LA-UR-03-5923
August 2003

Los Alamos National Laboratory
General Part B Permit Renewal Application

Revision 2.0

Prepared by:

Los Alamos National Laboratory
Risk Reduction and Environmental Stewardship Division
Solid Waste Regulatory Compliance Group (RRES-SWRC)
Los Alamos, New Mexico 87545

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
HRMB	Hazardous and Radioactive Materials Bureau
IWP	Installation Work Plan
LANL	Los Alamos National Laboratory
MOU	memorandum of understanding
NMED	New Mexico Environment Department
PRS	potential release site
TA	technical area
T&E	threatened and endangered
USC	*United States Code*
USFWS	U.S. Fish and Wildlife Service

1.0 INTRODUCTION

This “Los Alamos National Laboratory General Part B Permit Renewal Application” is submitted to address the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), revised June 14, 2000 [6-14-00], requirements that apply to hazardous and mixed waste treatment and storage facility operations at Los Alamos National Laboratory (LANL). This document serves as Revision 2.0 to previous applications submitted to the New Mexico Environment Department (NMED) in August 1996 (Revision 0.0; LANL, 1996) and January 1999 (Revision 1.0; LANL, 1998a). It includes revisions presented in Responses to Supplemental Information submitted to the NMED in June 2000 (LANL, 2000a) and November 2001 (LANL, 2001), and in a Response to a Notice of Deficiency submitted to the NMED in August 2002 (LANL, 2002a). Revision 1.0 and this revision of the application were prepared to be consistent with the permitting strategy outlined by the NMED Hazardous and Radioactive Materials Bureau (HRMB) in correspondence dated February 5, 1998.

This permit renewal application also contains data, references to groups or organizations and contractors, references to documents, and other material provided to NMED for informational purposes only. Groups, organizations, and contractors, if changed, will be replaced and/or supplemented with functionally equivalent services required to assume the same duties and responsibilities described in this application. The above information is not intended to be incorporated into the renewed permit as an enforceable permit requirement, and its submittal should not be construed by NMED as the basis for the facility to consent to the imposition of permit conditions and/or requirements that are unnecessarily restrictive, go beyond the regulatory requirements of the Resource Conservation and Recovery Act, and/or reduce the ability of the facility to implement improved waste management practices.

As presented in the 1998 correspondence, certain portions of the LANL General Part B will serve in the operating permit as "umbrella" documents, covering the requirements of the New Mexico Hazardous Waste Act and implementing regulations, specifically, 20.4.1 NMAC [6-14-00], common to all treatment and storage units. Other applicable 20.4.1 NMAC Part B requirements would be addressed in technical area (TA)-specific permit applications, permit modification requests, or permit renewal applications. Together, information provided in this application and in the TA-specific documents will meet the applicable Part B requirements specified in 20.4.1 NMAC, Subparts V and IX [6-14-00].

In accordance with HRMB's 1998 permitting strategy, LANL submitted the “Los Alamos National Laboratory General Part A Permit Application” (Revision 0.0) in April 1998 (LANL, 1998b). That Part A consolidated information from previous site-wide and TA-specific Part A submittals into one comprehensive document, identifying all hazardous and mixed waste treatment, storage, and disposal facilities at LANL subject to 20.4.1 NMAC, Subparts V, VI, and IX [6-14-00], at that time. The Part A was subsequently revised and submitted to the NMED in November 1999 (Revision 1.0; LANL, 1999), July 2000 (Revision 2.0; LANL, 2000b), and August 2002 (Revision 3.0; LANL, 2002b). The most recent version of that document, hereinafter referred to as the LANL General Part A, serves as a companion document to the LANL General Part B and TA-specific permit applications, permit modification requests, and permit renewal applications.

In the LANL General Part A, the LANL General Part B, and TA-specific permit applications, a unit to be permitted may sometimes be referred to as a "facility" (e.g., the Radioassay and Nondestructive Testing Facility). The term "facility," as it appears in this context, is used only to denote building names and does not imply the regulatory meaning of "facility" as defined in 20.4.1 NMAC § 260.10 [6-14-00]. However, pursuant to 20.4.1 NMAC § 260.10 [6-14-00], the LANL facility as a whole does meet the regulatory definition of a facility.

Table 1-1 provides a list of regulatory references and the corresponding section location in this document, as appropriate. Where applicable, regulatory citations in this document reference 20.4.1 NMAC, which adopts, with a few exceptions, all of the Code of Federal Regulations, Title 40, Parts 260 to 266, Part 268, and Part 270.

Table 1-1

Regulatory References and Corresponding Permit Renewal Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Document
§270.14(b)(1)	General facility description	Appendix A
§270.14(b)(2)	Chemical and physical analyses	Appendix B
§270.14(b)(3)	Waste analysis plan	Appendix B
§264.13(b)	Development and implementation of waste analysis plan	Appendix B
§264.13(c)	Off-site waste analysis requirements	Appendix B
§270.14(b)(4)	Security procedures and equipment	2.0[b]
§270.14(b)(5)	General inspection requirements	Appendix C
§264.174	Container inspections	Appendix C
§264.193(i)	Tank inspections	Appendix C
§264.195	Overfill control inspections	Appendix C
§264.226	Surface impoundments monitoring and inspection	NA
§264.254	Waste pile monitoring and inspection	NA
§264.273	Land treatment design and operating requirements	NA
§264.303	Landfill monitoring and inspection	NA
§264.347	Incinerator monitoring and inspection	NA
§264.602	Miscellaneous units	Appendix C
§264.1033	Process vent standards	Appendix C
§264.1052	Equipment leak air emission standards	Appendix C
§264.1053	Compressor standards	Appendix C
§264.1058	Standards for pumps, valves, pressure relief devices, flanges and connections	Appendix C
§264.1088	Subpart CC inspection and monitoring requirements	Appendix C
§270.14(b)(6)	Request for waiver from preparedness and prevention requirements of 264 Subpart C	NA
§270.14(b)(7)	Contingency plan requirements under 264 Subpart D	Appendix E
§264.227	Surface impoundment emergency repairs; contingency plans	NA
§270.14(b)(8)	Preparedness and prevention	2.0[b]
§270.14(b)(8)(i)	Prevention of hazards in unloading operations (ramps and special forklifts)	NA[b]
§270.14(b)(8)(ii)	Runoff prevention with berms, trenches, and dikes	NA[b]
§270.14(b)(8)(iii)	Prevention of contamination of water supplies	NA[b]
§270.14(b)(8)(iv)	Mitigation effects of equipment failure and power outages	NA[b]

Refer to footnotes at end of table.

Table 1-1 (Continued)

Regulatory References and Corresponding Permit Renewal Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Document
§270.14(b)(8)(v)	Prevention of undue exposure of personnel by use of personal protective equipment	NA[b]
§270.14(b)(8)(vi)	Prevention of release to the atmosphere	NA[b]
§270.14(b)(9)	Prevention of accidental ignition or reaction	2.0[b]
§264.17(c)	Documentation of compliance with 264.17 (general requirements for ignitable, reactive, or incompatible wastes)	NA[b]
§270.14(b)(10)	Traffic pattern, volume, and controls	Appendix A
	Identification of turn lanes	Appendix A
	Identification of traffic/stacking lanes	Appendix A
	Description of road surface	Appendix A
	Description of road load bearing capacity	Appendix A
	Identification of type and number of traffic controls	Appendix A
§270.14(b)(11)	Facility/unit location information	Appendix A
§270.14(b)(11)(i)	Seismic standard applicability [264.18(a)]	NA[b]
§270.14(b)(11)(ii)	Seismic standard requirements	NA[b]
§270.14(b)(11)(ii)(A)	No fault within 3,000 feet (ft) with displacement in Holocene time	NA[b]
§270.14(b)(11)(ii)(A)(1)	Published geological studies	NA[b]
§270.14(b)(11)(ii)(A)(2)	Aerial reconnaissance of a five-mile radius from the facility	NA[b]
§270.14(b)(11)(ii)(A)(3)	Analysis of aerial photographs covering 3,000-ft radius from the facility/unit	NA[b]
§270.14(b)(11)(ii)(A)(4)	Reconnaissance based on walking portions of the area within 3,000 ft of the facility	NA[b]
§270.14(b)(11)(ii)(B)	If faults which have displacement in Holocene time are present within 3,000 ft, no faults pass within 200 ft of portions of the facility where treatment, storage, or disposal will be conducted	NA[b]
§270.14(b)(11)(iii)	100-year floodplain standard	Appendix A[b]
§270.14(b)(11)(iv)	If facility is within 100-year floodplain	Appendix A[b]
§270.14(b)(11)(iv)(A)	Engineering analyses of hydrostatic forces expected in a 100-year flood	NA[b]
§270.14(b)(11)(iv)(B)	Structural engineering studies for flood protection to prevent washout	NA[b]
§270.14(b)(11)(iv)(C)	Detailed description of procedures to remove hazardous waste to safety before flood reaches the waste	NA[b]
§270.14(b)(11)(iv)(C)(1)	Timing of removal	NA[b]

Refer to footnotes at end of table.

Table 1-1 (Continued)

Regulatory References and Corresponding Permit Renewal Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Document
§270.14(b)(11)(iv)(C)(2)	Location to be moved to	NA[b]
§270.14(b)(11)(iv)(C)(3)	Dedicated equipment and personnel to ensure removal	NA[b]
§270.14(b)(11)(iv)(C)(4)	Potential for accidental discharge during movement	NA[b]
§270.14(b)(11)(v)	Plan to show how the facility will be brought into compliance with 264.18(b)	NA[b]
§270.14(b)(12)	Personnel training program	Appendix D
§270.14(b)(13)	Closure and post-closure plans	Appendices F & G
§264.112	Amendment of closure plan	Appendix F
§264.118	Post-closure plan; amendment of plan	Appendices F[b] & G[b]
§264.178	Closure/containers	Appendix F[b]
§264.197	Closure/tanks	Appendix F[b]
§264.228	Closure/post-closure/surface impoundments	NA
§264.258	Closure/post-closure/waste piles	NA
§264.280	Closure/post-closure/land treatment	NA
§264.310	Closure/post-closure/landfills	Appendices F[b] & G[b]
§264.351	Closure/incinerators	NA
§264.601	Miscellaneous units	Appendix F[b]
§264.603	Post-closure care	Appendix G[b]
§270.14(b)(14)	Post-closure notices (264.119)	Appendices F & G
§270.14(b)(15)	Closure cost estimate (264.142)	Appendix F
	Financial assurance (264.143)	Appendix F
§270.14(b)(16)	Post-closure cost estimate (264.144)	Appendix G
	Post-closure care financial assurance (264.145)	Appendix G
§270.14(b)(17)	Liability insurance (264.147)	Appendices F & G
§270.14(b)(18)	Proof of financial coverage (264.149-150)	Appendices F & G
§270.14(b)(19)	Topographic map requirements	Appendix A[c]
§270.14(b)(19)(i)	Map scale and date	Appendix A[c]
§270.14(b)(19)(ii)	100-year floodplain	Appendix A
§270.14(b)(19)(iii)	Surface waters	Appendix A[c]
§270.14(b)(19)(iv)	Land use	Appendix A

Refer to footnotes at end of table.

Table 1-1 (Continued)

Regulatory References and Corresponding Permit Renewal Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Document
§270.14(b)(19)(v)	Wind rose	Appendix A
§270.14(b)(19)(vi)	Map orientation	Appendix A[c]
§270.14(b)(19)(vii)	Legal boundaries	Appendix A[c]
§270.14(b)(19)(viii)	Access controls	NA[b]
§270.14(b)(19)(ix)	Wells	Appendix A[c]
§270.14(b)(19)(x)	Buildings	Appendix A[c]
	Treatment, storage, and disposal (TSD) operations	Appendix A[c]
	Run-on/run-off control systems	NA[b]
	Storm sewer systems	Appendix A
	Sanitary sewer systems	Appendix A
	Process sewer systems	Appendix A
	Loading/unloading areas	NA[b]
	Fire control facilities	Appendix E
§270.14(b)(19)(xi)	Drainage barriers	NA[b]
§270.14(b)(19)(xii)	Location of operational units	Appendix A[c]
§270.14(b)(20)	Other federal laws	3.0
	Wild and Scenic Rivers Act	3.0
	National Historic Preservation Act	3.0
	Endangered Species Act	3.0
	Costal Zone Management	3.0
	Fish and Wildlife Coordination Act	3.0
	Executive Orders	3.0
§270.14(b)(21)	Notice of extension approval for land disposal facilities	NA
§270.14(c)	Groundwater monitoring requirements	Appendix A
§270.14(c)(1)	Groundwater monitoring under 265.90 through 265.94	NA
§270.14(c)(2)	Identification of uppermost aquifer, groundwater flow rate and direction	Appendix A
§270.14(c)(3)	A topographic map required under 270.14(b)(19) that identifies proposed point of compliance	Appendix A
	Proposed location of groundwater monitoring wells under 264.97.	Appendix A
§270.14(c)(4)	Description of plume of contamination that has entered groundwater	NA
§270.14(c)(4)(i)	Extent of plume indicated on topographic map	NA

Refer to footnotes at end of table.

Table 1-1 (Continued)

Regulatory References and Corresponding Permit Renewal Application Location

Regulatory Citation(s)	Description of Requirement	Location in this Document
§270.14(c)(4)(ii)	Identification of constituents and concentration for Appendix IX of 264	NA
§270.14(c)(5)	Detailed plan and an engineering report describing proposed groundwater monitoring program under 264.97	NA
§270.14(c)(6)	No releases detected in groundwater (264.98)	Appendix A
§270.14(c)(6)(i)	List of proposed indicator parameters	NA
§270.14(c)(6)(ii)	Proposed groundwater monitoring system	NA
§270.14(c)(6)(iii)	Background values for each proposed monitoring parameter	NA
§270.14(c)(6)(iv)	Description of proposed sampling, analyses and statistical comparisons to be used	NA
§270.14(c)(7)	Release detected at point of compliance requires corrective action under 264.100	NA
§270.14(d)	Information requirements for solid waste management units (SWMU)	4.0[b]
§270.14(d)(1)(i)	Location of SWMUs on topographic map	NA[b]
§270.14(d)(1)(ii)	Types of SWMUs	NA[b]
§270.14(d)(1)(iii)	Dimensions and descriptions of SWMUs	NA[b]
§270.14(d)(1)(iv)	Dates of operation	NA[b]
§270.14(d)(1)(v)	Waste types managed at SWMU	NA[b]
§270.14(d)(2)	Information on releases from SWMUs	NA[b]
§270.15	Containers	NA[b]
§270.16	Tank systems	NA[b]
§270.16(a)	Written assessment and certification	NA[b]
§270.16(b)	Capacity/dimensions	NA[b]
§270.16(c)	Systems and controls	NA[b]
§270.16(d)	Piping and process flow	NA[b]
§270.16(e)	External corrosion protection	NA[b]
§270.16(f)	Installation	NA[b]
§270.16(g)	Secondary containment system	NA[b]
§270.16(h)	Request for variance from secondary containment	NA[b]
§270.16(i)	Spill prevention	NA[b]
§270.16(j)	Ignitable, reactive, or incompatible wastes	2.0[b]

[a] NA = not applicable
[b] Special requirements or information is addressed in technical area-specific permit applications, permit modification requests, or permit renewal applications, as appropriate.
[c] Some of the topographic map requirements are addressed in the most recent version of the "Los Alamos National Laboratory General Part A Permit Application."

Refer to footnotes at end of table.

2.0 FACILITY OPERATIONS AND UNIT DESIGNS

This section presents an overview of the general facility operations for hazardous and mixed waste management units at Los Alamos National Laboratory (LANL). Facility operations and unit designs for individual waste management units at LANL are presented in technical area (TA)-specific permit applications, permit modification requests, or permit renewal applications. Together, this information addresses the applicable Part B information requirements of the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subpart IX, Part 270, and 20.4.1 NMAC, Subpart V, Part 264, revised June 14, 2000 [6-14-00].

In accordance with 20.4.1 NMAC § 264.31, the waste management units at LANL are designed, constructed, maintained, and operated to minimize the possibility of fire, explosion, or unplanned releases of hazardous waste or hazardous waste constituents to any environmental medium that could potentially harm human health or the environment. Detailed information on the procedures to prevent hazards at the specific units is provided in TA-specific permit applications, permit modification requests, or permit renewal applications for the following subject areas:

- Security procedures and equipment [20.4.1 NMAC § 270.14(b)(4) and 20.4.1 NMAC § 264.14];
- Access control [20.4.1 NMAC § 270.14(b)(19)(viii)];
- Preparedness and prevention requirements [20.4.1 NMAC § 270.14(b)(8) and 20.4.1 NMAC, Subpart V, Part 264, Subpart C];
- Procedures, structures, and equipment for preventing hazards [20.4.1 NMAC § 270.14(b)(8)];
- General waste management practices for ignitable, reactive, and incompatible waste [20.4.1 NMAC § 270.14(b)(9) and 20.4.1 NMAC § 264.17].

The general information provided below is applicable to hazardous and mixed waste management units at LANL that are included in TA-specific permit applications, permit modification requests, or permit renewal applications.

2.1 GENERAL FACILITY OPERATIONS

The following is an overview of the general facility operations applicable to hazardous and/or mixed waste management units addressed in TA-specific permit applications, permit modification requests, or permit renewal applications. This overview includes a discussion of security and access control; preparedness and prevention; and precautions taken when managing incompatible, ignitable, or reactive wastes. This information is submitted to partially fulfill the requirements of 20.4.1 NMAC, Subpart V, Part 264. The facility standards in Subparts I through X of 20.4.1 NMAC, Subpart V, Part 264, will be addressed as applicable to waste management units included in TA-specific permit applications, permit modification requests, and permit renewal applications.

2.1.1 Security Procedures and Equipment/Access Control [20.4.1 NMAC §§ 270.14(b)(4) and (b)(19)(viii); 20.4.1 NMAC § 264.14]

Information on security procedures and equipment and on access control is provided in TA-specific permit applications, permit modification requests, or permit renewal applications.

2.1.2 Preparedness and Prevention Requirements

Detailed information on how operations at LANL's waste management units comply with the preparedness and prevention requirements of 20.4.1 NMAC § 270.14(b)(8), and 20.4.1 NMAC, Subpart V, Part 264, Subpart C [6-14-00], is provided in TA-specific permit applications, permit modification requests, or permit renewal applications. Communication and alarm equipment available at LANL is presented in Appendix E of this document. A summary list of the emergency equipment available for use at each waste management unit is addressed in Attachment E of TA-specific permit applications, permit modification requests, or permit renewal applications.

2.1.2.1 Required Equipment [20.4.1 NMAC § 264.32]

Information on required equipment for each waste management unit is provided in TA-specific permit applications, permit modification requests, or permit renewal applications. The required equipment includes internal communications or alarm systems; devices to summon emergency assistance; fire control, spill control, and decontamination equipment; and adequate water volume and pressure for fire suppression equipment.

2.1.2.2 Testing and Maintenance of Equipment [20.4.1 NMAC § 264.33]

Communications and alarm systems and fire protection, spill control, and decontamination equipment are inspected and/or tested according to the inspection schedule detailed in Appendix C of this document and/or Attachment C of TA-specific permit applications, permit modification requests, or permit renewal applications. The frequency of inspection is adequate to assure proper operation in the event of an emergency. Maintenance, repair, and replacement of emergency equipment are performed as needed.

2.1.2.3 Access to Communications or Alarm System [20.4.1 NMAC § 264.34]

Whenever waste is being handled at any of the waste management units, all personnel involved have immediate access to an internal alarm or emergency communication device, either directly or through visual or voice contact with another individual. In the event of an emergency, this communication equipment allows personnel to contact the operating group management, the Emergency Management and Response Office, and/or the Central Alarm Station operator (refer to Appendix E). In addition to the communications and alarm systems described in TA-specific permit applications, permit modification requests, or permit renewal applications, on-site personnel may carry pagers, two-way radios, and/or cellular telephones so that they can contact or be contacted by on-site and LANL emergency support personnel at all times.

2.1.2.4 Support Agreements with Outside Agencies [20.4.1 NMAC § 264.37(a)]

The U.S. Department of Energy maintains support agreements in the form of contracts and memoranda of understanding (MOU) with various outside response agencies (e.g., Los Alamos County Fire Department, Los Alamos County Police Department, and Los Alamos Medical Center) for emergency response assistance at LANL. In addition, LANL maintains contracts with additional response groups for security and scene access (i.e., Protection Technology Los Alamos) and maintenance support (i.e., KBR-Shaw-LATA) during emergency response. The contracts/MOUs generally provide for the training of fire department and emergency response personnel so that they are familiar with the layout of the facility, the properties of hazardous waste handled at the facility, associated hazards, and possible evacuation routes; summarize the agreement for local police assistance; and allow for the training of medical personnel regarding the care and treatment of patients contaminated with radioactive materials. Support agreements are discussed briefly in the Contingency Plan (Appendix E of this document). Responsibilities of internal and external emergency response groups and agencies are discussed in Appendix E.

2.1.3 Hazards Prevention [20.4.1 NMAC § 270.14(b)(8)]

Information on general procedures, equipment, and structures used to prevent hazards at or in the vicinity of the waste management units is provided in TA-specific permit applications, permit modification requests, or permit renewal applications.

2.1.4 Prevention of Accidental Ignition or Reaction of Ignitable, Reactive, or Incompatible Waste [20.4.1 NMAC §§ 270.14(b)(9), 270.15(c) and (d), 270.16(j); 20.4.1 NMAC §§ 264.17, 264.176, 264.177, 264.198, and 264.199]

This section provides a description of the precautions used to prevent accidental ignition or reaction of ignitable, reactive, or incompatible wastes at LANL.

Ignitable or reactive wastes are or will be protected from sources of ignition or reaction. Policies and features are in place that minimize the possibility of accidental ignition. Ignitable or reactive waste is separated and protected from welding activities, hot surfaces, frictional heat, and sources of sparks. Smoking is not allowed within any waste management area. "No Smoking" signs are conspicuously placed wherever there is a potential hazard from ignitable or reactive waste, as required by 20.4.1 NMAC § 264.17(a). Together, these measures meet the requirements of 20.4.1 NMAC §§ 264.17(a) and (b).

Waste management unit-specific information on prevention of accidental ignition or reaction of ignitable, reactive, or incompatible waste is provided in TA-specific permit applications, permit modification requests, and permit renewal applications.

2.1.5 Off-Site Wastes

Wastes from off-site sources may be accepted on a limited basis at LANL. "Off-site source" refers to wastes other than those generated by LANL or its contractor(s) operating on the permitted facility. Off-site wastes that may be accepted for storage or treatment include wastes generated by LANL or its contractor(s) at TA-57 (the Fenton Hill site) and wastes generated by LANL or its contractor(s) through investigation or remediation of potential release sites (PRS) located off the permitted facility. As required by Module VIII, LANL prepares an Installation Work Plan (IWP) that includes a listing of all PRSs. Investigation and remediation wastes generated at PRSs listed in the IWP and located in TA-0, TA-1, TA-10, TA-31, TA-32, TA-45, and TA-73 would constitute off-site wastes. All investigation and remediation activities generating off-site wastes must be conducted in accordance with approved investigation or remediation plans, with the exception of Voluntary Corrective Actions, which may be implemented without prior approval. LANL will notify the New

Mexico Environment Department (NMED) prior to conducting investigation or remediation activities in accordance with the notification requirements contained in Module VIII. All wastes generated during investigation and remediation at off-site PRSs and accepted for storage or treatment must be properly manifested.

Wastes or contaminated residuals of wastes associated with off-site treatment of those waste streams originally generated by LANL and subsequently managed or treated by off-site facilities may be accepted for storage or treatment if all such waste is properly characterized and manifested (Table 2-1). Wastes may also be received from the off-site facilities listed in Table 2-2 for characterization, storage, treatment, and transport to other off-site facilities, if all such waste is properly characterized and manifested. If it is determined that LANL will receive hazardous or mixed waste from an off-site source other than those listed in Tables 2-1 and 2-2, a permit modification will be requested in accordance with 20.4.1 NMAC § 270.42.

2.2 AIR EMISSION STANDARDS FOR PROCESS VENTS [20.4.1 NMAC, Subpart V, Part 264, Subpart AA]

Air emissions standards for process vents are addressed, as appropriate, in TA-specific permit applications, permit modification requests, or permit renewal applications, pursuant to 20.4.1 NMAC, Subpart V, Part 264, Subpart AA.

2.3 AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS [20.4.1 NMAC, Subpart V, Part 264, Subpart BB]

Air emissions standards for equipment leaks are addressed, as appropriate, in TA-specific permit applications, permit modification requests, or permit renewal applications, pursuant to 20.4.1 NMAC, Subpart V, Part 264, Subpart BB.

2.4 AIR EMISSION STANDARDS FOR TANKS, SURFACE IMPOUNDMENTS, AND CONTAINERS [20.4.1 NMAC, Subpart V, Part 264, Subpart CC]

Air emissions standards for tanks, surface impoundments, and containers are addressed, as appropriate, in TA-specific permit applications, permit modification requests, or permit renewal applications, pursuant to 20.4.1 NMAC, Subpart V, Part 264, Subpart CC.

2.5 CONTAINMENT BUILDINGS [20.4.1 NMAC, Subpart V, Part 264, Subpart DD]

Containment buildings are addressed, as appropriate, in TA-specific permit applications, permit modification requests, or permit renewal applications, pursuant to 20.4.1 NMAC, Subpart V, Part 264, Subpart DD.

2.6 RECORDKEEPING REQUIREMENTS

Recordkeeping requirements applicable to LANL hazardous and/or mixed waste management units consist of the biennial report, unmanifested waste report, and additional reports. These reports are discussed in the following sections.

2.6.1 Biennial Report [20.4.1 NMAC § 264.75]

LANL will prepare and submit a biennial report to the NMED by March 1 of each even-numbered year. The biennial report will be submitted to the NMED on U. S. Environmental Protection Agency (EPA) Form 8700-13B. The report will cover facility activities during the previous calendar year and will include:

- The EPA identification number, name, and address of the facility;
- The calendar years covered by the report;
- A description and the quantity of each hazardous waste the facility received during the year;
- The method of treatment, storage, or disposal for each hazardous waste;
- For generators who treat, store, or dispose of hazardous waste on site, a description of the efforts undertaken during the year to reduce the volume and toxicity of waste generated;
- For generators who treat, store, or dispose of hazardous waste on site, a description of the changes in volume and toxicity of waste actually achieved during the year in comparison to previous years to the extent such information is available for the years prior to 1984; and
- The certification signed by LANL and U.S. Department of Energy, National Nuclear Security Administration representatives.

2.6.2 Unmanifested Waste Report [20.4.1 NMAC § 264.76]

Waste from off-site sources may be accepted on a limited basis at LANL provided that such waste is properly characterized and manifested and meets the requirements listed in Section 2.1.5.

If LANL accepts any wastes for treatment or storage from an off-site facility without an accompanying manifest, or without an accompanying shipping paper as described in 20.4.1 NMAC § 264.76, LANL will prepare and submit an Unmanifested Waste Report (EPA Form 870013B) to the NMED within fifteen days after receiving the waste. The report will include the following:

- The EPA identification number, name, and address of the facility;
- The date the facility received the waste;
- A description and the quantity of each unmanifested hazardous waste a facility received;
- The method of treatment, storage, or disposal for each hazardous waste;
- The certification signed by LANL or an authorized representative; and
- A brief explanation of why the waste was unmanifested, if known.

2.6.3 Additional Reports [20.4.1 NMAC § 264.77]

In accordance with the requirements of 20.4.1 NMAC § 264.77, LANL will also report the following to the NMED:

- Releases and unanticipated fires and explosions that require implementation of the contingency plan, as specified in 20.4.1 NMAC § 264.56(j);
- Facility closures, as specified in 20.4.1 NMAC § 264.115; and
- As otherwise required by 20.4.1 NMAC, Subpart V, Part 264, Subparts F, BB, and CC.

2.7 LAND DISPOSAL RESTRICTIONS

Currently, no exemption from or extension to Land Disposal Restrictions has been requested by LANL. In the future, if LANL requires such an extension, it will be requested under 20.4.1 NMAC § 268.5 [6-14-00], as necessary. Similarly, a petition to allow land disposal of a waste prohibited under 20.4.1 NMAC, Subpart VIII, Part 268, Subpart C [6-14-00], would be requested under 20.4.1 NMAC § 268.6 [6-14-00], if needed.

Table 2-1

List of Off-Site Waste Management Facilities That May Return Treatment-Derived Waste or Waste Residuals to the Los Alamos National Laboratory

Off-Site Facility	EPA Identification Number
Argonne National Laboratory, Argonne, IL	IL38900089
Catholic University, Washington, D.C.	DCD980204879
Consolidated Incineration Facility, Savannah River Site, S.C.	SC1890008989
Diversified Scientific Services, Inc., Kingston, TN	TND982109142
Envirocare, Clive, UT	UTI982598898
Waste Experimental Reduction Facility, Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID	ID4890008952
M4 Environmental Management, Inc., Oak Ridge, TN	RD&D Permit
Nuclear Fuel Services, Erwin, TN	TND003095635
Nuclear Sources & Services, Inc., Houston, TX	TXD982560294
Toxic Substances Control Act Incinerator, Oak Ridge National Laboratory, Oak Ridge, TN	TN0890090004
International Technology Corporation, Technology Center, Knoxville, TN	TND000770479
International Technology Corporation, Biotech Applications Center, Knoxville, TN	TND987782521
International Technology Corporation, Environmental Technology Development Center, Oak Ridge, TN	TND981933120
Perma-Fix, Albuquerque, NM	NM0000182121
Perma-Fix, Gainesville, FL	FLG980711071
EG&G Mound Applied Technologies, Miamisburg, OH	OH6890008984
Waste Control Specialists, Andrews, TX	TXD988088464
Colorado Minerals Research Institute, Golden, CO	COD17944308
Allied Technology Group, Richland, WA	WAR000010355
East Tennessee Waste Treatment Center, Oak Ridge, TN	TNR000005397
Materials and Energy Corporation, Oak Ridge, TN	TNR000005397
Clean Harbors Environmental Service Corporation, Aragonite, UT	UTD381552177
Superior Special Services, Inc., Phoenix, AZ	AZ000033960
Clean Harbors Grassy Mountain, Grassy Mountain, UT	UTD991301748
Onyx Environmental Services, Henderson, CO	COD980591184

Table 2-2

List of Off-Site Waste Management Facilities That May Send Waste to Los Alamos National Laboratory

Off-Site Facility	EPA Identification Number
Sandia National Laboratories/New Mexico, Albuquerque, NM	NM5890110518

3.0 OTHER FEDERAL LAWS

The following federal laws are required under the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), §§ 270.3 and 270.14(b)(20), revised June 14, 2000 [6-14-00], to be given consideration when applying for a hazardous waste facility permit. When any of these laws is applicable, its procedures must be followed:

1. *The Wild and Scenic Rivers Act (16 United States Code [USC] 1273 et seq.)*. This act provides for a national wild and scenic rivers system and prohibits construction of any waterway that would have a direct adverse effect on the values for which a wild and scenic river was established.

2. *The National Historic Preservation Act of 1966 (16 USC 470 et seq.)*. This act establishes a program for the preservation of historic properties throughout the country. The act has provisions that require mitigation of adverse effects to registered properties.

3. *The Endangered Species Act of 1973 (16 USC 1531)*. This act provides for the conservation of endangered and threatened species of fish, wildlife, and plants. The act prohibits any action that would jeopardize the continued existence of any endangered or threatened species or adversely affect its critical habitat.

4. *The Coastal Zone Management Act of 1972 (16 USC 1451 et seq.)*. This act establishes national policy for the management, use, protection, and development of land and water resources of the nation's coastal zones. Section 307(c) of the act and implementing regulations prohibit the U.S. Environmental Protection Agency from issuing a permit for activity affecting coastal zone land or water without the certification from the applicant that the activity is in compliance with the state Coastal Zone Management Program.

5. *The Fish and Wildlife Coordination Act of 1934, as amended (16 USC 661 et seq.)*. This act promotes the conservation of wildlife, fish, and game and integrates this conservation with water resource projects. Certain provisions of the act require that permits proposing or authorizing the impoundment, diversion, or other control or modification of any body of water be considered by the appropriate state agency for impacts to wildlife resources.

Because Los Alamos National Laboratory (LANL) has ongoing programs in support of the National Historic Preservation Act, the Endangered Species Act, and the Fish and Wildlife Coordination Act, consideration was given to these federal laws.

The National Historic Preservation Act is administered by the Advisory Council on Historic Preservation, appointed by the President, and the New Mexico State Historic Preservation Office. Section 106 of the Act requires the U.S. Department of Energy (DOE) to consider the effects of its actions on historic properties, and provide the Council with a reasonable opportunity to comment on those actions and the manner in which DOE takes historic properties into account in their decisions.

DOE accomplishes this through consultation with the State Historic Preservation Office whenever a project may potentially impact a historic property. LANL may prepare a Historic Building Survey Report assessing the eligibility of a historic building dating from the Manhattan Project and early Cold War periods (1943 to 1956) for the National Register of Historic Places and evaluating the impacts of the proposed actions. The consultation process was formalized in April 2000 through a Programmatic Agreement between DOE, the Council, and the State.

For any undertaking on DOE land that may directly or indirectly impact threatened and endangered (T&E) species or their habitat, DOE must consult with the U.S. Fish and Wildlife Service (USFWS), as provided under Section 7 of the Endangered Species Act. Similarly, DOE must consult with the USFWS for projects that would impound, divert, or otherwise control or modify a body of water, as required by the Fish and Wildlife Coordination Act. For Endangered Species Act compliance, LANL may prepare a Biological Assessment to document the presence of T&E species and to evaluate the impacts of a project on a listed species or its habitat. DOE will then request in writing that the USFWS concurs with DOE's findings in the Biological Assessment. In recent years, DOE and LANL have streamlined the consultation process by preparing a T&E Species Habitat Management Plan. This plan fulfills the provisions of the Endangered Species Act that require federal agencies to carry out programs for the conservation of T&E species and their habitat. The USFWS approved this plan in February 1999.

Provisions in the Wild and Scenic Rivers Act and the Coastal Zone Management Act are not applicable to LANL's activities.

Consideration will be given to Executive Orders, issued by the President, that are relevant to waste management activities at LANL. When any of these Orders is applicable, its provisions will be followed. Requirements for Executive Orders are reserved in 20.4.1 NMAC § 270.3(f) [6-14-00].

4.0 CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS

In accordance with the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, § 270.14(d), revised June 14, 2000, information on solid waste management units in the vicinity of the hazardous and mixed waste management units at Los Alamos National Laboratory is presented in Section 4.0 of technical area-specific permit applications, permit modification requests, or permit renewal applications.

5.0 CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

James L. Holt
Associate Director, Operations
Los Alamos National Laboratory
University of California
Operator

8/22/03
Date Signed

for Ralph E. Erickson
Manager, Los Alamos Site Office
National Nuclear Security Administration
U.S. Department of Energy
Owner/Operator

8/22/03
Date Signed

6.0 REFERENCES

LANL, 2002a, “Response to Notice of Deficiency: General Part A, April 1998, Revision 0.0; General Part B, October 1998, Revision 1.0; RCRA Permit Applications; Los Alamos National Laboratory, EPA ID # NM0890010515,” LA-UR-02-5013, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 2002b, “Los Alamos National Laboratory General Part A Permit Application,” Revision 3.0, LA-UR-02-5273, August 2002, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 2001, “Response to Request for Supplemental Information: Technical Adequacy Review, RCRA Permit Application; General Part A, April 1998, Revision 0.0; General Part B, October 1998, Revision 1.0; Los Alamos National Laboratory, EPA ID No. NM0890010515,” LA-UR-01-6054, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 2000a, “Response to Request for Supplemental Information for the October 1998 General Part B Permit Application, Revision 1.0, Los Alamos National Laboratory (LANL), EPA I.D. NM0890010515,” Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 2000b, “Los Alamos National Laboratory General Part A Permit Application,” Revision 2.0, July 2000, LA-UR-00-4148, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 1999, “Los Alamos National Laboratory General Part A Permit Application,” Revision 1.0, November 1999, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 1998a, “Los Alamos National Laboratory General Part B Permit Application,” Revision 1.0, October 1998, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 1998b, "Los Alamos National Laboratory General Part A Permit Application," Revision 0.0, April 1998, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 1996, "General Part B Permit Application Information for Los Alamos National Laboratory," Revision 0.0, Los Alamos National Laboratory, Los Alamos, New Mexico.

APPENDIX A

FACILITY DESCRIPTION

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
µg/L	microgram(s) per liter
AASHTO	American Association of State Highway and Transportation Officials
amsl	above mean sea level
cm/yr	centimeters per year
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ER	environmental restoration
ft	feet/foot
GPP	Groundwater Protection Program
HE	high explosives
IC	ion chromatography
LANL	Los Alamos National Laboratory
LC/MS/MS	liquid chromatography/mass spectrometry/mass spectrometry
mg/L	milligrams per liter
m/s	meters per second
m/yr	meter(s) per year
NMED	New Mexico Environment Department
pCi/L	picocuries per liter
ppb	parts per billion
R&D	research and development
RLWTF	Radioactive Liquid Waste Treatment Facility
RRES	Risk Reduction and Environmental Stewardship Division
TA	technical area

APPENDIX A
FACILITY DESCRIPTION

The information provided in this appendix is submitted in accordance with the applicable requirements of the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), revised June 14, 2000 [6-14-00]. The following subject areas are addressed in this appendix or are referenced to technical area (TA)-specific permit applications, permit modification requests, or permit renewal applications:

- A general description of the Los Alamos National Laboratory (LANL) facility [20.4.1 NMAC § 270.14(b)(1)];
- Traffic patterns, volume, and control [20.4.1 NMAC § 270.14(b)(10)];
- Facility location information for compliance with the seismic standard and floodplain requirements [20.4.1 NMAC §§ 270.14(b)(11) and 270.14(b)(19)(ii), and 20.4.1 NMAC § 264.18(a) and (b)];
- Topographic map requirements [20.4.1 NMAC § 270.14(b)(19)];
- Groundwater [20.4.1 NMAC § 270.14(c) and 20.4.1 NMAC § 264.90(a)].

A.1 GENERAL DESCRIPTION [20.4.1 NMAC § 270.14(b)(1)]

LANL is located in Los Alamos County, an incorporated county, in north-central New Mexico, approximately 60 miles north-northeast of Albuquerque and 25 miles northwest of Santa Fe. The regional location of LANL is shown on Figure A-1. LANL is divided into TAs, as shown on Figure A-2. LANL, which occupies an area of 40 square miles, and the associated residential and commercial areas of Los Alamos County, which occupy an area of approximately 109 square miles, are situated on the Pajarito Plateau. The plateau consists of a series of finger-like mesas separated by deep east-west trending canyons. Ephemeral, interrupted, or intermittent streams lie at the bottoms of all the canyons. The mesa tops range in elevation from approximately 7,800 feet (ft) above mean sea level (amsl) at the flank of the Jemez Mountains, located to the west of Los Alamos, to about 6,200 ft amsl at their eastern extent, where they terminate above the Rio Grande.

LANL's central mission is the reduction of global nuclear danger supported by research that also contributes to conventional defense, civilian, and industrial needs. This includes programs in nuclear, medium energy, and space physics; hydrodynamics; conventional explosives; chemistry; metallurgy; radiochemistry; space nuclear systems; controlled thermonuclear fusion; laser research;

environmental technology; geothermal, solar, and fossil energy research; nuclear safeguards; biomedicine; health and biotechnology; and industrial partnerships. LANL is owned by the U.S. Department of Energy (DOE) and is operated jointly by the DOE National Nuclear Security Administration and the University of California. The facility mailing address is P.O. Box 1663, Los Alamos, New Mexico, 87545.

LANL is an existing treatment and storage facility. This General Part B Permit Renewal Application and other TA-specific permit applications, permit modification requests, or permit renewal applications are submitted for treatment and storage units that are current or proposed "active" operating units. LANL does not seek an operating permit for any disposal units.

Hazardous waste is generated at LANL primarily from research and development (R&D) activities, general facility operations, environmental restoration (ER) activities, and decontamination and decommissioning (D&D) projects. Mixed low-level waste is generated mainly from R&D activities, processing and recovery operations, general facility operations, D&D projects, and ER activities. Mixed transuranic waste is generated primarily from R&D activities, processing and recovery operations, and D&D projects. High explosives (HE)-contaminated waste is generated mainly from R&D activities, ER activities, wastewater treatment processes, and building maintenance and modification activities. Brief descriptions of specific hazardous and mixed waste management units at LANL are presented in Attachment A of TA-specific permit applications, permit modification requests, or permit renewal applications. Waste generated from R&D activities, processing and recovery operations, and ER activities may be received from off-site facilities, as described in Supplement 1 of this General Part B Permit Renewal Application.

A.2 TRAFFIC PATTERNS [20.4.1 NMAC § 270.14(b)(10)]

The traffic pattern information presented below is general in nature. More detailed information is addressed in TA-specific permit applications, permit modification requests, or permit renewal applications.

A.2.1 General

The rugged topography of alternating mesas and canyons present at LANL limits traffic circulation to only a few major arterial roads. Approximately 85 miles of paved roads are present within LANL (Pan Am World Services Inc., 1986). The major roads are shown on Map 1 in the most recent version of the "Los Alamos National Laboratory General Part A Permit Application," hereinafter

referred to as the LANL General Part A. There are approximately 19 miles of highway, 22 miles of TA access roads, and 44 miles of roads in LANL's TAs.

The main access route to LANL is State Road 502; the majority of traffic to LANL approaches from the east on State Road 502 and East Jemez Road. Alternate access routes are available from the south and west on State Roads 4 and 501 (West Jemez Road).

The pattern of east-west trending canyons at LANL prohibits north-south automobile travel in nearly all portions of LANL, with the exception of Diamond Drive and part of West Jemez Road. Los Alamos Canyon is spanned at Diamond Drive by an 820-ft-long steel-arch bridge that was completed in 1951 and improved in 1993. This bridge provides the main access between LANL facilities located on either side of Los Alamos Canyon.

Approximately 10,000 people are currently employed at LANL (including full-time, part-time, and casual LANL personnel and subcontractors). Roughly 4,000 people commute to LANL daily from communities outside Los Alamos County.

A.2.2 Waste Collection Areas

Hazardous and mixed waste is generated at TAs throughout LANL. Small quantities of waste are generally accumulated in containers at less-than-90-day storage areas or satellite accumulation areas and then packed in containers, such as drums, boxes, or crates, for transport to storage or treatment areas, as necessary. Bulk liquid waste is contained primarily in drums or tanks. Because hazardous and mixed waste may be generated throughout LANL, waste transport may occur on nearly all roads within LANL. Off-site wastes may be received at LANL on a limited basis.

A.2.3 Routes of Travel

Information addressing unit-specific travel routes is presented in Attachment A of TA-specific permit applications, permit modification requests, or permit renewal applications.

A.2.4 Traffic Volumes

According to a traffic study conducted in early 2003, the peak traffic periods are between 6:00 and 8:00 a.m. and 4:00 and 6:00 p.m. Monday through Thursday, and between 6:00 and 8:00 a.m. and 3:00 and 5:00 p.m. Friday (Digital Traffic Systems, 2003). The 2003 traffic study was conducted at 10 locations throughout Los Alamos County. The data collection locations are shown on a figure in

Supplement 2 of this document. A data summary and the data from the cited study are also presented in Supplement 2. Based on the study, the daily average number of vehicles is greatest on Monday through Friday near the intersection of Diamond Drive and Trinity Drive (Site 2 in the study), with 25,820 vehicles. The smallest daily average number of vehicles on Monday through Friday is 1,539 near the intersection of West Jemez Road and State Road 4.

Additional traffic volume information is provided in Attachment A of TA-specific permit applications, permit modification requests, or permit renewal applications.

A.2.5 Traffic Control Signals

Site-wide traffic flow at LANL is controlled by traffic lights, stop signs, and yield signs. Traffic lights are in place at all major intersections. Traffic signs are used at "T" intersections throughout LANL. Access to high security TAs is controlled by security guards or special access gates. Only personnel having appropriate security clearance and identification or escorted visitors are allowed access to the high security TAs. Vehicles and personnel entering these TAs are subject to periodic search by security personnel.

Unit-specific information addressing traffic control signals is presented in Attachment A of TA-specific permit applications, permit modification requests, or permit renewal applications.

A.2.6 Road Load-Bearing Capacity

Roads at LANL carrying the greatest traffic volumes include Diamond Drive, Pajarito Road, and East and West Jemez Roads. These roads are typically constructed with an 8-inch-thick base overlain with a 5-inch-thick asphaltic-concrete surface, and were designed and built in conformance with American Association of State Highway and Transportation Officials (AASHTO) specification HS-20 (AASHTO, 1996). This specification is intended to accommodate truck loading capacities of 32,000 pounds per axle. Roads within TAs are generally two-lane roads with asphaltic-concrete surfaces. These roads are typically constructed with a 6-inch-thick base overlain with a 3-inch-thick asphaltic-concrete surface. These roads were also designed and constructed to meet AASHTO specification HS-20.

A.3 LOCATION INFORMATION

A.3.1 Seismic Standard [20.4.1 NMAC § 270.14(b)(11)]

LANL is an "existing" facility that met the requirements for interim status under Section 74-4-9 of the New Mexico Hazardous Waste Act and Section 3005(e) of the Resource Conservation and Recovery Act. The U.S. Environmental Protection Agency (EPA) specifically exempted "existing" facilities operating under interim status from the requirement under 20.4.1 NMAC § 270.14(b)(11) to submit a Part B permit application that demonstrates compliance with the seismic standards under 20.4.1 NMAC § 264.18(a) [see *46 FR 2802* and *46 FR 2813* (January 12, 1981)].

A.3.2 Floodplain Standard [20.4.1 NMAC §§ 270.14(b)(11)(iii through v) and 270.14(b)(19)(ii); 20.4.1 NMAC § 264.18(b)]

As required in "Module VIII: Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments to RCRA for Los Alamos National Laboratory, EPA I.D. NM0890010515" (EPA, 1994), LANL mapped all 100-year floodplain boundaries within the LANL complex. A report was published documenting the floodplain mapping procedures (McLin, 1992). These maps were revised after the Cerro Grande Fire, and a new report was generated (McLin et al., 2001). The new maps and new report were provided to the New Mexico Environment Department (NMED) as Appendices B and C in the November 2001 Response to a Request for Supplemental Information (LANL, 2001). As shown on the new maps, no hazardous waste management units to be permitted are located within the 100-year floodplain at LANL. The new report is included as Supplement 3 in this document.

A.4 TOPOGRAPHIC MAPS [20.4.1 NMAC § 270.14(b)(19)]

Due to the size of LANL, several maps and figures are provided or referenced to meet the requirements of 20.4.1 NMAC § 270.14(b)(19) [6-14-00]. All maps clearly show the map scale, the date of preparation, and a north arrow. The maps and figures used to fulfill these regulatory requirements include the following:

- LANL-wide 100-year floodplain maps were provided as Appendix C of the "Response to Request for Supplemental Information: Technical Adequacy Review, RCRA Permit Application: General Part A, April 1998, Revision 0.0; General Part B, October 1998, Revision 1.0; Los Alamos National Laboratory, EPA ID No. NM0890010515" (LANL, 2001).
- A map showing surface waters, including intermittent streams, and flow direction is included in the LANL General Part A.
- Surrounding land uses are shown on Map 1 in the LANL General Part A.
- Wind roses for LANL are shown on Figures A-3 and A-4 of this appendix.

- Access control features (e.g., fences, gates) are shown on a figure(s) in TA-specific permit applications, permit modification requests, or permit renewal applications.
- Buildings and structures are shown on maps in the LANL General Part A and on figures in TA-specific permit applications, permit modification requests, or permit renewal applications.
- The locations of the hazardous and/or mixed waste management units at LANL are shown on maps in the LANL General Part A and on figures in TA-specific permit applications, permit modification requests, or permit renewal applications.
- A map showing National Pollutant Discharge Elimination System discharge structure locations is included in the LANL General Part A.
- Storm, sanitary, and process sewer systems at LANL are shown on Map A-1 of this appendix.
- A map showing the boundaries of LANL is provided as Map A-2 in this appendix.
- Drainage control features (e.g., run-on/runoff) are shown on a figure(s) in TA-specific permit applications, permit modification requests, or permit renewal applications.
- Fire stations serving LANL and the County of Los Alamos are shown on Figure E-2 of Appendix E.
- An equipment cleanup area for LANL is located at TA-50-1. The location of TA-50-1 is shown on Figure 50-1 in the LANL General Part A.

Contour lines on all topographic maps are in intervals sufficient to detail natural drainage at LANL and in the vicinity of the waste management units. As provided in 20.4.1 NMAC § 270.14(b)(19) [6-14-00], LANL has submitted the maps at these scales and contour intervals due to the size of the waste management units, the extent of the LANL facility, and the topographic relief in the area.

A.5 GROUNDWATER [20.4.1 NMAC § 270.14(c) and 20.4.1 NMAC § 264.90(a)]

The following information is provided to meet the requirements of 20.4.1 NMAC § 270.14(c) [6-14-00] for regulated units subject to corrective action.

In the Los Alamos area, groundwater occurs in three modes: (1) water in shallow alluvium and underlying tuff in some of the larger canyons, (2) intermediate perched zone groundwater (a perched groundwater body above a less permeable layer and separated from the underlying aquifer by an unsaturated zone), and (3) the regional aquifer of the Los Alamos area.

A.5.1 Alluvial Groundwater Occurrence

Infiltration of surface water flow (caused by effluent discharges, spring discharge, or stormwater runoff) maintains shallow groundwater in the alluvium of some canyons. Alluvial groundwater is unconfined and is perched on underlying Bandelier Tuff, Cerros del Rio basalts, or Puye Formation.

In wet canyon bottoms, infiltration of surface water maintains shallow groundwater in the alluvium. Wet canyons generally have large surface water flow, head in the Jemez Mountains, or receive effluent discharges. Groundwater levels are typically highest in the late spring due to snowmelt runoff and in mid-to-late summer due to thunderstorms. Groundwater levels and extent of saturation decrease during the winter and early summer when runoff is at a minimum. Dry canyons have little surface water flow. In these canyons, groundwater may occur seasonally in the alluvium. Dry canyons are generally those that head in the eastern portion of the Pajarito Plateau.

Alluvium that is as much as 100 ft thick has been deposited in the canyons of the Pajarito Plateau by intermittent and ephemeral stream flows. Alluvium in canyons that head in the Jemez Mountains is generally composed of sands, gravels, pebbles, cobbles, and boulders derived from the Tschicoma Formation and Bandelier Tuff on the flank of the mountains. Alluvium in canyons that head on the Pajarito Plateau is relatively fine-grained and consists of clays, silts, sands, and gravels derived from the Bandelier Tuff. In Mortandad Canyon east of Test Well 8, the alluvium has two distinct lithologic zones: the upper zone is a coarse-grained pebbly sand; the lower zone is a brown sandy silty clay, which rests unconformably on the Bandelier Tuff (Baltz et al., 1963, p. 31).

Ephemeral runoff in some canyons infiltrates the alluvium until downward movement is impeded by the less permeable underlying strata. The impeded downward movement results in a buildup of shallow alluvial groundwater. In some cases, relatively thin zones of shallow groundwater can also be contained in the weathered tuff or some other geologic unit immediately underlying the alluvium. The horizontal and vertical extent of the alluvial groundwater is limited by depletion via evapotranspiration and movement into the underlying rocks (Purtymun et al., 1977). The limited saturated thickness and extent of the alluvial groundwater within the Laboratory boundaries make it inadequate as a significant source of potable and industrial water supply to LANL .

A.5.1.1 Alluvial Groundwater Flux

Lateral flow of the alluvial groundwaters is down canyon and in an easterly direction. Purtymun (1974) used observed travel times through the alluvial groundwater of Mortandad Canyon of a pulse of tritium released from TA-50 to infer the large-scale permeability of the alluvium. Based on this study, the velocity of alluvial groundwater flow ranges from about 60 ft per day in the upper reach to about 7 ft per day in the lower reach of the canyon (Purtymun, 1974). Purtymun (1974) determined field-scale hydraulic conductivity values to several zones of different texture within the alluvium, which were identified during a study by Baltz et al. (1963). Chloride and tritium tracer

measurements were used to estimate the hydraulic conductivities. The upper zone has a hydraulic conductivity of 1.6×10^{-3} meters per second (m/s) between MCO-5 and MCO-6. The lower zone has a hydraulic conductivity of 5.8×10^{-4} m/s between MCO-6 and MCO-7.5, and 8.8×10^{-5} m/s between MCO-7.5 and MCO-8.

A.5.1.2 Alluvial Groundwater Quality

Water quality of the alluvial groundwater reflects the composition of storm runoff, snowmelt, and effluent discharges, where present. In canyons affected by effluents, the alluvial groundwater and sediments contain the majority of adsorbing contaminants (such as plutonium). Mobile solutes (such as tritium, HE compounds, and anions) migrate with moving groundwater, and are present in recharge. Contaminated alluvial groundwater occurs in Acid/Pueblo, DP/Los Alamos, and Mortandad canyons, and in Cañon de Valle, and potentially in other canyons where full investigations have not yet been conducted. In Acid/Pueblo, DP/Los Alamos, and Mortandad canyons, the contamination resulted from discharges from radioactive liquid waste treatment facilities (and untreated discharges in Acid/Pueblo Canyon). The groundwater and sediments are contaminated with residual radionuclides, including cesium-137, strontium-90, plutonium isotopes, and americium-241. In Mortandad Canyon, samples collected from alluvial shallow groundwater monitoring wells (Wells MCO-3 through MCO-6) in Mortandad Canyon in December 1999 contained perchlorate concentrations ranging from 80 to 220 parts per billion (ppb). Other components of the discharges included fluoride and nitrate. Cañon de Valle contains residues from past discharges of HE wastewater.

A permeable reactive barrier was installed in Mortandad Canyon in 2002 to remove from alluvial aquifer water radionuclide and chemical contaminants resulting from legacy discharges to the canyon. Alluvial water that encounters the barrier is scrubbed of radionuclides (such as strontium-90, americium-241, and plutonium and uranium isotopes) as well as chemicals (such as perchlorate, nitrate, and heavy metals). To assess the effectiveness of the barrier, samples of water and materials inside the barrier's treatment box and water upstream and downstream of the barrier will be collected for analyses.

A.5.2 Intermediate Perched Groundwater Occurrence

The areas where intermediate perched zone groundwater has been encountered in wells are shown in Table A-1. Intermediate perched zones occur beneath major canyons, particularly in wet canyons that receive effluent discharges, have large surface water flow, or head in the Jemez

Mountains. These intermediate perched zones occur in the Guaje Pumice Bed at the base of the Bandelier Tuff, the underlying Cerros del Rio basalts, and the Puye Formation. The location of intermediate perched zones is determined by presence of sufficient recharge, permeability variations of the rocks (reflecting lithologic variations), and geologic structure. Intermediate perched zones may be confined or unconfined. Intermediate perched zones beneath canyons do not generally extend laterally beneath the mesas.

Within drier mesas (generally in the eastern portion of the Laboratory), water can occur in the Bandelier Tuff under unsaturated conditions. Relatively little water (~1 millimeter/year) moves downward beneath the mesa tops under natural conditions due to low rainfall, high evaporation, and efficient water use by vegetation. Atmospheric evaporation extends within mesas, drying out the mesa interior and decreasing downward flow. Moisture content of the tuff varies with recharge rate and with texture of the lithologic units (Nylander et al., 2001). Generally, at depths of below 10 ft, the moisture content of the tuff varies from about 4 to 6% on the mesas. In the eastern portion of the Laboratory (e.g., in Los Alamos Canyon), perching layers are found within the interbedded Cerros del Rio Basalt and the Puye Formation sediments, where they underlie the more permeable Guaje Pumice Bed (Table A-1).

For wet mesas (generally along the western portion of the Laboratory), water occurs in the Bandelier Tuff primarily under unsaturated conditions. At the mesa top Well R-25 at TA-16, relatively low moisture contents in the Tshirege Member of the Bandelier Tuff range from 2% to 5%. The moisture content increases through the lower units of this member to about 21% in the top of the Cerro Toledo interval. Moisture content in the upper portion of the Otowi Member is about 7%, and increases at depth to approximately 20%. Groundwater also occurs as transient zones of saturation and in perennial saturated ribbons of limited spatial extent, which feed springs on the mesa sides. The saturated zones are localized by fractures and by permeability changes related to lithologic variations within the Bandelier Tuff. Higher rainfall and increased welding and jointing of the tuff lead to greater recharge rates for wet mesas than observed in drier mesas. In addition to spring discharge at mesa sides, saturated and unsaturated flow through mesas result in recharge to the underlying intermediate perched zones or the regional aquifer. In the western portion of the Laboratory, groundwater occurs as a thick (300-ft) intermediate perched zone within the lower Bandelier Tuff and the Puye Formation, approximately 700 ft below the mesa top.

Mesa top recharge under disturbed surface conditions is higher than under natural conditions. Increased recharge occurs when the soil is compacted, when vegetation is disturbed, or when more water is added to the hydrologic system by features such as pavement or effluent discharge. Fractures within mesas could provide preferential pathways for contaminants, especially in regions of high infiltration and in rocks of low matrix permeability. Fracture flow is less likely to occur when the rock matrix is porous and permeable, because water is drawn out of the fractures.

Characterization over the past decade has significantly improved the understanding of the hydrogeologic setting at LANL, including intermediate perched zone groundwater. The vertical and lateral extent of the perched zones, the nature and extent of the perching units, and the potential for migration of perched groundwater to the regional aquifer continue to be investigated. Drilling of alluvial wells and regional aquifer wells that intersect intermediate perched groundwater has provided sufficient information thus far that indicates that neither alluvial nor perched saturated water exist to any significant vertical extent. From the data and information generated thus far, LANL believes that upon completion of the Hydrogeologic Workplan, anticipated in calendar year 2004, sufficient information will have been generated through well installation and modeling to create a technically-based conceptual model of the alluvial and perched water zones. Such information will help fulfill the objectives and purpose of site-wide characterization under the Hydrogeologic Workplan.

Upon completion of the Hydrogeologic Workplan, it is anticipated that additional hydrogeologic characterization will be performed as part of Investigation Work Plans for canyons and aggregate areas. Information obtained during these investigations will be used to continue improving the conceptual model of the alluvial and perched water zones.

A.5.2.1 Intermediate Perched Groundwater Flux

Lateral movement of intermediate perched groundwater may occur if the dip of the perching horizon and the canyon orientation do not coincide. Most recharge for west side perched intermediate groundwater originates as underflow of groundwater from the Jemez Mountains, with some contribution from recharge through mesas and canyon bottoms. Discharge from the intermediate perched zones occurs at springs or results in recharge to the underlying regional aquifer. Studies have shown that the intermediate perched zone groundwater in Pueblo Canyon is hydrologically connected to the stream in Pueblo Canyon (Abrahams and Purtymun, 1966). This perched zone water discharges at the base of the basalt at Basalt Spring, located on San Ildefonso Pueblo land

east of LANL in lower Los Alamos Canyon. It has been estimated that the rate of movement of the perched groundwater in this vicinity is about 60 ft per day, or about 6 months from recharge to discharge (Purtymun, 1975).

The direction and flux of water through the unsaturated zone have been examined in two studies. Rogers and Gallaher (1995) tabulated Bandelier Tuff core hydraulic properties from several boreholes at LANL to estimate recharge rates beneath the Pajarito Plateau. Rogers et al. (1996) used hydraulic properties from seven boreholes that had sufficient data to evaluate movement of water in the vadose zone. The seven boreholes were from mesa top and canyon bottom locations, which represent two of the distinct hydrologic regimes on the Pajarito Plateau. Most head gradients determined for the boreholes were approximately unity, thus implying that flow is nearly steady state. One exception was found for boreholes at TA-54, Area G, where gradient reversals at depths of about 100 ft suggest that evaporative drying may be occurring.

Infiltration rates for liquid water at the seven locations were approximated by Rogers et al. (1996), who used vertical head gradients and unsaturated hydraulic conductivity estimates in their calculations. As such, the apparent fluxes beneath mesa top locations range from approximately 0.06 centimeters per year (cm/yr) beneath Area G to 245 cm/yr directly beneath the TA-53 surface impoundments when they were operational. It is believed that high precipitation or surface disturbances (e.g., man-made ponds) lead to higher fluxes beneath some mesas. Beneath Cañada del Buey and Potrillo Canyon, two typically dry canyons, the apparent canyon-bottom infiltration rates range from 0.4 to 8.3 cm/yr. Beneath Mortandad Canyon, the canyon-bottom infiltration rates range from 1 to 10 cm/yr. More recent data from wet canyons have been interpreted to provide more comprehensive estimates. For Well R-15 in Mortandad Canyon, moisture profile measurements yield infiltration rate estimates on the order of 50 cm/yr. In Los Alamos Canyon, similar estimation techniques in canyon well LADP-3 were estimated to be consistent with infiltration rates of about 10 to 60 cm/yr. Such values are large enough that contaminants are predicted to travel through at least 100 meters of Bandelier Tuff during the time of Laboratory operations. This result is consistent with the observations of relatively deep penetration of contaminants such as perchlorate ion in R-15.

A.5.2.2 Intermediate Perched Groundwater Quality

Water quality within intermediate perched zones reflects that of the recharge water, including effluent discharges and native groundwater. Flow within intermediate perched zones could

transport contaminants away from their surface source. Measurements of tritium in intermediate perched zone groundwater indicate that recharge to those depths has occurred during the last several decades. Observations made at four locations in Pueblo and Los Alamos canyons show that levels of tritium in the perched zone are high enough to be attributed to recharge of surface water contaminated by effluent or other releases from LANL operations. In a test well in Pueblo Canyon (TW-2A), tritium has been observed at concentrations between 2,000 and 3,000 picocuries per liter (pCi/L). Beginning in 1991, low-detection-limit tritium measurements have shown tritium levels of about 150 pCi/L in samples from a test well located in lower Pueblo Canyon near its confluence with Los Alamos Canyon (TW-1A), and in Basalt Spring, which is located in Los Alamos Canyon just downstream from its confluence with Pueblo Canyon. Measurements at these three locations are consistent with LANL's previous understanding that the intermediate perched zone groundwater in Pueblo Canyon has been affected by effluents discharged into the canyon. In the middle reach of Los Alamos Canyon, about one mile down gradient of TA-2, tritium was detected in the intermediate perched zone at well LADP-3 (Broxton and Eller, 1995). Perched groundwater was encountered at a depth of about 320 to 330 ft at this well, and water samples contained about 6,000 pCi/L of tritium.

In June 2001, characterization well MCOBT-4.4 was installed at the confluence of Mortandad and Ten Site canyons. Mortandad Canyon received effluent discharged from LANL's former wastewater treatment plant at TA-35 from 1951 to 1963 and from LANL's Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 from 1963 to present. Tritium, fluoride, nitrate plus nitrate (as N), and perchlorate were detected in the perched groundwater samples collected from MCOBT-4.4. The nitrate and perchlorate concentrations exceeded the EPA primary standard for nitrate (10 milligrams per liter [mg/L]) and the draft provisional risk-based level for perchlorate (1 microgram per liter [µg/L]). Additional characterization sampling is being conducted at this well to evaluate contaminant concentrations in the perched zone (Broxton et al., 2002a). Results to date show that perchlorate concentrations range from 140 to 180 µg/L (ppb) at depths of 492 to 524 ft (Longmire, 2003).

A.5.3 Regional Aquifer Groundwater Occurrence

The regional aquifer of the Los Alamos area is the only aquifer known to be capable of providing the Los Alamos County community and Laboratory water supply (Purtymun, 1984). The surface of the regional aquifer rises westward from the Rio Grande within the Santa Fe Group into the lower part of the Puye Formation beneath the central and western parts of the Pajarito Plateau. The depth to the regional aquifer below the mesa tops (and adjacent canyons) ranges from about 600 ft at the

eastern margin of the plateau (or near the surface at the Rio Grande) to about 1,200 ft along the western margin (or 900 ft below the deepest canyons). According to Purtymun (1984), the regional aquifer exhibits artesian conditions in the eastern part along the Rio Grande. Throughout the plateau, continuously recorded water level measurements collected in test wells since the Fall of 1992 indicate that the regional aquifer responds to barometric and earth tide effects in a manner typical of confined aquifers.

Twelve deep water-supply wells in three well fields currently produce water for LANL and the communities of Los Alamos and White Rock. The well fields include the off-site Guaje well field and the on-site Pajarito and Otowi well fields. The Guaje well field is located northeast of LANL and contains five production wells. The five production wells in the Pajarito well field are located in Sandia and Pajarito canyons and on mesa tops between these canyons. The Otowi well field is located in Los Alamos and Pueblo canyons, and consists of two production wells. Production of potable municipal water supplies from these three well fields from 1998 through 2001 ranged from approximately 1.32 billion gallons in 1999 to 1.51 billion gallons in 2000 (Koch and Rogers, 2003). Yields from individual production wells ranged from about 375 to 1,479 gallons per minute from 1998 through 2001 (Koch and Rogers, 2003). The long-term trends in water levels reflect a plateau-wide decline in regional aquifer water levels in response to municipal water production. The average annual decline is gradual and has ranged from 0.7 to 2 ft per year for production wells (Koch and Rogers, 2003).

A.5.3.1 Regional Aquifer Groundwater Flux

The Rio Grande is the main discharge area for the regional aquifer. The largest component of recharge occurs as underflow of groundwater from the Sierra de los Valles, to the west of the Pajarito Plateau. Recharge also occurs by leakage from wet mesas, from alluvial groundwater in canyon bottoms on the Pajarito Plateau, and from intermediate perched groundwater. Local recharge on the Pajarito Plateau is important because it provides potential pathways for contaminants that originate from effluent discharges (Nylander et al., 2001).

Recharge due to infiltration and percolation of alluvial groundwater can be a source of recharge to underlying intermediate perched zones and to the regional aquifer, usually by unsaturated flow. Recharge from alluvial groundwater by unsaturated flow accounts for important volumes of recharge and relatively rapid rates of groundwater flow (reaching the regional aquifer in decades or less). In some cases, recharge might occur by saturated flow. Faults, fractures, joints, surge beds,

and higher permeability geologic units that underlie saturated alluvium (such as the Guaje Pumice Bed, Cerro Toledo Interval, Cerros del Rio basalts, and Puye Formation) could provide pathways for downward movement of water and contaminants. Moisture content of the Bandelier Tuff below wet canyons is approximately 6% to saturation. In Mortandad Canyon, a wet canyon due to effluent discharges, the moisture content in the Otowi Member is about 20% at Well R-15. Moisture content in the underlying Cerros del Rio Basalt ranges from 0.5 to 14.6% (LANL, 2000a). Additional information on Los Alamos groundwater and vadose zone characteristics will be published in groundwater annual status reports, drill hole or characterization well completion reports, and other technical reports.

Isotope and age-dating measurements have been made in an effort to better understand the nature of recharge to the regional aquifer. Samples from test wells and water-supply wells that penetrate the regional aquifer were analyzed for carbon-14 and low-level tritium to allow tentative estimates of the age of the water in the regional aquifer at various locations. The interpretation of the carbon-14 data indicates that the minimum age of water in the regional aquifer varies. Under the western portion of the plateau, the minimum age is about 1,000 years. As the water moves eastward, the age increases. Near the Rio Grande, the age of water is about 30,000 years (Rogers et al., 1996). It is important to recognize that, because the samples were collected from water drawn from screened intervals of 600 to 3,100 ft, these ages are composite water ages. Nonetheless, these ages are consistent with easterly flow, with younger water recharging at the plateau's western boundary and flowing towards the east.

Groundwater samples from the regional aquifer near Los Alamos appear to show the presence of some recent (within the last 40 years) recharge. Samples from five locations detected tritium in several measurements by extremely low-detection-limit analytical methods (Environmental Protection Group, 1995, 1994). These locations include TW-1 in Pueblo Canyon near the confluence with Los Alamos Canyon, TW-3 in Los Alamos Canyon, old observation and water-supply wells LA-1A and LA-2 in Los Alamos Canyon near its confluence with the Rio Grande, TW-8 in Mortandad Canyon, and in wells and springs at San Ildefonso Pueblo (Environmental Protection Group, 1995; Blake et al., 1995). The tritium levels measured range from less than a percent to less than a hundredth of a percent of current drinking water standards. In addition, these levels are less than the levels that could be detected by EPA-specified analytical methods normally used to determine compliance with drinking water regulations. Additionally, samples from water-supply well Otowi-1 collected during 2000 detected perchlorate (see Section A.5.3.2) that documents recent

recharge to the regional aquifer.

The regional hydraulic gradient is generally to the east, with a slight southerly component in some areas. As shown in Table A-2, the gradient is fairly steep in the western portion of the plateau within the Puye Formation, less steep in the central portions, then steepening again to the east as the groundwater approaches the Rio Grande. Locally, gradients may depart from these larger scale estimates; uncertainty due to local variations at scales less than R-well spacing is probably larger than uncertainty due to measurement error. Permeability data (provided in Table A-3) show that considerable variation in permeability is present in the aquifer. Assuming average aquifer properties measured in wells in the central portion of the plateau, LANL estimates a typical groundwater velocity to be 33 meters per year [m/yr] (see Table A-4). This is in good agreement with previous estimates (Purtymun, 1995). Any such estimate has inherent uncertainties due to the difficulty in estimating the effective porosity of the medium. By choosing a value on the low end of the range typically assumed for sedimentary rocks, it is thought that the groundwater velocity estimate is a maximum bound.

A.5.3.2 Regional Aquifer Groundwater Quality

Continued testing of water-supply wells, test wells, and springs in 2001 confirm the overall quality of the regional aquifer (LANL, 2002). Trace levels of tritium are present in the regional aquifer in a few areas where past liquid waste discharges occurred, notably beneath Los Alamos, Pueblo, and Mortandad canyons. The highest tritium level found in a regional aquifer test well (Test Well-1), near water-supply well Otowi-1, was about 1/50 of the drinking water standard of 20,000 pCi/L (LANL, 2002). Tritium continued to be found in water-supply well Otowi-1, located in Pueblo Canyon, in 2001 at a level that is 1/500 the drinking water standard. Except for above-background tritium in water-supply well Otowi-1, no other radionuclides other than naturally-occurring uranium were found in Los Alamos County, San Ildefonso Pueblo, or Santa Fe water-supply wells (LANL, 2002). Nitrate concentration in Test Well-1 remained elevated; however, in 2001, the concentration was only about half the drinking water standard of 10 mg/L, and nitrate was higher than background in water-supply well Otowi 1 (LANL, 2002).

The EPA named perchlorate as a contaminant of concern after studies linked the chemical to thyroid disorders and other potential health problems. Perchlorate is a non-radioactive chemical compound used in a variety of industrial processes. At LANL, perchlorate is a byproduct of the perchloric acid used in nuclear chemistry research. Low-level concentrations (2 to 3 ppb) of

perchlorate were detected in late June 2000 in water samples collected from the Otowi-1 water-supply well located in lower Pueblo Canyon (LANL, 2000b). Independent analytical laboratories corroborated LANL's analytical results, and in four separate samples collected between June 21, 2000, and July 6, 2000, perchlorate concentrations in the Otowi-1 well ranged from 2 to 3.5 ppb. In 2001, perchlorate was detected in samples collected from the Otowi-1 well at concentrations of 1.7 and 5.85 µg/L (ppb); these concentrations were dependant on analytical method (LANL, 2002). Ion chromatography (IC) and liquid chromatography/mass spectrometry/mass spectrometry (LC/MS/MS) were used to analyze samples collected from Otowi-1. These two methods have different detection limits; the LC/MS/MS method has a lower detection limit than the IC method.

EPA has not yet established a drinking water standard for perchlorate, but has recommended safe drinking water levels ranging from 4 to 18 ppb. The State of California, in response to EPA studies, lowered its perchlorate standard from 18 to 4 ppb. An action level or regulatory standards have not been established by the State of New Mexico. In 1998, the EPA added perchlorate to the Safe Drinking Water Act's Contaminant Candidate List for consideration for possible regulation; however, a finalized toxicity assessment and technical guidance development must be completed before a federal drinking water regulation for perchlorate would be promulgated.

LANL began testing for perchlorate in December 1997 after the California Department of Health Services identified perchlorate as a contaminant of concern. A possible source for the contamination could be legacy waste that was discharged into Acid Canyon from LANL's TA-45 treatment plant, which operated from 1943 to 1964. The plant was decommissioned in 1966 and 1967. Prior to the June 2000 detection, perchlorate had not been detected in any water-supply wells. Since 1997, LANL has submitted samples to external laboratories that utilize the most current industry-recognized minimum detection limits for perchlorate. Since 1999, LANL has sampled and analyzed (internally) four drinking water wells and several shallow and intermediate groundwater monitoring wells using the minimum detection limit of 4 ppb. Historical industry detection limits prior to 1997 were 100 ppb.

LANL personnel have successfully demonstrated the effectiveness of a new ion-exchange system installed in March 2002 at the TA-50 RLWTF, which discharges treated effluent to Mortandad Canyon. Since the installation of this special ion-exchange resin system, perchlorate concentrations in the discharged effluent have been reduced to below the EPA's approved testing method detection limit of 4 ppb. Between January 2000 and April 2001, before the new ion-

exchange system was installed, monthly composite samples of effluent discharged from the RLWTF showed concentrations that ranged between 3 and 950 ppb. The modifications to the treatment operations have significantly decreased perchlorate concentrations in water discharged from the treatment facility.

Regulated units (i.e., surface impoundments, waste piles, land treatment units, and landfills, as provided by 20.4.1 NMAC § 264.90(a)(2) [6-14-00]) will meet the requirements specified in 20.4.1 NMAC §§ 260.90-100 [6-14-00], as appropriate. Currently, the regulated units at LANL include the Area G landfills (Pit 29 and Shaft 124), the Area H landfill (Shaft 9), and the Area L landfill (Shafts 1, 13-17, and 19-34 and Impoundments B and D). Areas G, H, and L are located at TA-54. Interim status groundwater monitoring data for the regulated units at LANL were not obtained as part of a groundwater monitoring program, as required by 20.4.1 NMAC §270.14(c)(1), because LANL had submitted groundwater monitoring waiver demonstrations, in accordance with 20.4.1 NMAC § 265.90(c). These waiver requests were subsequently denied, and NMED requested that LANL develop the Hydrogeologic Workplan, which would address the requirements of 20.4.1 NMAC §§ 264.91 through 264.100 for regulated units and 20.4.1 NMAC § 264.101 for solid waste management units that have been determined to have had a release. The Hydrogeologic Workplan is being used to characterize the site-wide hydrogeologic setting at the facility. The data collected will help in the identification of the regional aquifer and any hydraulically-interconnected aquifers beneath the facility property, including groundwater flow direction and rate, and the basis for such identification, as required by 20.4.1 NMAC § 270.14(c)(2). It will also be used to establish a technical basis for siting potential future monitoring wells. The groundwater wells constructed pursuant to the Hydrogeologic Workplan may be used to monitor groundwater, and, if necessary, the well characterization and groundwater monitoring data collected will be used as inputs to determine points of compliance, as required by 20.4.1 NMAC § 264.95, as well as potential future locations of groundwater monitoring wells.

As required in 20.4.1 NMAC § 270.14(c)(3), topographic maps of the hazardous waste management areas at TA-54 are included in the LANL General Part A and in the “Los Alamos National Laboratory Technical Area 54 Permit Renewal Application,” Revision 3.0 (LANL, 2003). These maps also show the property boundary (if allowed by map scale) and the locations of R wells installed at the time the maps were generated. The “point of compliance,” as defined under 20.4.1 NMAC § 264.95, and the groundwater flow direction and rate will be added to these maps in General Part A revisions, as appropriate, when this information is developed and refined,

respectively. There is currently no known groundwater contamination from the regulated units at TA-54; therefore, a description of any plume of contamination that has entered the groundwater, as required by 20.4.1 NMAC § 270.14(c)(4), is not provided herein. LANL is currently developing a facility-wide groundwater monitoring plan which will, among other topics, discuss relevant and appropriate groundwater monitoring provisions for LANL's regulated units and solid waste management units, as required by 20.4.1 NMAC § 270.14(c)(5) through (8).

A.5.4 Groundwater Characterization

To date, numerous characterization wells have been drilled, as required by the Hydrogeologic Workplan (LANL, 1998). The installed wells include Wells R-5, R-7, R-8, R-9, and R-9i (Los Alamos/Pueblo Canyon), R-12 (Sandia Canyon), R-13 and R-15 (Mortandad Canyon), R- 14 (Ten Site Canyon), R-16 (Overlook Park in White Rock), R-19 (mesa top above Threemile and Potrillo canyons), R-21 and R-22 (on Mesita del Buey between Pajarito Canyon and Cañada del Buey), R-20, R-23, and R-32 (Pajarito Canyon), R-25 (south rim of Cañon de Valle), and R-31 (Ancho Canyon). The following provides brief descriptions of each of the characterization wells. Additional information will continue to be provided to the NMED Hazardous Waste Bureau via well summary reports, well completion reports, monitoring reports, and other technical reports.

- Well R-5 is located in lower Pueblo Canyon between the Los Alamos County Sewage Treatment Plant and water-supply well Otowi-1. Drilling activities started in April 2001, and well installation was completed in May 2001. The total depth of Well R-5 is 902 ft. The regional aquifer was reached at a depth of 685 ft. The well was completed with four screened intervals at depths of 326-331 ft, 373-389 ft, 677-720 ft, and 859-864 ft. Based on the analytical results from screening samples collected from the borehole during drilling, it appears that contamination from Laboratory discharges is not present in the regional aquifer at this well site. Additional information for Well R-5 is presented in the "Characterization Well R-5 Completion Report" (Risk Reduction and Environmental Stewardship Division [RRES] Groundwater Protection Program [GPP], 2003a).

- Well R-7 is located in upper Los Alamos Canyon. Drilling activities began in February 2000, and well construction and development were completed in February 2001. The well was drilled to a total depth of 1,097 ft. The regional aquifer was reached at a depth of 903 ft. The R-7 well was completed with three screened intervals: two associated with perched saturation at depths of 363-379 ft and 730-746 ft; and one straddling the regional water table at 895-937 ft. No

contaminants above background were detected in samples collected from the borehole during drilling. Additional information for Well R-7 is published in the “Characterization Well R-7 Completion Report” (Stone et al., 2002).

- Well R-8 is located in Los Alamos Canyon, downstream of the confluence with DP Canyon. Drilling activities began in September 2001, and well construction and development were completed in February 2002. The R-8 well was drilled to a total depth of 1,022 ft. The regional aquifer was reached at a depth of 709 ft. The well was completed with two screened intervals at depths of 705-756 ft and 821-828 ft. Based on the analytical results from screening samples collected from the borehole during drilling, tritium is present at a slightly elevated level above background. Additional information for Well R-8 is presented in the “Characterization Well R-8 Completion Report” (RRES GPP, 2003b).

- Well R-9 is located in Los Alamos Canyon at the eastern boundary of LANL. During the drilling of the well to a total depth of 771 ft, five perched water zones were encountered. The regional aquifer was reached at a depth of 688 ft. Tritium levels were highest (347 pCi/L) in the uppermost perched zone and lowest (14 pCi/L) in the regional aquifer. These levels are far below the levels of health concern (20,000 pCi/L), but do indicate the movement of some water from the land surface to the groundwater zones within the past 40 or so years. Additional information for Well R-9 is published in the "Characterization Well R-9 Completion Report" (Broxton et al., 2001a).

- Well R-9i was completed in March 2000 near the eastern LANL boundary in Los Alamos Canyon to a depth of 322 ft with two screened intervals in the upper saturated zones identified in Well R-9. Additional information for Well R-9i is published in the "Characterization Well R-9i Completion Report" (Broxton et al., 2001b).

- Well R-12 is located in Sandia Canyon at the eastern boundary of LANL. This well was drilled to a total depth of 886 ft. An intermediate-depth perched groundwater zone was encountered at a depth of 424 ft, and the regional aquifer was reached at a depth of 805 ft. The perched groundwater at the 424-ft depth was found to contain nitrate, ammonia, chloride, and tritium (208.1 pCi/L). The presence of some recent recharge water is indicated at this regional aquifer location by tritium levels of 46.9 pCi/L; nitrogen isotopes present indicate a sewage influence.

Additional information for Well R-12 is published in the "Characterization Well R-12 Completion Report" (Broxton et al., 2001c).

- Well R-13 is located in Mortandad Canyon. Drilling activities began in August 2001, and well construction, development, and site completion were finished in February 2002. The borehole was drilled to a total depth of 1,133 ft, and the well was installed to a total depth of 1,029.4 ft. No perched water was encountered; the regional aquifer was reached at a depth of 834 ft. The well was completed with one screened interval in the regional aquifer at a depth of 958-1,019 ft. Based on the analytical results from water samples collected from the borehole during drilling, it appears that contamination from Laboratory discharges is not present in the regional aquifer at this well site. Additional information is presented in the “Characterization Well R-13 Completion Report” (RRES GPP, 2003c).

- Well R-14 is located in Ten Site Canyon, east of the former radioactive liquid waste treatment and septic facilities at TA-35. Preparation and drilling activities began in May 2002, and well construction, development, and site completion were finished in February 2003. The well was drilled to a total depth of 1,327 ft. No perched water zones were encountered; the regional aquifer was reached at a depth of 1,182 ft. The well was completed with two screened intervals in the regional aquifer at depths of 1,201-1,233 ft and 1,286-1,293 ft. Two water samples were collected from the screened intervals in the regional aquifer during well development activities. Based on the analytical results for these samples, it appears that contamination from Laboratory discharges is not present in the regional aquifer at this well site. Additional information is presented in the “Characterization Well R-14 Completion Report” (RRES GPP, 2003d).

- Well R-15 is located in Mortandad Canyon about 1.5 miles east of the RLWTF at TA-50. Both hollow stem auger and air rotary/casing advance methods were used in drilling this well. A definable intermediate perched zone was encountered at a depth of 646 ft, and the regional aquifer was reached at a depth of 964 ft. The total depth of Well R-15 is 1,107 ft. The deep perched zone contained tritium at concentrations of 3,770 ± 850 pCi/L; these levels indicate infiltration of Laboratory-derived contaminants at this location, but the levels are well below federal drinking water standards. The tritium concentration in the regional aquifer at Well R-15 is less than detection. A perchlorate concentration of 12 ppb was detected in the perched

water zone at Well R-15 in December 1999 (LANL, 2000c). Additional information for Well R-15 is published in the "Characterization Well R-15 Completion Report" (Longmire et al., 2001a).

- Well R-16 is located just south of Cañada del Buey near Overlook Park in White Rock, and immediately upstream from the sanitary sewage treatment plant. Preparation and drilling activities began in July 2002, and well construction and development were completed in December 2002. The well was drilled to a total depth of 1,287 ft, and the zone of regional groundwater saturation was encountered at a depth of 642 ft. The well was completed with four screened intervals at depths of 641-649 ft, 863-871 ft, 1,015-1,022 ft, and 1,237-1,245 ft. Three water samples were collected after well development, one each from the lower three screened intervals. Based on analytical results for these three samples, contamination from Laboratory discharges does not appear to be present in the regional aquifer at this well site. Additional information is presented in the “Characterization Well R-16 Completion Report (RRES GPP, 2003e).

- Well R-19 was completed near TA-36 on the mesa above Threemile and Potrillo canyons to a depth of 1,902 ft with seven screens: two in the perched zone; and five in the regional aquifer. Additional information for Well R-19 is published in the "Characterization Well R-19 Completion Report" (Broxton et al., 2001d).

- Well R-20 is located in Pajarito Canyon, just east of TA-18 on the south side of Pajarito Road. Preparation and drilling activities began in July 2002, and well construction, development, and site completion activities were finished in March 2003. The borehole was drilled to a total depth of 1,365 ft. No perched zones were encountered during drilling, and the regional aquifer was reached at a depth of 873 ft. The well was completed with three screened intervals in the regional aquifer at depths of 905-912 ft, 1,147-1,155 ft, and 1,329-1,336 ft. Two regional aquifer water samples were collected from the developed well. Although strontium-90 was detected near the minimum detection activity level, the absence of tritium suggests that the waters have not been impacted by Laboratory releases. Additional information is presented in the “Characterization Well R-20 Completion Report” (RRES GPP, 2003f).

- Well R-21 is located in Cañada del Buey north of TA-54. This well was installed between October 2002 and February 2003. It was advanced to a depth of 995 ft. No perched water zones were encountered during borehole advancement, and the static water level of the

regional aquifer was determined to be at a depth of approximately 804 ft. Based on the analytical results for screening samples collected from the single well screen, which extends from 889 ft to 907 ft below ground surface, potential contaminants of concern were not detected. Additional information for this well is published in the “Characterization Well R-21 Completion Report” (Kleinfelder, Inc., 2003).

- Well R-22 was drilled on Mesita del Buey east of TA-54, Area G, to a depth of 1,489 ft. Drilling activities began in August 2000, and well construction and development were completed in November 2000. The regional aquifer was reached at a depth of 883 ft; no perched intermediate groundwater was encountered in Well R-22. The well was completed with five screened intervals in the regional zone of saturation at depths of 872-914 ft, 947-989 ft, 1,272-1,279 ft, 1,378-1,385 ft, and 1,447-1,452 ft. Samples collected from the borehole during drilling contained tritium at concentrations above background. Additional information for Well R-22 is published in the "Characterization Well R-22 Completion Report" (Ball et al., 2002).

- Well R-23 is located in Pajarito Canyon, just west of the intersection of State Road 4 and Pajarito Road and on the south side of Pajarito Road. Preparation and drilling activities began in July 2002, and well construction, development, and site completion activities were finished in March 2003. The borehole was drilled to a total depth of 935 ft. A possible perched zone was encountered at a depth of 470 ft, and the regional aquifer was reached at a depth of 829 ft. The well was completed with one screened interval in the regional aquifer at a depth of 816-873 ft. Based on the analytical screening results of the regional groundwater samples collected, contamination from Laboratory discharges does not appear to be present in the regional aquifer at this well site. Additional information is presented in the “Characterization Well R-23 Completion Report” (RRES GPP, 2003g).

- Well R-25 is located on a mesa top at TA-16 along the south rim of Cañon de Valle near the western boundary of LANL. The total depth of Well R-25 is 1,942 ft, and the regional aquifer was reached at a depth of 1,286 ft. Well R-25 was completed with nine screened intervals: three in the upper zone of saturation; one in the intervening alternating wet/dry zone; and five in the regional zone of saturation. Contaminants detected in borehole samples included HE compounds and their associated degradation products. Subsequently, quarterly sampling has detected solvent compounds. Additional information for Well R-25 is published in the "Characterization Well R-25 Completion Report" (Broxton et al., 2002b).

- Well R-31 is located at TA-39 in the north fork of Ancho Canyon near the southern boundary of LANL. This well was drilled to a total depth of 1,103 ft. The regional zone of saturation was encountered between 521 and 537 ft; no intermediate perched zones were encountered in this well. Additional information for Well R-31 is published in the "Characterization Well R-31 Completion Report" (Vaniman et al., 2002).

- Well R-32 is located in Pajarito Canyon, within TA-36 and south of TA-54, on the north side of Pajarito Road. Preparation and drilling activities began in July 2002, and well construction, development, and site completion activities were finished in March 2003. This well was drilled to a total depth of 1,008 ft. Perched groundwater was encountered in the alluvium at a depth of 22 ft. No other perched zones were identified. The regional aquifer was reached at a composite depth of 783 ft. The well was completed with three screened intervals in the regional aquifer at depths of 867-875 ft, 932-935 ft, and 973-981 ft. Based on analytical results for water samples collected at each screened interval, contamination from Laboratory discharges does not appear to be present in the regional aquifer at this well site. Additional information is presented in the “Characterization Well R-32 Completion Report” (RRES GPP, 2003h).

The following provides brief descriptions of wells that were installed for further investigation of contaminants in groundwater:

- CdV-R-15-3 was completed at TA-15 on the mesa above Cañon de Valle in June 2000 with six screened intervals: three in the upper perched zone and three in the regional zone of saturation. The three perched zone screens are dry. Additional information for Well CdV-R-15-3 is published in the "Well CdV-R-15-3 Completion Report" (Kopp et al., 2002).

- MCOBT-4.4 in Mortandad Canyon was drilled to a total depth of 767 ft in June 2001. The borehole was plugged up to a depth of 725 ft and a single completion well was installed.

- MCOBT-8.5 in Mortandad Canyon was drilled to a total depth of 740 ft in June 2001. The borehole was plugged up to a depth of 670 ft in order to install a well in Cerros del Rio basalt. However, after several days of monitoring, the borehole did not yield water and MCOBT-8.5 was plugged back to the surface.

A.6 OTHER PERMIT ACTIVITIES

Other types of Resource Conservation and Recovery Act permits will be addressed in TA-specific permit applications, permit modification requests, or permit renewal applications.

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Table A-1
Occurrences of Intermediate-Depth Perched Groundwater

Well	Perched Water Level Depth (ft)	Unit Containing Perched Saturation	Data Source
Pueblo Canyon			
TW-2A	120	Puye Formation	Purtymun, 1995
O-1	183	Puye Formation	Purtymun, 1995
TW-1A	180	Cerros del Rio Basalt	Purtymun, 1995
R-5	375	Cerros del Rio Basalt	Longmire, 2001b
Los Alamos Canyon			
H-19	(20-ft interval)	Guaje Pumice Bed	LANL, 1995
R-7	378	Guaje Pumice Bed/Puye Formation	Longmire, 2001b
LAO(A)	295	Guaje Pumice Bed	LANL, 1995
LADP-3	325	Guaje Pumice Bed	LANL, 1995
O-4	253	Puye Formation	Purtymun, 1995
R-9	137	Cerros del Rio Basalt	Broxton et al., 2000
R-9	264	Cerros del Rio Basalt	Broxton et al., 2000
R-9	524	Cerros del Rio Basalt	Broxton et al., 2000
Sandia Canyon			
R-12	424	Cerros del Rio Basalt	Broxton et al., 2000
PM-1	450	Cerros del Rio Basalt	Purtymun, 1995
Mortandad Canyon			
MCM-51	55	Tsankawi/Cerro Toledo	LANL, 1997
MCM-5.9	105	Tsankawi/Cerro Toledo	LANL, 1997
R-15	646	Cerros del Rio Basalt	Longmire et al., 2000
Pajarito Canyon			
SHB-4	145	Cerro Toledo interval	LANL, 1998
R-19	909	Puye Formation	Longmire, 2001b
54-1016	592	Cerros del Rio basalt	LANL, 1998
Cañon de Valle			
R-25	747	Otowi Member	Nylander et al., 2001
Ancho Canyon			
R-31	440	Cerros del Rio basalt	Marin, 2000

Table A-2

Estimated West-East Hydraulic Gradients

Pair of Wells				West-East Distance (m)	Gradient (m/m)
Upgradient Well	Water level (m)	Downgradient Well	Water level (m)		
R25	1836	CDV15-3	1833	2189	-0.02884
CDV15-3	1833	R19	1795	4710	-0.02149
DT-10	1805	R22	1747	5195	-0.01121
R15	1785	R12	1738	3684	-0.01283

Table A-3

Permeability Data for Rocks in the Regional Aquifer

Stratigraphic Unit	Well	Permeability (log m^2)	Hydraulic Conductivity (ft/day)	Hydraulic Conductivity (m/yr)
Tsf	O-1	-12.64	0.63	70.11
	LA-6	-12.36	1.22	135.76
	LA-5	-12.84	0.4	44.51
	LA-4	-12.56	0.44	48.96
	LA-3	-12.8	0.44	48.96
	LA-2	-12.77	0.47	52.30
	LA-1B	-12.35	1.25	139.10
	G-4	-12.26	1.51	168.03
	G-3	-12.59	0.71	79.01
	G-2	-12.36	1.22	135.76
	G-1A	-12.36	1.22	135.76
	G-1	-12.47	0.94	104.60
Tsfuv	DT-9	-11.23	16.35	1819.44
	O-4	-11.84	4.02	447.35
	PM-4	-11.94	3.22	358.32
Tpf	TW-8	-11.92	3.35	372.79
	R-15	-12.14	2.01	223.67
	R-15	-11.92	3.32	369.45
	R-19	-11.2	17.5	1947.41
	R-19	-11.15	19.6	2181.10
	CDV-R-15	-13.05	0.25	27.82
	CDV-R-15	-13.44	0.1	11.13
	R-9[a]	-15.22	.002	0.18
	R-12[a]	-17.8	4.E-6	.0005
	R-12[a]	-15.01	.003	0.30
Tpt	TW-3	-11.24	16.08	1789.39
	TW-2	-10.93	32.39	3604.38
	TW-1	-12.71	0.54	60.09

Stratigraphic Unit	Well	Permeability (log m^2)	Hydraulic Conductivity (ft/day)	Hydraulic Conductivity (m/yr)
Tb	PM-5	-12.59	0.71	79.01
	G-5	-12.38	1.17	130.20
	DT-10	-11.27	14.87	
	R-31	-12.41	1.07	119.07
	R-31	-12.82	0.42	46.74
	R-31	-11.88	3.62	402.84
	R-31	-14.49	0.01	1.11
	R-31	-14.6	0.01	1.11
	R-9i	-10.87	37.07	4125.17
	R-9i	-12.55	0.78	86.80
	R-9[a]	-14.9	.003	0.30
	R-12[a]	-18.4	1.1E-6	.00012
Tt	TW-4	-12.04	2.55	283.77
Average[b]		-12.30	1.38	153.25

[a] Derived from core measurements
[b] Excluding core measurements

Table A-4

Groundwater Velocity Estimate

Gradient (m/m)	Hydraulic Conductivity (m/yr)	Porosity	Calculated Velocity (m/yr)
.019[a]	176 m/yr[b]	0.1[c]	33

[a] Average of gradients shown in Table A-2
[b] Geometric average of data shown in Table A-3, excluding LA well field (due to its lower permeability)
[c] At low end of range typically reported for sedimentary rocks (0.1 – 0.3)

Figure A-1

Regional Location Map of Los Alamos National Laboratory and Surrounding Land Use

Figure A-2
Location Map of Los Alamos National Laboratory (LANL) Technical Areas (TA)

State Plane Coordinate System New Mexico Central Zone North American Datum 1983 (ft)

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Wind rose information obtained from Weather Machine at weather.lanl.gov.

Figure A-3
Annual Wind Roses for Los Alamos Laboratory (LANL)--Day

Wind rose information obtained from Weather Machine at weather.lanl.gov.

Figure A-4
Annual Wind Roses for Los Alamos National Laboratory (LANL)--Night

APPENDIX B

WASTE ANALYSIS PLAN

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ATTACHMENT	TITLE
B-1	Waste Management Units at Los Alamos National Laboratory

LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
AK	acceptable knowledge
ALARA	as low as reasonably achievable
ASTM	American Society for Testing and Materials
CFR	Code of Federal Regulations
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
ER	environmental restoration
FFCO	Federal Facilities Compliance Order
FR	*Federal Register*
FWO-SWO	Facilities and Waste Operations-Solid Waste Operations Group
HE	high explosives
HEPA	high-efficiency particulate air
LANL	Los Alamos National Laboratory
LDR	land disposal restrictions
LIG	Laboratory Implementation Guidance
LIR	Laboratory Implementation Requirement
MLLW	mixed low-level waste(s)
MTRUW	mixed transuranic waste(s)
NCR	non-conformance report
NMED	New Mexico Environment Department
OB	open burning
OD	open detonation
ppmw	parts per million by weight
QA	quality assurance

LIST OF ABBREVIATIONS/ACRONYMS
(Continued)

QAPjP	"Los Alamos National Laboratory Transuranic Waste Quality Assurance Project Plan"
QC	quality control
R&D	research and development
RCRA	Resource Conservation and Recovery Act
RTL	regulatory threshold limit
RTR	real-time radiography
SOP	standard operating procedure
SVOC	semivolatile organic compound
STP	Site Treatment Plan
SW-846	EPA's "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
TA	technical area
TC	toxicity characteristic
TCLP	Toxicity Characteristic Leaching Procedure
TRU	transuranic
TSDF	treatment, storage, and disposal facility
UHC	underlying hazardous constituents
VOC	volatile organic compound
WAC	waste acceptance criteria
WAP	waste analysis plan
WCSF	Waste Characterization Strategy Form
WIPP	Waste Isolation Pilot Plant
WIPP WAC	"Waste Acceptance Criteria for the Waste Isolation Pilot Plant"
WMC	Waste Matrix Code(s)

APPENDIX B
WASTE ANALYSIS PLAN

This Waste Analysis Plan (WAP) presents information on and describes the sampling and characterization procedures used to determine the chemical and physical nature of hazardous waste, the hazardous component of mixed low-level waste (MLLW), the hazardous component of mixed transuranic waste (MTRUW), and high explosives (HE) and HE-contaminated waste stored and treated at Los Alamos National Laboratory (LANL). It has been prepared to meet the requirements set forth in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) § 264.13, revised June 14, 2000 [6-14-00]. The waste analysis information contained in this WAP is used for characterization of wastes managed in containers and tanks, and to support treatment by open burning (OB), open detonation (OD), and cementation processes. Additional waste analysis requirements are specified in 20.4.1 NMAC § 270.14(b), and 20.4.1 NMAC § 268.7 [6-14-00]. The content of this WAP follows the guidance provided in "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Wastes, A Guidance Manual" (U.S. Environmental Protection Agency [EPA], 1994). It is organized as follows:

Section B.1 Facility Description: Includes a general description of LANL; general descriptions of the waste streams stored and treated and the activities that generate waste; and a reference to an attachment listing the waste management units at LANL.

Section B.2 Waste Analysis Parameters: Includes a discussion of the proposed analytical parameters and methods used by LANL and the criteria/rationale for the parameter selection.

Section B.3 Characterization Procedures: Includes the characterization approach (e.g., acceptable knowledge, sampling and analysis) for each waste classification stored and treated at LANL.

Section B.4 Off-Site Waste: Includes a discussion of procedures in place for acceptance of waste from off-site facilities.

Section B.5 Special Procedural Requirements: Includes a discussion of the procedures in place for ignitable, reactive, and incompatible wastes; procedures to ensure compliance with land disposal restrictions (LDR); and procedures to ensure compliance with Subpart CC requirements.

Section B.6 References.

Table B-1 summarizes applicable regulatory requirements and the corresponding location where the requirement is addressed in this appendix.

Throughout this document, generator waste characterization is described as the preliminary source of information at LANL determining the identification and subsequent management of the waste. Generator waste characterization requirements are addressed in 20.4.1 NMAC, Subpart III, Part 262, and the information included in this permit renewal application is not intended to result in hazardous waste facility permit conditions being applied to the waste-generation process or the procedures covered by that regulation. The information presented is intended to discuss how the waste characterization data are reviewed and used by LANL waste management units and organizations in compliance with the 20.4.1 NMAC, Subpart V, Part 264, and 20.4.1 NMAC, Subpart VIII, Part 268, regulatory requirements.

B.1 FACILITY DESCRIPTION [20.4.1 NMAC § 270.14(b)(1)]

LANL is located in Los Alamos County in north-central New Mexico. It is approximately 60 miles north-northeast of Albuquerque and 25 miles northwest of Santa Fe. LANL and the associated residential and commercial areas of Los Alamos County are situated on the Pajarito Plateau. A detailed description of the LANL facility is included in Appendix A of this General Part B Permit Renewal Application.

LANL's central mission is the reduction of global nuclear danger supported by research that also contributes to conventional defense, civilian, and industrial needs. This includes programs in nuclear, medium energy, and space physics; hydrodynamics; conventional explosives; chemistry; metallurgy; radiochemistry; space nuclear systems; controlled thermonuclear fusion; laser research; environmental technology; geothermal, solar, and fossil energy research; nuclear safeguards; biomedicine, health, and biotechnology; and industrial partnerships. LANL is owned by the U.S. Department of Energy (DOE) and is operated jointly by DOE and the University of California.

B.1.1 Facility Waste-Generating Processes and Activities

Wastes are generated at LANL primarily from research and development (R&D) activities, processing and recovery operations, decontamination and decommissioning (D&D) projects, and environmental restoration (ER) activities. Wastes generated from these types of processes and activities may also be received from off-site facilities, as described in Supplement 1 of this General Part B Permit Renewal Application. Tables B-2 through B-7 present information on hazardous

wastes, MLLW, MTRUW, HE wastes, and HE-contaminated wastes potentially generated at LANL. Wastes generated at off-site facilities that may be received at LANL are described in Table B-8. These tables include brief waste descriptions, waste-generating process or activity, the characterization basis for waste designation, potential EPA Hazardous Waste Number(s), the hazardous constituent(s) listed in Appendix VIII of 20.4.1 NMAC, Subpart V, and/or the characteristic(s) defined at 20.4.1 NMAC, Subpart V, Part 264, Subpart C, that make the waste hazardous, and the regulatory limits, as appropriate. These tables are provided for information purposes only.

B.1.2 Stored Waste

Hazardous waste, MLLW, and MTRUW are stored at various container storage units throughout LANL. The following sections contain general descriptions of these wastes and the processes that generate them.

B.1.2.1 Hazardous Waste

The criteria for establishing a waste as a hazardous waste are provided in 20.4.1 NMAC, Subpart II [6-14-00]. A waste is considered hazardous if it meets the definition of a solid waste described in 20.4.1 NMAC § 261.2 [6-14-00]; is not exempted from regulation as a hazardous waste under 20.4.1 NMAC § 261.4 [6-14-00]; and exhibits any of the characteristics of hazardous waste identified in 20.4.1 NMAC, Subpart II, Part 261, Subpart C, or is listed in 20.4.1 NMAC, Subpart II, Part 261, Subpart D [6-14-00].

Hazardous wastes are generated at LANL primarily from R&D activities, general facility operations, D&D projects, and ER activities. These waste streams include spent solvents, contaminated solid wastes, paint and related wastes, photographic and photocopier wastes, corrosive liquids, solid metals and metallic compounds, contaminated noncorrosive aqueous and nonaqueous solutions and sludges, mercury wastes, used batteries and battery fluids, unused off-specification commercial chemical products, gas cylinder waste, ER soils and sludges, ER aqueous liquids, and ER debris. Hazardous waste streams may be of uniform physical composition (i.e., homogeneous) or of dissimilar/diverse composition (i.e., heterogeneous). Homogeneous waste is defined as waste that contains only one material or substance or waste that has its components mixed so that consistent samples can be drawn throughout. Homogeneous waste streams can be either solids or liquids. Heterogeneous waste is defined as waste that contains multiple components that are separate because of density or specific gravity, are located in different places within the mixture, or are

discrete and different articles. Heterogeneous wastes (e.g., debris) do not lend themselves to representative sampling and analysis. Descriptions of these routinely handled hazardous waste streams and their waste-generating processes are provided below and summarized in Table B-2.

Spent Solvents

This waste stream consists of spent solvents and spent solvent mixtures that may contain organic or inorganic compounds, heavy metals, oils, and other contaminants. Waste-generating activities include R&D, laser research, organic and inorganic chemistry research, cleaning, and degreasing.

Contaminated Solid Wastes

Contaminated solid wastes (i.e., wastes of a solid physical form) include mixtures of rags, spill cleanup materials, Kimwipes™, gloves, filters, plastic and paper products, and personal protective equipment. This waste stream may also consist of disposable equipment contaminated with organic or inorganic compounds, heavy metals, oils, and other contaminants. Waste-generating activities include machining operations, chemistry research, D&D projects, metal finishing operations, and general maintenance operations.

Paint and Related Wastes

Paint and paint-related wastes consist of excess paint, paint strippers/thinners, and sludges of paints and thinners. Possible contaminants include heavy metals used as paint pigments and solvents contained in thinners and lacquers. Waste-generating activities include painting and finishing operations and general facility maintenance.

Photographic and Photocopier Wastes

Photographic wastes include spent or excess film developers, fixer solutions, and bleach solutions that may be contaminated with heavy metals. Photocopier wastes include kerosene-based toners and dispersants. This waste stream is generated from photographic film processing and photocopier operations.

Corrosive Liquid Wastes

These wastes consist of acidic or alkaline solutions that may contain organics, inorganics, metals, oils, and other contaminants. Waste-generating activities include analytical chemistry research, electro-etching, and electro-polishing.

Solid Metals and Metallic Compounds

This waste stream consists of metal chips and turnings from machining and cutting operations. It also consists of metal powders; metal salts; metal sheets; reactive metals used in synthesis reactions; solders from electronic manufacturing, repair, and brazing operations; and grinding operations. Other solid metals and metallic compounds include lead shot, bricks, plate, and shielding.

Contaminated Noncorrosive Aqueous and Nonaqueous Solutions and Sludges

This waste stream consists of noncorrosive aqueous and nonaqueous solutions and sludges that are contaminated with hazardous wastes or hazardous residues. Waste-generating activities include vacuum pump maintenance, analytical spectrometry, equipment cleaning and maintenance, vehicle maintenance, synthesis reactions, metal-polishing operations, and chemical research.

Mercury Wastes

Mercury wastes include free elemental mercury, mercuric compounds, articles and instruments containing mercury, fluorescent light fixtures, and gels containing mercuric compounds. Waste-generating activities include lamp replacement, chemical research, mercury spill cleanup, and equipment cleaning and maintenance.

Used Batteries and Battery Fluids

This waste stream consists of used batteries and battery fluids that contain heavy metals such as cadmium, lead, mercury, and silver. Waste-generating activities include routine equipment maintenance.

Unused/Off-specification Commercial Chemical Products

This waste stream consists of discarded solid and liquid chemical reagents that are off-specification, unused, or outdated. This waste stream also includes spill residues and containers containing original product residues that are unused.

Gas Cylinder Waste

This waste stream consists of pressurized gas cylinders, including aerosol cans, which may contain regulated hazardous metals, organic compounds, or exhibit the hazardous characteristics of ignitability, corrosivity, and reactivity.

ER Soils and Sludges

This waste stream consists of environmental media and sludges generated through ER activities, including site decommissioning, site characterization, and site remediation. Waste-generating activities include septic tank and detention basin closure, removal actions, and other remedial actions and site closures.

ER Aqueous Liquids

This waste stream consists of liquids generated during ER activities, including decontamination of remedial equipment, drilling fluids and well development fluids, septic tank liquids, and contaminated stormwater runoff.

ER Debris

This waste stream consists of debris (such as concrete, vitrified clay pipe, steel baffles, and building materials) generated through ER activities, including site decommissioning, site characterization, and site remediation. Waste-generating activities include septic tank and detention basin closure, removal actions, and other remedial actions and site closures.

B.1.2.2 Mixed Low-Level Waste

Low-level waste is defined in DOE Order 435.1, “Radioactive Waste Management” (DOE, 1999), as “Radioactive waste that is not classified as high-level waste, spent nuclear fuel, transuranic waste, by-product material [as defined in Section 11(e)(2) of the *Atomic Energy Act,* as amended], or naturally occurring radioactive material”. MLLW is any waste that has both a hazardous waste component and a low-level waste component, as defined above. For MLLW, this WAP addresses only the hazardous component.

MLLW is generated at LANL primarily from R&D activities, processing and recovery operations, D&D projects, and ER activities. MLLW streams may be homogeneous or heterogeneous, as defined in Section B.1.2.1. Descriptions of the MLLW and their waste-generating processes are provided below and summarized in Table B-3. These descriptions are extracted primarily from

LANL's “Report for the Characterization Review of Low-Level Mixed Waste” (LANL, 1995a) and “Federal Facilities Compliance Order Site Treatment Plan Background Volume” (LANL, 1995b).

Soils with Heavy Metals

Soil waste contaminated with heavy metals is generated during D&D and ER activities at various locations throughout LANL. This waste consists of soils contaminated with varying concentrations of lead or other heavy metals.

Environmental Restoration Soils

This waste consists of soils contaminated with heavy metals and organic compounds. They are generated by ER activities, such as the remediation of release sites and D&D activities.

Inorganic Solid Oxidizers

Discarded reagent powders and crystalline materials comprise this waste stream. Most of these items are in the original manufacturer's containers, some of which may be hydrated. Many of these containers are unopened but are suspected to have radioactive surface contamination. Waste-generating activities include D&D of research laboratories and R&D.

Lead Waste

Lead waste consists of contaminated and activated lead shielding used as radiation shielding, inseparable lead, lead blankets, and lead requiring sorting. It is generated primarily from radioisotope experiments and other reactor, accelerator, laser, and x-ray activities. The lead may be in the form of sheets, pigs, bricks, shot, shavings, slag, dross, and other shapes. Radioactive contamination on the surface of the lead may be removable and the lead can then be recycled or reused.

Noncombustible Debris

Noncombustible debris consists of discarded hazardous and contaminated scrap metals that are generated by maintenance, D&D of research laboratories or equipment, R&D, and ER activities. Additionally, discarded bricks and glass are generated through dismantling of LANL buildings, including plating shops and machine sheds. The waste may be considered hazardous due to the metal content or by virtue of contamination during use.

Combustible Debris

Maintenance, D&D, R&D, and ER activities generate rags and combustible debris with heavy metals and/or organics, some of which contain residual liquids. Examples include solvents and lubricants that are used in metal-cutting operations. Much of this waste is generated during the processing of lead and barium, resulting in heavy metal contamination.

Organic-Contaminated Noncombustible Solids

This waste stream includes absorbed oils, laboratory trash, and discarded equipment. Absorbed oil waste is comprised of drums containing vermiculite or other inorganic sorbents used to absorb oil from spills and routine maintenance operations. Some of the oil originates from vacuum pumps and may be contaminated by mercury, lead, or cadmium.

Laboratory trash consists of noncombustible solid materials with residual solvent contamination. The laboratory debris includes reagent bottles, broken glassware, and disposable lab ware. Large quantities of chemicals are not placed in this trash; however, residual liquids or powders may have remained on some of the discarded material.

Discarded equipment with heavy metals and solvents primarily includes equipment and broken glassware that may have contained residual solvents.

Organic-Contaminated Combustible Solids

This waste stream consists of waste similar to combustible debris waste, along with rags, cardboard, protective clothing, and paint-stripper trash. This waste stream is potentially contaminated with methyl ethyl ketone and other solvents. Waste-generating activities include maintenance, D&D, and ER activities.

Water-Reactive Wastes

Water-reactive wastes consist of reactive metal debris generated through the cleanup of HE firing-site debris and from machining and disassembly of test components. This waste stream includes calcium, lithium hydride, lithium metal, and magnesium.

Mercury Wastes

The mercury-contaminated instruments and equipment waste stream consists of discarded or broken equipment containing liquid mercury. The instruments and equipment include broken thermometers, vacuum tubes, vacuum pumps with residual mercury, activated or contaminated fluorescent light bulbs, and mercury absorbed into a paper or solid matrix. Most of this waste is generated by cleanup operations and could not effectively be recycled or separated from its containing vessel.

Unused Solid Reagent Chemical Wastes

Many different types of discardable off-specification unused solid reagent chemical wastes are generated at LANL by R&D programs. Most of these items are in their original containers.

Spent Solvents and Contaminated Solvent Mixtures

This waste stream is comprised of spent solvents and spent solvent mixtures that contain organic or inorganic compounds, heavy metals, oils, and/or other contaminants. Waste-generating activities include a wide variety of maintenance, cleaning and degreasing, R&D, and processing operations, such as extraction, bench-scale experimental inorganic chemistry, environmental analysis, and radiochemistry.

Corrosive Liquid Wastes

This waste stream consists of acidic or alkaline solutions that contain organics, inorganics, metals, oils, and/or other contaminants. Waste-generating activities include radiochemistry research, plutonium processing, and analytical chemistry.

Aqueous and Nonaqueous Liquids Contaminated with Heavy Metals and/or Organics

This waste stream consists of aqueous and nonaqueous solutions that contain heavy metals and/or organics. Waste-generating activities include metal-polishing operations, radiochemistry research, and ER activities.

Oil Wastes

Oil wastes at LANL are generated during equipment maintenance operations. Possible contaminants in this waste stream include heavy metals and solvents.

Unused Liquid Reagent Chemical Wastes

Many different types of discarded off-specification unused liquid reagent chemical wastes are generated at LANL by R&D programs. Most of these items are in their original containers.

Gas Cylinder Waste

This waste stream consists of pressurized gas cylinders, including aerosol cans, which contain regulated hazardous metals, organic compounds, or exhibit the hazardous characteristics of ignitability, corrosivity, and reactivity.

B.1.2.3 Mixed Transuranic Waste

Transuranic (TRU) waste is defined in DOE Order 435.1, "Radioactive Waste Management" (DOE, 1999), as follows: "Radioactive waste containing more than 100 nanocuries (3700 becquerels) per gram of waste, with half-lives greater than 20 years." Transuranic isotopes are those with atomic numbers greater than 92. MTRUW contains both a hazardous waste component and a TRU waste component. For MTRUW, this WAP addresses only the hazardous component. The system of MTRUW stream descriptions presented below is consistent with the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit. This information may be superceded by any changes to the "Waste Acceptance Criteria for the Waste Isolation Pilot Plant" (WIPP WAC).

MTRUW is generated at LANL primarily from R&D activities, processing and recovery operations, and D&D projects. Limited quantities of MTRUW from off-site facilities will be accepted at LANL for additional characterization and management. MTRUW streams at LANL include four broad categories that can be described by a Summary Category Group, which is further subdivided into Waste Matrix Codes. Summary Category Groups are used to define waste characterization groupings for the "Federal Facility Compliance Order (Los Alamos National Laboratory)" (New Mexico Environment Department [NMED], 1995) requirements and are based on the physical and chemical forms of the waste. Complete descriptions of the Summary Category Groups are available in "DOE Waste Treatability Groups Guidance" (DOE, 1995). The Summary Category Groups that are applicable to the MTRUW stored and, in some cases, treated at LANL are listed below.

- *Summary Category Group S3000, Homogeneous Solids*: defined as solid waste materials, excluding soil/gravel, that do not meet the EPA LDR criteria for classification as debris.

- *Summary Category Group S4000, Soil/Gravel*: defined as solid waste materials that are at least 50 percent by volume soil/gravel.

- *Summary Category Group S5000, Debris*: defined as a heterogeneous waste stream that is at least 50 percent by volume solid materials exceeding a 2.36-inch particle size that is intended for disposal and is a manufactured object, plant or animal matter, or natural geologic material. Particle sizes smaller than 2.36 inches in size may be considered debris if the debris is a manufactured object and if it is not a particle of S3000 or S4000 material.

- *Summary Category Group L1000, Aqueous Liquids/Slurries*: defined as aqueous liquids and slurries that meet the EPA LDR criteria for wastewaters (i.e., <1 percent total suspended solids).

Summary Category Groups are applied to MTRUW streams as a general categorization scheme to distinguish between waste types. More specific waste identification systems (i.e., Waste Matrix Codes [WMC] and LANL TRU Waste Stream ID numbers) are used for supplementary purposes as part of waste management operations at LANL. The WMCs that are applicable to the solid MTRUW stored at LANL are:

- *WMC S3100, Inorganic Homogeneous Solid Waste*: includes mixed inorganic homogeneous waste (cemented inorganics, organics on vermiculite, non-cemented, salts, and cemented organics).

- *WMC S5300, Organic Debris Waste*: consists of mixed combustible debris waste (plastic, cellulosics, and rubber).

- *WMC S5400, Heterogeneous Debris Waste*: includes mixed heterogeneous debris waste (varying amounts of combustible and noncombustible debris, with a small amount of homogeneous waste present).

Solid MTRUW is assigned a WMC and is further identified with a LANL TRU Waste Stream ID number. Using the WMC, waste streams are further delineated based on the following prioritized criteria: waste-generating process (to the degree to which waste has been segregated by process); Summary Category Group (i.e., homogeneous or debris waste); waste matrix; and hazardous chemical content (i.e., organics and/or inorganics). The following are general MTRUW stream descriptions:

- Homogeneous Inorganic, Cemented: includes solidified aqueous or homogeneous inorganic solids, solidified inorganic process solids, leached process residues, evaporator bottoms/salts, and/or cement paste.

- Homogeneous Inorganic, Cemented Organics: major portion of the waste is cement (i.e., inorganic) containing a minor portion of cemented solidified organic process solids.

- Homogeneous Inorganic, Non-cemented: includes solid (non-cemented) inorganic waste, ash, dewatered aqueous sludge, and/or chemical treatment sludge.

- Homogeneous Inorganic, Salts: includes pyrochemical, nitrate, and/or chloride salts; hydroxide cake; and/or other salt waste.

- Homogeneous Inorganic, Vermiculite: includes vermiculite-absorbed hydrocarbon oil, vermiculite-absorbed silicon-based liquid, and solidified (non-cemented) organic waste.

- Soil: includes all radioactive-contaminated soil.

- Combustible debris: includes greater than 50% by volume combustible decontamination waste, cellulosics, plastics, rubber, laboratory trash, building debris, hot cell waste, and/or other combustibles.

- Heterogeneous debris: includes greater than 50% by volume noncombustible waste, metal scrap, glass, metal waste, metal crucibles and dies, precious metals, filter media and residue, beryllium-contaminated debris, ion-exchange resins, irradiation sources, firing point sources, leaded rubber, graphite waste, high-efficiency particulate air (HEPA) filter waste, skull and oxide, slag and porcelain, and/or other noncombustible waste.

The WMCs correspond to other historical and current waste identification systems used at LANL. Table B-4 lists the MTRUW streams stored at LANL by their Summary Category Group, WMC, and general matrix description, and provides a cross-reference between past and present waste identification systems.

LANL TRU Waste Stream ID numbers are applied to the MTRUW streams described above. LANL TRU Waste Stream ID numbers are assigned the prefix "LA-", followed by a unique identifier that further delineates the waste stream. The following paragraphs provide examples of the delineated waste streams for the MTRUW stored and, in some cases, treated at LANL. MTRUW information is summarized in Table B-5.

LA-TA-55-19: Mixed Combustible Debris Waste

This waste stream consists of mixed combustible debris waste generated by plutonium recovery, R&D processes, and facility and equipment operations and maintenance. The debris waste includes paper, rags, plastic, rubber, wood-based HEPA filters, and other plastic-based and cellulose-based items.

LA-TA-55-30: Mixed Heterogeneous Debris Waste

This waste stream consists of mixed heterogeneous debris waste generated by plutonium recovery, R&D processes, and facility and equipment operations and maintenance. The waste includes plutonium-contaminated noncombustible and combustible debris waste.

LA-MIN01-CIN: Mixed Inorganic Homogeneous Waste, Cemented Inorganics

This waste stream consists of mixed inorganic homogeneous waste generated by plutonium recovery, R&D processes, facility and equipment operations and maintenance, and liquid waste treatment operations. The waste includes cemented sludge, solidified aqueous waste, and solidified inorganic process solids.

LA-MIN02-V: Mixed Inorganic Homogeneous Waste, Organics on Vermiculite

This waste stream consists of mixed inorganic homogeneous waste generated by plutonium recovery, R&D processes, and facility and equipment operations and maintenance. The waste is comprised of organic liquids (oils and solvents) adsorbed on vermiculite.

LA-MIN03-NC: Mixed Inorganic Homogeneous Waste, Non-cemented

This waste stream consists of mixed inorganic homogeneous waste generated by plutonium recovery, R&D processes, and liquid waste treatment operations. It consists of vacuum filter cake solid waste.

LA-MIN04-S: Mixed Inorganic Homogeneous Waste, Salts

This waste stream consists of mixed inorganic homogeneous waste generated by plutonium recovery, R&D processes, and facility and equipment operations and maintenance. It is comprised of non-cemented inorganic process solids (salts).

LA-MIN05-COR: Mixed Inorganic Homogeneous Waste, Cemented Organics

This waste stream consists of mixed inorganic homogeneous solidified (cemented) organic process solids and emulsified solvents and oils generated by plutonium recovery, R&D processes, and facility and equipment operations and maintenance.

LA-MHD02-238: Mixed Heterogeneous Debris Waste, Pu-238

This waste stream consists of mixed heterogeneous debris waste generated by Pu-238 processing operations (primarily heat-source fabrication) and facility and equipment operations and maintenance. The waste includes Pu-238 contaminated noncombustible and combustible debris waste.

LA-MIN06-C238: Mixed Inorganic Homogeneous Waste, Cemented Inorganics, Pu-238

This waste stream consists of mixed inorganic homogeneous waste comprised of solidified (cemented) inorganic process solids. This waste stream is generated by Pu-238 processing operations (primarily heat-source fabrication) and facility and equipment operations and maintenance.

LA-MHD03-DD: Mixed Heterogeneous Debris Waste, D&D

This waste stream consists of mixed heterogeneous debris waste generated from facility and equipment D&D, including associated sectioning, size reduction, and packaging operations. The waste is comprised of plutonium-contaminated noncombustible and combustible debris waste.

LA-MHD05-ITRI: Mixed Heterogeneous Debris Waste, ITRI

This waste stream consists of mixed heterogeneous debris generated between 1975 and 1984 by the Inhalation Toxicology Research Institute, which is currently operated by Lovelace at the Kirtland Air Force Base, New Mexico. The waste is comprised of laboratory waste that may contain rags, tools, and biological waste contaminated with Pu-239.

LA-MHD07-SNL: Mixed Heterogeneous Debris Waste, Sandia National Laboratory

This waste stream consists of mixed heterogeneous debris waste generated by Sandia National Laboratories. This waste stream may contain lead (D008).

LA-MHD04-RH: Mixed Heterogeneous Debris Waste, Remote-Handled

This waste stream consists of mixed remote-handled heterogeneous debris waste generated by hot cell operations. This waste is comprised of combustible and noncombustible waste.

Sandia National Laboratories/New Mexico - Generated Waste

MTRUW managed at Sandia National Laboratories/New Mexico will be received and stored at LANL for waste certification purposes prior to subsequent reshipment for final disposition. The waste stream consists of combustible and noncombustible debris and may include metals, cellulosics, rubber, plastics, organic matrices, and inorganic materials (see Table B-8).

B.1.3 Treated Wastes

MTRUW, HE waste, and HE-contaminated waste are treated at various waste management units throughout LANL. MTRUW is treated by cementation to stabilize the waste for storage and to meet the WIPP WAC. The HE waste and HE-contaminated waste are treated by OB or OD to remove its reactive characteristic.

B.1.3.1 Treated Mixed TRU Wastes

MTRUW that require treatment are generated primarily from R&D and processing and recovery operations. Treatment of MTRUW at LANL may consist of immobilization/solidification by cementation to form a noncorrosive solid matrix. Additional specific information on the cementation treatment process is provided in Section B.3.2.3 of this WAP.

B.1.3.2 HE Waste and HE-Contaminated Waste Treated by Open Burning

HE waste and HE-contaminated waste are treated by OB at LANL to remove the hazardous characteristic of reactivity. HE waste generally consists of discrete pieces or volumes of HE, whereas HE-contaminated waste consists of solid or liquid wastes that have been contaminated with HE material. An explosive material is defined as any compound or mechanical mixture that detonates or deflagrates when subjected to heat, impact, friction, shock, or other suitable initiation stimulus. Therefore, HE waste and HE-contaminated waste meet the definition of reactive provided in 20.4.1 NMAC § 261.23 [6-14-00], because they are capable of detonation or explosive reaction if subjected to a strong initiating source or if heated under confinement.

HE waste and HE-contaminated waste are generated at LANL primarily from HE-processing operations, such as machining and pressing; R&D activities, including pilot-scale HE production; D&D; and ER activities. Table B-6 provides a summary of available information on HE waste and HE-contaminated waste treated by OB. These waste streams include homogeneous and heterogeneous wastes as defined in Section B.1.2.1 and are described in the following paragraphs.

HE-Contaminated Water

This waste stream consists of HE-contaminated water that may contain trace solvents and/or regulated hazardous metals. It is generated primarily by laboratory analysis; HE processing; ER, R&D, and D&D activities; drilling activities; and maintenance activities.

HE-Contaminated Solvent Waste

This waste stream consists of HE-contaminated solvents. It is generated primarily by laboratory analysis; R&D, ER, and D&D activities; HE production; spills; and the dissolving of HE and polymers.

HE-Contaminated Used Oil

This waste stream consists of HE-contaminated used oil, which is generated primarily from hydraulic presses and lubrication systems associated with HE-processing operations and ER and D&D activities.

Solid and Scrap HE

This waste stream consists of off-specification or obsolete HE. It is generated primarily from HE processing; testing operations; disposition of weapons; and from ER, R&D, and D&D activities.

HE-Contaminated Commercial Chemical Products

HE-contaminated commercial chemical products may be generated at various technical areas (TA) throughout LANL that manage HE. This waste generally consists of spilled commercial chemical products contaminated with HE.

Wet HE

This waste stream consists of wet HE-machining chips, ER and D&D wastes, sludges, spent activated carbon, filters, and filter solids that result primarily from the filtration of HE wastewater; ER, R&D, and D&D activities; and HE processing.

HE-Contaminated Solid Waste

This waste stream may include HE-contaminated rags, paper, glassware, tools, and other waste. These wastes may also be contaminated with solvents or oil. This waste stream is generated primarily from HE-processing activities; laboratory use; and ER, D&D, R&D, and drilling activities.

HE-Contaminated Equipment

This waste stream consists of HE-contaminated equipment, which includes discarded, noncombustible equipment and material from HE-processing areas; D&D, R&D, and ER activities; and laboratory use. This waste stream is typically recycled after treatment.

HE-Contaminated Liquid Acids, Bases, and/or Inorganic Salt Solutions

This waste stream consists of liquid acids, bases, and/or inorganic salts. It may include materials used as titrants, solvents, cleaning fluids, and/or materials from hydrolysis research.

B.1.3.3 HE Waste and HE-Contaminated Waste Treated by Open Detonation

The HE waste and HE-contaminated waste treated by OD typically consist of off-specification explosive wastes, scrap explosive waste, and other HE-contaminated solid wastes (e.g., rags, glass, wood). These wastes are characteristic for reactivity, as defined in Section B.1.3.2. OD treatment of these wastes involves an explosion that chemically transforms the HE component of the waste faster than the speed of sound.

Table B-7 provides a summary of available information on HE waste and HE-contaminated waste that is treated by OD. These waste streams include homogeneous and heterogeneous wastes and are described briefly below.

HE-Contaminated Solid Waste

This waste stream may include HE-contaminated rags, paper, glassware, tools, and other waste. These wastes may also be contaminated with solvents or oil. This waste stream is generated primarily from HE-processing activities; laboratory use; and ER, D&D, R&D, and drilling activities.

Solid and Scrap HE

This waste stream consists of off-specification or obsolete HE. It is generated primarily from HE processing; testing operations; disposition of weapons; and from ER, R&D, and D&D activities.

B.1.4 Description of Waste Management Units

The waste management units used for storage and treatment of wastes addressed in this WAP are located within numerous TAs at LANL. These units are listed in Attachment B-1, which is provided for information purposes only. Detailed information on the waste management units is provided in the TA-specific permit applications, permit modification requests, or permit renewal documents.

B.2 WASTE ANALYSIS PARAMETERS [20.4.1 NMAC § 264.13(a)(1)]

Detailed chemical and physical characterization will be performed on hazardous wastes, the hazardous component of MLLW, the hazardous component of MTRUW, HE wastes, and HE-contaminated wastes for management purposes, as required by 20.4.1 NMAC § 264.13. Waste analysis parameters will be selected to ensure that the waste characterization documentation will contain the information necessary to properly manage the waste in accordance with Resource Conservation and Recovery Act (RCRA) general facility standards in 20.4.1 NMAC, Subpart V, Part 264, and LDR requirements in 20.4.1 NMAC, Subpart VIII, Part 268.

B.2.1 Proposed Analytical Parameters and Methods [20.4.1 NMAC § 264.13(b)(1), and 20.4.1 NMAC § 270.14(b)(2)]

Analytical parameters and characterization methods that will be used for hazardous wastes, MLLW, MTRUW, and HE and HE-contaminated wastes generated at LANL are summarized in Tables B-9 through B-12. The parameters listed below will be used, as necessary, to determine the RCRA regulatory status of the wastes listed in Section B.1.

- Acceptable Knowledge (AK)
- Sampling and analysis to determine the presence and concentrations of:
  - RCRA-regulated metals
  - RCRA-regulated volatile organic compounds (VOC)
  - RCRA-regulated semivolatile organic compounds (SVOC)
- MTRUW characterization sampling methods
  - Headspace gas sampling to determine the presence of VOCs in container headspace
  - Physical waste form characterization through real-time radiography (RTR) and/or visual examination to verify the absence of prohibited items (e.g., liquids and sealed >4 liter containers).
- Flash point characterization

- pH characterization
- Reactivity characterization
- Additional characterization data

B.2.2 Criteria and Rationale for Parameter Selection [20.4.1 NMAC § 264.13(b)(1)]

Parameter selection for waste characterization is based on the physical form of the waste (e.g., debris) and on knowledge of the process generating the waste. To determine whether a solid waste is hazardous, LANL uses AK (which includes process knowledge), supplemented by sampling and analysis, if necessary, as described in Sections B.3.1.1 and B.3.1.2. The analytical parameters selected to confirm knowledge-based waste characterization for hazardous waste, MLLW, and MTRUW, and the rationale for the selected parameters are identified in Tables B-9, B-10, and B-11, respectively. MTRUW characterization incorporates characterization procedures from the WIPP permit (NMED, 2003) requirements, which are based on knowledge of raw materials and physical/chemical processes of waste-generating activities and by verification methods. Additional characterization procedures will be implemented as needed to meet the requirements of the WIPP permit or other LANL waste management conditions. Parameters for HE waste and HE-contaminated waste are selected to characterize the hazardous and explosive components of the waste and are based on knowledge of raw materials and physical/chemical processes of waste-generating activities. The rationale for HE waste and HE-contaminated waste parameter selection is identified in Table B-12.

Appendix III of 20.4.1 NMAC, Subpart II, Part 261, provides references which list approved analytical methods used to determine the concentrations of hazardous constituents in the liquid and solid fractions and extracts of waste samples. All the methods are fully described in the most recent version of *SW-846*. These and other approved methods will be used , as necessary, to determine whether a waste stream is hazardous. Samples will not be analyzed for all listed hazardous constituents, only those that are most likely to be present based on the source of the waste stream.

Detailed instructions for conducting Toxicity Characteristic Leaching Procedure (TCLP) waste analysis are found in the most recent version of “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods” *(SW-846)* and are incorporated by reference into 20.4.1 NMAC,

Subpart II, Part 261, Appendices II and III. Also listed in the most recent version of *SW-846* is the appropriate analytical method for each hazardous constituent required to determine if the waste contains a contaminant in excess of the maximum contaminant concentration regulated under 20.4.1 NMAC, Subpart II, Part 261. TCLP is a method for leaching hazardous constituents from the solid portion of the waste and is used only if the solids constitute more than 0.5% of the waste by weight. The laboratory can also forego extraction if: 1) total analysis of the waste shows the concentrations of the analytes are so low, an extract of the waste could not contain analytes at concentrations above the regulatory limits; or 2) analysis of any liquid portion of the waste contains such high concentrations of hazardous constituents that, even accounting for dilution, the entire sample would be hazardous.

Many RCRA hazardous wastes are restricted from land disposal under the Hazardous and Solid Waste Amendments unless they are treated first to substantially diminish their toxicity and reduce the likelihood that hazardous constituents will migrate from the disposal site. As required in 20.4.1 NMAC, Subpart VIII, Part 268, each waste shipment must be accompanied by a notification stating whether the restricted waste meets specific LDR treatment standards promulgated for hazardous constituents, or is otherwise exempt. In most cases, the notification can be completed after laboratory analysis of the waste. If an LDR notification is based solely on knowledge of the waste, the supporting documentation will be kept on record, in accordance with 20.4.1 NMAC § 268.7.

B.3 CHARACTERIZATION PROCEDURES [20.4.1 NMAC §§ 264.13(a)(1) and 264.13(b)(2), and 20.4.1 NMAC § 270.14(b)(2)]

Throughout LANL, it is required that characterization of wastes be considered before a waste-generating process will begin. The preliminary characterization of waste begins prior to actual generation (at the point of concept and design of a process or system), which in turn allows the generator to determine whether AK, sampling and analysis, or a combination of the two will be required prior to actual waste characterization for transport to the TA-54 storage facility.

The approach to characterization of hazardous wastes, MLLW, MTRUW, HE wastes, and HE-contaminated wastes is based on the chemical, physical, and radiological nature of the waste stream. Characterization procedures require that information for the waste stream be provided on waste characterization documentation, accompanied by sampling and analysis data or AK documentation. The waste characterization documentation is submitted to Facilities and Waste Operations-Solid Waste Operations (FWO-SWO) personnel for review, classification, and approval

prior to acceptance at TA-54. This characterization is accomplished by using AK and/or sampling and analysis, which are described in the following sections.

Trained personnel review the waste characterization documentation for adequacy and waste acceptance criteria (WAC) acceptability. Training for use of waste characterization documentation is included in a facility waste documentation course. This training provides step-by-step instructions on how to complete forms for characterizing wastes. If the documentation is incomplete or does not contain sufficient information to adequately characterize or classify the waste, the documentation is returned to the generator for additional information. Examples of further documentation that may be requested include more detailed process knowledge and description or additional/new analytical data to meet WAC requirements for the off-site treatment, storage, or disposal facility (TSDF).

Waste characterization documentation allows waste classification and assignment of EPA Hazardous Waste Numbers, as needed; preparation of LDR documentation; and proper management of the waste. Once the waste characterization documentation is reviewed, classified, and approved, the generator is notified and paperwork is prepared for shipping. The shipping documentation is submitted to FWO-SWO personnel and reviewed against the waste characterization documentation and Department of Transportation regulations. If approved by FWO-SWO personnel, the waste shipment is scheduled for transport to the appropriate TSDF. If the shipping documentation is inadequate or does not correspond with the characterization documentation, the shipping documentation is returned to the generator for corrections.

Upon receipt and prior to accepting the waste containers for storage at TA-54, waste shipments are inspected to ensure that the shipping documentation and the waste characterization documentation have the proper approvals in addition to ensuring that compliance with the WAC and all federal and state regulations are met. At TA-54, both the waste characterization documentation and the shipping documentation become part of the operating record upon receipt of the waste. These records will be made available within a reasonable timeframe to the NMED, upon request.

Reevaluation of initial characterization information is performed to verify the accuracy of the initial waste characterization, to ensure that applicable treatment standards have been met, when there is a change in a waste-generating process, when the generator requests a review, or when analytical results indicate a change in a waste stream. Waste streams are reevaluated annually to verify that

they have not changed. This annual reevaluation will be accomplished through review and recertification of applicable waste characterization documentation, and the documented reevaluation will be maintained in the facility operating record. Any information that indicates a change in the process that generates the waste and/or affects the waste will require the waste to be recharacterized.

B.3.1 Hazardous and Mixed Low-Level Waste Characterization

Characterization procedures for hazardous waste and MLLW are selected based on the physical nature of the waste stream (e.g., homogeneous or heterogeneous waste). Homogeneous solid waste will be characterized for the presence of hazardous components of the waste (i.e., VOCs, SVOCs, and metals) on the basis of AK and, if necessary, sampling and analysis. Heterogeneous solid waste is typically characterized on the basis of AK for the following reasons: (1) the physical, chemical, and/or radiological nature of the waste makes it difficult to obtain representative samples; (2) the lack of appropriate sampling methodology; and (3) for MLLW, safety concerns associated with unnecessary exposure to the radioactive component of the waste (i.e., as low as reasonably achievable [ALARA] concerns). In the event AK is used to characterize the waste, characterization documents are reviewed with the help of subject matter experts, when necessary, to achieve the most comprehensive characterization available before waste is approved for transport to TA-54.

Chemicals of an unknown nature are handled on a case-by-case basis. The individual waste is initially characterized by knowledge of the operations and activities that were performed in the specific area in which the waste was generated. This information is used to restrict the choices of initial waste analysis to a smaller population of chemicals and is not the sole basis of waste characterization. In the event that RCRA hazardous wastes are present in the initial waste analysis, more definitive AK is obtained, including, as appropriate, further analysis for sufficient and complete waste characterization prior to waste acceptance at TA-54.

For purposes of managing unknown wastes, a small volume is defined at LANL as one liquid gallon (approximately four liters) or less. The rationale for the small volume designation is that this is the minimum quantity of sample needed to test if the waste is hazardous. At and below this limit, the sample may be consumed in the analytical procedure. Small volumes of unknown wastes are typically analyzed for pH, flash point, and reactivity. This allows the material to be categorized for further management.

Volumes greater than one gallon (four liters) of a single unknown waste allow a more detailed analytical scheme. These wastes are tested for ignitability, corrosivity, reactivity, toxicity characteristics, and/or any other parameters indicated by the initial data gathered on the material. Sufficient detail must be reported to allow the assignment of the proper EPA Hazardous Waste Number(s) to the waste. Characterization methods used are provided in Tables B-9 and B-10.

Information regarding the presence of free liquids in containers of hazardous waste and MLLW is obtained through generator waste-characterization knowledge, visual examinations, and/or the Paint Filter Liquids Test.

HE waste and HE-contaminated waste at LANL are treated by OB or OD to remove the characteristic of reactivity. They are considered, by definition, to be reactive because they meet the RCRA requirement of being "capable of detonation or explosive reaction if subjected to a strong initiating source or if heated under confinement." Regulations do not specify a particular test method for reactivity of HE waste and HE-contaminated waste, so the determination of whether a waste is HE-contaminated is made based on the properties of the chemicals known or suspected to be in the waste and/or field screening or laboratory analysis. Wastes that contain concentrated HE are characterized by process knowledge, as described in Section B.3.1.1.1. Wastes that may contain HE in lower concentrations are characterized by both process knowledge and/or the following techniques to determine whether HE in lower concentrations is detonable/explosive:

- If it is unknown whether HE is present, a screening method, such as the DX-2 Spot Test or DeTech, may be used.
- If heterogeneous waste contains visible HE, it is considered reactive.
- If heterogeneous waste came into direct contact with HE and all of the surfaces cannot be tested or visually examined (e.g., debris or equipment), it is assumed that there is a reactive amount of HE associated with it.
- HE concentrations may be directly measured in homogeneous materials (e.g., soil or water). This is usually done using the appropriate analytical method from the most recent version of *SW-846* Method 8300 series. Parameters such as the concentration of HE, its sensitivity, and the media in which it occurs are used to determine whether the waste is likely to be reactive or not.

Characterization methods for HE and HE-contaminated wastes are summarized in Table B-13.

OB and OD completely remove the reactive characteristic from HE-contaminated wastes. These wastes, however, may also exhibit RCRA toxicity characteristics or contain listed wastes. In some cases, OB and OD are effective in removing these other characteristics (e.g., 2,4-dinitrotoluene and solvents). This is not the case when it comes to HE contaminated with RCRA metals. Untreated HE-contaminated wastes do not usually contain metals in high enough concentrations to be considered hazardous. Once the waste has been treated by OB, however, the metals are concentrated in the residue ash/debris. The treatment process may also oxidize parent metals, making them more soluble, which can cause the residue to fail the TCLP. Sampling and analysis for ash generated by OB are summarized in Table B-14.

B.3.1.1 Acceptable Knowledge [20.4.1 NMAC §§ 264.13(a)(2) and 264.13(b)(5), and 20.4.1 NMAC § 270.14(b)(2)]

The physical, chemical, and radiological nature of some waste forms (e.g., heterogeneous) makes collection of representative samples for characterization difficult. This difficulty arises from several factors, some of which include: waste streams that contain disparate elements; disparate elements may need to be segregated into similar forms; large objects which cannot fit within standard size sample containers; and laboratories which do not have the capability to sample large objects (EPA, 1992). Other difficulties arise from health and safety risks to personnel due to potential exposure to radioactive material (i.e., ALARA concerns) or explosive material.

Acceptable knowledge is a method used to characterize the waste streams utilizing process knowledge and additional waste analysis data. According to EPA guidance, *acceptable knowledge* is broadly defined to include process knowledge, additional characterization data, and/or facility records of analysis (EPA, 1994A). Consistent with the 1994 guidance, EPA defined "acceptable knowledge" as it applies to TRU waste destined for WIPP as "any information about the process used to generate the waste, material inputs to the process, and the time period during which the waste was generated . . ." [Code of Federal Regulations, Title 40 (40 CFR), § 194.254(c)(3)]. EPA recognizes AK as an "integral part" of the system for controls for waste characterization of certain types of DOE waste (see *67 FR 51930, 51942* [August 9, 2002]).

Process knowledge is described in 20.4.1 NMAC § 264.13(a)(2) [6-14-00], as data developed under 20.4.1 NMAC, Subpart II, Part 261, and existing published or documented data on a specific hazardous waste or hazardous waste generated from similar processes. EPA described *process knowledge* as knowledge of waste characteristics derived from information generated contemporaneously with the waste on the materials or processes used to generate the waste. This information may include administrative, procurement, and quality control documentation associated with the generating process, or past sampling or analytical data. Usually, the major elements of process knowledge include information about the process used to generate the waste, material inputs to the process, and the time period during which the waste was generated (see *67 FR 51934*).

Additional characterization data includes data obtained from chemical or physical analysis or review that is not subject to RCRA protocols, such as the most recent version of *SW-846* and other

approved methods, or through testing of similar or surrogate waste streams. These data can be used to determine if wastes are RCRA-regulated and to determine LDR status.

Facility records of analysis consist of waste analysis and/or physical characterization performed prior to the effective date of RCRA regulations. These analytical results must be accurate and applicable to the specified waste and should be supplemented with other existing information (e.g., published data).

For characterization, the following examples from EPA guidance (EPA, 1994A) are appropriate for the use of AK:

- Hazardous components in wastes from specific processes are well documented, such as with F-listed and K-listed wastes.
- Wastes are discarded unused commercial chemical products, reagents, or chemicals of known physical and chemical properties.
- Health and safety risks to personnel would not justify sampling and analysis (e.g., radioactive mixed waste).
- Physical nature of the waste does not lend itself to taking a laboratory sample.

Waste characterization documentation based solely on AK is reviewed by appropriate personnel, with the aid of subject matter experts if necessary, to determine if one or more of the above criteria have been met. The criteria must be provided or available for review to ensure that a valid and accurate RCRA hazardous waste characterization can be made before acceptance at TA-54. While AK documentation will be maintained at the generator's location for at least three years as required by 20.4.1 NMAC § 262.40, it must be in a format so that waste management personnel and/or subject matter experts can obtain copies or review the documentation at the generator's site. The latter would be the case with classified or sensitive AK documentation that cannot be sent to TA-54 due to security requirements. A traceable identifier (i.e., process or AK document number or alphanumeric designation) is assigned by the generator on the waste characterization documentation, and must be referenced in such a way that generators can access the information at their site for as long as required by RCRA regulation.

B.3.1.1.1 Process Knowledge

For characterization, process knowledge consists of one or more of the following:

- Detailed information on a waste stream obtained from existing published or documented waste analysis data;

- Studies conducted on hazardous wastes generated by processes similar to that which generated the waste; and

- Knowledge of the materials and operations that generated the waste and that demonstrates the potential for hazardous components in the waste. For example, metals present in debris waste are often associated with specific materials (e.g., lead in leaded rubber or lead shielding).

Waste generators obtain, assemble, and prepare the process knowledge documentation for each waste stream. There are many sources of applicable documentation at LANL that are acceptable to substantiate process knowledge for a specific waste stream. Examples of documentation that are acceptable include, but are not limited to, the following:

- Process design documents (e.g., Title II Design).

- Preliminary and final safety analysis reports, unreviewed safety question determinations, and technical safety requirements.

- Standard operating procedures and detailed operating procedures, which can include a list of the raw materials or reagents, a description of the process/experiment that uses the materials, and a description of the wastes generated and how the wastes are handled.

- Waste packaging logs.

- Test plans or research project reports that describe the reagents and other raw materials used in an experiment.

- Site databases (e.g., chemical inventory database for Superfund Amendments and Reauthorization Act Title III requirements).

- Information from site personnel (e.g., documented interviews).

- Standard industry practice documents (e.g., vendor information).

- Industry reports on a similar process when there is a clear connection between the LANL process/experiment and the industry's similar process/experiment.

- Previous analytical data relevant to the waste stream, including results from fingerprint analyses, spot checks, or routine waste verification sampling.

- Analytical data from studies of common industry processes that are similar to LANL processes. These data can be used to identify the chemical composition in a specific “similar” process waste stream and to determine the regulatory status of the waste.

- Material Safety Data Sheets, product labels, and other product package information.
- Sampling and analysis data from comparable waste streams.
- Documented visual inspections to confirm or identify the physical characteristics and packaging of a waste.
- Laboratory notebooks that detail the research processes and raw materials used in an experiment.
- ER site characterization data, waste characterization data, waste characterization strategy documentation, and RCRA Facility Investigation documentation.

B.3.1.1.2 Additional Characterization Data

Additional characterization data used for AK include information for the waste stream provided by the generator. These data may be qualitative in nature, not subject to an approved quality control program, or performed on a similar waste stream. This information can be the result of a recent analysis of the waste, a well-documented historical analysis of the waste, and/or the analysis of a surrogate waste stream. For example, data from the analysis of nonradioactive leaded-rubber glove waste may be used to evaluate the characteristics of similar radioactive leaded-rubber glove waste. Sampling nonradioactive inputs or outputs from processes may also provide data that are useful for characterizing a similar mixed waste stream.

B.3.1.2 Sampling and Analysis [20.4.1 NMAC §§ 264.13(a)(3), 264.13(b)(2), (3), and (4), and 20.4.1 NMAC § 270.14(b)(2)]

This section discusses proposed sampling and analytical procedures and frequency of sampling applicable to hazardous waste and the hazardous component of MLLW. The approach described for characterizing these waste types is based on the radiological, physical, chemical, and hazardous properties of the waste. If necessary for waste characterization purposes, chemical data will be obtained, as needed, through solid and liquid waste sampling techniques.

For waste streams that can be representatively sampled (i.e., homogeneous), sampling and analysis is performed when a waste lacks sufficient process information to adequately characterize the waste based on AK. A representative sample of the waste is collected and handled by means that preserve its original physical form and composition and prevent contamination or changes in concentration of the constituents to be analyzed. Analytical methods for the determination of RCRA-regulated metals, VOCs, and SVOCs are conducted to meet certain technical performance

criteria and to be consistent with regulatory guidelines. Personnel involved in sampling and analysis comply with LANL-specific protocol consistent with the most recent version of *SW-846* (EPA, 1986) and/or other approved methods.

Many analytical laboratories provide sample containers and specify required minimum volumes for individual waste types or physical states. The most important determinants of sampling method and volume are the physical state of the waste (liquid, solid, sludge), the waste container (drum, tank), accessibility, waste variability, and safety concerns. Detailed sampling recommendations and guidance are provided in the most recent version of *SW-846*, Chapter 9. For solids, 500 grams in a glass container is usually adequate. Liquid sample volumes vary from one liter to approximately eight liters, depending on the number of analysis parameters and solids content. Sample jars for samples to be analyzed for VOCs must be completely filled to minimize volatilization of contaminants from the liquid into the headspace.

Sampling is performed with a device appropriate for the waste being sampled. Sampling devices include, but are not limited to, weighted bottles, bailers, or composite liquid waste samplers for sampling liquids in drums, pits, or tanks. Augers, triers, scoops, shovels, and similar types of devices are useful for sampling solid wastes in containers or other locations.

The aim of the sampling method is to obtain a sample or samples representative of the waste stream. Sampling personnel must use an understanding of the waste-generating and -handling processes to ensure samples are representative. Some wastes separate into distinct layers with time, and representative samples must include aliquots from each layer. In some cases, it may be important to use a statistical or random sampling scheme that provides for the collection of representative samples.

A number of criteria must be considered in determining how many samples are required, how locations are selected, and how frequently sampling should be repeated. If a highly uniform waste stream is generated from a single process location, one sample collected annually is sufficient. However, if a single waste stream is a mixture of materials generated in several locations under varying conditions through time, more samples will be required, and composite sampling may be appropriate. At a minimum, the sampling must be repeated if the waste-generating process changes in a material way, or if inspection of the waste reveals it has changed.

Appendix I of 20.4.1 NMAC, Subpart II, Part 261, lists specific guidance documents that detail sampling protocols for different waste types. Waste samples collected in accordance with these protocols are considered representative by EPA. The protocols include standards developed by the American Society for Testing and Materials (ASTM) and portions of the most recent version of *SW-846*.

B.3.1.2.1 Solid Waste Analysis [20.4.1 NMAC § 264.13(b)(3)]

If necessary for waste characterization purposes, solid homogeneous waste streams are sampled and analyzed for total metal content, VOCs, and SVOCs. The sampling protocol for solid hazardous waste and MLLW is based on sampling methods approved by EPA for solid waste and soil sampling in the most recent version of *SW-846*, as well as other approved methods. These methods are designed to ensure that representative waste samples are collected consistently and transferred to the responsible laboratory in a manner that maintains sample integrity.

If necessary for waste characterization purposes, homogeneous waste streams will be sampled and analyzed for the toxicity characteristic (TC) contaminants listed in 20.4.1 NMAC § 261.24 [6-14-00]. Analysis for total concentration of TC contaminants will be performed on samples in a screening step, as described in Section 1.2 of Method 1311 (TCLP). If total concentrations are used in the waste characterization process, analytical data will be compared to the TC regulatory levels expressed as total values. These total values will be considered the regulatory threshold limit (RTL) values for the determination of whether a particular waste exhibits a TC. RTL values are obtained by calculating the weight/weight concentration (in the solid) of a TC contaminant that would give the regulatory weight/volume concentration in the TCLP extract. If the total concentrations are less than the RTL value, the waste does not exhibit the toxicity characteristic and the TCLP does not need to be completed for the screened TC contaminants.

B.3.1.2.2 Liquid Waste Analysis

Liquid wastes generated at LANL consist of aqueous solutions, slurries, and organic liquids. If necessary for waste characterization purposes, these wastes will be sampled and analyzed for total metal content, VOCs, and SVOCs. In accordance with Method 1311 (TCLP), liquid wastes (i.e., those wastes that contain less than 0.5 percent dry solids) do not require extraction. The liquid waste, after filtration, is defined as the TCLP extract. Liquid waste, therefore, is characterized by

filtering the waste, measuring total contaminant concentrations in the resulting filtrate, and comparing these concentrations to the TC regulatory levels in 20.4.1 NMAC § 261.24 [6-14-00].

Wastes that contain both a liquid and a solid phase are characterized using total analytical data for the solid phase to determine toxicity characteristics. This is accomplished by comparison with the TC regulatory levels for each phase in a manner consistent with the discussion in Section B.3.1.2.1. The following formula (EPA, 1994b) will be used to calculate the maximum theoretical leachate concentrations for the combined phases:

$$\frac{[A \times B] + [C \times D]}{B + [20 \text{ liters/kilogram} \times D]} = M$$

Where,

A = concentration of the analyte in the liquid portion of the sample (milligrams/liter)
B = volume of the liquid portion of the sample (liter)
C = concentration of the analyte in the solid portion of the sample (milligrams/kilogram)
D = weight of the solid portion of the sample (kilogram)
M = maximum theoretical leachate concentration (milligrams/liter).

B.3.1.2.3 Sample Handling, Preservation, and Storage

Table B-15 presents requirements specified in the most recent version of *SW-846* regarding sample containers, preservation techniques, and holding times associated with sample collection. Adherence to these requirements will ensure that sampling and analysis meet quality objectives for data. In the event the specified criteria are not met, another sample will be collected and submitted for analysis.

B.3.1.2.4 Analytical Laboratory Selection and Analytical Methods [20.4.1 NMAC § 264.13(b)(2)]

Analytical laboratories at LANL and/or approved subcontractor laboratories will perform the detailed qualitative and quantitative chemical analyses specified in Tables B-16 and B-17 of this WAP. These laboratories must have:

- A documented comprehensive quality assurance (QA)/quality control (QC) program
- Technical analytical expertise

- A document control/records management plan
- The capability to perform data reduction, validation, and reporting.

The selection and development of analytical testing methods for LANL waste streams were based on the following considerations:

- The physical form of the waste
- Analytes of interest
- Required detection limits (e.g., regulatory thresholds)
- Information requirements (e.g., verify compliance with LDR treatment standards, waste classification).

Collectively, these factors contributed to the selection of the analytical methods specified in Tables B-16 and B-17. Qualified analytical laboratories at LANL and/or approved subcontractor laboratories that meet the above criteria will be used for the required analyses.

B.3.1.3 Verification Frequencies [20.4.1 NMAC §§ 264.13(a)(3) and 264.13(b)(4)]

Verification frequencies vary by the types of waste received at each LANL treatment or storage facility. As the primary storage and shipping facility at LANL, TA-54 manages the widest variety of waste streams. A limited number of HE waste streams, primarily debris, are managed at the OB/OD units.

The waste verification process at TA-54 applies to waste received at that facility and designated for storage and/or off-site treatment and/or disposal. Personnel involved in verification activities are trained and qualified for the activities they perform.

Waste may be identified as part of the verification program at TA-54 through any of the following:

- Random selection, with a bias toward AK waste streams,
- Past performance of the waste generators, including previous non-conformances, and
- Incomplete or suspect documentation.

Once the waste stream has been designated for verification, waste verification personnel are notified of its pending arrival at TA-54. Waste streams needing verification are sampled in

accordance with approved EPA and ASTM protocols. Some waste streams may only require a visual verification of the container's contents.

If the characterization for the waste stream is found to be inconsistent with the documentation, a non-conformance report (NCR) is issued. The NCR program is used both to trigger further verification of waste and as enforceable criteria for the TA-54 waste verification program. Depending on the severity of the discrepancy, the waste generator or waste-generating facility may be subject to increased verification review under the program, and the waste may not be accepted for management at TA-54.

The verification program for wastes treated at the OB/OD units is different because debris and HE are the predominant types of waste treated and because there are a limited number of waste streams. Due to the difficulty in analyzing debris, information on the waste-generating process becomes the primary source of information. Verification for debris occurs in two stages. The debris is first visually inspected before treatment to ensure that the received waste matches the description on the waste characterization documentation. Then, any residues separated from the debris before or after treatment are analyzed each time a new waste stream is treated. If analysis of the residues finds constituents not identified on the waste characterization documentation for the incoming waste, treatment facility personnel contact the waste generator and conduct a thorough review of the process generating the waste. Based on the review, the generator may be requested to modify the waste characterization documentation. Solid and scrap HE and wet HE are not usually sampled because the formulations are closely controlled and well known, and HE waste is dangerous to transport off site for analysis. In addition to the transportation considerations, HE is by definition "energetic" and may react adversely to dissolution with acids, extraction with solvents, and sample size reduction techniques used in standard laboratory analytical procedures.

For other HE waste streams, initial chemical analysis by the generator is required. Analysis is also required if the waste-generating process changes. Additional analytical testing from generators may be requested based upon the following criteria:

- The complexity of the waste-generating process,
- Constituents identified during testing of residues were not included on original waste characterization documentation,

- Incomplete or suspect documentation, and/or
- Past performance of the waste generators.

The frequency of sampling OB/OD treatment residues is, at a minimum, each time a new waste stream is treated. Treatment residues may be sampled more frequently, considering the above criteria.

For wastes managed at the TA-55 hazardous and mixed waste management units, the waste may be verified through the TA-54 waste verification process. Wastes treated by cementation at TA-55 are subject to institutional controls, which assure that the waste composition is constant. Because this waste-generating process does not change, subsequent review through the TA-54 waste verification process is sufficient.

B.3.2 Mixed Transuranic Waste Characterization

Characterization of the hazardous component of MTRUW stored and treated at LANL and destined for disposal at WIPP is performed in accordance with the procedures described in the WIPP Hazardous Waste Facility Permit. The following summarizes these requirements, as presented in the "Los Alamos National Laboratory Transuranic Waste Quality Assurance Project Plan" (QAPjP) (LANL, 2003). MTRUW not destined for WIPP is characterized as described in Section B.3.2.2 of this WAP.

Initial characterization of both homogeneous and heterogeneous MTRUW is based primarily on AK. Additional characterization to meet WIPP certification procedures will be implemented at appropriate LANL or other facilities to meet requirements of the WIPP WAP permit conditions. Pursuant to WIPP certification and WIPP WAP requirements, further characterization of homogeneous waste will be accomplished through statistically-based sampling and analysis, headspace gas sampling, RTR, and visual examination. Further characterization of heterogeneous waste will be implemented at appropriate LANL or other facilities using AK, headspace gas sampling, RTR, and visual examination. MTRUW not destined for WIPP but stored at LANL is characterized using the routine procedures used for hazardous waste and MLLW, as discussed in Section B.3.2.2.

The MTRUW streams described in Section B.1.2.3 are categorized by Summary Category Groups based on the physical and chemical form of the waste. Homogeneous waste streams in the solid

process residue (Summary Category Group S3000), soil/gravel (Summary Category Group S4000), or aqueous liquids/slurries (Summary Category Group L1000) categories may contain RCRA-regulated VOCs, SVOCs, and metals and will be characterized using AK and/or sampling and analysis. Debris waste streams (Summary Category Group S5000) consist of heterogeneous materials and, as such, it is difficult to obtain representative samples of these wastes. Therefore, debris waste will be characterized for the presence of hazardous components using AK based on examination of the original materials and operations from which the waste was generated, followed by RTR, visual examination, and headspace gas sampling.

MTRUW destined for storage at Area G must meet the following WAC for free liquids: 1) no more than two liters of liquid in a 55-gallon drum; 2) no more than eight liters of liquid in a standard waste box; and 3) no more than one inch of liquid in the bottom of any container. Compliance with this requirement is verified through RTR and/or visual examination.

The QAPjP referenced above addresses MTRUW characterization procedures to be utilized after the waste is stored at LANL. These procedures were developed primarily to meet the off-site WAC. LANL's use of these procedures is designed to allow appropriate waste characterization information obtained for storage to serve as a basis for or to supplement future characterization needs without a duplication of effort. Because the QAPjP and other WIPP permit-derived documents addressing MTRUW characterization are subject to change as new information is provided, developed, or approved, and because LANL is not subject to their requirements in LANL's operating permit for storage, but rather utilizes them as waste management guidelines, this WAP will not be modified as ongoing changes to the referenced documents occur.

LANL has prepared a records inventory and disposition schedule for all waste characterization data and related QA/QC records for MTRUW to be shipped to WIPP. These documents will be designated as Lifetime Records or Non-Permanent Records as defined by the schedule and Table B-7 of the WIPP permit. Lifetime Records will be maintained for the life of the LANL MTRUW characterization program plus six years and then offered to WIPP or the appropriate Federal Records Center for permanent archival. Non-Permanent Records will be maintained for 10 years after the date of record generation and then disposed of according to the schedule.

B.3.2.1 LANL TRU Waste Certification Plan

The LANL TRU Waste Certification Plan (LANL, 2002) incorporates the certification requirements of the "Waste Acceptance Criteria for the Waste Isolation Pilot Plant" (WIPP WAC) (DOE, 2002a or most recent version) for MTRUW that will be sent to that site. It establishes the programmatic framework and requirements within which waste generators operate to ensure that their wastes can be certified as meeting the sampling, characterization, and packaging requirements of the WIPP WAC. These include LANL site-specific documents and procedures by which the waste stream analytical data and other AK information are evaluated. Once this documentation has been prepared, it is subject to review and approval by certification program personnel. Waste generators also participate in external audits, as required by the QAPjP and the LANL TRU Waste Certification Plan, to verify the characterization and certification process. If the requirements of the WIPP WAC and the "TRUPACT-II Authorized Methods for Payload Control" (DOE, 2002b) are met, the waste will be certified and transported to WIPP.

B.3.2.1.1 Acceptable Knowledge

AK characterization procedures for MTRUW stored at LANL prior to certification for WIPP acceptance are the same as those described in Section B.3.1.1. The QAPjP (LANL, 2003) describes how LANL ensures compliance with the WIPP requirements associated with the compilation, confirmation, and administrative controls of AK information. LANL-specific procedures consistent with the WIPP WAP are used to implement AK as part of the LANL TRU waste certification program for WIPP to ensure the AK information is compiled in an auditable record, the facility and MTRUW management operations are described and correlated to specific waste stream information, prohibited wastes are identified and segregated, discrepancies in AK are resolved, and the appropriate EPA Hazardous Waste Numbers are assigned.

B.3.2.1.2 Real-Time Radiography [20.4.1 NMAC § 264.13(b)(2), and 20.4.1 NMAC § 270.14(b)(2)]

RTR is a nondestructive, qualitative, and semiquantitative assay technique that involves x-ray scanning of waste containers to identify and verify, using appropriate equipment and qualified operators, the physical form(s) of waste container contents. RTR will be used to verify the absence of free liquids and prohibited items and that the physical form requirements of the WIPP WAC are met. At the same time, RTR will verify the waste classification (i.e., Summary Category Group) and waste form determined using AK. All MTRUW containers will be analyzed by RTR, and the results

for each waste container will be documented. An RTR data form will be used to document the types and quantities of material types observed in each container.

A radiography system routinely consists of an x-ray producing device, an imaging system, an enclosure for radiation protection, a waste container-handling system, an audio/video recording system, and an operator control and data acquisition station. Operating parameters such as the intensity of the x-ray can be varied for optimum viewing of the interior of the waste container. The imaging system typically utilizes an image intensifier, television camera, and remotely-located television screen. Instrument configurations will vary depending on manufacturer and site usage.

During operation of the system, the waste container is scanned while the operator views and permanently records the image from the television screen on audio/videotape. The radiography data form is also used to document the materials present and other information about the containerized waste, as required by the WIPP permit.

The radiography image produced is examined for evidence of liquid materials by jogging the container or repetitively moving the container-handling system and searching for evidence of wave motion in addition to observing the container contents for suspect waste items. The container contents are also observed for items that confirm the waste classification of the container. Conditions that limit or interfere with this determination are noted.

Operator training and experience are important considerations for assuring the quality of the radiography data. Only properly trained personnel are allowed to operate radiography equipment. Standardized training requirements for radiography operators are based upon existing industry standard training requirements. Radiography operators receive formal and on-the-job training in project requirements, system operations and standards, safe operating practices, application techniques, specific waste-generating practices, packaging configurations, parameter estimation, and identification of prohibited items. Operators must be trained and tested before they are qualified for RTR operation, and must requalify at least every two years. LANL operating and training requirements for RTR analysis of MTRUW are based on Attachment B1, “Waste Characterization Sampling Methods,” Section B1-3, “Radiography” (NMED, 2003).

B.3.2.1.3 Visual Examination [20.4.1 NMAC § 264.13(b)(2), and 20.4.1 NMAC §270.14(b)(2)]

The contents of select MTRUW containers will be visually examined to confirm RTR results, or visual examination may be used in lieu of RTR. Visual examination will also verify aspects of AK amenable to visual confirmation. For example, the visual examination will verify the physical characteristics of a waste and the associated Summary Category Group (i.e., Summary Category Group S3000, S4000, or S5000). In addition, visual examination will verify the presence of certain hazardous constituents, such as lead in lead bricks or lead-lined gloves. These types of visual confirmations will either verify or refute the overall AK used to characterize the waste stream.

The contents of each container undergoing visual examination will be recorded on audio/videotape and a description of the observed items must be provided on a visual examination data form. Visual examination procedure operators receive formal and on-the-job training in project requirements, safe operating practices, specific waste-generating practices, packaging configurations, waste parameter estimation, and identification of prohibited items. Operators must be trained and qualify for visual examination procedures and must requalify at least every two years. LANL operating and training requirements for visual examination of MTRUW are based on Attachment B1, “Waste Characterization Sampling Methods,” Section B1-3b(3), “Visual Examination” (NMED, 2003).

The hypergeometric distribution is a statistical means of estimating the probability of determining the true number of miscertified containers in the overall population of waste containers by selecting a number of containers for visual examination using a previously determined or observed miscertification rate and a set confidence factor. The basis for the determination of the number of appropriate containers to be visually examined and a description of the hypergeometric distribution used is available in the WIPP permit, Attachment B2, “Statistical Methods Used in Sampling and Analysis,” Section B2-1, “Approach for Statistically Selecting Waste Containers for Visual Examination” (NMED, 2003). The following table is an example of how the number of MTRUW containers to be randomly selected for visual examination will be determined. The selection process will be updated as necessary to maintain consistency with revisions of the WIPP permit.

Number of Waste Containers Requiring Visual Examination:

Annual Number of Waste Containers Undergoing Characterization	Number of Waste Containers Requiring Visual Examination					
50	22	22	22	22	29	29
100	15	24	24	33	33	41
200	15	26	26	35	44	52
300	15	26	26	35	44	53
400	15	26	26	36	45	54
500	15	26	26	36	45	63
Percent of Waste Containers Miscertified to WIPP WAC by Radiography in Previous Year	1 percent	2 percent	3 percent	4 percent	5 percent	6 percent

LANL uses the miscertification rate observed at LANL in the previous year to determine the appropriate number of containers for visual examination.

B.3.2.1.4 Headspace Gas Sampling [20.4.1 NMAC §§ 264.13(b)(2) and (3), and 20.4.1 NMAC § 270.14(b)(2)]

Headspace gas sampling and analysis is a qualitative screening technique used to confirm the presence of certain regulated hazardous constituents. This method of characterization includes sampling and analysis of headspace gas from the container headspace. In order to meet the characterization requirements in the WIPP permit, the headspace of all containers in storage will be sampled and analyzed as the containers are characterized for shipment to WIPP. Headspace gas sampling will not be relied upon to prove the absence of a hazardous constituent in a waste.

The precision, accuracy, and representativeness of headspace gas samples will be evaluated for adherence to the QAPjP QA objectives through analysis of field QC samples and adherence to QC practices. Sampling and analysis methods for the determination of VOCs in the headspace of MTRUW containers must meet the requirements in the WIPP WAP.

B.3.2.1.5 Solid Waste Sampling and Analysis

The following describes the methods for collecting samples of MTRUW classified as homogeneous solids or soils. Sampling protocol is based on requirements in the WIPP WAP. These sampling methods are similar to those approved by EPA for solid waste and soil sampling in the most recent version of *SW-846*; in “Standard Practice for Thin-Walled Tube Sampling of Soils” (ASTM, 1983); and in “Standard Practice for Sampling Waste and Soils for Volatile Organic Compounds” (ASTM,

1991). These methods are designed to ensure that representative waste samples are consistently collected and transferred to the responsible laboratory in a manner that maintains sample integrity.

The MTRUW classified as homogeneous solids or soils is packaged as a monolith in waste containers or in smaller containers within the outermost waste container. For waste containers selected for sampling that contain multiple small containers, one of the small containers will be randomly selected for sampling. Waste parameters for which homogeneous solids or soils are analyzed are listed in Table B-18.

To accomplish sampling of these wastes, the techniques described below have been developed for sample collection. The methods used to collect samples from the monolithic waste containers or smaller containers must be such that the samples are representative of the waste from which they are taken. For containers of monolithic homogeneous solids or soils, a sample must be collected as a core that is representative of the waste along the entire depth of the waste in the container.

Sample Core Collection

Coring tools must be used to collect cores of homogeneous solids or soils from waste containers in a manner that minimizes disturbance to the core. A rotational coring tool (i.e., a tool that is rotated longitudinally), similar to a drill bit, must be used to cut, lift the waste cuttings, and collect a core sample from containers of waste. For homogeneous solids or soils that are relatively soft, nonrotational coring tools will be used in lieu of a rotational coring tool. Requirements for coring tools are presented in the WIPP WAP.

Statistical Approach for Selection of Homogeneous Waste Containers

A statistical approach will be used to select homogeneous waste containers for solid waste sampling and analysis of solid process residue and soil waste streams. This approach relies on the premise that the waste containers have been separated into waste streams on the basis of AK and, thus, represent populations that contain similar waste. The specific method for calculating the number of drums for sampling is found in the WIPP permit. Waste containers within each waste stream and sample locations within each container will be randomly selected to ensure that the analytical results provide an unbiased estimate of the true mean contaminant concentration for each waste stream.

B.3.2.2 Non-WIPP Mixed TRU Waste Characterization

MTRUW may be generated, re-characterized, or accepted at LANL that is not currently destined for characterization and shipment to WIPP and subject to the WIPP certification requirements. Examples of this type of waste stream are MTRUW that is not generated by defense programs and items that are not compliant with the WIPP WAC.

Characterization procedures for these types of wastes will consist of the same procedures as those described for hazardous waste and MLLW in Section B.3.1 of this plan. These wastes will be characterized using AK and/or sampling and analysis on the same basis as discussed in Section B.3. AK for these wastes can also include additional AK verification procedures for MTRUW, as discussed in Section B.3.2.1, depending on the waste type.

Characteristic MTRUW that is not currently destined for disposition at WIPP will be required to complete characterization for underlying hazardous constituents (UHC) as discussed in Section B.5.3.

B.3.2.3 Characterization Procedures for Treatment of Mixed TRU Wastes

This section presents waste analysis information specific to treatment in the cementation unit at TA-55. It addresses only the hazardous component of mixed waste treated in the cementation unit.

The cementation unit is a Subpart X miscellaneous unit pursuant to 20.4.1 NMAC, Subpart V, Part 264, Subpart X [6-14-00], and is used to treat liquid and solid mixed wastes by stabilization in cement to form a noncorrosive solid matrix. The cementation unit is located in Glovebox GB-454 along the west wall of TA-55, Building 4 (TA-55-4), in Room 401, and consists of a pH adjustment column, vacuum trap, two motor-driven mixers, four impellers, associated support structures, a glovebox, and piping.

The cementation unit treats homogeneous liquid and solid mixed waste generated primarily from R&D and processing and recovery operations at TA-55 and at the Chemistry and Metallurgy Research Building at TA-3. The liquid wastes (Summary Category Group L1000) generally consist of evaporator bottoms solutions and laboratory solutions that may exhibit the hazardous characteristics of corrosivity and toxicity for metals (including arsenic, barium, cadmium, chromium, lead, mercury, and silver), as defined in 20.4.1 NMAC §§ 261.22 and 261.24 [6-14-00], respectively.

The homogeneous solid process wastes (Summary Category Group S3000) generally consist of process residue from the evaporator, process leached solids, filter cake, and other miscellaneous solids. This waste stream typically exhibits the hazardous characteristics of toxic metals. These waste streams will be mixed with cement in 55-gallon drums and allowed to cure into a noncorrosive solid matrix. Table B-19 provides a description of the waste streams associated with the cementation unit and identifies their potentially applicable EPA Hazardous Waste Numbers. The resulting cemented waste is identified by Summary Category Group S3000 and typically carries the Waste Matrix Code S3100. A general description of the Summary Category Groups and WMCs is provided in Section B.1.2.3.

B.3.2.3.1 Characterization Procedures for Waste to Be Treated by Cementation

Chemical and physical characterization is performed prior to treatment of MTRUW, in accordance with 20.4.1 NMAC § 264.13 [6-14-00]. Documented AK, as described in Section B.3.1.1, is used to determine whether the waste stream is regulated as a hazardous waste. Process knowledge and/or chemical analytical data will be utilized to adequately characterize the MTRUW prior to cementation. If process information is not sufficient, the wastes to be treated by cementation may be periodically sampled and analyzed for pH and for TC metals listed in 20.4.1 NMAC § 261.24 [6-14-00] to establish a baseline, as appropriate. Based on documented AK, these wastes do not contain VOCs or SVOCs. Parameters and analytical methods for specific hazardous constituents are presented in Table B-18.

To ensure that proper procedures and considerations for sample collection and preservation, QA/QC, and occupational safety and health are followed, personnel involved in sampling and analysis of MTRUW at TA-55 will comply with the LANL-specific protocol consistent with the most recent version of *SW-846*. For purposes of collecting a representative sample of MTRUW, the sample will be collected and handled in a manner that preserves its original physical form and composition and prevents contamination or changes in concentration of the parameters to be analyzed. Specific information relative to sampling, parameters, and analytical methods is outlined in Tables B-11 and B-18. Reevaluation frequency is addressed in Section B.3.

B.3.2.3.2 Characterization Procedures for Waste Treated by Cementation

The treated cemented waste will be shipped to WIPP for disposal. Therefore, the treated waste will be characterized in accordance with the LANL QAPjP (LANL, 2003), which incorporates the characterization requirements of the WIPP WAP for waste to be shipped to WIPP. QAPjP

characterization procedures for the treated wastes also meet the RCRA waste analysis requirements of 20.4.1 NMAC § 264.13(a) [6-14-00].

B.3.2.4 Sample Handling, Preservation, and Storage

Table B-15 presents the most recent *SW-846* requirements regarding sample containers, preservation techniques, and holding times associated with sample collection. Sampling personnel adhere to these requirements to ensure that sampling and analysis meet quality objectives for data.

B.3.2.5 Analytical Laboratory Selection and Analytical Methods

Analytical laboratory selection and methods for the purpose of certifying MTRUW for transportation to WIPP must be certified to the requirements of the WIPP WAP. For wastes to be stored at LANL, analytical laboratories at LANL and/or approved subcontractor laboratories will perform the detailed qualitative and quantitative chemical analyses specified in Table B-18 of this WAP. These laboratories must have:

- The capability of handling TRU waste
- A documented comprehensive QA/QC program
- Technical analytical expertise
- A document control/records management plan
- The capability to perform data reduction, validation, and reporting.

The selection and development of analytical testing methods for LANL MTRUW streams were based on the following considerations:

- The physical form of the waste
- Analytes of interest
- Information requirements (e.g., verify compliance with LDR treatment standards, waste classification).

Collectively, these factors contributed to the selection of the analytical methods specified in Table B-18. Qualified analytical laboratories at LANL and/or approved subcontractor laboratories that meet the above criteria will be used for the required analytes.

B.3.3 Remediation Waste Characterization

Remediation waste is defined in 20.4.1 NMAC § 260.10 as all solid and hazardous waste, and all media and debris, which contain listed hazardous wastes or which themselves exhibit a hazardous waste characteristic, that are managed for the purposes of implementing corrective action requirements. At LANL, ER Project remediation wastes are generated from a wide variety of activities, including, but not limited to, site investigations, corrective actions (e.g., interim actions, interim measures, voluntary corrective actions, voluntary corrective measures, and corrective measures study/corrective measures implementation), drilling projects, closures, and D&D activities. These remediation wastes consist primarily of contaminated soil and structural debris. Investigation-derived waste, a subset of remediation wastes, may include small amounts of samples, personal protective equipment, contaminated sampling supplies, plastic, environmental media (e.g., drill cuttings and/or core material, well development and purge waters), and decontamination fluids.

The Laboratory's ER Project has developed two standard operating procedures (SOP) to fully address characterization of remediation waste, which form the basis for the information provided in this WAP. The SOPs are subject to change and the following discussion is provided for information purposes only. The SOPs are "Management of Environmental Restoration Project Waste," ER-SOP-01.06 (LANL, 2001a), which describes the process for managing ER Project waste generated during corrective action, and "Waste Characterization," ER-SOP-01.10 (LANL, 2001b), which describes the development of a strategy for characterizing wastes generated during specific corrective action-related activities implemented by the ER Project. These SOPs provide specific, mandatory, and uniform procedures for managing and characterizing remediation waste and incorporate, by reference, the most current version of Laboratory Implementation Requirements (LIR) and Laboratory Implementation Guidance (LIG) associated with waste management.

ER-SOP-01.06 provides definitions and references for all types and categories of waste, corresponding waste documentation, waste management personnel, and applicable ER Project policies. The SOP describes training requirements for any ER Project personnel managing waste, and references ER-SOP-01.10 for the completion of a Waste Characterization Strategy Form (WCSF).

ER-SOP-01.10 identifies the steps involved in waste identification and characterization as delineated by Laboratory requirements, and provides instructions for completing a WCSF. A WCSF

must be completed by ER Project personnel and subsequently reviewed and approved by appropriate personnel prior ER Project waste generation. The WCSF process for ER Project remediation waste is used in conjunction with current LIRs and LIGs associated with waste characterization and management, and with the Laboratory's current WAC document.

Completion of a WCSF includes the following steps:

- Identify potential wastes to be generated by the proposed activity through reviewing historical site information, including previously developed ER Project data and reports regarding the project site.
- Determine whether the existing data and/or documentation for the waste stream fulfill the criteria for AK specified in LIG 404-00-02, "Acceptable Knowledge Guidance."
- If the existing data do not fulfill the AK criteria specified in the LIG, develop a waste analysis suite and select test methods appropriate to identify and quantify potential contaminants. If the existing data are partially useful, develop a sampling and analysis strategy that will complete the characterization for the waste stream. If the existing data provide no useful information, develop a sampling and analysis strategy that will identify and quantify all potential constituents of concern in the waste stream.
- Identify preliminary classifications of wastes to be generated. Classifications include, but are not limited to, radioactive (including low-level and mixed low-level), RCRA solid or hazardous, polychlorinated biphenyl, and special. Wastes may be combinations of these classifications.
- List the anticipated amount of waste, by classification, to be generated as part of the ER Project activity.
- List packaging requirements.

The WCSF for a specific ER Project site or activity is amended when a new waste type or classification not previously identified on the form is to be generated or there are changes in planned field activities. Once approved, the amendment becomes part of the original WCSF. The WCSF, with instructions on its completion, is included in ER-SOP-01.10.

The information provided in a WCSF is used to aid the classification of waste generated by an ER Project activity. Waste characterization documentation is prepared for each type of waste generated and is used to document the actual characterization of a specific waste stream described in the WCSF.

B.4 OFF-SITE WASTE ACCEPTANCE PROCEDURES [20.4.1 NMAC §§ 264.13(a)(3)(ii)

and (a)(4); 264.13(b)(5); and 264.13(c)]

This section discusses general waste acceptance procedures that will be used when hazardous or mixed waste is accepted from off-site waste-generating facilities. These procedures will be used to meet the requirements of 20.4.1 NMAC §§ 264.13(a)(3)(ii), 264.13(a)(4), 264.13(b)(5), and 264.13(c) [6-14-00]. Table 2-2 of this General Part B Permit Renewal Application lists off-site waste-generating facilities that may send waste to LANL. Specific descriptions of the waste streams to be received by LANL from these facilities and the appropriate waste characterization documentation and acceptance procedures are included in Supplement 1 of this General Part B Permit Renewal Application. The basis for characterization of waste streams to be accepted by LANL is generator documentation of the waste. For off-site waste, all of LANL's routine waste characterization documentation will, at a minimum, be collected from the generator and reviewed for completeness and accuracy by LANL in accordance with standard procedures. Off-site preshipment inspection of the waste will be used to examine the waste and its documentation, if the information provided by the generator is insufficient to meet LANL WAC.

Uniform Hazardous Waste Manifests and LDR Notification Forms, as applicable, will be prepared for each shipment of off-site hazardous or mixed waste to LANL and verified by LANL waste management personnel. Upon receipt at LANL, waste shipments will be physically examined for correct documentation, presence and correctness/completeness of waste container identification and labeling, and conformance with LANL container types and waste compatibility for storage and segregation, as appropriate. If discrepancies are found, nonconformance procedures will be followed to resolve the discrepancy. Acceptable options for resolution will include shipment of the waste back to the off-site generation facility, or temporary storage pending further analysis or characterization.

If TA-54 accepts hazardous waste from an off-site facility, each shipment is inspected and analyzed as necessary to determine that it matches the waste identified on the waste manifest. These requirements are reiterated under LDR.

Additional waste characterization activities in support of WIPP certification will generally be the purpose of MTRUW shipments to LANL from off site, and discrepancies may become apparent as part of characterization, as described in Section B.3.2. Resolution of such discrepancies will be

performed in accordance with the procedures contained in each analytical method in conformance with the WIPP permit.

B.5 SPECIAL PROCEDURAL REQUIREMENTS [20.4.1 NMAC § 264.13(b)(6)]

Waste management requirements specific to ignitable, reactive, and incompatible waste, as well as for compliance with LDR and Subpart CC regulations, are described below.

B.5.1 Procedures for Ignitable, Reactive, and Incompatible Wastes to be Stored

Pursuant to 20.4.1 NMAC § 264.17 [6-14-00], specific waste management procedures for ignitable, reactive, and incompatible wastes to be stored are described as follows. These waste management methods vary depending on the physical form and type of waste managed. To ensure that these wastes are managed safely and properly, their characteristics are identified and documented as described in Section B.3, they are labeled appropriately, and the waste types are physically segregated within each container storage unit. Wastes are segregated and stored, as appropriate, by their physical characteristics (i.e., liquids or solids) and according to the following compatibility groups: (1) flammables/ignitables; (2) oxidizers; (3) corrosive acids; (4) reactive with water; (5) corrosive bases; (6) other reactives; and (7) other wastes.

B.5.2 Procedures for Ignitable, Reactive, and Incompatible Wastes to be Treated

Waste management procedures for ignitable, reactive, and incompatible wastes to be treated will be followed pursuant to 20.4.1 NMAC § 264.17 [6-14-00]. LANL personnel will take the necessary precautions to prevent accidental ignition or reaction of wastes to be treated by OB or OD. LANL relies on SOPs, hazard control plans, and other formal procedures for specific safety and handling associated with the treatment of HE waste and HE-contaminated waste. This includes, but is not limited to, the segregation of these wastes according to compatibility groups and by the physical nature of the waste (i.e., liquids and solids).

The treatment of these wastes by OB or OD is an appropriate treatment method under RCRA. It is necessary to mitigate the ignitable and/or reactive hazards associated with HE waste and HE-contaminated waste and is the preferred waste management practice for health and safety concerns.

The cementation unit will not treat ignitable, reactive, or incompatible mixed waste.

B.5.3 Procedures to Ensure Compliance with LDR Requirements [20.4.1 §§ 268.7(a) and 268.7(b)(3), (4), and (5)]

The LDR contained in 20.4.1 NMAC, Subpart VIII, Part 268, identify hazardous wastes restricted from land disposal; define those circumstances under which an otherwise prohibited waste may continue to be placed on or in a land treatment, storage, or disposal unit; specify treatment standards; and describe testing, tracking, and recordkeeping requirements for generators and TSDFs. This section describes the approach used by LANL treatment and storage facilities to comply with LDR requirements.

The characterization documentation for all waste streams to be treated or stored on-site are reviewed as described in Section B.3. The documentation is evaluated:

- To ensure that appropriate EPA Hazardous Waste Numbers and UHCs exceeding treatment standards are identified and that the wastes are accompanied by generator notifications/certifications, if required by 20.4.1 NMAC § 268.7(a).
- To determine whether the waste is exempt or excluded, already meets the treatment standards, or must be treated on site, off site, or both to meet all treatment standards.
- To identify the appropriate TSDF to which the waste will next be sent.

LANL maintains the waste characterization data and other records, as specified in Section B.3.

If waste is to be treated on site to meet the LDR requirements, the treatment unit must comply with the testing and reporting requirements of 20.4.1 NMAC § 268.7(b). After treating the waste, the treated waste/residue is evaluated to determine whether all treatment standards have been met. The treatment standards are defined in 20.4.1 NMAC §§ 268.40, 268.45, 268.48, or 268.49, depending on the type of waste treated. Residues from wastes with concentration-based treatment standards are analyzed by the appropriate methods described in Section B.3.1.2 to assure that the waste meets applicable treatment standards. For wastes or contaminated soil with treatment standards expressed by the waste extract, the TCLP procedures described in Sections B.3.1.2.1 or B.3.1.2.2 will be used.

The treatment facility prepares the certifications appropriate to excluded debris treated to 20.4.1 NMAC § 268.45 alternative standards, soil treated to 20.4.1 NMAC § 268.49 standards, characteristic wastes for which all characteristics have been treated and all Universal Treatment

Standards have been met, characteristic wastes for which all characteristics have been treated but not all treatment standards are achieved, and/or other special certifications required for materials such as soil. New waste characterization documentation, incorporating the treatment facility paperwork requirements of 20.4.1 NMAC § 268.7(b) or the generator paperwork requirements of 20.4.1 NMAC § 268.7(a) if the residue is considered a newly-generated waste or is being shipped to another TSDF, is prepared for the treated waste/residue, as appropriate. The certifications/notifications and waste characterization documentation are used to determine where the waste will be sent for further treatment, storage, or disposal. The appropriate 20.4.1 NMAC § 268.7(a) notifications are prepared before sending any waste subject to LDR to an off-site TSDF. Most receiving facilities have their own WAC requirements, specifying how the LDR information will be submitted. The receiving facilities usually require that analytical data be provided before the waste is shipped to ensure the waste meets their WAC. Waste may be sent to TA-54 or other LANL storage units after treatment or directly off-site from the treatment facility.

For wastes received from off-site, LANL will require an LDR notification that addresses all LDR requirements applicable to the specific waste type. If off-site wastes are treated at LANL, LANL will comply with the requirements of 20.4.1 NMAC §268.7(b), as discussed above.

As a permitted storage facility, LANL must comply with the 20.4.1 NMAC, Subpart VIII, Part 268, Subpart E, prohibitions on storage. Generally, wastes subject to LDR can be stored no longer than one year. However, the LDR provide relief from the storage prohibition for wastes that have received a variance or waiver from treatment or have no practical disposal alternative. Other rulemaking may also exempt waste from LDR. For example, MTRUW destined for WIPP is not be subject to LDR under the Federal Facilities Compliance Order (FFCO) and the WIPP Land Withdrawal Act. The 1992 Federal Facility Compliance Act (Pub.L. 102-386, 106 Stat. 1505) exempts LANL's mixed waste from the storage prohibitions under 20.4.1 NMAC, Subpart VIII, Part 268, so long as LANL is in compliance with a state-issued order and Site Treatment Plan (STP). NMED issued LANL an FFCO and approved an STP setting forth schedules for LDR compliance. LANL is in compliance with its FFCO and STP and, therefore, the storage prohibition under 20.4.1 NMAC, Subpart VIII, Part 268, does not apply to mixed waste covered by the FFCO.

B.5.4 Procedures to Ensure Compliance with Subpart CC Requirements [40 CFR § 264.1082]

LANL waste streams described in this document may be subject to 40 CFR, Part 264, Subpart CC, "Air Emission Standards for Tanks, Surface Impoundments, and Containers," based on applicability criteria specified in 40 CFR § 264.1080. For wastes that are not eligible for exemption under 40 CFR §264.1080(b), LANL will address the applicable Subpart CC characterization requirements. LANL requires that Subpart CC requirements be evaluated as part of the waste characterization process. Generator information is used to determine whether the concentration of VOCs in a waste stream at the point of generation is less than 500 parts per million by weight (ppmw), or is equal to or greater than 500 ppmw. The generator documents this determination for that waste stream. AK or process knowledge will be used to make this determination; however, if sampling and analysis is needed, it will be performed in accordance with the approved methods listed in Tables B-16, B-17, and B-18.

The characterization documentation for VOCs will be reviewed prior to acceptance of the waste at TA-54, as discussed in Section B.3. If process knowledge is insufficient, sampling and analysis of the waste will be required, in accordance with 20.4.1 NMAC §§ 265.1084(a)(2) through 265.1084(a)(4). Any hazardous waste that is newly-generated through the treatment or re-characterization of mixed waste will be characterized for the volatile organic content.

B.6 REFERENCES

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LANL, 1995a, "Report for the Characterization Review of Low-Level Mixed Waste," Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 1995b, "LANL's Federal Facilities Compliance Order Site Treatment Plan Background Volume," Los Alamos National Laboratory, Los Alamos, New Mexico.

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NMED, 1995, "Federal Facility Compliance Order (Los Alamos National Laboratory)," New Mexico Environment Department, Santa Fe, New Mexico.

Table B-1

Regulatory References and Corresponding Waste Analysis Plan Location

Regulatory Citation(s)	Description of Requirement	Location in the Waste Analysis Plan
§264.13	General waste analysis	Throughout document
§264.13(a)(1)	A detailed chemical and physical analysis of a representative sample of the waste prior to treatment, storage, or disposal of the waste	B.2, B.3
§264.13(a)(2)	Analysis may include data developed under Part 261 and existing published or documented data on the hazardous waste or on hazardous waste generated from similar processes	B.3.1, B.3.2, B.3.3
§264.13(a)(3)	Analysis must be repeated as necessary to ensure that it is accurate and up to date	B.3.1, B.3.2, B.3.3
§264.13(a)(3)(i)	Analysis repeated when owner/operator has reason to believe that the process or operation generating the hazardous wastes, or nonhazardous wastes if applicable under § 264.113(d), has changed	B.3.1, B.3.2, B.3.3
§264.13(a)(3)(ii)	For off-site facilities, analysis repeated when the results of the inspection required in § 264.13(a)(4) indicate that the hazardous waste received at the facility does not match the waste designated on the accompanying manifest or shipping paper	B.4
§264.13(a)(4)	Owner/operator of an off-site facility must inspect and, if necessary, analyze each hazardous waste received to determine whether it matches the identity of the waste specified on the accompanying manifest or shipping paper	B.4
§264.13(b)	Development and implementation of waste analysis plan	Entire document
§264.13(b)(1)	Parameters for which each hazardous waste, or non-hazardous waste if applicable under § 264.113(d), will be analyzed and the rationale for selection of the parameters	B.2, Tables B-9, B-10, B-11, and B-12
§264.13(b)(2)	Test methods which will be used for the proposed parameters	B.3, Tables B-13, B-14, B-16, B-17, and B-18
§264.13(b)(3)	Sampling method which will be used to obtain a representative sample of the waste to be analyzed	B.3
§264.13(b)(3)(i)	Sampling methods described in Appendix I of Part 261	B.3.1, B.3.2, B.3.3
§264.13(b)(3)(ii)	An equivalent sampling method	B.3.1, B.3.2, B.3.3
§264.13(b)(4)	Frequency with which the initial analysis of the waste will be reviewed or repeated to ensure that the analysis is accurate and up to date	B.3.1, B.3.2, B.3.3

Table B-1 (Continued)

Regulatory References and Corresponding Waste Analysis Plan Location

Regulatory Citation(s)	Description of Requirement	Location in the Waste Analysis Plan
§264.13(b)(5)	For off-site facilities, the waste analyses that hazardous waste generators have agreed to supply	B.4
§264.13(b)(6)	Where applicable, the methods to meet additional waste analysis requirements for specific waste management methods as specified in § 264.17 (ignitable, reactive, or incompatible), § 264.314 (bulk and containerized liquids), § 264.341 (waste analysis for incinerators), § 264.1034(d) (Subpart AA), § 264.1063(d) (Subpart BB), § 264.1083 (Subpart CC), and § 268.7 (Land Disposal Restrictions)	B.5
§264.13(b)(7)	The procedures and schedules for surface impoundments exempted from land disposal restrictions under § 268.4(a)	NA
§264.13(b)(7)(i)	Sampling of impoundment contents	NA
§264.13(b)(7)(ii)	Analysis of test data	NA
§264.13(b)(7)(iii)	Annual removal of residues which are not delisted under § 260.22 or which exhibit a characteristic of hazardous waste and either:	NA
§264.13(b)(7)(iii)(A)	Do not meet applicable treatment standards of Part 268, Subpart D; or	NA
§264.13(b)(7)(iii)(B)	Where no treatment standards have been established;	NA
§264.13(b)(7)(iii)(B)(1)	Such residues are prohibited from land disposal under § 268.32 or the Resource Conservation and Recovery Act § 3004(d); or	NA
§264.13(b)(7)(iii)(B)(2)	Such residues are prohibited from land disposal under § 268.33(f)	NA
§264.13(b)(8)	For owner/operator seeking an exemption to the air emission standards of Subpart CC in accordance with § 264.1082	B.5.4
§264.13(b)(8)(i)	If direct measurement is used for the waste determination, the procedures and schedules for waste sampling and analysis and the results of the analysis of test data to verify the exemption	B.5.4
§264.13(b)(8)(ii)	If knowledge of the waste is used for the waste determination, any information prepared by the facility owner/operator or by the generator of the hazardous waste if the waste is received from off-site, that is used as the basis for knowledge of the waste	B.5.4
§264.13(c)	For off-site facilities, the procedures which will be used to inspect and, if necessary, analyze each movement of hazardous waste received at the facility to ensure that it matches the identity of the waste designated on the accompanying manifest or shipping paper	B.4

Table B-1 (Continued)

Regulatory References and Corresponding Waste Analysis Plan Location

Regulatory Citation(s)	Description of Requirement	Location in the Waste Analysis Plan
§264.13(c)(1)	The procedures to determine the identity of each movement of waste managed at the facility	B.4
§264.13(c)(2)	The sampling method which will be used to obtain a representative sample of the waste to be identified, if the identification method includes sampling	B.4
§264.13(c)(3)	The procedures for an off-site landfill receiving containerized hazardous wastes to determine whether a hazardous waste generator or treater has added a biodegradable sorbent to the waste in the container	NA

[a] NA = not applicable

Table B-2
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Spent Solvents	Research and development (R&D) activities; laser research; organic and inorganic chemistry research (e.g., solvent extractions, liquid chromatography solvents, polymer synthesis, and distillations); cleaning; and degreasing operations	Acceptable Knowledge[d] Sampling and Analysis	D001	Ignitability	NA[e]	Acetone, Acetonitrile, Antimony, Benzene, Cadmium, Cyanides (Total), 1,2-Dichloroethane, 1,4-Dioxane, Ethyl ether, Methanol, Methylene chloride, Toluene, Trichloroethylene, Triethylamine
			D002	Corrosivity	NA[e]	
			D003	Reactivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D019	Carbon tetrachloride	0.5	
			D021	Chlorobenzene	100.0	
			D022	Chloroform	6.0	
			D026	Cresol	200.0[h]	
			D027	1,4-Dichlorobenzene	7.5	
			D028	1,2-Dichloroethane	0.5	
			D029	1,1-Dichloroethylene	0.7	
			D030	2,4-Dinitrotoluene	0.13	
			D032	Hexachlorobenzene	0.13	
			D034	Hexachloroethane	3.0	
			D035	Methyl ethyl ketone	200.0	
			D036	Nitrobenzene	2.0	
			D037	Pentrachlorophenol	100.0	
			D038	Pyridine	5.0	
			D040	Trichloroethylene	0.5	
			D041	2,4,5-Trichlorophenol	400.0	
			D042	2,4,6-Trichlorophenol	2.0	
			D043	Vinyl chloride	0.2	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F004	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	
			U213	Tetrahydrofuran	NA[e]	

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Contaminated Solid Wastes	Machining operations, chemistry research, decontamination and decommissioning projects, metal finishing operations, HE wastewater filtration, and general maintenance operations	Acceptable Knowledge[d] Sampling and Analysis	D001	Ignitability	NA[e]	Barium, Beryllium, Cadmium, Carbon disulfide, Chloroform, Chromium (Total), Ethel ether, Lead, Mercury-all others, Methanol, Methyl ethyl ketone, Methylene chloride, Nickel, Phenol, p,p'-DDT, Selenium, Silver, Thallium, Trichloroethylene
			D003	Reactivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D019	Carbon tetrachloride	0.5	
			D021	Chlorobenzene	100.0	
			D022	Chloroform	6.0	
			D023	o-Cresol	200.0[h]	
			D024	m-Cresol	200.0[h]	
			D025	p-Cresol	200.0[h]	
			D026	Cresol	200.0[h]	
			D027	1,4-Dichlorobenzene	7.5	
			D028	1,2-Dichloroethane	0.5	
			D029	1,1-Dichloroethylene	0.7	
			D030	2,4-Dinitrotoluene	0.13	
			D031	Heptachlor (and its epoxide)	0.008	
			D032	Hexachlorobenzene	0.13	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D035	Methyl ethyl ketone	200.0	
			D036	Nitrobenzene	2.0	
			D037	Pentrachlorophenol	100.0	
			D038	Pyridine	5.0[f]	
			D039	Tetrachloroethylene	0.7	
			D040	Trichloroethylene	0.5	
			D041	2,4,5-Trichlorophenol	400.0	
			D042	2,4,6-Trichlorophenol	2.0	
			D043	Vinyl chloride	0.2	
			F001	Spent halogented solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F004	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	
			K045	Spent carbon	NA[e]	

Refer to footnotes at end of table.

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Paint and Related Wastes	Painting and finishing operations, and general facility maintenance	Acceptable Knowledge[d] Sampling and Analysis	D001 D005 D006 D007 D008 D009 D011 D036 F003 F005	Ignitability Barium Cadmium Chromium Lead Mercury Silver Nitrobenzene Spent non-halogenated solvents Spent non-halogenated solvents	NA[e] 100.0 1.0 5.0 5.0 0.2 5.0 2.0 NA[e] NA[e]	Lead, Methyl ethyl ketone
Photographic and Photocopier Wastes	Photographic film processing and photocopier operations	Acceptable Knowledge[d] Sampling and Analysis	D001 D002 D006 D007 D008 D011	Ignitability Corrosivity Cadmium Chromium Lead Silver	NA[e] NA[e] 1.0 5.0 5.0 5.0	Silver

Refer to footnotes at end of table.

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Corrosive Liquid Wastes	Analytical chemistry research, electro-etching, and electro-polishing	Acceptable Knowledge[d] Sampling and Analysis	D001 D002 D003 D004 D005 D006 D007 D008 D009 D010 D011 D018 D022 D038 F002 F003 F005 P023	Ignitability Corrosivity Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Chloroform Pyridine Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents Chloroacetaldehyde	NA[e] NA[e] NA[e] 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 6.0 5.0 NA[e] NA[e] NA[e] NA[e]	Acetone, Arsenic, Barium, Cadmium, Chromium (Total), Cyanides (Total), 2,4-Dinitrophenol, Fluoride, Isobutyl alcohol, Lead, Mercury-all others, Methanol, Nickel, o-Nitrophenol, Selenium, Silver, Sulfide, Thallium, Triethylamine, Zinc
Solid Metals and Metallic Compounds	Machining and cutting operations; synthesis reactions; solder from electronic manufacturing, repair, and brazing operations; and grinding operations	Acceptable Knowledge[d] Sampling and Analysis	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	NA[e] NA[e] 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0	Arsenic, Lead, Nickel, Silver

Refer to footnotes at end of table.

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Contaminated Noncorrosive Aqueous and Nonaqueous Solutions and Sludges	Vacuum pump maintenance, analytical spectrometry, equipment cleaning and maintenance, vehicle maintenance, synthesis reactions, metal-polishing operations, and chemical research	Acceptable Knowledge[d] Sampling and Analysis	D001	Ignitability	NA[e]	Acetone, Acetonitrile, Antimony, Arsenic, Barium, Benzene, Cadmium, Carbon tetrachloride, Chromium (Total), Chrysene, p-Cresol, m-Dichlorobenzene, 1,2-Dichloroethane, 4,6-Dinitro-o-cresol, 1,4-Dioxane, Fluorene, Indeno(1,2,3-c,d) pyrene, Lead, Mercury-all others, Methanol, Methyl ethyl ketone, Methylene chloride, Naphthalene, p-Nitrophenol, Pyridine, Selenium, Silver, Tetrachloroethylene, Toluene, Trichloroethylene, 2,4,6-Trichlorophenol, Zinc
			D002	Corrosivity	NA[e]	
			D003	Reactivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D019	Carbon tetrachloride	0.5	
			D021	Chlorobenzene	100.0	
			D022	Chloroform	6.0	
			D023	o-Cresol	200.0[h]	
			D024	m-Cresol	200.0[h]	
			D025	p-Cresol	200.0[h]	
			D026	Cresol	200.0[h]	
			D027	1,4-Dichlorobenzene	7.5	
			D028	1,2-Dichloroethane	0.5	
			D029	1,1-Dichloroethylene	0.7	
			D030	2,4-Dinitrotoluene	0.13[f]	
			D032	Hexachlorobenzene	0.13[f]	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D035	Methyl ethyl ketone	200.0	
			D036	Nitrobenzene	2.0	
			D037	Pentrachlorophenol	100.0	
			D038	Pyridine	5.0	
			D039	Tetrachloroethylene	0.7	
			D040	Trichloroethylene	0.5	
			D041	2,4,5-Trichlorophenol	400.0	
			D042	2,4,6-Trichlorophenol	2.0	
			D043	Vinyl chloride	0.2	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F004	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	

Refer to footnotes at end of table.

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Mercury Wastes	Lamp replacement, chemical research, mercury spill cleanup, and equipment cleaning and maintenance	Acceptable Knowledge[d] Sampling and Analysis	D003 D008 D009 D011 U151	Reactivity Lead Mercury Silver Mercury	NA[e] 5.0 0.2 5.0 NA[e]	Barium, Chromium (Total), Mercury-all others, Thallium, Zinc
Used Batteries and Battery Fluids	Equipment maintenance	Acceptable Knowledge[d]	D002 D003 D006 D007 D008 D009 D011 D038	Corrosivity Reactivity Cadmium Chromium Lead Mercury Silver Pyridine	NA[e] NA[e] 1.0 5.0 5.0 0.2 5.0 5.0[f]	Cadmium, Lead, Pyridine, Silver
Unused/Off-specification Commercial Chemical Products	R&D, spill residues, and general facility operations	Acceptable Knowledge[d] Sampling and Analysis	D001 D002 D003 D004 through D043 All P- and U-listed EPA Hazardous Waste Numbers[g]	Ignitability Corrosivity Reactivity Toxicity characteristic wastes Discarded commercial chemical products and off-specification species	NA[e] NA[e] NA[e] -[c] NA[e]	Acetonitrile, Barium, Cadmium, Chromium (Total), Lead, Mercury-all others, Nickel, Selenium, Silver, Toluene

Refer to footnotes at end of table.

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Gas Cylinder Waste	R&D and general facility operations	Acceptable Knowledge[d]	D001	Ignitability	NA[e]	
			D002	Corrosivity	NA[e]	
			D003	Reactivity	NA[e]	
			Potential D-coded EPA Hazardous Waste Numbers	Toxicity characteristic wastes	-[c]	
			Potential P-and U-listed EPA Hazardous Waste Numbers[g]	Discarded commercial chemical products and off-specification species	NA[e]	
Environmental Restoration (ER) Soils and Sludges	Site decommissioning, site characterization, and site remediation; includes septic tank and detention basin closure, removal actions, and other remedial actions and site closures	Acceptable Knowledge[d] Sampling and Analysis	D001	Ignitability	NA[e]	Barium, Cadmium, Lead
			D003	Reactivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D022	Chloroform	6.0	
			D030	2,4-Dinitrotoluene	0.13[f]	
			D032	Hexachlorobenzene	0.13[f]	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D036	Nitrobenzene	2.0	
			D039	Tetrachloroethylene	0.7	
			D040	Trichloroethylene	0.5	
			D042	2,4,6-Trichlorophenol	2.0	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	

Refer to footnotes at end of table.

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
ER Aqueous Liquids	Decontamination of remedial equipment, drilling fluids and well development fluids, septic tank liquids, and contaminated storm water runoff	Acceptable Knowledge[d] Sampling and Analysis	D001	Ignitability	NA[e]	
			D002	Corrosivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D038	Pyridine	5.0	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	
ER Debris	Site decommissioning, site characterization, and site remediation; includes septic tank and detention basin closure, removal actions, and other remedial actions and site closures	Acceptable Knowledge[d]	D001	Ignitability	NA[e]	Barium, Lead
			D003	Reactivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D022	Chloroform	6.0	
			D030	2,4-Dinitrotoluene	0.13[f]	
			D032	Hexachlorobenzene	0.13[f]	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D036	Nitrobenzene	2.0	
			D039	Tetrachloroethylene	0.7	
			D040	Trichloroethylene	0.5	
			D042	2,4,6-Trichlorophenol	2.0	

Refer to footnotes at end of table.

Table B-2 (Continued)
Descriptions of Hazardous Waste Stored at LANL

Waste Description[a]	Waste-Generating Process[a]	Basis for Characterization[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
ER Debris (continued)			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	

a Denotes information from the Los Alamos National Laboratory waste characterization documentation database.
b U.S. Environmental Protection Agency.
c A solid waste exhibits the characteristics of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986), the extract from a representative sample of the waste contains any of the contaminants listed (D004-D043) at a concentration equal to or greater than the respective value given in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subpart II, Part 261, Subpart C [6-14-00].
d Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994. "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.
e Not applicable: Refers to the absence of regulatory limits for ignitable, corrosive, and reactive characteristic wastes and F-, P-, and U-listed wastes.
f The quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level (20.4.1 NMAC, Subpart II, 261.24, Table 1) [6-14-00].
g Refers to the P- and U-listed wastes found in the "Los Alamos National Laboratory General Part A Permit Application," Revision 3.0, 2002, Los Alamos National Laboratory, Los Alamos, New Mexico.
h If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 milligrams per liter.

Note: Fluoride, sulfide, vanadium, and zinc are not "underlying hazardous constituents" in characteristic wastes, according to the definition in § 268.2(i). Selenium is not an underlying hazardous constituent as defined at § 268.2(i) because its Universal Treatment Standard level is greater than its Toxicity Characteristic level, thus a treated selenium waste would always be characteristically hazardous, unless it is treated to below its characteristic level.

Refer to footnotes at end of table.

Table B-3

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Solid Wastes						
Soils with Heavy Metals	Decontamination and decommissioning (D&D) and Environmental Restoration (ER) activities	Acceptable Knowledge[d] and Preliminary Analysis[e]	D004 D005 D006 D007 D008 D009 D010 D011	Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0	Arsenic, Barium, Chromium (Total), Mercury-all others, Selenium, Vanadium, Zinc
Environmental Restoration Soils	Remediation of release sites and D&D activities	Acceptable Knowledge[d] Sampling and Analysis	D005 D006 D007 D008 D009 D028 D029 F001 F002 F004 F005	Barium Cadmium Chromium Lead Mercury 1,2-Dichloroethane 1,1-Dichloroethylene Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	100.0 1.0 5.0 5.0 0.2 0.5 0.7 NA[e] NA[e] NA[e] NA[e]	Chromium (Total), Lead
Inorganic Solid Oxidizers	D&D of research laboratories and research and development (R&D)	Acceptable Knowledge[d]	D001 D003 D005	Ignitability Reactivity Barium	NA[e] NA[e] 100.0	
Lead Waste	Radioisotope experiments and other reactor, accelerator, laser, and x-ray activities	Acceptable Knowledge[d]	D002 D003 D007 D008 D009	Corrosivity Reactivity Chromium Lead Mercury	NA[e] NA[e] 5.0 5.0 0.2	Lead
Noncombustible Debris	Maintenance, D&D, R&D, and ER activities	Acceptable Knowledge[d]	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011 F002 F005	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Spent halogenated solvents Spent non-halogenated solvents	NA[e] NA[e] 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 NA[e] NA[e]	Arsenic, Cadmium, Chromium (Total), Lead, Mercury-all others

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Solid Wastes (Continued)						
Combustible Debris	Maintenance, R&D, D&D, and ER activities	Acceptable Knowledge[d]	D001	Ignitability	NA[e]	Lead, Mercury-all others, Nickel, Zinc
			D003	Reactivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	
Organic-Contaminated Noncombustible Solids	Vacuum pump maintenance, R&D, D&D, and ER activities	Acceptable Knowledge[d]	D001	Ignitability	NA[e]	Methoxychlor, Methyl ethyl ketone
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D027	1,4-Dichlorobenzene	7.5	
			D030	2,4-Dinitrotoluene	0.13[f]	
			D032	Hexachlorobenzene	0.13[f]	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D035	Methyl ethyl ketone	200.0	
			D037	Pentrachlorophenol	100.0	
			D038	Pyridine	5.0[f]	
			D041	2,4,5-Trichlorophenol	400.0	
			D042	2,4,6-Trichlorophenol	2.0	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F004	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Solid Wastes (Continued)						
Organic-Contaminated Combustible Solids	Maintenance, D&D, and ER activities	Acceptable Knowledge[d]	D001 D003 D007 D008 D009 D030 D035 F001 F002 F003 F005	Ignitability Reactivity Chromium Lead Mercury 2,4-Dinitrotoluene Methyl ethyl ketone Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents Spent non-halogenated solvents	NA[e] NA[e] 5.0 5.0 0.2 0.13[f] 200.0 NA[e] NA[e] NA[e] NA[e]	
Water-Reactive Wastes	Cleanup of HE firing-site debris, machining and disassembly of test components	Acceptable Knowledge[d]	D001 D003 D005 F002	Ignitability Reactivity Barium Spent halogenated solvents	NA[e] NA[e] 100.0 NA[e]	
Mercury Wastes	Cleanup operations	Acceptable Knowledge[d]	D005 D007 D008 D009 F001	Barium Chromium Lead Mercury Spent halogenated solvents	100.0 5.0 5.0 0.2 NA[e]	Mercury-all others
Unused Solid Reagent Chemical Wastes	R&D activities	Acceptable Knowledge[d]	D001 D002 D003 All P- and U-listed EPA Hazardous Waste Numbers[h]	Ignitability Corrosivity Reactivity Discarded commercial chemical products and off-specification species	NA[e] NA[e] NA[e] NA[e]	

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Liquid Wastes						
Spent Solvents and Contaminated Solvent Mixtures	Maintenance, cleaning, and degreasing activities: R&D; processing operations, such as extraction, bench-scale experimental inorganic chemistry, environmental analysis, radiochemistry	Acceptable Knowledge[d]	D001	Ignitability	NA[e]	Tribromomethane (Bromoform)
			D002	Corrosivity	NA[e]	
			D004	Arsenic	5.0	
			D005	Barium	100.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D011	Silver	5.0	
			D018	Benzene	0.5	
			D019	Carbon tetrachloride	0.5	
			D021	Chlorobenzene	100.0	
			D022	Chloroform	6.0	
			D027	1,4-Dichlorobenzene	7.5	
			D028	1,2-Dichloroethane	0.5	
			D030	2,4-Dinitrotoluene	0.13[f]	
			D032	Hexachlorobenzene	0.13[f]	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D036	Nitrobenzene	2.0	
			D042	2,4,6-Trichlorophenol	2.0	
			D043	Vinyl chloride	0.2	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Liquid Wastes (Continued)						
Corrosive Liquid Wastes	Radiochemistry research, plutonium-processing operations, and analytical chemistry	Acceptable Knowledge[d]	D001 D002 D004 D006 D007 D008 D009 D010 D011 D036 D043 F001 F002 F005	Ignitability Corrosivity Arsenic Cadmium Chromium Lead Mercury Selenium Silver Nitrobenzene Vinyl chloride Spent halogenated solvents Spent halogenated solvents Spent non-halogenated solvents	NA[e] NA[e] 5.0 1.0 5.0 5.0 0.2 1.0 5.0 2.0 0.2 NA[e] NA[e] NA[e]	Arsenic, Barium, Bromodichloromethane, Chromium (Total), Lead, Nickel, Silver
Aqueous and Nonaqueous Liquids Contaminated with Heavy Metals and/or Organics	ER activities, metal-polishing operations, and radiochemistry research	Acceptable Knowledge[d] Sampling and Analysis[i]	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011 D018 D019 D021 D022 D023 D024 F002 F005	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform o-Cresol m-Cresol Spent halogenated solvents Spent non-halogenated solvents	NA[e] NA[e] 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 200.0[g] 200.0[g] NA[e] NA[e]	Chromium (Total), 1,2-Dichloroethane, Selenium

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Liquid Wastes (Continued)						
Oil Wastes	Equipment maintenance operations	Acceptable Knowledge[d]	D004	Arsenic	5.0	Diethylphthalate, Di-n-butyl phthalate, Hexachlorobenzene, Hexachlorocyclopentadiene, Nitrobenzene, Thallium, 2,4,5-Trichlorophenol, Silver
			D005	Barium	100.0	
			D006	Cadmium	1.0	
			D007	Chromium	5.0	
			D008	Lead	5.0	
			D009	Mercury	0.2	
			D010	Selenium	1.0	
			D018	Benzene	0.5	
			D019	Carbon tetrachloride	0.5	
			D027	1,4-Dichlorobenzene	7.5	
			D028	1,2-Dichloroethane	0.5	
			D030	2,4-Dinitrotoluene	0.13[f]	
			D032	Hexachlorobenzene	0.13[f]	
			D033	Hexachlorobutadiene	0.5	
			D034	Hexachloroethane	3.0	
			D036	Nitrobenzene	2.0	
			D037	Pentrachlorophenol	100.0	
			D038	Pyridine	5.0[f]	
			D041	2,4,5-Trichlorophenol	400.0	
			D042	2,4,6-Trichlorophenol	2.0	
			D043	Vinyl chloride	0.2	
			F001	Spent halogenated solvents	NA[e]	
			F002	Spent halogenated solvents	NA[e]	
			F003	Spent non-halogenated solvents	NA[e]	
			F005	Spent non-halogenated solvents	NA[e]	
Unused Liquid Reagent Chemical Wastes	R&D activities	Acceptable Knowledge[d]	D001	Ignitability	NA[e]	
			D002	Corrosivity	NA[e]	
			D035	Methyl ethyl ketone	200.0	
			All P- and U-listed EPA Hazardous Waste Numbers[h]	Discarded commercial chemical products and off-specification species	NA[e]	

Table B-3 (Continued)

Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description[a]	Waste Generating Activity[a]	Basis for Hazardous Waste Designation[a]	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents
Gas Cylinder Waste						
Gas Cylinder Waste	R&D and general facility operations	Acceptable Knowledge[d]	D001 D002 D003 Potential D-coded EPA Hazardous Waste Numbers Potential P- and U-listed EPA Hazardous Waste Numbers[i]	Ignitability Corrosivity Reactivity Toxicity characteristic wastes Discarded commercial chemical products and off-specification species	NA[e] NA[e] NA[e] -[c] NA[e]	

[a] Denotes information from the Los Alamos National Laboratory waste characterization documentation database.
[b] U.S. Environmental Protection Agency.
[c] A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986), the extract from a representative sample of the waste contains any of the contaminants listed (D004-D043) at a concentration equal to or greater than the respective value given in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subpart II, Part 261, Subpart C [6-14-00].
[d] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.
[e] Not applicable: Refers to the absence of regulatory limits for ignitable, corrosive, and reactive characteristic wastes and F-, P-, and U-listed wastes.
[f] The quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level (20.4.1 NMAC, Subpart II, 261.24, Table 1 [6-14-00]).
[g] If o-, m-, and p-Cresol concentrations cannot be differentiated, the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 milligrams per liter.
[h] Refers to the P- and U-listed wastes found in the "Los Alamos National Laboratory General Part A Permit Application," Revision 3.0, 2002, Los Alamos National Laboratory, Los Alamos, New Mexico.

Note: Fluoride, sulfide, vanadium, and zinc are not "underlying hazardous constituents" in characteristic wastes, according to the definition in § 268.2(i). Selenium is not an underlying hazardous constituent as defined at § 268.2(i) because its Universal Treatment Standard level is greater than its Toxicity Characteristic level, thus a treated selenium waste would always be characteristically hazardous, unless it is treated to below its characteristic level.

Table B-4

LANL MTRUW Stream Waste Matrix Codes Correlated with LANL Waste Identification Systems

Summary Category Group	Waste Matrix Code	Waste Stream Description	RSWD Code[a]		IDC[b]		TRUCON Code[c]	
S3000 - Homogeneous	S3100	Homogeneous Inorganic, Cemented	A-25 A-26 A-76	Leached Process Residues Evaporator Bottoms/Salts Cement Paste	002 006	Cemented Aqueous Waste Solidified Inorganic and Organic Process Solids	LA111 LA114	Solidified Aqueous or Homogeneous Inorganic Solids Solidified Inorganic Process Solids
	S3100	Homogeneous Inorganic, Cemented Organics					LA126	Solidified Organic Process Solids
	S3100	Homogeneous Inorganic, Non-cemented	A-75	Chemical Treatment Sludge	003	Stabilized Aqueous Waste (dewatered sludge)	LA122 LA130	Solid Inorganic Waste Ash
	S3100	Homogeneous Inorganic, Salts	A-27 A-28 A-29	Nitrate Salts Chloride Salts Hydroxide Cake		Salt Waste	LA124	Pyrochemical Salt Waste
	S3100	Homogeneous Inorganic, Vermiculite	A-20 A-21	Hydrocarbon Oil – Liquid (Absorbed) Silicon-Based - Liquid (Absorbed)			LA112	Solidified Organic Waste
S4000 – Soil/Gravel	S4100	Soil	A-90	Radioactively-Contaminated Soil				

Table B-4 (Continued)

LANL MTRUW Stream Waste Matrix Codes Correlated with LANL Waste Identification Systems

Summary Category Group	Waste Matrix Code	Waste Stream Description	RSWD Code[a]		IDC[b]		TRUCON Code[c]	
S5000 - Debris	S5300	Combustible Debris	A-14	Combustible Decon Waste	004	Combustible Waste	LA116	Combustible Debris
			A-15	Cellulosics				
			A-16	Plastics				
			A-17	Rubber Materials				
			A-18	Combustible Lab Trash				
			A-35	Combustible Building Debris				
			A-40	Combustible Hot-Cell Waste				
			A-60	Other Combustibles				
	S5400	Heterogeneous Debris	A-10	Graphite Solids	001	Metal Scrap and Incidental Combustibles	LA115	Graphite Waste
			A-19	Combined Combustible/Non-Combustible Lab Trash	005	Combined Noncombustible / Combustible Waste	LA117	Metal Waste
			A-30	PN Equipment	005LG	Glass Waste	LA118	Glass Waste
			A-31	Non-PN Equipment	005LM	Metal Waste	LA119	HEPA Filter Waste
			A-36	Noncombustible Building Debris	005P1	Leaded Rubber and Metal Waste	LA123	Leaded Rubber and Metal Waste

Table B-4 (Continued)

LANL MTRUW Stream Waste Matrix Codes Correlated with LANL Waste Identification Systems

Summary Category Group	Waste Matrix Code	Waste Stream Description	RSWD Code[a]		IDC[b]		TRUCON Code[c]	
			A-41	Noncombustible Hot-Cell Waste	005P2G	Graphite Waste	LA125	Mixed Combustible / Noncombustible Waste
			A-46	Skull and Oxide				
			A-47	Slag and Porcelain				
			A-50	Metal Crucibles, Scrap, Dies				
			A-51	Precious Metals				
			A-52	Scrap Metal				
			A-55	Filter Media				
			A-56	Filter Media Residue				
			A-61	Other Noncombustibles				
			A-72	Beryllium Contaminated Debris				
			A-74	Ion Exchange Resin				
			A-80	Irradiation Sources				
			A-85	Firing Point Residues				
			A-95	Glass				

[a] RSWD = Radioactive Solid Waste Disposal [codes]
[b] IDC = Item Description Code
[c] TRUCON = TRUPACT-II Content [codes]

Table B-5

Descriptions of Mixed Transuranic Waste Stored at LANL[a]

Summary Category Group	Waste Matrix Code	Waste Stream Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents[f]
S3000 - Homogeneous	S3100	Homogeneous Inorganic, Cemented	Plutonium processing operations	Acceptable Knowledge[d]	D002	Corrosive	NA[e]	
					D003	Reactive	NA[e]	
					D004	Arsenic	5.0	
					D005	Barium hydroxide	100.0	
		Homogeneous Inorganic, Cemented Organics	Plutonium processing operations	Acceptable Knowledge[d]	D006	Cadmium	1.0	
					D007	Chromium	5.0	
					D008	Lead	5.0	
					D009	Mercury	0.2	
		Homogeneous Inorganic, Non-cemented	Plutonium processing operations	Acceptable Knowledge[d]	D010	Selenium	1.0	
					D011	Silver	5.0	
					D018	Benzene	0.5	
					D019	Carbon tetrachloride	0.5	
		Homogeneous Inorganic, Salts	Plutonium processing operations	Acceptable Knowledge[d]	D021	Chlorobenzene	100.0	
					D022	Chloroform	6.0	
					D035	Methyl ethyl ketone	200.0	
					D038	Pyridine	5.0[g]	
					D039	Tetrachloroethylene	0.7	
					D040	Trichloroethylene	0.5	
					F001	Spent halogenated solvents	NA[e]	
					F002	Spent halogenated solvents	NA[e]	
					F003	Spent non-halogenated solvents	NA[e]	
					F005	Spent non-halogenated solvents	NA[e]	

Table B-5 (Continued)

Descriptions of Mixed Transuranic Waste Stored at LANL[a]

Summary Category Group	Waste Matrix Code	Waste Stream Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents[f]
S3000 - Homogeneous	S3100	Homogeneous Inorganic, Vermiculite	Plutonium processing operations	Acceptable Knowledge[d]	D002	Corrosive	NA[e]	
					D004	Arsenic	5.0	
					D005	Barium hydroxide	100.0	
					D006	Cadmium	1.0	
					D007	Chromium	5.0	
					D008	Lead	5.0	
					D009	Mercury	0.2	
					D010	Selenium	1.0	
					D011	Silver	5.0	
					D018	Benzene	0.5	
					D019	Carbon tetrachloride	0.5	
					D021	Chlorobenzene	100.0	
					D022	Chloroform	6.0	
					D027	1,4-Dichlorobenzene	7.5	
					D028	1,2-Dichloroethane	0.5	
					D030	2,4-Dinitrotoluene	0.13[g]	
					D032	Hexachlorobenzene	0.13[g]	
					D033	Hexachlorobutadiene	0.5	
					D034	Hexachloroethane	3.0	
					D035	Methyl ethyl ketone	200.0	
					D036	Nitrobenzene	2.0	
					D037	Pentachlorophenol	100.0	
					D038	Pyridine	5.0[g]	
					D039	Tetrachloroethylene	0.7	
					D040	Trichloroethylene	0.5	
					D042	2,4,6-Trichlorophenol	2.0	
					D043	Vinyl Chloride	0.2	
					F001	Spent halogenated solvents	NA[e]	
					F002	Spent halogenated solvents	NA[e]	
					F003	Spent non-halogenated solvents	NA[e]	
					F005	Spent non-halogenated solvents	NA[e]	

Table B-5 (Continued)

Descriptions of Mixed Transuranic Waste Stored at LANL[a]

Summary Category Group	Waste Matrix Code	Waste Stream Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents[f]
S4000 – Soil/ Gravel	S4100	Soil	D&D	Acceptable Knowledge[d]	D004	Arsenic	5.0	D004
					D005	Barium hydroxide	100.0	D005
					D006	Cadmium	1.0	D006
					D007	Chromium	5.0	D007
					D008	Lead	5.0	D008
					D009	Mercury	0.2	D009
					D010	Selenium	1.0	D010
					D011	Silver	5.0	D011
					D018	Benzene	0.5	D018
					D019	Carbon tetrachloride	0.5	D019
					D021	Chlorobenzene	100.0	D021
					D022	Chloroform	6.0	D022
					D035	Methyl ethyl ketone	200.0	D035
					D038	Pyridine	5.0[g]	D038
					D039	Tetrachloroethylene	0.7	D039
					D040	Trichloroethylene	0.5	D040
					F001	Spent halogenated solvents	NA[e]	F001
					F002	Spent halogenated solvents	NA[e]	F002
					F003	Spent non-halogenated solvents	NA[e]	F003
					F005	Spent non-halogenated solvents	NA[e]	F005

Table B-5 (Continued)

Descriptions of Mixed Transuranic Waste Stored at LANL[a]

Summary Category Group	Waste Matrix Code	Waste Stream Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[b] Hazardous Waste Numbers	Potential Hazardous Waste Constituents and/or Characteristics	Regulatory Limits[c] (milligrams per liter)	Potential Underlying Hazardous Constituents[f]
S5000 - Debris	S5300	Combustible Debris	Plutonium processing operations	Acceptable Knowledge[d]	D003	Reactive	NA[e]	
					D004	Arsenic	5.0	
					D005	Barium hydroxide	100.0	
					D006	Cadmium	1.0	
					D007	Chromium	5.0	
					D008	Lead	5.0	
					D009	Mercury	0.2	
					D010	Selenium	1.0	
					D011	Silver	5.0	
					D018	Benzene	0.5	
					D019	Carbon tetrachloride	0.5	
					D021	Chlorobenzene	100.0	
					D022	Chloroform	6.0	
					D035	Methyl ethyl ketone	200.0	
					D038	Pyridine	5.0[g]	
					D039	Tetrachloroethylene	0.7	
					D040	Trichloroethylene	0.5	
					D043	Vinyl Chloride	0.2	
					F001	Spent halogenated solvents	NA[e]	
					F002	Spent halogenated solvents	NA[e]	
					F003	Spent non-halogenated solvents	NA[e]	
					F004	Spent non-halogenated solvents	NA[e]	
					F005	Spent non-halogenated solvents	NA[e]	
					U080	Methylene Chloride	NA[e]	
	S5400	Heterogeneous Debris	Plutonium processing operations; D&D	Acceptable Knowledge[d]				

Table B-5 (Continued)

Descriptions of Mixed Transuranic Waste Stored at LANL[a]

[a] This table is based on information from the *Acceptable Knowledge Information Summary for Los Alamos National Laboratory Transuranic Waste Streams* (AKIS), (TWCP-AK-2.1-019, R.0) (LA-UR-03-4870); and from waste characterization documentation information maintained by the Facility and Waste Operations Division. Waste with EPA Hazardous Waste Numbers that are not included in the Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit will not be transported to WIPP.

[b] U.S. Environmental Protection Agency.

[c] A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986), the extract from a representative sample of the waste contains any of the contaminants listed at a concentration equal to or greater than the respective value given in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart II, Part 261, Subpart C [6-14-00].

[d] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

[e] Not Applicable.

[f] Potential underlying hazardous constituents (UHC) have been included, where the information is available. UHC characterization for the purpose of Land Disposal Restrictions will not apply for mixed transuranic waste to be disposed of at WIPP.

[g] Quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level.

Note: Fluoride, sulfide, vanadium, and zinc are not "underlying hazardous constituents" in characteristic wastes, according to the definition in § 268.2(i). Selenium is not an underlying hazardous constituent as defined at § 268.2(i) because its Universal Treatment Standard level is greater than its Toxicity Characteristic level, thus a treated selenium waste would always be characteristically hazardous, unless it is treated to below its characteristic level.

Table B-6

Descriptions of High Explosives (HE) Waste and HE-Contaminated Waste Treated by Open Burning at LANL

Waste Description	Waste Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[a] Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits[b] (milligrams per liter)
HE-Contaminated Water	Laboratory analysis; HE processing; maintenance, Environmental Restoration (ER), decontamination and decommissioning (D&D), research and development (R&D), and drilling activities	Acceptable Knowledge[c]	D003	Reactivity	NA[d]
			D005	Barium	100.0
			D006	Cadmium	1.0
			D007	Chromium	5.0
			D008	Lead	5.0
			D009	Mercury	0.2
			D011	Silver	5.0
			D018	Benzene	0.5
			D022	Chloroform	6.0
			D028	1,2-Dichloroethane	0.5
			D029	1,1-Dichloroethylene	0.7
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			D040	Trichloroethylene	0.5
			F001	Spent halogenated solvents	NA[d]
			F002	Spent halogenated solvents	NA[d]
			F004	Spent nonhalogenated solvents	NA[d]
			F005	Spent nonhalogenated solvents	NA[d]
HE-Contaminated Oil/Solvent Waste	Laboratory analysis; dissolving HE and polymers; HE production; spills; and ER, D&D, and R&D activities	Acceptable Knowledge[c]	D001	Ignitability	NA[d]
			D002	Corrosivity	NA[d]
			D003	Reactivity	NA[d]
			D005	Barium	100.0
			D006	Cadmium	1.0
			D007	Chromium	5.0
			D008	Lead	5.0
			D009	Mercury	0.2
			D011	Silver	5.0
			D018	Benzene	0.5
			D022	Chloroform	6.0
			D028	1,2-Dichloroethane	0.5
			D029	1,1-Dichloroethylene	0.7
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0

Refer to footnotes at end of table.

Table B-6 (Continued)

Descriptions of High Explosives (HE) Waste and HE-Contaminated Waste Treated by Open Burning at LANL

Waste Description	Waste Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[a] Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits[b] (milligrams per liter)
HE-Contaminated Oil/Solvent Waste (Continued)			D038	Pyridine	5.0
			D040	Trichloroethylene	0.5
			F001	Spent halogenated solvents	NA[d]
			F002	Spent halogenated solvents	NA[d]
			F003	Spent nonhalogenated solvents	NA[d]
			F004	Spent nonhalogenated solvents	NA[d]
			F005	Spent nonhalogenated solvents	NA[d]
Solid and Scrap HE	HE-processing; R&D, ER, and D&D activities; testing operations; disposition of weapons	Acceptable Knowledge[c]	D001	Ignitability	NA[d]
			D003	Reactivity	NA[d]
			D005	Barium	100.0
			D006	Cadmium	1.0
			D007	Chromium	5.0
			D008	Lead	5.0
			D018	Benzene	0.5
			D030	2,4-Dinitrotoluene	0.13
HE-Contaminated Commercial Chemical Products	Spilled commercial chemical products contaminated with HE	Acceptable Knowledge[c]	D001	Ignitability	NA[d]
			D003	Reactivity	NA[d]
			U022	Acetone	NA[d]
			U019	Benzene	NA[d]
			U044	Chloroform	NA[d]
			U112	Ethyl acetate	NA[d]
			U154	Methanol	NA[d]
			U159	Methyl ethyl ketone	NA[d]
			U196	Pyridine	NA[d]
			U169	Nitrobenzene	NA[d]
			U220	Toluene	NA[d]
			U239	Xylene	NA[d]

Refer to footnotes at end of table.

Table B-6 (Continued)

Descriptions of High Explosives (HE) Waste and HE-Contaminated Waste Treated by Open Burning at LANL

Waste Description	Waste Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[a] Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits[b] (milligrams per liter)
Wet HE	Filtration of HE wastewater; ER, R&D, and D&D activities; HE processing	Acceptable Knowledge[c]	D001	Ignitability	NA[d]
			D003	Reactivity	NA[d]
			D005	Barium	100.0
			D006	Cadmium	1.0
			D007	Chromium	5.0
			D008	Lead	5.0
			D009	Mercury	0.2
			D011	Silver	5.0
			D018	Benzene	0.5
			D022	Chloroform	6.0
			D028	1,2-Dichloroethane	0.5
			D029	1,1-Dichloroethylene	0.7
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			D040	Trichloroethylene	0.5
			F001	Spent halogenated solvents	NA[d]
			F002	Spent halogenated solvents	NA[d]
			F003	Spent nonhalogenated solvents	NA[d]
			F004	Spent nonhalogenated solvents	NA[d]
			F005	Spent nonhalogenated solvents	NA[d]
			K044	Wastewater sludges	NA[d]
			K045	Spent carbon	NA[d]

Refer to footnotes at end of table.

Table B-6 (Continued)

Descriptions of High Explosives (HE) Waste and HE-Contaminated Waste Treated by Open Burning at LANL

Waste Description	Waste Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[a] Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits[b] (milligrams per liter)
HE-Contaminated Solid Waste	HE processing activities; D&D, ER, R&D, and drilling activities; and laboratory use	Acceptable Knowledge[c]	D001	Ignitability	NA[d]
			D002	Corrosivity	NA[d]
			D003	Reactivity	NA[d]
			D005	Barium	100.0
			D006	Cadmium	1.0
			D007	Chromium	5.0
			D008	Lead	5.0
			D009	Mercury	0.2
			D011	Silver	5.0
			D018	Benzene	0.5
			D022	Chloroform	6.0
			D028	1,2-Dichloroethane	0.5
			D029	1,1-Dichloroethylene	0.7
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			D040	Trichloroethylene	0.5
			F001	Spent halogenated solvents	NA[d]
			F002	Spent halogenated solvents	NA[d]
			F003	Spent nonhalogenated solvents	NA[d]
			F004	Spent nonhalogenated solvents	NA[d]
			F005	Spent nonhalogenated solvents	NA[d]
HE-Contaminated Equipment	HE processing; D&D, R&D, and ER activities; and laboratory use	Acceptable Knowledge[c]	D003	Reactivity	NA[d]
			D005	Barium	100.0
			D006	Cadmium	1.0
			D007	Chromium	5.0
			D008	Lead	5.0
			D009	Mercury	0.2
			D011	Silver	5.0
			D030	2,4-Dinitrotoluene	0.13

Refer to footnotes at end of table.

Table B-6 (Continued)

Descriptions of High Explosives (HE) Waste and HE-Contaminated Waste Treated by Open Burning at LANL

Waste Description	Waste Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[a] Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits[b] (milligrams per liter)
HE-Contaminated Liquid Acids, Bases, and/or Inorganic Salt Solutions	Materials used as titrants, solvents, and cleaning fluids and/or material from hydrolysis research	Acceptable Knowledge[c]	D002	Corrosivity	NA[d]
			D003	Reactivity	NA[d]
			D018	Benzene	0.5
			D022	Chloroform	6.0
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			F001	Spent halogenated solvents	NA[d]
			F002	Spent halogenated solvents	NA[d]
			F003	Spent nonhalogenated solvents	NA[d]
			F004	Spent nonhalogenated solvents	NA[d]
			F005	Spent nonhalogenated solvents	NA[d]

[a] U.S. Environmental Protection Agency. Note that these constituents will likely be present only in trace amounts.

[b] A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986), the extract from a representative sample of the waste contains any of the contaminants listed at a concentration equal to or greater than the respective value given in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart II, Part 261, Subpart C [6-14-00]. These constituents are included if they are likely to be present; however, they are not expected to exceed the toxicity characteristic limits on a routine basis.

[c] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

[d] Not applicable: refers to the absence of regulatory limits for ignitable, corrosive, reactive wastes, and F-, K-, and U-listed wastes. The amount of F-listed waste is expected to be trace in all waste streams, with the exception of the HE-contaminated spent solvent waste, which is expected to be 30 percent or more (by volume) solvent.

Table B-7

Descriptions of High Explosives (HE) Waste and HE-Contaminated Waste Treated by Open Detonation at LANL

Waste Description	Waste Generating Activity	Basis for Hazardous Waste Designation	Potential EPA[a] Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits[b] (milligrams per liter)
HE-Contaminated Solid Waste	HE processing activities; D&D, ER, R&D, and drilling activities; and laboratory use	Acceptable Knowledge[c]	D001	Ignitability	NA[d]
			D002	Corrosivity	NA[d]
			D003	Reactivity	NA[d]
			D005	Barium	100.0
			D006	Cadmium	1.0
			D007	Chromium	5.0
			D008	Lead	5.0
			D009	Mercury	0.2
			D011	Silver	5.0
			D018	Benzene	0.5
			D022	Chloroform	6.0
			D028	1,2-Dichloroethane	0.5
			D029	1,1-Dichloroethylene	0.7
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			D040	Trichloroethylene	0.5
			F001	Spent halogenated solvents	NA[d]
			F002	Spent halogenated solvents	NA[d]
			F003	Spent nonhalogenated solvents	NA[d]
			F004	Spent nonhalogenated solvents	NA[d]
			F005	Spent nonhalogenated solvents	NA[d]
Solid and Scrap HE	HE-processing; R&D, ER, and D&D activities; testing operations; disposition of weapons	Acceptable Knowledge[c]	D001	Ignitability	NA[d]
			D003	Reactivity	NA[d]
			D005	Barium	100.0
			D006	Cadmium	1.0
			D007	Chromium	5.0
			D008	Lead	5.0
			D018	Benzene	0.5
			D030	2,4-Dinitrotoluene	0.13

Table B-7 (Continued)

Descriptions of High Explosives (HE) Waste and HE-Contaminated Waste Treated by Open Detonation at LANL

[a] U.S. Environmental Protection Agency. Note that these constituents will likely be present only in trace amounts.

[b] A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986), the extract from a representative sample of the waste contains any of the contaminants listed at a concentration equal to or greater than the respective value given in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart II, Part 261, Subpart C [6-14-00]. These constituents are included if they are likely to be present; however, they are not expected to exceed the toxicity characteristic limits on a routine basis.

[c] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

[d] Not applicable: refers to the absence of regulatory limits for ignitable, corrosive, reactive wastes, and F-, K-, and U-listed wastes.

Table B-8

Descriptions of Waste Generated at Off-Site Facilities That May Be Received at LANL

Off-Site Waste Generating Facility	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste
Sandia National Laboratories/New Mexico, Albuquerque, NM	Potential mixed transuranic waste: Combustible and noncombustible debris including metals, cellulosics, rubber, plastics, organic matrices, and inorganic materials.	To be determined	To be determined	To be determined	To be determined

Table B-9
Parameters, Characterization Methods, and Rationale for Parameter Selection for Hazardous Waste

Waste Description[a]	Parameters[b]	Characterization Methods	Rationale
Spent Solvents	– Flash point (for liquid waste) – pH (for liquid waste) – RCRA[c]-regulated metals – Volatile organic compounds (VOC) – Semivolatile organic compounds (SVOC)	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, corrosivity, reactivity, and toxicity – Determine concentration of F-listed solvents
Contaminated Solid Wastes	– RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, reactivity, and toxicity – Determine concentration of F-listed solvents
Paint and Related Wastes	– Flash point (for liquid waste) – RCRA[c]-regulated metals – VOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability and toxicity – Determine concentration of F-listed solvents
Photographic and Photocopier Wastes	– Flash point (for liquid waste) – pH (for liquid waste) – RCRA[c]-regulated metals	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, corrosivity, and toxicity
Corrosive Liquid Wastes	– Flash point (for liquid waste) – pH (for liquid waste) – RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, corrosivity, and toxicity – Determine concentration of F-listed solvents
Solid Metals and Metallic Compounds	– RCRA[c]-regulated metals	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, reactivity, and toxicity
Contaminated Noncorrosive Aqueous and Nonaqueous Solutions and Sludges	– Flash point – RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, reactivity, and toxicity – Determine concentration of F-listed solvents
Mercury Wastes	– RCRA[c]-regulated metal	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characterisitc for toxicity – Determine the presence of a U-listed unused commercial chemical product
Used Batteries and Battery Fluids	– pH (for liquid waste) – RCRA[c]-regulated metals	– Acceptable Knowledge[d]	– Determine characteristic for corrosivity and toxicity
Unused/Off-specification Commercial Chemical Products	– Flash point (for liquid waste) – pH (for liquid waste) – RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, corrosivity, reactivity, and toxicity – Determine presence of P-listed or U-listed unused commercial chemical products
Gas Cylinder Waste	– RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d]	– Determine characterisitic for ignitability, corrosivity, and reactivity – Determine presence of D-coded and U- and P-listed wastes
Environmental Restoration (ER) Soils and Sludges	– RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d]	– Determine characteristic for ignitability, reactivity, and toxicity – Determine concentration of F-listed solvents

Refer to footnotes at end of table.

Table B-9 (Continued)

Parameters, Characterization Methods, and Rationale for Parameter Selection for Hazardous Waste

Waste Description[a]	Parameters[b]	Characterization Methods	Rationale
ER Aqueous Liquids	– pH – RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d]	– Determine characteristic for ignitability, corrosivity, reactivity, and toxicity – Determine concentration of F-listed solvents
ER Debris	– RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d]	– Determine characteristic for ignitability, reactivity, and toxicity – Determine concentration of F-listed solvents

[a] Information contained in this column is from the Los Alamos National Laboratory waste characterization documentation database.
[b] Parameter selection is based on acceptable knowledge for each waste stream. Additional parameters may be selected for each waste stream as necessary.
[c] Resource Conservation and Recovery Act. Use of the term "RCRA-regulated metals" refers to hazardous waste as defined in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart II, 261.24 [6-14-00].
[d] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-10

Parameters, Characterization Methods, and Rationale for Parameter Selection for Mixed Low-Level Waste

Waste Description[a]	Parameter[b]	Characterization Method	Rationale
Solid Wastes			
Soils with Heavy Metals	– RCRA-regulated metals[c]	– Acceptable Knowledge[d] – Sample and analyze randomly selected drums in waste stream	– Determine toxicity characteristic
Environmental Restoration Soils	– RCRA-regulated metals[c] – Volatile organic compounds (VOC)	– Acceptable Knowledge[d] – Sample and analyze randomly selected drums in waste stream	– Determine presence of F-listed solvents – Determine toxicity characteristic
Inorganic Solid Oxidizers	– RCRA-regulated metals[c]	– Acceptable Knowledge[d] – Sample and analyze randomly selected drums in waste stream	– Determine toxicity characteristic – Determine characteristic for ignitability and reactivity
Lead Waste	– RCRA-regulated metals[c]	– Acceptable Knowledge[d]	– Determine characteristic for reactivity – Determine toxicity characteristic
Noncombustible Debris	– RCRA-regulated metals[c]	– Acceptable Knowledge[d]	– Determine toxicity characteristic – Determine characteristic for ignitability and reactivity
Combustible Debris	– RCRA-regulated metals[c] – VOCs	– Acceptable Knowledge[d]	– Determine toxicity characteristic – Determine presence of F-listed solvents – Determine characteristic for ignitability and reactivity
Organic-Contaminated Noncombustible Solids	– RCRA-regulated metals[c] – VOCs	– Acceptable Knowledge[d]	– Determine toxicity characteristic – Determine presence of F-listed solvents
Organic-Contaminated Combustible Solids	– RCRA-regulated metals[c] – VOCs	– Acceptable Knowledge[d]	– Determine characteristic for ignitability and reactivity – Determine toxicity characteristic – Determine presence of F-listed solvents
Water-Reactive Wastes	– RCRA-regulated metals[c] – VOCs	– Acceptable Knowledge[d] – Sample and analyze randomly selected drums in waste stream	– Determine toxicity characteristic – Determine characteristic for ignitability and reactivity – Determine presence of F-listed solvents

Refer to footnotes at end of table.

Table B-10 (Continued)

Parameters, Characterization Methods, and Rationale for Parameter Selection for Mixed Low-Level Waste

Waste Description[a]	Parameter[b]	Characterization Method	Rationale
Solid Wastes (Continued)			
Mercury Wastes	– RCRA-regulated metals[c] – VOCs	– Acceptable Knowledge[d] – Sample and analyze randomly selected drums in waste stream	– Determine toxicity characteristic – Determine presence of F-listed solvents
Unused Solid Reagent Chemical Wastes	– RCRA-regulated metals[c]	– Acceptable Knowledge[d]	– Determine characteristic for ignitability and corrosivity – Determine the presence of P- and U-listed unused commercial chemical product
Liquid Wastes			
Spent Solvents and Contaminated Solvent Mixtures	– Flash point – pH – RCRA-regulated metals[c] – VOCs – Semivolatile organic compounds (SVOC)	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, corrosivity, and toxicity – Determine concentration of F-listed solvents
Corrosive Liquid Wastes	– Flash point – pH – RCRA-regulated metals[c] – SVOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability, corrosivity, and toxicity – Determine concentration of F-listed solvents
Aqueous and Nonaqueous Liquids Contaminated with Heavy Metals and/or Organics	– Flash point – RCRA-regulated metals[c] – VOCs – SVOCs	– Acceptable Knowledge[d] – Sampling and Analysis	– Determine characteristic for ignitability and toxicity – Determine concentration of F-listed solvents
Oil Wastes	– RCRA-regulated metals[c] – VOCs – SVOCs	– Acceptable Knowledge[d] – Sampling and analysis	– Determine characteristic for toxicity – Determine concentration of F-listed solvents
Unused Liquid Reagent Chemical Wastes	– Flash point – pH	– Acceptable Knowledge[d]	– Determine characteristic for ignitability and corrosivity – Determine the presence of P- and U-listed unused commercial chemical product
Gas Wastes			
Gas Cylinder Waste	– RCRA[c]-regulated metals – VOCs – SVOCs	– Acceptable Knowledge[d]	– Determine characteristic for ignitability, corrosivity, and reactivity – Determine presence of D-coded and P- and U-listed waste

[a] Information contained in this column is extracted primarily from Los Alamos National Laboratory, 1995, "LANL's Federal Facility Compliance Order Site Treatment Plan Background Volume," Los Alamos National Laboratory, Los Alamos, New Mexico.
[b] Parameter selection is based on acceptable knowledge for each waste stream. Additional parameters may be selected for each waste stream as necessary.
[c] Resource Conservation and Recovery Act. Use of the term "RCRA-regulated metals" refers to hazardous waste as defined in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart II, 261.24 [6-14-00].
[d] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-11

Parameters, Characterization Methods, and Rationale for Parameter Selection for Mixed Transuranic Waste

Summary Category Group/Description[a]	Waste Description	Parameters	Characterization Methods	Rationale
		Storage		
S3000-Homogeneous Solids	– Solidified aqueous waste (e.g., concreted/cemented aqueous waste)	– Free liquids in waste matrix – Physical form of the waste	– Visual examination – Real-time radiography (RTR) – Acceptable Knowledge[b]	– Verify physical waste form – No free liquids allowed
	– Solidified aqueous waste (e.g., dewatered sludge and chemical treatment sludge) – Solidified inorganic/organic process solids and liquids	– Resource Conservation and Recovery Act (RCRA)-regulated metals	– Sample and analyze statistically selected number of drums in waste stream – Acceptable Knowledge[b]	– Determine toxicity characteristic – Determine concentration of metals
	– Homogeneous inorganic solids – Glass/noncombustible waste – Uncemented inorganics – Absorbed organics on vermiculite	– Volatile organic compounds (VOC) in container headspace gas	– Gas chromatography / mass spectrometry (GC/MS) – Fourier transform infrared spectrometry – Gas chromatography / Flame ionization detector – Acceptable Knowledge[b]	Qualitative screening to confirm the presence of VOCs
S4000-Soils/Gravels	– Contaminated soil	– Free liquids in waste matrix – Physical form of the waste	– Visual examination – RTR – Acceptable Knowledge[b]	– Verify physical waste form – No free liquids allowed
		– RCRA-regulated metals	– Sample and analyze statistically selected number of drums in waste stream – Acceptable Knowledge[b]	– Determine toxicity characteristic – Determine concentration of metals
		– VOCs in container headspace gas	– GC/MS – Fourier transform infrared spectrometry – Gas chromatography / Flame ionization detector	Qualitative screening to confirm the presence of VOCs
S5000-Debris Waste	– Mixed metal scrap and incidental combustibles – Combustible waste – Graphite waste – Metal waste – Glass waste	– Free liquids – Physical form of the waste – VOCs in container headspace gas – VOCs and semivolatile organic compounds	– Visual examination – RTR – Acceptable Knowledge[b]	– Verify physical waste form – No free liquids allowed – Determine compliance with land disposal restrictions (LDR) treatment standards, if applicable
	– Leaded-rubber and metal waste – High-efficiency particulate air filters – Noncombustible waste – Mixed combustible / noncombustible waste	– RCRA-regulated metals	– Gas chromatography / mass spectrometry – Fourier transform infrared spectrometry – Gas chromatography / Flame ionization detector – Acceptable Knowledge[b]	– Qualitative screening to confirm the presence of VOC – Determine compliance with LDR treatment standards, if applicable

Refer to footnotes at end of table.

Table B-11 (Continued)

Parameters, Characterization Methods, and Rationale for Parameter Selection for Mixed Transuranic Waste

Summary Category Group/Description [a]	Waste Description	Parameters	Characterization Methods	Rationale
		Treatment		
L1000–Aqueous Liquids/Slurries	Evaporator bottoms solutions, aqueous waste, and laboratory solutions	– RCRA-regulated metals and corrosivity	– Acceptable Knowledge[b] – Sampling and Analysis	– Determine toxicity characteristics – Determine concentration of metals
S3000-Homogeneous Solids	Inorganic process solids and cemented inorganic process solids	– RCRA-regulated metals	– Acceptable Knowledge[b] – Sampling and Analysis	– Determine concentration of metals

[a] Information in this column is based on information from the *Acceptable Knowledge Information Summary for Los Alamos National Laboratory Transuranic Waste Streams* (AKIS), TWCP-AK-2.1-019, R.0, LA-UR-03-4870, Los Alamos National Laboratory, Los Alamos, New Mexico.

[b] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-12

Parameters, Characterization Methods, and Rationale for Parameter Selection for High Explosives (HE) Waste and HE-Contaminated Waste

Waste Description	Parameter[a]	Characterization Method	Rationale
HE-Contaminated Water	– Ignitability – Reactivity – Toxicity – Solvents from non-specific sources	– Acceptable Knowledge[b] – Field screening – Sampling and analysis	– Determine characteristic for ignitability and reactivity – Determine toxicity characteristic (metals and organics) – Determine the presence of F-listed solvents
HE-Contaminated Oil/Solvent Waste	– Corrosivity – Ignitability – Reactivity – Toxicity – Solvents from non-specific sources	– Acceptable Knowledge[b] – Sampling and analysis	– Determine characteristic for ignitability, corrosivity, and reactivity – Determine toxicity characteristic (organics) – Determine the presence of F-listed solvents
Solid and Scrap HE	– Ignitability – Reactivity – Toxicity	– Acceptable Knowledge[b]	– Determine characteristic for ignitability and reactivity – Determine toxicity characteristic (barium and dinitrotoluene)
HE-Contaminated Commercial Chemical Products	– Ignitability – Reactivity – Spill residues from commercial products	– Acceptable Knowledge[b]	– Determine characteristic for ignitability and reactivity – Determine the presence of U-listed wastes
Wet HE	– Ignitability – Reactivity – Toxicity – Solvents from non-specific sources – Specific source wastes (K wastes)	– Acceptable Knowledge[b]	– Determine characteristic for ignitability and reactivity – Determine toxicity characteristic (organics and metals) – Determine the presence of F- and K- listed solvents

Refer to footnotes at end of table.

Table B-12 (Continued)

Parameters, Characterization Methods, and Rationale for Parameter Selection for High Explosives (HE) Waste and HE-Contaminated Waste

Waste Description	Parameter[a]	Characterization Method	Rationale
HE-Contaminated Solid Waste	– Ignitability – Corrosivity – Reactivity – Toxicity – Solvents from non-specific sources	– Acceptable Knowledge[b] – Field screening – Sampling and analysis	– Determine characteristic for ignitability, corrosivity, and reactivity – Determine toxicity characteristic (organics and metals) – Determine the presence of F-listed solvents
HE-Contaminated Equipment	– Reactivity – Toxicity	– Acceptable Knowledge[b] – Field screening – Sampling and analysis	– Determine characteristic for reactivity – Determine toxicity characteristic (dinitrotoluene and metals)
HE-Contaminated Liquid Acids, Bases, and/or Inorganic Salt Solutions	– Corrosivity – Reactivity – Toxicity – Solvents from non-specific sources	– Acceptable Knowledge[b] – Field screening – Sampling and analysis	– Determine characteristic for corrosivity and reactivity – Determine toxicity characteristic (organics) – Determine the presence of F-listed solvents

[a] Parameter selection is based on process knowledge for each waste stream. Additional parameters may be selected for each waste stream as necessary.

[b] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-13

Summary of Characterization Methods for High Explosives (HE) Waste and HE-Contaminated Waste

Parameters	Method Numbers	Test Method	Rationale
HE in the Waste	SW-846 (Appropriate analytical method from the Method 8300 series)[a]	High Performance Liquid Chromatography or Acceptable Knowledge[b]	Determine HE concentrations directly in homogeneous materials or by process information.
		DX-2 Spot Test, DeTech, or other screening methods	Determine if HE is present in the waste stream.
		Acceptable Knowledge[b]	If all surfaces of heterogeneous waste cannot be directly tested or visually examined (e.g., debris or equipment) and the waste object was potentially contaminated with HE during its use.

[a] U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.

[b] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-14

Summary of Characterization Methods for Ash Generated by Open Burning[a]

Parameters	Method Numbers	Test Method	Rationale
Metals: Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	SW-846 (1311, 6010B, 7060A, 7061A)[b] (1311, 6010B, 7080A, 7081) [b] (1311, 6010B, 7130, 7131A) [b] (1311, 6010B, 7190, 7191) [b] (1311, 6010B, 7420, 7421[d]) [b] (1311, 6010B, 7470A, 7471A)[b] (1311, 6010B, 7740, 7741A, 7742)[b] (1311, 6010B, 7760A, 7761) [b] or equivalent methods[c]	Total and/or toxicity characteristic leaching procedure (TCLP) Inductively-coupled plasma atomic emission spectroscopy Atomic absorption Manual cold vapor technique Acceptable Knowledge[d]	Determine total and/or TCLP metals concentrations in samples of solid process residues
Volatile Organic Compounds	SW-846 (8260B)	Total VOC analysis by gas chromotography/mass spectrometry (GC/MS) Acceptable Knowledge[d]	Determine total VOC concentrations for comparison with Universal Treatment Standards (UTS
Semivolatile Organic Compounds	SW-846 (8270C)	Total SVOC analysis by GC/MS Acceptable Knowledge[d]	Determine total SVOC concentrations for comparison with UTS

[a] Ash generated by open burning is characterized for all TCLP metals.
[b] U.S. Environmental Protection Agency (EPA), 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C..
[c] Equivalent methods, subject to EPA approval, may be substituted.
[d] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, “Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual,” *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-15

Recommended Sample Containers[a], Preservation Techniques, and Holding Times[b]

Analyte Class and Sample Type	Container	Preservative	Holding Time
Volatile Organics			
Concentrated Waste Samples:	Method 5035: 40-milliliter (mL) vials with stirring bar. Method 5021: See method. Methods 5031 & 5032: 125-mL WM[c]-G[d]. Use Teflon-lined lids for all procedures.	Cool to 4º degrees Celsius (ºC)[e]	14 days
Aqueous Samples:			
No Residual Chlorine Present	Methods 5030, 5031, & 5032: 2 x 40-mL vials with Teflon-lined septum caps.	Cool to 4ºC and adjust pH[f] to less than 2 with H_2SO_4, HCl, or solid $NaHSO_4$	14 days
Residual Chlorine Present	Methods 5030, 5031, & 5032: 2 x 40-mL vials with Teflon-lined septum caps.	Collect sample in a 125-mL container which has been pre-preserved with 4 drops of 10% sodium thiosulfate solution. Gently swirl to mix sample and transfer to a 40-mL volatile organic analysis (VOA) vial. Cool to 4ºC and adjust pH to less than 2 with H_2SO_4, HCl, or solid $NaHSO_4$	14 days
Acrolein and Acrylonitrile	Methods 5030, 5031, & 5032: 2 x 40-mL vials with Teflon-lined septum caps.	Adjust to pH of 4-5. Cool to 4ºC	14 days
Soil/Sediments and Sludges:	Method 5035: 40-mL vials with stirring bar. Method 5021: See method. Methods 5031 & 5032: 125-mL WM[c]-G[d]. Use Teflon-lined lids for all procedures.	See the individual method	14 days

Refer to footnotes at end of table.

Table B-15 (Continued)

Recommended Sample Containers[a], Preservation Techniques, and Holding Times[b]

Analyte Class and Sample Type	Container	Preservative	Holding Time
Semivolatile Organics/Organochlorine Pesticides and Herbicides			
Concentrated Waste Samples:	125 mL WM[c]-G[d] with Teflon-lined lid	None	Samples must be extracted within 14 days and analyzed within 40 days following extraction.
Soil/Sediments and Sludges:	250 mL WM[c]-G[d] with Teflon-lined lid	Cool to 4ºC	Samples must be extracted within 14 days and analyzed within 40 days following extraction.
Liquid Samples:			
No Residual Chlorine Present	1-gallon (gal.), 2 x 0.5 gal., or 4 x 1 liter (L) AG[g] container with Teflon[ϑ]-lined lid	Cool to 4ºC	Samples must be extracted within 7 days and extracts analyzed within 40 days following extraction
Residual Chlorine Present	1-gal., 2 x 0.5 gal., or 4 x 1-L AG[g] with Teflon[ϑ]-lined lid	Add 3-mL 10% sodium thiosulfate solution per gallon (or 0.008%). Addition of sodium thiosulfate solution to sample container may be performed in the laboratory prior to field use. Cool to 4ºC.	Samples must be extracted within 7 days and extracts analyzed within 40 days following extraction
Metals			
Aqueous Samples:			
Metals (except hexavalent chromium and mercury)	1-L P[h] or G[d]	Add nitric acid to adjust pH to less than 2.	180 days
Hexavalent chromium	500-mL P[h] or G[d]	Cool to 4ºC	24 hours
Mercury	500-mL P[h] or G[d]	Add nitric acid to adjust pH to less than 2.	28 days
Soil/Sediments and Sludges:			
Metals (except hexavalent chromium and mercury)	500-mL WM[c]-P[h] or G[d]	Cool to 4ºC	180 days
Hexavalent chromium	500-mL WM[c]-P[h] or G[d]	Cool to 4ºC	Not established - analyze as soon as possible.
Mercury	500-mL WM[c]-P[h] or G[d]	Cool to 4ºC	28 days

Refer to footnotes at end of table.

Table B-15 (Continued)

Recommended Sample Containers[a], Preservation Techniques, and Holding Times[b]

[a] Smaller sample containers may be required due to health and safety concerns associated with potential radiation exposure, transportation requirements, and waste management considerations.
[b] Information primarily from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846,* U.S. Environmental Protection Agency, 1986 and all approved updates.
[c] WM = Wide-mouth
[d] G - Glass
[e] Adjust to pH of less than 2 with sulfuric acid, hydrochloric acid, or solid sodium bisulfate.
[f] A term used to describe the hydrogen-ion activity of a system.
[g] AG = Amber glass
[h] P = Polyethylene

Table B-16

Summary of Characterization Methods for Hazardous Waste

Parameter	Method Numbers	Test Methods	Rationale
Volatile organic compounds (VOC) in waste matrix: Spent halogenated solvents Spent nonhalogenated solvents	ASTM Method D4547-91[a] U.S. EPA/540/4-91/001[b] SW-846 (1311, 8260B, 8275A)[c] or equivalent methods[d] Methods included in 20.4.1 NMAC §§ 265.1084(a)(2), (a)(3), and (a)(4)	Total and/or toxicity characteristic leaching procedure (TCLP) VOC analysis by gas chromotography/mass spectrometry (GC/MS) Semivolatile organic compound (SVOC) analysis by thermal extraction/gas chromatography/mass spectrometry (TE/GC/MS) Acceptable Knowledge[f]	Determine total and/or TCLP and SVOC/VOC concentration in samples of solids or liquids
SVOCs in waste:	SW-846 (1311 and 8270C)[c] or equivalent methods[d]	Total or TCLP SVOC analysis by GC/MS Acceptable Knowledge[f]	Determine total and/or TCLP and SVOC concentration in samples of solids or liquids
Resource Conservation and Recovery Act-regulated metals in waste: Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	SW-846 (1311, 6010B, 7060A, 7061A)[c] (1311, 6010B, 7080A, 7081)[c] (1311, 6010B, 7130, 7131A)[c] (1311, 6010B, 7190, 7191)[c] (1311, 6010B, 7420, 7421)[c] (1311, 6010B, 7470A, 7471A, 7472)[c] (1311, 6010B, 7740, 7741A, 7742)[c] (1311, 6010B, 7760A, 7761)[c] or equivalent methods[d]	Total and/or TCLP Inductively-coupled plasma atomic emission spectroscopy Atomic absorption Manual cold vapor atomic absorption Anodic stripping voltammetry Acceptable Knowledge[f]	Determine total and/or TCLP concentration in samples of solids or liquids
Reactive Sulfide	SW-846, Test Method to Determine Hydrogen Sulfide Released from Wastes[e] SW-846 (9030B, 9031, 9034)[c] or equivalent methods[d]	Colorimetric, titrametric, or spectrophotometric measurement of hydrogen sulfide released from waste following reflux distillation under acidic conditions	Determine concentration of reactive sulfides
Ignitability (Flash Point)	SW-846 (1010, 1020A, 1030)[c] or equivalent methods[d]	Pensky-Martens closed cup Setaflash closed cup Ignitability of solids	Determine ignitablity
pH (Corrosivity)	SW-846 (9040B, 9041A, 9045C)[c] or equivalent methods[d]	pH electrometric measurement pH paper Soil and waste pH	Determine corrosivity

Refer to footnotes at end of table.

Table B-16 (Continued)

Summary of Characterization Methods for Hazardous Waste

[a] American Society for Testing and Materials, 1991, "Standard Practice for Sampling Waste and Soils for Volatile Organic Compounds," ASTM D4547-91, *Annual Book of ASTM Standards*, Philadelphia, Pennsylvania, American Society for Testing and Materials.

[b] U.S. Environmental Protection Agency (EPA), 1991, "Soil Sampling and Analysis for Volatile Organic Compounds," EPA 154014-91001, Office of Research and Development.

[c] U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.

[d] Equivalent methods subject to EPA approval may be substituted.

[e] *SW-846*, Section 7.3.4.2 contains specialized methods to determine if a sulfide-containing waste exhibits the reactivity characteristic.

[f] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-17

Summary of Characterization Methods for Mixed Low-Level Waste

Parameter	Method Numbers	Test Method	Rationale
Solid Wastes			
Volatile organic compounds (VOC) in waste matrix: Spent halogenated solvents Spent nonhalogenated solvents	ASTM Method D4547-91[a] U.S. EPA/540/4-91/001[b] SW-846 (1311, 8260B, 8275A)[c] or equivalent methods[d] Methods included in 20.4.1 NMAC §§ 265.1084(a)(2), (a)(3), and (a)(4)	Total and/or toxicity characteristic leaching procedure (TCLP) VOC analysis by gas chromotography/mass spectrometry (GC/MS) Semivolatile organic compounds (SVOC) analysis by thermal extraction/gas chromatography/mass spectrometry (TE/GC/MS) Acceptable Knowledge[e]	Determine total and/or TCLP and VOC concentration in samples of solid process residues and soils
SVOCs in waste:	SW-846 (1311 and 8270C)[c] or equivalent methods[d]	Total and/or TCLP SVOC analysis by GC/MS Acceptable Knowledge[e]	Determine total and/or TCLP and SVOC concentration in samples of solid process residues and soils
Resource Conservation and Recovery Act (RCRA)-regulated metals in waste: Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	SW-846 (1311, 6010B, 7060A, 7061A)[c] (1311, 6010B, 7080A, 7081)[c] (1311, 6010B, 7130, 7131A)[c] (1311, 6010B, 7190, 7191)[c] (1311, 6010B, 7420, 7421)[c] (1311, 6010B, 7470A, 7471A, 7472)[c] (1311, 6010B, 7740, 7741A, 7742)[c] (1311, 6010B, 7760A, 7761)[c] or equivalent methods[d]	Total and/or TCLP Inductively-coupled plasma atomic emission spectroscopy Atomic absorption Manual cold vapor atomic absorption Acceptable Knowledge[e]	Determine total and/or TCLP concentration in samples of solid process residues and soils
Liquid Wastes			
VOCs in waste matrix: Spent halogenated solvents Spent nonhalogenated solvents	ASTM Method D4547-91[a] EPA/540/4-91/001[b] SW-846 (1311 and 8260B)[c] or equivalent methods[d]	Total and/or TCLP VOC analysis by GC/MS Acceptable Knowledge[e]	Determine total and/or TCLP and VOC concentration in samples of liquid
SVOCs in waste:	SW-846 (1311 and 8270B)[c] or equivalent methods[d]	Total and/or TCLP SVOC analysis by GC/MS Acceptable Knowledge[e]	Determine total and/or TCLP and SVOC concentration in samples of liquid
RCRA-regulated metals in waste: Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	SW-846 (1311, 6010B, 7060A, 7061A)[c] (1311, 6010B, 7080A, 7081)[c] (1311, 6010B, 7130, 7131A)[c] (1311, 6010B, 7190, 7191)[c] (1311, 6010B, 7420, 7421)[c] (1311, 6010B, 7470A, 7471A, 7472)[c] (1311, 6010B, 7740, 7741A, 7742)[c] (1311, 6010B, 7760A, 7761)[c] or equivalent methods[d]	Total and/or TCLP Inductively-coupled plasma atomic emission spectroscopy Atomic absorption Manual cold vapor atomic absorption Anodic stripping voltammetry Acceptable Knowledge[e]	Determine total and/or TCLP concentration in samples of liquid

Refer footnotes at end of table.

Table B-17 (Continued)

Summary of Characterization Methods for Mixed Low-Level Waste

Parameter	Method Numbers	Test Method	Rationale
Liquid Wastes (Continued)			
Ignitability (Flash Point)	SW-846 (1010, 1020A, 1030)[c] or equivalent methods[d]	Pensky-Martens closed cup Setaflash closed cup Acceptable Knowledge[e]	Determine ignitability
pH (Corrosivity)	SW-846 (9040B, 9041A, 9045C)[c] or equivalent methods[d]	pH electrometric Measurement pH paper Soil and waste pH Acceptable Knowledge[e]	Determine corrosivity

[a] American Society for Testing and Materials, 1991, "Standard Practice for Sampling Waste and Soils for Volatile Organic Compounds," ASTM D4547-91, *Annual Book of ASTM Standards*, Philadelphia, Pennsylvania, American Society for Testing and Materials.
[b] U.S. Environmental Protection Agency (EPA), 1991, "Soil Sampling and Analysis for Volatile Organic Compounds," EPA 154014-91991, Office of Research and Development.
[c] U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
[d] Equivalent methods, subject to EPA approval, may be substituted.
[e] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-18

Summary of Characterization Methods for Mixed Transuranic Waste

Parameter	Method Numbers	Test Methods	Rationale
	Storage		
Physical Waste Form (Free liquids in waste matrix)		Waste inspection procedures Real-time radiography Visual examination Acceptable Knowledge[e]	Verify waste container contents
Volatile organic compounds (VOC) in waste matrix: Spent halogenated solvents Spent nonhalogenated solvents	ASTM Method D4547-91[a] U.S. EPA/540/4-91/001[b] SW-846 (1311, 8260B, 8275A)[c] or equivalent methods[d] Methods included in 20.4.1 NMAC §§ 265.1084(a)(2), (a)(3), and (a)(4)	Total and/or toxicity characteristic leaching procedure (TCLP) VOCs in container headspace gas VOC analysis by gas chromatography/mass spectrometry (GC/MS) Semivolatile organic compound (SVOC) analysis by thermal extraction/gas chromatography/mass spectrometry (TE/GC/MS) Acceptable Knowledge[e]	Determine the presence or absence of VOCs in samples
SVOCs in waste	SW-846 (1311 and 8270C)[c] or equivalent methods[d]	Total and/or TCLP SVOC analysis by GC/MS Acceptable Knowledge[e]	Determine the presence or absence of SVOCs in samples
Resource Conservation and Recovery Act (RCRA)-regulated metals in waste: Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	SW-846 (1311, 6010B, 7060A, 7061A)[c] (1311, 6010B, 7080A, 7081)[c] (1311, 6010B, 7130, 7131A)[c] (1311, 6010B, 7190, 7191)[c] (1311, 6010B, 7420, 7421)[c] (1311, 6010B, 7470A, 7471A, 7472)[c] (1311, 6010B, 7740, 7741A, 7742)[c] (1311, 6010B, 7760A, 7761) or equivalent methods[d]	Total and/or TCLP Inductively-coupled plasma atomic emission spectroscopy Atomic absorption Manual cold vapor atomic absorption Anodic stripping voltammetry Acceptable Knowledge[e]	Determine total and/or TCLP concentration in samples
Ignitability	SW-846 (1010, 1020A, 1030)[c] or equivalent methods[d]	Pensky-Martens closed cup Setaflash closed cup Ignitabililty of Solids Acceptable Knowledge[e]	Determine ignitability
pH (Corrosivity)	SW-846 (9040B, 9041A, 9045C) or equivalent methods[d]	pH electrometric measurement Acceptable Knowledge[e]	Determine corrosivity

Refer to footnotes at end of table.

Table B-18 (Continued)

Summary of Characterization Methods for Mixed Transuranic Waste

Parameter	Method Numbers	Test Methods	Rationale
	Treatment		
RCRA-regulated metals in waste: Arsenic Barium Cadmium Chromium Lead Mercury Silver	SW-846 (1311, 6010B, 7060A, 7061A)[c] (1311, 6010B, 7080A, 7081)[c] (1311, 6010B, 7130, 7131A)[c] (1311, 6010B, 7190, 7191)[c] (1311, 6010B, 7420, 7421)[c] (1311, 6010B, 7470A, 7471A, 7472)[c] (1311, 6010B, 7760A, 7761)[c] or equivalent methods[d]	Total and/or TCLP Inductively-coupled plasma atomic emission spectroscopy Atomic absorption Manual cold vapor atomic absorption Acceptable Knowledge[e]	Determine total and/or TCLP metals concentration in samples
pH (Corrosivity)	SW-846 (9040B, 9041A, 9045C) or equivalent methods[d]	pH electrometric measurement Acceptable Knowledge[e]	Determine corrosivity

[a] American Society for Testing and Materials, 1991, "Standard Practice for Sampling Waste and Soils for Volatile Organic Compounds," ASTM D4547-91, *Annual Book of ASTM Standards*, Philadelphia, Pennsylvania, American Society for Testing and Materials.
[b] U.S. Environmental Protection Agency (EPA), 1991, "Soil Sampling and Analysis for Volatile Organic Compounds," EPA 154014-91001, Office of Research and Development.
[c] U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
[d] Equivalent methods, subject to EPA approval, may be substituted.
[e] Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

Table B-19

Description of Cementation Waste Streams at Technical Area 55

Summary Category Group	Waste Description	Waste-Generating Activity	Basis for Hazardous Waste Designation	Potential EPA Hazardous Waste Numbers	Potential Hazardous Constituents in the Waste	Regulatory Limits[a] (milligrams per liter)
L1000 – Aqueous Liquids/Slurries	Evaporator bottoms solutions, aqueous waste, and laboratory solutions	Process residue from evaporator bottoms and other discardable solutions.	Acceptable Knowledge[b]	D002	Nitric acid	NA
				D004	Arsenic	5.0
				D005	Barium hydroxide	100.0
				D006	Cadmium	1.0
				D007	Chromium	5.0
				D008	Lead	5.0
				D009	Mercury	0.2
				D011	Silver	5.0
S3000 – Homogenous Solids	Inorganic process solids and cemented inorganic process solids	Process residue from evaporator bottoms and other discardable solutions; process-leached solids, ash, filter cakes, salts, metal oxides, and fines generated as a result of plutonium-processing	Acceptable Knowledge[b]	D004	Arsenic	5.0
				D006	Cadmium	1.0
				D007	Chromium	5.0
				D008	Lead	5.0
				D009	Mercury	0.2

[a] A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure, Test Method 1311 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *EPA-SW-846*, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C., the extract from a representative sample of the waste contains any of the contaminants listed at a concentration equal to or greater than the respective value given in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart II, 261.24, revised June 14, 2000.

[b] Acceptable knowledge is broadly defined as process knowledge, supplemental waste analysis data, and/or facility records of analysis, U.S. Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guidance Manual," *OSWER 9938.4-03*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

EPA = U.S. Environmental Protection Agency
NA = Not applicable

APPENDIX C

INSPECTION PLAN

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C-1	Hazardous and Mixed Waste Facility Inspection Record Form

LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
AR	Action Required
CSU	container storage unit
IRF	Inspection Record Form
LANL	Los Alamos National Laboratory
NA	Not Applicable
TA	technical area

APPENDIX C
INSPECTION PLAN

In accordance with the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) § 264.15, revised June 14, 2000 [6-14-00], this appendix presents inspection requirements applicable to all currently existing hazardous or mixed waste management units at Los Alamos National Laboratory (LANL) that are included in technical area (TA)-specific permit applications, permit modification requests, or permit renewal applications. Pursuant to 20.4.1 NMAC § 264.15(a) [6-14-00], inspection schedules for the units have been developed to identify equipment malfunctions and deterioration, operator errors, and discharges that might cause or lead to a release of hazardous or mixed waste and pose a threat to human health and the environment. As specified in 20.4.1 NMAC § 270.14(b)(5) [6-14-00], this inspection plan, which presents general inspection schedules, is being submitted with this permit renewal application. Inspections will be conducted often enough to identify problems in time to correct them before they harm human health or the environment. Inspection schedules or methods may differ at certain waste management units based upon worker safety issues or the nature of the safety and emergency equipment. In these cases, the specific inspection schedules or methods are or will be included in Attachment C of TA-specific permit applications, permit modification requests, or permit renewal applications.

C.1 GENERAL INSPECTION SCHEDULES AND REQUIREMENTS [20.4.1 NMAC § 270.14(b)(5) and 20.4.1 NMAC § 264.15(b) and (c)]

In accordance with the requirements of 20.4.1 NMAC § 270.14(b)(5), and 20.4.1 NMAC § 264.15(b)(1) [6-14-00], a written inspection schedule has been developed at LANL. This schedule will be followed for the inspection of monitoring equipment, safety and emergency equipment, security devices, and operating and structural equipment that are important to preventing, detecting, and responding to environmental or human health hazards. Inspections may be conducted at any time during the applicable day or week, as specified in the inspection schedule. A copy of this inspection plan, which includes inspection schedules, will be maintained by LANL's Solid Waste Regulatory Compliance Group and by the site operator (i.e., the division or operating group that is responsible for or manages the unit), as required in 20.4.1 NMAC § 264.15(b)(2) [6-14-00].

Inspection schedules outlining the items to be addressed on LANL's Hazardous and Mixed Waste Facility Inspection Record Form (IRF) and inspection frequencies for the unit types addressed in TA-specific permit applications, permit modification requests, or permit renewal applications are

provided in Sections C.2 through C.9. The IRF and instructions for its completion are provided for informational purposes only as Figure C-1 of this appendix; the form may be supplemented, changed, or otherwise replaced with an equivalent form. Pursuant to 20.4.1 NMAC § 264.15(b)(3) [6-14-00], the IRF lists the types of problems to be looked for during an inspection. The activities discussed below are addressed according to the specified regulatory requirements as well as to existing LANL inspection requirements for hazardous and mixed waste management units.

C.1.1 Inspection Records [20.4.1 NMAC § 264.15(d)]

Inspection training is provided through LANL's Performance Surety Division's ES&H Training Group. The division or operating group is responsible for ensuring that training is repeated, as necessary. After training, personnel assigned from the division or operating group that is responsible for or manages the unit will conduct inspections and record the information on IRFs or equivalent forms. The division or operating group responsible for or managing the unit will retain the inspection records for a minimum of three years from the date of inspection. During that timeframe, the inspection records will be available for review in the event that the New Mexico Environment Department or the U.S. Environmental Protection Agency inspects the facility for compliance with inspection requirements.

If necessary, LANL may modify the IRF or develop a form equivalent to it. Because the IRF is a comprehensive form, not all sections of the form apply to all units. The IRF encompasses 20.4.1 NMAC, Subpart V, Part 264 [6-14-00], requirements for permitted hazardous and mixed waste management units, and additional requirements directed by LANL policy. Instructions included with the IRF provide specific guidance for each inspection item listed.

The IRF or equivalent form will be completed according to the daily and/or weekly schedules provided in Sections C.2 through C.9. Inspections will be conducted and recorded in Parts I and II of the IRF for each working day or week that waste is opened, moved, received, stored, treated, or removed, as appropriate. Other records, such as a memo to file, may be used to document a condition of "No Use" at a unit.

For every item requiring inspection, a response indicating the condition of each item must be entered in the column under the appropriate day of the week. Responses may include "OK," "NA" (Not Applicable), or "AR" (Action Required). If the response is AR, the action required must be noted in Part II of the IRF. If more than one AR is listed, ARs should be numbered. All ARs must

be identified and noted, even if corrected immediately by the inspector. If inspection results indicate that corrective measures are warranted, any and all actions taken (along with time, date, and other pertinent information) will be recorded in Part II of the IRF and the AR noted on all subsequent IRFs until corrective measures are completed. Only after corrective measures have been completed and recorded on an IRF can an OK be entered in the "Condition" column on the IRF.

C.1.2 Inspection Frequency [20.4.1 NMAC § 264.15(b)(4)]

Inspection frequencies relevant to the unit types at LANL are presented in Sections C.2 through C.9 of this appendix and/or in Attachment C of TA-specific permit applications, permit modification requests, or permit renewal applications. Inspection frequencies may be increased at LANL's discretion when it determines that increased frequency may further assist in the detection or prevention of environmental hazards.

C.1.3 Actions Resulting From Inspections [20.4.1 NMAC § 264.15(c)]

If any defects, deterioration, operator errors, discharges, or potential hazards are discovered during an inspection, appropriate corrective measures (e.g., transfer of waste from a defective container to an appropriate container in good condition, repair or replacement of nonfunctioning equipment and/or systems, or removal of any accumulated liquids) will be completed on a schedule which ensures that the problem does not lead to an environmental or human health hazard. Any action taken in response to an inspection will be noted on the IRF or IRF documentation.

If a hazardous condition is imminent or has already occurred, an assessment of the condition will be made immediately, followed by appropriate remedial action. The condition will be assessed by the division or operating group that is responsible for or manages the unit. If this assessment indicates that human health or the environment may be adversely affected, the contingency plan (Appendix E of this document) may be implemented. The contingency plan discusses the appropriate responses to emergency situations. Evacuation determinations will be made as outlined in Table E-4 of the contingency plan. In the event the contingency plan is implemented, any sampling, decontamination, and verification will be conducted as specified in that plan. If the condition is such that the contingency plan is not implemented, remedial action will be defined and documented by the division or operating group that is responsible for or manages the unit.

C.2 INSPECTION SCHEDULE AND REQUIREMENTS FOR CONTAINER STORAGE UNITS [20.4.1 NMAC §§ 264.15(b) and 264.174]

Container storage units (CSU) are inspected according to the schedule provided below and/or in TA-specific permit applications, permit modification requests, or permit renewal applications. Inspection frequencies are adequate based on the deterioration rates of equipment/systems and the probability of harm to human health or the environment if failure of the equipment/systems occurs, or any operator error goes undetected between inspections.

C.2.1 On Day(s) of Waste Handling

Inspections will be conducted every day of or the day after waste handling, with special attention placed on areas subject to spills, such as loading and unloading areas. Waste handling includes when waste is received at, moved or opened within, treated at, or removed from a CSU. For inspections of CSUs, the following items will be addressed, as appropriate:

- General information (Items 1-6)
- Secondary containment structures
- Run on/off control
- Covers/lids of containers
- Labels
- Accumulation start date
- Compatibility
- Structural integrity of containers
- (Un)loading area
- Presence and condition of shaft cover

C.2.2 Weekly

Weekly inspections of CSUs will be conducted every week that waste remains in storage. These weekly inspections will address the following items, as appropriate:

- General information (Items 1-6)
- Communications equipment
- Warning signs
- Security
- Work surfaces/floors
- Spill/fire equipment
- Eyewashes/safety showers
- Wind sock
- Secondary containment structures
- Run on/off control
- Covers/lids of containers

- Labels
- Accumulation start date
- Compatibility
- Structural integrity of containers
- (Un)loading area
- Aisle space/stacking
- Pallets/raised containers
- Presence and condition of shaft cover

C.3 INSPECTION SCHEDULE AND REQUIREMENTS FOR TANK SYSTEMS [20.4.1 NMAC §§ 264.15(b), 264.193(i), and 264.195]

Resource Conservation and Recovery Act-regulated tank systems are inspected according to the schedule provided below and/or in TA-specific permit applications, permit modification requests, or permit renewal applications. The inspection frequency is adequate based on the deterioration rate of equipment/systems and the probability of adverse impact to human health or the environment if failure of the equipment/systems or any operator error goes undetected between inspections.

C.3.1 Daily (During Operation)

Tank systems (including ancillary equipment) will be inspected at least once each operating day. An operating day includes when waste is added to or emptied from a tank, or when tank treatment is conducted. Tank systems will be inspected for the items listed below, as appropriate:

- General information (Items 1-6)
- Secondary containment structures
- Labels
- Structural integrity of tanks and ancillary equipment
- (Un)loading areas
- Aboveground portions of tank systems to detect corrosion or releases of waste and to detect any possible malfunctions to overfill/spill control equipment, tank monitoring and leak detection systems, and data from these systems
- Proper operating condition of treatment tank (if applicable)

C.3.2 Weekly

Weekly inspection requirements for tank systems include the following items, as appropriate:

- General information (Items 1-6)
- Communications equipment
- Warning signs
- Security
- Work surfaces/floors
- Spill/fire equipment
- Eyewashes/safety showers
- Wind sock, if applicable
- Secondary containment structures
- Run on/off controls, if applicable
- Labels
- Accumulation start date, if appropriate
- Structural integrity of tanks and ancillary equipment
- (Un)loading areas
- Aboveground portions of tank systems to detect corrosion or releases of waste, overfill/spill control equipment, tank monitoring and leak detection systems, and data from these systems
- Proper operating condition of treatment tank (if applicable)

C.3.3 Annually

In accordance with 20.4.1 NMAC § 264.193(i) [6-14-00], an annual assessment of the overall condition of a tank system that does not have secondary containment will be performed by an independent, qualified registered professional engineer. The assessment procedure must be adequate to detect obvious cracks, leaks, and corrosion or erosion that may lead to cracks and leaks. Stored waste must be removed from the tank, if necessary, to allow the condition of all internal tank surfaces to be assessed. The frequency of these assessments must be based on the material of construction of the tank and its ancillary equipment, the age of the system, the type of corrosion or erosion protection used, the rate of corrosion or erosion observed during the previous inspection, and the characteristics of the waste being stored or treated.

C.4 INSPECTION SCHEDULE AND REQUIREMENTS FOR OPEN BURNING/OPEN DETONATION UNITS [20.4.1 NMAC §§ 264.15(b) and 264.602]

Open burning/open detonation units are inspected according to the schedule provided below. Inspection frequencies are adequate based on the deterioration rates of equipment/systems and the probability of harm to human health or the environment if failure of the equipment/systems occurs, or any operator error goes undetected between inspections.

C.4.1 On Day of Treatment

Inspections will be conducted every day of operation (i.e., every day that open burning/open detonation occurs). For inspections conducted on the day of treatment at open burning/open detonation units, the following items will be addressed, as appropriate:

- General information (Items 1-6)
- Secondary containment structures (if applicable)
- Detonation pad run on/off control (if applicable)
- (Un)loading area

C.4.2 Weekly

Weekly inspections of open burning/open detonation units will be conducted if no treatment will occur during that week or when waste is present on the treatment unit and awaiting treatment. Weekly inspections will address the following items, as appropriate:

- General information (Items 1-6)
- Communications equipment
- Warning signs
- Security
- Work surfaces
- Spill/fire equipment
- Eyewashes/safety showers
- Wind sock (if applicable)
- Secondary containment structures (if applicable)
- Detonation pad run on/off control (if applicable)
- Open burning units covered when not in use
- (Un)loading area

C.5 INSPECTION SCHEDULE AND REQUIREMENTS FOR CEMENTATION UNITS [20.4.1 NMAC §§ 264.15(b) and 264.602]

Cementation units will be inspected according to the schedule provided below and/or in TA-specific permit applications, permit modification requests, or permit renewal applications. The inspection frequency is adequate based on the deterioration rate of equipment/systems and the probability of harm to human health or the environment if failure of the equipment/systems or any operator error goes undetected between inspections.

C.5.1 Daily (During Operation)

Cementation units for treatment by solidification will be inspected each operating day (i.e., when waste is treated in the unit). For the daily inspection of the cementation unit, the following items will be addressed, as appropriate.

- General information (Items 1-6)
- Warning signs
- Work surfaces/floors
- Secondary containment structures
- Covers/lids of containers
- Labels
- (Un)loading area
- Structural integrity of cementation unit

C.5.2 Weekly

Weekly inspections of cementation units will be conducted if no treatment will occur during that week. Weekly inspections will address the following items, as appropriate:

- General information (Items 1-6)
- Communications equipment
- Warning signs
- Security
- Work surfaces/floors
- Spill/fire equipment
- Eyewashes/safety showers
- Secondary containment structures
- Covers/lids of containers
- Labels
- (Un)loading area
- Structural integrity of cementation unit

C.6 INSPECTION AND MONITORING FOR UNITS SUBJECT TO SUBPART AA REQUIREMENTS [20.4.1 NMAC, Subpart V, Part 264, Subpart AA]

Inspection and monitoring requirements for units subject to 20.4.1 NMAC, Subpart V, Part 264, Subpart AA [6-14-00], are addressed, if applicable, in Attachment C of TA-specific permit applications, permit modification requests, or permit renewal applications.

C.7 INSPECTION AND MONITORING FOR UNITS SUBJECT TO SUBPART BB REQUIREMENTS [20.4.1 NMAC, Subpart V, Part 264, Subpart BB]

Inspection and monitoring requirements for units subject to 20.4.1 NMAC, Subpart V, Part 264, Subpart BB [6-14-00], are addressed, if applicable, in Attachment C of TA-specific permit applications, permit modification requests, or permit renewal applications.

C.8 INSPECTION AND MONITORING FOR UNITS SUBJECT TO SUBPART CC REQUIREMENTS [20.4.1 NMAC, Subpart V, Part 264, Subpart CC]

Inspection and monitoring requirements for units subject to 20.4.1 NMAC, Subpart V, Part 264, Subpart CC [6-14-00], are addressed, if applicable, in Attachment C of TA-specific permit applications, permit modification requests, or permit renewal applications.

C.9 INSPECTION AND MONITORING FOR UNITS SUBJECT TO SUBPART DD REQUIREMENTS [20.4.1 NMAC, Subpart V, Part 264, Subpart DD]

Inspection and monitoring requirements for units subject to 20.4.1 NMAC, Subpart V, Part 264, Subpart DD [6-14-00], are addressed, if applicable, in Attachment C of TA-specific permit applications, permit modification requests, or permit renewal applications.

HAZARDOUS AND MIXED WASTE FACILITY INSPECTION RECORD FORM

[1] FACILITY: [2] Site ID #:	[3] ❑ <90-DAY ACCUMULATION AREA ❑ TREATMENT, STORAGE, OR DISPOSAL UNIT	[4] START DATE:	[5] END DATE:

[6] ❑ Containers ❑ Landfill ❑ Thermal Treatment

❑ Physical Treatment ❑ Biological Treatment ❑ Chemical Treatment

❑ Tank ❑ UST ❑ Miscellaneous Unit (OB/OD, Cementation)

PART I- Enter condition of the item inspected **(OK**, **NA** [Not Applicable], or **AR** [Action Required]**)** in column for day inspected.

ITEM	INSPECTED FOR:	MON	TUE	WED	THU	FRI	SAT	SUN
[7] NO USE	No waste opened, moved, received, treated, or removed; or no waste stored							
[8] COMMUNICATIONS EQUIPMENT	Availability and proper operating condition							
[9] WARNING SIGNS	Posted, legible, and bilingual							
[10] SECURITY	Condition of fences, gates, locks, and other access control equipment							
[11] WORK SURFACES/ FLOORS	Any conditions that could lead to an accident or spill							
[12] SPILL/FIRE EQUIPMENT	Present, appropriate, and in proper operating condition							
[13] EYEWASHES/ SAFETY SHOWERS	Proper operating condition							
[14] WIND SOCK	Proper operating condition and checked for damage							
[15] SECONDARY CONTAINMENT	Standing water/waste, integrity, surrounding vegetation, and erosion							
[16] RUN-ON/OFF CONTROL	Ponding, integrity, erosion, and damage							
[17] COVERS/LIDS OF CONTAINERS	Closed and secured properly							
[18] LABELS	Proper labels on all tanks and containers							
[19] ACCUMULATION START DATE	Present, legible, and not exceeding limit							
[20] COMPATIBILITY	Separated according to compatibility							
[21] INTEGRITY (Containers, tanks, and ancillary equipment)	Integrity, leakage, deterioration, corrosion, and damage							
[22] (UN)LOADING AREA	Spills and deterioration							
[23] AISLE SPACE/STACKING	Appropriateness and adequacy							
[24] PALLETS AND RAISED CONTAINERS	Any condition that could result in failure							
[25] TANK SYSTEMS (Aboveground portions)	Discharge controls, leakage, fill level, and corrosion							
[26] TREATMENT TANKS	Proper operating condition and leakage							
[27] SHAFTS	Presence and condition of cover							
[28] FILTER VESSELS (for open burning)	Deterioration and sand condition							
[29] OPEN BURNING UNITS	Deterioration, vegetation, sand condition, erosion, leakage, and cover							
[30] OPEN DETONATION UNITS	Condition, vegetation, and erosion							
[31] CEMENTATION UNITS	Structural integrity and condition of equipment and systems							

For Informational Purposes Only

Figure C-1

Hazardous and Mixed Waste Facility Inspection Record Form

HAZARDOUS AND MIXED WASTE FACILITY INSPECTION RECORD FORM

	MON	TUE	WED	THU	FRI	SAT	SUN
[32] **DATE**							
[33] **TIME**							
[34] **SIGNATURE OF INSPECTOR(S)**							

FACILITY:	Site ID #:	START DATE:	END DATE:

Part II- For any AR (Action Required) in PART I, describe below: action required, action taken, date, and time of action. Attach additional sheets if necessary. If more than one action is required, number each AR.

[35]

For Informational Purposes Only

Figure C-1 (Continued)

Hazardous and Mixed Waste Facility Inspection Record Form

Instruction for Use of the Hazardous and Mixed Waste Facility Inspection Record Form

Part I

TO BE CONDUCTED FOR ALL INSPECTIONS:
(Not all items in this section will apply to all facilities. An "NA" [not applicable] is required if the item does not apply.)

1. FACILITY: Location information, including TA, building, and room (if applicable). Other location descriptors may be necessary (e.g., TA-59-3-114 or TA-59-1-S, Dock).

2. Site ID Number: An identification number is assigned to every facility. This allows for ease in identification of a certain TSD unit <90-day accumulation area.

3. <90-DAY ACCUMULATION AREA: Should be checked if this location is intended for operation in accordance with generator requirements for storage of hazardous or mixed waste for less than 90 days.

   TREATMENT, STORAGE, OR DISPOSAL (TSD) UNIT: Should be checked if this location is listed in LANL's Hazardous Waste Facility Permit or General Part A Permit Application as a TSD operation.

4. START DATE: The date of the actual first working day of the week.

5. END DATE: The date of the actual last working day of the week.

6. Check the appropriate box for the type of operation. Several boxes may be checked, if necessary, for those locations where inspections are combined on a single sheet. You must have prior approval from RRES-SWRC to combine inspections for more than one unit.

7. NO USE: May be checked if waste was not received at, moved, or opened (to add or remove waste) within, treated at, or removed from a unit for the day in question. For some inspections that are performed weekly, "NO USE" may be checked if no waste was stored. In the situation that this box is checked, the individual responsible for the inspection must only complete this box and the signature section for that day/week. If any hazardous or mixed waste is subsequently placed at the site for any reason, a full inspection must be performed immediately and then subsequently according to the inspection plan. List "NA" to show normal nonworking days. Holidays and Laboratory closures should also be noted (e.g., by writing "H" or "Closed" in the first box and drawing a line all the way down the page).

8. Communication equipment must be inspected in order to ensure availability and proper operating condition for each piece of equipment (e.g., telephones, radios, and alarms). Consultation with RRES-SWRC prior to use of the facility/location is available, if necessary.

For Informational Purposes Only

Instruction for Use of the Hazardous and Mixed Waste Facility Inspection Record Form (Continued)

9. Required signs must be legible and prominently posted. TSD units must be equipped with bilingual (English/Spanish) signs with the legend "DANGER UNAUTHORIZED PERSONNEL KEEP OUT." <90-day accumulation areas must be identified with a sign with the legend "<90-DAY HAZARDOUS WASTE STORAGE AREA." TSD units are required to have signs that read "HAZARDOUS WASTE STORAGE AREA" spaced 50 feet apart and legible from 25 feet away.

10. The TSD unit or <90-day accumulation area site security must be verified. Items such as fences, gates, locks, and other access control equipment should be checked for proper operating condition.

11. Process floors and other work surfaces at TSD units must be inspected for any conditions that could lead to a spill or an accident.

12. Hazardous or mixed waste TSD units and <90-day accumulation areas must have fire control and spill control equipment. TSD units will be in compliance with the Laboratory's Hazardous Waste Facility Permit Contingency Plan. Equipment must be present, in proper operating condition, and appropriate for the material in question. Outdoor fire-water supply systems must be checked for freezing and damage.

13. If present, eyewashes and safety showers must be inspected to ensure proper operating condition. Outdoor locations must be checked for freezing.

14. Wind socks, where present at TSD units, must be inspected to ensure that they are in proper operating condition and checked for damage.

15. Secondary containment structures for hazardous or mixed waste operations must be inspected to verify proper operating condition and to ensure adequate capacity. Structures must also be inspected for the presence of standing water or hazardous/mixed waste. For certain operations, secondary containment includes inspection of gloves, gloveboxes, hoods, and ventilation systems. For locations where inflatable "Porta Berms" are used, inspectors must ensure that they are adequately inflated. All monitoring and leak detection systems must also be checked.

16. Run-on and runoff controls, wherever present, must be checked. The integrity should be inspected by looking for signs of damage, erosion, ponding, or any other conditions that could lead to a spill or an accident.

17. All tanks and containers used for treating or storing hazardous or mixed waste must have the cover or lid securely in place. Containers are not considered to be closed until the lid/cover is fastened in the manner the manufacturer originally intended. However, the lid may be off of a tank or container during treatment (if it is part of the treatment), and while waste is being placed into or removed from a container.

18. All containers and tanks containing hazardous or mixed waste must be labeled with the words "HAZARDOUS WASTE."

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Instruction for Use of the Hazardous and Mixed Waste Facility Inspection Record Form (Continued)

19. All containers and tanks of hazardous or mixed waste in <90-day accumulation areas must be marked with the accumulation start date. This date must be legible. At <90-day accumulation areas, containers must be marked with the accumulation start date at the time the container first receives any waste. For <90-day accumulation areas, no containers may exceed 90 days from the accumulation start date to the time they are delivered to a permitted treatment, storage, or disposal unit. At TSD units, all containers must be dated when they arrive at the facility. At TSD units, no hazardous or mixed waste may be stored for over one year, unless specifically exempted.

20. All hazardous or mixed waste containers holding materials that may be incompatible with any other materials at that location must be separated from those materials by dikes, berms, or other physical barriers to prevent a possible reaction.

21. All containers and tanks must be checked for structural integrity, leakage, corrosion, or damage. This includes checking the condition of all construction materials, fixtures, seams, and auxiliary equipment. There are special inspection criteria for tank systems (see Item 25 below).

22. Loading and unloading areas must be inspected daily when in use for signs of damage or deterioration that may lead to an accident or spill. This includes asphalt covered areas and areas where containers or tanks are handled or the contents thereof are transferred.

23. Adequate aisle space must be maintained to allow for inspection and for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency. All containers of hazardous and mixed waste must be stored in a manner that ensures a minimum 2-foot aisle space, unless otherwise specified for the facility.

24. Hazardous or mixed waste containers at TSD units and <90-day accumulation areas must be stored on pallets, elevated, or otherwise protected from contact with accumulated liquid.

<u>TANKS SYSTEMS</u>:

25. For tank systems used for treatment or storage of hazardous or mixed waste, all aboveground portions of the tank system, including any and all ancillary plumbing, must be inspected for signs of leaking, corrosion, deterioration, or improper operation. Tanks must be operated with a minimum freeboard of 6 inches. If the tank system includes discharge controls, overtopping controls, tank level alarms, or other monitoring equipment, including leak detection equipment, all controls and relevant data must be checked to ensure they are operating properly and that operation is within design specifications for the system.

26. Hazardous and mixed waste treatment tanks must be operated within the design specifications and in accordance with standard operating procedures and work plans. Tanks must be inspected for leakage or damage prior to operation.

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Instruction for Use of the Hazardous and Mixed Waste Facility Inspection Record Form (Continued)

SHAFTS:

27. Shafts used for retrievable storage should have their covers securely in place and the surrounding area should show no evidence of erosion.

FILTER VESSELS:

28. The condition and adequacy of sand must be inspected in filter vessels. The vessels must also be inspected for deterioration and damage.

OPEN BURNING UNITS:

29. Open burning units must be inspected for deterioration, leakage, vegetation that could catch fire, the condition of sand (as appropriate), and assure that the unit is covered when not in use. Inspectors must also look for explosives and debris not consumed during the burn.

OPEN DETONATION UNITS:

30. Open detonation units must be inspected for deterioration, leakage, or vegetation that could catch fire. Inspectors must also look for explosives and debris not consumed by the detonation.

CEMENTATION UNITS:

31. The structural integrity and condition of equipment and systems must be inspected on cementation units. Units must also be inspected for signs of leaking, corrosion, deterioration, or improper operation.

FOR ALL INSPECTIONS:

32. Record of the date of the current inspection. Only one date is given for each inspection, whether a team or an individual performs the inspection.

33. Record of the time of the current inspection. Only one time is given for each inspection, whether a team or an individual performs the inspection.

34. Signature of each inspector involved in the current inspection.

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Instruction for Use of the Hazardous and Mixed Waste Facility Inspection Record Form (Continued)

Part II

List any action required. Document any action taken immediately and express any plans for future action to be taken. If necessary, attach additional sheets to IRF to efficiently cover the action taken or required. Initial any information or comments added, and if more than one action is required or conducted, assign a number to each AR.

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APPENDIX D

PERSONNEL TRAINING PLAN

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
EDS	Employee Development System
EM&R	LANL's Emergency Management and Response
EMP	Emergency Management Plan
ES&H	environment, safety, and health
FWO	LANL’s Facility and Waste Operations Division
KSL	KBR-Shaw-LATA
LANL	Los Alamos National Laboratory
OJT	on-the-job training
PS-13	LANL's ES&H Training Group
PTLA	Protection Technology Los Alamos
RCRA	Resource Conservation and Recovery Act
S-10	LANL's Hazardous Material Response Group
SWRC	LANL's Solid Waste Regulatory Compliance Group
TSF	treatment and storage facility
USC	United States Code

APPENDIX D
PERSONNEL TRAINING

This section describes the personnel training program for Los Alamos National Laboratory (LANL) treatment and storage facility (TSF) workers. Training requirements for treatment, storage, and disposal facility personnel are specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) § 264.16, revised June 14, 2000 [6-14-00], and are included in this document, as required by 20.4.1 NMAC § 270.14(b)(12) [6-14-00]. The primary objective of the training program is to prepare personnel to operate and maintain safely those areas managing hazardous and/or mixed waste, in accordance with 20.4.1 NMAC, Subpart V, Part 264 [6-14-00]. This training program applies to all employees of the U.S. Department of Energy, the University of California, and any subcontractors who work regularly at LANL TSFs and manage hazardous and/or mixed waste. The degree of training varies with the job duties.

D.1 HAZARDOUS AND MIXED WASTE MANAGEMENT/RESPONSIBILITIES

Waste management activities and responsibilities at specific hazardous and/or mixed waste management units are handled by the appropriate LANL division or group. Waste management groups within the Facility and Waste Operations (FWO) Division are responsible for most centralized waste management activities at LANL. The Solid Waste Regulatory Compliance Group (SWRC) is responsible for providing waste management regulatory guidance to all LANL personnel and operations. Other personnel at LANL that may provide assistance in various waste management activities are discussed in the following paragraph and in Appendix E of this document.

Laboratory-contracted support services (e.g., KBR-Shaw-LATA [KSL]) provide trained personnel to assist in waste-handling activities. Personnel in the Health Physics Operations Group, the Occupational Medicine Group, the Industrial Hygiene and Safety Group, the Nuclear Criticality Safety Group, the Occurrence Reporting Group, the Hazardous Material Response Group (S-10), the Meteorology and Air Quality Group, the Water Quality and Hydrology Group, the Ecology Group, and personnel in SWRC are trained in their respective specialties to provide emergency response support. Protection Technology Los Alamos (PTLA) is responsible for LANL security, and provides workers trained in traffic and site-access control.

The Emergency Management and Response (EM&R) Office provides emergency planning and response at LANL and has the overall responsibility for LANL's Emergency Management Plan (EMP) training. The Performance Surety Division ES&H Training Group (PS-13) is responsible for the analysis, design, development, and delivery of LANL-wide environment, safety, and health (ES&H) training. Courses on hazardous and/or mixed waste are designed with substantial input from SWRC and FWO waste management groups, and other subject matter experts, as appropriate.

D.2 TRAINING CONTENT, FREQUENCY, AND TECHNIQUES [20.4.1 NMAC § 270.14(b)(12) and 20.4.1 NMAC § 264.16(a), (b), (d), and (e)]

The training program instituted at LANL includes a combination of LANL-wide courses, facility-specific training, and on-the-job training (OJT). LANL-wide courses are provided internally or through external vendors and are usually classroom-based. Facility-specific training may be developed and delivered within a particular TSF, and OJT consists of supervised and documented training focused primarily on procedures performed by individual workers. Each of these types of training is described briefly in Sections D.2.1 through D.2.3. All LANL employees and LANL contract and support personnel who handle hazardous and/or mixed waste at TSFs receive the appropriate level of training within six months of their date of hire or transfer for work at a TSF. Personnel will not work in unsupervised waste handling positions at TSFs until they have successfully completed the appropriate level of training for their positions and responsibilities.

Records of LANL-wide training currently sponsored or administered by PS-13 are entered by that group into the Employee Development System (EDS), the official LANL training database. These records document that the required training has been successfully completed by the worker. Training records of former workers are kept for at least three years from the date that they last worked at the TSF. It is required that records documenting successful completion of facility-specific, on-the-job, or externally provided training be kept by the sponsoring LANL organization. LANL will maintain, at a minimum, hard or electronic copies of TSF training records for currently employed workers until the TSF closes.

Table D-1 presents components of the LANL-wide training program as administered through PS-13. This table includes a listing of the relevant training courses, a summary of topics, and a designation of the relevant courses for each job category. Categories of workers presented in Table D-1 include TSF hazardous/mixed waste workers, managers and supervisors of TSF hazardous/mixed

waste workers, emergency responders, and uncontrolled area potential release site workers. Table D-2 summarizes the components of facility-specific training and OJT that workers receive, as applicable. Each training element has been designed to ensure that every worker involved in hazardous and/or mixed waste handling operations is properly trained in the procedures relevant to the positions in which they are employed. Tracking the completion of training is possible through the EDS training plans. If a worker is no longer involved in hazardous and/or mixed waste handling operations, continued training to meet the components of the relevant hazardous waste management program is not required.

TSF Hazardous/Mixed Waste Workers are responsible for handling hazardous/mixed wastes at a TSF. In addition, they are responsible for assisting in TSF spill and emergency response activities, as required.

Managers and Supervisors of TSF Hazardous/Mixed Waste Workers are directly responsible for day-to-day operations related to TSF waste management activities. They are also responsible for assuring that personnel safety and training requirements are met.

Emergency Responders are trained emergency response personnel (e.g., S-10, Technical Area 55 Emergency Response Team) that respond to emergencies (e.g., spills, fires, explosions) involving hazardous and/or mixed wastes. Emergency Responders also provide support for emergency response activities.

Uncontrolled Area Potential Release Site Workers conduct investigations and remedial activities at potential release sites. They are also responsible for proper waste management from generation to disposal, including waste characterization, treatment, and storage.

Training materials of LANL-wide training courses are on file in the ES&H Training Center and are available for review by all hazardous/mixed waste management and handling personnel, emergency response personnel, and regulatory agencies. Course content will be reviewed on a regular schedule and updated as required to keep materials current with hazardous waste management regulations. Alternative forms of training (e.g., paper-based self-study courses, web-based training) may be taken to meet specific training requirements. Such alternate forms of training must be approved by PS-13 personnel and be determined to be equivalent in content to more traditional classroom-based training courses. Files listing the requisite skills, education, and

training for workers who handle hazardous and/or mixed waste and the duties and responsibilities for each job description, as well as the name of each worker filling a job description, are maintained at LANL, as required by 20.4.1 NMAC § 264.16(d)(2) [6-14-00].

D.2.1 LANL-Wide Courses

Hazardous waste management courses for TSF personnel include Waste Generation Overview Live Training, Resource Conservation and Recovery Act (RCRA) Personnel Training, and RCRA Refresher Training. Additional LANL-wide courses may be required for specific job functions.

The RCRA Personnel Training course provides an overview of state and federal hazardous waste management regulations and emphasizes compliance with the RCRA requirements that apply to job-related activities, such as the safe handling of hazardous and mixed waste. Instructors are trained in hazardous and mixed waste management programs and procedures and in RCRA *(42 United States Code [USC] § 6901 et seq.)*. PS-13, with guidance from SWRC, provides an annual refresher of applicable hazardous waste management requirements. TSF personnel who handle hazardous and/or mixed waste and/or clean up spills or releases of hazardous and/or mixed waste at TSFs and the managers and supervisors of these workers also receive instruction on appropriate topics listed in Table D-1. In addition, personnel responsible for shipping or transporting hazardous and/or mixed waste require supplementary training, as necessary.

D.2.2 Facility-Specific Training [20.4.1 NMAC § 264.16(a)(3)]

Waste-handling personnel will participate in facility-specific training at their particular work locations, as appropriate. Table D-2 addresses program requirements that ensure that hazardous and mixed waste management and handling personnel know the specific requirements for their particular facilities and are able to respond effectively to emergencies. Personnel will become familiar with emergency procedures, equipment, and systems at their particular facility, including emergency and monitoring equipment use, inspection, repair, and replacement, as appropriate. In addition, they will receive instruction on contingency plan contents and implementation (as they apply to their particular facility) including, but not limited to, communications or alarm systems, response to fires and explosions at their facility, key parameters for automatic waste-feed cutoff systems, shutdown of facility operations, and response to groundwater contamination incidents.

D.2.3 On-the-Job Training

Supervised and documented OJT may be developed and delivered by supervisors or other subject matter experts who are able to evaluate worker proficiency and determine appropriate training for the procedures required of each function-specific position. OJT topics may include implementation of facility-specific procedures, maintenance of operating records, reporting requirements, and TSF-specific inspection requirements. TSF emergency response personnel receive TSF-specific training regarding emergency response and shutdown procedures at the TSF to which they are assigned.

D.2.4 Training Coordinator [20.4.1 NMAC § 264.16(a)(2)]

The PS-13 Group Leader directs the LANL-wide ES&H training program. The Group Leader (or designee) serves as the Training Coordinator for LANL-wide waste management training. The Training Coordinator is trained in the operation of hazardous and mixed waste management facilities, waste management practices, and emergency procedures and is responsible for coordinating training courses.

D.3 EMERGENCY TRAINING [20.4.1 NMAC § 264.16(a)(3) and (c)]

If called upon by the EM&R Office, additional non-LANL emergency response personnel (e.g., KSL, PTLA) may assist the LANL Incident Commander at the scene of a hazardous or mixed waste emergency. These workers are trained in their specialties (e.g., heavy equipment operation, hazardous material cleanups, traffic control, and security). At all times during an emergency, these workers are coordinated by the Incident Commander in the Incident Command System or by the designated Emergency Manager, as appropriate. Appendix E of this document (the Contingency Plan) provides a more detailed discussion of emergency procedures, personnel, and equipment.

To ensure maximum protection of life and property and to mitigate the consequences of an emergency situation, TSF personnel involved in waste handling and emergency response must be knowledgeable about appropriate building and operating area emergency procedures. These workers receive training in TSF-specific emergency procedures or participate in the LANL-wide emergency training program. Group leaders and immediate supervisors are responsible for ensuring that education and training in TSF-specific emergency procedures are provided to all personnel under their supervision. Training in TSF-specific emergency procedures is given by the operating group. Periodic exercises may be used to familiarize workers with emergency procedures. Training may also be provided to workers through instructional displays or presentations and discussions in safety meetings.

Immediate supervisors ensure that each new or transferred worker is informed on the general and specific emergency procedures related to the work area. The immediate supervisor also ensures that each worker is advised of any changes to emergency procedures and that each worker is provided with an annual refresher of these procedures. The organization that develops and delivers TSF-specific emergency training maintains these training records.

Specialized training is given to personnel assigned special functions or specific emergency duties. Emergency response personnel are required to attend training on the implementation of the RCRA Contingency Plan (Appendix E), spill response, and Occupational Safety and Health Administration emergency response provisions. The EM&R Office provides training related to implementing LANL's EMP. In addition, TSF waste management and handling personnel participate in a training program in which they are instructed in emergency procedures pertinent to their work areas. The operating group is responsible for providing this site-specific instruction.

D.4 IMPLEMENTATION OF TRAINING PROGRAMS [20.4.1 NMAC § 264.16(b) and (c)]

Waste Generation Overview Live is an introductory course that provides an overview of federal and state waste management regulations and Laboratory policies and procedures for waste management operations. The training addresses the information needed to identify and properly manage wastes that are subject to hazardous waste regulations in 20.4.1 NMAC, Subpart II [6-14-00].

In addition to Waste Generation Overview Live, all TSF workers who handle hazardous and/or mixed waste are required to complete RCRA Personnel Training and annual RCRA refresher courses. These refresher courses are intended to update personnel on LANL procedures and changes in RCRA *(42 USC § 6901 et seq.)* provisions and 20.4.1 NMAC regulations and to provide them with an overview of their introductory training. Line managers and group leaders are responsible for ensuring that personnel participate in the appropriate introductory and annual training courses.

Table D-1

Los Alamos National Laboratory-Wide Training Program Outline

Courses[a]	TSF[b] Hazardous/Mixed Waste Worker	Manager/Supervisor of TSF Hazardous/Mixed Waste Workers	Emergency Responder	Uncontrolled Area Potential Release Site Worker
HAZWOPER[c]: First Responder (Operations Level) (provides an overview of hazardous materials emergency response, including recognition and identification of hazardous materials and associated risks, required actions, and relationships with other emergency responders)			X[d]	
HAZWOPER: General Site Worker (40 hours) (provides general information on hazardous waste operations and emergency response for general site workers engaged in corrective action, remediation, or decontamination and decommissioning activities)				X
HAZWOPER: Refresher (provides general information on hazardous waste operations)			X	X
RCRA[e] Personnel Training (includes an overview of the Code of Federal Regulations, Title 40, Parts 260-265, 268; the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (6-14-00); Department of Transportation shipping regulations; internal and external protocol for facility inspections; operating equipment, communication systems, security systems; contingency plan; and emergency equipment use, inspection, and repair)	X	X	*[f]	*
RCRA Refresher Training (includes regulatory and legislative updates, occurrence reports and lessons learned, audit findings, modification/review of the contingency plan; provides required retraining)	X	X	*	*

Table D-1 (Continued)

Los Alamos National Laboratory-Wide Training Program Outline

Courses[a]	TSF[b] Hazardous/Mixed Waste Worker	Manager/Supervisor of TSF Hazardous/Mixed Waste Workers	Emergency Responder	Uncontrolled Area Potential Release Site Worker
Waste Generation Overview Live (includes waste management regulations and policies, definition of hazardous waste, waste minimization, cycle of waste management at Los Alamos National Laboratory, storage and disposal)	X	X	X	X
Respirators: Air-Purifying (provides required annual retraining for operation and inspection of device, changing filters, donning and doffing)	*	*	X	*
Respirators: Self-Contained Breathing Apparatus (provides required annual retraining for operation and inspection, changing compressed air bottles, donning and doffing, safety features, care and cleaning, fitting)	*	*	X	*

[a] Additional training courses (not listed in this attachment) may also be taken by personnel depending on the types of hazards (e.g., chemical) associated with a particular job description.
[b] TSF = Treatment and storage facility
[c] HAZWOPER = Hazardous Waste Operations and Emergency Response
[d] X indicates a required course.
[e] RCRA = Resource Conservation and Recovery Act
[f] * indicates that a course may be required for specific job tasks and/or work areas.

Table D-2

Outline of Facility-Specific and On-the-Job Training for Treatment and Storage Facility Operations

Facility-specific and/or on-the-job training (OJT) is provided to treatment and storage facility (TSF) workers to ensure that operations are performed in a safe manner and that actual job tasks are conducted in accordance with safe operating procedures.

Facility-specific training will include, as applicable, the following topics:

- Procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment
- Key parameters for automatic waste feed cut-off systems
- Communications or alarm systems
- Response to fires or explosions
- Response to groundwater contamination incidents
- Shutdown of operations.

OJT will include the following topics, as applicable:

- Implementation of facility-specific procedures
- Maintenance of operating records
- Reporting requirements
- TSF-specific inspection requirements.

OJT and facility-specific training must be documented by the sponsoring organization and training records must be maintained for a minimum of three years from the date that the trainee last worked at the TSF.

APPENDIX E

CONTINGENCY PLAN

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
BEP	building emergency plan
CAS	Central Alarm Station
DOE	U.S. Department of Energy
DX	Dynamic Experimentation
EM&R	Emergency Management and Response
EMP	Emergency Management Plan
EOC	Emergency Operations Center
HAZMAT	Hazardous Materials
HMGS	Hazardous Materials Group Supervisor
HSR	Health, Safety, and Radiation Protection
HSR-1	Health Physics Operations Group
HSR-2	Occupational Medicine Group
HSR-5	Industrial Hygiene and Safety Group
IC	Incident Commander
ICS	Incident Command System
KSL	KBR-Shaw-LATA
LACFD	Los Alamos County Fire Department
LACPD	Los Alamos County Police Department
LAMC	Los Alamos Medical Center
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office

LIST OF ABBREVIATIONS/ACRONYMS
(Continued)

NAWAS	National Warning System
NIIMS	National Interagency Incident Management System
NMED	New Mexico Environment Department
NNSA	National Nuclear Security Administration
PA	public address
PPE	personal protective equipment
PS	Performance Surety
PTLA	Protection Technology Los Alamos
RRES	Risk Reduction and Environmental Stewardship
RRES-MAQ	Meteorology and Air Quality Group
RRES-SWRC	Solid Waste Regulatory Compliance Group
RRES-WQH	Water Quality and Hydrology Group
S	Security and Safeguards
S-10	Hazardous Materials Response Group
TA	technical area

APPENDIX E
CONTINGENCY PLAN

This appendix presents contingency measures applicable to all hazardous or mixed waste units at Los Alamos National Laboratory (LANL) included in technical area (TA)-specific permit applications, permit modification requests, or permit renewal applications. This Contingency Plan is intended to meet the requirements specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC), Subpart V, Part 264, Subpart D, revised June 14, 2000 [6-14-00], and 20.4.1 NMAC § 270.14(b)(7) [6-14-00], for hazardous waste treatment and storage facilities. In addition, this plan is consistent with the LANL Emergency Management Plan (EMP) (LANL, 2002), prepared by the LANL Emergency Management and Response (EM&R) Office. The provisions of this plan will be carried out immediately to minimize hazards whenever there is a fire, explosion, or release of hazardous or mixed waste or hazardous or mixed waste constituents that could threaten human health or the environment, as required by 20.4.1 NMAC § 264.51(b) [6-14-00]. When necessary, additional Contingency Plan information will be provided in Attachment E of TA-specific permit applications, permit modification requests, or permit renewal applications. Individual facilities at LANL may have their own facility-specific emergency plans and/or procedures to follow in the event of a fire, explosion, or release of hazardous and/or mixed waste.

E.1 HAZARDOUS AND MIXED WASTE EMERGENCY RESPONSE RESOURCES [20.4.1 NMAC §§ 264.52(c) and 264.53]

The management of hazardous and mixed waste emergency incidents at LANL resides within the EM&R Office, which is part of the Security and Safeguards (S) Division. During an emergency situation, line management (i.e., the Group Leader of the affected area) works with the Duty Emergency Manager from the EM&R Office. The Emergency Manager has primary responsibility for managing emergency response operations, making appropriate notifications, activating the emergency response organizations, and proceeding to the scene. The Emergency Manager has authority to assume the role of Incident Commander (IC) during an emergency and typically assumes full responsibility for management of the emergency response operations at the scene. (Personnel from other organizations, such as the Federal Bureau of Investigation or the Los Alamos County Fire Department [LACFD], may also assume the role of IC, depending upon the type of emergency and responding organizations.) Additional LANL resources that may provide assistance in an emergency include personnel from the Health, Safety, and Radiation Protection (HSR) Division, Risk Reduction and Environmental Stewardship (RRES) Division, and Performance Surety

(PS) Division at LANL. These groups as well as other groups in S Division are discussed in Sections E.1.2, E.1.3, and E.1.6.

Laboratory-contracted support services and other agencies are also available for assistance during emergencies. These are discussed in Section E.1.5 and include the contracted services of Protection Technology Los Alamos (PTLA) for security and the LACFD. Facility maintenance and heavy equipment operation are provided by KBR-Shaw-LATA (KSL). These contracted services, if changed, will be replaced and/or supplemented with functionally equivalent contracted services required to assume the same duties and responsibilities described in this section. Other outside response agencies are discussed in Section E.1.7 and include the Los Alamos County Police Department (LACPD) and the Los Alamos Medical Center (LAMC). The LACPD and the LAMC each provide assistance under a memorandum of understanding with the U.S. Department of Energy (DOE).

The Laboratory, as required by DOE and the State of New Mexico, uses the Incident Command System (ICS) in response to all emergencies. The ICS is based on the on-scene management structure protocols of the National Interagency Incident Management System (NIIMS). The NIIMS is a national standard that provides consistency in terminology/methodology and allows for an integrated emergency response both locally and nationally, if necessary. Consequently, this Contingency Plan may undergo modification.

The IC (e.g., Duty Emergency Manager) coordinates all groups and agencies responding to the emergency and personnel operating at the scene using the ICS. The general emergency notification structure, illustrated on Figure E-1, is designed to expand and contract, as appropriate, to include the response groups/agencies needed to address any particular emergency.

The IC may appoint and utilize a network of support personnel to assess, plan for, and mitigate emergencies. These personnel can include, but are not limited to, a Safety Officer, a Public Information Officer, and a Liaison Officer that report directly to the IC and are responsible for issues related to safety, information, and the interaction of various groups associated with the overall emergency. Also reporting directly to the IC are an Operations Section Chief, Logistics Section Chief, Planning Section Chief, and an Administrative Section Chief. The Operations Section Chief oversees the Fire Branch and the Emergency Medical Services Branch, and is responsible for the

actual emergency response. The Logistics Section Chief is responsible for providing support personnel and equipment necessary for the emergency response. The Planning Section Chief is responsible for planning the active mitigation and recovery for the emergency. The Administrative Section Chief is responsible for keeping records of expenditures. In some instances, some or all of these positions may be activated, as the emergency warrants. During an emergency at LANL, assistance may be provided to the IC and the IC's appointees by a large variety of response groups/agencies. The responsibilities and/or assistance available from the various response groups/agencies are listed in Table E-1 and discussed briefly in Sections E.1.2 through E.1.7.

A copy of this Contingency Plan and any revisions will be provided to each of the emergency response groups/agencies (including the LACPD, LACFD, and LAMC). LANL's Solid Waste Regulatory Compliance Group (RRES-SWRC) is responsible for the controlled distribution of this plan. Amendments to this plan are discussed in Section E.12.

E.1.1 Emergency Management and Response Office [20.4.1 NMAC §§ 264.52(d) and 264.55] The Director of LANL has delegated the authority and responsibility for administering and implementing LANL's emergency management program to the S Division, which includes the EM&R Office. The EM&R Office coordinates and issues LANL's EMP and provides response coordination for emergencies. The EM&R Office also provides a 24-hour Duty Emergency Manager to respond to emergencies, including hazardous and mixed waste releases. The LANL Emergency Manager is the functional equivalent of the Emergency Coordinator (20.4.1 NMAC § 264.55 [6-14-00]). The EM&R Office maintains an Emergency Operations Center (EOC) in a ready condition, should a center be required. The primary EOC is located at TA-59, Building 1 (TA-59-1). An alternate EOC is located at TA-49-113. After September 30, 2003, the primary EOC will be located at TA-69, Building 33 (TA-69-33). Should an EOC be activated during an emergency, additional emergency personnel can be requested by the IC through the EOC.

Assignment as the Duty (i.e., primary) Emergency Manager is rotated. The Duty Emergency Manager can be reached 24 hours a day by contacting the EM&R Office at 667-6211 or the Central Alarm Station (CAS) operator (911).

The Duty Emergency Manager will respond to emergency incidents involving the release of hazardous or mixed waste to the environment, including spills, fires, and explosions. With input from the appropriate LANL groups, the Duty Emergency Manager will initially assess the possible

hazards to human health or the environment and, if assuming incident command, will use whatever response personnel and/or emergency equipment necessary to control and contain the waste. In the event of an emergency, the Emergency Manager typically becomes the IC with full responsibility for field activities (including safety, operations, and planning, or establishing these positions within the ICS). As described previously, the exception to this is when on-site personnel can adequately address the emergency and maintain incident command internally. At the scene of the emergency, the IC will assemble the ICS, as required, for response to the emergency.

The Duty Emergency Manager responding to an emergency will have access to a copy of the appropriate building emergency plan(s) (BEP) for the area in which the incident is occurring. These plans are maintained by the facility manager where a waste management unit is located and are available at the EM&R Office at TA-59; they are also located on site for use by emergency response personnel. The various response groups will obtain specific information relating to the facilities involved (including the layout of all affected buildings; the location of evacuation routes, equipment, and personnel; properties of the materials/wastes managed at the facility; and the hazards associated with these materials/wastes) from the BEP(s) and other site-specific information.

Listed below is the name, address, and phone number of the current Primary and Alternate Emergency Coordinator, as required by 20.4.1 NMAC § 264.52(d) [6-14-00].

Primary	Alternate
Dennis Armstrong	William Purtymun
998 Capulin Road	1813 Mountain View Place
Los Alamos, NM 87544	Los Alamos, NM 87544
(H) 505-662-3514	(H) 505-662-9886
(W) 505-667-6211	(W) 505-667-6211

To assure timely notifications during an emergency, one must call 911 or 667-6211 to obtain the on-call Duty Emergency Manager.

E.1.2 Hazardous Materials Response Group

The Hazardous Materials (HAZMAT) Team is comprised of personnel from the Hazardous Materials Response Group (S-10). The HAZMAT Team is responsible for the aggressive mitigation of chemical, radiological, hazardous waste, and mixed waste emergencies, including field

decontamination of responders and response equipment. At the request of the IC, the HAZMAT Team may provide limited field decontamination support for victims. The HAZMAT Team is capable of providing a decontamination station at the scene of a hazardous material incident to process people working in a contaminated area and is prepared to perform decontamination of personnel. LANL standards require that the HAZMAT Team meet the training criteria for emergency response personnel specified in the Code of Federal Regulations, Title 29, §1910.120(q)(6)(iii), (iv), and (v). The HAZMAT Team acts as part of the ICS reporting through the HAZMAT Group Supervisor (HMGS) via the Operations Section Chief. The LANL HMGS coordinates the HAZMAT Team and radiological field monitoring activities.

During an emergency response, S-10 may also provide site field monitoring to determine the nature and extent of contamination, provide information on correct handling of chemicals, make recommendations on protective clothing and equipment, and provide exposure and treatment information to responders. To operate effectively, S-10 may obtain resources from HSR groups, such as the Health Physics Operations Group (HSR-1) and the Industrial Hygiene and Safety Group (HSR-5).

E.1.3 RRES Division Response Groups

At the scene, representatives and technical advisors from RRES Division and other response personnel are coordinated by the IC. In addition to their post-emergency duties, they may also be responsible for on-scene emergency operations such as planning. Depending on the type of emergency and the associated hazards, an individual from the most relevant group in the RRES Division will assume the position of the Environmental Safety and Health Advisor, will provide technical support, and will ensure LANL compliance with applicable federal, state, and local regulations.

E.1.3.1 Ecology Group

The Ecology Group provides field surveys of soil, foodstuffs, and biota to determine environmental effects of exposure after an emergency.

E.1.3.2 Meteorology and Air Quality Group

The Meteorology and Air Quality Group (RRES-MAQ) provides field surveys of air to determine environmental impacts and dose equivalent to members of the public after a radiological

emergency. In addition, RRES-MAQ provides expertise in meteorology to project short- and long-term environmental effects of emergency conditions.

E.1.3.3 Solid Waste Regulatory Compliance Group

RRES-SWRC provides guidance on regulatory requirements for proper treatment, storage, and transportation of hazardous and mixed wastes to other LANL groups. After an emergency, RRES-SWRC provides field sampling (e.g., of soil, spills, or potentially hazardous waste) to determine environmental effects of exposure.

E.1.3.4 Water Quality and Hydrology Group

After an emergency, the Water Quality and Hydrology Group (RRES-WQH) provides sampling of surface water runoff and sediments to determine environmental effects of an emergency and performs assessments for regulatory reporting requirements. RRES-WQH also provides expertise in hydrogeology to establish short- and long-term environmental effects of emergency conditions.

E.1.4 Other LANL Response Resources

Emergency response personnel from the Nuclear Materials Technology Division at TA-55 have been trained to respond to emergencies at that facility. Dynamic Experimentation (DX) Division personnel are responsible for the hazardous waste management units at TA-14, TA-36, and TA-39. DX personnel responsible for these units are trained in emergency procedures and may provide information and/or assistance during emergencies involving high explosive waste. Engineering Sciences and Applications Division personnel are responsible for hazardous waste management units at TA-16. These personnel are also trained in emergency procedures and may provide information and/or assistance during emergencies involving units at TA-16. Personnel from the Facilities and Waste Operations Division may provide guidance on proper treatment, storage, and transportation of hazardous and mixed waste at TA-50 and TA-54.

E.1.5 Contracted Response Groups

Contracted response groups' representatives may report directly to the IC Post, if requested. If the IC deems it necessary, the IC may designate an Operations Section Chief to aid in the coordination and direction of these groups. In addition, contracted response groups may report to a staging area, with a representative going either to the IC Post or, if activated, to the EOC.

E.1.5.1 Protection Technology Los Alamos

PTLA is the subcontractor for LANL security and provides this service under contract to LANL. During an emergency, PTLA activities include maintaining security, directing traffic within LANL, and controlling access to the emergency scene. PTLA maintains the necessary equipment (such as crowd-control equipment and patrol vehicles) to perform these functions.

E.1.5.2 KBR-Shaw-LATA (KSL)

KSL provides a maintenance support force under contract to LANL. This support force is under LANL's direction in an emergency. KSL also provides a representative to LANL in the event of an emergency and participates, as necessary, in post-emergency cleanup under the direction of a Recovery Manager designated by the IC. The duties of the Recovery Manager are discussed in Section E.10.

E.1.5.3 Los Alamos County Fire Department

The LACFD provides fire protection and ambulance coverage for the residential communities of Los Alamos and White Rock and for LANL. In the case of an emergency within LANL, the LACFD coordinates fire suppression and Emergency Medical Services. The IC retains overall responsibility for the emergency response effort.

E.1.6 LANL Support Groups

E.1.6.1 Health Physics Operations Group

HSR-1 provides field personnel to perform routine site evaluation and monitoring to determine radiological conditions in facilities. HSR-1 also provides guidance on radiological decontamination. In addition, this group augments the assessment and monitoring functions of the HAZMAT Team.

E.1.6.2 Occupational Medicine Group

LANL maintains its own medical facility operated by the Occupational Medicine Group (HSR-2). HSR-2 provides appropriate medical treatment for occupation-related illnesses and injuries and monitors employees to assess the effectiveness of health protection programs. In addition to promoting early identification and prevention of illnesses or injuries that may arise from exposures to hazardous or radioactive materials, HSR-2 maintains records of the health status of employees and related occupational medicine activities.

Although HSR-2 is not routinely involved with on-scene emergency response, the group maintains a central medical facility with a fully equipped emergency room and decontamination facilities at TA-3,

Building 409. The location of this and other emergency facilities are shown on Figure E-2. Medical staff at these facilities include physicians, physician's assistants, nurses, technicians, and counselors. All full-time physicians and nurses receive radiation accident training. HSR-2 also maintains access to a database that provides the clinical staff with timely toxic exposure and treatment information.

E.1.6.3 Industrial Hygiene and Safety Group

HSR-5 assists HSR-2 with its ability to obtain additional exposure and treatment information. In addition, HSR-5 maintains computer access to the National Institute of Occupational Safety and Health Technical Information Center and the Registry of Toxic Effects of Chemical Substances. During routine operations, HSR-5 performs site evaluations and field testing to determine the nature and extent of chemical contamination and specifies protective clothing and equipment.

E.1.6.4 Occurrence Reporting Group

The PS Division hosts the Occurrence Reporting Group, whose personnel assist the facility manager in investigating all adverse environmental, safety, health, and operational occurrences (on-site and off-site), determining the causal factors, identifying the appropriate corrective actions, and assisting in the preparation of reports documenting the occurrence to DOE. This group tracks corrective actions associated with such occurrences and maintains the information in an on-site database.

E.1.7 Outside Response Agencies

During an emergency, outside response agencies report directly to the IC. An Operations Section Chief, designated by the IC, may aid in coordinating and directing the groups responding to an emergency.

E.1.7.1 Los Alamos County Police Department

The LACPD may assume IC under unique circumstances, but usually has only minimal interaction with LANL in an on-site emergency. This interaction normally involves traffic control on DOE roads with public access, handling criminal activity, and criminal investigations.

E.1.7.2 Los Alamos County Emergency Management Coordinator

Los Alamos County has an agreement with LANL's EM&R Office to provide assistance in certain emergency situations. If an emergency occurs on LANL property that may affect the communities

of Los Alamos and White Rock, the EM&R Office will notify the Los Alamos County Emergency Management Coordinator, who will coordinate necessary emergency actions throughout the county.

E.1.7.3 Los Alamos Medical Center

LANL maintains a fully equipped decontamination room adjacent to the emergency room at LAMC. In the event that a case is sent to LAMC, support for the emergency room staff is provided by HSR-2 medical personnel. HSR-1, HSR-5, and S-10 personnel also provide assistance to the emergency room staff; assistance from additional LANL resources is provided, as necessary. Assistance is coordinated through the EM&R Office.

E.2 EMERGENCY EQUIPMENT AND COMMUNICATIONS [20.4.1 NMAC § 264.52(e)]

E.2.1 Emergency Equipment

20.4.1 NMAC, Subpart V, Part 264, Subpart D [6-14-00], requires a listing of all emergency response equipment available that can be used in the event of an emergency. Table E-2 lists emergency equipment available for use at any of LANL's hazardous or mixed waste management units. The list includes emergency equipment available in the HAZMAT vehicles and trailers as well as supplemental emergency equipment maintained by the LACFD, KSL, and HSR-2. A list of emergency equipment available for use at specific hazardous and/or mixed waste management units is presented in Attachment E of TA-specific permit applications, permit modification requests, or permit renewal applications. Emergency equipment listed in Table E-2 may be replaced and/or upgraded with functionally equivalent components and equipment, as necessary, for routine maintenance and repair.

E.2.2 Emergency Communications [20.4.1 NMAC § 264.56(a)]

Effective emergency response at LANL requires an efficient communication system that will integrate required personnel into the emergency response. The initial phase of an emergency may involve a small number of individuals at the affected area, require notification of the Duty Emergency Manager, and utilize local communication equipment and/or systems. When responding to hazardous and/or mixed waste emergencies, the EM&R Office can provide communications between response units and emergency organizations.

E.2.2.1 Central Alarm Station

The LANL CAS is manned by PTLA or security personnel 24 hours a day and is equipped with telephones (including direct-line telephones), medium- and short-range radios, a National Warning

System (NAWAS) station, and an emergency power system. The fire alarm board at the control room gives the location of automatic and manual fire alarm equipment. The CAS receives alarms from several sources and, in turn, notifies the Duty Emergency Manager of a hazardous or mixed waste emergency. Sources include:

- Telephone communication (911)
- Automatic fire alarms
- Manual pull alarms
- Computer interface (to warn of critical events at selected facilities)
- Security alarms
- Radio communications.

Upon receipt of an alarm, the CAS operator notifies the LACFD and the Duty Emergency Manager. The Emergency Manager, the EOC communicator, and/or the CAS operator may request emergency response groups to respond. Should the LANL 911 system fail, the Los Alamos County System, located at the LACPD Station, will be used to activate emergency response groups.

E.2.2.2 Power Dispatch

The Power Dispatch is maintained 24 hours a day. Alarms at this facility are connected to LANL experiments, equipment, and/or buildings to record outages and hazardous conditions. Any conditions that activate these alarms will be reported immediately to the building management or to the CAS operator for notification and response.

E.2.2.3 Additional Communication Systems

Internal communication systems at LANL include:

- The Centrex telephone system
- A telephone paging system
- A variety of frequency modulated very high frequency simplex repeater systems, including:
  - Multiple base stations
  - Mobile and hand-held units
  - Links to New Mexico public safety agencies
- An ultrahigh frequency radio system, including:
  - Multiple antenna sites

- Mobile and base units
- Links with the LACPD, the LACFD, and the State Medical System

- A 400-megahertz trunked radio system that includes a link with the LACFD

- Transmission and reception (through the EOC) for:

  - Secure telephone
  - Secure fax
  - Secure still video
  - Secure videoconference system (to all DOE EOCs and DOE Headquarters)

- Access to all radio systems outlined above (through the EOC).

Off-site communications with federal, state, tribal, county, and other agencies are available through the following:

- A Centrex telephone system
- Private telephone lines (if Centrex fails)
- Two NAWAS stations
- A link to KRSN radio (local radio station)
- The local cable television
- The Community Alert Network.

The LANL EOC, maintained by the EM&R Office, operates radio systems on key LANL and off-site channels. Emergency personnel responding to on-site incidents have the benefit of wide-area radio coverage using EOC facilities. The Duty Emergency Manager is responsible for activating whatever support personnel, equipment, or services are needed 24 hours a day.

E.3 CONTINGENCY PLAN IMPLEMENTATION [20.4.1 NMAC § 264.56]

The following sections discuss guidelines used to implement this plan, emergency notification, emergency manager actions, and actions to be taken in response to fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents into the environment at LANL.

E.3.1 Guidelines For Implementation [20.4.1 NMAC §§ 264.51(b) and 264.56]

The decision to implement this plan depends upon whether an emergency exists, which for the purposes of this section is defined as an imminent or actual incident arising from fires, explosions, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste

constituents that could threaten human health or the environment. The Duty Emergency Manager or IC will use the guidelines listed below to decide whether to implement this plan.

This plan will be implemented immediately in the following situations involving releases or potential releases of hazardous or mixed waste:

- Spills:
  - If a hazardous or mixed waste spill cannot be contained with secondary containment or application of sorbents
  - If a hazardous or mixed waste spill causes the release of flammable material, creating a fire or explosion hazard
  - If a hazardous or mixed waste spill results in toxic fumes that threaten human health
- Explosions:
  - If an unplanned explosion involving hazardous or mixed waste occurs
  - If an imminent danger of an explosion involving hazardous or mixed waste exists.
- Fires:
  - If a fire involving hazardous or mixed waste occurs
  - If any building, grass, forest, or nonhazardous waste fire exists that threatens to volatilize or ignite hazardous or mixed waste.
- Other Acts of Force Majeure (i.e., acts of God)
  - If an earthquake or other natural disaster threatens containment integrity, including precipitation that threatens to move spilled material off site.

E.3.2 Emergency Notification [20.4.1 NMAC § 264.56(a) and (b)]

Emergency notification requires immediate notification of 911 or the EM&R Office upon discovery of an imminent or actual incident involving hazardous and/or mixed waste. During nonworking hours, personnel will report all imminent or actual incidents involving hazardous and/or mixed waste to the Emergency Manager or the CAS operator at 667-6211. In the case of fire, notification of these individuals is superseded by the LANL fire alarm system. A fire is reported by dialing 911 (from telephone exchanges 667 and 665) or 667-7080 (from all exchanges, including cellular phones), activating automatic alarms, or activating a fire alarm pull box. All fire alarms alert the CAS operator, the LACFD, and PTLA, who in turn notify the Duty Emergency Manager.

Upon recognition of a hazardous or mixed waste emergency, the first arriving emergency-trained person will become the Facility Command Leader. Once the EM&R Office is notified of the emergency, the Duty Emergency Manager will proceed to the scene and be briefed by the Facility Command Leader, building/area personnel, and/or other emergency units/teams. The Emergency Manager will then assume the position of IC. If necessary, the IC may recommend that the EOC be activated and that the necessary members of the emergency management team be determined. The IC will form an ICS and contact the HMGS. The HMGS will notify the appropriate emergency response groups. The IC may determine from the list of response groups described in Table E-1 which groups to contact in an emergency. Each response group maintains an on-call person and/or a call-down procedure to respond to emergencies.

The EM&R Office will be notified of any potential hazardous or mixed waste emergency. The IC and the HMGS will use whatever means are available (including the assistance of other response groups, computer data searches, and sampling) to determine if a hazardous or mixed waste emergency exists.

E.3.3 Emergency Manager Actions [20.4.1 NMAC § 264.56(b-h)]

Upon notification of an emergency incident, the Duty Emergency Manager may:

- Make an initial assessment of the incident and, in conjunction with the IC, obtain resources to determine the source, quantities, and types of hazardous and/or mixed waste involved and the areal extent of any released materials.
- Request resources needed and have EOC staff begin notifications.
- Proceed directly to the scene.
- Assess the nature of the incident (e.g., through communication with the IC).
- Assume incident command after a direct briefing with the Facility Command Leader.
- Based on the guidelines in Section E.3.1 of this plan, determine if implementation of this plan is warranted.
- Activate the EOC, if necessary.

Upon deciding to implement this plan, the IC will, when appropriate:

- Assess the hazards to human health and the environment, including both direct and indirect effects, such as generation of toxic, irritating, or asphyxiating gases and/or hazards of runoff of water or chemicals used for fire suppression. An individual designated by the IC will use the guidelines in Section E.3.1 to assess the hazards to human health and the environment. If any of the criteria under Section E.3.1 are met and if the responsible Group Leader (or his/her designee) has not already accomplished evacuation of the area, the IC will initiate shelter in place or evacuation of the immediate area.

- Direct the EOC staff to initiate protective actions and immediately notify appropriate response groups and personnel as per the EM&R Guidelines. The IC may activate one or more of the following community alert mechanisms: the Community Alert (telephone) Network, the KRSN radio remote input system, or the cable television capture system, sitewide area network radios, and public radio and television channels.

- In the case of fire or release of any type, make reasonable efforts to confirm that all response personnel at the scene are aware of actual or imminent special hazards associated with hazardous or mixed waste.

- In emergency situations, contact the appropriate RRES representative to notify the New Mexico Environment Department (NMED) at (505) 827-9329 and the National Response Center at (800) 424-8802, reporting:

  - The name and telephone number of the RRES representative
  - The name and address of the facility
  - The time and type of incident
  - The name and quantity of material involved, to the extent known
  - The extent of injuries, if any
  - The possible hazards to human health or the environment outside the facility.

- When an emergency occurs at hazardous or mixed waste treatment units, ensure that appropriate LANL personnel monitor for leaks, pressure buildup, gas generation, or equipment ruptures.

Once control of the emergency is established, the IC will take all reasonable measures to minimize the occurrence, recurrence, or spread of fires, explosions, or releases. In addition, the IC will delegate cleanup and decontamination responsibilities to the Recovery Manager. These responsibilities may include:

- Arranging for site cleanup.

- Assisting with arrangements for proper handling of recovered waste, contaminated soil, or contaminated surface/groundwater.

- Assisting with arrangements for decontamination of equipment, as needed.

- Arranging for replacement and/or repair of equipment, as needed.

- Requesting that testing is conducted to verify successful cleanup.

Within 15 days of the incident, DOE National Nuclear Security Administration (NNSA) Los Alamos Site Office (LASO) will submit a report to the Secretary of the NMED. The contents of this report are generated by several LANL groups responding to the emergency, as detailed in Section E.11.

E.4 SPILLS [20.4.1 NMAC § 264.56(e)]

Sudden releases may include spills of hazardous or mixed waste that pose a significant threat to human health or the environment. Spill incidents resulting in a sudden release of hazardous or mixed waste that present a potential threat to human health or the environment, as listed in Section E.3.1, require implementation of this plan.

Hazardous and mixed wastes are stored on site at LANL in a variety of containers. Volumes of hazardous or mixed waste managed will vary from unit to unit. The general steps in handling hazardous and/or mixed waste spills are as follows:

- Isolate the immediate area and deny entry to all unauthorized personnel.
- Contain the spill by spreading sorbents or forming temporary dikes to prevent further migration (performed by properly trained personnel, if safe).
- Monitor the spill area and sample the spilled waste and contaminated media.
- Package the waste and contaminated media in sound containers.
- Decontaminate the area and all involved equipment and personnel (followed by testing to assure adequate cleanup).
- Remove the waste and contaminated media (performed by appropriate waste management personnel).

The IC will determine the steps to be taken for spill mitigation. If initial mitigation of the spill is necessary and can be accomplished safely (by appropriately trained personnel) before the Emergency Manager arrives, a qualified member of the affected area's operating group will serve as the Facility Command Leader.

Hazardous and/or mixed waste spills will be stabilized, if necessary, and cleaned up. During spill control and cleanup, all personnel will wear appropriate personal protective equipment (PPE).

Monitoring will be conducted to ensure that chemical and, as appropriate, radiological exposure is minimized. The collected material may be treated as hazardous or mixed waste, depending on the components present. Runoff from spills of listed hazardous or mixed waste that have migrated outside hazardous waste management areas must be contained and managed as hazardous or mixed waste, as appropriate. If the spill was from a characteristic hazardous or mixed waste and if it is determined that the runoff does not exhibit the characteristic (i.e., ignitability, corrosivity, reactivity, and/or toxicity), the runoff need not be managed as characteristic waste. Temporary dikes may be constructed to contain runoff.

E.4.1 Spill Control Procedures

When a flammable organic solvent spill, a highly acidic spill, or a highly caustic spill has been stabilized with the contents of an organic solvent spill kit, an acid spill kit, or a caustic spill kit, respectively, the resulting material may be sorbed using a nonbiodegradable sorbent. Nonbiodegradable sorbent can be used to control any spill if it is known to be compatible with the spilled material. Appropriate containers or packaging will be used to collect all spilled material and contaminated sorbent. Table E-1 of TA-specific permit applications, permit modification requests, or permit renewal applications lists emergency equipment available for spill control at specific units. The ultimate disposition of any contaminated sorbent or waste material will be determined by appropriate waste management personnel, according to hazardous waste management regulatory requirements.

E.4.1.1 Tank System Spill Control and Reporting

A tank system will be removed from service immediately using approved shutdown procedures if a leak or spill occurs from the tank system or its secondary containment system or if the system is determined to be unfit for use. Further addition of waste to the tank system or containment system will cease and the system will be visually inspected to determine the cause of the leak or spill. If a leak occurs from a tank system, as much of the waste as is necessary to prevent further release of waste will be removed within 24 hours after detection or as early as practicable, and the system will be inspected and repaired. All released waste will be removed within 24 hours or as soon as possible if a leak occurs to a tank's containment system.

If a spill from a tank is not immediately contained and cleaned up and exceeds a quantity of 1 pound, the release will be reported to the NMED within 24 hours of its detection in accordance with the requirements of 20.4.1 NMAC § 264.196(d)(1) [6-14-00]. In addition, a written report will be

submitted to the NMED within 30 days describing the likely migration route of the release; soil characteristics at the site; monitoring and sampling data relevant to the release; proximity to downgradient drinking water, surface water, and populated areas; and response actions taken or planned.

E.4.1.2 Tank System/Secondary Containment Repair and Closure

If the integrity of a tank system, including its secondary containment, has not been damaged by a spill, the system may be returned to service. Service may not resume until after all released waste is removed and repairs, if necessary, are made. Any tank system that cannot satisfy the criteria described above will undergo closure in accordance with the requirements of 20.4.1 NMAC § 264.197 [6-14-00].

E.4.1.3 Certification of Major Repairs

If a tank system undergoes extensive repairs (e.g., installation of an internal liner, tank system piping retrofit), the tank system will not be returned to service until a certification by an independent, qualified registered professional engineer is obtained, verifying that the repaired system is capable of handling wastes without release for the intended life of the system. This certification will be submitted to NMED within seven days after returning the tank system to use.

E.4.2 Decontamination Verification

Decontamination will be accomplished at the spill site. After the spilled material has been sorbed, the material will be containerized. If the spill occurs on a concrete or asphaltic-concrete area, water or an appropriate solvent will be used to clean the area. Liquids (i.e., spilled material and cleaning water or solvents used to clean a spill) may be sorbed with a compatible, nonbiodegradable sorbent and containerized. If a spill is from an identifiable source, the spilled material may be characterized as a newly-generated waste using acceptable knowledge or may be analyzed, as applicable, for the hazardous waste constituents known to be components of the waste managed at that unit. Analytical method(s) given in Table E-3 will be utilized, as appropriate. If the spill is from other than an identifiable source, the spilled material will be analyzed for the appropriate parameters listed in Table E-3. All personnel conducting decontamination verification will wear appropriate PPE. HSR-1 will conduct health physics monitoring whenever mixed waste is involved to ensure that radiation exposure is maintained as low as reasonably achievable. Any hazardous or mixed waste collected from decontamination activities will be handled appropriately.

In order to establish baseline data, a sample of decontamination water or solvent (and nonbiodegradable sorbent material, as applicable) will be taken prior to the start of the decontamination effort. A sample of the final washwater (or the used sorbent) will then be taken. The baseline samples and final washwater/used sorbent samples will be analyzed for the applicable parameters given in Table E-3. If the decontamination samples contain hazardous constituents that are not present in the baseline samples and the levels exceed established health-based levels, the decontamination procedure may be repeated. An alternative demonstration of decontamination may be proposed and justified to NMED, who will evaluate the proposed alternative in accordance with the standards and guidance currently in effect. If the proposed alternative is accepted, decontamination levels will meet the levels approved by NMED. Each sample will be collected with an appropriate sampling device (e.g., a thief or trier) as specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986), and approved updates, as applicable.

If a hazardous/mixed waste spill occurs on soil, any free liquid present will be collected and containerized. Liquids may be sorbed with a compatible nonbiodegradable sorbent prior to containerization. For such a spill, contaminated soil will either be excavated and containerized or remediated in situ. HSR-5 will conduct industrial hygiene monitoring and, if mixed waste is involved, HSR-1 will conduct health physics monitoring, if deemed necessary, to minimize exposure during soil removal or remediation operations. To establish comparative background data, one or more samples will be collected from an unaffected area near the spill site. The spill site will then be characterized, and the data will be compared to the background data to ensure that contaminated material from the spill has been removed or remediated.

If a hazardous/mixed waste spill occurs in an area with flooring, the floor will either be removed in lieu of decontamination, or the floor will be decontaminated. If the decision is made to decontaminate the floor, swipe samples or other types of sampling appropriate for the contaminant will be collected at random and characterized for decontamination verification. If, after several decontamination efforts, it is subsequently determined that the affected floor area cannot be decontaminated, the floor material will be removed. In all cases, wastes generated during the decontamination and/or removal process will be managed appropriately.

E.5 EXPLOSION

Explosions and resultant releases may result in a significant threat to human health or the environment. The potential exists for hazardous or mixed waste to be released during an

explosion. Implementation of this plan is required whenever a sudden release that cannot be contained or that presents a threat to human health or the environment occurs as a result of an explosion.

In the event of an explosion at LANL, all personnel will immediately evacuate the area. Any injured personnel will be decontaminated at the site, if required and if time allows. An LACFD ambulance will transport these personnel to LAMC for treatment. If an injury is severe and requires immediate medical evacuation, the injured person will be wrapped to contain contamination, if necessary. In the case of an actual or potential explosion, on-site personnel will contact the EM&R Office immediately so that the Emergency Manager can ensure that all necessary emergency response personnel are alerted. The LACFD is notified automatically upon central alarm system activation. The Emergency Manager assumes incident command and will remain near but at a safe distance from the site in order to inform personnel responding to the explosion of the known hazards.

If a fire results from an explosion, the LACFD Senior Officer will, upon arrival at the scene, evaluate all available information and determine the appropriate firefighting methods and tactics. The LACFD Senior Officer will direct firefighting operations as the acting IC until EM&R formally assumes command.

E.6 FIRE

Fires and resultant releases of hazardous or mixed waste may result in a significant threat to human health or the environment. Implementation of this plan is required whenever a fire incident results in a sudden release of hazardous or mixed waste that cannot be contained or that presents a threat to human health or the environment.

Fire alarms will be sounded automatically or manually to alert personnel that a fire hazard exists and to evacuate the area immediately if in the vicinity. Information related to the various fire alarms at the specific units is included in tables in Attachment E of TA-specific permit applications, permit modification requests, or permit renewal applications.

Depending on the size of the fire and the fuel source, portable fire extinguishers may be used. However, LANL policy does not encourage the use of portable fire extinguishers by employees unless they are properly trained. Instead, LANL policy encourages immediate evacuation of the area and notification of the CAS operator by dialing 911. For any fire, including a fire that involves

hazardous or mixed waste, the responsible Group Leader and the EM&R Office must be contacted immediately. The Emergency Manager will alert the LACFD and all other necessary emergency response personnel. If the fire spreads or increases in intensity, all personnel must follow protective actions as designated by the Emergency Manager. The Emergency Manager assumes incident command and will remain near the scene to advise personnel responding to the fire of the known hazards.

Upon arrival at the scene, the LACFD Senior Officer will evaluate all available information and determine the appropriate firefighting methods and tactics. The LACFD Senior Officer will direct firefighting operations as the acting IC until EM&R formally assumes command.

E.7 UNPLANNED NONSUDDEN RELEASES

Nonsudden releases include those incidents that, if uncontrolled, impact the environment over a long period of time. Such incidents include minor leaks from containers and loss of secondary containment integrity.

E.7.1 Responsibility

Appropriate LANL personnel are responsible for correction of a nonsudden release from a hazardous or mixed waste unit if the correction can be performed safely with normal maintenance and management procedures. Personnel from the EM&R Office may provide assistance in mitigating releases. Any correction methods for nonsudden releases that have resulted in an impact to the environment will be coordinated with the NMED.

E.7.2 Nonsudden Releases

In general, the response to a nonsudden release will be to contain the release, to correct the cause of the release, and to clean up any release to a level that protects human health and the environment.

Appropriate LANL personnel will conduct regularly scheduled inspections to detect failure of containment at the unit(s) addressed in TA-specific permit applications, permit modification requests, or permit renewal applications. Secondary containment systems will be inspected regularly to ensure that the integrity of the containment systems has not deteriorated. If an inspection reveals that containers are leaking or that secondary containment has deteriorated,

LANL personnel will ensure that maintenance or replacement of containment is performed, as appropriate.

E.7.3 Nonsudden Release Surveillance

In addition to routine inspection and site-specific sampling and testing, LANL has established an area-wide environmental monitoring network maintained by RRES. Monitoring and sampling locations for various types of measurements are organized into three main groups. Regional monitoring stations located within the five counties surrounding Los Alamos County are placed up to 80 kilometers (50 miles) from LANL. These stations serve to determine background conditions. Perimeter stations, located within approximately 4 kilometers (2.5 miles) of the LANL boundary, document conditions in residential areas surrounding LANL. On-site stations, most of which are accessible only to employees during normal working hours, are within the LANL boundary.

Routine surveillance conducted at these stations includes measuring radiation and collecting samples of air particulates, surface waters, groundwater, soil, sediment, and foodstuffs for subsequent analysis. Additional samples provide information about particular events, such as major runoff events and nonroutine releases. Data from these efforts are used for comparison with standards, for determining background levels, and for radiation dose calculations.

E.8 EXPOSURE TO HAZARDOUS OR MIXED WASTE

If a person is exposed to hazardous or mixed waste, the affected person, a co-worker, or line management will notify the EM&R Office. Appropriate first aid should be administered immediately. An EM&R Office representative will make appropriate notifications as soon as possible so that exposure levels and decontamination requirements can be established. The affected person will then be transported to the HSR-2 medical facility or to LAMC for evaluation. If possible, the material involved in the exposure will be ascertained, and the information will be given to the medical staff.

Other potential exposures will necessitate evacuation of the area, if appropriate, or under any of the following conditions:

- Irritation of the eyes, breathing passages, or skin
- Difficulty in breathing
- Nausea, lightheadedness, vertigo, or blurred vision.

The affected person will be transferred to the HSR-2 medical facility or to LAMC. An HSR-1, HSR-5, or S-10 representative will attempt to ascertain what, if any, exposure occurred and what corrective measure is appropriate.

E.9 EVACUATION [20.4.1 NMAC § 264.52(f)]

A facility will be evacuated upon the voice command to evacuate the area or upon the sounding of the evacuation or fire alarm. The IC may call for sheltering in place when evacuation is impractical due to significant airborne hazards. Shelter in place may be possible in a designated area or in a building where all exterior windows and doors may be closed and outdoor air ventilation equipment turned off. Once the airborne hazard has decreased, personnel would then be evacuated.

E.9.1 Emergency Process Shutdown Prior To Evacuation

Personnel are instructed to shut down equipment prior to evacuating a building/area unless an immediate building/area evacuation is announced or signaled. To ensure efficient shutdown, training and exercises addressing the shutdown process are performed. In the case of an immediate evacuation, a selected team may shut down designated equipment in an evacuated area. The team will be equipped with proper equipment and PPE. If they are on location, HSR-1, HSR-5, and/or S-10 will provide advice and assistance. Process-shutdown procedures apply mainly to hazardous or mixed waste treatment units and are addressed, as appropriate, in Attachment E of TA-specific permit applications, permit modification requests, or permit renewal applications.

E.9.2 Evacuation Plan

Emergency situations may warrant the shutdown and evacuation of areas or buildings in order to protect personnel and property, to anticipate the emergency condition, or to enhance the appropriate response. Table E-4 lists the criteria for evacuation, persons responsible for initiating evacuations, and reentry conditions. Figures in Attachment E of TA-specific permit applications, permit modification requests, or permit renewal applications show evacuation routes and assembly/muster areas for specific hazardous and/or mixed waste management units.

To initiate the evacuation of a building/area, the evacuation or fire alarm is sounded and/or the public address (PA) system may be used. Evacuation alarms cannot be silenced and reset by site personnel. Only the Fire Alarm Maintenance Section and the LACFD Battalion Chief can silence and reset alarms. To evacuate a portion of a building or area, use of the PA system may be more

appropriate. The PA system will notify the occupants of the area to be evacuated and will advise personnel throughout the building of the existence of a problem in a specific area. Once evacuation has been initiated and if conditions allow, personnel will turn off all equipment that could contribute to the hazard if left unattended. All personnel will then proceed from the affected area to the assembly/muster area.

In the event of evacuation of a building, an outbuilding, or an outlying work area, the responsible Group Leader (or his/her designee) will determine a control point at the closest safe location (e.g., considering wind direction). The designated area will be outside the affected area and will serve as an assembly/muster area where the Group Leader (or designee) can oversee evacuation operations and work to prevent further spread of the hazard.

As personnel exit an affected building/area, a primary sweep of the building/area will be performed to ensure that all personnel have evacuated. If the building/area is evacuated, a Group Leader designee will take attendance at the assembly/muster area and report personnel accountability to the IC. The evacuation procedure is as follows:

- The person discovering the accident or emergency will call 911 to ensure that line management and the EM&R Office are notified.
- Site-specific BEPs and/or emergency action procedures will be followed concerning evacuation, sweep, personnel accountability, and equipment shutdown procedures.

A responsible on-site person may direct the initial evacuation and the central alarm system may be activated. The EM&R Office will be notified immediately and will dispatch the Duty Emergency Manager. A responsible on-site person may implement the evacuation process until the Duty Emergency Manager arrives at the scene to assume that responsibility.

E.10 SALVAGE AND CLEANUP [20.4.1 NMAC § 264.56(g) and (h)]

Appropriate representatives from the RRES groups will survey the affected area before salvage and cleanup begin. They will conduct visual inspections and sampling, as appropriate, of the affected area to determine whether cleanup is complete. If gases or fumes, electrical or radiological problems, or other conditions present a hazardous situation, personnel or selected teams equipped with proper PPE will reenter the area to perform designated decontamination tasks, repairs, and salvage to allow the return to normal operations. After an emergency, the IC will turn the operation over to a designated Recovery Manager, who will:

- Provide for proper handling of recovered waste, contaminated soil or surface water, or any other material that results from a spill, fire, or explosion. Contaminated material will be managed appropriately and temporarily stored at one of the hazardous or mixed waste storage areas at LANL. Waste management personnel will be responsible for determining the final disposition of the waste. This determination will be made in compliance with hazardous waste management regulations.

- Arrange to monitor for damage or improper operation of the unit and associated equipment as a result of the emergency or of plant shutdown in response to the emergency.

- Arrange for site cleanup procedures to be completed and ensure that no waste that may be incompatible with the released material is treated or stored in the same area.

- Ensure that emergency equipment is cleaned, decontaminated, and fit for its intended use before operations are resumed. Equipment will be inspected visually and then sampled, if necessary, to determine the type and degree of contamination and to determine appropriate cleanup measures.

Prior to resuming operations, the appropriate facility management at LANL will verify that the previously mentioned tasks have been performed. The owner/operator (DOE NNSA/LASO) will notify appropriate state and local authorities that cleanup procedures are completed and that emergency equipment is clean and fit for its intended use.

The IC assumes the coordination of post-emergency actions (particularly during the time period immediately following the emergency) until a Recovery Manager is appointed. The Recovery Manager then assumes this coordination role. The Recovery Manager is the functional equivalent of the Emergency Coordinator for post-emergency actions. The post-emergency actions include cleanup operations, vital equipment repair, or interim hazard-removal operations (such as arranging for demolition of unstable walls). The services of affected operational organizations, RRES groups, KSL, and other on-site resources will also be used to estimate cleanup costs and operational impact.

E.11 EMERGENCY RESPONSE RECORDS AND REPORTS [20.4.1 NMAC § 264.56(j)]

Any emergency that requires implementation of this plan will be documented by the Group Leader (or his/her designee) responsible for the hazardous or mixed waste unit associated with the emergency, and reported in writing within 15 days of the incident to the NMED. The incident report, submitted by DOE NNSA/LASO, will include the following data:

- Name, address, and phone number of owner or operator
- Name, address, and phone number of the facility
- Date, time, and type of incident (e.g. fire, explosion, spill)
- Name of material(s) involved
- Quantity of material(s) involved
- Extent of injuries (if any)
- Assessment of actual or potential hazards to human health or the environment
- Estimated quantity and disposition of material recovered from the incident.

In addition, LANL personnel responding to any emergency requiring implementation of this plan will record the date, time, location, and details of the incident. This information will be maintained in the facility operating record.

E.12 CONTINGENCY PLAN AMENDMENT [20.4.1 NMAC § 264.54]

This plan will be reviewed periodically by appropriate division personnel. The plan will be amended immediately if determined to be inadequate to handle releases (spills, explosions, and/or fires) and whenever:

- The facility permit is revised.
- There is change in the design or operation of the facility (e.g., quantities of waste handled and handling techniques) that increases the likelihood of an emergency and requires changes in emergency response.
- The Primary Emergency Manager changes.
- The list of emergency equipment changes significantly.

E.13 REFERENCES

EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *EPA-SW-846*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C.

LANL, 2002, "Los Alamos National Laboratory Emergency Management Plan," LIR 403-00-01.0, Los Alamos National Laboratory, Emergency Management and Response Office, Los Alamos, New Mexico.

Table E-1

Response Groups and Agencies Available to the Emergency Management and Response Office for Guidance and/or Emergency Assistance

LANL[a]-Controlled Response Group	Telephone	Responsibilities
HSR-1, Health Physics Operations	667-7171	Provides routine guidance on radiological decontamination. Provides routine site evaluation and monitoring to determine the nature and extent of contamination (radiological).
HSR-2, Occupational Medicine	667-0660	Provides emergency medical treatment.
HSR-5, Industrial Hygiene and Safety	667-5231	Provides guidance on industrial hygiene equipment and operational safety. Provides routine site evaluation/support field testing to determine the nature and extent of contamination (chemical).
PS-7, Occurrence Reporting	667-0598	Reports occurrences and tracks follow-up actions.
S-10, Hazardous Materials Response	665-5237	Provides emergency site evaluation/field monitoring (chemical and radiological). Specifies protective clothing and equipment. Dispatches Hazardous Materials Response Team. Provides support for chemical, radiological, hazardous, and mixed waste incidents and decontamination of responders and response equipment.
RRES-MAQ, Meteorology & Air Quality	665-8855	Provides information on meteorological conditions.
RRES-WQH, Water Quality and Hydrology	665-1859	Provides information on hydrologic conditions.
RRES-SWRC, Solid Waste Regulatory Compliance	665-9527	Provides guidance on regulatory requirements. Provide guidance on proper treatment, storage, and off-site shipment of hazardous and mixed waste. Conducts field surveys to determine spread of contamination and adequacy of cleanup.
RRES-ECO, Ecology	665-8961	Provides information on biotic conditions.
PTLA, Protection Technology Los Alamos	667-4531	Provides traffic control and security.
KSL[b]	662-9080	Dispatches maintenance personnel and equipment. Assists in waste cleanup under the direction of the Recovery Manager.
NMT, Nuclear Materials Technology Division	667-2556	Provides initial emergency site evaluation at Technical Area (TA) 55 and conducts activities related to the prevention, notification, and control of emergencies at TA-55. In the event of an emergency at TA-55, monitors for leaks, pressure buildup, gas generation, or equipment ruptures, if necessary. Maintains and operates TA-55 Emergency Response Team. Writes TA-55 emergency plans and procedures.
DX, Dynamic Experimentation Division	667-5653	Provides information and/or assistance during emergencies involving units at TA-14, TA-15, TA-36, and TA-39.

Refer to footnotes at end of table.

Table E-1 (Continued)

Response Groups and Agencies Available to the Emergency Management and Response Office for Guidance and/or Emergency Assistance

LANL[a]-Controlled Response Group	Telephone	Responsibilities
ESA, Engineering Sciences and Applications Division	667-4136	Provides information and/or assistance during emergencies involving units at TA-16.
Los Alamos County Fire Department	911 662-8301	Dispatches firefighting personnel and equipment and provides Emergency Medical Services.
Los Alamos County Police Department	662-8222	Provides traffic control on public access roads.
Los Alamos Medical Center[c]	662-4201	Provides medical services. Provides and maintains Emergency Room.

[a] Los Alamos National Laboratory.
[b] KBR-Shaw-LATA.
[c] Medical services related to hazardous and mixed waste injuries are provided under the direction of HSR-2.

Refer to footnotes at end of table.

Table E-2

Los Alamos National Laboratory-Wide Emergency Equipment

Hazardous Materials (HAZMAT) Vehicles and Associated Emergency Equipment:

HAZMAT vehicles and trailers are located at Technical Area (TA) 64, Building 39 (TA-64-39). They are available to the Security and Safeguards (S) Hazardous Materials Response Group (S-10) for emergency response to all of the TAs at Los Alamos National Laboratory (LANL). S-10 is responsible for maintaining the supplies of appropriate emergency equipment in each vehicle and trailer.

The HAZMAT vehicles and trailers are equipped with safety and emergency equipment, personal protective clothing, and other supplies, which may include, but are not limited to, some or all of the following:

Assorted personal protective equipment, T-shirts, and gloves
Safety goggles, safety glasses, and face shields
Boots and booties
Totally encapsulating suits and boots
Level A and B suits
Flash suits
Self-contained breathing apparatus (SCBA) and SCBA bottles
Respirators and cartridges
Hazardous chemical reference books and other reference materials
Shovels
Siphon pumps
Assorted spill kits and sorbents
Neutralizing solutions: acids, bases, and caustics
Two-way radios, cellular phones, facsimile, and other communication equipment
Bottles of leak detector and leak repair kits
Emergency repair packs
HAZMAT bags
Gas detectors and chemical monitoring equipment
Radiological monitoring equipment
Sponges and cleaners
Warning signs and barricade tape
Traffic control barriers
Flashlights
Cameras and film
Knives
Portable power supplies
Warning and signal horns
Harnesses and belts
Decontamination equipment
Sampling equipment
Lifting equipment and vetter bags
Assorted tools, tape, and other supplies
Non-sparking tools
Biological detection equipment
Chemical vacuums
Sandia foam
Plugging and diking equipment
Sample van equipped with a glovebox and analysis equipment
Environmental continuous air monitoring equipment
Robot
National Atmospheric Release Advisory Center-Internet Client (NARAC iClient)

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Table E-2 (Continued)

Los Alamos National Laboratory-Wide Emergency Equipment

Hazardous Materials (HAZMAT) Vehicles and Associated Emergency Equipment:

Hotspot plume modeling program
Mass decontamination trailer with tent and supplies
Portable decontamination trailer
Portable structures
Tents
Trucks
Trailers
International Shipping Units
Portable hot water heater
Forklift
Automated external defibrillators.

Table E-2 (Continued)

Los Alamos National Laboratory-Wide Emergency Equipment

Supplemental emergency equipment and personnel available from the Los Alamos County Fire Department (LACFD):

Supplemental emergency equipment available from the LACFD may include, but is not limited to, some or all of the following:

Fire engines
Mini-tankers with compressed air foam capability
Modular ambulances
Rescue vehicles
Crash-Fire-Rescue (CFR) unit
Water tankers with compressed air foam capability
Incident Command vehicles
SCBA units
SCBA air tanks
Remote air system for confined space rescue
Ladder truck with pump
Personnel with Hazardous Material First Response Operational Level training
Personnel with Basic Emergency Medical Technician training
Personnel with Advanced Life Support training

Table E-2 (Continued)

Los Alamos National Laboratory-Wide Emergency Equipment

Supplemental emergency equipment and personnel available from KBR-Shaw-LATA (KSL):

Supplemental emergency equipment available from KSL may include, but is not limited to, some or all of the following:

TRANSPORTATION EQUIPMENT:

Pickups, 1/2 through 3/4 ton
Trucks, 1 through 3 ton
Vans, panels, and carryalls
Buses

SPECIAL EQUIPMENT:

Graders
Loaders
Snowplows and snow blowers
Bulldozers
Scrapers
Semitrailers
Chain saws
Street flushers
Mobile transceivers
Generators
Handsets (2-way)
Pageboys (1-way)
Welders
Mobile site logistics support equipment/associated heavy equipment
Fully equipped spill response unit
Utilities equipment and emergency utility support
Fuel trucks
Light banks
Dump trucks
Backhoes
Potable water trucks
Cranes
Forklifts

TRAINED PERSONNEL:

Heavy equipment operators
Dispatchers
Mechanics
Power saw operators
Radio and telephone operators
Truck drivers
Rodent/Pest Control personnel
HAZMAT response/cleanup personnel
Welders
Electricians

Table E-2 (Continued)

Los Alamos National Laboratory-Wide Emergency Equipment

Table E-2 (Continued)

Los Alamos National Laboratory-Wide Emergency Equipment

Emergency equipment and personnel at the Occupational Medicine Clinic, Occupational Medicine Group (HSR-2):

At TA-3 (SM-409) Central Clinic:

Emergency equipment and supplies available from HSR-2 may include, but are not limited to, some or all of the following:

PERSONNEL:

Physicians
Physician's Assistants
Nurses
X-ray Technician
Clinical Laboratory Technicians
Clinical Testing Technicians
Clinical Psychologist
Counselors

SPECIAL EQUIPMENT-PORTABLE:

Multichannel emergency receiver-base station
Two-way radio on the State Med Net, the LANL Emergency Management channel, and the LANL Health-Safety Net
Cardiac monitors and defibrillators
Crash cart emergency equipment with E-tank oxygen (O_2)
Portable physicians' bag with medications
Portable suction unit
Portable stretchers (ambulance, gurney, folding)
Wheelchairs
O_2 tanks
Manual resuscitators
Intravenous (IV) stands
IV solutions
Otoscopes/ophthalmoscopes
Portable sphygmomanometers
Stethoscopes
Anticontamination apparel
Eye irrigation solution
First-aid kits
Extrication and cervical collars, crutches, canes
Suture sets
Protective apparel
Morgan lens irrigation sets
Decontamination equipment (portable)

Table E-2 (Continued)

Los Alamos National Laboratory-Wide Emergency Equipment

Emergency equipment and personnel at the Occupational Medicine Clinic, HSR-2 (Continued):

At TA-3 (SM-409) Central Clinic (continued):

SUPPLIES-GENERAL:

Bedding/pillows
Rescue blankets
Burn blankets
Thermal/icing pouches
Multitrauma dressings, surgical and first aid supplies
Disposable ice bags

SPECIAL FACILITIES - NONPORTABLE:

Fully equipped decontamination room at the Occupational Medicine Clinic
Completely equipped emergency room with ambulance entrance
Emergency lighting system
Complete X-ray suite
Protective clothing and wound counters
12-lead electrocardiograph
Fully equipped crash cart with Life Pak defibrillator/external pacer, intubation equipment, emergency medications
Fully equipped decontamination room at Los Alamos Medical Center (LAMC) adjacent to the LAMC emergency room

TRANSPORTATION:

Full ambulance service is available within minutes to the central facility.

COMMUNICATION:

Base station on State Medical Net and Los Alamos County Fire Department trunked radio system.

Table E-3

Waste Analysis Parameters and Test Methods[a]

Parameter	Test Method	Reference[b]
Ignitability	Pensky-Martens closed-cup method	(L, S) SW1010, SW1020A
	Setaflash closed-cup method	(S) SW1030
	Ignitability of solids	(L, S) ASTM D93-02a
Reactivity	Test method to determine hydrogen cyanide released from waste	(L, S) SW, Section 7.3
	Test method to determine hydrogen sulfide released from waste	
Corrosivity	Electrometric (pH of aqueous solution)	(L) SW9040B
Toxicity characteristic (TC)	Toxicity characteristic leaching procedure (TCLP) extraction	(S) SW1311
TC Metals:	Graphite furnace atomic absorption (AA) spectroscopy, gaseous hydride AA, or direct aspiration AA, manual cold-vapor technique	
Arsenic		(L, S) SW7060A, SW7061A
Barium		(L, S) SW7080A, SW7081
Cadmium		(L, S) SW7130, SW7131A
Chromium		(L, S) SW7190, SW7191
Lead		(L, S) SW7420, SW7421
Selenium		(L, S) SW7740, SW7741A
Silver		(L, S) SW7760A, SW7761
Mercury	Manual cold-vapor technique	(L) SW7470A, (S) SW7471A
Volatile organics	Gas chromatography (GC)/mass spectrometry (MS)	(L, S) SW8260B
	GC/MS capillary column technique	
Semivolatile organics	GC/MS	(L, S) SW8270C[c]
	GC/MS capillary column technique	(S) SW8275A
Organochlorine pesticides	Thermal extraction/GC/MS	(L, S) SW8081A
Chlorinated herbicides	GC	(L, S) SW8151A
Cyanide, free and total	Distillation and colorimetric ultraviolet	(L, S) SW9010B, SW9012A
Total chromium	Colorimetric method for hexavalent chromium	(L, S) SW7196A
Sulfide	Colorimetric titration	(L, S) SW9030B

Table E-3 (Continued)

Waste Analysis Parameters and Test Methods[a]

Parameter	Test Method	Reference[b]
Total RCRA metals[c,d]	Acid digestion Inductively coupled plasma atomic emission spectroscopy	(L) SW3010A, (S) SW3050B (L, S) SW6010B
Arsenic		(L, S) SW6010B
Barium		(L, S) SW6010B
Cadmium		(L, S) SW6010B
Chromium		(L, S) SW6010B
Lead		(L, S) SW6010B
Selenium		(L, S) SW6010B
Silver		(L, S) SW6010B
Mercury	Manual cold-vapor technique	(L) SW7470A, (S) SW7471A
Free liquids	Paint Filter Liquids Test	(L, S) SW9095A

[a] At Los Alamos National Laboratory, current analytical capabilities include limited analyses of mixed waste samples. These analyses include gross alpha, beta, and gamma screening.

[b] "A" (e.g., A006) refers to U.S. Environmental Protection Agency, 1984, "Sampling and Analysis Methods for Hazardous Waste Combustion," *EPA-600/8-84-002*.
"ASTM" refers to American Society for Testing and Materials standards.
"SW" refers to U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
(L) refers to liquid waste.
(S) refers to solid waste.

[c] See also atomic absorption methods. Total metals may be substituted for TCLP metals, if appropriate.

[d] RCRA = Resource Conservation and Recovery Act.

Table E-4

Evacuation Determination and Reentry Conditions

Reason for Evacuation	Evacuation Determination Made by	Reentry Conditions[a]
Fire	[1]Fire or evacuation alarm, Group Leader or alternate, Lead Engineer, Senior Staff Member present, Senior Technician, or Emergency Manager	Following survey by the person designated by the IC[b]
Explosion	Same as 1 above	Same as above
Loss of ventilation	[2]Group Leader or alternate, Senior Staff Member, Lead Engineer, or Senior Technician	Same as above
Loss of electric power	Same as 2 above	Same as above
Extensive contamination	Same as 2 above or HSR-1[c] Representative	Same as above
Airborne contamination	Same as 2 above or Radiation Monitor	Same as above
Escape or release of toxic or hazardous gas or fumes	Group Leader or alternate, Senior Staff Member, Lead Engineer, Senior Technician, or Emergency Manager	Same as above
Bomb or bomb threat	EM&R[d] or PTLA[e] representative, R&D[f] Section Leader or alternate, Senior Staff Member, or Lead Engineer	Same as above

[a] All reentries are authorized by the EM&R Incident Commander.
[b] "IC" refers to the Incident Commander as defined in 29 CFR § 1910.120.
[c] "HSR-1" refers to the Health Physics Operations Group.
[d] "EM&R" refers to the Emergency Management and Response Office.
[e] "PTLA" refers to Protection Technology Los Alamos.
[f] "R&D" refers to the Research and Development Section.

APPENDIX F

GENERAL CLOSURE PLAN

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
ASTM	American Society for Testing and Materials
COPC	contaminant(s) of potential concern
CSU	container storage unit
DOE/NNSA	U.S. Department of Energy, National Nuclear Security Administration
EPA	U.S. Environmental Protection Agency
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
NMED	New Mexico Environment Department
OB	open burning
OD	open detonation
PPE	personal protective equipment
QA	quality assurance
QC	quality control
RCRA	Resource Conservation and Recovery Act
SAP	sampling and analysis plan
SW-846	"Test Methods for Evaluating Solid Waste, Physical/Chemical Methods"
SWMU	solid waste management unit
SWRC	Solid Waste Regulatory Compliance Group
TA	technical area

APPENDIX F
GENERAL CLOSURE PLAN

This appendix describes general closure activities applicable to all hazardous and/or mixed waste management units at Los Alamos National Laboratory (LANL). The general closure information presented in this appendix addresses final closure of the LANL facility and partial closures of individual hazardous/mixed waste management units. The information provided in this appendix is submitted to address applicable closure requirements specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) § 270.14(b)(13), revised June 14, 2000 [6-14-00], and 20.4.1 NMAC, Subpart V, Part 264, Subparts G and H [6-14-00].

This plan includes procedures to document final closure of the LANL hazardous waste management facility. It also includes general discussions of partial closure approaches and procedures for the types of waste management units operating within the LANL facility. Partial closure information and procedures for specific hazardous/mixed waste management units are addressed in individual waste management unit closure plans included with technical area (TA)-specific permit applications, permit modification requests, or permit renewal applications. Further site-specific closure details will be included in required sampling and analysis plans (SAP) to be submitted to the New Mexico Environment Department (NMED) for approval 90 days prior to the initiation of closure activities.

There are multiple types of waste management units at LANL meeting many separate treatment, storage, and disposal requirements both by waste type and different waste management programs. Partial closure of these units will occur separately and over the active life of the LANL facility. All existing units may not be closed before 2100. There is a high potential that decontamination procedures, analytical verification procedures, and the environmental characterization of LANL will change and improve over the life of the facility. Therefore, this closure plan summarizes the general closure activities for the different types of units to be closed and establishes the procedure of submitting separate unit-specific SAPs to the NMED for approval prior to beginning partial closure activities for individual waste management units. The information requirements for the SAPs are included in Section F.2.2.7 of this plan. The SAP will provide the required level of detail to assure closure standards consistent with the appropriate decontamination and verification requirements existing at the time of closure. Closure activities will meet the closure performance standards described in Section F.1.1.

Until final closure is complete and certified in accordance with 20.4.1 NMAC § 264.115 [6-14-00], as discussed in Section F.1.6, a copy of this closure plan and any approved revisions will be on file at LANL's Solid Waste Regulatory Compliance Group (SWRC) and at the U.S. Department of Energy, National Nuclear Security Administration (DOE/NNSA) Los Alamos Site Office (LASO).

F.1 GENERAL CLOSURE INFORMATION

This section is prepared in accordance with the requirements of 20.4.1 NMAC § 270.14(b)(13) and 20.4.1 NMAC, Subpart V, Part 264, Subparts G and H, as applicable.

F.1.1 Closure Performance Standard [20.4.1 NMAC § 264.111]

The hazardous or mixed waste management units addressed in TA-specific permit applications, permit modification requests, or permit renewal applications will be closed to meet the following performance standards:

- Minimize the need for further maintenance
- Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or atmosphere
- Comply with the applicable closure and post-closure requirements of 20.4.1 NMAC, Subpart V, Part 264, Subparts G and I through DD [6-14-00].

For the majority of the storage and treatment units at LANL, partial closure will be accomplished by removal of waste from the unit(s) and decontamination, if necessary, of the structures, equipment, and areas that have been contaminated by waste materials. These activities will ensure the removal or decontamination of hazardous waste and hazardous waste residues from the unit to established cleanup levels. Land disposal units, tanks, and miscellaneous units that cannot be closed by the removal or decontamination of hazardous waste or hazardous waste residues will be managed under post-closure care requirements contained in 20.4.1 NMAC, Subpart V, Part 264, Subpart G. In the case of land disposal units and tanks or miscellaneous units that are co-located with solid waste management units (SWMU) and that cannot be closed by removal or decontamination of hazardous waste and hazardous waste residues, partial closure will be accomplished by stabilizing, as necessary, the wastes and/or waste residues that remain in place and requesting NMED approval to address such units under alternative requirements, as allowed by

20.4.1 NMAC § 264.110(c), to meet post-closure care requirements, as discussed in Appendix G, the "General Post-Closure Plan."

F.1.2 Partial and Final Closure Activities [20.4.1 NMAC § 264.112(d)]

Partial Resource Conservation and Recovery Act (RCRA) closure is the closure of a hazardous waste management unit at a facility that contains other active hazardous waste management units. Partial closure at LANL will consist of closing one or more of the hazardous/mixed waste management units at the TAs that operate them, while leaving other active units at the LANL facility in operation. Closure activities for the partial closure of a unit are addressed in Attachment F of TA-specific permit applications, permit modification requests, or permit renewal applications. Partial closure will be deemed complete when the removal or decontamination of hazardous wastes and hazardous waste residues has been verified; the unit is being addressed under alternative requirements to address closure and post-closure care requirements, if appropriate; the closure certification has been submitted to the NMED; and the NMED has approved the closure.

Final RCRA closure of the LANL hazardous waste management facility will occur when all of LANL's hazardous/mixed waste management units are closed. Final closure will consist of assembling documentation on the closure status of each unit, including all previous partial closures as well as land-based units that have been or are being addressed via alternative closure requirements. Final closure will be deemed complete when the closure certification has been submitted to the NMED and the NMED has approved the final closure.

F.1.3 General Closure Schedule [20.4.1 NMAC §§ 264.112(b)(6), 264.112(e), and 264.113]

Final closure of the LANL facility will occur in the year 2100, but partial closure of any LANL hazardous or mixed waste management unit may occur at any time before then. The following schedule requirements will apply for any LANL closure, partial or final. Written notification will be provided to the NMED 60 days before the start of closure activities at the waste management unit or for the LANL facility final closure review. Written notification will be provided 45 days before the start of partial closure activities for container storage units and tanks, and 60 days before the start of partial closure activities for a landfill unit. However, pursuant to 20.4.1 NMAC § 264.112(e) [6-14-00], removing hazardous wastes and decontaminating or dismantling equipment in accordance with an approved closure plan may be conducted at any time before or after notification of closure. Closure activities will begin according to the requirements of 20.4.1 NMAC § 264.112(d)(2) [6-14-00]. Treatment, removal, or disposal of hazardous wastes will begin in accordance with the

approved closure plan, as required by 20.4.1 NMAC § 264.113(a) [6-14-00], within 90 days after final receipt of waste at the hazardous or mixed waste management unit. This timeframe will be met as long as facilities are available for treatment, storage, or disposal of these wastes. In the event that closure activities cannot begin at a unit within 90 days, LANL will notify the Secretary of the NMED in accordance with the extension requirements in 20.4.1 NMAC § 264.113(a) [6-14-00]. Closure activities will be completed in accordance with the requirements of 20.4.1 NMAC § 264.113(b) [6-14-00]. Closure will be conducted in accordance with the schedule(s) presented in Attachment F of TA-specific permit applications, permit modification requests, or permit renewal applications. In the event that closure of a unit is prevented from proceeding according to schedule, LANL will notify the Secretary of the NMED in accordance with extension request requirements in 20.4.1 NMAC § 264.113(b) [6-14-00]. In addition, the demonstrations in 20.4.1 NMAC §§ 264.113(a)(1) and (b)(1) [6-14-00] will be made in accordance with 20.4.1 NMAC § 264.113(c) [6-14-00].

F.1.4 Amendment of the General Closure Plan [20.4.1 NMAC § 264.112(c)]

In accordance with 20.4.1 NMAC § 264.112(c) [6-14-00], LANL will submit a written notification of or request for a permit modification to authorize a change in the approved closure plan whenever:

- There are changes in operating plans or facility design that affect the approved closure plan
- There is a change in the expected year of closure
- Unexpected events occur during closure that require modification of the approved closure plan
- The owner or operator requests the Secretary of the NMED to apply alternative requirements to a regulated unit under 20.4.1 NMAC §§ 264.90(f) and/or 264.110(c).

The written notification or request will include a copy of the amended closure plan for approval by the NMED.

LANL will submit a written request for a permit modification with a copy of the amended closure plan at least 60 days prior to the proposed change in unit design or operation or no later than 60 days after an occurrence of an unexpected event that affects the closure plan. If the unexpected event occurs during closure, the permit modification will be requested within 30 days of the occurrence. The Secretary of the NMED may request a modification of the closure plan under the conditions

presented in the bulleted items above. LANL will submit the modified plan in accordance with the request within 60 days of notification, or within 30 days of notification if a change in facility condition occurs during the closure process.

F.1.5 Closure Cost Estimate, Financial Assurance, and Liability Requirements [20.4.1 NMAC § 264.140(c)]

In accordance with 20.4.1 NMAC § 264.140(c) [6-14-00], LANL, as a federal facility, is exempt from the requirements of 20.4.1 NMAC, Subpart V, Part 264, Subpart H [6-14-00], to provide a cost estimate, financial assurance mechanisms, and liability insurance for closure actions.

F.1.6 General Closure Certification [20.4.1 NMAC § 264.115]

Within 60 days after completion of closure of each hazardous waste management unit or final closure of the facility, LANL will submit to the Secretary of the NMED, via certified mail, a certification that the unit or facility has been closed in accordance with the approved closure plan. The certification will be signed by the appropriate DOE/NNSA and LANL officials and by an independent, registered professional engineer, in accordance with 20.4.1 NMAC § 264.115. Documentation supporting the independent, registered engineer's certification will be furnished to the Secretary of the NMED upon request, as specified in 20.4.1 NMAC § 264.115. A copy of the certification and supporting documentation will be maintained by both DOE/NNSA LASO and SWRC.

F.1.7 Security

Because of the ongoing nature of waste management operations at LANL, security and administrative controls at the sites of hazardous or mixed waste management units will be maintained by the DOE/NNSA or another authorized federal agency for as long as necessary to prohibit public access. Details of security measures are included in Attachment F of TA-specific permit applications, permit modification requests, or permit renewal applications.

F.1.8 Closure Reports

Upon completion of final RCRA closure of the LANL hazardous waste management facility or partial closure of individual waste management units, a closure report will be prepared and provided to the Secretary of the NMED. The report will document the closure and contain, for example, the following:

- A copy of the certification described in Section F.1.6
- Any significant variance from the approved closure plan and the reason for the variance
- The location of the file of supporting documentation, including:
  - Closure certification reports for closed units
  - Documentation for units being closed under alternative closure requirements
  - NMED closure approvals
  - Survey plats and related field data
- A certification of accuracy of the report.

Information to be included in closure reports for waste management units is addressed in Attachment F of TA-specific permit applications, permit modification requests, or permit renewal applications.

F.1.9 Survey Plat and Post-Closure Requirements [20.4.1 NMAC §§ 264.116 and 264.117 through 264.120]

For partial closure, LANL intends to remove hazardous waste and associated constituents from the unit(s) undergoing closure, remove or conduct in-situ treatment of soil contaminated with hazardous wastes or hazardous waste residues, and decontaminate structures and equipment contained in the unit. If decontamination to the cleanup levels approved in the closure plan cannot be achieved, LANL intends to dispose of or otherwise manage the contaminated structures, equipment, soil, or other media. If decontamination to these cleanup levels is not achievable, LANL may also propose an alternate demonstration of decontamination, as circumstances indicate. A survey plat, post-closure certification, and post-closure notices will not be required for the closure of units that remove, treat in situ, or decontaminate hazardous waste or hazardous waste residues.

If a land disposal unit, tank unit, or miscellaneous unit cannot be closed by removal or decontamination of hazardous waste or hazardous waste residues, LANL will conduct post-closure or equivalent activities in accordance with Appendix G of this document. A survey plat prepared in accordance with 20.4.1 NMAC § 264.116 [6-14-00] will be filed with the appropriate authorities at certification of closure, as described in that regulation. Post-closure care pursuant to 20.4.1 NMAC §§ 264.117 through 264.120 [6-14-00] will begin after closure of the unit. Post-closure notices will be filed with appropriate authorities, as described in 20.4.1 NMAC § 264.119 [6-14-00]. To meet that requirement, DOE/NNSA will file a “Land Use Restriction Notice” or equivalent document with

the County of Los Alamos and other authorized agencies. Within 60 days after completion of the established post-closure care period for the unit, LANL will submit to the Secretary of the NMED, via certified mail, a certification of completion of post-closure care in accordance with the requirements of 20.4.1 NMAC § 264.120 [6-14-00].

F.2. CLOSURE APPROACHES BY WASTE MANAGEMENT UNIT TYPE

F.2.1 Preliminary Closure Activities

F.2.1.1 Safety Precautions

Job hazards associated with closure activities will be identified, controls developed, and workers briefed before closure activities are conducted, in accordance with LANL safety procedures. Personnel involved in closure activities will wear appropriate personal protective equipment (PPE) specified by LANL industrial safety groups, and will follow good hygiene practices to protect themselves from exposure to hazardous and/or mixed waste. All workers involved in closure activities will be required to have appropriate training (see Appendix D in this document). Contaminated PPE will either be decontaminated or managed in compliance with appropriate waste management regulations.

F.2.1.2 Background Determination

Before any decontamination activity begins, background levels for potential hazardous waste constituents will be determined. Decontamination and verification sampling procedures may involve wash water sampling, swipe sampling, soil sampling, or other methods developed before the time of closure. Background samples will be obtained from clean water, cleaning equipment, and detergent solutions if wash water methods are used for decontamination. Background samples will be obtained for the material to be decontaminated or for any sampling materials used in swipe sampling analysis used for verification purposes. Appropriate background samples and/or concentrations derived from LANL studies developed under the LANL corrective action or other programs will be used to determine hazardous constituent background/baseline levels. Details of appropriate background levels and/or necessary samples and collection techniques will be included in the unit-specific SAPs, as discussed in Section F.2.2.7 of this closure plan.

F.2.2 Storage and Treatment Units

F.2.2.1 Container Storage Units

Removal of Waste

Prior to the initiation of closure activities, wastes will be removed from the LANL container storage unit (CSU) to be closed. Containers will be removed from each unit with forklifts, cranes, hand trucks, or manually as appropriate for the size, amounts, and types of waste in the CSU. Containers will be placed onto flatbed trucks, trailers, or other vehicles appropriate for transport. Appropriate shipping papers will accompany the wastes during transport. Waste containers will be moved to an approved on-site CSU or to an off-site permitted treatment, storage, or disposal facility.

Closure Procedure and Decontamination

To the extent possible, all contaminated structures and equipment at the LANL CSUs to be closed will be decontaminated. Closure activities at LANL CSUs will generally involve the use of wash water solutions to decontaminate the waste management structure surfaces (e.g., floors, secondary containment structures, and walls). Structures and equipment that cannot or will not be decontaminated will be removed, containerized, and managed in compliance with appropriate waste management regulations. Decontamination procedures will be verified by sampling and analysis. All sampling conducted during closure activities will be done as prescribed in the CSU-specific SAP (see Section F.2.2.7). Sampling and analysis will be done in accordance with appropriate quality assurance/quality control (QA/QC) procedures as required by the individual analytical technique or the authority for the relevant standard methods (e.g., “Test Methods for Evaluating Solid Waste, Physical/Chemical Methods” [*SW-846*] [U.S. Environmental Protection Agency (EPA), 1986]; American Society for Testing and Materials [ASTM]). Closure will be conducted in accordance with the SAPs submitted for approval prior to the actual closures.

Structural Assessment

Before decontamination activities begin, the base or secondary containment of each CSU will be inspected for any cracks or conditions that could potentially lead to loss of wash water containment if wash water procedures will be used for decontamination. Preventive maintenance inspections are conducted routinely (i.e., weekly) at each CSU. If any defects, deterioration, damage, or hazards affecting containment have developed after the most recent preventive maintenance inspection was conducted, appropriate remedial actions (including sampling, repairs, maintenance, or replacement) will be completed before decontamination activities begin. If a crack or gap is present, a swipe sample or a representative sample of the media will be taken (e.g., epoxy or paint coatings, asphaltic concrete, or concrete) to determine the presence of contamination. The sample will be analyzed for hazardous contaminants of potential concern (COPC) determined through review of the chemical properties of the waste stored during the operating history of the CSU and

through an evaluation of the history of any spills that may have occurred at the CSU. If contamination is detected, the surface flaw will be decontaminated prior to repairing the crack/gap. Complete or partial removal (e.g., scraping or cold-milling) of the material may be performed until contamination is no longer detected. If partial removal is successful in eliminating the contamination, it will be assumed that the remaining material, including underlying soil, is clean.

After any decontamination wash down process, the used wash water will be collected, transferred to containers, sampled, and analyzed for the appropriate parameters determined during the documentation review. If the used wash water is nonhazardous and nonradioactive, it will be managed appropriately in accordance with LANL policy. Otherwise, the used wash water will be managed at an appropriate on-site facility.

Decontamination of CSUs

LANL CSUs will be closed by removal and decontamination of hazardous waste and hazardous waste residues. Storage rooms, sheds, domes, and buildings will be closed by washing the interior storage surfaces to remove or decontaminate hazardous wastes and hazardous waste residues. The first step in decontamination will be to evaluate the CSU's operating record to determine the COPCs. The appropriate surfactant/solvent to be used in the wash water solution will be determined based upon the COPCs. General laboratory surfactants (e.g., Alconox) will be used for the majority of washes where many COPCs are being sampled for, and specialized solvents may be used for more focused removal purposes.

Based on the review of the operating record (e.g., spills) and an evaluation of structural areas of potential concern (e.g., sumps, stained areas, low areas), preliminary decontamination focused on these areas may be conducted prior to the overall decontamination of the CSU. Prior to overall decontamination of a structure, any portable equipment will be wiped down with wash water solution. The structure walls and floors will then be wiped down with mops and sponges to minimize the amount of liquid waste generated as a result of decontamination activities. A portable berm, existing berm or sump, or other device (e.g., absorbent socks, plastic sheeting, wading pools) designed to collect and provide containment for used wash water will be used, as necessary.

After the walls and floors have been decontaminated, any recessed areas present (e.g., sumps) will be wiped down with wash water. The used wash water will collect in the recessed area; it will then be removed and transferred to an appropriate container(s). The recessed area will be wiped down

again with wash water; this wash water will be minimized, collected with sponges and/or mops, and transferred to the same appropriate container(s), where it will be sampled. The container(s) of used wash water will be stored appropriately, pending analysis for decontamination verification.

In certain cases of closures at the LANL CSUs, soil removal or in-situ remediation may be conducted to meet the closure performance standards. Examples of when these activities may be performed include the detection of contamination that had migrated beyond CSU pads to the surrounding soil, and cases in which operating records indicate that a release of hazardous waste from storage structures to the surrounding soil has occurred. If records indicate that no release of hazardous waste to soils has occurred, soil sampling will not be conducted.

If collection of soil samples is determined to be necessary to demonstrate decontamination, background soil samples will be collected and analyzed to provide a baseline for decontamination verification. Sampling locations to determine the extent of contamination will be based upon a biased random sampling approach, including historical evidence of releases, physical evidence of distressed vegetation or visual staining, and any other information that indicates a potential contamination pathway. The number of samples, locations, depths, and sampling methods will be determined before closure and included in the CSU-specific closure SAP, as discussed in Section F.2.2.7. Results from sampling will be compared to the background samples and/or baseline concentration levels included in the closure SAP. If analysis shows that the soil at the storage areas is contaminated, soil sampling results that are above the background/baseline levels will be used to identify the extent of soil contamination. Contaminated soils may be removed in layers and sampling conducted following removal of each layer. This procedure will be used to minimize the amount of waste generated during closure. The removal and sampling process will be repeated until the decontamination criteria are achieved or it is decided to close the CSU as a landfill. Alternatively, the contaminated soil may be remediated in situ, with post-remediation sampling and analysis conducted to demonstrate successful decontamination.

In the event that closure of the CSU cannot be achieved, a post-closure plan will be prepared for the site, as required by 20.4.1 NMAC § 264.118. The plan will include provisions to stabilize the site and will describe planned monitoring activities, maintenance activities, and the frequencies at which these activities will be performed, as required by 20.4.1 NMAC § 264.118.

Sufficient sampling and analysis will be required to demonstrate that hazardous or mixed waste residue is not present at the CSU after closure. Wash water sampling, swipe sampling, or other appropriate sampling and analysis methodologies may be used to verify decontamination. The verification sampling method will be determined at the time of development of the CSU-specific closure SAP and will be based on factors such as COPCs and materials of construction for the storage structure. The SAP will establish the minimum number of verification samples based on the total surface area of the CSU. Using a biased random sampling approach, items, structures, and/or surfaces will be sampled for verification of decontamination. Sample bias will include known or likely areas of contamination, low areas, sumps, and known spill locations, as determined to be appropriate on a case-by-case basis.

For wash water-based decontamination verifications (e.g., asphaltic-concrete pads), the samples of clean wash water solution squeezed from mops and/or sponges prior to use will be collected as background before initial wash down of any CSU. The samples will be analyzed for the appropriate parameters, as presented in the closure SAP. Analytical procedures will conform to methods found in the most current version of *SW-846* (EPA, 1986). Used wash down solutions will be analyzed for the same parameters. Wash down solutions will be considered contaminated if the used wash water solution shows a significant increase (i.e., determined using statistical methods defined in *SW-846*) in the analytical parameters over those in the clean wash water solution. If subsequent wash downs are deemed necessary, an additional sample of clean wash water solution squeezed from mops and/or sponges prior to use will be taken for each additional wash down event.

Swipe sampling may be used on a case-by-case basis (e.g., for smooth or impervious surfaces such as metal and dome fabric) to determine verification of decontamination at the CSUs. Background for swipe samples will be determined by submitting an unused swipe and solvent sample for analysis. Swipe samples will be analyzed using approved methods, which will be included in the closure SAP. The rationale for when swipe sampling will be conducted will also be included in the SAP.

If other sampling methodologies have been developed at the time of closure for a CSU, their use to determine decontamination will be addressed in the closure SAP.

For any sampling methodology, decontamination will be verified if the collected samples meet any of the decontamination criteria listed in Section F.2.2.6 of this closure plan. If the verification

sampling indicates contamination higher than the approved values, additional sampling will be performed to establish the boundaries of contamination for large structures. After establishing the boundaries of contamination, the decontamination process may be repeated within those boundaries, using portable berms or other appropriate material to limit the potential for run-off from the affected area. An additional round of verification sampling will be performed for all of the areas previously determined to be contaminated. After each decontamination event and verification iteration, a decision will be made to repeat the process or remove contaminated materials and dispose of them properly.

F.2.2.2 Tank Storage Units

Tank storage units will be closed by removal and/or decontamination of hazardous waste or hazardous waste residues. All contaminated surfaces and equipment associated with storage tank systems will be decontaminated, decommissioned, or dismantled, depending on the extent of contamination and anticipated disposition or use after closure. Tank system components will be decommissioned at closure and either decontaminated or containerized and managed in compliance with appropriate regulations. Tank system ancillary equipment (e.g., piping, pumps) will be managed in the same manner.

If a tank system or its ancillary equipment is decontaminated, the following procedure will be used. The interior surfaces of the tank system components or ancillary equipment will be flushed with wash water. Following the wash down, the water will be collected and analyzed for COPCs. The exterior surfaces will be wiped down with a wash water solution using cloths and/or other absorbent material to minimize the amount of liquid waste generated as a result of the decontamination activities. The wash water will be collected and analyzed for the applicable COPCs. Used wash water will be managed in accordance with applicable regulations. The wash cycles will continue until the equipment has been cleaned to established levels or the decision is made to manage it as waste.

Random swipe samples will be taken from the areas adjacent to the storage tank system (e.g., walls, floors, sumps, and drains) and will be analyzed for the applicable COPCs. If decontamination is determined to be needed based upon the levels of contaminants determined by swipe sampling, the surfaces will be washed down using procedures to minimize dilution by limiting the amount of wash solution used. The wash solution will be collected and analyzed for the applicable COPCs. Wash cycles will continue until the surfaces have been cleaned to established levels.

Decontamination verification will be determined through this process. Used wash water will be managed in accordance with applicable regulations.

F.2.2.3 Cementation Treatment Units

Cementation units will be closed by removal and decontamination of hazardous waste and hazardous waste residues. Treatment by cementation at LANL occurs in containers. The cementation unit equipment and associated ancillary equipment will be decontaminated, decommissioned, or dismantled, depending on the extent of contamination and anticipated disposition or use after closure. If any of the cementation unit equipment is to be decommissioned or dismantled, the resulting components will be containerized and managed appropriately at an approved on-site facility, depending on the regulated constituents present.

Prior to decontamination, any visible material located within the unit will be removed and managed as waste. The cementation unit will be rinsed and washed down with specified procedures for minimizing dilution by limiting the amount of wash water solution used. The used wash water will be collected and analyzed for appropriate COPCs to verify decontamination. Successive rinse cycles will be performed until decontamination levels are achieved or the decision is made to dispose of the equipment as waste. Equipment to be disposed as waste will be containerized and managed in compliance with appropriate regulations.

Random swipe samples will be taken from the areas adjacent to the cementation unit and analyzed for the COPCs determined for the unit-specific closure. If decontamination measures are determined to be necessary to achieve closure standards, wash and analysis cycles will be performed until decontamination to established levels is verified.

F.2.2.4 Open Burning Treatment Units

Open burning (OB) units will be closed by removal and decontamination of hazardous waste and hazardous waste residues to the extent possible. LANL OB units are permitted under 20.4.1 NMAC, Subpart V, Part 264, Subpart X standards. If decontamination procedures for OB units are not effective, the unit will be subject to post-closure care requirements as required by 20.4.1 NMAC § 264.603.

The OB unit will receive a thorough visual inspection for unburned materials, which, if found, will be treated and managed appropriately. To the extent possible, contaminated OB structures will be decontaminated. Any equipment associated with the OB unit will be removed, decontaminated, decommissioned, or dismantled, depending on the extent of contamination and anticipated disposition or use after closure. If any of the unit equipment is to be decommissioned or

dismantled, the resulting components will be managed appropriately at an approved facility, depending on the regulated constituents present. Other closure activities will include the removal, treatment, segregation, and/or disposition of OB structures and related equipment, and soil sampling and removal as determined to be necessary.

Soil sampling, if determined to be necessary, will be performed and analyses conducted for the identified COPCs to determine the existence or extent of OB-related contaminants. Based upon the results of this sampling, excavation of surrounding soils may be required. Any soil removed will be properly characterized and disposed of.

If decontamination of the surrounding soil cannot be reasonably achieved, LANL may propose alternative decontamination demonstrations for approval by NMED, or request that the unit be closed and further managed under post-closure requirements. In that event, a post-closure care plan will be developed for further management of the unit. If the OB unit being closed is situated in close proximity with SWMUs, releases have been determined to be present, and the origin of the releases is not distinguished, and if the characterization and potential remediation of the SWMUs is being managed under the LANL corrective action program, LANL will request that the unit be considered for alternative requirements for post-closure care, as allowed by 20.4.1 NMAC § 264.110(c).

F.2.2.5 Open Detonation Treatment Units

Open detonation (OD) units will be closed by removal and decontamination of hazardous waste and hazardous waste residues to the extent possible. LANL OD units are permitted under 20.4.1 NMAC, Subpart V, Part 264, Subpart X standards. If decontamination procedures for OD units are not effective, the unit will be subject to post-closure care requirements as required by 20.4.1 NMAC § 264.603.

To the extent possible, contaminated OD structures will be decontaminated. Any equipment associated with the OD unit will be decontaminated, decommissioned, or dismantled, depending on the extent of contamination and anticipated disposition or use after closure. If any of the unit equipment is to be decommissioned or dismantled, the resulting components will be managed appropriately at an approved facility, depending on the regulated constituents present. Other closure activities will include the removal, treatment, segregation, and/or disposition of OD structures and related equipment, and soil sampling and removal as determined to be necessary.

The OD structure will receive a thorough visual inspection for untreated materials, which, if found, will be treated and managed appropriately. Any equipment associated with the OD unit will be removed, decontaminated, and disposed of in accordance with applicable regulations. Soil sampling for identified COPCs will be performed to determine the existence or extent of OD-related contaminants. Based upon the results of this sampling, excavation of surrounding soils will be performed and the soils collected for appropriate disposition, if contaminated. As layers or areas of soil are removed, additional soil sampling will subsequently be performed until the decontamination process is verified.

If decontamination of the surrounding soil cannot be reasonably achieved, LANL may propose alternative decontamination demonstrations for approval by NMED, or request that the unit be closed and further managed under post-closure requirements. In that event, a post-closure care plan will be developed for further management of the unit. If the OD unit being closed is situated in close proximity with SWMUs, releases have been determined to be present, and the origin of the releases is not distinguished, and if the characterization and potential remediation of the SWMUs is being managed under the LANL corrective action program, LANL will request that the unit be considered for alternative requirements for post-closure care, as allowed by 20.4.1 NMAC § 264.110(c).

F.2.2.6 Decontamination Criteria

Successful decontamination for LANL hazardous waste management units is defined as one of the following criteria:

- No detectable hazardous waste or hazardous waste constituents from hazardous waste management unit activities are found in the final sample.
- Detectable hazardous waste or hazardous waste constituents from hazardous waste management unit activities in the final sample are removed to statistically significant levels based on baseline concentrations in the clean wash water.
- Detectable hazardous waste or hazardous waste constituents from hazardous waste management unit activities in the final sample are at or below levels agreed upon with the NMED.
- Detectable hazardous waste or hazardous waste constituent concentrations from hazardous waste management unit activities do not significantly decrease after several wash downs. In such an event, hazardous constituents that pose an acceptable risk will be allowed to remain, as mutually agreed upon with the NMED.

An alternative demonstration of decontamination may be proposed and justified at the time of unit closure, as circumstances indicate. The Secretary of the NMED will evaluate the proposed alternative in accordance with the standards and guidance then in effect and, if approved, incorporate the alternative into the closure plan.

F.2.2.7 Sampling and Analytical Procedures

Sampling and analytical procedures will be performed during the decontamination and verification activities associated with the partial closure of the hazardous waste management units. These procedures will use standard approved methods (e.g., *SW-846*, ASTM) as appropriate for making closure decontamination verification determinations. However, the units may not be closed for relatively lengthy periods of time and it is probable that sampling and analytical methods will be revised and improved before closure. In order to alleviate the need for future closure plan and permit modifications until actual closure activities are finalized, LANL will submit unit-specific closure SAPs at the time of closure notification to NMED for review and approval.

The closure SAP will contain a detailed discussion of the available hazardous waste management unit information and proposed closure methodology to assure the closure standards are met. These include:

- A detailed discussion of site characteristics.
- The hazardous waste management unit operational history, to include descriptions of known spills, releases, and/or evidence of potential problems (e.g., visual stains, dead vegetation, SWMUs).
- Chemical properties of the waste managed at the hazardous waste management unit.
- Determination of applicable COPCs.
- A hazard control plan, including a review of chemical hazards present at the site, control and monitoring methods and procedures, and required PPE.
- Determination of wash water solution composition, if necessary.
- Detailed procedures for decontamination methods for equipment, structures, and media.
- Discussion of background levels determined through sampling or use of published data and their relevance to the specific hazardous waste management unit.
- Methods for sampling and analysis of contaminated media.

- Removal procedures for contaminated media, if necessary.
- Sampling methods for decontamination media and hazardous waste determination. The discussion should include the rationale for using wash water samples, swipe samples, soil samples, and/or other sampling methodology.
- Sampling methods for decontamination verification procedures. The discussion should include the statistical or judgmental basis for determining the number of verification samples needed and the constituents to be analyzed for.
- Sampling equipment decontamination and disposition procedures.
- Sample handling and documentation procedures.
- Analytical methods (including detection limits) and the rationale for their determination.
- Disposition of removed waste, decontamination media, or contaminated soils. This discussion should include an identification of proposed on- or off-site hazardous waste management facilities that may be used for final disposition and the types of wastes anticipated to be shipped.
- Decontamination criteria.
- Statistical basis for verification of decontamination, if applicable. The discussion should include information on determination of statistical increases in analytical parameters and numerical values for significant increases.
- Risk assessment procedures to be used, if necessary.
- Field and laboratory QA/QC procedures.
- Schedule of closure activities, including decontamination, sampling, analysis, potential removal of soils, and closure certification submittal.
- Identification of contact person or office.

F.2.3 Land Disposal Units

Land disposal units, tank units, and miscellaneous units that cannot be closed by removal or decontamination of hazardous waste or hazardous waste residues will be managed under post-closure care requirements contained in 20.4.1 NMAC, Subpart V, Part 264, Subpart G. In the case of land disposal units and tanks or miscellaneous units that are co-located with SWMUs and that cannot be closed by removal or decontamination of hazardous waste and hazardous waste residues, partial closure will be accomplished by stabilizing, as necessary, the wastes and/or waste residues that remain in place and requesting NMED approval to address such units under

alternative requirements, as allowed by 20.4.1 NMAC § 264.110(c), to meet post-closure care requirements.

Post-closure care plans will be prepared for any hazardous waste management unit meeting the conditions discussed above. The post-closure plan will address applicable post-closure requirements specified in 20.4.1 NMAC, Subpart V, Part 264, Subparts G and H. These requirements will include provisions for maintenance and monitoring of the unit during the post-closure care period as set forth in 20.4.1 NMAC § 264.118. General requirements for LANL post-closure plans are discussed in Appendix G of this permit renewal application. Detailed requirements for specific LANL land disposal units will be included in TA-specific permit applications, permit modification requests, or permit renewal applications.

F.3 REFERENCES

EPA, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA-*SW-846*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C.

APPENDIX G

GENERAL POST-CLOSURE PLAN

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LIST OF ABBREVIATIONS/ACRONYMS

20.4.1 NMAC	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
40 CFR	Code of Federal Regulations, Title 40
CMS	Corrective Measures Study
DOE/NNSA	U.S. Department of Energy, National Nuclear Security Administration
EPA	U.S. Environmental Protection Agency
LANL	Los Alamos National Laboratory
LASO	Los Alamos Site Office
NMED	New Mexico Environment Department
SWMU	solid waste management unit

APPENDIX G
GENERAL POST-CLOSURE PLAN

This appendix describes general post-closure activities applicable to the regulated hazardous and/or mixed waste management units at Los Alamos National Laboratory (LANL). The general post-closure information presented in this appendix addresses post-closure of land-based units. The information provided in this appendix is submitted to address applicable post-closure requirements specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20.4.1 NMAC) § 270.14(b)(13), revised June 14, 2000 [6-14-00], and 20.4.1 NMAC, Subpart V, Part 264, Subparts G and H [6-14-00].

Detailed post-closure information and procedures for regulated units at LANL are addressed in the following documents:

- "Closure/Post-Closure Plan for the Technical Area 54 Area G Landfills (Pit 29 and Shaft 124),"
- "Compliance Demonstration with 40 CFR 264, Subparts G and F under Corrective Action Procedures for Material Disposal Area H at Technical Area 54," and
- "Closure/Post-Closure Plan for the Technical Area 54 Area L Landfill (Shafts 1, 13-17, and 19-34 and Impoundments B and D)."

The Area G landfills last received hazardous waste in 1986 (Pit 29) and 1987 (Shaft 124). The Area H landfill (Shaft 9) last received hazardous waste in 1986. The Area L landfill (Shafts 1, 13-17, and 19-34 and Impoundments B and D) last received hazardous waste in 1985. Post-closure activities for land-based units at LANL will meet the closure performance standards described in Section G.1.1.

The approved post-closure plan(s) and any approved revisions will be kept on file at the U.S. Department of Energy, National Nuclear Security Administration (DOE/NNSA) Los Alamos Site Office (LASO), in accordance with 20.4.1 NMAC § 264.118(c). Certification of completion of post-closure care in accordance with 20.4.1 NMAC §264.120 [6-14-00] is discussed in Section G.1.5.

G.1 GENERAL POST-CLOSURE INFORMATION

This section is prepared in accordance with the requirements of 20.4.1 NMAC § 270.14(b)(13) and 20.4.1 NMAC, Subpart V, Part 264, Subparts G and H [6-14-00], as applicable.

G.1.1 Closure Performance Standard [20.4.1 NMAC § 264.111]

Post-closure of the regulated units addressed in the plans cited above will meet the following performance standards:

- Minimize the need for further maintenance
- Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products to the ground or surface waters or atmosphere
- Comply with the applicable closure and post-closure requirements of 20.4.1 NMAC, Subpart V, Part 264, Subparts G and I through DD [6-14-00].

For land disposal units and other units that cannot be closed by removal and decontamination, closure will be accomplished by stabilizing, as necessary, the wastes and/or waste residues that remain in place. Known land disposal units at LANL are identified in Table G-1. Post-closure of such units will be accomplished under alternative closure requirements, as discussed in Section G.1.2 below, to meet post-closure care requirements.

G.1.2 Post-Closure Care and Alternative Requirements [20.4.1 NMAC § 264.117]

In accordance with 20.4.1 NMAC § 264.117(a)(1), post-closure care for each land-based unit will begin after completion of closure of the unit and will continue for 30 years. Post-closure care of the regulated unit under alternative requirements will begin after closure is completed. Closure of land-based units will be deemed complete when closure in place has been verified, the closure certification has been submitted to the New Mexico Environment Department (NMED), and the NMED has approved the closure. Alternative closure requirements are discussed below. At any time preceding partial closure or during the post-closure period, the Secretary of the NMED may shorten the post-closure care period if all disposal units at the facility are closed and it is determined that the reduced period is sufficient to protect human health and the environment, in accordance with 20.4.1 NMAC § 264.117(a)(2)(i). Alternatively, the Secretary of the NMED may extend the post-closure care period if it is determined that the extended period is necessary to protect human health and the environment, in accordance with 20.4.1 NMAC § 264.117(a)(2)(ii).

As required by 20.4.1 NMAC § 264.117(a)(1)(i) and (ii), post-closure care of the existing regulated units at LANL will consist of maintenance, monitoring, and reporting, as appropriate and in accordance with the requirements of 20.4.1 NMAC, Subpart V, Part 264, Subpart F, and 20.4.1

NMAC § 264.310. Post-closure care activities will follow the approved post-closure plan, in accordance with 20.4.1 NMAC § 264.117(d).

Post-closure activities for the existing regulated units may be accomplished under alternative requirements pursuant to 20.4.1 NMAC § 264.118(b)(4). This is consistent with U.S. Environmental Protection Agency (EPA) guidance (EPA, 1998) because the existing regulated units at LANL are situated among solid waste management units (SWMU), releases potentially originating from both the regulated unit and the SWMU(s) have or are likely to have occurred, and the alternative requirements will meet the closure performance standards set forth in 20.4.1 NMAC § 264.111. The EPA guidance discusses the transfer of the closure and post-closure process to the facility corrective action process as an appropriate mechanism to address this situation. Therefore, some post-closure procedures for the regulated units will be established as part of the corrective measures to be identified for the ongoing corrective action program at LANL.

In such circumstances, if corrective measures are deemed necessary to protect human health and the environment, they will be analyzed, selected, and implemented during the Corrective Measures Study (CMS)/Corrective Measures Implementation process and the most current and approved Installation Work Plan for the Environmental Restoration Project. The selected corrective measures will include the alternative requirements for post-closure of the regulated unit in a manner that complies with the requirements of 20.4.1 NMAC § 264.110(c)(2), and as approved by the NMED.

Therefore, the detailed post-closure plans for the regulated units at LANL are linked to the appropriate CMS reports and Statements of Basis associated with a permit modification for selection and implementation of corrective measures for the SWMUs associated with the regulated unit. The post-closure plans meet the requirements of 20.4.1 NMAC § 264.118(b) and identify the activities that will be carried on after closure of each disposal unit and the frequencies at which these activities will be performed to comply with 20.4.1 NMAC, Subpart V, Part 264, Subpart F, and 20.4.1 NMAC § 264.310(b). The plans include a description of the monitoring activities and frequencies; a description of the planned maintenance activities and frequencies; the name, address, and phone number of the person or office to contact about the unit during the post-closure care period; and either the alternative requirements that apply to the regulated unit or a reference to the permit modification or other enforceable document that will contain those requirements.

G.1.3 Amendment of the Post-Closure Plan [20.4.1 NMAC § 264.118(d)]

In accordance with 20.4.1 NMAC § 264.118(d)(1) [6-14-00], LANL may submit a written notification of or request for a permit modification to authorize a change in the approved post-closure plan at any time during the active life of the facility or during the post-closure care period. In accordance with 20.4.1 NMAC § 264.118(d)(2) [6-14-00], LANL will submit a written notification of or request for a permit modification to authorize a change in the approved post-closure plan whenever:

- There are changes in operating plans or facility design that affect the approved post-closure plan
- There is a change in the expected year of final closure, if applicable
- Events which occur during the active life of the facility, including partial and final closures, affect the approved post-closure plan
- LANL requests the Secretary of the NMED to apply alternative requirements to a regulated unit under 20.4.1 NMAC § 264.90(f) and/or § 264.110(c).

The written notification or request will include a copy of the amended post-closure plan for review or approval by the NMED, in accordance with 20.4.1 NMAC § 264.118(d).

LANL will submit a written request for a permit modification at least 60 days prior to the proposed change in unit design or operation, or no later than 60 days after an occurrence of an unexpected event that affects the post-closure plan. The Secretary of the NMED will approve, disapprove, or modify this plan in accordance with the procedures in the Code of Federal Regulations, Title 40 (40 CFR), Part 124, and 20.4.1 NMAC, Subpart IX, Part 270. The approved post-closure plan will become a permit condition, in accordance with 20.4.1 NMAC § 270.32.

The Secretary of the NMED may request modifications to the plan under the conditions presented in the bulleted items above. LANL will submit the modified plan no later than 60 days after the Secretary's request. Any modifications requested by the Secretary will be approved in accordance with the procedures in 40 CFR, Part 124, and 20.4.1 NMAC, Subpart IX, Part 270.

G.1.4 Post-Closure Cost Estimate, Financial Assurance, and Liability Requirements [20.4.1 NMAC § 264.140(c)]

In accordance with 20.4.1 NMAC § 264.140(c) [6-14-00], LANL, as a federal facility, is exempt from the requirements of 20.4.1 NMAC, Subpart V, Part 264, Subpart H [6-14-00], to provide a cost estimate, financial assurance mechanisms, and liability insurance for post-closure actions.

G.1.5 Post-Closure Certification [20.4.1 NMAC § 264.120]

Within 60 days after completion of the established post-closure care period for each hazardous waste disposal unit, LANL will submit to the Secretary of the NMED, by registered mail, a certification that the post-closure care period for the unit was performed in accordance with the approved post-closure plan. The certification will be signed by the appropriate DOE/NNSA and LANL officials and by an independent, registered professional engineer. Documentation supporting the independent, registered professional engineer's certification will be furnished to the Secretary of the NMED upon request. A copy of the certification and supporting documentation will be maintained by DOE/NNSA LASO. The supporting documentation may include, for example, the following:

- Any significant variance from the approved activities and the reason for the variance
- A summary of all sampling results
- A quality assurance/quality control statement on analytical data validation
- The location of the supporting documentation file
- Storage or disposal location of hazardous/mixed waste resulting from post-closure activities.

G.1.6 Security

Because of the ongoing nature of waste management operations at LANL, security and administrative controls for the sites of land-based units will be under the care of the DOE/NNSA or another authorized federal agency during the post-closure care period. Site security will be maintained during that period to prohibit public access to the land-based units. Details of security measures are included in the land-based unit-specific closure/post-closure plans cited previously.

G.1.7 Survey Plat and Post-Closure Requirements [20.4.1 NMAC § 264.116 and § 264.117 through § 264.120]

A survey plat prepared in accordance with 20.4.1 NMAC § 264.116 [6-14-00] will be filed with the appropriate authorities at certification of closure. No later than 60 days after certification of closure of each land-based unit, LANL will submit to the County of Los Alamos and other authorized agencies and to the Secretary of the NMED a record of the type, location, and quantity of hazardous wastes disposed of within each regulated disposal unit. For hazardous wastes disposed of before January 12, 1981, LANL will identify the type, location, and quantity of the hazardous wastes to the best of their knowledge and in accordance with any records that have been kept.

Post-closure care pursuant to 20.4.1 NMAC § 264.117 through § 264.120 [6-14-00] will begin after closure of a regulated disposal unit is certified by LANL and approved by the NMED. Post-closure notices will be filed with appropriate authorities within 60 days of certification of closure of the first regulated disposal unit and within 60 days of certification of closure of the last regulated disposal unit, as described in 20.4.1 NMAC § 264.119 [6-14-00]. To meet that requirement, DOE/NNSA will file a “Land Use Restriction Notice” or equivalent document with the County of Los Alamos and other authorized agencies. The “Land Use Restriction Notice” will indicate that the land has been used to manage hazardous wastes and that its use is restricted under 20.4.1 NMAC, Subpart V, Part 264, Subpart G regulations. It will also indicate that the survey plat and record of the type, location, and quantity of hazardous wastes disposed of have been filed with the County of Los Alamos and other authorized agencies and with the Secretary of the NMED. LANL will also submit a certification to the Secretary of the NMED, signed by DOE/NNSA and LANL, that they have recorded the notation specified in 20.4.1 NMAC § 264.119(b)(1), including a copy of the document in which the notation has been placed.

Within 60 days after completion of the established post-closure care period for the regulated disposal unit, LANL will submit to the Secretary of the NMED, via certified mail, a certification of completion of post-closure care in accordance with the requirements of 20.4.1 NMAC § 264.120 [6-14-00]. Certification of completion of post-closure care is described in Section G.1.5.

In accordance with 20.4.1 NMAC § 264.117(c), post-closure use of property on or in which hazardous waste remains after partial or final closure will not be allowed to disturb the integrity of the final cover or any other components of the containment system, if present, or the function of the monitoring systems unless the Secretary of the NMED finds that the disturbance is necessary to the

proposed use of the property and will not increase the potential hazard to human health or the environment, or it is necessary to reduce a threat to human health or the environment.

G.1.8 References

EPA, 1998, "Standards Applicable to Owners and Operators of Closed and Closing Hazardous Waste Management Facilities: Post-Closure Permit Requirement and Closure Process; Final Rule," *Federal Register*, pp. 56710-56735.

Table G-1

Current Land Disposal Units at Los Alamos National Laboratory Subject to Post-Closure Requirements

Unit	Associated Material Disposal Area (MDA)	Structure	Type
Area G Landfills	MDA G	Shaft 124	Landfill
		Pit 29	Landfill
Area H Landfill	MDA H	Shaft 9	Landfill
Area L Landfill	MDA L	Impoundment B	Impoundment/Landfill Cell
		Impoundment D	Impoundment/Landfill Cell
		Shaft 1	Landfill Cell
		Shaft 13	Landfill Cell
		Shaft 14	Landfill Cell
		Shaft 15	Landfill Cell
		Shaft 16	Landfill Cell
		Shaft 17	Landfill Cell
		Shaft 19	Landfill Cell
		Shaft 20	Landfill Cell
		Shaft 21	Landfill Cell
		Shaft 22	Landfill Cell
		Shaft 23	Landfill Cell
		Shaft 24	Landfill Cell
		Shaft 25	Landfill Cell
		Shaft 26	Landfill Cell
		Shaft 27	Landfill Cell
		Shaft 28	Landfill Cell
		Shaft 29	Landfill Cell
		Shaft 30	Landfill Cell
		Shaft 31	Landfill Cell
		Shaft 32	Landfill Cell
		Shaft 33	Landfill Cell
		Shaft 34	Landfill Cell

Supplement 1

Off-Site Waste Information

SUPPLEMENT 1

OFF-SITE WASTE INFORMATION

Introduction

This supplement provides descriptions of waste streams proposed to be received from off-site facilities by waste management organizations at Los Alamos National Laboratory (LANL) and of the waste characterization and acceptance procedures to be used in their management. The waste streams currently identified to be received are mixed transuranic (MTRU) wastes from Sandia National Laboratories/New Mexico (SNL/NM) that will require waste certification and preparation for subsequent transport and management at the U.S. Department of Energy (DOE) Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico.

The SNL/NM waste streams proposed to be accepted at LANL contain radioactive and potentially hazardous waste components. One reason for their shipment will be to utilize LANL capacity to confirm the hazardous component of the waste using the procedures in Section B.3.2 of the Waste Analysis Plan (WAP) contained in this General Part B Permit Renewal Application. Due to the relatively low volumes of these wastes, the shipment and waste management approach proposed here will alleviate the need for costly and redundant waste characterization facilities at both sites. The waste streams may include combustible and noncombustible waste, soil and gravel, organic and inorganic process solids, metal and noncombustible debris waste, and metal waste. Because the waste stream characterizations are consistent with LANL and DOE MTRU waste stream descriptions, the Summary Category Groups described in Section B.1.2.3 of the WAP have been used to identify these waste streams.

Sandia National Laboratories/New Mexico Waste Streams

The SNL/NM mixed wastes are predominantly generated from laboratory operations. Approximately eight cubic meters (8 m^3) of these wastes are stored at SNL/NM, although future characterization activities may significantly reduce the amount of waste currently characterized as mixed. SNL/NM may generate a yearly average volume of one cubic meter (1 m^3) of these wastes using the present generator activity level as a basis for estimation. The waste stream descriptions listed below are based on current inventories obtained from the following documents: *SNL Radioactive and Mixed Waste Department's Radtrack Database* (queried 2/4/99), *Radioactive and Mixed Waste Disposal Forms* (for legacy waste), *Preliminary Characterization of Materials in Manzano Storage Bunker 37055* (Sand98), and *Candidate Auxiliary Hot Cell Facility Containers*

(SNL, 2/9/99).

Solidified Inorganic Process Solids, Summary Category Group S3000

S3000 wastes are defined generally in the General Part B WAP as solid waste materials, excluding soil and gravel, that do not meet the U.S. Environmental Protection Agency Land Disposal Restriction criteria for classification as debris. This waste consists of solidified inorganic process residues from Hot Cell Facility (HCF) operations. These process solids have been immobilized in cement to form a noncorrosive solid matrix.

Solidified Organic Process Solids, Summary Category Group S3000

This waste consists of solidified organic process solids. The waste is generated as a result of HCF operations. These residues possibly contain the following listed spent solvents: Freon-TF, methylene chloride, acetone, ethylbenzene, xylenes, benzene, 2-butanone, carbon disulfide, and toluene. These process residues have been immobilized in cement to form a noncorrosive solid matrix.

Soils and Gravel, Summary Category Group S4000

S4000 wastes are defined as solid waste materials that are at least 50% soil and gravel by volume. Soil and gravel wastes are generated by decontamination and corrective action activities.

Combustible/Noncombustible Waste, Summary Category Group S5000

S5000 debris wastes are defined as a heterogeneous waste stream that is at least 50% by volume solid materials exceeding a 2.36-inch particle size that is intended for disposal and is a manufactured object, plant or animal matter, or natural geologic material. This waste stream consists of used personal protective equipment, laboratory wipes, metal equipment, solder, and filters from laboratory and decontamination activities.

Metal Debris Waste, Summary Category Group S5000

This waste stream includes metal equipment and other scrap from laboratory experiments that require separate remote-handling techniques for management due to relatively high radioactivity levels.

Noncombustible Debris Waste, Summary Category Group S5000

This waste stream includes filters, fuel cells, experimental pressure cells, and calorimetry cells from laboratory experiments that require remote-handling techniques for management due to relatively high radioactivity levels.

Combustible Waste, Summary Category Group S5000

This waste stream includes personal protective equipment, laboratory wipes, packaging, paraffin wax, and plastic from decontamination and recovery processes.

Noncombustible Waste, Summary Category Group S5000

This waste stream consists of metal scrap and equipment from decontamination and recovery processes.

Metal Waste, Summary Category Group S5000

This waste stream consists of metal parts from plutonium and americium source equipment.

Los Alamos National Laboratory Waste Acceptance Procedures

SNL/NM mixed wastes have been characterized by acceptable knowledge procedures mainly using generator documentation of the waste or of the process generating the waste. This documentation is used for characterization, segregation, and storage at SNL/NM in compliance with 20.4.1 NMAC hazardous waste management regulations. If sufficient, this characterization will be used for transportation and subsequent staging at LANL prior to certification for the WIPP program.

The generator waste documentation will be collected and reviewed for completeness prior to shipment using LANL routine waste characterization procedures as described in the General Part B WAP. Off-site pre-shipment inspection of the waste containers by the appropriate LANL waste management organizations may be used to examine the waste and its documentation if the information provided by the generator is insufficient to meet LANL waste acceptance criteria. If necessary, further characterization to meet those criteria will be completed at the site before the waste can be shipped. Preparation of shipping documentation and waste acceptance procedures at LANL will be performed as described in Section B.4 of the General Part B WAP.

After being received at LANL, these waste streams will be stored in appropriate waste management units. These container storage units will probably be located at Technical Areas 50 and 54. Further

waste characterization activities will be performed in accordance with the procedures for mixed TRU waste contained in Section B.3.2 of the General Part B WAP, including the waste characterization parameters and methods described in Tables B-11 and B-18 of the WAP.

2003 Traffic Study Site Locations

State Plane Coordinate System New Mexico Central Zone North American Datum 1983 (ft)

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Analysis of Traffic Count Results
Selected Study Conducted 1/28/03 through 2/03/03

Site #	Site Location	Average Daily # of Vehicles (Monday-Sunday)	Average Daily # of Vehicles (Monday–Friday)
Site 1	West Jemez Road 100' East of S Site	2661	3332
Site 2	Diamond Drive 250' North of Jemez Road	20520	25820
Site 3	Pajarito Road 200' East of Diamond Drive	10118	12868
Site 4	West Jemez Road 100' East of NM 4	1386	1539
Site 5	East Jemez Road ¼ mile West of NM 4	6159	7837
Site 6	East Jemez Road 500' West of Royal Crest Trailer Park	7586	9711
Site 7	Pajarito 1000' West of NM 4	5913	7311
Site 8	Pajarito 500' West of TA-51	6446	7974
Site 9	East Jemez Road 250' West of TA-53 LANSCE Entrance	6779	8679
Site 10	West Jemez Road 150' West of Guard Station 431	4369	5592

Peak Traffic Occurs:

Monday through Thursday	6-8 am	and	4-6 pm
Friday	6-8 am	and	3-5 pm
Saturday	Approximately 10 am		
Sunday	Approximately 12 pm		

Most traffic occurs at Site 2 and least traffic occurs at Site 4.

The busiest (Tuesday) and the slowest (Sunday) days for traffic are consistent with three exceptions: Site 2 is busiest on Monday, and Site 7 and Site 8 (both along Pajarito Road) are busiest on Thursday and slowest on Saturday.

TRAFFIC STUDY DATA FOR JANUARY 28 THROUGH FEBRUARY 3, 2003

Time	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	Site 9	Site 10
0:00	2	47	39	2	20	25	10	23	23	2
1:00	2	23	13	3	12	11	2	8	12	3
2:00	3	10	16	2	1	4	7	8	2	3
3:00	1	18	13	1	10	10	7	15	9	2
4:00	5	43	25	2	31	34	15	18	28	6
5:00	38	154	96	29	205	171	91	93	165	56
6:00	245	1258	703	105	980	905	807	712	867	438
7:00	449	2514	1342	233	1362	1457	1127	1142	1337	694
8:00	297	2090	1214	114	594	775	566	688	733	505
9:00	203	1560	838	79	379	528	271	342	497	382
10:00	182	1288	791	69	270	403	226	329	374	348
11:00	255	2144	1032	75	302	494	422	463	453	466
12:00	256	2256	1058	88	292	513	393	434	440	454
13:00	243	1739	972	95	271	488	273	367	439	424
14:00	182	1391	919	79	316	501	258	331	458	316
15:00	257	1641	1032	101	571	756	487	581	688	457
16:00	302	1927	1014	157	973	1055	690	699	985	553
17:00	355	2298	1477	174	969	1060	1053	1037	939	571
18:00	122	1362	576	87	440	502	485	476	446	199
19:00	47	512	227	31	139	175	197	186	136	77
20:00	39	323	142	34	65	107	93	108	69	55
21:00	31	344	180	32	83	115	159	160	90	29
22:00	7	114	104	7	73	84	49	40	73	16
23:00	8	71	94	5	46	60	13	31	55	19
Total	**3531**	**25127**	**13917**	**1604**	**8404**	**10233**	**7701**	**8291**	**9318**	**6075**

Most traffic:	25127	Site 2
Least traffic:	1604	Site 4

Technician: Jm
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS2-7
Page : 1

Location :On West Jemez 100' East of S Site

Both directions

Begin Time	Mon. 01/27 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Tues. 01/28 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	*	*	*	*	*	*	0	29	1	36	1	65
12:15	*	*	*	*	*	*	0	29	0	31	0	60
12:30	*	*	*	*	*	*	0	21	0	43	0	64
12:45	*	*	*	*	*	*	0	24	1	43	1	67
01:00	*	*	*	*	*	*	0	29	0	49	0	78
01:15	*	*	*	*	*	*	1	22	1	32	2	54
01:30	*	*	*	*	*	*	0	17	0	26	0	43
01:45	*	27	*	17	*	44	0	31	0	37	0	68
02:00	*	32	*	24	*	56	0	21	1	21	1	42
02:15	*	36	*	17	*	53	0	21	1	20	1	41
02:30	*	22	*	26	*	48	0	26	0	22	0	48
02:45	*	22	*	19	*	41	1	30	0	21	1	51
03:00	*	23	*	28	*	51	0	24	0	25	0	49
03:15	*	39	*	22	*	61	0	50	0	24	0	74
03:30	*	36	*	19	*	55	0	37	0	30	0	67
03:45	*	32	*	25	*	57	0	42	1	25	1	67
04:00	*	51	*	37	*	88	0	35	1	26	1	61
04:15	*	37	*	34	*	71	0	36	0	41	0	77
04:30	*	61	*	33	*	94	2	46	1	33	3	79
04:45	*	38	*	36	*	74	0	55	1	30	1	85
05:00	*	56	*	42	*	98	0	65	3	33	3	98
05:15	*	68	*	37	*	105	4	66	3	38	7	104
05:30	*	52	*	33	*	85	1	58	4	36	5	94
05:45	*	30	*	22	*	52	10	27	13	32	23	59
06:00	*	25	*	18	*	43	8	23	8	16	16	39
06:15	*	14	*	17	*	31	31	21	25	21	56	42
06:30	*	10	*	12	*	22	22	8	34	15	56	23
06:45	*	6	*	10	*	16	30	8	87	10	117	18
07:00	*	5	*	11	*	16	59	6	57	9	116	15
07:15	*	6	*	7	*	13	40	2	57	3	97	5
07:30	*	0	*	13	*	13	59	13	65	8	124	21
07:45	*	4	*	6	*	10	44	0	68	6	112	6
08:00	*	4	*	4	*	8	27	1	56	8	83	9
08:15	*	3	*	5	*	8	24	2	63	11	87	13
08:30	*	0	*	5	*	5	29	1	44	7	73	8
08:45	*	0	*	6	*	6	25	1	29	8	54	9
09:00	*	2	*	2	*	4	19	4	23	11	42	15
09:15	*	0	*	5	*	5	36	1	25	4	61	5
09:30	*	3	*	6	*	9	29	0	15	4	44	4
09:45	*	0	*	0	*	0	32	4	24	3	56	7
10:00	*	4	*	4	*	8	28	0	24	2	52	2
10:15	*	0	*	5	*	5	19	1	21	1	40	2
10:30	*	0	*	1	*	1	18	0	20	1	38	1
10:45	*	1	*	0	*	1	27	0	25	2	52	2
11:00	*	2	*	2	*	4	39	2	14	2	53	4
11:15	*	1	*	2	*	3	45	2	32	1	77	3
11:30	*	1	*	0	*	1	37	0	24	0	61	0
11:45	*	1	*	1	*	2	47	0	17	1	64	1
Totals	0	754	0	613	0	1367	793	941	889	908	1682	1849
Day Totals		754		613		1367		1734		1797		3531
% Total	.0%	55.1%	.0%	44.8%			22.4%	26.6%	25.1%	25.7%		
Peaks		04:30		04:30		04:30	07:00	04:45	06:45	00:30	06:45	04:45
Volume		223		148		371	202	244	256	167	454	381
P.H.F.		.81		.88		.88	.85	.92	.76	.85	.91	.91

Site 1, Page 1

Technician:Jm
Location :On West Jemez 100' East of
S Site

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS2-7
Page : 2

Both directions

Begin Time	Wed. 01/29 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Thur. 01/30 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	1	33	1	27	2	60	1	33	1	22	2	55
12:15	0	30	3	37	3	67	1	19	2	25	3	45
12:30	1	24	0	30	1	54	1	22	2	27	3	49
12:45	0	31	1	24	1	55	0	23	0	36	0	59
01:00	0	19	0	40	0	59	1	25	0	32	1	57
01:15	0	20	0	27	0	47	0	19	0	28	0	47
01:30	0	22	1	34	1	56	0	26	1	32	1	58
01:45	0	22	1	29	1	51	0	25	0	27	0	52
02:00	0	22	0	27	0	49	0	22	0	25	0	47
02:15	0	22	0	27	0	49	1	22	1	19	2	41
02:30	1	26	0	27	1	53	1	36	1	22	2	58
02:45	0	25	0	11	0	36	0	40	1	22	1	62
03:00	0	29	0	25	0	54	0	30	1	24	1	54
03:15	0	52	0	24	0	76	0	32	0	26	0	58
03:30	0	37	0	23	0	60	0	38	0	29	0	67
03:45	0	43	0	26	0	69	1	35	1	26	2	61
04:00	0	45	1	47	1	92	0	37	0	30	0	67
04:15	0	50	0	34	0	84	1	42	0	29	1	71
04:30	1	37	0	45	1	82	2	58	0	37	2	95
04:45	3	62	2	21	5	83	0	54	2	30	2	84
05:00	1	69	3	36	4	105	0	52	2	34	2	86
05:15	2	50	1	38	3	88	4	72	4	33	8	105
05:30	5	51	10	32	15	83	3	47	5	23	8	70
05:45	8	40	10	35	18	75	8	28	16	29	24	57
06:00	13	11	10	16	23	27	16	25	12	12	28	37
06:15	24	10	21	16	45	26	20	8	25	23	45	31
06:30	26	3	37	19	63	22	29	13	36	15	65	28
06:45	36	8	90	10	126	18	40	4	84	8	124	12
07:00	40	7	53	8	93	15	45	1	80	19	125	20
07:15	50	4	44	13	94	17	51	4	53	10	104	14
07:30	50	5	53	9	103	14	56	3	51	6	107	9
07:45	34	3	78	10	112	13	48	3	69	9	117	12
08:00	34	1	68	2	102	3	41	3	52	7	93	10
08:15	24	2	47	11	71	13	30	5	58	6	88	11
08:30	37	2	44	7	81	9	12	3	28	5	40	8
08:45	21	0	42	1	63	1	23	0	28	6	51	6
09:00	26	1	21	5	47	6	31	2	25	3	56	5
09:15	14	2	33	3	47	5	28	0	26	5	54	5
09:30	17	2	24	4	41	6	23	0	17	4	40	4
09:45	36	4	26	1	62	5	17	0	20	5	37	5
10:00	21	5	15	4	36	9	23	0	13	3	36	3
10:15	22	3	22	0	44	3	23	1	29	3	52	4
10:30	39	3	26	1	65	4	17	2	23	0	40	2
10:45	26	2	13	1	39	3	25	1	24	1	49	2
11:00	37	0	18	3	55	3	33	0	30	3	63	3
11:15	45	1	19	2	64	3	39	0	16	2	55	2
11:30	37	0	25	0	62	0	33	0	22	2	55	2
11:45	28	1	29	0	57	1	63	0	28	1	91	1
Totals	760	941	892	872	1652	1813	791	915	889	826	1680	1741
Day Totals	1701		1764		3465		1706		1715		3421	
% Total	21.9%	27.1%	25.7%	25.1%			23.1%	26.7%	25.9%	24.1%		
Peaks	06:45	04:45	07:30	03:45	06:45	04:45	07:00	04:30	06:45	04:30	06:45	04:30
Volume	175	232	246	152	416	359	200	236	268	134	460	370
P.H.F.	.88	.84	.78	.80	.82	.85	.89	.81	.79	.90	.92	.88

Technician:Jm
Location :On.West Jemez 100' East of
S Site

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS2-7
Page : 3

Both directions

Begin Time	Fri. 01/31 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Sat. 02/01 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	0	18	1	19	1	37	0	9	1	11	1	20
12:15	0	22	1	18	1	40	1	14	1	13	2	27
12:30	1	22	0	25	1	47	0	10	1	17	1	27
12:45	1	23	0	19	1	42	2	7	1	15	3	22
01:00	0	14	1	26	1	40	1	21	1	12	2	33
01:15	0	25	1	29	1	54	1	10	0	7	1	17
01:30	3	23	0	30	3	53	0	20	3	8	3	28
01:45	1	19	0	23	1	42	0	8	1	14	1	22
02:00	0	32	0	35	0	67	0	11	0	10	0	21
02:15	0	29	0	24	0	53	1	11	0	11	1	22
02:30	0	13	0	15	0	28	1	15	0	9	1	24
02:45	0	27	0	23	0	50	0	6	0	13	0	19
03:00	0	28	0	18	0	46	0	12	0	21	0	33
03:15	0	33	0	26	0	59	0	21	0	12	0	33
03:30	0	45	0	37	0	82	1	15	0	16	1	31
03:45	1	44	0	28	1	72	0	11	0	18	0	29
04:00	0	29	1	30	1	59	0	11	0	13	0	24
04:15	0	28	0	34	0	62	0	16	0	16	0	32
04:30	1	28	0	24	1	52	0	13	0	11	0	24
04:45	1	35	2	17	3	52	0	21	1	3	1	24
05:00	1	21	0	29	1	50	1	15	1	10	2	25
05:15	1	14	4	17	5	31	0	9	1	13	1	22
05:30	4	19	3	12	7	31	2	9	0	4	2	13
05:45	7	13	6	14	13	27	3	13	1	4	4	17
06:00	2	11	9	13	11	24	1	13	7	7	8	20
06:15	21	14	21	14	42	28	3	12	7	3	10	15
06:30	22	2	36	5	58	7	3	6	6	10	9	16
06:45	19	6	36	10	55	16	6	2	6	4	12	6
07:00	24	5	41	7	65	12	4	2	7	4	11	6
07:15	38	0	34	6	72	6	1	1	11	1	12	2
07:30	34	1	27	5	61	6	12	2	11	4	23	6
07:45	40	2	54	7	94	9	10	0	3	6	13	6
08:00	32	1	52	6	84	7	5	2	10	1	15	3
08:15	25	2	46	6	71	8	8	3	10	4	18	7
08:30	20	6	31	8	51	14	10	0	5	1	15	1
08:45	21	1	20	1	41	2	13	3	10	3	23	6
09:00	20	2	24	2	44	4	7	3	13	2	20	5
09:15	26	1	24	4	50	5	8	1	5	6	13	7
09:30	27	1	33	3	60	4	4	0	9	4	13	4
09:45	25	0	20	4	45	4	8	1	10	7	18	8
10:00	25	2	11	3	36	5	12	0	15	5	27	5
10:15	27	2	26	4	53	6	5	3	11	4	16	7
10:30	26	2	15	7	41	9	14	4	12	1	26	5
10:45	25	1	15	3	40	4	8	1	7	2	15	3
11:00	33	0	14	4	47	4	11	0	16	3	27	3
11:15	20	1	20	1	40	2	6	1	15	0	21	1
11:30	31	0	11	3	42	3	20	2	9	1	29	3
11:45	30	0	17	5	47	5	13	1	14	3	27	4
Totals	635	667	657	703	1292	1370	206	371	242	367	448	738
Day Totals	1302		1360		2662		577		609		1186	
% Total	23.8%	25.0%	24.6%	26.4%			17.3%	31.2%	20.4%	30.9%		
Peaks	07:15	03:15	07:45	03:30	07:15	03:30	11:00	04:15	11:00	03:00	11:00	03:00
Volume	144	151	183	129	311	275	50	65	54	67	104	126
P.H.F.	.9	.83	.84	.67	.82	.83	.62	.77	.84	.79	.89	.95

Technician: Jm
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LCS2-7
Page : 4

Location :On-West Jemez 100' East of
S Site

Both directions

Begin Time	Sun. 02/02 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Mon. 02/03 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	0	11	1	7	1	18	2	30	1	20	3	50
12:15	2	12	1	17	3	29	1	15	0	25	1	40
12:30	1	7	1	12	2	19	0	28	0	25	0	53
12:45	0	12	2	13	2	25	0	22	0	30	0	52
01:00	1	15	1	13	2	28	0	22	0	40	0	62
01:15	1	10	4	11	5	21	0	21	1	24	1	45
01:30	2	10	1	7	3	17	1	23	1	29	2	52
01:45	2	11	1	15	3	26	1	30	0	16	1	46
02:00	0	15	0	11	0	26	0	31	0	24	0	55
02:15	1	10	0	9	1	19	0	23	0	28	0	51
02:30	2	17	0	12	2	29	0	32	0	34	0	66
02:45	0	9	0	15	0	24	0	31	1	20	1	51
03:00	0	11	0	6	0	17	0	28	0	21	0	49
03:15	1	15	0	13	1	28	0	33	1	18	1	51
03:30	0	11	0	7	0	18	2	55	1	26	3	81
03:45	0	17	0	3	0	20	0	31	0	23	0	54
04:00	0	6	0	9	0	15	0	29	0	34	0	63
04:15	0	12	1	10	1	22	2	41	0	31	2	72
04:30	0	10	0	7	0	17	2	59	0	33	2	92
04:45	1	18	0	13	1	31	0	73	2	30	2	103
05:00	0	7	0	5	0	12	1	51	4	33	5	84
05:15	0	9	0	7	0	16	5	54	4	47	9	101
05:30	1	14	0	3	1	17	5	39	9	40	14	79
05:45	0	5	0	3	0	8	3	32	7	28	10	60
06:00	0	13	0	10	0	23	13	11	11	24	24	35
06:15	1	3	0	8	1	11	20	34	29	15	49	49
06:30	3	9	0	3	3	12	28	12	36	11	64	23
06:45	4	8	1	3	5	11	40	7	74	5	114	12
07:00	3	6	1	1	4	7	35	4	59	8	94	12
07:15	2	3	5	6	7	9	59	2	50	7	109	9
07:30	1	2	3	1	4	3	36	9	63	6	99	15
07:45	8	1	5	1	13	2	49	3	66	6	115	9
08:00	5	4	11	3	16	7	33	1	53	3	86	4
08:15	7	1	6	2	13	3	29	3	71	5	100	8
08:30	5	2	5	8	10	10	31	2	40	4	71	6
08:45	5	2	2	4	7	6	29	0	29	8	58	8
09:00	9	2	8	4	17	6	23	0	25	3	48	3
09:15	6	3	8	5	14	8	19	0	24	4	43	4
09:30	2	2	7	0	9	2	27	0	19	6	46	6
09:45	7	3	9	1	16	4	32	1	24	2	56	3
10:00	4	2	5	2	9	4	22	1	26	2	48	3
10:15	7	1	12	4	19	5	25	2	17	4	42	6
10:30	16	1	11	2	27	3	24	1	16	4	40	5
10:45	6	3	9	0	15	3	26	1	14	3	40	4
11:00	12	0	9	2	21	2	27	1	25	1	52	2
11:15	6	0	18	0	24	0	41	0	23	2	64	2
11:30	9	2	17	2	26	4	35	0	28	0	63	0
11:45	9	0	17	1	26	1	29	1	27	2	56	3
Totals	152	347	182	301	334	648	757	929	881	814	1638	1743
Day Totals	499		483		982		1686		1695		3381	
% Total	15.4%	35.3%	18.5%	30.6%			22.3%	27.4%	26.0%	24.0%		
Peaks	10:15	03:00	11:00	00:15	11:00	00:15	07:00	04:30	07:30	04:45	07:00	04:30
Volume	41	54	61	55	97	101	179	237	253	150	417	380
P.H.F.	.64	.79	.84	.80	.93	.87	.75	.81	.89	.79	.90	.92

Technician: Jm
3600 CERRILLOS ROAD #205
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TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS2-7
Page : 5

Location :On West Jemez 100' East of S Site

Both directions

Begin Time	Tues. 02/04 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Wed. 02/05 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	1	21	0	30	1	51	0	30	0	32	0	62
12:15	0	34	0	30	0	64	0	23	1	31	1	54
12:30	1	32	2	34	3	66	0	31	0	44	0	75
12:45	1	26	1	52	2	78	0	30	1	40	1	70
01:00	1	27	1	40	2	67	1	28	0	38	1	66
01:15	1	32	0	40	1	72	2	33	3	28	5	61
01:30	0	21	1	25	1	46	0	19	1	22	1	41
01:45	0	32	0	34	0	66	1	23	0	25	1	48
02:00	0	25	0	22	0	47	0	25	0	27	0	52
02:15	1	22	1	26	2	48	0	20	0	15	0	35
02:30	1	39	0	18	1	57	0	20	0	20	0	40
02:45	0	36	0	25	0	61	0	25	0	24	0	49
03:00	0	30	0	21	0	51	0	32	0	26	0	58
03:15	0	40	0	26	0	66	0	52	1	36	1	88
03:30	0	43	0	29	0	72	0	48	0	31	0	79
03:45	1	33	0	26	1	59	1	30	0	21	1	51
04:00	0	56	0	40	0	96	0	40	0	35	0	75
04:15	0	40	2	23	2	63	0	46	1	43	1	89
04:30	1	60	1	32	2	92	1	64	0	29	1	93
04:45	1	60	2	34	3	94	1	51	1	16	2	67
05:00	2	60	0	32	2	92	0	65	2	36	2	101
05:15	6	44	1	41	7	85	6	61	1	40	7	101
05:30	6	38	6	36	12	74	3	43	6	57	9	100
05:45	8	31	20	23	28	54	6	38	11	23	17	61
06:00	21	22	13	32	34	54	10	14	14	18	24	32
06:15	21	27	18	22	39	49	18	14	31	22	49	36
06:30	34	9	38	13	72	22	27	19	29	10	56	29
06:45	29	10	80	7	109	17	38	12	84	10	122	22
07:00	51	5	69	9	120	14	33	2	72	10	105	12
07:15	39	2	54	9	93	11	57	3	48	9	105	12
07:30	53	1	66	9	119	10	44	5	66	6	110	11
07:45	52	4	80	7	132	11	46	0	69	4	115	4
08:00	30	3	70	3	100	6	36	5	57	4	93	9
08:15	26	3	52	4	78	7	31	3	46	6	77	9
08:30	35	2	36	7	71	9	27	4	39	7	66	11
08:45	27	2	40	2	67	4	24	3	38	8	62	11
09:00	31	2	20	12	51	14	16	1	26	3	42	4
09:15	23	1	30	4	53	5	30	0	20	6	50	6
09:30	27	2	20	5	47	7	25	2	28	4	53	6
09:45	37	3	25	2	62	5	24	1	29	2	53	3
10:00	29	8	21	4	50	12	17	2	31	4	48	6
10:15	20	1	25	1	45	2	24	1	21	2	45	3
10:30	28	1	21	3	49	4	30	2	12	0	42	2
10:45	38	3	34	1	72	4	26	2	16	1	42	3
11:00	28	1	24	1	52	2	32	1	18	4	50	5
11:15	42	1	16	2	58	3	35	0	32	1	67	1
11:30	38	1	23	0	61	1	46	0	13	0	59	0
11:45	39	1	31	1	70	2	39	2	20	1	59	3
Totals	832	997	944	899	1776	1896	757	975	888	881	1645	1856
Day Totals	1829		1843		3672		1732		1769		3501	
% Total	22.6%	27.1%	25.7%	24.4%			21.6%	27.8%	25.3%	25.1%		
Peaks	07:00	04:30	07:15	00:30	07:00	04:30	07:15	04:30	06:45	05:00	06:45	04:45
Volume	195	224	270	166	464	363	183	241	270	156	442	369
P.H.F.	.91	.93	.84	.79	.87	.96	.80	.92	.80	.68	.90	.91

3600 CERRILLOS ROAD #235
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Technician:Jm
Location :On West Jemez 100' East of S Site

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS2-7
Page : 6

Both directions

Begin Time	Thur. 02/06 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Fri. 02/07 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	1	*	3	*	4	*	*	*	*	*	*	*
12:15	0	*	0	*	0	*	*	*	*	*	*	*
12:30	1	*	0	*	1	*	*	*	*	*	*	*
12:45	0	*	0	*	0	*	*	*	*	*	*	*
01:00	0	*	0	*	0	*	*	*	*	*	*	*
01:15	0	*	0	*	0	*	*	*	*	*	*	*
01:30	0	*	1	*	1	*	*	*	*	*	*	*
01:45	0	*	0	*	0	*	*	*	*	*	*	*
02:00	0	*	0	*	0	*	*	*	*	*	*	*
02:15	1	*	0	*	1	*	*	*	*	*	*	*
02:30	0	*	0	*	0	*	*	*	*	*	*	*
02:45	0	*	0	*	0	*	*	*	*	*	*	*
03:00	0	*	0	*	0	*	*	*	*	*	*	*
03:15	0	*	3	*	3	*	*	*	*	*	*	*
03:30	1	*	0	*	1	*	*	*	*	*	*	*
03:45	0	*	0	*	0	*	*	*	*	*	*	*
04:00	0	*	1	*	1	*	*	*	*	*	*	*
04:15	1	*	0	*	1	*	*	*	*	*	*	*
04:30	1	*	0	*	1	*	*	*	*	*	*	*
04:45	0	*	1	*	1	*	*	*	*	*	*	*
05:00	1	*	1	*	2	*	*	*	*	*	*	*
05:15	4	*	3	*	7	*	*	*	*	*	*	*
05:30	3	*	3	*	6	*	*	*	*	*	*	*
05:45	9	*	16	*	25	*	*	*	*	*	*	*
06:00	13	*	12	*	25	*	*	*	*	*	*	*
06:15	20	*	29	*	49	*	*	*	*	*	*	*
06:30	35	*	32	*	67	*	*	*	*	*	*	*
06:45	33	*	76	*	109	*	*	*	*	*	*	*
07:00	26	*	69	*	95	*	*	*	*	*	*	*
07:15	54	*	50	*	104	*	*	*	*	*	*	*
07:30	50	*	59	*	109	*	*	*	*	*	*	*
07:45	46	*	74	*	120	*	*	*	*	*	*	*
08:00	37	*	48	*	85	*	*	*	*	*	*	*
08:15	30	*	59	*	89	*	*	*	*	*	*	*
08:30	33	*	35	*	68	*	*	*	*	*	*	*
08:45	31	*	37	*	68	*	*	*	*	*	*	*
09:00	21	*	36	*	57	*	*	*	*	*	*	*
09:15	19	*	22	*	41	*	*	*	*	*	*	*
09:30	22	*	17	*	39	*	*	*	*	*	*	*
09:45	37	*	31	*	68	*	*	*	*	*	*	*
10:00	24	*	22	*	46	*	*	*	*	*	*	*
10:15	15	*	21	*	36	*	*	*	*	*	*	*
10:30	30	*	25	*	55	*	*	*	*	*	*	*
10:45	29	*	23	*	52	*	*	*	*	*	*	*
11:00	36	*	35	*	71	*	*	*	*	*	*	*
11:15	41	*	24	*	65	*	*	*	*	*	*	*
11:30	46	*	23	*	69	*	*	*	*	*	*	*
11:45	*	*	*	*	*	*	*	*	*	*	*	*
Totals	751	0	891	0	1642	0	0	0	0	0	0	0
Day Totals	751		891		1642		0		0		0	
Total	45.7%	.0%	54.2%	.0%			*	*	*	*		

Peaks	07:15	06:45	07:00
Volume	187	254	428
P.H.F.	.86	.83	.89

Technician: JM
Location : Diamond Drive 250' North of Jemez

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS14-7
Page : 1

Both directions

Begin Time	Mon. 01/27	North A.M.	North P.M.	South A.M.	South P.M.	Combined A.M.	Combined P.M.	Tues. 01/28	North A.M.	North P.M.	South A.M.	South P.M.	Combined A.M.	Combined P.M.
12:00		*	*	*	*	*	*		12	329	5	223	17	552
12:15		*	*	*	*	*	*		7	248	3	283	10	531
12:30		*	*	*	*	*	*		5	264	3	329	8	593
12:45		*	*	*	*	*	*		10	229	2	351	12	580
01:00		*	*	*	*	*	*		10	232	3	300	13	532
01:15		*	207	*	256	*	463		1	210	0	239	1	449
01:30		*	168	*	195	*	363		2	154	2	205	4	359
01:45		*	182	*	204	*	386		3	189	2	210	5	399
02:00		*	151	*	134	*	285		2	160	2	185	4	345
02:15		*	173	*	179	*	352		1	175	2	197	3	372
02:30		*	165	*	179	*	344		1	157	2	166	3	323
02:45		*	189	*	172	*	361		0	197	0	154	0	351
03:00		*	214	*	167	*	381		1	182	0	167	1	349
03:15		*	205	*	190	*	395		3	216	1	234	4	450
03:30		*	279	*	148	*	427		5	280	2	163	7	443
03:45		*	238	*	154	*	392		2	255	4	144	6	399
04:00		*	345	*	138	*	483		1	384	3	140	4	524
04:15		*	278	*	159	*	437		1	276	2	144	3	420
04:30		*	341	*	134	*	475		3	381	14	151	17	532
04:45		*	330	*	142	*	472		7	343	12	108	19	451
05:00		*	499	*	149	*	648		6	476	13	151	19	627
05:15		*	444	*	146	*	590		3	477	24	147	27	624
05:30		*	394	*	145	*	539		13	450	34	137	47	587
05:45		*	377	*	106	*	483		15	354	46	106	61	460
06:00		*	284	*	92	*	376		39	333	108	107	147	440
06:15		*	245	*	69	*	314		65	297	168	92	233	389
06:30		*	198	*	49	*	247		49	187	244	59	293	246
06:45		*	155	*	53	*	208		140	221	445	66	585	287
07:00		*	106	*	58	*	164		134	115	385	62	519	177
07:15		*	84	*	58	*	142		194	63	426	49	620	112
07:30		*	65	*	57	*	122		278	57	384	52	662	109
07:45		*	87	*	35	*	122		351	66	362	48	713	114
08:00		*	42	*	40	*	82		333	44	394	39	727	83
08:15		*	43	*	30	*	73		185	43	375	49	560	92
08:30		*	37	*	46	*	83		135	33	228	42	363	75
08:45		*	25	*	44	*	69		191	32	249	41	440	73
09:00		*	20	*	44	*	64		176	22	189	99	365	121
09:15		*	26	*	31	*	57		204	34	186	71	390	105
09:30		*	21	*	28	*	49		232	20	168	48	400	68
09:45		*	26	*	17	*	43		230	25	175	25	405	50
10:00		*	25	*	16	*	41		191	21	158	10	349	31
10:15		*	10	*	26	*	36		147	17	150	12	297	29
10:30		*	9	*	15	*	24		144	19	152	13	296	32
10:45		*	6	*	11	*	17		205	13	141	9	346	22
11:00		*	25	*	6	*	31		232	12	154	8	386	20
11:15		*	16	*	1	*	17		286	12	241	3	527	15
11:30		*	17	*	4	*	21		345	21	213	5	558	26
11:45		*	5	*	4	*	9		449	6	224	4	673	10
Totals		0	6756	0	3931	0	10687		5049	8331	6100	5647	11149	13978
Day Totals			6756		3931		10687			13380		11747		25127
% Total		.0%	63.2%	.0%	36.7%				20.0%	33.1%	24.2%	22.4%		
Peaks			05:00		01:15		05:00		11:00	05:00	06:45	00:15	07:15	05:00
Volume			1714		789		2260		1312	1757	1640	1263	2722	2298
P.H.F.			.85		.77		.87		.73	.92	.92	.89	.93	.91

Site 2, Page 1

DIGITAL TRAFFIC SYST
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Technician:JM
Location :On Diamond Drive 250' North of Jemez

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS14-7
Page : 2

Both directions

Begin Time	Wed. 01/29 North A.M.	North P.M.	South A.M.	South P.M.	Combined A.M.	Combined P.M.	Thur. 01/30 North A.M.	North P.M.	South A.M.	South P.M.	Combined A.M.	Combined P.M.
12:00	12	347	3	245	15	592	17	400	9	261	26	661
12:15	10	278	3	290	13	568	4	276	3	324	7	600
12:30	4	220	3	289	7	509	5	257	4	344	9	601
12:45	5	283	2	354	7	637	8	227	2	375	10	602
01:00	2	202	1	361	3	563	0	226	1	316	1	542
01:15	4	180	2	275	6	455	5	214	3	328	8	542
01:30	1	167	0	242	1	409	3	191	0	233	3	424
01:45	5	162	2	204	7	366	1	201	0	228	1	429
02:00	8	167	0	161	8	328	3	148	0	157	3	305
02:15	4	168	1	163	5	331	3	174	6	169	9	343
02:30	1	172	1	149	2	321	3	188	8	161	11	349
02:45	1	227	0	153	1	380	3	213	0	157	3	370
03:00	2	202	2	167	4	369	0	220	1	179	1	399
03:15	2	249	2	214	4	463	5	225	5	246	10	471
03:30	0	349	0	159	0	518	2	352	3	213	5	565
03:45	3	317	6	156	9	473	0	308	3	187	3	495
04:00	2	420	5	165	7	585	3	411	3	144	6	555
04:15	0	344	4	133	4	477	2	283	6	137	8	420
04:30	3	373	7	178	10	551	3	373	8	152	11	525
04:45	6	400	12	125	18	525	5	395	10	129	15	524
05:00	2	519	12	209	14	728	5	512	15	166	20	678
05:15	12	509	28	183	40	692	12	526	32	149	44	675
05:30	9	502	42	130	51	632	10	492	23	143	33	635
05:45	39	420	56	121	95	541	18	426	65	105	83	531
06:00	18	347	100	105	118	452	24	387	101	101	125	488
06:15	63	264	153	88	216	352	63	268	160	80	223	348
06:30	58	231	271	88	329	319	55	215	268	91	323	306
06:45	122	177	430	78	552	255	148	166	443	76	591	242
07:00	150	143	378	83	528	226	148	154	409	92	557	246
07:15	176	102	402	58	578	160	219	108	428	58	647	166
07:30	272	70	423	61	695	131	277	85	424	62	701	147
07:45	368	78	449	62	817	140	428	96	429	67	857	163
08:00	321	74	405	43	726	117	384	70	412	60	796	130
08:15	196	42	309	44	505	85	283	41	357	47	640	88
08:30	176	37	258	51	434	88	232	40	247	58	479	98
08:45	220	35	215	48	435	83	226	37	244	39	470	76
09:00	154	21	178	36	332	57	168	29	202	37	370	66
09:15	152	44	164	25	316	69	139	43	199	45	338	88
09:30	190	26	152	25	342	51	140	23	171	31	311	54
09:45	174	31	201	38	375	69	194	32	177	25	371	57
10:00	172	28	134	13	306	41	152	38	177	23	329	61
10:15	138	22	136	18	274	40	174	15	133	28	307	43
10:30	150	19	140	21	290	40	142	24	153	13	295	37
10:45	196	13	162	19	358	32	197	13	156	16	353	29
11:00	268	14	157	7	425	21	254	10	153	4	407	14
11:15	341	20	155	8	496	28	354	26	172	11	526	37
11:30	383	21	181	5	564	26	438	10	183	8	621	18
11:45	377	11	244	3	621	14	432	15	238	5	670	20
Totals	4972	9047	5991	5863	10963	14910	5391	9183	6246	6080	11637	15263
Day Totals	14019		11854		25873		14574		12326		26900	
Total	19.2%	34.9%	23.1%	22.6%			20.0%	34.1%	23.2%	22.6%		
Peaks	11:00	05:00	07:15	00:15	07:15	05:00	11:00	05:00	06:45	00:30	07:15	05:00
Volume	1369	1950	1679	1294	2816	2593	1478	1956	1704	1363	3001	2519
P.H.F.	.89	.93	.93	.89	.86	.89	.84	.92	.96	.90	.87	.92

Technician: JM
Location : On Diamond Drive 250' North of Jemez

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS14-7
Page : 3

Both directions

Begin Time	Fri. 01/31 North A.M.	North P.M.	South A.M.	South P.M.	Combined A.M.	Combined P.M.	Sat. 02/01 North A.M.	North P.M.	South A.M.	South P.M.	Combined A.M.	Combined P.M.
12:00	11	266	4	214	15	480	25	79	7	74	32	153
12:15	11	204	11	249	22	453	12	61	9	57	21	118
12:30	7	234	2	217	9	451	12	82	10	77	22	159
12:45	8	224	2	289	10	513	7	66	7	74	14	140
01:00	6	191	3	231	9	422	5	84	4	73	9	157
01:15	2	177	1	202	3	379	5	57	5	50	10	107
01:30	0	158	3	199	3	357	7	66	6	70	13	136
01:45	4	150	3	177	7	327	4	71	2	56	6	127
02:00	3	169	2	147	5	316	2	61	1	70	3	131
02:15	2	131	2	160	4	291	1	63	4	77	5	140
02:30	1	161	3	124	4	285	2	75	2	64	4	139
02:45	4	199	0	141	4	340	7	68	1	82	8	150
03:00	1	239	2	175	3	414	1	89	0	71	1	160
03:15	1	211	2	187	3	398	1	78	1	54	2	132
03:30	2	285	1	166	3	451	2	80	2	53	4	133
03:45	8	266	2	111	10	377	3	93	0	55	3	148
04:00	0	365	4	124	4	489	1	77	0	58	1	135
04:15	1	244	7	125	8	369	0	80	0	42	0	122
04:30	3	230	8	124	11	354	5	85	5	47	10	132
04:45	3	238	8	118	11	356	3	71	1	46	4	117
05:00	10	311	8	127	18	438	4	107	3	59	7	166
05:15	11	272	17	120	28	392	5	86	3	67	8	153
05:30	14	231	23	84	37	315	9	90	7	28	16	118
05:45	18	210	34	74	52	284	10	100	9	40	19	140
06:00	29	160	61	57	90	217	8	84	14	41	22	125
06:15	60	146	118	73	178	219	5	96	13	48	18	144
06:30	66	121	156	52	222	173	18	79	23	45	41	124
06:45	89	119	258	44	347	163	30	84	30	38	60	122
07:00	121	104	249	48	370	152	21	69	21	29	42	98
07:15	192	71	265	46	457	117	21	58	25	23	46	81
07:30	230	55	240	31	470	86	52	46	39	25	91	71
07:45	330	39	327	36	657	75	97	46	43	31	140	77
08:00	269	46	324	38	593	84	68	27	51	35	119	62
08:15	208	46	282	41	490	87	54	27	39	35	93	62
08:30	164	48	212	27	376	75	56	29	45	22	101	51
08:45	173	49	198	43	371	92	105	28	58	22	163	50
09:00	174	41	174	28	348	69	68	35	51	21	119	56
09:15	144	32	175	26	319	58	65	44	60	37	125	81
09:30	152	36	153	21	305	57	59	37	57	79	116	116
09:45	182	29	145	15	327	44	90	29	80	37	170	66
10:00	145	32	147	15	292	47	64	29	79	17	143	46
10:15	145	24	150	11	295	35	57	23	73	15	130	38
10:30	172	12	140	30	312	42	68	20	68	20	136	40
10:45	187	15	142	16	329	31	68	21	80	23	148	44
11:00	216	18	134	19	350	37	59	19	60	14	119	33
11:15	309	29	156	27	465	56	61	17	72	16	133	33
11:30	327	35	155	19	482	54	58	21	59	12	117	33
11:45	325	25	182	12	507	37	86	21	71	17	157	38
Totals	4540	6598	4695	4660	9235	11358	1471	2858	1300	2146	2771	5004
Day Totals	11238		9355		20593		4329		3446		7775	
Total	22.0%	32.5%	22.8%	22.6%			18.9%	36.7%	16.7%	27.6%		
Peaks	11:00	03:30	07:30	00:15	07:30	00:00	08:45	05:00	09:45	02:15	09:45	02:15
Volume	1177	1160	1173	986	2210	1897	297	383	300	294	579	589
P.H.F.	.89	.79	.89	.85	.84	.92	.70	.89	.93	.89	.85	.92

Technician: JM
Location : On Diamond Drive 250' North of Jemez

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS14-7
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Both directions

Begin Time	Sun. 02/02 North A.M.	North P.M.	South A.M.	South P.M.	Combined A.M.	Combined P.M.	Mon. 02/03 North A.M.	North P.M.	South A.M.	South P.M.	Combined A.M.	Combined P.M.
12:00	19	65	5	96	24	161	9	398	4	231	13	629
12:15	10	65	5	127	15	192	3	313	3	266	6	579
12:30	16	63	6	73	22	136	2	280	2	342	4	622
12:45	7	92	7	78	14	170	5	375	3	394	8	769
01:00	9	74	7	78	16	152	5	230	3	322	8	552
01:15	4	66	7	51	11	117	4	183	2	252	6	435
01:30	2	67	3	55	5	122	1	142	1	347	2	489
01:45	4	56	3	54	7	110	1	123	2	361	3	484
02:00	4	62	1	54	5	116	3	128	0	319	3	447
02:15	4	58	3	73	7	131	4	139	3	327	7	466
02:30	3	63	2	68	5	131	0	127	1	301	1	428
02:45	7	68	2	62	9	130	0	161	0	332	0	493
03:00	1	66	1	59	2	125	1	157	1	328	2	485
03:15	3	63	0	53	3	116	2	162	3	351	5	513
03:30	2	73	1	37	3	110	5	246	2	366	7	612
03:45	0	76	3	43	3	119	0	240	1	342	1	582
04:00	3	68	1	47	4	115	1	350	4	439	5	789
04:15	1	74	1	37	2	111	0	232	5	301	5	533
04:30	4	73	3	45	7	118	5	371	10	379	15	750
04:45	1	101	3	36	4	137	4	397	11	339	15	736
05:00	1	74	2	51	3	125	13	563	11	393	24	956
05:15	3	74	2	48	5	122	9	520	27	437	36	957
05:30	1	74	2	38	3	112	11	472	43	324	54	796
05:45	1	64	4	44	5	108	15	371	53	321	68	692
06:00	12	70	6	42	18	112	26	318	68	277	94	595
06:15	9	73	4	35	13	108	62	267	154	258	216	525
06:30	15	94	10	44	25	138	67	173	219	219	286	392
06:45	18	93	25	30	43	123	165	134	415	157	580	291
07:00	6	50	13	31	19	81	176	98	377	158	553	256
07:15	12	44	13	25	25	69	250	93	403	138	653	231
07:30	19	37	14	21	33	58	313	50	421	107	734	157
07:45	45	37	20	15	65	52	337	57	430	88	767	145
08:00	46	36	32	23	78	59	287	40	391	72	678	112
08:15	46	31	25	18	71	49	329	38	370	85	699	123
08:30	48	16	35	31	83	47	274	35	333	64	607	99
08:45	127	45	41	50	168	95	281	24	268	68	549	92
09:00	62	32	42	33	104	65	219	29	223	62	442	91
09:15	90	21	40	23	130	44	225	20	187	47	412	67
09:30	43	23	38	18	81	41	209	23	198	46	407	69
09:45	48	18	44	25	92	43	224	10	203	37	427	47
10:00	70	34	56	20	126	54	237	17	164	41	401	58
10:15	71	8	69	14	140	22	236	12	152	31	388	43
10:30	67	23	53	14	120	37	174	19	151	37	325	56
10:45	65	17	67	16	132	33	245	7	144	20	389	27
11:00	82	10	55	11	137	21	287	18	179	17	466	35
11:15	66	21	72	5	138	26	384	12	180	27	564	39
11:30	46	20	60	11	106	31	424	20	184	31	608	51
11:45	55	8	70	7	125	15	418	13	211	27	629	40
Totals	1278	2540	978	1959	2256	4509	5952	8207	6220	10228	12172	18435
Day Totals	3818		2947		6765		14159		16448		30607	
Total	18.8%	37.5%	14.4%	29.1%			19.4%	26.8%	20.3%	33.4%		
Peaks	08:30	06:00	11:00	00:00	10:15	00:00	11:00	04:45	07:15	04:30	07:30	04:45
Volume	327	330	257	374	529	659	1513	1952	1645	1548	2878	3445
P.H.F.	.64	.87	.89	.73	.94	.85	.89	.86	.95	.88	.93	.89

Technetronic
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS14-7
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Location :On Diamond Drive 250' North of Jemez

Both directions

Begin Time	Tues. 02/04 North A.M.	North P.M.	South A.M.	South P.M.	Combined A.M.	Combined P.M.	Wed. 02/05 North A.M.	North P.M.	South A.M.	South P.M.	Combined A.M.	Combined P.M.
12:00	9	283	19	486	28	769	3	320	8	470	11	790
12:15	8	255	19	483	27	738	9	351	13	525	22	876
12:30	2	233	11	515	13	748	1	252	2	466	3	718
12:45	4	235	9	539	13	774	5	238	12	527	17	765
01:00	2	177	3	445	5	622	1	173	3	467	4	640
01:15	1	163	3	411	4	574	3	221	3	479	6	700
01:30	2	133	0	368	2	501	2	162	7	341	9	503
01:45	1	123	5	321	6	444	1	138	2	337	3	475
02:00	2	129	5	307	7	436	2	121	6	295	8	416
02:15	2	148	8	334	10	482	0	140	0	288	0	428
02:30	0	151	0	328	0	479	2	182	5	327	7	509
02:45	1	160	4	292	5	452	4	194	4	327	8	521
03:00	1	188	2	351	3	539	0	181	0	298	0	479
03:15	3	170	3	380	6	550	2	182	7	343	9	525
03:30	1	208	4	441	5	649	1	220	4	382	5	602
03:45	3	197	3	362	6	559	3	195	5	335	8	530
04:00	1	298	5	458	6	756	3	276	7	469	10	745
04:15	3	245	9	379	12	624	3	288	8	292	11	580
04:30	2	314	10	418	12	732	2	391	6	350	8	741
04:45	3	359	14	333	17	692	6	399	21	313	27	712
05:00	3	537	13	451	16	988	5	507	16	426	21	933
05:15	6	509	30	374	36	883	6	523	33	396	39	919
05:30	3	514	37	316	40	830	11	534	45	403	56	937
05:45	31	373	79	258	110	631	21	473	80	345	101	818
06:00	16	337	109	229	125	566	27	323	120	259	147	582
06:15	43	293	209	196	252	489	58	291	195	283	253	574
06:30	49	217	279	209	328	426	51	265	290	206	341	471
06:45	151	171	530	153	681	324	130	203	517	178	647	381
07:00	187	107	508	139	695	246	144	131	521	115	665	246
07:15	191	95	566	133	757	228	206	114	558	107	764	221
07:30	291	47	598	102	889	149	329	101	582	104	911	205
07:45	383	51	683	93	1066	144	363	77	582	72	945	149
08:00	280	43	524	73	804	116	367	80	491	82	858	162
08:15	258	21	473	53	731	74	253	67	475	51	728	118
08:30	235	33	399	78	634	111	272	60	370	53	642	113
08:45	248	34	388	61	636	95	268	55	321	74	589	129
09:00	183	29	294	72	477	101	201	50	245	60	446	110
09:15	205	23	288	94	493	117	230	38	199	35	429	73
09:30	178	23	275	60	453	83	235	41	224	49	459	90
09:45	194	12	325	38	519	50	220	16	252	33	472	49
10:00	176	34	288	51	464	85	168	31	229	54	397	85
10:15	151	17	281	31	432	48	143	25	242	35	385	60
10:30	144	16	283	36	427	52	111	22	232	27	343	49
10:45	186	12	298	31	484	43	176	14	264	17	440	31
11:00	247	15	383	17	630	32	175	18	268	25	443	43
11:15	231	14	376	17	607	31	203	16	377	18	580	34
11:30	291	11	492	19	783	30	284	14	412	28	696	42
11:45	352	12	530	16	882	28	305	6	461	21	766	27
Totals	4964	7769	9674	11351	14638	19120	5015	8719	8724	11187	13739	19906
Day Totals	12733		21025		33758		13734		19911		33645	
% Total	14.7%	23.0%	28.6%	33.6%			14.9%	25.9%	25.9%	33.2%		
Peaks	07:30	05:00	07:15	00:00	07:15	04:45	07:30	05:00	07:00	00:00	07:15	05:00
Volume	1212	1933	2371	2023	3516	3393	1312	2037	2243	1988	3478	3607
P.H.F.	.79	.89	.86	.93	.82	.85	.89	.95	.96	.94	.92	.96

Technician: JM
Location : On Diamond Drive 250' North of Jemez

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
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Both directions

Begin Time	Thur. 02/06 North A.M.	North P.M.	South A.M.	South P.M.	Combined A.M.	Combined P.M.	Fri. 02/07 North A.M.	North P.M.	South A.M.	South P.M.	Combined A.M.	Combined P.M.
12:00	12	*	10	*	22	*	*	*	*	*	*	*
12:15	5	*	5	*	10	*	*	*	*	*	*	*
12:30	8	*	7	*	15	*	*	*	*	*	*	*
12:45	5	*	1	*	6	*	*	*	*	*	*	*
01:00	5	*	11	*	16	*	*	*	*	*	*	*
01:15	6	*	6	*	12	*	*	*	*	*	*	*
01:30	3	*	2	*	5	*	*	*	*	*	*	*
01:45	4	*	6	*	10	*	*	*	*	*	*	*
02:00	4	*	2	*	6	*	*	*	*	*	*	*
02:15	1	*	2	*	3	*	*	*	*	*	*	*
02:30	1	*	0	*	1	*	*	*	*	*	*	*
02:45	1	*	2	*	3	*	*	*	*	*	*	*
03:00	0	*	0	*	0	*	*	*	*	*	*	*
03:15	3	*	5	*	8	*	*	*	*	*	*	*
03:30	5	*	9	*	14	*	*	*	*	*	*	*
03:45	2	*	2	*	4	*	*	*	*	*	*	*
04:00	6	*	4	*	10	*	*	*	*	*	*	*
04:15	4	*	2	*	6	*	*	*	*	*	*	*
04:30	6	*	4	*	10	*	*	*	*	*	*	*
04:45	18	*	12	*	30	*	*	*	*	*	*	*
05:00	14	*	10	*	24	*	*	*	*	*	*	*
05:15	31	*	9	*	40	*	*	*	*	*	*	*
05:30	36	*	18	*	54	*	*	*	*	*	*	*
05:45	61	*	21	*	82	*	*	*	*	*	*	*
06:00	112	*	50	*	162	*	*	*	*	*	*	*
06:15	159	*	63	*	222	*	*	*	*	*	*	*
06:30	212	*	82	*	294	*	*	*	*	*	*	*
06:45	428	*	122	*	550	*	*	*	*	*	*	*
07:00	387	*	120	*	507	*	*	*	*	*	*	*
07:15	444	*	227	*	671	*	*	*	*	*	*	*
07:30	481	*	311	*	792	*	*	*	*	*	*	*
07:45	567	*	432	*	999	*	*	*	*	*	*	*
08:00	614	*	387	*	1001	*	*	*	*	*	*	*
08:15	545	*	315	*	860	*	*	*	*	*	*	*
08:30	440	*	227	*	667	*	*	*	*	*	*	*
08:45	443	*	256	*	699	*	*	*	*	*	*	*
09:00	342	*	159	*	501	*	*	*	*	*	*	*
09:15	342	*	134	*	475	*	*	*	*	*	*	*
09:30	325	*	168	*	493	*	*	*	*	*	*	*
09:45	397	*	121	*	518	*	*	*	*	*	*	*
10:00	338	*	5	*	343	*	*	*	*	*	*	*
10:15	374	*	6	*	380	*	*	*	*	*	*	*
10:30	363	*	4	*	367	*	*	*	*	*	*	*
10:45	358	*	2	*	360	*	*	*	*	*	*	*
11:00	*	*	*	*	*	*	*	*	*	*	*	*
11:15	*	*	*	*	*	*	*	*	*	*	*	*
11:30	*	*	*	*	*	*	*	*	*	*	*	*
11:45	*	*	*	*	*	*	*	*	*	*	*	*
Totals	7912	0	3341	0	11253	0	0	0	0	0	0	0
Day Totals	7912		3341		11253		0		0		0	
Total	70.3%	.0%	29.6%	.0%			*	*	*	*		

Peaks	07:30	07:30	07:30
Volume	2207	1445	3652
P.H.F.	.89	.83	.91

Technician:Jm
Location :On Pajarito 200' East of
Diamond

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS12-7
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Both directions

Begin Time	Mon. 01/27 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Tues. 01/28 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	*	*	*	*	*	*	4	97	8	147	12	244
12:15	*	105	*	116	*	221	3	114	4	107	7	221
12:30	*	129	*	105	*	234	6	162	2	120	8	282
12:45	*	176	*	107	*	283	2	190	10	121	12	311
01:00	*	191	*	94	*	285	2	171	2	105	4	276
01:15	*	150	*	99	*	249	0	161	2	112	2	273
01:30	*	116	*	90	*	206	2	111	0	88	2	199
01:45	*	94	*	103	*	197	4	122	1	102	5	224
02:00	*	91	*	67	*	158	3	128	3	98	6	226
02:15	*	115	*	76	*	191	1	116	3	101	4	217
02:30	*	117	*	90	*	207	1	131	0	98	1	229
02:45	*	128	*	112	*	240	3	130	2	117	5	247
03:00	*	124	*	124	*	248	0	121	2	106	2	227
03:15	*	139	*	133	*	272	0	157	4	127	4	284
03:30	*	107	*	126	*	233	1	119	3	148	4	267
03:45	*	115	*	125	*	240	1	116	2	138	3	254
04:00	*	119	*	123	*	242	0	123	1	145	1	268
04:15	*	105	*	124	*	229	3	100	0	115	3	215
04:30	*	134	*	140	*	274	8	137	3	133	11	270
04:45	*	103	*	137	*	240	9	124	1	137	10	261
05:00	*	189	*	184	*	373	8	256	7	255	15	511
05:15	*	148	*	150	*	298	10	224	7	238	17	462
05:30	*	150	*	135	*	285	7	141	8	126	15	267
05:45	*	108	*	121	*	229	33	121	16	116	49	237
06:00	*	101	*	107	*	208	33	87	30	120	63	207
06:15	*	63	*	78	*	141	81	59	50	83	131	142
06:30	*	53	*	48	*	101	141	62	62	53	203	115
06:45	*	34	*	50	*	84	179	44	127	68	306	112
07:00	*	37	*	28	*	65	171	49	116	30	287	79
07:15	*	24	*	24	*	48	171	33	155	26	326	59
07:30	*	37	*	33	*	70	182	32	160	18	342	50
07:45	*	20	*	25	*	45	185	26	202	13	387	39
08:00	*	29	*	10	*	39	182	23	226	13	408	36
08:15	*	12	*	11	*	23	179	17	129	11	308	28
08:30	*	21	*	6	*	27	118	28	104	19	222	47
08:45	*	29	*	6	*	35	138	19	138	12	276	31
09:00	*	22	*	13	*	35	103	42	101	9	204	51
09:15	*	9	*	10	*	19	95	54	94	10	189	64
09:30	*	14	*	3	*	17	95	36	110	7	205	43
09:45	*	14	*	12	*	26	101	15	139	7	240	22
10:00	*	13	*	10	*	23	95	8	95	8	191	16
10:15	*	21	*	4	*	25	110	16	77	6	187	22
10:30	*	22	*	3	*	25	118	30	88	6	206	36
10:45	*	30	*	3	*	33	95	26	112	4	207	30
11:00	*	5	*	16	*	21	83	10	128	6	211	16
11:15	*	7	*	14	*	21	121	8	140	23	261	31
11:30	*	3	*	27	*	30	123	5	155	28	278	33
11:45	*	5	*	8	*	13	104	2	178	12	282	14
Totals	0	3578	0	3230	0	6808	3115	4103	3007	3692	6122	7795
Day Totals		3578		3230		6808		7218		6699		13917
% Total	.0%	52.5%	.0%	47.4%			22.3%	29.4%	21.6%	26.5%		
Peaks		00:30		04:30		04:45	07:30	04:45	07:15	04:30	07:15	04:30
Volume		646		611		1196	728	745	743	763	1463	1504
P.H.F.		.84		.83		.80	.98	.72	.82	.74	.89	.73

Site 3, Page 1

Technician:Jm
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS12-7
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Location :On Pajarito 200' East of Diamond

Both directions

Begin Time	Wed. 01/29 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Thur. 01/30 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	1	96	6	106	7	202	3	149	14	159	17	308
12:15	2	134	5	107	7	241	3	125	7	135	10	260
12:30	4	138	3	148	7	286	3	166	0	100	3	266
12:45	3	212	3	121	6	333	0	182	4	103	4	285
01:00	2	176	3	98	5	274	0	190	1	99	1	289
01:15	1	200	2	115	3	315	0	182	4	105	4	287
01:30	4	117	3	85	7	202	2	112	1	89	3	201
01:45	2	122	4	89	6	211	2	120	0	123	2	243
02:00	0	99	6	96	6	195	1	118	2	73	3	191
02:15	1	106	2	100	3	206	2	111	3	104	5	215
02:30	1	113	1	90	2	203	6	129	5	92	11	221
02:45	2	140	0	102	2	242	1	137	2	119	3	256
03:00	0	107	1	106	1	213	2	117	1	112	3	229
03:15	2	150	2	135	4	285	3	131	4	139	7	270
03:30	0	132	0	145	0	277	1	141	1	148	2	289
03:45	0	96	4	150	4	246	0	111	0	139	0	250
04:00	1	133	0	105	1	238	0	117	2	136	2	253
04:15	3	110	1	144	4	254	3	97	1	118	4	215
04:30	3	119	2	130	5	249	5	120	1	135	6	255
04:45	6	116	2	141	8	257	4	126	2	132	6	258
05:00	5	208	5	194	10	402	6	175	5	185	11	360
05:15	14	154	8	148	22	302	13	148	7	161	20	309
05:30	8	128	11	152	19	280	6	137	9	150	15	287
05:45	30	95	27	102	57	197	37	112	17	130	54	242
06:00	31	84	29	103	60	187	37	75	27	114	64	189
06:15	96	69	41	68	137	137	88	66	36	81	124	147
06:30	127	61	62	57	189	118	125	51	81	57	206	108
06:45	199	52	117	45	316	97	212	59	120	38	332	97
07:00	154	46	126	43	280	89	135	46	129	33	264	79
07:15	168	32	166	25	334	57	176	37	163	20	339	57
07:30	187	28	175	19	362	47	204	30	138	24	342	54
07:45	194	30	207	19	401	49	218	40	222	24	440	64
08:00	184	24	223	13	407	37	191	33	197	18	388	51
08:15	150	31	154	17	304	48	164	30	136	9	300	39
08:30	128	22	103	11	231	33	113	40	123	7	236	47
08:45	120	30	111	12	231	42	119	22	106	23	225	45
09:00	106	24	95	11	201	35	106	16	92	6	198	22
09:15	102	9	86	13	188	22	121	23	79	14	200	37
09:30	96	13	112	8	208	21	91	10	97	7	188	17
09:45	116	21	125	11	241	32	99	17	109	9	208	26
10:00	100	14	93	7	193	21	104	13	101	15	205	28
10:15	96	12	85	6	181	18	85	19	100	4	185	23
10:30	119	23	89	4	208	27	96	30	99	3	195	33
10:45	101	39	132	4	233	43	116	30	97	7	213	37
11:00	115	7	124	15	239	22	96	10	141	14	237	24
11:15	125	5	158	18	283	23	130	4	199	20	329	24
11:30	149	3	181	29	326	32	117	6	184	20	301	26
11:45	107	4	170	11	277	15	116	8	166	23	282	31
Totals	3161	3884	3065	3478	6226	7362	3162	3968	3035	3576	6197	7544
Day Totals	7045		6543		13588		7130		6611		13741	
% Total	23.2%	28.5%	22.5%	25.6%			23.0%	28.8%	22.0%	26.0%		
Peaks	07:15	00:30	07:15	04:45	07:15	04:45	07:15	00:30	07:15	04:45	07:15	04:45
Volume	733	726	771	635	1504	1241	789	720	720	628	1509	1214
P.H.F.	.94	.85	.86	.81	.92	.77	.90	.94	.81	.84	.85	.84

Technician: Jm
Location :On Pajarito 200' East of Diamond
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 0000000000
Start Date: 01/27/03
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Both directions

Begin Time	Fri. 01/31	East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Sat. 02/01	East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00		5	94	10	87	15	181		7	37	11	31	18	68
12:15		4	100	2	87	6	187		7	27	4	16	11	43
12:30		2	109	5	107	7	216		3	27	2	26	5	53
12:45		2	136	4	100	6	236		2	36	2	21	4	57
01:00		1	129	4	72	5	201		2	30	6	34	8	64
01:15		0	91	2	108	2	199		2	21	2	21	4	42
01:30		3	105	0	76	3	181		0	23	3	24	3	47
01:45		3	85	0	63	3	148		2	28	1	15	3	43
02:00		0	75	1	74	1	149		1	23	0	17	1	40
02:15		2	99	4	77	6	176		2	35	1	23	3	58
02:30		6	103	0	78	6	181		7	43	0	23	7	66
02:45		1	100	2	93	3	193		1	48	4	24	5	72
03:00		0	101	2	105	2	206		1	33	3	31	4	64
03:15		1	102	0	97	1	199		1	23	0	29	1	52
03:30		2	106	2	127	4	233		1	19	5	41	6	60
03:45		1	67	2	110	3	177		2	23	3	40	5	63
04:00		2	104	3	113	5	217		1	25	4	30	5	55
04:15		7	71	1	82	8	153		0	22	1	18	1	40
04:30		14	86	3	67	17	153		4	20	1	27	5	47
04:45		7	83	7	65	14	148		1	22	1	22	2	44
05:00		5	85	7	92	12	177		0	29	0	36	0	65
05:15		9	96	10	59	19	155		1	27	2	22	3	49
05:30		8	68	14	60	22	128		1	23	0	26	1	49
05:45		17	64	12	55	29	119		2	21	5	24	7	45
06:00		22	37	18	31	40	68		0	27	1	21	1	48
06:15		47	47	31	38	78	85		7	17	3	22	10	39
06:30		98	31	32	32	130	63		27	22	6	30	33	52
06:45		121	27	69	21	190	48		36	14	9	20	45	34
07:00		79	18	83	28	162	46		15	19	3	26	22	45
07:15		95	24	110	18	205	42		16	15	33	15	49	30
07:30		104	16	105	18	209	34		16	8	26	10	42	18
07:45		112	16	172	9	284	25		19	14	53	7	72	21
08:00		123	10	162	13	285	23		21	18	22	6	43	24
08:15		130	20	111	17	241	37		10	17	21	9	31	26
08:30		92	21	97	9	189	30		22	12	22	9	44	21
08:45		95	24	98	11	193	35		16	13	39	5	55	18
09:00		88	15	98	10	186	25		28	11	30	8	58	19
09:15		76	7	68	5	145	12		18	17	22	10	40	27
09:30		77	13	80	8	157	21		23	51	18	9	41	60
09:45		92	9	92	11	184	20		34	24	37	12	71	36
10:00		87	8	70	12	157	20		42	12	24	11	66	23
10:15		73	12	66	12	139	24		35	16	18	4	53	20
10:30		75	27	80	7	155	34		23	21	33	8	56	29
10:45		78	40	94	10	172	50		41	39	43	6	84	45
11:00		97	14	90	8	187	22		20	15	21	10	41	25
11:15		97	22	141	28	238	50		26	16	22	20	48	36
11:30		95	15	138	29	233	44		39	3	18	20	57	23
11:45		76	10	137	17	213	27		24	11	27	15	51	26
Totals		2233	2742	2339	2456	4572	5198		613	1096	612	934	1225	2030
Day Totals		4975		4795		9770			1709		1546		3255	
% Total		22.8%	28.0%	23.9%	25.1%				18.8%	33.6%	18.8%	28.6%		
Peaks		07:30	00:15	07:30	03:15	07:30	00:30		10:00	02:15	07:15	03:00	10:00	02:15
Volume		469	474	550	447	1019	852		141	159	134	141	259	260
P.H.F.		.90	.87	.79	.87	.89	.90		.83	.82	.63	.85	.77	.90

Technician:Jm
Location :On Pajarito 200' East of Diamond

3600 CERRILLOS ROAD #205
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Site Code : 000000000000
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Both directions

Begin Time	Sun. 02/02 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Mon. 02/03 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	6	38	10	23	16	61	2	129	11	145	13	274
12:15	9	63	8	28	17	91	2	122	1	121	3	243
12:30	5	42	9	21	14	63	4	149	3	105	7	254
12:45	8	36	6	30	14	66	4	169	5	119	9	288
01:00	4	27	5	35	9	62	3	220	5	101	8	321
01:15	3	23	1	17	4	40	3	185	5	120	8	305
01:30	3	31	1	21	4	52	2	104	0	99	2	203
01:45	0	18	3	18	3	36	2	111	0	86	2	197
02:00	0	21	2	25	2	46	2	100	1	79	3	179
02:15	3	41	2	21	5	62	2	93	2	76	4	169
02:30	4	41	1	23	5	64	0	118	1	82	1	200
02:45	4	53	0	18	4	71	1	121	0	101	1	222
03:00	0	33	2	31	2	64	0	105	2	119	2	224
03:15	1	19	4	35	5	54	2	114	1	147	3	261
03:30	0	39	2	28	2	67	1	104	1	141	2	245
03:45	1	21	0	41	1	62	0	104	1	122	1	226
04:00	1	28	1	29	2	57	4	117	1	137	5	254
04:15	1	19	0	27	1	46	3	108	2	99	5	207
04:30	4	16	4	13	8	29	4	128	3	117	7	245
04:45	1	22	1	30	2	52	10	116	2	132	12	248
05:00	1	32	4	24	5	56	4	192	8	176	12	368
05:15	1	24	1	23	2	47	12	190	11	152	23	342
05:30	2	22	0	19	2	41	8	133	15	155	23	288
05:45	2	26	0	13	2	39	23	104	19	98	42	202
06:00	0	23	2	17	2	40	30	80	23	108	53	188
06:15	6	23	4	20	10	43	68	86	39	86	107	172
06:30	22	25	6	25	28	50	126	59	59	53	185	112
06:45	38	18	8	27	46	45	188	54	134	30	322	84
07:00	12	15	5	14	17	29	182	30	120	40	302	70
07:15	7	12	24	13	31	25	158	33	144	32	302	65
07:30	11	14	22	14	33	28	187	27	139	21	326	48
07:45	9	6	33	9	42	15	189	20	167	16	356	36
08:00	8	14	27	10	35	24	176	17	189	18	365	35
08:15	12	8	21	8	33	16	157	28	157	9	314	37
08:30	11	22	29	9	40	31	167	25	105	8	272	33
08:45	29	30	47	15	76	45	128	29	148	12	276	41
09:00	18	28	27	16	45	44	125	20	98	10	224	30
09:15	15	22	26	13	41	35	110	11	106	8	216	19
09:30	14	12	15	6	29	18	109	17	109	6	218	23
09:45	16	22	19	6	35	28	104	12	103	4	207	16
10:00	27	16	28	13	55	29	128	12	103	8	231	20
10:15	27	15	34	12	61	27	124	12	106	11	230	23
10:30	35	26	21	9	56	35	93	26	96	4	189	30
10:45	34	33	30	6	64	39	89	33	97	5	186	38
11:00	25	7	31	8	56	15	95	8	112	13	207	21
11:15	35	8	37	21	72	29	120	7	171	22	291	29
11:30	30	11	24	30	54	41	109	9	160	23	269	32
11:45	39	7	22	14	61	21	131	5	155	20	286	25
Totals	544	1152	609	928	1153	2080	3192	3796	2940	3396	6132	7192
Day Totals	1696		1537		3233		6988		6336		13324	
% Total	16.8%	35.6%	18.8%	28.7%			23.9%	28.4%	22.0%	25.4%		
Peaks	10:30	00:00	08:30	03:00	10:30	00:15	07:00	00:30	07:30	04:45	07:30	04:45
Volume	129	179	129	135	248	282	716	723	652	615	1361	1245
P.H.F.	.92	.71	.68	.82	.86	.77	.94	.82	.86	.87	.93	.84

Technician: Jm
Location : On Pajarito 200' East of Diamond

3600 CERRILLOS ROAD #205
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Site Code : 000000000000
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Both directions

Begin Time	Tues. 02/04 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Wed. 02/05 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	6	129	11	138	17	267	3	103	4	168	7	271
12:15	4	104	6	110	10	214	6	121	6	126	12	247
12:30	4	151	5	89	9	240	1	138	5	90	6	228
12:45	1	178	2	125	3	303	2	152	4	131	6	283
01:00	2	168	2	116	4	284	3	165	0	140	3	305
01:15	1	136	0	112	1	248	1	153	2	133	3	286
01:30	2	126	1	86	3	212	1	132	2	91	3	223
01:45	0	112	2	79	2	191	1	127	1	107	2	234
02:00	1	112	3	82	4	194	2	111	1	82	3	193
02:15	4	139	2	102	6	241	3	110	1	83	4	193
02:30	1	146	0	109	1	255	2	129	1	95	3	224
02:45	0	143	2	108	2	251	4	165	0	112	4	277
03:00	1	119	1	128	2	247	0	118	2	106	2	224
03:15	1	132	1	150	2	282	2	151	2	139	4	290
03:30	1	127	1	162	2	289	2	163	3	123	5	286
03:45	1	72	3	136	4	208	0	107	1	123	1	230
04:00	1	140	1	134	2	274	3	135	2	128	5	263
04:15	3	98	3	137	6	235	3	103	4	95	7	198
04:30	2	115	2	121	4	236	3	116	3	132	6	248
04:45	7	130	2	109	9	239	4	114	0	112	4	226
05:00	5	142	4	173	9	315	6	190	2	194	8	384
05:15	11	193	8	189	19	382	11	151	12	135	23	286
05:30	10	117	12	127	22	244	11	144	10	152	21	296
05:45	23	110	16	99	39	209	23	121	20	110	43	231
06:00	25	101	26	86	51	187	33	102	21	83	54	185
06:15	91	77	33	73	124	150	76	81	38	91	114	172
06:30	132	70	69	68	201	138	132	67	61	58	193	125
06:45	210	38	106	39	316	77	174	50	106	49	280	99
07:00	173	46	138	39	311	85	181	39	136	36	317	75
07:15	151	43	151	34	302	77	176	31	143	29	319	60
07:30	204	44	165	20	369	64	223	29	163	13	386	42
07:45	234	31	193	17	427	48	162	37	222	21	384	58
08:00	175	24	187	12	362	36	181	30	189	17	370	47
08:15	180	23	159	12	339	35	168	35	133	15	301	50
08:30	151	30	136	14	287	44	153	17	115	17	268	34
08:45	157	27	120	15	277	42	146	20	117	14	263	34
09:00	116	18	94	11	210	29	85	19	99	11	184	30
09:15	91	39	98	10	189	49	83	17	89	3	176	20
09:30	79	19	87	6	166	25	87	17	101	11	188	28
09:45	101	15	121	8	222	23	107	9	102	9	209	18
10:00	85	16	103	9	188	25	91	9	103	12	194	21
10:15	89	13	94	8	183	21	104	13	83	5	187	18
10:30	95	33	80	9	175	42	94	28	70	5	164	33
10:45	100	41	115	5	215	46	96	33	109	8	205	41
11:00	108	9	142	14	250	23	83	10	96	9	179	19
11:15	107	7	135	24	242	31	101	3	122	23	223	26
11:30	115	6	155	26	270	32	98	10	128	23	226	33
11:45	128	5	164	20	292	25	108	4	133	29	241	33
Totals	3189	3914	2961	3500	6150	7414	3044	3929	2766	3498	5810	7427
Day Totals	7103		6461		13564		6973		6264		13237	
% Total	23.5%	28.8%	21.8%	25.8%			23.0%	29.6%	20.9%	26.4%		
Peaks	07:30	00:30	07:30	04:45	07:30	04:45	06:45	00:30	07:15	04:45	07:15	05:00
Volume	793	633	704	598	1497	1180	754	608	717	593	1459	1197
P.H.F.	.84	.88	.91	.79	.87	.77	.84	.92	.80	.76	.94	.77

Technician: Jm
Location : On Pajarito 200' East of Diamond

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
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Both directions

Begin Time	Thur. 02/06 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Fri. 02/07 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	7	120	10	155	17	275	*	*	*	*	*	*
12:15	6	107	3	112	9	219	*	*	*	*	*	*
12:30	2	168	5	114	7	282	*	*	*	*	*	*
12:45	2	*	5	*	7	*	*	*	*	*	*	*
01:00	1	*	1	*	2	*	*	*	*	*	*	*
01:15	2	*	3	*	5	*	*	*	*	*	*	*
01:30	4	*	1	*	5	*	*	*	*	*	*	*
01:45	5	*	2	*	7	*	*	*	*	*	*	*
02:00	0	*	0	*	0	*	*	*	*	*	*	*
02:15	0	*	2	*	2	*	*	*	*	*	*	*
02:30	3	*	1	*	4	*	*	*	*	*	*	*
02:45	1	*	0	*	1	*	*	*	*	*	*	*
03:00	0	*	1	*	1	*	*	*	*	*	*	*
03:15	0	*	4	*	4	*	*	*	*	*	*	*
03:30	3	*	2	*	5	*	*	*	*	*	*	*
03:45	1	*	2	*	3	*	*	*	*	*	*	*
04:00	1	*	1	*	2	*	*	*	*	*	*	*
04:15	1	*	0	*	1	*	*	*	*	*	*	*
04:30	3	*	4	*	7	*	*	*	*	*	*	*
04:45	7	*	2	*	9	*	*	*	*	*	*	*
05:00	4	*	4	*	8	*	*	*	*	*	*	*
05:15	15	*	7	*	22	*	*	*	*	*	*	*
05:30	7	*	12	*	19	*	*	*	*	*	*	*
05:45	22	*	19	*	41	*	*	*	*	*	*	*
06:00	33	*	24	*	57	*	*	*	*	*	*	*
06:15	73	*	45	*	118	*	*	*	*	*	*	*
06:30	121	*	67	*	188	*	*	*	*	*	*	*
06:45	191	*	108	*	299	*	*	*	*	*	*	*
07:00	181	*	105	*	286	*	*	*	*	*	*	*
07:15	164	*	162	*	326	*	*	*	*	*	*	*
07:30	187	*	192	*	379	*	*	*	*	*	*	*
07:45	210	*	189	*	399	*	*	*	*	*	*	*
08:00	164	*	220	*	384	*	*	*	*	*	*	*
08:15	168	*	168	*	336	*	*	*	*	*	*	*
08:30	137	*	104	*	241	*	*	*	*	*	*	*
08:45	137	*	128	*	265	*	*	*	*	*	*	*
09:00	90	*	101	*	191	*	*	*	*	*	*	*
09:15	116	*	73	*	189	*	*	*	*	*	*	*
09:30	94	*	70	*	164	*	*	*	*	*	*	*
09:45	133	*	110	*	243	*	*	*	*	*	*	*
10:00	88	*	80	*	168	*	*	*	*	*	*	*
10:15	103	*	106	*	209	*	*	*	*	*	*	*
10:30	102	*	92	*	194	*	*	*	*	*	*	*
10:45	91	*	99	*	190	*	*	*	*	*	*	*
11:00	104	*	123	*	227	*	*	*	*	*	*	*
11:15	110	*	166	*	276	*	*	*	*	*	*	*
11:30	125	*	207	*	332	*	*	*	*	*	*	*
11:45	132	*	170	*	302	*	*	*	*	*	*	*
Totals	3151	395	3000	381	6151	776	0	0	0	0	0	0
Day Totals	3546		3381		6927		0		0		0	
% Total	45.4%	5.7%	43.3%	5.5%			*	*	*	*		
Peaks	07:00	00:00	07:30	00:00	07:30	00:00						
Volume	742	395	769	381	1498	776						
P.H.F.	.88	.58	.87	.61	.93	.68						

02/07/2003 14:21 15054248704 DIGITAL TRAFFIC STUDY PAGE 02/07

Technician: JM
Location : On West Jemez 100' East of
IM 4

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS1-7
Page : 1

Both directions

Begin Time	Mon. 01/27 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Tues. 01/28 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	*	*	*	*	*	*	0	8	1	14	1	22
12:15	*	*	*	*	*	*	0	7	0	14	0	21
12:30	*	*	*	*	*	*	0	9	0	21	0	30
12:45	*	*	*	*	*	*	0	6	1	9	1	15
01:00	*	*	*	*	*	*	0	5	0	10	0	15
01:15	*	*	*	*	*	*	1	11	1	18	2	29
01:30	*	*	*	*	*	*	0	8	0	13	0	21
01:45	*	*	*	*	*	*	0	14	1	16	1	30
02:00	*	15	*	8	*	23	0	6	1	11	1	17
02:15	*	13	*	7	*	20	0	12	0	6	0	18
02:30	*	8	*	7	*	15	0	13	0	9	0	22
02:45	*	9	*	10	*	19	1	11	0	11	1	22
03:00	*	6	*	17	*	23	0	8	0	9	0	17
03:15	*	6	*	9	*	15	0	12	0	17	0	29
03:30	*	9	*	12	*	21	0	7	0	21	0	28
03:45	*	3	*	16	*	19	0	7	1	20	1	27
04:00	*	11	*	35	*	46	0	9	0	22	0	31
04:15	*	6	*	30	*	36	0	9	0	36	0	45
04:30	*	7	*	31	*	38	2	10	0	37	2	47
04:45	*	5	*	35	*	40	0	11	0	23	0	34
05:00	*	5	*	39	*	44	1	7	0	35	1	42
05:15	*	12	*	42	*	54	4	11	1	32	5	43
05:30	*	10	*	33	*	43	3	7	0	45	3	52
05:45	*	5	*	24	*	29	10	4	10	33	20	37
06:00	*	8	*	21	*	29	10	5	0	20	10	25
06:15	*	2	*	20	*	22	33	11	2	20	35	31
06:30	*	2	*	11	*	13	28	4	2	15	30	19
06:45	*	2	*	10	*	12	28	1	2	11	30	12
07:00	*	0	*	11	*	11	64	2	3	10	67	12
07:15	*	2	*	6	*	8	50	0	4	4	54	4
07:30	*	0	*	13	*	13	48	4	8	6	56	10
07:45	*	4	*	5	*	9	42	0	14	5	56	5
08:00	*	4	*	5	*	9	24	1	8	8	32	9
08:15	*	1	*	5	*	6	21	1	11	10	32	11
08:30	*	0	*	5	*	5	22	0	10	7	32	7
08:45	*	1	*	6	*	7	10	0	8	7	18	7
09:00	*	1	*	2	*	3	11	4	6	9	17	13
09:15	*	0	*	5	*	5	13	1	6	6	19	7
09:30	*	2	*	5	*	7	11	0	9	4	20	4
09:45	*	0	*	1	*	1	11	4	12	4	23	8
10:00	*	5	*	4	*	9	9	0	4	2	13	2
10:15	*	0	*	2	*	2	7	1	11	1	18	2
10:30	*	0	*	4	*	4	10	0	6	1	16	1
10:45	*	1	*	0	*	1	12	0	10	2	22	2
11:00	*	0	*	1	*	1	17	0	5	1	22	1
11:15	*	1	*	2	*	3	20	2	4	1	24	3
11:30	*	1	*	0	*	1	9	0	2	0	11	0
11:45	*	1	*	1	*	2	11	1	7	0	18	1
Totals	0	168	0	500	0	668	543	254	171	636	714	890
Day Totals		168		500		668		797		807		1604
% Total	.0%	25.1%	.0%	74.8%			33.8%	15.8%	10.6%	39.6%		
Peaks		02:00		04:45		04:45	07:00	01:45	07:45	05:00	07:00	05:00
Volume		45		149		181	204	45	43	145	233	174
P.H.F.		.75		.88		.83	.79	.80	.76	.80	.86	.83

Site 4, Page 1

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Technician: JM
Location :On West Jemez 100' East of NM 4

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS1-7
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Both directions

Begin Time	Wed. 01/29	East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Thur. 01/30	East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00		0	9	2	10	2	19		1	5	1	12	2	17
12:15		0	11	3	10	3	21		1	6	2	6	3	12
12:30		1	6	0	9	1	15		0	12	0	12	0	24
12:45		0	8	1	13	1	21		0	16	1	9	1	25
01:00		0	4	0	15	0	19		1	13	0	8	1	21
01:15		0	6	0	5	0	11		0	9	0	7	0	16
01:30		0	12	1	17	1	29		0	12	1	6	1	18
01:45		0	10	1	12	1	22		0	13	1	22	1	35
02:00		0	5	0	8	0	13		0	9	0	10	0	19
02:15		1	10	0	13	1	23		2	6	1	7	3	13
02:30		1	11	0	10	1	21		1	16	1	12	2	28
02:45		0	4	0	7	0	11		0	8	1	11	1	19
03:00		0	14	0	10	0	24		0	13	2	10	2	23
03:15		0	9	0	14	0	23		0	12	0	18	0	30
03:30		0	7	0	12	0	19		0	7	0	17	0	24
03:45		0	9	0	21	0	30		1	13	1	20	2	33
04:00		0	14	0	34	0	48		0	9	0	26	0	35
04:15		0	3	0	32	0	35		1	8	0	27	1	35
04:30		1	7	0	38	1	45		2	3	0	36	2	39
04:45		2	17	0	27	2	44		0	7	0	27	0	34
05:00		2	11	0	42	2	53		0	4	0	43	0	47
05:15		3	2	0	36	3	38		5	7	1	41	6	48
05:30		5	5	2	38	7	43		3	8	0	28	3	36
05:45		9	7	9	32	18	39		9	2	5	26	14	28
06:00		14	3	2	15	16	18		19	8	2	15	21	23
06:15		24	0	0	12	24	12		19	3	0	25	19	28
06:30		33	2	3	14	36	16		35	3	3	15	38	18
06:45		37	2	3	13	40	15		39	2	2	7	41	9
07:00		43	4	3	10	46	14		49	1	1	19	50	20
07:15		59	1	3	8	62	9		57	1	4	8	61	9
07:30		49	2	3	13	52	15		56	1	6	6	62	7
07:45		39	0	12	8	51	8		36	2	10	9	46	11
08:00		24	1	7	4	31	5		29	1	10	6	39	7
08:15		17	1	7	10	24	11		21	2	12	5	33	7
08:30		17	1	11	7	28	8		12	2	8	5	20	7
08:45		10	0	10	2	20	2		5	0	7	4	12	4
09:00		18	1	7	4	25	5		13	1	8	6	21	7
09:15		10	0	12	5	22	5		11	0	4	5	15	5
09:30		11	2	8	2	19	4		9	0	4	3	13	3
09:45		11	4	6	2	17	6		4	0	10	5	14	5
10:00		10	7	4	4	14	11		8	0	7	4	15	4
10:15		11	1	10	0	21	1		11	0	10	3	21	3
10:30		9	3	13	1	22	4		9	2	8	0	17	2
10:45		11	1	5	1	16	2		12	0	12	1	24	1
11:00		19	0	6	3	25	3		14	0	11	2	25	2
11:15		12	1	7	2	19	3		5	0	4	3	9	3
11:30		5	0	7	0	12	0		10	0	5	2	15	2
11:45		5	1	6	0	11	1		16	0	12	0	28	0
Totals		523	239	174	605	697	844		526	247	178	599	704	846
Day Totals			762		779		1541			773		777		1550
% Total		33.9%	15.5%	11.2%	39.2%				33.9%	15.9%	11.4%	38.6%		
Peaks		07:00	04:00	08:30	05:00	07:00	04:30		06:45	00:30	10:15	04:30	07:00	04:30
Volume		190	41	40	148	211	180		201	50	41	147	219	168
P.H.F.		.80	.60	.83	.88	.85	.84		.88	.78	.85	.85	.88	.87

Technician:JM
Location :On West Jemez 100' East of
NM 4

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS1-7
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Both directions

Begin	Fri.	East		West		Combined		Sat.	East		West		Combined	
Time	01/31	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	02/01	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00		0	5	2	8	2	13		0	9	1	8	1	17
12:15		0	9	1	11	1	20		1	12	1	12	2	24
12:30		1	9	0	8	1	17		0	8	1	15	1	23
12:45		1	9	0	4	1	13		2	6	1	14	3	20
01:00		0	5	1	15	1	20		1	20	1	13	2	33
01:15		0	15	1	13	1	28		1	6	0	8	1	14
01:30		3	13	0	18	3	31		0	19	4	7	4	26
01:45		1	9	0	23	1	32		0	6	1	17	1	23
02:00		0	9	0	16	0	25		0	13	0	9	0	22
02:15		0	10	0	17	0	27		2	9	0	10	2	19
02:30		0	7	0	8	0	15		1	14	0	6	1	20
02:45		0	14	0	13	0	27		0	5	0	12	0	17
03:00		0	6	0	15	0	21		0	12	0	23	0	35
03:15		0	7	0	19	0	26		0	17	0	11	0	28
03:30		0	9	0	27	0	36		1	7	0	17	1	24
03:45		1	9	0	25	1	34		0	9	0	17	0	26
04:00		0	6	0	30	0	36		0	8	0	11	0	19
04:15		0	6	0	30	0	36		0	16	0	13	0	29
04:30		1	10	0	24	1	34		0	14	0	10	0	24
04:45		2	10	0	17	2	27		0	18	1	5	1	23
05:00		1	7	0	30	1	37		1	12	1	10	2	22
05:15		1	4	0	17	1	21		0	9	1	11	1	20
05:30		3	13	1	14	4	27		2	8	0	7	2	15
05:45		8	6	1	12	9	18		3	12	1	3	4	15
06:00		2	9	5	17	7	26		1	13	2	6	3	19
06:15		22	14	5	14	27	28		5	12	8	3	13	15
06:30		26	1	9	4	35	5		5	6	4	5	9	11
06:45		19	5	1	10	20	15		4	2	4	9	8	11
07:00		26	5	5	7	31	12		6	1	2	4	8	5
07:15		37	0	2	7	39	7		1	1	8	2	9	3
07:30		37	2	7	5	44	7		10	2	7	3	17	5
07:45		29	1	10	5	39	6		7	1	2	7	9	8
08:00		19	1	5	8	24	9		4	2	8	2	12	4
08:15		16	2	11	6	27	8		7	3	9	3	16	6
08:30		9	4	9	8	18	12		8	0	4	2	12	2
08:45		12	1	8	1	20	2		10	3	9	3	19	6
09:00		11	2	10	2	21	4		7	3	13	1	20	4
09:15		9	1	14	2	23	3		8	1	8	6	16	7
09:30		16	1	12	5	28	6		6	0	8	5	14	5
09:45		10	0	13	4	23	4		6	1	10	7	16	8
10:00		17	2	7	2	24	4		12	0	12	5	24	5
10:15		9	1	9	4	18	5		4	3	8	4	12	7
10:30		13	2	7	5	20	7		10	4	11	1	21	5
10:45		11	1	7	5	18	6		6	1	9	2	15	3
11:00		10	0	7	4	17	4		11	0	14	3	25	3
11:15		8	1	9	1	17	2		5	1	12	1	17	2
11:30		8	0	8	3	16	3		20	1	11	0	31	1
11:45		11	0	9	5	20	5		12	1	14	3	26	4
Totals		410	263	196	548	606	811		190	331	211	356	401	687
Day Totals		673		744		1417			521		567		1088	
% Total		28.9%	18.5%	13.8%	38.6%				17.4%	30.4%	19.3%	32.7%		
Peaks		07:00	01:15	09:00	03:30	07:00	03:30		11:00	04:15	11:00	03:00	11:00	03:00
Volume		129	46	49	112	153	142		48	60	51	68	99	113
P.H.F.		.87	.76	.87	.93	.86	.98		.6	.83	.91	.73	.79	.80

Technician:JM
Location :On West Jemez 100' East of
NM 4

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS1-7
Page : 4

Both directions

Begin Time	Sun. 02/02 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Mon. 02/03 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	0	11	2	14	2	25	2	4	1	3	3	7
12:15	2	8	1	15	3	24	1	6	0	5	1	11
12:30	1	6	1	9	2	15	0	9	0	13	0	22
12:45	0	12	2	13	2	25	0	10	0	12	0	22
01:00	1	15	0	10	1	25	0	8	0	12	0	20
01:15	1	10	4	15	5	25	0	10	0	9	0	19
01:30	1	7	1	8	2	15	1	8	2	9	3	17
01:45	2	13	2	12	4	25	1	15	0	6	1	21
02:00	0	13	0	10	0	23	1	15	0	10	1	25
02:15	2	11	0	9	2	20	0	12	0	16	0	28
02:30	2	15	0	10	2	25	0	16	0	17	0	33
02:45	0	9	0	16	0	25	0	9	0	11	0	20
03:00	0	11	0	5	0	16	0	8	1	9	1	17
03:15	1	14	0	13	1	27	0	7	1	10	1	17
03:30	0	9	0	8	0	17	2	18	0	17	2	35
03:45	0	18	0	3	0	21	0	7	1	13	1	20
04:00	0	6	0	8	0	14	0	6	0	33	0	39
04:15	0	12	1	8	1	20	2	4	0	27	2	31
04:30	0	9	0	8	0	17	2	9	0	29	2	38
04:45	1	16	0	11	1	27	0	11	0	35	0	46
05:00	0	7	0	6	0	13	1	4	0	36	1	40
05:15	0	9	0	8	0	17	5	7	2	55	7	62
05:30	1	14	1	5	2	19	6	8	1	37	7	45
05:45	0	3	0	1	0	4	5	5	8	33	13	38
06:00	0	13	0	8	0	21	14	3	3	20	17	23
06:15	2	3	0	8	2	11	22	21	7	19	29	40
06:30	3	8	0	2	3	10	30	4	4	11	34	15
06:45	3	6	1	4	4	10	39	2	2	5	41	7
07:00	3	6	0	2	3	8	43	1	6	7	49	8
07:15	2	2	4	4	6	6	63	1	5	7	68	8
07:30	1	1	2	1	3	2	44	6	13	7	57	13
07:45	8	2	2	1	10	3	49	0	7	5	56	5
08:00	4	3	8	2	12	5	24	1	9	4	33	5
08:15	3	1	6	3	9	4	23	2	18	5	41	7
08:30	5	0	5	6	10	6	12	2	11	4	23	6
08:45	4	2	4	4	8	6	16	3	10	7	25	7
09:00	8	2	5	5	13	7	13	0	5	4	18	4
09:15	6	2	9	4	15	6	11	0	6	3	17	3
09:30	2	3	8	1	10	4	8	0	10	6	18	6
09:45	7	3	9	1	16	4	13	1	7	3	20	4
10:00	1	2	3	2	4	4	8	1	12	2	20	3
10:15	8	2	9	5	17	7	8	2	9	3	17	5
10:30	12	1	10	2	22	3	8	1	6	5	14	6
10:45	6	3	8	0	14	3	8	1	5	2	13	3
11:00	12	0	9	1	21	1	12	0	10	0	22	0
11:15	5	0	16	1	21	1	12	0	6	3	18	3
11:30	9	2	16	2	25	4	13	0	9	0	22	0
11:45	7	0	9	1	16	1	5	0	6	0	11	0
Totals	136	325	158	296	294	621	527	265	203	589	730	854
Day Totals	461		454		915		792		792		1584	
% Total	14.8%	35.5%	17.2%	32.3%			33.2%	16.7%	12.8%	37.1%		
Peaks	10:15	01:45	11:00	00:00	11:00	01:45	07:00	01:45	08:00	04:45	07:00	04:45
Volume	38	52	50	52	83	93	199	58	48	163	230	193
P.H.F.	.79	.86	.78	.81	.83	.93	.78	.90	.66	.74	.84	.77

Technician:JM
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS1-7
Page : 5

Location :On West Jemez 100' East of NM 4

Both directions

Begin Time	Tues. 02/04 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Wed. 02/05 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	1	4	2	11	3	15	0	10	0	12	0	22
12:15	0	7	0	15	0	22	0	4	1	10	1	14
12:30	1	16	1	8	2	24	0	12	0	10	0	22
12:45	1	11	2	20	3	31	0	9	0	14	0	23
01:00	1	9	1	12	2	21	1	11	1	11	2	22
01:15	1	7	0	9	1	16	2	12	3	7	5	19
01:30	0	12	1	17	1	29	0	7	1	15	1	22
01:45	0	10	1	7	1	17	1	9	0	6	1	15
02:00	0	9	0	11	0	20	0	2	0	13	0	15
02:15	2	8	0	10	2	18	0	13	0	9	0	22
02:30	1	14	1	13	2	27	0	8	0	8	0	16
02:45	0	15	0	9	0	24	0	5	0	11	0	16
03:00	0	7	0	12	0	19	0	6	0	10	0	16
03:15	0	3	0	19	0	22	0	7	1	18	1	25
03:30	0	5	0	14	0	19	0	9	0	13	0	22
03:45	1	9	0	19	1	28	1	11	0	19	1	30
04:00	0	7	0	33	0	40	0	7	0	26	0	33
04:15	0	9	2	23	2	32	0	5	0	28	0	33
04:30	1	11	0	34	1	45	1	16	0	35	1	51
04:45	1	12	0	33	1	45	1	13	0	22	1	35
05:00	2	10	0	35	2	45	0	11	0	38	0	49
05:15	7	11	0	42	7	53	5	11	0	45	5	56
05:30	4	5	0	37	4	42	5	7	0	48	5	55
05:45	10	8	9	26	19	34	6	9	7	29	13	38
06:00	19	6	10	25	29	31	11	5	6	20	17	25
06:15	22	19	1	28	23	47	17	5	6	21	23	26
06:30	36	4	5	13	41	17	33	15	4	15	37	30
06:45	37	2	2	8	39	10	42	5	2	7	44	12
07:00	51	0	6	10	57	10	31	1	6	12	37	13
07:15	41	2	7	6	48	8	56	2	7	5	63	7
07:30	52	0	9	9	61	9	45	2	8	6	53	8
07:45	47	1	16	4	63	5	44	0	10	7	54	7
08:00	31	1	13	6	44	7	34	0	10	2	44	2
08:15	14	1	11	4	25	5	24	1	8	5	32	6
08:30	21	0	7	7	28	7	14	2	12	9	26	11
08:45	13	0	12	1	25	1	13	2	5	6	18	8
09:00	12	0	8	12	20	12	10	1	6	5	16	6
09:15	15	1	4	3	19	4	10	0	8	4	18	4
09:30	6	0	4	6	10	6	12	2	17	5	29	7
09:45	12	4	10	4	22	8	8	1	8	2	16	3
10:00	12	8	6	3	18	11	5	3	8	4	13	7
10:15	11	2	7	2	18	4	7	0	5	2	12	2
10:30	11	1	8	1	19	2	14	2	4	0	18	2
10:45	17	3	14	3	31	6	9	2	4	1	13	3
11:00	11	0	8	1	19	1	7	0	4	1	11	1
11:15	17	0	8	2	25	2	9	0	5	4	14	4
11:30	10	0	7	0	17	0	15	0	4	0	19	0
11:45	8	2	8	1	16	3	8	2	4	1	12	3
Totals	560	276	211	628	771	904	501	267	175	601	676	868
Day Totals	836		839		1675		768		776		1544	
% Total	33.4%	16.4%	12.6%	37.4%			32.4%	17.2%	11.3%	38.9%		
Peaks	07:00	02:00	07:30	04:45	07:00	04:30	07:15	04:30	09:15	05:00	07:15	05:00
Volume	191	46	49	147	229	188	179	51	41	160	214	198
P.H.F.	.91	.76	.76	.87	.90	.88	.79	.79	.60	.83	.84	.88

Technician: JM
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS1-7
Page : 6

Location :On West Jemez 100' East of NM 4

Both directions

Begin Time	Thur. 02/06 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Fri. 02/07 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	1	*	3	*	4	*	*	*	*	*	*	*
12:15	0	*	0	*	0	*	*	*	*	*	*	*
12:30	1	*	0	*	1	*	*	*	*	*	*	*
12:45	0	*	0	*	0	*	*	*	*	*	*	*
01:00	0	*	0	*	0	*	*	*	*	*	*	*
01:15	0	*	0	*	0	*	*	*	*	*	*	*
01:30	0	*	1	*	1	*	*	*	*	*	*	*
01:45	0	*	0	*	0	*	*	*	*	*	*	*
02:00	0	*	0	*	0	*	*	*	*	*	*	*
02:15	1	*	0	*	1	*	*	*	*	*	*	*
02:30	0	*	0	*	0	*	*	*	*	*	*	*
02:45	0	*	0	*	0	*	*	*	*	*	*	*
03:00	0	*	0	*	0	*	*	*	*	*	*	*
03:15	0	*	2	*	2	*	*	*	*	*	*	*
03:30	1	*	1	*	2	*	*	*	*	*	*	*
03:45	0	*	0	*	0	*	*	*	*	*	*	*
04:00	0	*	0	*	0	*	*	*	*	*	*	*
04:15	1	*	0	*	1	*	*	*	*	*	*	*
04:30	1	*	0	*	1	*	*	*	*	*	*	*
04:45	0	*	0	*	0	*	*	*	*	*	*	*
05:00	1	*	0	*	1	*	*	*	*	*	*	*
05:15	4	*	0	*	4	*	*	*	*	*	*	*
05:30	5	*	0	*	5	*	*	*	*	*	*	*
05:45	8	*	8	*	16	*	*	*	*	*	*	*
06:00	13	*	5	*	18	*	*	*	*	*	*	*
06:15	22	*	3	*	25	*	*	*	*	*	*	*
06:30	31	*	2	*	33	*	*	*	*	*	*	*
06:45	40	*	2	*	42	*	*	*	*	*	*	*
07:00	32	*	5	*	37	*	*	*	*	*	*	*
07:15	62	*	4	*	66	*	*	*	*	*	*	*
07:30	49	*	7	*	56	*	*	*	*	*	*	*
07:45	42	*	4	*	46	*	*	*	*	*	*	*
08:00	31	*	8	*	39	*	*	*	*	*	*	*
08:15	21	*	7	*	28	*	*	*	*	*	*	*
08:30	21	*	6	*	27	*	*	*	*	*	*	*
08:45	20	*	10	*	30	*	*	*	*	*	*	*
09:00	12	*	13	*	25	*	*	*	*	*	*	*
09:15	8	*	7	*	15	*	*	*	*	*	*	*
09:30	3	*	8	*	11	*	*	*	*	*	*	*
09:45	20	*	4	*	24	*	*	*	*	*	*	*
10:00	9	*	14	*	23	*	*	*	*	*	*	*
10:15	4	*	9	*	13	*	*	*	*	*	*	*
10:30	8	*	11	*	19	*	*	*	*	*	*	*
10:45	14	*	9	*	23	*	*	*	*	*	*	*
11:00	6	*	4	*	10	*	*	*	*	*	*	*
11:15	4	*	9	*	13	*	*	*	*	*	*	*
11:30	12	*	5	*	17	*	*	*	*	*	*	*
11:45	*	*	*	*	*	*	*	*	*	*	*	*
Totals	508	0	171	0	679	0	0	0	0	0	0	0
Day Totals	508		171		679		0		0		0	
% Total	74.8%	.0%	25.1%	.0%			*	*	*	*		

Peaks	07:00	10:00	07:15
Volume	185	43	207
P.H.F.	.74	.76	.78

Technician: JM
Location : On East Jemez 1/4 mile W of
Nm 4

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704
Both directions

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS9-7
Page : 1

Begin	Mon.	East		West		Combined		Tues.	East		West		Combined	
Time	01/27	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	01/28	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00		*	33	*	23	*	56		3	41	2	26	5	67
12:15		*	31	*	44	*	75		4	35	0	40	4	75
12:30		*	17	*	36	*	53		1	27	2	40	3	67
12:45		*	31	*	41	*	72		3	38	5	45	8	83
01:00		*	31	*	30	*	61		2	30	1	60	3	90
01:15		*	30	*	27	*	57		0	32	1	40	1	72
01:30		*	28	*	23	*	51		2	37	1	20	3	57
01:45		*	22	*	27	*	49		1	27	4	25	5	52
02:00		*	23	*	25	*	48		0	28	0	24	0	52
02:15		*	33	*	24	*	57		0	48	0	34	0	82
02:30		*	47	*	33	*	80		0	48	0	57	0	105
02:45		*	48	*	25	*	73		0	45	1	32	1	77
03:00		*	72	*	19	*	91		1	87	1	22	2	109
03:15		*	63	*	34	*	97		2	103	1	25	3	128
03:30		*	190	*	31	*	221		0	187	3	26	3	213
03:45		*	114	*	21	*	135		0	99	2	22	2	121
04:00		*	272	*	12	*	284		0	260	2	14	2	274
04:15		*	160	*	30	*	190		1	192	6	17	7	209
04:30		*	246	*	21	*	267		0	233	10	13	10	246
04:45		*	221	*	19	*	240		1	221	11	23	12	244
05:00		*	258	*	27	*	285		2	258	26	23	28	281
05:15		*	249	*	26	*	275		3	240	26	32	29	272
05:30		*	214	*	19	*	233		1	218	53	15	54	233
05:45		*	181	*	11	*	192		3	165	91	18	94	183
06:00		*	126	*	16	*	142		2	147	109	15	111	162
06:15		*	104	*	13	*	117		7	96	159	17	166	113
06:30		*	65	*	21	*	86		5	68	300	28	305	96
06:45		*	40	*	13	*	53		6	47	392	22	398	69
07:00		*	36	*	9	*	45		20	46	298	10	318	56
07:15		*	20	*	11	*	31		9	30	383	6	392	36
07:30		*	25	*	8	*	33		13	18	310	5	323	23
07:45		*	22	*	9	*	31		30	12	299	12	329	24
08:00		*	24	*	6	*	30		31	13	203	5	234	18
08:15		*	8	*	8	*	16		23	9	124	8	147	17
08:30		*	14	*	10	*	24		29	16	84	4	113	20
08:45		*	1	*	6	*	7		20	6	80	4	100	10
09:00		*	10	*	9	*	19		20	19	68	6	88	25
09:15		*	17	*	4	*	21		35	25	80	10	115	35
09:30		*	8	*	9	*	17		16	8	77	6	93	14
09:45		*	6	*	3	*	9		25	3	58	6	83	9
10:00		*	7	*	7	*	14		35	6	54	7	93	13
10:15		*	6	*	10	*	16		21	2	33	16	54	18
10:30		*	7	*	12	*	19		37	3	25	20	62	23
10:45		18	1	31	10	49	11		33	5	28	14	61	19
11:00		19	10	29	3	48	13		23	4	34	2	57	6
11:15		19	10	38	1	57	11		29	9	41	3	70	12
11:30		28	11	33	3	61	14		31	15	49	1	80	16
11:45		26	11	37	0	63	11		50	11	45	1	95	12
Totals		110	3203	168	829	278	4032		584	3317	3582	921	4166	4238
Day Totals		3313		997		4310			3901		4503		8404	
Total		2.5%	74.3%	3.9%	19.2%				6.9%	39.4%	42.6%	10.9%		
Peaks		11:00	04:30	11:00	00:15	11:00	04:30		11:00	04:30	06:45	00:15	05:45	04:30
Volume		92	974	137	151	229	1067		133	952	1383	185	1431	1043
P.H.F.		.82	.94	.90	.85	.90	.93		.66	.92	.88	.77	.89	.92

Site 5, Page 1

Technician:
Location* :On East Jemez 1/4 mile W of
No 4

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 0000000000
Start Date: 01/27/03
File I.D. : LCS9-7
Page : 2

Both directions

Begin	Wed.	East		West		Combined		Thur.	East		West		Combined	
Time	01/29	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	01/30	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00		8	35	3	26	11	61		11	41	1	32	12	73
12:15		4	37	3	42	7	79		4	42	1	34	5	76
12:30		3	27	2	42	5	69		7	34	0	39	7	73
12:45		2	30	0	42	2	72		0	33	2	39	2	72
01:00		1	32	0	43	1	75		1	40	0	40	1	80
01:15		1	32	1	34	2	66		0	39	0	31	0	70
01:30		1	36	3	29	4	65		1	29	1	29	2	58
01:45		0	36	0	33	0	69		1	31	0	17	1	48
02:00		2	36	1	24	3	60		0	27	0	23	0	50
02:15		2	33	0	46	2	79		0	47	0	29	0	76
02:30		1	52	1	35	2	87		0	46	1	46	1	92
02:45		0	54	1	27	1	81		1	53	1	32	2	85
03:00		1	58	0	29	1	87		0	54	2	20	2	74
03:15		0	78	2	23	2	101		1	87	2	20	3	107
03:30		2	177	2	24	4	201		1	176	1	20	2	196
03:45		1	118	4	17	5	135		0	125	3	26	3	151
04:00		0	243	1	17	1	260		1	217	2	25	3	242
04:15		1	201	2	27	3	228		2	150	4	6	6	156
04:30		1	243	9	18	10	261		0	239	10	10	10	249
04:45		1	226	12	24	13	250		0	201	13	34	13	235
05:00		3	261	17	22	20	283		3	236	23	16	26	252
05:15		3	249	32	24	35	273		2	266	31	30	33	296
05:30		3	239	52	24	55	263		2	189	55	24	57	213
05:45		3	162	77	20	80	182		3	169	74	34	77	203
06:00		1	137	108	20	109	157		3	136	111	21	114	157
06:15		5	86	195	10	200	96		5	112	187	8	193	120
06:30		7	75	331	13	338	88		6	82	309	18	315	100
06:45		13	55	388	15	401	70		8	68	392	18	400	86
07:00		17	33	327	15	344	48		23	40	332	11	355	51
07:15		15	28	353	7	368	35		24	28	327	2	351	30
07:30		16	25	275	5	291	30		13	26	291	11	304	37
07:45		27	20	309	6	336	26		31	32	291	10	322	42
08:00		27	20	205	6	232	26		20	19	209	9	229	28
08:15		28	9	142	8	170	17		38	12	106	7	144	19
08:30		15	5	113	10	131	15		18	17	118	7	136	24
08:45		22	10	85	6	107	16		19	13	100	1	119	14
09:00		28	11	60	4	88	15		21	8	51	11	72	19
09:15		32	2	66	6	98	8		26	11	51	12	79	23
09:30		18	2	43	8	61	10		22	8	54	7	76	15
09:45		21	8	45	7	66	15		24	5	40	7	64	12
10:00		19	6	44	9	63	15		23	1	43	12	66	13
10:15		32	7	41	6	73	13		11	3	36	13	47	16
10:30		26	6	29	16	55	22		24	5	38	17	62	22
10:45		24	5	29	12	53	17		23	1	45	13	68	14
11:00		24	7	48	1	72	8		28	9	39	1	67	10
11:15		34	12	25	0	59	12		25	10	26	4	51	14
11:30		28	10	28	2	56	12		23	9	33	3	58	12
11:45		38	9	32	1	70	10		40	16	29	2	69	18
Totals		564	3283	3546	885	4110	4168		544	3242	3485	881	4029	4123
Day Totals		3847		4431		8278			3786		4366		8152	
% Total		6.8%	39.6%	42.8%	10.6%				6.6%	39.7%	42.7%	10.8%		
Peaks		11:00	04:30	06:30	00:15	06:30	04:45		11:00	04:30	06:30	00:15	06:30	04:30
Volume		124	979	1399	169	1451	1069		118	942	1360	152	1421	1032
P.H.F.		.81	.93	.90	.98	.90	.94		.73	.88	.86	.95	.88	.87

Location: :On East Jemez 1/4 mile W of
Nm 4

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704
Both directions

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : L009-7
Page : 3

Begin	Fri.	East		West		Combined		Sat.	East		West		Combined	
Time	01/31	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	02/01	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00		6	52	4	16	10	68		8	13	3	9	11	22
12:15		7	46	0	35	7	81		5	18	0	20	5	38
12:30		8	21	2	32	10	53		4	15	3	22	7	37
12:45		0	33	1	27	1	60		4	21	1	20	5	41
01:00		1	29	1	34	2	63		3	18	0	9	3	27
01:15		2	41	0	27	2	68		2	18	3	13	5	31
01:30		1	39	0	31	1	70		3	13	1	20	4	33
01:45		1	37	3	30	4	67		0	17	0	20	0	37
02:00		1	37	0	26	1	63		1	14	0	22	1	36
02:15		0	44	1	38	1	82		0	26	2	18	2	44
02:30		1	67	0	41	1	108		1	21	1	27	2	48
02:45		0	56	3	22	3	78		0	20	3	26	3	46
03:00		1	65	1	29	2	94		1	15	0	15	1	30
03:15		5	120	4	25	9	145		0	25	0	21	0	46
03:30		0	200	3	21	3	221		1	22	2	18	3	40
03:45		2	125	6	27	8	152		3	25	1	25	4	50
04:00		0	252	2	20	2	272		0	19	0	33	0	52
04:15		1	132	5	20	6	152		1	20	3	15	4	35
04:30		0	120	9	20	9	140		0	25	4	15	4	40
04:45		0	115	8	17	8	132		1	19	1	20	2	39
05:00		2	103	10	19	12	122		2	33	3	15	5	48
05:15		0	96	25	31	25	127		1	13	4	19	5	32
05:30		5	86	30	17	35	103		1	9	6	23	7	32
05:45		2	51	50	20	52	71		0	17	5	18	5	35
06:00		3	36	84	12	87	48		0	11	12	24	12	35
06:15		5	39	128	13	133	52		2	15	14	19	16	34
06:30		12	31	219	15	231	46		0	14	32	17	32	31
06:45		8	18	273	20	281	38		2	8	35	22	37	30
07:00		15	22	218	16	233	38		6	8	13	10	19	18
07:15		17	15	223	5	240	20		9	3	9	12	18	15
07:30		20	19	178	4	198	23		9	2	35	14	44	16
07:45		21	4	224	15	245	19		14	5	30	5	44	10
08:00		26	8	133	8	159	16		19	4	15	6	34	10
08:15		42	2	97	8	139	10		10	5	14	4	24	10
08:30		19	8	76	8	95	16		12	3	20	7	32	10
08:45		27	6	75	6	102	12		9	3	22	5	31	8
09:00		22	11	68	5	90	16		15	2	18	12	33	14
09:15		20	8	34	8	54	16		13	4	17	9	30	13
09:30		23	6	48	11	71	17		10	16	22	4	32	20
09:45		21	9	51	1	72	10		15	13	23	12	38	25
10:00		24	3	38	9	62	12		13	8	19	8	32	16
10:15		25	3	39	16	64	19		13	2	24	11	37	13
10:30		19	8	42	18	61	26		11	5	9	16	20	21
10:45		19	2	31	18	50	20		21	6	17	9	38	15
11:00		32	2	33	5	65	7		18	3	18	7	36	10
11:15		41	8	27	9	68	17		21	13	19	3	40	16
11:30		38	15	29	4	67	20		14	1	18	3	32	4
11:45		37	7	38	5	75	12		15	10	18	3	33	13
Totals		592	2258	2574	864	3156	3122		313	621	519	705	832	1326
Day Totals			2840		3438		6278			934		1224		2158
% Total		9.2%	35.9%	41.0%	13.7%				14.5%	28.7%	24.0%	32.6%		
Peaks		11:00	03:30	06:30	01:45	06:30	03:30		10:45	04:15	06:15	03:15	07:30	03:15
Volume		148	709	933	135	985	797		74	97	94	97	145	188
P.H.F.		.90	.70	.85	.82	.87	.73		.88	.73	.67	.73	.82	.90

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Technician:
Location :On East Jemez 1/4 mile W of
Nm 4

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS9-7
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Both directions

Begin Time	Sun. 02/02 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Mon. 02/03 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	4	13	3	17	7	30	3	38	0	46	3	84
12:15	4	32	2	17	6	49	11	37	0	31	11	68
12:30	4	22	0	22	4	44	3	25	0	35	3	60
12:45	0	18	3	23	3	41	1	25	1	45	2	71
01:00	4	22	1	19	5	41	1	30	3	35	4	65
01:15	2	11	1	10	3	21	2	28	0	31	2	59
01:30	0	10	0	13	0	23	0	28	1	29	1	57
01:45	1	17	1	19	2	36	0	25	2	22	2	47
02:00	0	8	1	17	1	25	0	38	1	30	1	68
02:15	2	15	2	20	4	35	0	25	2	37	2	62
02:30	0	18	5	28	5	46	0	35	1	31	1	66
02:45	0	25	0	25	0	50	1	39	1	27	2	66
03:00	0	15	1	13	1	28	0	62	0	42	0	104
03:15	0	19	0	11	0	30	1	86	0	25	1	111
03:30	0	10	0	19	0	29	0	168	6	19	6	187
03:45	1	15	3	12	4	27	0	131	2	18	2	149
04:00	0	19	0	13	0	32	0	260	1	17	1	277
04:15	0	14	3	11	3	25	2	174	3	14	5	188
04:30	0	17	0	17	0	34	2	212	10	17	12	229
04:45	1	9	1	25	2	34	1	206	17	23	18	229
05:00	1	22	1	10	2	32	1	270	18	17	19	287
05:15	0	14	0	16	0	30	0	253	28	17	28	270
05:30	0	13	1	16	1	29	2	218	48	19	50	237
05:45	2	12	1	14	3	26	3	159	77	18	80	177
06:00	1	6	6	10	7	16	3	130	111	17	114	147
06:15	1	5	6	18	7	23	6	91	190	12	196	103
06:30	3	2	18	21	21	23	10	83	308	13	318	96
06:45	3	10	17	18	20	28	10	52	388	10	398	62
07:00	2	6	2	10	4	16	14	45	345	13	359	58
07:15	7	2	3	13	10	15	11	30	337	13	348	43
07:30	6	4	12	5	18	9	25	27	263	9	288	36
07:45	13	5	22	13	35	18	29	16	287	8	316	24
08:00	12	3	13	3	25	6	36	14	189	13	225	27
08:15	10	3	8	9	18	12	29	12	136	5	165	17
08:30	13	7	19	6	32	13	26	11	89	14	115	25
08:45	12	4	27	8	39	12	11	7	91	5	102	12
09:00	13	8	21	4	34	12	27	3	65	3	92	6
09:15	9	9	24	7	33	15	19	13	52	3	71	16
09:30	8	6	14	6	22	12	12	2	44	11	56	13
09:45	12	6	22	2	34	8	25	7	56	3	81	10
10:00	7	4	14	9	21	13	26	4	47	5	73	9
10:15	9	2	14	12	23	14	23	5	47	13	70	18
10:30	7	5	15	17	22	22	18	4	32	25	50	29
10:45	11	3	16	8	27	11	28	3	47	12	75	15
11:00	19	3	22	0	41	3	26	11	19	1	45	12
11:15	19	6	13	6	32	12	34	8	28	5	62	13
11:30	13	7	10	2	23	9	34	17	42	4	76	21
11:45	18	8	19	4	37	12	44	16	27	2	71	18
Totals	254	514	387	618	641	1132	560	3183	3462	866	4022	4049
Day Totals	768		1005		1773		3743		4328		8071	
Total	14.3%	28.9%	21.8%	34.8%			6.9%	39.4%	42.8%	10.7%		
Peaks	11:00	00:15	08:30	02:00	08:30	00:15	11:00	04:45	06:30	00:00	06:30	04:45
Volume	69	94	91	90	138	175	138	947	1378	158	1423	1023
P.H.F.	.90	.73	.84	.80	.88	.89	.78	.87	.88	.85	.89	.89

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Location :On East Jemez 1/4 mile W of
Nm 4

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS9-7
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Both directions

Begin Time	Tues. 02/04 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Wed. 02/05 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	5	52	1	44	6	96	5	44	0	37	5	81
12:15	7	28	2	33	9	61	4	28	1	42	5	70
12:30	8	31	1	38	9	69	6	36	2	37	8	73
12:45	2	27	1	40	3	67	2	37	0	38	2	75
01:00	1	31	2	39	3	70	0	29	2	24	2	53
01:15	0	33	0	30	0	63	0	27	2	41	2	68
01:30	1	27	1	28	2	55	1	25	2	21	3	46
01:45	1	34	0	23	1	57	2	22	1	21	3	43
02:00	0	45	0	32	0	77	0	42	1	33	1	75
02:15	1	38	1	34	2	72	0	25	2	28	2	53
02:30	1	62	0	35	1	97	0	53	1	37	1	90
02:45	0	71	0	34	0	105	0	48	3	52	3	100
03:00	2	76	1	24	3	100	1	60	2	30	3	90
03:15	0	107	0	25	0	132	3	77	0	14	3	91
03:30	1	187	2	20	3	207	1	177	4	26	5	203
03:45	1	139	4	24	5	163	2	116	6	18	8	134
04:00	0	272	3	16	3	288	0	283	2	17	2	300
04:15	0	197	2	19	2	216	3	185	4	19	7	204
04:30	1	197	4	16	5	213	0	231	7	17	7	248
04:45	0	186	19	16	19	202	1	240	20	20	21	260
05:00	2	246	16	27	18	273	1	245	16	18	17	264
05:15	5	254	32	22	37	276	3	259	25	23	28	282
05:30	2	181	50	22	52	203	2	207	60	28	62	235
05:45	3	136	81	18	84	154	5	180	74	28	79	208
06:00	4	110	100	19	104	129	2	114	93	12	95	126
06:15	5	116	166	15	171	131	5	117	190	16	195	133
06:30	0	80	321	22	321	102	9	69	304	9	313	78
06:45	7	56	381	15	388	71	6	66	375	16	381	82
07:00	12	41	351	17	363	58	9	39	335	9	344	48
07:15	17	27	333	15	350	42	12	25	376	6	388	31
07:30	23	34	292	6	315	40	12	22	264	6	276	28
07:45	34	16	260	5	294	21	26	26	288	7	314	33
08:00	20	22	182	3	202	25	28	18	234	5	262	23
08:15	32	10	148	7	180	17	31	12	128	6	159	18
08:30	17	14	102	7	119	21	24	16	101	5	125	21
08:45	27	12	87	6	114	18	24	6	88	7	112	13
09:00	32	12	62	8	94	20	34	11	64	8	98	19
09:15	24	17	73	11	97	28	15	9	61	6	76	15
09:30	28	4	62	7	90	11	21	6	50	11	71	17
09:45	19	7	62	3	81	10	21	7	51	7	72	14
10:00	25	8	42	8	67	16	13	2	43	13	56	15
10:15	27	3	45	11	72	14	20	9	34	12	54	21
10:30	27	3	31	26	58	29	25	6	31	19	56	25
10:45	24	5	41	10	65	15	12	1	33	12	45	13
11:00	32	7	41	5	73	12	26	4	41	2	67	6
11:15	27	12	28	0	55	12	23	10	44	3	67	13
11:30	35	14	23	2	58	16	39	13	27	1	66	14
11:45	32	14	23	3	55	17	44	18	38	2	82	20
Totals	574	3301	3479	890	4053	4191	523	3303	3530	869	4053	4172
Day Totals	3875		4369		8244		3826		4399		8225	
Total	6.9%	40.0%	42.2%	10.8%			6.3%	40.1%	42.9%	10.5%		
Peaks	11:00	04:30	06:30	00:00	06:30	04:30	11:00	04:30	06:30	00:00	06:30	04:30
Volume	126	883	1386	155	1422	964	132	976	1390	154	1426	1054
P.H.F.	.9	.86	.90	.88	.91	.87	.75	.94	.92	.91	.91	.93

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Technician:JM
Location :On East Jemez 1/4 mile W of
Mm 4

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS9-7
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Both directions

Begin Time	Thur. 02/06 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Fri. 02/07 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	4	33	2	29	6	62	*	*	*	*	*	*
12:15	8	40	0	36	8	76	*	*	*	*	*	*
12:30	7	24	3	42	10	66	*	*	*	*	*	*
12:45	5	31	0	39	5	70	*	*	*	*	*	*
01:00	3	24	2	38	5	62	*	*	*	*	*	*
01:15	0	*	1	*	1	*	*	*	*	*	*	*
01:30	1	*	2	*	3	*	*	*	*	*	*	*
01:45	0	*	0	*	0	*	*	*	*	*	*	*
02:00	0	*	0	*	0	*	*	*	*	*	*	*
02:15	1	*	0	*	1	*	*	*	*	*	*	*
02:30	1	*	0	*	1	*	*	*	*	*	*	*
02:45	1	*	3	*	4	*	*	*	*	*	*	*
03:00	0	*	2	*	2	*	*	*	*	*	*	*
03:15	0	*	1	*	1	*	*	*	*	*	*	*
03:30	0	*	1	*	1	*	*	*	*	*	*	*
03:45	0	*	4	*	4	*	*	*	*	*	*	*
04:00	3	*	3	*	6	*	*	*	*	*	*	*
04:15	1	*	5	*	6	*	*	*	*	*	*	*
04:30	0	*	6	*	6	*	*	*	*	*	*	*
04:45	2	*	13	*	15	*	*	*	*	*	*	*
05:00	1	*	15	*	16	*	*	*	*	*	*	*
05:15	2	*	39	*	41	*	*	*	*	*	*	*
05:30	4	*	42	*	46	*	*	*	*	*	*	*
05:45	5	*	84	*	89	*	*	*	*	*	*	*
06:00	3	*	100	*	103	*	*	*	*	*	*	*
06:15	9	*	173	*	182	*	*	*	*	*	*	*
06:30	2	*	321	*	323	*	*	*	*	*	*	*
06:45	7	*	359	*	366	*	*	*	*	*	*	*
07:00	18	*	356	*	374	*	*	*	*	*	*	*
07:15	17	*	323	*	340	*	*	*	*	*	*	*
07:30	17	*	278	*	295	*	*	*	*	*	*	*
07:45	30	*	259	*	289	*	*	*	*	*	*	*
08:00	16	*	200	*	216	*	*	*	*	*	*	*
08:15	26	*	149	*	175	*	*	*	*	*	*	*
08:30	21	*	92	*	113	*	*	*	*	*	*	*
08:45	31	*	108	*	139	*	*	*	*	*	*	*
09:00	34	*	48	*	82	*	*	*	*	*	*	*
09:15	12	*	48	*	60	*	*	*	*	*	*	*
09:30	24	*	61	*	85	*	*	*	*	*	*	*
09:45	22	*	45	*	67	*	*	*	*	*	*	*
10:00	21	*	37	*	58	*	*	*	*	*	*	*
10:15	24	*	23	*	47	*	*	*	*	*	*	*
10:30	24	*	32	*	56	*	*	*	*	*	*	*
10:45	26	*	33	*	59	*	*	*	*	*	*	*
11:00	29	*	20	*	49	*	*	*	*	*	*	*
11:15	21	*	36	*	57	*	*	*	*	*	*	*
11:30	37	*	31	*	68	*	*	*	*	*	*	*
11:45	32	*	31	*	63	*	*	*	*	*	*	*
Totals	552	152	3391	184	3943	336	0	0	0	0	0	0
Day Totals	704		3575		4279		0		0		0	
Total	12.9%	3.5%	79.2%	4.3%			*	*	*	*		
Peaks	11:00	00:00	06:30	00:15	06:30	00:00						
Volume	119	128	1359	155	1403	274						
P.H.F.	.80	.8	.94	.92	.93	.90						

Tech: Melanium
Location: On East Jemez 500' West of Royal Crest

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
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Both directions

Begin Time	Mon. 01/27 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Tues. 01/28 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	*	57	*	59	*	116	4	60	3	57	7	117
12:15	*	49	*	52	*	101	4	47	2	71	6	118
12:30	*	66	*	64	*	130	3	66	2	76	5	142
12:45	*	67	*	56	*	123	3	70	4	66	7	136
01:00	*	70	*	63	*	133	0	75	3	68	3	143
01:15	*	58	*	40	*	98	0	69	1	64	1	133
01:30	*	54	*	41	*	95	2	66	1	34	3	100
01:45	*	49	*	56	*	105	1	60	3	52	4	112
02:00	*	53	*	36	*	89	0	63	1	43	1	106
02:15	*	50	*	53	*	103	2	76	0	54	2	130
02:30	*	66	*	47	*	113	0	56	0	64	0	120
02:45	*	67	*	57	*	124	0	88	1	57	1	145
03:00	*	89	*	33	*	122	1	106	1	47	2	153
03:15	*	105	*	50	*	155	2	121	1	45	3	166
03:30	*	201	*	67	*	268	0	182	3	44	3	226
03:45	*	142	*	41	*	183	0	144	2	67	2	211
04:00	*	279	*	46	*	325	1	265	3	35	4	300
04:15	*	136	*	42	*	178	1	146	3	46	4	192
04:30	*	245	*	54	*	299	1	257	11	52	12	309
04:45	*	204	*	53	*	257	3	198	11	56	14	254
05:00	*	251	*	86	*	337	4	262	24	69	28	331
05:15	*	219	*	62	*	281	1	195	27	66	28	261
05:30	*	192	*	54	*	246	3	204	42	64	45	268
05:45	*	157	*	47	*	204	2	140	68	60	70	200
06:00	*	102	*	37	*	139	8	128	101	48	109	176
06:15	*	100	*	33	*	133	20	88	155	51	175	139
06:30	*	47	*	31	*	78	28	62	213	36	241	98
06:45	*	43	*	31	*	74	32	44	348	45	380	89
07:00	*	34	*	18	*	52	32	47	298	28	330	75
07:15	*	28	*	24	*	52	41	23	354	8	395	31
07:30	*	24	*	12	*	36	50	27	294	10	344	37
07:45	*	30	*	13	*	43	57	16	331	16	388	32
08:00	*	26	*	13	*	39	74	15	219	10	293	25
08:15	*	11	*	15	*	26	65	16	138	16	203	32
08:30	*	23	*	13	*	36	64	15	78	8	142	23
08:45	*	9	*	8	*	17	43	19	94	8	137	27
09:00	*	14	*	8	*	22	59	27	66	10	125	37
09:15	*	16	*	10	*	26	42	34	98	12	140	46
09:30	*	11	*	11	*	22	32	9	82	10	114	19
09:45	41	8	68	4	109	12	53	5	96	8	149	13
10:00	33	11	66	8	99	19	59	5	78	12	137	17
10:15	41	6	64	8	105	14	41	2	58	15	99	17
10:30	49	6	48	18	97	24	53	6	34	19	87	25
10:45	38	1	52	14	90	15	40	5	40	20	80	25
11:00	31	13	60	10	91	23	48	6	51	6	99	12
11:15	32	14	71	1	103	15	45	15	68	4	113	19
11:30	46	11	66	0	112	11	52	18	74	1	126	19
11:45	47	9	72	1	119	10	74	8	82	2	156	10
Totals	358	3523	567	1600	925	5123	1150	3656	3667	1760	4817	5416
Day Totals	3881		2167		6048		4806		5427		10233	
% Total	5.9%	58.2%	9.3%	26.4%			11.2%	35.7%	35.8%	17.2%		
Peaks	09:45	04:30	11:00	04:30	11:00	04:30	07:45	04:30	05:45	00:15	07:00	04:30
Volume	164	919	269	255	425	1174	260	912	1294	281	1457	1155
P.H.F.	.83	.91	.93	.74	.89	.87	.87	.87	.91	.92	.92	.87

Site 6, Page 1

Technician: Jim
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000300
Start Date: 01/27/03
File I.D. : LOS7-7
Page : 2

Location :On East Jemez 500' West of Royal Crest

Both directions

Begin Time	Wed. 01/29 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Thur. 01/30 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	6	65	4	69	10	134	9	66	4	69	13	135
12:15	5	58	5	66	10	124	4	52	1	49	5	101
12:30	1	70	3	48	4	118	7	92	1	59	8	151
12:45	1	76	2	60	3	136	0	75	1	58	1	133
01:00	0	72	0	64	0	136	0	76	0	61	0	137
01:15	1	61	0	50	1	111	1	68	1	51	2	119
01:30	0	74	0	43	0	117	2	54	1	40	3	94
01:45	2	60	4	60	6	120	0	59	0	48	0	107
02:00	1	64	1	47	2	111	0	48	0	30	0	78
02:15	3	46	0	57	3	103	0	72	0	61	0	133
02:30	0	63	0	56	0	119	1	58	1	56	2	114
02:45	0	72	2	67	2	139	1	66	1	58	2	124
03:00	1	74	0	41	1	115	0	68	2	35	2	103
03:15	2	104	1	79	3	183	2	113	2	36	4	155
03:30	0	188	2	71	2	259	1	187	1	50	2	237
03:45	2	153	5	46	7	199	1	153	3	52	4	205
04:00	0	273	1	42	1	315	2	221	1	45	3	266
04:15	2	168	3	58	5	226	1	145	5	44	6	189
04:30	0	258	7	43	7	301	2	240	9	46	11	286
04:45	3	180	12	50	15	230	0	175	15	65	15	240
05:00	5	276	13	81	18	357	7	275	19	70	26	345
05:15	3	221	31	66	34	287	2	218	27	63	29	281
05:30	2	223	33	58	35	281	3	184	41	70	44	254
05:45	10	142	82	57	92	199	10	120	80	62	90	182
06:00	15	98	79	39	94	137	12	123	78	56	90	179
06:15	11	73	169	28	180	103	13	92	156	26	169	118
06:30	23	73	253	33	276	106	27	73	254	35	281	108
06:45	44	55	377	34	421	89	53	56	362	35	415	91
07:00	39	28	320	24	359	52	63	51	321	22	384	73
07:15	43	24	320	18	363	42	49	34	312	13	361	47
07:30	42	25	286	11	328	36	40	28	291	18	331	46
07:45	68	31	314	11	382	42	54	29	299	20	353	49
08:00	77	16	220	15	297	31	59	16	215	14	275	30
08:15	70	10	140	7	210	17	76	12	129	10	205	22
08:30	57	9	124	11	181	20	54	19	119	10	173	29
08:45	46	18	112	8	158	26	44	15	98	4	142	19
09:00	61	16	72	6	133	22	42	16	82	11	124	27
09:15	45	4	72	11	117	15	42	15	56	17	98	32
09:30	32	7	67	12	99	19	52	13	73	8	125	21
09:45	47	16	54	8	101	24	41	8	63	12	104	20
10:00	39	8	58	11	97	19	40	5	53	6	93	11
10:15	46	12	50	7	96	19	46	5	49	14	95	19
10:30	43	9	53	15	96	24	42	3	53	19	95	22
10:45	45	3	58	20	104	23	35	4	57	16	92	20
11:00	52	10	69	3	121	13	33	11	66	3	99	14
11:15	41	16	49	1	90	17	41	13	66	6	107	19
11:30	50	9	70	3	120	12	47	12	71	3	118	15
11:45	67	9	73	2	140	11	50	12	78	4	138	16
Totals	1154	3622	3670	1717	4824	5339	1121	3556	3618	1660	4739	5216
Day Totals	4776		5387		10163		4677		5278		9955	
% Total	11.3%	35.6%	35.1%	16.8%			11.2%	35.7%	36.3%	16.6%		
Peaks	07:45	04:30	06:45	05:00	06:45	04:30	07:45	04:30	06:45	04:45	06:45	04:30
Volume	272	935	1303	262	1471	1175	243	908	1286	268	1491	1152
P.H.F.	.88	.84	.86	.80	.87	.82	.79	.82	.88	.95	.89	.83

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Technician: Jm
Location :On East James 500' West of Royal Crest

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS7-7
Page : 3

Both directions

Begin Time	Fri. 01/31 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Sat. 02/01 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	9	64	4	52	13	116	11	22	8	24	19	46
12:15	8	49	2	56	10	105	7	20	2	26	9	46
12:30	6	47	1	41	7	88	5	23	6	26	11	49
12:45	1	62	0	69	1	131	7	24	4	28	11	52
01:00	2	70	1	41	3	111	5	29	0	17	5	46
01:15	1	60	0	40	1	100	4	15	3	17	7	32
01:30	4	52	0	60	4	112	3	20	2	21	5	41
01:45	2	61	3	40	5	101	1	24	0	22	1	46
02:00	1	59	2	54	3	113	0	22	0	23	0	45
02:15	0	75	0	47	0	122	1	35	1	25	2	60
02:30	1	69	1	60	2	129	0	26	2	29	2	55
02:45	0	68	3	57	3	125	1	22	3	31	4	53
03:00	3	79	1	33	4	112	0	21	0	24	0	45
03:15	4	144	1	44	5	188	0	27	0	31	0	58
03:30	2	183	4	45	6	228	2	35	0	22	2	57
03:45	1	168	7	45	8	213	2	19	1	29	3	48
04:00	0	227	3	48	3	275	1	29	1	34	2	63
04:15	1	119	6	47	7	166	0	23	2	23	2	46
04:30	1	132	7	42	8	174	0	26	3	18	3	44
04:45	2	97	9	37	11	134	2	22	4	18	6	40
05:00	3	116	18	46	21	162	4	32	4	29	8	61
05:15	1	103	16	57	17	160	2	22	2	31	4	53
05:30	2	76	26	36	28	112	1	11	9	23	10	34
05:45	5	43	45	31	50	74	0	17	10	28	10	45
06:00	9	30	72	29	81	59	3	13	12	27	15	40
06:15	18	49	104	19	122	68	1	31	6	24	7	55
06:30	15	23	177	25	192	48	0	20	36	23	36	43
06:45	25	22	262	32	287	54	4	10	40	29	44	39
07:00	34	29	215	21	249	50	7	10	16	19	23	29
07:15	27	18	223	14	250	32	12	8	13	17	25	25
07:30	33	18	200	13	233	31	8	9	30	15	38	24
07:45	43	11	216	14	259	25	23	11	41	11	64	22
08:00	70	9	147	12	217	21	24	11	18	7	42	18
08:15	57	8	116	7	173	15	5	9	18	7	23	16
08:30	44	9	74	4	118	13	16	5	19	9	35	14
08:45	51	13	71	11	122	24	15	9	36	7	51	16
09:00	45	15	83	6	128	21	23	8	25	11	48	19
09:15	37	8	57	12	94	20	14	6	22	9	36	15
09:30	37	8	47	12	84	20	15	20	17	10	32	30
09:45	46	13	76	7	122	20	18	18	42	8	60	26
10:00	45	3	62	9	107	12	27	4	30	6	57	10
10:15	41	5	41	11	82	16	14	7	25	14	39	21
10:30	32	10	70	18	102	28	20	7	21	14	41	21
10:45	35	3	45	24	80	27	27	5	18	17	45	22
11:00	55	4	49	6	104	10	23	8	28	8	51	16
11:15	49	15	44	8	93	23	18	11	18	3	36	14
11:30	44	15	55	6	99	21	25	8	18	3	43	11
11:45	57	12	53	7	110	19	16	11	29	4	45	15
Totals	1009	2573	2719	1455	3728	4028	417	823	645	901	1062	1726
Day Totals	3582		4174		7756		1242		1546		2788	
% Total	13.0%	33.1%	35.0%	18.7%			14.9%	29.5%	23.1%	32.3%		
Peaks	08:00	03:15	06:45	00:00	06:45	03:15	10:45	03:15	09:45	03:15	09:45	03:15
Volume	222	722	900	218	1019	904	93	110	118	116	197	226
P.H.F.	.79	.79	.85	.78	.88	.82	.86	.78	.70	.85	.82	.89

Technician: Jm
Location :On East Jemez 500' West of
Royal Crest

3500 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 00000000000
Start Date: 01/27/03
File I.D. : L057-7
Page : 4

Both directions

Begin Time	Sun. 02/02 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Mon. 02/03 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	3	23	4	27	7	50	6	58	3	56	9	114
12:15	5	34	0	17	5	51	12	51	1	72	13	123
12:30	5	30	5	23	10	53	2	60	0	58	2	118
12:45	3	22	2	22	5	44	2	73	0	66	2	139
01:00	3	23	3	29	6	52	1	74	1	63	2	137
01:15	4	17	0	16	4	33	1	71	1	55	2	126
01:30	1	17	0	24	1	41	0	61	1	48	1	109
01:45	1	15	1	23	2	38	0	58	1	42	1	100
02:00	1	20	0	18	1	38	0	60	1	46	1	106
02:15	1	24	0	18	1	42	0	42	1	62	1	104
02:30	0	20	2	32	2	52	1	62	0	48	1	110
02:45	0	22	2	29	2	51	0	54	2	51	2	105
03:00	0	17	0	29	0	46	1	93	1	43	2	136
03:15	0	29	0	12	0	41	1	103	0	60	1	163
03:30	1	15	0	18	1	33	0	164	5	43	5	207
03:45	2	19	2	16	4	35	0	157	3	41	3	198
04:00	0	18	2	19	2	37	0	292	2	43	2	335
04:15	0	20	3	20	3	40	3	142	3	37	6	179
04:30	0	19	1	22	1	41	2	233	7	70	9	303
04:45	1	21	1	31	2	52	1	186	16	59	17	245
05:00	1	18	1	19	2	37	3	274	18	68	21	342
05:15	1	20	3	17	4	37	1	225	32	58	33	283
05:30	1	14	3	17	4	31	7	193	37	64	44	257
05:45	2	13	2	18	4	31	6	124	63	59	69	183
06:00	2	13	9	19	11	32	5	116	89	41	94	157
06:15	2	10	9	18	11	28	19	74	164	48	183	122
06:30	2	9	12	25	14	35	28	74	243	29	271	103
06:45	5	12	24	28	30	40	47	46	358	28	405	74
07:00	4	13	3	13	7	26	40	46	329	22	369	68
07:15	14	9	4	15	18	24	45	28	315	21	360	49
07:30	6	10	12	8	18	18	49	31	293	14	342	45
07:45	16	5	22	12	38	17	49	15	269	12	318	27
08:00	10	7	19	9	29	16	68	16	227	13	295	29
08:15	16	6	16	14	32	20	67	16	149	17	216	33
08:30	13	10	15	7	28	17	61	13	91	12	152	25
08:45	12	10	37	8	49	18	39	9	90	10	129	19
09:00	11	11	25	4	36	15	45	10	79	13	124	23
09:15	8	9	33	6	41	15	38	12	62	5	100	17
09:30	5	7	16	7	21	14	51	6	63	16	114	22
09:45	14	10	23	5	37	15	67	14	74	5	141	19
10:00	8	8	22	9	30	17	46	5	58	4	104	9
10:15	17	9	17	10	34	19	35	10	60	14	95	24
10:30	15	2	19	24	34	26	38	8	41	24	79	32
10:45	16	4	18	13	34	17	49	7	49	26	98	33
11:00	27	9	33	3	60	12	36	9	57	1	93	10
11:15	20	7	15	9	35	16	50	12	56	5	106	17
11:30	18	6	10	1	28	7	42	19	69	5	111	24
11:45	27	8	21	6	48	14	65	12	93	6	158	18
Totals	325	694	471	790	796	1484	1129	3518	3577	1703	4706	5221
Day Totals	1019		1261		2280		4647		5280		9927	
% Total	14.2%	30.4%	20.6%	34.6%			11.3%	35.4%	36.0%	17.1%		
Peaks	11:00	00:00	08:45	02:15	11:00	00:15	07:45	04:30	06:45	00:15	06:45	04:30
Volume	92	109	111	108	171	200	245	918	1295	259	1476	1173
P.H.F.	.85	.80	.75	.84	.71	.94	.90	.83	.90	.89	.91	.85

Technician:
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS7-7
Page : 5

Location :On East Jemez 500' West of Royal Crest

Both directions

Begin Time	Tues. 02/04 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Wed. 02/05 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	8	66	0	56	8	122	3	49	1	75	4	124
12:15	10	56	4	62	14	118	10	46	1	89	11	135
12:30	6	62	1	67	7	129	5	60	0	57	5	117
12:45	3	62	3	56	6	118	0	68	1	50	1	118
01:00	1	73	1	67	2	140	0	69	1	44	1	113
01:15	0	76	0	61	0	137	1	57	2	57	3	114
01:30	1	58	1	40	2	98	3	48	4	51	7	99
01:45	2	56	0	48	2	104	0	51	0	48	0	99
02:00	0	68	1	49	1	117	1	56	4	47	5	103
02:15	2	62	1	51	3	113	0	56	0	50	0	106
02:30	0	75	0	67	0	142	0	67	4	52	4	119
02:45	2	85	0	62	2	147	0	64	2	75	2	139
03:00	1	106	1	45	2	151	1	84	1	59	2	143
03:15	0	120	0	50	0	170	2	115	0	41	2	156
03:30	2	190	2	53	4	243	2	192	3	56	5	248
03:45	0	168	4	39	4	207	1	149	6	36	7	185
04:00	0	281	1	32	1	313	1	300	4	30	5	330
04:15	0	177	4	46	4	223	2	162	3	47	5	209
04:30	1	220	4	65	5	285	1	262	6	66	7	328
04:45	1	181	18	65	19	246	3	173	19	63	22	236
05:00	2	242	15	74	17	316	3	270	16	65	19	335
05:15	6	224	25	59	31	283	2	203	19	70	21	273
05:30	4	172	45	58	49	230	4	203	51	61	55	264
05:45	6	105	74	51	80	156	8	136	65	75	73	211
06:00	13	121	80	53	93	174	8	109	72	34	80	143
06:15	10	92	146	40	156	132	17	98	173	38	190	136
06:30	22	64	261	38	283	102	24	70	237	29	261	99
06:45	43	50	354	42	397	92	30	53	361	35	391	88
07:00	38	37	324	17	362	54	59	32	330	20	389	52
07:15	42	30	337	26	379	56	42	22	346	11	388	33
07:30	50	33	272	12	322	45	61	34	274	12	335	46
07:45	90	19	282	10	372	29	67	20	281	15	348	35
08:00	66	22	205	10	271	32	69	23	257	11	326	34
08:15	64	13	146	7	210	20	68	18	144	7	212	25
08:30	57	18	107	8	164	26	58	14	94	9	152	23
08:45	57	18	98	3	155	21	42	11	105	10	147	21
09:00	39	11	74	11	113	22	49	13	76	8	125	21
09:15	58	20	78	12	136	32	41	10	58	8	99	18
09:30	42	10	83	14	125	24	37	12	68	14	105	26
09:45	26	13	92	2	118	15	48	6	65	5	113	11
10:00	51	7	50	11	101	18	33	9	57	10	90	19
10:15	42	5	68	13	110	18	41	11	53	17	94	28
10:30	39	4	54	20	93	24	36	3	38	20	74	23
10:45	45	8	58	20	103	28	28	5	48	19	76	24
11:00	45	8	64	9	109	17	39	8	53	6	92	14
11:15	45	17	57	0	102	17	36	21	66	3	102	24
11:30	37	10	58	1	95	11	55	11	55	5	110	16
11:45	56	13	79	3	135	16	62	17	71	2	133	19
Totals	1135	3628	3632	1705	4767	5333	1103	3570	3595	1712	4698	5282
Day Totals	4763		5337		10100		4673		5307		9980	
% Total	11.2%	35.9%	35.9%	16.8%			11.0%	35.7%	36.0%	17.1%		
Peaks	07:45	04:30	06:45	04:30	06:45	04:30	07:30	04:30	06:45	00:00	06:45	04:30
Volume	277	867	1287	263	1460	1130	265	908	1311	271	1503	1172
P.H.F.	.76	.89	.90	.88	.91	.89	.96	.84	.90	.76	.96	.87

Technician:Jm
Location :On East Jemez 500' West of
Royal Crest

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS7-7
Page : 6

Both directions

Begin Time	Thur. 02/06 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Fri. 02/07 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	4	67	2	71	6	138	*	*	*	*	*	*
12:15	10	54	1	57	11	111	*	*	*	*	*	*
12:30	6	65	1	60	7	125	*	*	*	*	*	*
12:45	5	70	0	66	5	136	*	*	*	*	*	*
01:00	4	*	1	*	5	*	*	*	*	*	*	*
01:15	1	*	2	*	3	*	*	*	*	*	*	*
01:30	0	*	2	*	2	*	*	*	*	*	*	*
01:45	0	*	0	*	0	*	*	*	*	*	*	*
02:00	0	*	1	*	1	*	*	*	*	*	*	*
02:15	2	*	0	*	2	*	*	*	*	*	*	*
02:30	1	*	0	*	1	*	*	*	*	*	*	*
02:45	0	*	0	*	0	*	*	*	*	*	*	*
03:00	0	*	2	*	2	*	*	*	*	*	*	*
03:15	0	*	1	*	1	*	*	*	*	*	*	*
03:30	0	*	3	*	3	*	*	*	*	*	*	*
03:45	1	*	3	*	4	*	*	*	*	*	*	*
04:00	2	*	3	*	5	*	*	*	*	*	*	*
04:15	1	*	3	*	4	*	*	*	*	*	*	*
04:30	2	*	6	*	8	*	*	*	*	*	*	*
04:45	2	*	19	*	21	*	*	*	*	*	*	*
05:00	1	*	11	*	12	*	*	*	*	*	*	*
05:15	6	*	35	*	41	*	*	*	*	*	*	*
05:30	3	*	36	*	39	*	*	*	*	*	*	*
05:45	4	*	74	*	78	*	*	*	*	*	*	*
06:00	16	*	80	*	96	*	*	*	*	*	*	*
06:15	13	*	136	*	149	*	*	*	*	*	*	*
06:30	24	*	256	*	280	*	*	*	*	*	*	*
06:45	57	*	365	*	422	*	*	*	*	*	*	*
07:00	44	*	323	*	367	*	*	*	*	*	*	*
07:15	40	*	317	*	357	*	*	*	*	*	*	*
07:30	46	*	259	*	305	*	*	*	*	*	*	*
07:45	74	*	300	*	374	*	*	*	*	*	*	*
08:00	77	*	212	*	289	*	*	*	*	*	*	*
08:15	78	*	150	*	228	*	*	*	*	*	*	*
08:30	59	*	101	*	160	*	*	*	*	*	*	*
08:45	70	*	100	*	170	*	*	*	*	*	*	*
09:00	58	*	72	*	130	*	*	*	*	*	*	*
09:15	31	*	59	*	90	*	*	*	*	*	*	*
09:30	42	*	84	*	126	*	*	*	*	*	*	*
09:45	39	*	87	*	126	*	*	*	*	*	*	*
10:00	43	*	51	*	94	*	*	*	*	*	*	*
10:15	43	*	49	*	92	*	*	*	*	*	*	*
10:30	42	*	41	*	83	*	*	*	*	*	*	*
10:45	36	*	51	*	87	*	*	*	*	*	*	*
11:00	38	*	59	*	97	*	*	*	*	*	*	*
11:15	47	*	69	*	116	*	*	*	*	*	*	*
11:30	50	*	67	*	117	*	*	*	*	*	*	*
11:45	53	*	72	*	125	*	*	*	*	*	*	*
Totals	1175	256	3566	254	4741	510	0	0	0	0	0	0
Day Totals	1431		3820		5251		0		0		0	
% Total	22.3%	4.8%	67.9%	4.8%			*	*	*	*		
Peaks	07:45	00:00	06:45	00:00	06:45	00:00						
Volume	288	256	1264	254	1451	510						
P.H.F.	.92	.91	.85	.89	.85	.92						

Technician: JM
Location : On Pajarito 1000' W of NM 4
Other :

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 00000000000
Start Date: 01/27/03
File I.D. : LOS10-7
Page : 1

Both directions

Begin Time	Mon. 01/27 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Tues. 01/28 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	*	76	*	39	*	115	1	64	0	35	1	99
12:15	*	57	*	44	*	101	2	45	1	54	3	99
12:30	*	33	*	54	*	87	2	47	2	63	4	110
12:45	*	44	*	66	*	110	1	32	1	53	2	85
01:00	*	33	*	45	*	78	0	39	0	54	0	93
01:15	*	22	*	38	*	60	1	23	0	37	1	60
01:30	*	33	*	37	*	70	1	34	0	42	1	76
01:45	*	29	*	26	*	55	0	22	0	22	0	44
02:00	*	26	*	24	*	50	2	33	1	27	3	60
02:15	*	23	*	15	*	38	2	38	0	25	2	63
02:30	*	23	*	21	*	44	0	37	2	30	2	67
02:45	*	57	*	23	*	80	0	42	0	26	0	68
03:00	*	41	*	26	*	67	0	55	0	29	0	84
03:15	*	85	*	23	*	108	0	108	2	22	2	130
03:30	*	111	*	24	*	135	1	130	1	32	2	162
03:45	*	111	*	25	*	136	0	88	3	23	3	111
04:00	*	181	*	24	*	205	0	159	0	18	0	177
04:15	*	107	*	18	*	125	0	85	1	17	1	102
04:30	*	203	*	21	*	226	0	199	2	18	2	217
04:45	*	157	*	33	*	190	3	179	9	15	12	194
05:00	*	251	*	19	*	270	0	251	6	20	6	271
05:15	*	259	*	14	*	273	1	230	10	17	11	247
05:30	*	304	*	24	*	328	1	296	27	25	28	321
05:45	*	177	*	16	*	193	1	193	45	21	46	214
06:00	*	155	*	13	*	168	3	155	87	17	90	172
06:15	*	98	*	16	*	114	0	128	147	16	147	144
06:30	*	91	*	17	*	108	4	69	244	28	248	97
06:45	*	60	*	15	*	75	3	54	319	18	322	72
07:00	*	45	*	12	*	57	14	47	268	13	282	60
07:15	*	44	*	15	*	59	11	51	287	11	298	62
07:30	*	37	*	13	*	50	20	31	231	10	251	41
07:45	*	28	*	6	*	34	36	29	260	5	296	34
08:00	*	23	*	4	*	27	35	21	176	7	211	28
08:15	*	20	*	5	*	25	24	18	125	6	149	24
08:30	*	14	*	5	*	19	22	20	90	4	112	24
08:45	*	27	*	6	*	33	24	13	70	4	94	17
09:00	*	19	*	8	*	27	16	23	49	6	65	29
09:15	*	20	*	3	*	23	11	68	64	5	75	73
09:30	*	7	*	4	*	11	27	26	44	1	71	27
09:45	*	13	*	1	*	14	28	23	32	7	60	30
10:00	*	9	*	7	*	16	23	9	19	4	42	13
10:15	*	14	*	2	*	16	19	3	35	4	54	7
10:30	*	7	*	8	*	15	31	7	31	8	62	15
10:45	*	3	*	4	*	7	35	9	33	5	68	14
11:00	*	1	*	1	*	2	38	2	39	0	77	2
11:15	49	3	27	0	76	3	50	4	29	0	79	4
11:30	72	3	33	1	105	4	89	1	27	1	116	2
11:45	66	5	34	0	100	5	91	5	59	0	150	5
Totals	187	3191	94	865	281	4056	673	3245	2878	905	3551	4150
Day Totals	3378		959		4337		3918		3783		7701	
% Total	4.3%	73.5%	2.1%	19.9%			8.7%	42.1%	37.3%	11.7%		
Peaks	11:00	05:00	11:00	00:15	11:00	05:00	11:00	05:00	06:30	00:15	06:45	05:00
Volume	187	991	94	209	281	1064	268	970	1118	224	1153	1053
P.H.F.	.64	.81	.69	.79	.65	.81	.73	.81	.87	.88	.89	.82

Site 7, Page 1

Technician:JM
Location :On Pajarito 1000' W of NM 4
Other :

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-6704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS10-7
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Both directions

Begin Time	Wed. 01/29 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Thur. 01/30 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	3	57	2	36	5	93	4	75	2	37	6	112
12:15	3	59	0	55	3	114	4	66	0	60	4	126
12:30	1	44	0	57	1	101	2	37	1	65	3	102
12:45	2	47	2	55	4	102	2	42	1	68	3	110
01:00	1	33	0	55	1	88	0	52	2	43	2	95
01:15	1	27	0	30	1	57	0	36	0	36	0	72
01:30	1	41	1	27	2	68	0	33	0	42	0	75
01:45	0	24	0	29	0	53	0	19	0	16	0	35
02:00	1	38	0	28	1	66	1	29	1	36	2	65
02:15	2	35	1	23	3	58	0	33	0	26	0	59
02:30	1	42	0	40	1	82	1	45	2	34	3	79
02:45	0	42	0	26	0	68	0	47	1	37	1	84
03:00	1	44	2	24	3	68	1	52	0	26	1	78
03:15	0	107	1	26	1	133	1	86	1	36	2	122
03:30	2	120	0	27	2	147	3	136	2	31	5	167
03:45	0	65	2	30	2	95	1	91	3	32	4	123
04:00	0	173	0	28	0	201	0	183	1	26	1	209
04:15	0	123	1	28	1	151	0	123	2	18	2	141
04:30	0	184	3	18	3	202	0	154	2	24	2	178
04:45	0	161	2	24	2	185	0	180	2	21	2	201
05:00	3	225	8	16	11	241	1	241	8	17	9	258
05:15	2	298	11	19	13	317	1	283	11	32	12	315
05:30	2	302	33	21	35	323	0	293	18	35	18	328
05:45	1	214	45	8	46	222	3	203	49	30	52	233
06:00	2	142	87	19	89	161	2	112	69	20	71	132
06:15	2	114	137	19	139	133	0	118	149	16	149	134
06:30	9	84	247	17	256	101	5	74	246	17	251	91
06:45	11	64	331	21	342	85	9	75	331	9	340	84
07:00	9	44	272	15	281	59	13	47	256	14	269	61
07:15	22	41	279	8	301	49	17	44	273	13	290	57
07:30	23	38	226	9	249	47	42	41	257	9	299	50
07:45	27	36	272	10	299	46	41	36	273	13	314	49
08:00	24	21	189	13	213	34	17	38	176	4	193	42
08:15	17	30	126	6	143	36	25	30	103	8	128	38
08:30	17	21	83	8	100	29	21	35	87	14	108	49
08:45	16	31	60	6	76	37	10	33	66	4	76	37
09:00	20	19	33	10	53	29	13	11	37	3	50	14
09:15	13	17	33	6	46	23	18	17	32	7	50	24
09:30	21	13	34	7	55	20	17	14	32	2	49	16
09:45	23	13	28	6	51	19	31	11	45	8	76	19
10:00	22	15	31	2	53	17	26	8	30	5	56	13
10:15	20	5	24	2	44	7	38	13	36	3	74	16
10:30	24	7	35	6	59	13	19	11	24	7	43	18
10:45	21	4	28	10	49	14	32	2	37	11	69	13
11:00	35	4	22	0	57	4	41	3	42	0	83	3
11:15	47	3	28	0	75	3	53	3	33	2	86	5
11:30	63	0	34	2	97	2	87	3	33	0	120	3
11:45	78	2	33	0	111	2	87	7	40	0	127	7
Totals	593	3273	2786	932	3379	4205	690	3325	2816	1017	3506	4342
Day Totals	3866		3718		7584		4015		3833		7848	
% Total	7.8%	43.1%	36.7%	12.2%			8.7%	42.3%	35.8%	12.9%		
Peaks	11:00	05:00	06:30	00:15	06:30	05:00	11:00	05:00	06:45	00:15	06:45	05:00
Volume	223	1039	1129	222	1180	1103	268	1020	1117	236	1198	1134
P.H.F.	.71	.86	.85	.97	.86	.85	.77	.87	.84	.86	.88	.86

Technician:JM
Location :On Pajarito 1000' W of NM 4
Other :

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS10-7
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Both directions

Begin Time	Fri. 01/31 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Sat. 02/01 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	3	50	2	28	5	78	7	26	6	21	13	47
12:15	2	57	1	35	3	92	7	31	1	24	8	55
12:30	1	45	1	46	2	91	5	25	1	14	6	39
12:45	0	53	0	34	0	87	0	28	1	19	1	47
01:00	0	54	1	46	1	100	3	23	1	26	4	49
01:15	0	31	0	31	0	62	0	23	1	17	1	40
01:30	3	44	0	34	3	78	1	15	2	14	3	29
01:45	1	32	0	35	1	67	0	25	0	13	0	38
02:00	0	39	0	25	0	64	0	17	0	16	0	33
02:15	1	40	1	18	2	58	0	25	1	23	1	48
02:30	2	56	0	42	2	98	3	25	0	30	3	55
02:45	0	61	0	21	0	82	1	28	0	22	1	50
03:00	0	63	0	26	0	89	0	29	1	14	1	43
03:15	2	110	0	28	2	138	0	22	0	11	0	33
03:30	1	138	2	30	3	168	1	17	3	21	4	38
03:45	0	106	0	20	0	126	0	26	1	20	1	46
04:00	0	165	2	17	2	182	0	23	0	17	0	40
04:15	4	101	2	11	6	112	0	21	0	17	0	38
04:30	0	104	4	17	4	121	0	14	0	16	0	30
04:45	1	100	3	20	4	120	2	23	0	24	2	47
05:00	1	124	13	25	14	149	0	25	0	23	0	48
05:15	0	125	6	22	6	147	0	20	0	21	0	41
05:30	0	99	14	30	14	129	0	28	0	17	0	45
05:45	1	73	36	11	37	84	0	17	7	24	7	41
06:00	1	49	42	12	43	61	0	19	5	19	5	38
06:15	1	48	80	25	81	73	0	21	6	21	6	42
06:30	4	41	139	12	143	53	1	27	18	19	19	46
06:45	10	24	158	18	168	42	3	8	21	17	24	25
07:00	12	15	158	12	170	27	4	21	8	21	12	42
07:15	18	28	170	11	188	39	1	10	14	9	15	19
07:30	20	17	140	9	160	26	3	10	21	7	24	17
07:45	20	21	194	13	214	34	10	8	19	3	29	11
08:00	17	9	143	10	160	19	15	15	20	3	35	18
08:15	26	15	77	14	103	29	5	18	15	7	20	25
08:30	19	21	79	4	98	25	15	14	20	5	35	19
08:45	15	16	61	8	76	24	14	8	26	3	40	11
09:00	16	19	42	7	58	26	19	11	29	7	48	18
09:15	18	10	45	5	63	15	13	13	16	7	29	20
09:30	21	11	46	8	67	19	15	25	20	3	35	29
09:45	17	12	38	11	55	23	21	41	24	12	45	53
10:00	25	7	22	9	47	16	28	15	17	7	45	22
10:15	20	7	32	7	52	14	34	8	13	5	47	13
10:30	29	7	22	12	51	19	20	11	31	8	51	19
10:45	28	5	23	7	51	12	25	11	24	10	49	21
11:00	45	6	35	6	80	12	29	3	12	0	41	3
11:15	58	13	22	7	80	20	22	13	21	4	43	17
11:30	48	18	39	5	87	23	22	3	20	4	42	7
11:45	49	12	20	2	69	14	26	11	24	4	50	15
Totals	560	2301	1915	886	2475	3187	375	901	470	669	845	1570
Day Totals	2861		2801		5662		1276		1139		2415	
% Total	9.8%	40.6%	33.8%	15.6%			15.5%	37.3%	19.4%	27.7%		
Peaks	11:00	03:15	07:00	00:15	07:00	03:15	10:15	00:00	08:30	02:00	10:00	02:15
Volume	200	519	662	161	732	614	108	110	91	91	192	196
P.H.F.	.86	.78	.85	.87	.85	.84	.79	.88	.78	.75	.94	.89

Technician: JM
Location: On Pajarito 1000' W of NM 4
Other :

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS10-7
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Both directions

Begin Time	Sun. 02/02 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Mon. 02/03 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	11	38	6	29	17	67	8	79	0	57	8	136
12:15	4	33	3	25	7	58	1	56	1	50	2	106
12:30	4	62	3	20	7	82	3	47	2	52	5	99
12:45	3	33	3	23	6	56	0	51	0	75	0	126
01:00	2	28	3	17	5	45	2	48	1	58	3	106
01:15	1	20	1	17	2	37	2	45	1	41	3	86
01:30	4	21	1	11	5	32	2	28	0	35	2	63
01:45	0	22	1	22	1	44	2	36	0	30	2	66
02:00	1	13	2	16	3	29	0	36	1	32	1	68
02:15	1	25	0	16	1	41	1	24	0	26	1	50
02:30	1	30	2	30	3	60	0	30	0	33	0	63
02:45	3	16	1	21	4	37	0	42	1	29	1	71
03:00	0	23	0	23	0	46	0	57	0	56	0	113
03:15	0	23	0	9	0	32	2	57	0	25	2	82
03:30	1	23	0	18	1	41	0	116	0	20	0	136
03:45	0	35	0	20	0	55	0	58	2	26	2	84
04:00	0	20	0	15	0	35	0	168	0	14	0	182
04:15	0	21	2	15	2	36	0	118	2	18	2	136
04:30	1	14	3	24	4	38	1	155	3	30	4	185
04:45	2	20	0	17	2	37	1	180	2	13	3	193
05:00	0	21	1	14	1	35	0	276	14	65	14	341
05:15	0	21	0	23	0	44	2	270	13	20	15	290
05:30	0	26	0	13	0	39	1	316	27	33	28	349
05:45	2	28	1	10	3	38	0	209	39	22	39	231
06:00	1	17	1	20	2	37	3	127	57	20	60	147
06:15	0	17	4	20	4	37	3	122	139	11	142	133
06:30	0	18	17	20	17	38	5	83	255	17	260	100
06:45	0	22	5	14	5	36	7	65	355	14	362	79
07:00	3	6	4	8	7	14	15	42	269	11	284	53
07:15	4	11	3	13	7	24	10	35	247	18	257	53
07:30	5	9	12	8	17	17	25	28	235	6	260	34
07:45	6	10	19	7	25	17	52	33	221	10	273	43
08:00	6	7	7	8	13	15	25	22	186	6	211	28
08:15	10	9	21	10	31	19	28	22	113	6	141	28
08:30	9	12	36	5	45	17	26	25	90	4	116	29
08:45	21	26	35	14	56	40	26	27	68	8	94	35
09:00	13	31	27	7	40	38	23	18	44	11	67	29
09:15	15	16	25	3	40	19	23	10	56	1	79	11
09:30	12	8	13	4	25	12	16	11	44	3	60	14
09:45	10	20	22	6	32	26	41	15	40	5	81	20
10:00	21	11	33	7	54	18	28	10	37	9	65	19
10:15	19	8	20	6	39	14	41	5	37	5	78	10
10:30	27	5	26	14	53	19	22	4	34	5	56	9
10:45	23	4	31	7	54	11	27	5	27	10	54	15
11:00	23	3	31	2	54	5	34	0	26	0	60	0
11:15	33	3	28	5	61	8	47	2	38	2	85	4
11:30	26	9	26	6	52	15	67	6	33	0	100	6
11:45	28	7	19	1	47	8	60	11	43	3	103	14
Totals	356	905	498	663	854	1568	682	3230	2803	1045	3485	4275
Day Totals	1261		1161		2422		3912		3848		7760	
% Total	14.7%	37.3%	20.5%	27.3%			8.7%	41.6%	36.1%	13.4%		
Peaks	11:00	00:00	08:30	00:00	10:30	00:00	11:00	05:00	06:30	00:15	06:30	05:00
Volume	110	156	123	97	222	263	208	1071	1126	235	1183	1211
P.H.F.	.83	.66	.85	.83	.90	.80	.77	.84	.79	.78	.80	.86

Technician: JM
Location: On Pajarito 1000' W of NM 4
Other :

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS10-7
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Both directions

Begin Time	Tues. 02/04 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Wed. 02/05 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	4	75	0	34	4	109	3	79	0	48	3	127
12:15	3	54	4	52	7	106	2	64	0	64	2	128
12:30	2	50	2	71	4	121	2	44	0	56	2	100
12:45	0	30	0	61	0	91	0	44	2	66	2	110
01:00	1	32	0	69	1	101	1	37	0	75	1	112
01:15	2	29	2	35	4	64	1	40	0	49	1	89
01:30	0	33	1	29	1	62	1	31	0	39	1	70
01:45	0	41	0	27	0	68	0	31	0	35	0	66
02:00	1	29	1	23	2	52	1	41	0	25	1	66
02:15	0	24	0	24	0	48	1	27	0	26	1	53
02:30	0	71	0	39	0	110	1	40	0	27	1	67
02:45	0	54	0	31	0	85	1	37	0	35	1	72
03:00	0	75	1	30	1	105	0	50	0	22	0	72
03:15	2	81	0	40	2	121	0	94	1	26	1	120
03:30	1	168	2	24	3	192	1	115	1	19	2	134
03:45	0	109	1	24	1	133	1	82	1	24	2	106
04:00	0	184	1	32	1	216	0	163	1	22	1	185
04:15	1	138	1	14	2	152	1	132	1	21	2	153
04:30	0	157	4	9	4	166	0	175	1	13	1	188
04:45	0	157	5	21	5	178	0	171	1	20	1	191
05:00	1	224	7	19	8	243	2	214	11	18	13	232
05:15	0	236	12	17	12	253	0	278	14	29	14	307
05:30	1	223	22	36	23	259	2	303	24	36	26	339
05:45	2	166	45	18	47	184	2	194	48	20	50	214
06:00	1	149	54	14	55	163	0	142	62	24	62	166
06:15	7	114	146	15	153	129	2	113	141	12	143	125
06:30	10	76	272	15	282	91	10	98	262	16	272	114
06:45	10	75	317	13	327	88	6	69	335	22	341	91
07:00	9	44	271	18	280	62	11	49	282	14	293	63
07:15	11	50	279	11	290	61	18	40	256	7	274	47
07:30	23	28	244	6	267	34	17	36	236	12	253	48
07:45	49	53	215	8	264	61	47	42	255	11	302	53
08:00	33	25	209	11	242	36	27	25	196	7	223	32
08:15	23	19	122	8	145	27	27	32	106	12	133	44
08:30	15	30	77	11	92	41	18	25	92	11	110	36
08:45	23	23	64	9	87	32	23	23	73	7	96	30
09:00	25	20	48	8	73	28	25	13	46	7	71	20
09:15	24	34	40	5	64	39	15	19	40	6	55	25
09:30	27	14	35	4	62	18	18	14	33	5	51	19
09:45	24	18	44	1	68	19	31	11	47	10	78	21
10:00	26	15	23	6	49	21	22	5	33	6	55	11
10:15	32	7	31	5	63	12	20	3	29	1	49	4
10:30	21	8	23	5	44	13	20	5	25	5	45	10
10:45	34	7	35	5	69	12	25	3	29	8	54	11
11:00	38	5	27	3	65	8	36	4	26	1	62	5
11:15	37	6	26	0	63	6	50	2	26	1	76	3
11:30	73	3	37	3	110	6	55	1	32	5	87	6
11:45	79	10	34	2	113	12	90	2	49	1	139	3
Totals	675	3273	2784	965	3459	4238	636	3262	2817	1026	3453	4288
Day Totals	3948		3749		7697		3898		3843		7741	
% Total	8.7%	42.5%	36.1%	12.5%			8.2%	42.1%	36.3%	13.2%		
Peaks	11:00	05:00	06:30	00:15	06:30	05:00	11:00	05:00	06:30	00:15	06:30	05:00
Volume	227	849	1139	253	1179	939	231	989	1135	261	1180	1092
P.H.F.	.71	.89	.89	.89	.90	.90	.64	.81	.84	.87	.86	.80

Technician: JM
Location : On Pajarito 1000' W of NM 4
Other : 3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS10-7
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Both directions

Begin Time	Thur. 02/06 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Fri. 02/07 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	4	85	0	38	4	123	*	*	*	*	*	*
12:15	8	*	1	*	9	*	*	*	*	*	*	*
12:30	1	*	0	*	1	*	*	*	*	*	*	*
12:45	2	*	1	*	3	*	*	*	*	*	*	*
01:00	1	*	0	*	1	*	*	*	*	*	*	*
01:15	0	*	0	*	0	*	*	*	*	*	*	*
01:30	2	*	0	*	2	*	*	*	*	*	*	*
01:45	1	*	0	*	1	*	*	*	*	*	*	*
02:00	1	*	0	*	1	*	*	*	*	*	*	*
02:15	0	*	0	*	0	*	*	*	*	*	*	*
02:30	0	*	0	*	0	*	*	*	*	*	*	*
02:45	0	*	0	*	0	*	*	*	*	*	*	*
03:00	0	*	1	*	1	*	*	*	*	*	*	*
03:15	0	*	1	*	1	*	*	*	*	*	*	*
03:30	1	*	0	*	1	*	*	*	*	*	*	*
03:45	0	*	3	*	3	*	*	*	*	*	*	*
04:00	1	*	0	*	1	*	*	*	*	*	*	*
04:15	0	*	2	*	2	*	*	*	*	*	*	*
04:30	0	*	0	*	0	*	*	*	*	*	*	*
04:45	0	*	2	*	2	*	*	*	*	*	*	*
05:00	1	*	9	*	10	*	*	*	*	*	*	*
05:15	1	*	14	*	15	*	*	*	*	*	*	*
05:30	0	*	23	*	23	*	*	*	*	*	*	*
05:45	1	*	55	*	56	*	*	*	*	*	*	*
06:00	1	*	55	*	56	*	*	*	*	*	*	*
06:15	4	*	143	*	147	*	*	*	*	*	*	*
06:30	5	*	271	*	276	*	*	*	*	*	*	*
06:45	7	*	318	*	325	*	*	*	*	*	*	*
07:00	12	*	262	*	274	*	*	*	*	*	*	*
07:15	16	*	291	*	307	*	*	*	*	*	*	*
07:30	24	*	272	*	296	*	*	*	*	*	*	*
07:45	31	*	262	*	293	*	*	*	*	*	*	*
08:00	18	*	203	*	221	*	*	*	*	*	*	*
08:15	13	*	104	*	117	*	*	*	*	*	*	*
08:30	14	*	90	*	104	*	*	*	*	*	*	*
08:45	24	*	61	*	85	*	*	*	*	*	*	*
09:00	11	*	47	*	58	*	*	*	*	*	*	*
09:15	21	*	32	*	53	*	*	*	*	*	*	*
09:30	20	*	38	*	58	*	*	*	*	*	*	*
09:45	37	*	32	*	69	*	*	*	*	*	*	*
10:00	24	*	28	*	52	*	*	*	*	*	*	*
10:15	26	*	24	*	50	*	*	*	*	*	*	*
10:30	31	*	22	*	53	*	*	*	*	*	*	*
10:45	36	*	35	*	71	*	*	*	*	*	*	*
11:00	30	*	27	*	57	*	*	*	*	*	*	*
11:15	50	*	35	*	85	*	*	*	*	*	*	*
11:30	75	*	28	*	103	*	*	*	*	*	*	*
11:45	74	*	55	*	129	*	*	*	*	*	*	*
Totals	629	85	2847	38	3476	123	0	0	0	0	0	0
Day Totals	714		2885		3599		0		0		0	
% Total	17.4%	2.3%	79.1%	1.0%			*	*	*	*		
Peaks	11:00	00:00	06:45	00:00	06:45	00:00						
Volume	229	85	1143	38	1202	123						
P.H.F.	.76	.25	.89	.25	.92	.25						

Technician: JM
Location: On Pajarito 500' W of TA 51
Other :

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS11-7
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Both directions

Begin Time	Mon. 01/27 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Tues. 01/28 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	*	75	*	44	*	119	5	83	1	37	6	120
12:15	*	52	*	49	*	101	3	45	3	49	6	94
12:30	*	43	*	57	*	100	3	47	3	59	6	106
12:45	*	52	*	67	*	119	2	48	3	66	5	114
01:00	*	52	*	63	*	115	3	55	1	62	4	117
01:15	*	35	*	57	*	92	0	52	1	42	1	94
01:30	*	44	*	36	*	80	2	35	0	44	2	79
01:45	*	36	*	43	*	79	1	32	0	45	1	77
02:00	*	32	*	26	*	58	3	46	0	26	3	72
02:15	*	36	*	36	*	72	2	39	2	35	4	74
02:30	*	47	*	32	*	79	0	52	1	34	1	86
02:45	*	64	*	26	*	90	0	56	0	43	0	99
03:00	*	53	*	33	*	86	1	71	1	32	2	103
03:15	*	104	*	34	*	138	0	115	5	46	5	161
03:30	*	102	*	47	*	149	1	122	2	45	3	167
03:45	*	123	*	37	*	160	2	113	3	37	5	150
04:00	*	146	*	27	*	173	0	123	1	35	1	158
04:15	*	102	*	26	*	128	2	85	1	27	3	112
04:30	*	207	*	41	*	248	1	190	4	42	5	232
04:45	*	143	*	49	*	192	2	162	7	35	9	197
05:00	*	257	*	37	*	294	1	240	9	35	10	275
05:15	*	261	*	27	*	288	5	240	8	33	13	273
05:30	*	270	*	31	*	301	6	268	17	28	23	296
05:45	*	154	*	23	*	177	1	168	46	25	47	193
06:00	*	143	*	23	*	166	10	146	64	22	74	168
06:15	*	88	*	15	*	103	6	104	118	22	124	126
06:30	*	75	*	21	*	96	11	73	201	29	212	102
06:45	*	60	*	18	*	78	28	53	274	27	302	80
07:00	*	47	*	12	*	59	24	51	253	11	277	62
07:15	*	33	*	16	*	49	32	47	238	13	270	60
07:30	*	42	*	18	*	60	37	30	243	10	280	40
07:45	*	26	*	5	*	31	64	21	251	3	315	24
08:00	*	24	*	8	*	32	44	25	205	9	249	34
08:15	*	21	*	4	*	25	45	15	142	10	187	25
08:30	*	14	*	4	*	18	25	22	103	5	128	27
08:45	*	29	*	8	*	37	41	17	83	5	124	22
09:00	*	18	*	8	*	26	24	22	56	2	80	24
09:15	*	19	*	4	*	23	28	65	67	8	95	73
09:30	*	10	*	4	*	14	40	33	48	2	88	35
09:45	*	14	*	2	*	16	31	19	48	9	79	28
10:00	*	11	*	8	*	19	34	5	36	4	70	10
10:15	*	13	*	3	*	16	33	6	37	3	70	9
10:30	*	5	*	3	*	8	52	9	43	3	95	12
10:45	*	5	*	3	*	8	42	6	52	3	94	9
11:00	*	2	*	3	*	5	46	4	50	1	95	5
11:15	*	3	*	3	*	6	66	7	44	4	110	11
11:30	66	4	52	3	118	7	77	5	39	2	116	7
11:45	75	4	37	4	112	8	84	2	57	6	141	8
Totals	141	3200	89	1148	230	4348	970	3275	2871	1175	3841	4450
Day Totals	3341		1237		4578		4245		4046		8291	
% Total	3.0%	69.9%	1.9%	25.0%			11.7%	39.5%	34.6%	14.1%		
Peaks	11:00	05:00	11:00	00:30	11:00	04:45	11:00	05:00	06:45	00:15	07:00	04:45
Volume	141	942	89	244	230	1075	273	916	1008	236	1142	1041
P.H.F.	.47	.87	.42	.91	.48	.89	.81	.85	.91	.89	.90	.87

Site 8, Page 1

Technician: JM
Location : On Palantto 500' W of TA 51
Other :

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS11-7
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Both directions

Begin Time	Wed. 01/29 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Thur. 01/30 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	3	72	3	37	6	109	4	91	5	43	9	134
12:15	4	58	1	44	5	102	1	60	2	55	3	115
12:30	1	44	1	70	2	114	2	47	0	60	2	107
12:45	4	59	2	54	6	113	1	57	4	78	5	135
01:00	1	40	2	65	3	105	1	67	2	59	3	126
01:15	1	68	1	44	2	112	1	70	3	51	4	121
01:30	2	42	1	42	3	84	0	34	0	41	0	75
01:45	0	32	1	43	1	75	1	46	0	38	1	84
02:00	2	51	0	30	2	81	1	46	2	37	3	83
02:15	1	53	1	35	2	88	2	32	2	38	4	70
02:30	1	51	0	49	1	100	1	52	1	38	2	90
02:45	1	50	0	36	1	86	2	62	0	43	2	105
03:00	2	64	3	37	5	101	2	56	1	40	3	96
03:15	4	132	0	36	4	168	1	114	1	50	2	164
03:30	0	108	2	39	2	147	1	121	2	40	3	161
03:45	0	73	3	51	3	124	0	107	1	50	1	157
04:00	0	142	0	35	0	177	0	152	3	47	3	199
04:15	1	110	0	39	1	149	0	117	0	34	0	151
04:30	0	174	4	33	4	207	0	136	4	47	4	183
04:45	2	157	2	31	4	188	0	179	0	31	0	210
05:00	1	248	5	37	6	285	6	258	9	36	15	294
05:15	4	280	13	26	17	306	0	255	8	35	8	290
05:30	4	291	26	26	30	317	1	260	19	37	20	297
05:45	5	164	36	21	41	185	5	174	34	43	39	217
06:00	3	140	71	24	74	164	5	112	56	30	61	142
06:15	7	96	109	17	116	113	4	108	112	21	116	129
06:30	15	81	191	18	206	99	15	64	193	20	208	84
06:45	29	55	290	26	319	81	44	74	296	15	340	89
07:00	27	48	237	16	264	64	33	50	230	9	263	59
07:15	39	35	248	12	287	47	31	43	255	16	286	59
07:30	42	41	242	8	284	49	57	34	237	10	294	44
07:45	50	37	254	12	304	49	54	41	268	13	322	54
08:00	27	23	230	10	257	33	41	30	209	8	250	38
08:15	37	29	125	15	162	44	35	37	127	8	162	45
08:30	24	21	101	11	125	32	34	37	90	9	124	46
08:45	34	33	75	5	109	38	27	27	98	12	125	39
09:00	34	23	55	8	89	31	31	14	41	6	72	20
09:15	33	10	45	7	78	17	30	15	43	8	73	23
09:30	35	13	45	5	80	18	29	14	34	3	63	17
09:45	37	17	46	9	83	26	50	16	51	9	101	25
10:00	35	12	41	4	76	16	46	8	45	6	91	14
10:15	37	8	38	1	75	9	38	11	53	3	91	14
10:30	37	7	39	8	76	15	37	13	40	5	77	18
10:45	40	6	42	1	82	7	54	2	41	7	95	9
11:00	53	6	44	4	97	10	61	4	61	1	122	5
11:15	56	4	47	4	103	8	63	6	57	5	120	11
11:30	67	3	52	4	119	7	82	4	52	2	134	6
11:45	68	5	46	4	114	9	74	4	45	7	119	11
Totals	910	3316	2820	1193	3730	4509	1008	3361	2837	1304	3845	4665
Day Totals	4226		4013		8239		4369		4141		8510	
Total	11.0%	40.2%	34.2%	14.4%			11.8%	39.4%	33.3%	15.3%		
Peaks	11:00	05:00	06:45	00:15	06:45	04:45	11:00	04:45	06:45	00:15	06:45	05:00
Volume	244	983	1017	233	1154	1096	280	952	1018	252	1183	1098
P.H.F.	.89	.84	.87	.83	.90	.86	.85	.91	.85	.80	.86	.92

Technician: JM
Location : On Pajarito 500' W of TA 51
Other :

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS11-7
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Both directions

Begin Time	Fri. 01/31 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Sat. 02/01 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	4	62	3	37	7	99	8	33	6	22	14	55
12:15	3	65	2	41	5	106	5	26	4	22	9	48
12:30	3	49	2	52	5	101	5	28	2	14	7	42
12:45	1	74	2	34	3	108	1	29	2	17	3	46
01:00	2	68	4	63	6	131	4	30	2	23	6	53
01:15	0	46	0	35	0	81	0	16	2	18	2	34
01:30	3	49	0	32	3	81	1	16	1	17	2	33
01:45	1	43	0	47	1	90	1	32	2	12	3	44
02:00	1	50	0	30	1	80	1	17	1	16	2	33
02:15	2	49	1	32	3	81	1	25	0	22	1	47
02:30	0	50	0	43	0	93	4	24	0	24	4	48
02:45	0	69	0	40	0	109	1	27	1	26	2	53
03:00	2	79	1	39	3	118	0	30	2	16	2	46
03:15	1	119	0	44	1	163	1	25	0	14	1	39
03:30	1	141	2	48	3	189	1	25	3	19	4	44
03:45	0	98	0	41	0	139	1	24	2	28	3	52
04:00	2	145	0	29	2	174	0	22	0	16	0	38
04:15	3	84	2	15	5	99	0	19	0	19	0	38
04:30	4	105	9	23	13	128	2	18	0	18	2	36
04:45	2	107	1	18	3	125	1	22	1	18	2	40
05:00	13	123	15	39	28	162	0	26	1	28	1	54
05:15	4	112	9	27	13	139	0	28	0	22	0	50
05:30	10	94	9	32	19	126	0	30	0	22	0	52
05:45	13	68	29	18	42	86	1	14	5	28	6	42
06:00	14	43	38	12	52	55	0	26	4	16	4	42
06:15	27	54	77	21	104	75	1	20	4	25	5	45
06:30	73	37	149	19	222	56	1	26	14	24	15	50
06:45	42	27	142	14	184	41	7	13	17	12	24	25
07:00	18	21	135	20	153	41	3	18	7	24	10	42
07:15	26	21	165	12	191	33	4	11	14	12	18	23
07:30	36	26	131	12	167	38	7	8	21	7	28	15
07:45	40	15	177	13	217	28	17	15	21	6	38	21
08:00	34	11	181	13	215	24	16	19	25	7	41	26
08:15	36	17	90	12	126	29	8	14	18	7	26	21
08:30	33	24	89	11	122	35	26	13	19	5	45	18
08:45	34	21	67	7	101	28	12	10	31	4	43	14
09:00	25	16	56	8	81	24	20	11	31	6	51	17
09:15	23	13	44	5	67	18	15	15	19	10	34	25
09:30	26	10	45	12	71	22	24	36	16	6	40	42
09:45	29	16	53	9	82	25	27	39	34	11	61	50
10:00	29	3	38	14	67	17	31	10	25	10	56	20
10:15	41	9	28	10	69	19	32	10	12	3	44	13
10:30	34	10	37	10	71	20	17	11	24	7	41	18
10:45	42	6	38	5	80	11	36	14	25	7	61	21
11:00	56	7	30	5	86	12	26	6	22	4	48	10
11:15	52	16	53	10	105	26	18	17	18	7	36	24
11:30	54	17	39	5	93	22	26	4	19	6	45	10
11:45	53	12	44	9	97	21	29	10	24	10	53	20
Totals	952	2401	2037	1127	2989	3528	442	962	501	717	943	1679
Day Totals	3353		3164		6517		1404		1218		2622	
% Total	14.6%	36.8%	31.2%	17.2%			16.8%	36.6%	19.1%	27.3%		
Peaks	11:00	03:15	07:15	00:15	07:15	03:15	10:00	00:00	08:30	05:00	09:45	05:00
Volume	215	503	654	190	790	665	116	116	100	100	202	198
P.H.F.	.95	.86	.90	.75	.91	.87	.80	.87	.80	.89	.82	.91

Technician: JM
Location: On Pajarito 500' W of TA 51
Other :

3500 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 00000000000
Start Date: 01/27/03
File I.D. : LOS11-7
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Both directions

Begin Time	Sun. 02/02 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Mon. 02/03 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	7	37	5	28	12	65	2	82	6	63	8	145
12:15	5	43	3	28	8	71	0	53	1	54	1	107
12:30	3	57	4	17	7	74	6	63	3	45	9	108
12:45	5	42	3	28	8	70	2	54	3	71	5	125
01:00	5	22	7	22	12	44	5	75	4	70	9	145
01:15	4	22	1	15	5	37	3	53	0	56	3	109
01:30	2	19	3	14	5	33	2	41	1	43	3	84
01:45	1	25	2	17	3	42	1	48	0	36	1	84
02:00	1	20	2	23	3	43	0	46	0	43	0	89
02:15	2	25	1	13	3	38	1	41	1	34	2	75
02:30	2	29	0	26	2	55	1	36	1	44	2	80
02:45	3	23	1	20	4	43	0	55	1	37	1	92
03:00	1	26	3	21	4	47	2	67	1	58	3	125
03:15	0	21	0	17	0	38	2	79	0	54	2	133
03:30	0	31	0	13	0	44	0	92	0	36	0	128
03:45	0	29	0	26	0	55	0	80	3	34	3	114
04:00	0	23	0	19	0	42	0	148	0	38	0	186
04:15	0	20	1	20	1	40	0	109	0	23	0	132
04:30	2	16	3	18	5	34	1	152	3	45	4	197
04:45	3	23	1	23	4	46	1	156	2	33	3	189
05:00	1	23	3	16	4	39	1	267	10	31	11	298
05:15	0	28	1	27	1	55	4	267	16	48	20	315
05:30	0	21	0	12	0	33	2	284	19	35	21	319
05:45	2	27	0	10	2	37	0	175	35	23	35	198
06:00	1	20	1	22	2	42	6	128	44	24	50	152
06:15	1	18	4	22	5	40	5	115	104	15	109	130
06:30	1	21	11	18	12	39	12	76	188	26	200	102
06:45	2	19	4	21	6	40	22	65	308	15	330	80
07:00	4	12	5	15	9	27	35	37	244	14	279	51
07:15	10	10	5	9	15	19	31	38	251	16	282	54
07:30	12	13	19	10	31	23	44	30	214	8	258	38
07:45	7	8	21	10	28	18	81	24	221	6	302	30
08:00	7	9	15	9	22	18	38	21	199	13	237	34
08:15	9	13	19	12	28	25	47	29	122	6	169	35
08:30	11	20	28	7	39	27	36	23	112	6	148	29
08:45	22	30	43	18	65	48	32	28	80	13	112	41
09:00	11	26	31	6	42	32	45	20	63	7	108	27
09:15	19	16	24	6	43	22	32	7	64	7	96	14
09:30	15	11	14	7	29	18	41	13	61	1	102	14
09:45	12	25	21	6	33	31	53	12	42	8	95	20
10:00	23	6	29	5	52	11	48	14	48	5	96	19
10:15	27	8	28	8	55	16	48	6	40	9	88	15
10:30	25	4	23	9	48	13	37	4	48	2	85	6
10:45	30	10	30	4	60	14	36	5	42	2	78	7
11:00	21	2	29	4	50	6	40	1	34	4	74	5
11:15	36	6	30	8	66	14	63	3	51	6	114	9
11:30	31	13	20	6	51	19	72	11	58	0	130	11
11:45	26	6	20	3	46	9	64	6	48	9	112	15
Totals	412	978	518	718	930	1696	1004	3239	2796	1276	3800	4515
Day Totals	1390		1236		2626		4243		4072		8315	
% Total	15.6%	37.2%	19.7%	27.3%			12.0%	38.9%	33.6%	15.3%		
Peaks	10:45	00:00	08:30	00:00	10:45	00:00	11:00	05:00	06:45	00:30	06:45	05:00
Volume	118	179	126	101	227	280	239	993	1017	242	1149	1130
P.H.F.	.81	.78	.73	.90	.85	.94	.82	.87	.82	.85	.87	.88

Technician: JM
Location: On Pajarito 500' W of TA 51
Other :

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS11-7
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Both directions

Begin Time	Tues. 02/04 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Wed. 02/05 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	5	68	4	46	9	114	6	69	2	58	8	127
12:15	11	55	5	45	16	100	1	68	3	62	4	130
12:30	3	55	4	74	7	129	2	53	0	64	2	117
12:45	3	58	0	63	3	121	2	55	2	61	4	116
01:00	1	42	2	70	3	112	2	43	1	75	3	118
01:15	2	55	2	46	4	101	2	55	0	65	2	120
01:30	0	43	0	39	0	82	0	55	2	46	2	101
01:45	2	53	4	35	6	88	0	48	0	47	0	95
02:00	1	40	3	37	4	77	2	64	0	47	2	111
02:15	1	55	0	32	1	87	1	59	0	38	1	97
02:30	0	73	0	50	0	123	1	64	1	34	2	98
02:45	0	65	1	43	1	108	4	54	0	44	4	98
03:00	1	90	3	55	4	145	0	58	2	33	2	91
03:15	3	108	1	52	4	160	1	107	0	35	1	142
03:30	1	161	1	50	2	211	2	128	2	41	4	169
03:45	0	109	1	50	1	159	0	92	1	40	1	132
04:00	1	163	1	41	2	204	0	127	2	32	2	159
04:15	1	117	2	31	3	148	1	125	2	27	3	152
04:30	0	152	3	28	3	180	0	162	1	34	1	196
04:45	1	154	5	27	6	181	1	151	0	33	1	184
05:00	3	219	7	37	10	256	4	255	14	39	18	294
05:15	0	228	9	31	9	259	2	233	14	40	16	273
05:30	1	196	23	39	24	235	6	259	18	22	24	281
05:45	4	147	33	27	37	174	3	175	35	25	38	200
06:00	3	133	49	20	52	153	3	132	49	26	52	158
06:15	11	104	113	17	124	121	9	106	111	23	120	129
06:30	18	77	203	15	221	92	16	82	189	18	205	100
06:45	24	64	277	18	301	82	26	58	303	19	329	77
07:00	24	41	248	19	272	60	29	51	247	19	276	70
07:15	36	43	250	16	286	59	40	34	242	9	282	43
07:30	51	39	255	6	306	45	62	34	209	11	271	45
07:45	63	42	223	5	286	47	66	44	259	13	325	57
08:00	51	29	210	14	261	43	54	27	228	9	282	36
08:15	46	22	140	7	186	29	42	35	120	10	162	45
08:30	26	30	89	12	115	42	33	20	106	14	139	34
08:45	48	23	93	11	141	34	41	24	89	7	130	31
09:00	34	19	54	6	88	25	30	15	63	10	93	25
09:15	39	37	45	7	83	44	26	19	51	7	77	26
09:30	29	17	47	7	76	24	30	13	58	8	88	21
09:45	39	17	52	4	91	21	56	13	49	6	105	19
10:00	33	14	41	7	74	21	63	5	46	11	109	16
10:15	38	9	37	4	75	13	55	6	41	2	96	8
10:30	36	10	34	4	70	14	37	5	34	3	71	8
10:45	45	5	46	3	91	8	36	3	35	4	71	7
11:00	46	7	35	2	81	9	50	3	36	1	86	4
11:15	51	6	37	5	88	11	58	4	44	3	102	7
11:30	80	10	52	6	132	16	66	2	45	8	111	10
11:45	85	6	56	8	141	14	95	3	57	7	152	10
Totals	1000	3310	2800	1271	3800	4581	1066	3297	2813	1290	3879	4587
Day Totals	4310		4071		8381		4363		4103		8466	
% Total	11.9%	39.4%	33.4%	15.1%			12.5%	38.9%	33.2%	15.2%		
Peaks	11:00	04:45	06:45	00:30	06:45	04:45	11:00	05:00	06:45	00:30	07:15	05:00
Volume	262	797	1030	253	1165	931	269	922	1001	265	1160	1048
P.H.F.	.77	.87	.92	.85	.95	.89	.70	.88	.82	.88	.89	.89

Technician: JM
Location: On Pajarito 500' W of TA 51
Other : :

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS11-7

Both directions

Begin	Thur.	East		West		Combined		Fri.	East		West		Combined	
Time	02/06	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.	02/07	A.M.	P.M.	A.M.	P.M.	A.M.	P.M.
12:00		7	77	1	36	8	113		*	*	*	*	*	*
12:15		4	61	1	54	5	115		*	*	*	*	*	*
12:30		2	*	0	*	2	*		*	*	*	*	*	*
12:45		2	*	2	*	4	*		*	*	*	*	*	*
01:00		3	*	1	*	4	*		*	*	*	*	*	*
01:15		0	*	2	*	2	*		*	*	*	*	*	*
01:30		2	*	1	*	3	*		*	*	*	*	*	*
01:45		2	*	0	*	2	*		*	*	*	*	*	*
02:00		1	*	1	*	2	*		*	*	*	*	*	*
02:15		0	*	1	*	1	*		*	*	*	*	*	*
02:30		1	*	0	*	1	*		*	*	*	*	*	*
02:45		0	*	0	*	0	*		*	*	*	*	*	*
03:00		2	*	2	*	4	*		*	*	*	*	*	*
03:15		0	*	3	*	3	*		*	*	*	*	*	*
03:30		2	*	1	*	3	*		*	*	*	*	*	*
03:45		1	*	2	*	3	*		*	*	*	*	*	*
04:00		0	*	1	*	1	*		*	*	*	*	*	*
04:15		0	*	1	*	1	*		*	*	*	*	*	*
04:30		0	*	1	*	1	*		*	*	*	*	*	*
04:45		0	*	0	*	0	*		*	*	*	*	*	*
05:00		5	*	9	*	14	*		*	*	*	*	*	*
05:15		2	*	14	*	16	*		*	*	*	*	*	*
05:30		5	*	20	*	25	*		*	*	*	*	*	*
05:45		4	*	50	*	54	*		*	*	*	*	*	*
06:00		3	*	36	*	39	*		*	*	*	*	*	*
06:15		8	*	111	*	119	*		*	*	*	*	*	*
06:30		12	*	206	*	218	*		*	*	*	*	*	*
06:45		31	*	278	*	309	*		*	*	*	*	*	*
07:00		34	*	216	*	250	*		*	*	*	*	*	*
07:15		47	*	273	*	320	*		*	*	*	*	*	*
07:30		51	*	275	*	326	*		*	*	*	*	*	*
07:45		60	*	244	*	304	*		*	*	*	*	*	*
08:00		38	*	231	*	269	*		*	*	*	*	*	*
08:15		41	*	124	*	165	*		*	*	*	*	*	*
08:30		28	*	96	*	124	*		*	*	*	*	*	*
08:45		46	*	87	*	133	*		*	*	*	*	*	*
09:00		27	*	50	*	77	*		*	*	*	*	*	*
09:15		31	*	51	*	82	*		*	*	*	*	*	*
09:30		40	*	35	*	75	*		*	*	*	*	*	*
09:45		39	*	52	*	91	*		*	*	*	*	*	*
10:00		34	*	36	*	70	*		*	*	*	*	*	*
10:15		49	*	42	*	91	*		*	*	*	*	*	*
10:30		46	*	43	*	89	*		*	*	*	*	*	*
10:45		49	*	39	*	88	*		*	*	*	*	*	*
11:00		42	*	44	*	86	*		*	*	*	*	*	*
11:15		59	*	53	*	112	*		*	*	*	*	*	*
11:30		94	*	54	*	148	*		*	*	*	*	*	*
11:45		75	*	76	*	151	*		*	*	*	*	*	*
Totals		1029	138	2867	90	3896	228		0	0	0	0	0	0
Day Totals		1167		2957		4124			0		0		0	
% Total		24.9%	3.3%	69.5%	2.1%				*	*	*	*		
Peaks		11:00	00:00	06:45	00:00	07:15	00:00							
Volume		270	138	1042	90	1219	228							
P.H.F.		.71	.44	.93	.41	.93	.49							

Technician:dm
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Location: :On East Jemez 250' W of TA 53 LANSE Entrance

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LCS8-7
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Both directions

Begin Time	Mon. 01/27 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Tues. 01/28 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	*	49	*	52	*	101	3	38	3	55	6	93
12:15	*	38	*	47	*	85	4	41	2	61	6	102
12:30	*	60	*	57	*	117	2	58	2	62	4	120
12:45	*	65	*	52	*	117	3	66	4	59	7	125
01:00	*	59	*	47	*	106	1	65	3	68	4	133
01:15	*	55	*	33	*	88	0	65	1	56	1	121
01:30	*	43	*	35	*	78	2	54	1	35	3	89
01:45	*	44	*	48	*	92	1	50	3	46	4	96
02:00	*	40	*	32	*	72	0	53	1	40	1	93
02:15	*	44	*	51	*	95	0	68	0	55	0	123
02:30	*	59	*	38	*	97	0	49	0	73	0	122
02:45	*	56	*	54	*	110	0	68	1	52	1	120
03:00	*	85	*	29	*	114	1	104	1	47	2	151
03:15	*	83	*	44	*	127	2	105	0	36	2	141
03:30	*	189	*	62	*	251	0	169	3	43	3	212
03:45	*	119	*	32	*	151	0	128	2	56	2	184
04:00	*	279	*	30	*	309	1	271	3	25	4	296
04:15	*	130	*	38	*	168	1	142	3	36	4	178
04:30	*	229	*	47	*	276	0	239	10	39	10	278
04:45	*	178	*	43	*	221	2	188	8	45	10	233
05:00	*	225	*	73	*	298	4	233	24	57	28	290
05:15	*	225	*	57	*	282	1	199	25	50	26	249
05:30	*	185	*	38	*	223	3	177	39	45	42	222
05:45	*	142	*	38	*	180	2	135	67	43	69	178
06:00	*	95	*	36	*	131	8	121	96	42	104	163
06:15	*	89	*	23	*	112	14	72	144	43	158	115
06:30	*	47	*	32	*	79	26	58	211	33	237	91
06:45	*	37	*	28	*	65	32	39	336	38	368	77
07:00	*	27	*	16	*	43	38	44	254	22	292	66
07:15	*	18	*	18	*	36	40	17	345	2	385	19
07:30	*	23	*	11	*	34	43	19	276	9	319	28
07:45	*	20	*	9	*	29	56	10	285	13	341	23
08:00	*	26	*	9	*	35	64	11	208	10	272	21
08:15	*	8	*	9	*	17	59	8	132	11	191	19
08:30	*	15	*	9	*	24	58	12	75	4	133	16
08:45	*	4	*	9	*	13	46	8	91	5	137	13
09:00	*	11	*	7	*	18	51	25	66	9	117	34
09:15	*	14	*	10	*	24	38	24	90	8	128	32
09:30	*	10	*	11	*	21	30	5	87	9	117	14
09:45	*	9	*	4	*	13	47	4	88	6	135	10
10:00	*	6	*	8	*	14	54	6	75	9	129	15
10:15	40	6	56	7	96	13	38	1	58	12	96	13
10:30	38	5	46	16	84	21	40	3	35	18	75	21
10:45	33	1	43	13	76	14	37	5	37	19	74	24
11:00	26	10	53	7	79	17	38	2	49	6	87	8
11:15	27	11	70	2	97	13	39	14	73	5	112	19
11:30	39	12	63	1	102	13	39	13	78	0	117	13
11:45	39	8	70	1	109	9	61	12	76	3	137	15
Totals	242	3193	401	1373	643	4566	1029	3298	3471	1520	4500	4818
Day Totals	3435		1774		5209		4327		4991		9318	
% Total	4.6%	61.3%	7.7%	26.3%			11.0%	35.3%	37.2%	16.3%		
Peaks	10:15	04:30	11:00	04:30	11:00	04:30	07:45	04:30	06:45	00:15	06:45	04:30
Volume	137	857	256	220	387	1077	237	859	1211	250	1354	1050
P.H.F.	.85	.93	.91	.75	.88	.90	.92	.89	.87	.91	.88	.90

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Technician:JM
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS8-7
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Location. :On East Jemez 250' W of
TA 53'LANSE Entrance

Both directions

Begin Time	Wed. 01/29 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Thur. 01/30 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	7	48	2	61	9	109	7	60	2	61	9	121
12:15	4	48	4	56	8	104	4	43	1	50	5	93
12:30	2	55	2	48	4	103	6	82	0	49	6	131
12:45	1	71	2	47	3	118	0	68	1	53	1	121
01:00	1	66	0	53	1	119	0	69	0	55	0	124
01:15	1	55	0	51	1	106	0	63	0	37	0	100
01:30	0	60	1	40	1	100	1	50	1	39	2	89
01:45	0	54	3	50	3	104	1	54	0	46	1	100
02:00	2	56	1	42	3	98	0	42	0	27	0	69
02:15	2	42	0	56	2	98	0	57	0	50	0	107
02:30	1	56	0	53	1	109	0	53	0	52	0	105
02:45	0	67	2	61	2	128	1	64	2	52	3	116
03:00	1	72	0	46	1	118	0	62	2	38	2	100
03:15	1	88	1	73	2	161	2	107	2	25	4	132
03:30	1	168	2	50	3	218	0	161	1	42	1	203
03:45	2	140	4	40	6	180	1	147	3	43	4	190
04:00	0	272	1	36	1	308	2	212	0	42	2	254
04:15	2	151	3	42	5	193	0	136	5	31	5	167
04:30	0	235	6	37	6	272	1	221	7	35	8	256
04:45	2	169	14	39	16	208	0	169	13	53	13	222
05:00	4	255	11	66	15	321	6	251	19	52	25	303
05:15	2	210	28	51	30	261	0	211	27	54	27	265
05:30	2	196	30	50	32	246	3	177	42	53	45	230
05:45	7	139	82	50	89	189	7	119	70	62	77	181
06:00	12	96	81	35	93	131	13	104	76	52	89	156
06:15	13	73	159	27	172	100	10	89	160	20	170	109
06:30	24	60	257	18	281	78	23	64	239	34	262	98
06:45	43	53	329	26	372	79	38	52	338	24	376	76
07:00	41	24	296	22	337	46	49	41	275	14	324	55
07:15	40	23	311	11	351	34	48	24	295	8	343	32
07:30	36	18	254	11	290	29	37	23	263	15	300	38
07:45	68	23	289	8	357	31	57	27	272	18	329	45
08:00	70	17	199	11	269	28	50	15	202	9	252	24
08:15	58	10	145	7	203	17	69	11	120	10	189	21
08:30	57	6	110	10	167	16	50	18	108	9	158	27
08:45	36	12	109	7	145	19	45	13	97	2	142	15
09:00	53	8	66	4	119	12	36	10	71	7	107	17
09:15	44	3	71	8	115	11	42	5	51	15	93	20
09:30	27	2	56	10	83	12	48	8	66	7	114	15
09:45	40	9	52	8	92	17	38	5	59	10	97	15
10:00	35	4	63	11	98	15	41	1	51	7	92	8
10:15	41	8	47	5	88	13	39	5	47	15	86	20
10:30	35	9	52	15	87	24	33	3	50	18	83	21
10:45	41	2	52	15	93	17	33	2	51	16	84	18
11:00	43	6	59	4	102	10	29	10	63	3	92	13
11:15	38	13	48	0	86	13	35	13	66	5	101	18
11:30	36	11	68	3	104	14	40	9	68	3	108	12
11:45	53	10	64	2	117	12	45	13	73	3	118	16
Totals	1029	3273	3436	1476	4465	4749	990	3243	3339	1425	4349	4668
Day Totals	4302		4912		9214		4233		4784		9017	
% Total	11.1%	35.5%	37.2%	16.0%			10.9%	35.9%	37.2%	15.8%		
Peaks	07:45	04:30	06:30	02:30	06:45	04:30	07:45	04:30	06:45	05:00	06:45	04:30
Volume	253	869	1193	233	1350	1062	226	852	1171	221	1343	1046
P.H.F.	.90	.85	.90	.79	.90	.82	.81	.84	.86	.89	.89	.86

Technician:Jm
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS8-7
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Location. :On East Jemez 250' W of TA 53 LANSE Entrance

Both directions

Begin Time	Fri. 01/31 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Sat. 02/01 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	8	52	5	47	13	99	10	17	6	16	16	33
12:15	6	42	1	40	7	82	4	18	1	19	5	37
12:30	7	33	1	36	8	69	3	15	1	20	4	35
12:45	0	59	1	48	1	107	5	22	3	20	8	42
01:00	1	59	1	39	2	98	3	26	0	14	3	40
01:15	2	51	1	36	3	87	3	9	4	10	7	19
01:30	4	46	0	51	4	97	2	13	1	18	3	31
01:45	0	53	4	29	4	82	1	22	0	20	1	42
02:00	1	52	1	46	2	98	0	18	0	23	0	41
02:15	0	56	1	42	1	98	0	24	1	21	1	45
02:30	1	75	0	55	1	130	1	23	2	20	3	43
02:45	0	56	2	52	2	108	1	19	3	28	4	47
03:00	2	73	1	32	3	105	0	16	0	19	0	35
03:15	4	122	1	43	5	165	0	21	0	27	0	48
03:30	2	174	4	38	6	212	1	30	1	21	2	51
03:45	0	150	5	43	5	193	3	16	2	19	5	35
04:00	0	216	3	43	3	259	1	25	0	35	1	60
04:15	1	114	7	36	8	150	0	16	2	18	2	34
04:30	1	119	9	27	10	146	0	25	2	14	2	39
04:45	1	94	3	33	4	127	2	19	4	19	6	38
05:00	2	93	16	36	18	129	3	26	3	20	6	46
05:15	1	83	16	48	17	131	2	17	1	17	3	34
05:30	3	70	25	30	28	100	0	12	7	19	7	31
05:45	6	46	48	26	54	72	0	13	7	26	7	39
06:00	7	24	69	22	76	46	2	10	13	21	15	31
06:15	20	39	100	16	120	55	1	19	7	21	8	40
06:30	12	20	167	26	179	46	1	10	32	17	33	27
06:45	27	14	246	25	273	39	2	7	37	23	39	30
07:00	30	21	197	18	227	39	7	9	14	11	21	20
07:15	27	16	219	9	246	25	12	1	9	13	21	14
07:30	32	14	166	5	198	19	7	3	28	15	35	18
07:45	45	6	202	11	247	17	19	4	37	9	56	13
08:00	62	4	132	10	194	14	23	6	15	5	38	11
08:15	55	3	94	10	149	13	6	4	13	4	19	8
08:30	39	8	66	7	105	15	19	4	18	6	37	10
08:45	43	11	62	10	105	21	12	4	28	6	40	10
09:00	45	11	72	2	117	13	15	4	15	12	30	16
09:15	28	6	56	9	84	15	16	6	17	8	33	14
09:30	31	5	38	13	69	18	12	18	15	9	27	27
09:45	40	8	77	4	117	12	18	11	32	9	50	20
10:00	43	2	49	8	92	10	19	3	21	8	40	11
10:15	37	3	40	9	77	12	10	4	21	13	31	17
10:30	26	7	65	18	91	25	15	7	15	14	30	21
10:45	26	2	40	24	66	26	22	4	13	13	35	17
11:00	50	3	42	7	92	10	22	7	20	8	42	15
11:15	45	11	38	10	83	21	13	8	15	2	28	10
11:30	38	13	48	4	86	17	16	6	17	3	33	9
11:45	40	6	56	5	96	11	12	8	20	4	32	12
Totals	901	2245	2497	1238	3398	3483	346	629	523	737	869	1366
Day Totals	3146		3735		6881		975		1260		2235	
% Total	13.0%	32.6%	36.2%	17.9%			15.4%	28.1%	23.4%	32.9%		
Peaks	07:45	03:15	06:30	02:00	06:45	03:15	10:45	03:15	07:30	03:15	09:45	03:15
Volume	201	662	829	195	944	829	73	92	93	102	151	194
P.H.F.	.81	.76	.84	.88	.86	.80	.82	.76	.62	.72	.75	.80

Technician: Jm
Location :On East Jemez 250' W of
TA 53 LANSE Entrance

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LCS8-7
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Both directions

Begin Time	Sun. 02/02 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Mon. 02/03 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	1	16	3	21	4	37	5	50	1	51	6	101
12:15	4	31	0	16	4	47	11	47	0	65	11	112
12:30	4	18	2	18	6	36	2	51	0	44	2	95
12:45	0	22	2	19	2	41	1	52	0	55	1	107
01:00	5	21	3	27	8	48	2	79	3	54	5	133
01:15	2	13	1	9	3	22	0	62	0	42	0	104
01:30	0	12	0	15	0	27	0	52	1	39	1	91
01:45	1	14	1	17	2	31	0	52	2	37	2	89
02:00	0	11	1	15	1	26	0	49	1	42	1	91
02:15	1	20	1	18	2	38	0	37	2	56	2	93
02:30	0	14	3	28	3	42	1	49	0	44	1	93
02:45	0	20	2	26	2	46	0	44	2	47	2	91
03:00	0	13	0	23	0	36	0	89	0	40	0	129
03:15	0	23	1	7	1	30	1	91	0	54	1	145
03:30	0	11	0	20	0	31	0	156	6	37	6	193
03:45	1	17	2	15	3	32	0	144	3	30	3	174
04:00	0	15	1	16	1	31	0	286	1	35	1	321
04:15	0	17	3	15	3	32	3	138	3	27	6	165
04:30	0	16	0	17	0	33	2	217	8	49	10	266
04:45	2	13	1	25	3	38	1	166	13	45	14	211
05:00	1	15	0	12	1	27	1	259	15	59	16	318
05:15	0	15	1	18	1	33	1	213	30	44	31	257
05:30	0	11	1	15	1	26	7	182	36	51	43	233
05:45	2	13	1	16	3	29	5	122	61	43	66	165
06:00	1	6	4	13	5	19	4	106	86	38	90	144
06:15	3	3	8	14	11	17	17	67	166	34	183	101
06:30	1	3	12	20	13	23	22	65	235	24	257	89
06:45	5	11	21	25	26	36	43	41	335	22	378	63
07:00	2	5	2	13	4	18	37	41	301	15	338	56
07:15	10	4	4	13	14	17	44	25	296	21	340	46
07:30	7	4	6	7	13	11	51	23	249	12	300	35
07:45	14	4	21	13	35	17	53	12	256	9	309	21
08:00	12	3	15	3	27	6	65	15	190	11	255	26
08:15	12	2	13	8	25	10	56	8	146	12	202	20
08:30	16	8	10	6	26	14	56	12	87	13	143	25
08:45	9	6	30	8	39	14	36	7	86	6	122	13
09:00	15	8	21	5	36	13	38	8	76	9	114	17
09:15	9	8	26	7	35	15	35	8	57	3	92	11
09:30	6	6	14	6	20	12	46	2	58	12	104	14
09:45	14	6	12	4	26	10	58	10	77	3	135	13
10:00	5	3	20	8	26	11	43	1	52	5	95	6
10:15	11	4	14	10	25	14	27	6	54	9	81	15
10:30	8	3	13	20	21	23	33	5	39	24	72	29
10:45	15	3	14	10	29	13	43	2	47	22	90	24
11:00	18	5	29	1	47	6	35	10	52	1	87	11
11:15	19	6	11	6	30	12	46	9	48	5	94	14
11:30	15	6	10	2	25	8	36	20	69	2	105	22
11:45	20	8	16	5	36	13	56	12	85	4	141	16
Totals	272	516	376	655	648	1171	1023	3202	3335	1406	4358	4608
Day Totals	788		1031		1819		4225		4741		8966	
% Total	14.9%	28.3%	20.6%	36.0%			11.4%	35.7%	37.2%	15.6%		
Peaks	11:00	00:15	08:45	02:15	11:00	00:15	07:45	04:30	06:45	00:15	06:45	04:30
Volume	72	92	91	95	138	172	230	855	1181	218	1356	1052
P.H.F.	.9	.74	.75	.84	.73	.89	.88	.82	.88	.83	.89	.82

Technicianum
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS8-7
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Location, :On East Jemez 250' W of
TA 53 LANSE Entrance

Both directions

Begin Time	Tues. 02/04 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Wed. 02/05 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	5	56	1	57	6	113	3	41	2	72	5	113
12:15	7	45	2	55	9	100	8	41	1	82	9	123
12:30	7	58	1	56	8	114	3	51	2	50	5	101
12:45	1	53	2	49	3	102	0	73	0	41	0	114
01:00	0	61	1	58	1	119	0	56	0	39	0	95
01:15	0	72	0	53	0	125	1	55	2	53	3	108
01:30	1	51	1	38	2	89	3	40	3	36	6	76
01:45	2	57	0	42	2	99	0	43	0	40	0	83
02:00	0	61	1	45	1	106	0	53	4	45	4	98
02:15	2	55	1	43	3	98	0	44	0	36	0	80
02:30	0	72	0	60	0	132	0	63	4	42	4	105
02:45	1	79	0	53	1	132	0	55	2	68	2	123
03:00	2	95	1	36	3	131	1	78	2	54	3	132
03:15	0	111	0	44	0	155	3	94	0	34	3	128
03:30	2	177	1	49	3	226	2	186	3	41	5	227
03:45	0	156	5	30	5	186	1	129	5	26	6	155
04:00	0	265	0	28	0	293	1	288	4	25	5	313
04:15	0	176	5	32	5	208	2	157	4	41	6	198
04:30	2	204	2	51	4	255	1	236	5	55	6	291
04:45	0	175	16	49	16	224	2	176	19	43	21	219
05:00	2	214	14	63	16	277	2	239	13	64	15	303
05:15	6	204	26	47	32	251	2	201	22	42	24	243
05:30	4	149	41	42	45	191	4	187	46	52	50	239
05:45	6	112	68	47	74	159	7	134	65	55	72	189
06:00	12	111	80	46	92	157	7	99	74	31	81	130
06:15	10	88	135	37	145	125	17	85	159	32	176	117
06:30	18	56	253	27	271	83	18	59	233	21	251	80
06:45	38	46	320	32	358	78	40	52	320	28	360	80
07:00	40	35	297	17	337	52	37	34	303	17	340	51
07:15	50	23	300	23	350	46	38	20	299	8	337	28
07:30	44	31	257	11	301	42	48	25	262	9	310	34
07:45	86	10	249	9	335	19	62	17	253	12	315	29
08:00	63	23	180	8	243	31	66	18	231	7	297	25
08:15	66	10	134	5	200	15	63	16	131	5	194	21
08:30	49	12	104	9	153	21	49	8	90	6	139	14
08:45	53	16	92	3	145	19	48	7	96	6	144	13
09:00	36	9	65	12	101	21	38	9	67	9	105	18
09:15	54	16	82	11	136	27	41	7	60	6	101	13
09:30	35	4	80	10	116	14	30	7	59	13	89	20
09:45	28	9	78	2	106	11	48	4	56	6	104	10
10:00	46	8	39	10	85	18	26	5	54	12	80	17
10:15	32	2	67	10	99	12	38	9	49	15	87	24
10:30	39	3	53	20	92	23	26	5	40	17	66	22
10:45	37	4	56	21	93	25	29	1	47	19	76	20
11:00	42	7	60	6	102	13	31	4	53	2	84	6
11:15	35	16	49	1	84	17	27	16	69	4	96	20
11:30	35	9	54	3	89	12	46	12	47	1	93	13
11:45	43	13	69	2	112	15	52	13	66	3	118	16
Totals	1042	3319	3342	1462	4384	4781	971	3252	3326	1425	4297	4677
Day Totals	4361		4804		9165		4223		4751		8974	
% Total	11.3%	36.2%	36.4%	15.9%			10.8%	36.2%	37.0%	15.8%		
Peaks	07:45	04:00	06:45	00:15	06:45	04:30	07:45	04:00	06:45	00:00	06:45	04:30
Volume	264	820	1174	216	1346	1007	240	857	1184	245	1347	1056
P.H.F.	.76	.77	.91	.93	.93	.90	.90	.74	.92	.74	.93	.87

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Technician: Jm
Location : On East Jemez 250' W of TA 53 LANSE Entrance

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS8-7
Page : 5

Both directions

Begin Time	Thur. 02/06 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Fri. 02/07 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	3	51	1	69	4	120	*	*	*	*	*	*
12:15	10	50	1	50	11	100	*	*	*	*	*	*
12:30	5	56	2	47	7	103	*	*	*	*	*	*
12:45	5	61	0	57	5	118	*	*	*	*	*	*
01:00	2	*	1	*	3	*	*	*	*	*	*	*
01:15	1	*	3	*	4	*	*	*	*	*	*	*
01:30	0	*	2	*	2	*	*	*	*	*	*	*
01:45	0	*	0	*	0	*	*	*	*	*	*	*
02:00	0	*	0	*	0	*	*	*	*	*	*	*
02:15	1	*	0	*	1	*	*	*	*	*	*	*
02:30	1	*	0	*	1	*	*	*	*	*	*	*
02:45	0	*	0	*	0	*	*	*	*	*	*	*
03:00	0	*	3	*	3	*	*	*	*	*	*	*
03:15	0	*	1	*	1	*	*	*	*	*	*	*
03:30	0	*	2	*	2	*	*	*	*	*	*	*
03:45	1	*	3	*	4	*	*	*	*	*	*	*
04:00	2	*	3	*	5	*	*	*	*	*	*	*
04:15	1	*	4	*	5	*	*	*	*	*	*	*
04:30	2	*	6	*	8	*	*	*	*	*	*	*
04:45	1	*	14	*	15	*	*	*	*	*	*	*
05:00	1	*	11	*	12	*	*	*	*	*	*	*
05:15	3	*	35	*	38	*	*	*	*	*	*	*
05:30	6	*	33	*	39	*	*	*	*	*	*	*
05:45	6	*	71	*	77	*	*	*	*	*	*	*
06:00	8	*	79	*	87	*	*	*	*	*	*	*
06:15	19	*	127	*	146	*	*	*	*	*	*	*
06:30	21	*	251	*	272	*	*	*	*	*	*	*
06:45	36	*	326	*	362	*	*	*	*	*	*	*
07:00	41	*	288	*	329	*	*	*	*	*	*	*
07:15	43	*	282	*	325	*	*	*	*	*	*	*
07:30	40	*	237	*	277	*	*	*	*	*	*	*
07:45	70	*	271	*	341	*	*	*	*	*	*	*
08:00	61	*	186	*	247	*	*	*	*	*	*	*
08:15	84	*	140	*	224	*	*	*	*	*	*	*
08:30	55	*	89	*	144	*	*	*	*	*	*	*
08:45	69	*	87	*	156	*	*	*	*	*	*	*
09:00	55	*	73	*	128	*	*	*	*	*	*	*
09:15	25	*	56	*	81	*	*	*	*	*	*	*
09:30	36	*	81	*	117	*	*	*	*	*	*	*
09:45	36	*	77	*	113	*	*	*	*	*	*	*
10:00	38	*	51	*	89	*	*	*	*	*	*	*
10:15	36	*	45	*	81	*	*	*	*	*	*	*
10:30	41	*	40	*	81	*	*	*	*	*	*	*
10:45	32	*	45	*	77	*	*	*	*	*	*	*
11:00	34	*	54	*	88	*	*	*	*	*	*	*
11:15	35	*	66	*	101	*	*	*	*	*	*	*
11:30	42	*	62	*	104	*	*	*	*	*	*	*
11:45	40	*	68	*	108	*	*	*	*	*	*	*
Totals	1048	218	3277	223	4325	441	0	0	0	0	0	0
Day Totals	1266		3500		4766		0		0		0	
% Total	21.9%	4.5%	68.7%	4.6%			*	*	*	*		
Peaks	07:45	00:00	06:30	00:00	06:45	00:00						
Volume	270	218	1147	223	1293	441						
P.H.F.	.80	.89	.87	.80	.89	.91						

DIGITAL TRAFFIC SYST

Technician: JM
Location : On West Jemez 150' W of
Guard Station 431

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 00000000000
Start Date: 01/27/03
File I.D. : LOS3-7
Page : 1

Both directions

Begin Time	Mon. 01/27 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Tues. 01/28 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	*	*	*	*	*	*	0	58	0	49	0	107
12:15	*	*	*	*	*	*	0	50	0	51	0	101
12:30	*	*	*	*	*	*	0	42	2	76	2	118
12:45	*	*	*	*	*	*	0	45	0	83	0	128
01:00	*	*	*	*	*	*	0	45	0	89	0	135
01:15	*	*	*	*	*	*	0	46	1	55	1	102
01:30	*	41	*	48	*	89	0	34	0	50	0	84
01:45	*	36	*	32	*	68	1	47	1	56	2	103
02:00	*	49	*	40	*	89	0	30	1	35	1	65
02:15	*	57	*	36	*	93	0	44	1	31	1	75
02:30	*	44	*	38	*	82	0	38	0	35	0	73
02:45	*	46	*	32	*	78	1	57	0	46	1	103
03:00	*	46	*	41	*	87	0	54	0	49	0	103
03:15	*	85	*	35	*	121	0	87	0	31	0	118
03:30	*	78	*	34	*	112	0	79	0	46	0	125
03:45	*	71	*	42	*	113	0	69	2	42	2	111
04:00	*	81	*	39	*	120	0	94	1	33	1	127
04:15	*	76	*	43	*	119	1	91	0	46	1	137
04:30	*	123	*	33	*	155	2	113	1	36	3	149
04:45	*	87	*	36	*	123	0	104	1	36	1	140
05:00	*	132	*	51	*	183	0	123	4	32	4	155
05:15	*	120	*	35	*	155	3	123	5	46	8	169
05:30	*	96	*	40	*	136	2	123	7	37	9	160
05:45	*	64	*	19	*	83	8	64	27	23	35	87
06:00	*	42	*	21	*	63	10	45	26	18	36	63
06:15	*	36	*	20	*	56	26	38	60	23	86	61
06:30	*	23	*	11	*	34	33	24	87	12	120	36
06:45	*	18	*	11	*	29	29	19	167	20	196	39
07:00	*	13	*	8	*	21	53	12	117	8	170	20
07:15	*	8	*	9	*	17	60	11	113	3	173	14
07:30	*	4	*	12	*	16	55	19	118	9	173	28
07:45	*	4	*	5	*	9	53	7	125	8	178	15
08:00	*	8	*	6	*	14	37	2	105	9	142	11
08:15	*	4	*	4	*	8	35	11	119	13	154	24
08:30	*	0	*	7	*	7	40	2	75	7	115	9
08:45	*	1	*	5	*	6	45	2	49	9	94	11
09:00	*	2	*	3	*	5	33	4	68	9	101	13
09:15	*	1	*	6	*	7	52	1	46	3	98	4
09:30	*	4	*	6	*	10	51	1	34	5	85	6
09:45	*	0	*	1	*	1	53	2	45	4	98	6
10:00	*	3	*	3	*	6	46	0	48	2	94	2
10:15	*	2	*	5	*	7	47	2	30	2	77	4
10:30	*	2	*	1	*	3	37	4	45	1	82	5
10:45	*	2	*	0	*	2	54	2	41	3	95	5
11:00	*	1	*	2	*	3	73	3	26	1	99	4
11:15	*	4	*	5	*	9	82	1	56	4	138	5
11:30	*	1	*	0	*	1	59	6	35	1	94	7
11:45	*	2	*	2	*	4	93	0	42	3	135	3
Totals	0	1518	0	827	0	2345	1174	1879	1731	1291	2905	3170
Day Totals		1518		827		2345		3053		3022		6075
Total	.0%	64.7%	.0%	35.2%			19.3%	30.9%	28.4%	21.2%		
Peaks		04:30		04:15		04:30	11:00	04:45	06:45	00:30	06:45	04:45
Volume		462		163		617	307	473	515	304	712	624
P.H.F.		.87		.79		.84	.82	.96	.77	.85	.90	.92

Site 10, Page 1

DIGITAL TRAFFIC SYST

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Technician:JM
Location :On West Jemez 150' W of
Guard Station 431

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : L053-7
Page : 2

Both directions

Begin Time	Wed. 01/29 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Thur. 01/30 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	1	63	0	53	1	116	2	65	1	43	3	108
12:15	1	58	3	59	4	117	3	40	3	44	6	84
12:30	1	38	0	62	1	100	1	44	1	55	2	99
12:45	0	57	2	64	2	121	0	43	1	66	1	109
01:00	0	36	0	76	0	112	0	44	0	81	0	125
01:15	1	45	0	47	1	92	0	44	1	69	1	113
01:30	0	43	1	57	1	100	0	41	1	56	1	97
01:45	0	41	2	52	2	93	0	54	0	53	0	107
02:00	0	43	0	55	0	98	2	37	1	43	3	80
02:15	0	58	0	42	0	100	1	45	2	51	3	96
02:30	1	88	2	37	3	125	3	48	1	31	4	79
02:45	0	78	0	24	0	102	1	75	2	36	3	111
03:00	0	42	0	38	0	80	0	66	2	38	2	104
03:15	0	71	0	30	0	101	0	69	0	38	0	107
03:30	0	93	0	38	0	131	0	80	0	47	0	127
03:45	1	68	2	34	3	102	1	70	2	38	3	108
04:00	2	77	4	54	6	131	0	73	0	34	0	107
04:15	0	96	0	72	0	168	0	107	0	36	0	143
04:30	1	99	0	54	1	153	3	124	0	34	3	158
04:45	5	112	3	27	8	139	0	103	2	27	2	130
05:00	1	130	4	35	5	165	0	109	5	40	5	149
05:15	2	98	3	37	5	135	4	142	5	27	9	169
05:30	5	102	13	35	18	137	4	94	8	26	12	120
05:45	6	82	22	28	28	110	7	72	31	29	38	101
06:00	10	32	23	19	33	51	15	53	29	16	44	69
06:15	29	35	64	17	93	52	25	24	58	24	83	48
06:30	24	16	97	18	121	34	31	31	98	12	129	43
06:45	37	16	163	10	200	26	44	12	171	10	215	22
07:00	39	14	103	8	142	22	52	7	121	21	173	28
07:15	53	9	112	14	165	23	59	9	106	8	165	17
07:30	60	6	118	9	178	15	64	5	120	8	184	13
07:45	55	4	144	9	199	13	53	3	121	7	174	10
08:00	40	3	125	4	165	7	47	2	116	5	163	7
08:15	31	4	88	10	119	14	41	4	90	6	131	10
08:30	47	5	64	7	111	12	33	1	75	6	108	7
08:45	36	1	63	1	99	2	43	2	58	5	101	7
09:00	35	2	43	6	78	8	42	2	52	5	94	7
09:15	37	2	43	3	80	5	41	0	40	5	81	5
09:30	30	2	27	3	57	5	35	0	37	4	72	4
09:45	56	4	50	4	106	8	39	1	41	6	80	7
10:00	39	7	34	1	73	8	31	0	35	3	66	3
10:15	36	4	41	1	77	5	39	0	42	1	81	1
10:30	65	2	37	0	102	2	32	5	27	0	59	5
10:45	50	6	44	2	94	8	49	2	38	1	87	3
11:00	69	1	45	4	114	5	65	0	36	3	101	3
11:15	81	2	33	4	114	6	80	0	34	6	114	6
11:30	79	2	25	2	104	4	64	1	33	0	97	1
11:45	51	0	49	0	100	0	103	1	47	1	150	2
Totals	1117	1897	1696	1266	2813	3163	1159	1854	1694	1205	2853	3059
Day Totals	3014		2962		5976		3013		2899		5912	
Total	18.6%	31.7%	28.3%	21.1%			19.6%	31.3%	28.6%	20.3%		
Peaks	11:00	04:45	07:15	00:15	07:15	04:15	11:00	04:30	06:45	00:45	06:45	04:30
Volume	280	442	499	261	707	625	312	478	518	272	737	606
P.H.F.	.86	.85	.86	.85	.88	.93	.75	.84	.75	.83	.85	.89

Technician:JM
3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS3-7
Page : 3

Location :On West Jemez 150' W of Guard Station 431

Both directions

Begin Time	Fri. 01/31 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Sat. 02/01 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	0	33	2	29	2	62	0	15	0	13	0	28
12:15	0	42	0	37	0	79	1	19	3	13	4	32
12:30	1	34	0	37	1	71	1	14	1	17	2	31
12:45	1	36	1	53	2	89	0	6	1	23	1	31
01:00	0	32	3	55	3	87	3	22	1	11	4	33
01:15	0	48	0	34	0	82	1	12	2	8	3	20
01:30	3	32	0	42	3	74	0	18	1	10	1	28
01:45	1	33	0	35	1	68	0	15	1	12	1	27
02:00	0	49	0	44	0	93	0	13	0	11	0	24
02:15	0	51	1	38	1	89	1	11	1	11	2	22
02:30	2	49	0	23	2	72	1	17	0	11	1	28
02:45	0	54	0	26	0	80	0	11	0	18	0	29
03:00	0	57	0	26	0	83	1	16	2	20	3	36
03:15	0	60	0	34	0	94	0	20	0	17	0	37
03:30	0	88	0	40	0	128	1	24	0	17	1	41
03:45	1	58	0	28	1	86	0	14	0	15	0	29
04:00	0	57	2	32	2	89	1	15	1	16	2	31
04:15	0	45	1	41	1	86	0	19	0	12	0	31
04:30	3	50	1	22	4	72	0	18	1	12	1	30
04:45	0	55	2	21	2	76	0	21	0	4	0	25
05:00	2	48	1	27	3	75	1	24	1	11	2	35
05:15	1	33	6	18	7	51	0	9	1	16	1	25
05:30	4	29	4	14	8	43	1	11	0	4	1	15
05:45	6	22	10	14	16	36	4	17	2	8	6	25
06:00	3	18	23	16	26	34	3	8	12	4	15	12
06:15	17	19	45	11	62	30	4	21	5	4	9	25
06:30	26	8	56	11	82	19	3	5	13	10	16	15
06:45	20	8	92	5	112	13	8	3	15	8	23	11
07:00	28	6	58	9	86	15	8	4	11	2	19	6
07:15	36	7	64	5	100	12	3	2	17	5	20	7
07:30	43	1	55	7	98	8	11	3	16	4	27	7
07:45	58	1	85	5	143	6	16	0	12	6	28	6
08:00	39	1	97	10	136	11	6	2	15	3	21	5
08:15	34	1	87	2	121	3	10	3	13	2	23	5
08:30	30	8	50	8	80	16	9	1	10	2	19	3
08:45	34	1	35	3	69	4	14	4	17	4	31	8
09:00	31	3	58	1	89	4	11	2	9	1	20	3
09:15	32	2	51	4	83	6	8	2	9	6	17	8
09:30	37	2	35	3	72	5	5	1	11	5	16	6
09:45	35	0	37	3	72	3	10	1	13	7	23	8
10:00	34	3	26	6	60	9	12	1	15	7	27	8
10:15	40	2	31	2	71	4	11	4	16	3	27	7
10:30	42	4	17	7	59	11	18	5	21	1	39	6
10:45	37	1	29	3	66	4	10	2	9	5	19	7
11:00	57	0	23	3	80	3	18	2	18	3	36	5
11:15	55	2	28	5	83	7	7	2	14	3	21	5
11:30	45	2	20	7	65	9	21	4	9	2	30	6
11:45	46	3	31	5	77	8	16	1	15	2	31	3
Totals	884	1198	1167	911	2051	2109	259	466	334	409	593	875
Day Totals	2082		2078		4160		725		743		1468	
% Total	21.2%	28.8%	28.0%	21.9%			17.6%	31.7%	22.7%	27.8%		
Peaks	11:00	03:00	07:30	00:45	07:30	03:15	11:00	04:15	09:45	02:45	10:15	02:45
Volume	203	263	324	184	498	397	62	82	65	72	121	143
P.H.F.	.89	.74	.83	.83	.87	.77	.73	.85	.77	.9	.77	.87

Technician: JM
Location: On West Jemez 150' W of
Guard Station 431

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LOS3-7
Page : 4

Both directions

Begin Time	Sun. 02/02 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Mon. 02/03 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	0	16	1	17	1	33	1	56	1	46	2	102
12:15	3	15	4	13	7	28	1	41	0	55	1	96
12:30	1	8	0	13	1	21	0	47	0	60	0	107
12:45	0	15	2	13	2	28	0	47	0	63	0	110
01:00	0	10	3	23	3	33	0	32	2	68	2	100
01:15	1	19	2	7	3	26	2	42	1	54	3	96
01:30	2	14	1	9	3	23	1	40	0	48	1	88
01:45	2	14	1	17	3	31	0	43	0	44	0	87
02:00	1	15	1	9	2	24	1	52	0	50	1	102
02:15	1	12	0	11	1	23	0	53	0	38	0	91
02:30	4	21	0	14	4	35	0	52	0	40	0	92
02:45	0	10	0	14	0	24	0	56	2	39	2	95
03:00	0	10	0	9	0	19	0	60	1	26	1	86
03:15	1	18	0	12	1	30	1	60	0	30	1	90
03:30	0	10	0	7	0	17	1	104	1	38	2	142
03:45	0	27	0	6	0	33	0	47	1	35	1	82
04:00	0	6	1	6	1	12	0	72	0	43	0	115
04:15	0	14	1	13	1	27	4	84	1	41	5	125
04:30	0	9	0	8	0	17	2	125	0	42	2	167
04:45	0	21	0	12	0	33	0	111	3	34	3	145
05:00	1	7	0	9	1	16	1	120	5	37	6	157
05:15	0	9	0	4	0	13	4	111	7	48	11	159
05:30	0	14	0	4	0	18	7	81	13	42	20	123
05:45	1	7	1	7	2	14	4	76	19	25	23	101
06:00	0	11	0	7	0	18	12	40	25	23	37	63
06:15	3	5	1	8	4	13	21	61	56	15	77	76
06:30	3	10	3	5	6	15	27	33	95	13	122	46
06:45	7	9	3	5	10	14	41	19	156	4	197	23
07:00	2	7	2	3	4	10	39	11	114	13	153	24
07:15	4	3	6	5	10	8	62	6	102	8	164	14
07:30	3	2	4	1	7	3	44	7	117	7	161	14
07:45	8	2	10	1	18	3	56	7	117	5	173	12
08:00	7	5	17	4	24	9	46	6	141	3	187	9
08:15	5	2	8	3	13	5	44	2	109	6	153	8
08:30	7	2	5	8	12	10	45	5	72	4	117	9
08:45	5	1	4	4	9	5	51	2	68	11	119	13
09:00	10	5	9	5	19	10	44	0	37	2	81	2
09:15	6	4	10	4	16	8	46	2	43	6	89	8
09:30	3	3	9	1	12	4	36	1	36	5	72	6
09:45	6	5	9	1	15	6	44	2	50	1	94	3
10:00	7	4	7	3	14	7	43	1	52	3	95	4
10:15	9	1	11	4	20	5	42	3	31	6	73	9
10:30	14	1	14	2	28	3	52	1	30	1	82	2
10:45	7	4	9	1	16	5	47	2	32	3	79	5
11:00	15	0	17	2	32	2	46	1	47	1	93	2
11:15	8	0	15	2	23	2	69	1	34	5	103	6
11:30	8	3	17	4	25	7	72	1	39	2	111	3
11:45	9	1	18	1	27	2	63	2	32	2	95	4
Totals	174	411	226	341	400	752	1122	1828	1692	1195	2814	3023
Day Totals	585		567		1152		2950		2887		5837	
% Total	15.1%	35.6%	19.6%	29.6%			19.2%	31.3%	28.9%	20.4%		
Peaks	10:15	03:00	11:00	00:15	11:00	01:00	11:00	04:30	06:45	00:15	07:15	04:30
Volume	45	65	67	62	107	113	250	467	483	246	685	628
P.H.F.	.75	.60	.93	.67	.83	.85	.86	.93	.78	.90	.91	.94

Technician: JM
Location: On West Jemez 150' W of
Guard Station 431

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
File I.D. : LCS3-7
Page : 5

Both directions

Begin Time	Tues. 02/04 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Wed. 02/05 East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00	2	51	0	49	2	100	1	50	1	50	2	100
12:15	1	64	2	56	3	120	0	47	2	50	2	97
12:30	1	51	2	70	3	121	0	57	0	63	0	120
12:45	1	51	0	76	1	127	1	48	1	79	2	127
01:00	0	49	3	81	3	130	0	43	0	79	0	122
01:15	3	56	2	53	5	109	3	49	3	48	6	97
01:30	0	37	0	43	0	80	0	32	1	47	1	79
01:45	0	43	0	52	0	95	1	47	0	47	1	94
02:00	0	53	0	44	0	97	0	41	0	40	0	81
02:15	1	34	1	40	2	74	0	34	0	35	0	69
02:30	0	58	0	37	0	95	0	36	0	31	0	67
02:45	1	69	0	38	1	107	0	45	1	41	1	86
03:00	0	52	0	40	0	92	0	53	1	40	1	93
03:15	0	76	0	31	0	107	1	90	0	40	1	130
03:30	0	69	0	36	0	105	0	83	1	45	1	128
03:45	1	60	1	35	2	95	1	59	0	27	1	86
04:00	0	88	0	41	0	129	0	74	0	54	0	128
04:15	0	73	1	33	1	106	0	92	1	49	1	141
04:30	1	130	1	37	2	167	1	127	0	27	1	154
04:45	1	109	2	31	3	140	1	90	1	25	2	115
05:00	3	115	2	37	5	152	0	120	4	38	4	158
05:15	6	102	5	45	11	147	5	114	3	43	8	157
05:30	7	96	8	30	15	126	4	97	12	57	16	154
05:45	9	56	32	24	41	80	5	78	19	21	24	99
06:00	20	46	31	30	51	76	9	53	33	24	42	77
06:15	23	65	48	19	71	84	20	39	62	20	82	59
06:30	28	25	76	13	104	38	29	29	80	9	109	38
06:45	39	14	171	7	210	21	41	22	159	10	200	32
07:00	51	11	140	9	191	20	33	13	136	13	169	26
07:15	47	9	106	9	153	18	60	10	97	11	157	21
07:30	57	6	123	12	180	18	56	8	114	6	170	14
07:45	63	11	131	6	194	17	59	5	133	4	192	9
08:00	44	7	127	4	171	11	49	9	91	6	140	15
08:15	31	4	100	3	131	7	48	3	100	5	148	8
08:30	53	2	63	8	116	10	42	7	66	8	108	15
08:45	44	3	71	5	115	8	47	3	65	7	112	10
09:00	47	3	50	11	97	14	20	2	34	3	54	5
09:15	53	1	48	3	101	4	46	1	37	6	83	7
09:30	34	3	38	4	72	7	32	1	46	3	78	4
09:45	57	5	31	2	88	7	43	3	51	3	94	6
10:00	44	7	37	4	81	11	37	2	48	4	85	6
10:15	42	2	42	2	84	4	39	2	34	2	73	4
10:30	42	1	52	3	94	4	39	2	34	0	73	2
10:45	60	7	52	0	112	7	45	3	22	2	67	5
11:00	66	1	40	1	106	2	64	3	25	4	89	7
11:15	68	2	27	5	95	7	71	2	42	5	113	7
11:30	70	1	40	2	110	3	75	2	20	0	95	2
11:45	76	2	47	0	123	2	63	4	43	1	106	5
Totals	1197	1880	1753	1221	2950	3101	1091	1834	1623	1232	2714	3066
Day Totals	3077		2974		6051		2925		2855		5780	
% Total	19.7%	31.0%	28.9%	20.1%			18.8%	31.7%	28.0%	21.3%		
Peaks	11:00	04:30	06:45	00:15	06:45	04:30	11:00	04:30	06:45	00:15	06:45	04:30
Volume	280	456	540	283	734	606	273	451	506	271	696	584
P.H.F.	.92	.87	.78	.87	.87	.90	.91	.88	.79	.85	.87	.92

Tschnician: JM
Location: On West Jonez 150' W of
Guard Station 431

3600 CERRILLOS ROAD #205
SANTA FE, NM 87507
TEL (505)474-4922 FAX (505)424-8704

Site Code : 000000000000
Start Date: 01/27/03
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Page : 6

Both directions

Begin Time	Thur. 02/06	East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.	Fri. 02/07	East A.M.	East P.M.	West A.M.	West P.M.	Combined A.M.	Combined P.M.
12:00		1	*	6	*	7	*		*	*	*	*	*	*
12:15		1	*	0	*	1	*		*	*	*	*	*	*
12:30		1	*	2	*	3	*		*	*	*	*	*	*
12:45		0	*	1	*	1	*		*	*	*	*	*	*
01:00		2	*	0	*	2	*		*	*	*	*	*	*
01:15		0	*	3	*	3	*		*	*	*	*	*	*
01:30		0	*	0	*	0	*		*	*	*	*	*	*
01:45		0	*	0	*	0	*		*	*	*	*	*	*
02:00		0	*	1	*	1	*		*	*	*	*	*	*
02:15		0	*	0	*	0	*		*	*	*	*	*	*
02:30		2	*	0	*	2	*		*	*	*	*	*	*
02:45		0	*	0	*	0	*		*	*	*	*	*	*
03:00		0	*	0	*	0	*		*	*	*	*	*	*
03:15		0	*	2	*	2	*		*	*	*	*	*	*
03:30		2	*	0	*	2	*		*	*	*	*	*	*
03:45		0	*	1	*	1	*		*	*	*	*	*	*
04:00		0	*	1	*	1	*		*	*	*	*	*	*
04:15		1	*	0	*	1	*		*	*	*	*	*	*
04:30		1	*	0	*	1	*		*	*	*	*	*	*
04:45		0	*	2	*	2	*		*	*	*	*	*	*
05:00		2	*	3	*	5	*		*	*	*	*	*	*
05:15		3	*	4	*	7	*		*	*	*	*	*	*
05:30		4	*	9	*	13	*		*	*	*	*	*	*
05:45		8	*	28	*	36	*		*	*	*	*	*	*
06:00		13	*	25	*	38	*		*	*	*	*	*	*
06:15		22	*	60	*	82	*		*	*	*	*	*	*
06:30		32	*	77	*	109	*		*	*	*	*	*	*
06:45		37	*	166	*	203	*		*	*	*	*	*	*
07:00		30	*	133	*	163	*		*	*	*	*	*	*
07:15		60	*	100	*	160	*		*	*	*	*	*	*
07:30		65	*	125	*	190	*		*	*	*	*	*	*
07:45		67	*	115	*	182	*		*	*	*	*	*	*
08:00		61	*	97	*	158	*		*	*	*	*	*	*
08:15		50	*	101	*	151	*		*	*	*	*	*	*
08:30		46	*	76	*	122	*		*	*	*	*	*	*
08:45		47	*	58	*	105	*		*	*	*	*	*	*
09:00		41	*	48	*	89	*		*	*	*	*	*	*
09:15		40	*	43	*	83	*		*	*	*	*	*	*
09:30		39	*	41	*	79	*		*	*	*	*	*	*
09:45		58	*	47	*	105	*		*	*	*	*	*	*
10:00		30	*	38	*	68	*		*	*	*	*	*	*
10:15		28	*	47	*	75	*		*	*	*	*	*	*
10:30		40	*	36	*	76	*		*	*	*	*	*	*
10:45		48	*	50	*	98	*		*	*	*	*	*	*
11:00		56	*	54	*	110	*		*	*	*	*	*	*
11:15		91	*	35	*	126	*		*	*	*	*	*	*
11:30		*	*	*	*	*	*		*	*	*	*	*	*
11:45		*	*	*	*	*	*		*	*	*	*	*	*
Totals		1028	0	1635	0	2663	0		0	0	0	0	0	0
Day Totals		1028		1635		2663			0		0		0	
Total		38.6%	.0%	61.4%	.0%				*	*	*	*		

Peaks	07:15	06:45	06:45
Volume	253	524	716
P.H.F.	.94	.78	.88

Supplement 3

Copy of
"Mapping 100-Year Floodplain Boundaries Following the Cerro Grande Wildfire"

LA-UR-01-5218

LA-UR-01-5218

Approved for public release; distribution is unlimited.

Title: Mapping 100-Year Floodplain Boundaries Following the Cerro Grande Wildfire

Author(s): Stephen G. McLin
Mark E. van Eeckhout
Andrew Earles

Submitted to: State of New Mexico Environment Department
Hazardous Waste Bureau

Los Alamos
NATIONAL LABORATORY

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Form 836 (8/00)

Mapping 100-Year Floodplain Boundaries Following the Cerro Grande Wildfire

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Abstract

A combined ArcView GIS-HEC modeling application for floodplain analysis of pre- and post-burned watersheds is described. The burned study area is located on Pajarito Plateau near Los Alamos National Laboratory (the Laboratory), where the Cerro Grande Wildfire burned 42,878 acres (17,352 ha) in May 2000. This area is dominated by rugged mountains that are dissected by numerous steep canyons having both ephemeral and perennial channel reaches. Vegetation consists of pinon-juniper woodlands located between 6,000-7,000 feet (1,829-2,134 m) above mean sea level (ft MSL), and Ponderosa pine stands between 7,000-10,000 ft MSL (2,134-3,048 m). Approximately seventeen percent of the burned area is located within the Laboratory, and the remainder is located in upstream or adjacent watersheds. Pre-burn floodplains were previously mapped in 1990-91 using early HEC models as part of the hazardous waste site permitting process. Precipitation and stream gage data provide essential information characterizing rainfall-runoff relationships before and after the fire. They also provide a means of monitoring spatial and temporal changes as forest recovery progresses. The 2000 summer monsoon began in late June and provided several significant runoff events for model calibration. HEC-HMS modeled responses were sequentially refined so that observed and predicted hydrograph peaks were matched at numerous channel locations. The 100-year, 6-hour design storm was used to predict peak hydrographs at critical sites. These results were compared to pre-fire simulations so that new flood-prone areas could be systematically identified. Stream channel cross-sectional geometries were extracted from a gridded 1-foot (0.3 m) DEM using ArcView GIS. Then floodpool topwidths, depths, and flow velocities were remapped using the HEC-RAS model. These floodplain boundaries are depicted on 1:2400 scale maps for all major watersheds within the Laboratory facility. Continued refinement of these maps is essential as forest recovery progresses because these floodplains will slowly recede back toward their pre-fire configurations.

INTRODUCTION

The Los Alamos National Laboratory (the Laboratory) was established in 1943 as part of the Manhattan Project. It is located (35° 52′ N, 106° 19′ W) in north-central New Mexico (USA) about 60 miles (97 km) north-northeast of Albuquerque, and 25 miles (40 km) northwest of Santa Fe (Figure 1). Los Alamos has a semiarid, temperate mountain climate. This 43-square mile (111-square km) facility is situated on Pajarito Plateau between the Jemez Mountains on the west and the Rio Grande Valley to the east. The Plateau slopes east-southeast for more than 15 channel miles (24 km), where it terminates along the Rio Grande in White Rock Canyon. Topography ranges from 7,800 feet (2,377 m) above mean sea level (ft MSL) along the western Laboratory margin to about 6,400 ft MSL (1,951 m) at the canyon rim. The Plateau is dissected by a system of gaged and ungaged watersheds that are dominated by ephemeral stream drainage. Here we define a gaged watershed as one having at least one rain gage (input) and one stream gage (output) so that the system response can be estimated (Dooge, 1959, 1973). Some perennial channel reaches are also locally defined. All of these watersheds are elongated in the west-to-

Figure 1. Location map showing Cerro Grande wildfire near Los Alamos, New Mexico.

east flow direction along Pajarito Plateau, and are extremely narrow in the north-south direction. All total, there are 13 separate watersheds draining Laboratory lands that contain over 100 channel miles (161 km) requiring floodplain identification. These floodplains are defined at

approximately 200-foot (61 m) intervals using topographic data obtained from a 1-foot (0.3 m) gridded digital elevation model (DEM). These data were obtained from a 1992 aerial photogrammetric survey of the Laboratory and surrounding areas.

The Cerro Grande wildfire began as a US National Park Service prescribed burn on May 4, 2000. It quickly spread out of control because of high winds and extremely dry conditions. The fire was contained on June 6, 2000, after consuming approximately 42,878 acres (17,352 ha), including 7,439 acres (3,010 ha) within the Laboratory. The fire continued to burn inside the containment line throughout July as seen in Figure 1. A complete summary of fire-related events is available (BAER, 2000).

Although the Laboratory has maintained a comprehensive environmental monitoring program since 1949, it became a permitted hazardous waste treatment, storage, and disposal facility in 1990. Permit conditions stipulate that these Resource Conservation and Recovery Act (RCRA) facilities must delineate all 100-year floodplain elevations within their boundaries [40 CFR 270.14(b)(11)(iii)]. These floodplains were originally mapped (McLin, 1992) using the US Army Corps of Engineers (USACE) Hydrologic Engineering Center (HEC) computer-based Flood Hydrograph Package (HEC-1) and the Water Surface Profiles Package (HEC-2). These techniques are well-documented and routinely used for floodplain analyses (USACE, 1985, 1982; Hoggan, 1996). Updated models (USACE, 2001a, 2001b) now include HEC-HMS (Hydrologic Modeling System) and HEC-RAS (River Analysis System). The Laboratory's RCRA operating permit is subject to renewal in 2001. All floodplain boundaries have been remapped for this renewal because they have expanded following the fire. These changes are in direct response to fire-related modifications in the rainfall-runoff process due to reductions in watershed vegetation cover and development of hydrophobic soil conditions. As the forest around the Laboratory recovers over the next several decades, these floodplain boundaries are expected to recede slowly back toward their pre-fire boundaries at some undetermined rate.

The US Geological Survey (USGS) has produced probabilistic techniques to estimate peak discharges in New Mexico streams (Waltemeyer, 1986; Thomas and Gold, 1982). These studies define the regional magnitude and flood frequency within stream channels using multiple regression techniques for the 2, 5, 10, 25, 50, and 100-year storm events. However, as seen in Figures 2 and 3, these empirical equations produce significantly larger pre-fire hydrograph peaks for ungaged watersheds compared to observed peaks or HEC-HMS simulations (McLin, 1992). The observed peaks in Figure 2 were obtained from backwater calculations (Veenhuis, 2000), while the observed peaks in Figure 3 were recorded at stream gages (Shaull et al., 2000). The USGS procedure yields peaks that are typically one to two orders of magnitude larger than physical observations or HEC-HMS simulated peaks using equivalent subbasin parameters. More importantly, there is no known methodology to extrapolate the USGS technique to post-fire watershed conditions. Hence, these probabilistic techniques are not used in this evaluation.

HEC-HMS is a single event, rainfall-runoff model that can be used to simulate real or hypothetical storm hydrographs in gaged or ungaged watersheds in response to user specified rainfall hyetographs (USACE, 2001a). As used here, HEC-HMS employs traditional 50, 100, or 500-year, 6-hour design storm events for Los Alamos. These representative design storms are

Figure 2. Comparison of simulated HEC-HMS and USGS 100-year pre-fire peak discharges at eastern Laboratory boundary. Observed peaks are from backwater calculations.

Figure 3. Comparison of simulated HEC-HMS and USGS 2-year pre-fire peak discharges at eastern Laboratory boundary. Observed peaks are from stream gage records.

hypothetical events that were constructed using historical precipitation patterns from six Pajarito Plateau recording rain gages (McLin, 1992). Predicted HEC-HMS hydrograph peaks, along with stream channel geometry and watershed drainage characteristics, are then utilized by the HEC-

RAS model to compute either 50, 100, or 500-year floodplain boundaries. This procedure is well established in modern engineering practice.

For the modeling efforts described here, stream channel cross-sections at varying locations were obtained from the Laboratory's computer-based graphical information system (ArcView GIS) and is similar to an earlier GIS-HEC topographic data extraction procedure (McLin, 1993). For this study, cross-sections are located approximately every 200 feet (61 m) along each reach. Topographic data are automatically extracted from the DEM database in order to minimize channel-surveying tasks. This procedure is performed for each cross-section following the pre-selected channel reach pathway. Each DEM point along the cross-section forms an (x, y, z) topographic point that is geo-referenced to the New Mexico State Plane coordinate system. A typical 100-foot (30 m) long cross section contains between 15 and 50 data points. These cross-sectional features are exported to the HEC-RAS model using HEC-geoRAS, an ArcView extension capability developed by the USACE-HEC.

The independently executed HEC-RAS model employs a HEC-HMS hydrograph peak to simulate a water surface elevation at each channel section using a steady, gradually varied flow approximation. Here the water surface elevation is computed as a function of channel distance using an iterative standard-step method (USACE, 2001b). The model computes a pair of left and right overbank floodpool coordinates for each section that identifies where the DEM land surface and computed floodpool intersect. Coordinate pairs from adjacent channel sections are imported back into ArcView GIS and linked together using the geo-referenced New Mexico State Plane coordinate system. These linked coordinates define the floodplain over the entire channel reach. Parameter estimation procedures and construction of input data files for pre- and post-fire conditions are described in the sections below. Finally, 1:2400 scale maps depicting the Laboratory boundary and all floodplains have been generated.

DESIGN STORM FOR LOS ALAMOS

An observed storm hydrograph for a given watershed is closely related to the spatial and temporal storm distribution that generated it. However, observed large recurrence interval storms are generally unavailable so hypothetical design storms must be used in most engineering applications. In this paper, we describe the 100-year, 6-hour design storm event for Los Alamos that is assumed to produce the 100-year floodplain. The reader should note that other 100-year storm events (e.g., the 100-year, 24-hour event) will produce different 100-year floodplain definitions. Other design storm construction methodologies also exist (e.g., Chow et al., 1988; USBR, 1977; Miller et al., 1973) and depend on availability of precipitation records.

In constructing a design storm event, several important steps are required, including (1) storm frequency or return period; (2) storm duration, total rainfall depth, and watershed area adjustment; and (3) storm time distribution and duration of rainfall excess. In our case, the US Environmental Protection Agency (EPA) stipulates that RCRA permitted facilities must use the 100-year storm to define all floodplains. The USACE recommends (M. Magnuson, USACE Albuquerque District Office, personal communication, 1989) that a 6-hour storm event should be

used for northern New Mexico in most 100-year flood simulations. Bowen (1990, 1996) has tabulated statistically based rainfall depths for various storms. No areal adjustment was made for rainfall depths because individual subbasins are less than about 3 mi^2 (8 km^2). Hence, factors (1) and (2) above are fixed via institutional constraints and rainfall observations. The selection rationale for factor (3) is described below.

A representative rainfall hyetograph must be selected that is based either on the worst possible storm pattern or from recorded storm distribution patterns. This hyetograph will significantly affect the shape and peak value of the resulting runoff hydrograph for a given watershed. Daily precipitation depths have been measured in Los Alamos since 1911 (Bowen, 1990, 1996). Individual storm patterns have been recorded at 15-minute intervals beginning in 1964. These data were used to develop intensity-duration-frequency (IDF) relationships (McLin, 1992, 2001). These IDF curves (Figure 4) were used to establish individual 6-hour design storm distributions for the 2, 5, 10, 25, 50, 100, and 500-year events.

Figure 4. Intensity-duration-frequency curves for Los Alamos, New Mexico.

Once IDF curves are constructed, then a 6-hour design storm hyetograph can be developed for each return period event using the alternating block method (Chow et al., 1988, p. 454-466). Results for the dimensionless 2 and 100-year instantaneous storm events are shown in Figure 5. All of the cumulative 6-hour storm distributions developed and used in this report are summarized in Appendix A; these include the 2, 5, 10, 25, 50, 100, and 500-year events. The SCS (Soil Conservation Service, now the Natural Resources Conservation Service) 100-year, 6-hour design storm distribution (SCS, 1993) is also shown in Figure 5 for comparison. Note that the SCS curve will produce a more uniform rainfall distribution, and lower corresponding hydrograph peak. As seen in Figure 5, the 6-hour instantaneous design storm distributions used here are bell-shaped with a midpoint peak intensity at 3 hours. These distributions imply

gradually increasing and decreasing intensities preceding and following peak values. This design storm pattern essentially satisfies soil infiltration and other abstraction loss requirements with low rainfall intensity, and generates higher hydrographs in response to higher rainfall intensities later. Observed New Mexico summer thunderstorms typically result from intense prefrontal squall lines moving south to north. These thunderstorms are exceptionally localized events that rarely cover more than about 0.5 mi^2 (1.3 km^2). Hence, our design is conservative since it is simultaneously applied to all subbasins within the west-east oriented watersheds.

Figure 5. Six-hour design storms for Los Alamos; the SCS 6-hour storm is shown for comparison.

Each of the 6-hour design storm distributions described above contains all of the shorter duration events with the same recurrence interval. For example, the 100-year, 6-hour design storm contains the 100-year, 15-minute storm in its central 15-minute interval. Likewise, the 100-year, 1-hour storm is contained within the central 60-minute interval of the 100-year, 6-hour design distribution. In other words, the 100-year, 6-hour design storm incorporates all 100-year events with storm durations of 6 hours or less. This observation is directly related to the alternating block method used to construct the design storm. Hence, the 6-hour design storm will produce larger hydrographs than shorter duration design storms with the same recurrence interval because it has a longer period of low intensity rainfall before its central peak. For example, the 6-hour design storm will yield larger hydrograph peaks than its 1-hour counterpart. This is a significant point that is often overlooked.

As employed here, the HEC-HMS simulations used total rainfall depths reported by Bowen (1990, 1996) and the cumulative design storm distributions computed from the instantaneous distributions described above. Rainfall depths from Bowen (1990) were also adjusted for elevation differences between subbasin centroids using a least squares linear

regression of rain gage elevations and recorded precipitation depths (McLin, 1992). This was done to account for orthographic effects across Pajarito Plateau. These elevation-corrected rainfall depths are listed in Appendix B according to subbasins within individual watersheds.

HEC-HMS MODEL

HEC-HMS is a general-purpose model that can predict the optimal unit hydrograph, channel loss rate, stream flow routing parameters, snowmelt computations, unit hydrograph computations, hydrograph routing and combinations, and hydrograph balancing operations. HEC-HMS can be used to forecast both pre- and post-burn flooding impacts associated with these changing land-use patterns. Output from the model includes the design storm hydrograph for each subbasin. Hydrograph peaks are then utilized in the HEC-RAS model as input data.

HEC-HMS can utilize five different unit hydrographs (UH) to simulate runoff, including a user specified UH, kinematic wave, Clark, Snyder, or SCS UH. The SCS UH was selected in this study to characterize the relationship between rainfall-runoff and peak discharge. The SCS rainfall abstraction loss rate was also utilized as explained later. Finally, HEC-HMS can route computed flood flows through downstream subbasins using a variety of techniques, including modified Puls, Muskingum, Muskingum-Cunge, kinematic wave, and level-pool reservoir routing. The Muskingum method was selected for this option because channel losses and flood-wave attenuation in individual watersheds have not been fully characterized. Hence these losses were assumed to be zero even though they are known to be relatively high in certain pre-fire stream channel reaches (e.g., those channel reaches with relatively thick alluvial deposits). Muskingum routing parameters were computed from average channel flow velocities using Manning's equation. In addition, level-pool reservoir routing was selected to move water through road culverts with high embankments and for flood detention structures.

Obviously, not all rainfall from a storm contributes to direct runoff since some is lost during the overland flow process. These abstractions include vegetation interception, depression storage, soil infiltration, evaporation, and other minor losses. Five theoretical rainfall loss calculation techniques are incorporated in HEC-HMS, including the initial and uniform, HEC exponential, Green-Ampt, Holton, and SCS curve number (CN). However, the SCS CN loss method provides a systematic method for computing composite CN values that can account for changing impervious areas or dramatic land use alterations. The SCS synthetic UH expresses the ratio of discharge to peak discharge against the ratio of time to basin lag time. Here lag time is given by (Viessman et al., 1977):

$$t_p = D/2 + t_l \quad \text{and} \quad t_l = [l^{0.8}\,(S+1)^{0.7}]/[1900\,Y^{0.5}] \qquad (1)$$

where t_p is the time (hours) from rainfall beginning to peak discharge, D is rainfall duration (hours), t_l is subbasin lag time (hours), l is the longest water course length (feet) from the subbasin outflow toward the upstream watershed divide, S is potential maximum retention after rainfall begins (inches), and Y is the average watershed slope (%) along the flowpath. Note that

in (1) the lag time is directly related to CN since S=1000/CN-10. Once rainfall excess has been determined, a unit hydrograph can be computed for each subbasin.

In Figure 6, pre-fire Los Alamos watershed data are used to show SCS basin lag times from (1) as a function of Snyder lag times (Viessman et al., 1977). Empirical coefficients used in the Snyder technique were obtained from USACE studies (M. Magnuson, USACE Albuquerque District Office, personal communication, 1989) from the Rio Puerco in New Mexico and Rio Grande near El Paso, Texas (lower curve). Synder lag times for the upper curve were obtained using a modified form of the Snyder relationship and coefficients for mountainous watersheds near Los Angeles, California (Linsley et al., 1982, pp. 223-225). Figure 6 clearly shows that SCS basin lag times used in this study are bracketed by extremes produced with the Snyder technique. Computation of post-fire changes in Snyder lag times was not possible because changes in empirical coefficients associated with the fire could not be evaluated. Appendix C summarizes pre-fire HEC-HMS model parameters; these data were originally reported in McLin (1992). Appendix D summarizes post-fire HEC-HMS model parameters that were used in the present study. Appendix E shows a HEC-HMS model input data file for Pajarito Canyon, including the flood retention structure located above Technical Area 18 (TA-18).

Figure 6. Comparison of SCS and Snyder pre-fire basin lag times for Los Alamos using equivalent basin parameters.

Figure 7 shows a plot of changes in pre- and post-fire SCS CN values and lag times for impacted watersheds. Note that t_l values from (1) have been dramatically reduced in upland subbasins where CN values have increased the most. Fire impacts are also the most pronounced in these same locations (e.g., Wilson et al., 2001). In some headwater subbasins, lag time has been reduced from 90 minutes to under 33 minutes. This implies that both recording rain and stream gages need to be collecting data every 15 minutes or less in order to capture the dynamic

nature of the rainfall-runoff process. In other words, data acquisition rates for systems inputs and outputs need to be less than one-half the system response time (approximated here by t_l) in order to avoid data aliasing (Jenkins and Watts, 1968, p. 285).

Figure 7. Cerro Grande wildfire changes in curve number (CN) and basin lag times. Here a relative change is defined as (pre-fire value - post-fire value)/(pre-fire value).

In addition to ease of use, (1) has the advantage that impacts of development within a given watershed can be evaluated since changes in CN over time are easily estimated. These same impacts can not be systematically evaluated with the kinematic wave, Snyder, or Clark UH methods.

Pre-fire CN values were determined for all watersheds (McLin, 1992) and formed a starting point for post-fire simulations. These pre-fire values typically ranged from the mid-50s and 60s for wooded alpine forests, to 70s and 80s for mountain brush and pinon-juniper woodlands. These values were originally obtained using a quasi-model calibration procedure for ungaged watersheds as discussed below.

Once all pre-fire basin characteristic parameters had been estimated, then individual watershed hydrographs could be generated. Before this was done, however, a parameter sensitivity analysis was made. All model parameters were constrained to a vary narrow range of observed values except for composite subbasin CN numbers. These CN values were estimated from county soil maps (Nyhan et al., 1978) and standard tables (Hoggan, 1996), although alternative methodologies are available (Hawkins 1993; Hjelmfelt, 1980). To evaluate the uncertainty in estimated pre-fire CN values, hydrograph peaks produced by the 2-year, 6-hour design storm event for Los Alamos were examined for all subbasins. The logic for this design procedure is straightforward: one can quickly develop a general appreciation for flood

magnitudes associated with individual pre-fire 2-year storm events from physical observation. These qualitative observations suggest that pre-fire 2-year flood peaks in Los Alamos County are only slightly larger than zero. This same appreciation can not be easily developed for pre-fire 100-year magnitude events because these events are rarely observed. Following this logic, all HEC-HMS simulations should accurately reflect observed pre-fire 2-year events if one is to have confidence in large recurrence-interval flood predictions. One should recognize that once all pre-fire subbasin characteristic parameters have been determined, then one only needs to change subbasin rainfall totals and design storm distribution patterns in order to generate larger recurrence interval hydrographs.

Each pre-fire watershed simulation was made for the 2-year, 6-hour Los Alamos design storm event. If a given subbasin yielded a hydrograph peak that was unreasonably high or low, then the composite CN was adjusted either downward or upward, respectively, and a new simulation was made. Recall that a change in CN implies a corresponding change in basin lag time, as suggested by (1). This iterative process was repeated several times for each watershed. Individual composite CN values were typically adjusted less than 3% until the predicted 2-year hydrograph peak was greater than zero but less than about 3 cfs (85 l/s) for an average sized subbasin. Approximately half of all subbasins required a composite CN adjustment; these adjustments were nearly equally divided between increases and decreases in CN values. Once these CN values were fixed, then the larger recurrence interval hydrographs were computed using the 6-hour rainfall totals and the design storm distribution patterns developed earlier.

The post-fire CN values were initially modified from original values using weighting factors based on the percent of subbasin areas that were burned. These burned areas were subdivided into low (57% of total burn area), medium (8% of total), and high (34% of total) severity burned areas as defined by the Burned Area Emergency Rehabilitation team (BAER, 2000). This classification is qualitatively linked to changes in soil texture and infiltration capacity. High burn severity areas are located in those areas where the surficial soil structure has been altered. These soils typically have a hydrophobic layer that was formed during the fire. This layer is located approximately 0.25 inch (6.4 mm) below the surface and is between 0.25 to 3.0 inches thick (6.4 to 76 mm). These hydrophobic soils develop when high temperature fires produce heavy volatile organics that migrate into soils and condense (Imeson et al., 1992; Dekker and Ritsema, 1994). For the Cerro Grande wildfire, these hydrophobic soils are preferentially located on north-facing canyon slopes with heavy ponderosa pine forests. They occur on approximately 22% of the total burn area. Medium severity burn areas show little or no hydrophobicity and are concentrated on south-facing canyon slopes with sparser vegetation, on mesa tops, and in canyon bottoms. Low severity burn areas are generally located along the perimeter of more severely burned areas. This hydrophobic soil distribution is related to the distribution of fuels, temperature, and heavy winds during the fire. Quantitative evaluation of infiltration capacity changes in these hydrophobic soils is currently underway.

The BAER team originally assigned CN values of 65, 85, and 90 to the low, medium, and high severity burn areas, respectively. We modified these CN values to include a range of values for each severity classification. Thus for low severity burns, we estimated CN values range from a low of 65 to a high of 85, with an expected value of 75. For moderate severity burned areas,

we estimated than CN values range from a low of 80 to a high of 90, with an expected value of 85. Finally, for high severity burned areas, we estimated that CN values range from a low of 85 to a high of 95, with an expected value of 90. Unburned areas retained their original pre-fire CN values; however, we assumed these values could range four CN points above and below this original value. A composite CN value was computed for each subbasin using these four burn severity weight factors and four expected CN values. These weight factors were computed according to the fraction of burned area within each subbasin area (i.e., unburned, low, medium, or high severity). Each respective weight factor was multiplied by each respective CN value and the results were summed to obtain the composite CN value. This process was then repeated for the low and high CN estimates to establish lower and upper limits on these CN composites. All of these weighted CN values are listed in Appendix F. Calibration efforts will be repeated as forest recovery progresses to document the time rate of change in CN values. This procedure was implemented because public safety and environmental questions needed addressing before the summer (2000) monsoon season created flooding hazards at the Laboratory.

Figure 8. Comparison of observed and simulated peak discharges per unit drainage basin area. The La Mesa and Dome wildfires occured south of the Cerro Grande wildfire in the years indicated.

Figure 8 shows a dramatic increase between pre- and post-fire hydrograph peaks per unit area for both observed and simulated storm events. The observed data in Figure 8 were obtained from stream gages (Cerro Grande fire) and backwater calculations (La Mesa and Domes fires) for several regional wildfires (McLin,2001; Veenhuis, 2000; Cannon and Reneau, 2000). Simulated values were obtained with the HEC-HMS model using the pre- and post-burn CN values described earlier. In addition, the 2-year, 1-hour design storm distribution was used for these simulations because this pattern best represented the observed rainfall pattern following each of the fires. Figure 8 suggests that the final CN values for the post–burn areas yield simulated hydrograph peaks that compare favorably with observed values.

Figure 9 shows a comparison between observed and HEC-HMS predicted hydrographs for Starmer Canyon, a small tributary watershed located in the Santa Fe National Forest along the western Laboratory perimeter. This watershed was severely burned during the Cerro Grande wildfire. The observed hydrograph was in response to approximately 0.69 inches (17.5 mm) of rain that fell in less than 45 minutes on 28 June 2000. The observed and predicted hydrograph peaks match well. However, total observed runoff volume is considerably less than the predicted volume. Five additional observed and predicted hydrographs for other small watersheds follow a similar pattern. These comparisons suggest that the shape of the SCS unit hydrograph may not completely represent Pajarito Plateau watersheds or that channel infiltration losses are significant. These preliminary results are encouraging however.

Figure 9. Observed and simulated hydrographs for the Starmer Canyon watershed following a small thunderstorm on 28 June 2000.

HEC-RAS FLOODPLAIN MAPPING

The HEC-RAS model calculates and plots water surface profiles for subcritical, critical, and supercritical gradually varied, steady flows in channels of any cross-sectional configuration. Surface water profile analyses are commonly used to map floodplains at RCRA sites, determine flood protection levee heights, and establish flood hazard zones for insurance purposes. The HEC-HMS and HEC-RAS models are typically used in conjunction with one another for these floodplain assessment studies.

Flow regime boundary geometry is defined in the HEC-RAS model with cross-sections and reach distances between adjacent cross-sections. These cross-sections are located at user

specified intervals along the stream channel so that the flow capacity in the channel and overbank areas can be characterized. Reducing the distance between adjacent sections will increase the model's accuracy because erratic fluctuations in energy losses between sections can be minimized. Manning's equation is initially used to determine how much of the cross-sectional flow is in the channel and how much is in the overbank areas. Values for subarea conveyance (i.e., all terms in Manning's equation except the friction slope term) are known if the friction slope is assumed constant throughout a given cross-section. A starting water surface elevation at either the downstream (subcritical) or upstream (supercritical) end of the watercourse, expansion or contraction coefficients, Manning's roughness factor n, and stream discharge are specified as input data.

Figure 10. Predicted post-fire 100-year floodplain map for TA-18 following construction of the upstream flood control structure.

This floodplain mapping procedure implies that natural channels meet uniform flow conditions, that the energy grade is approximately equal to the average channel bed slope, and that water surface elevations can be obtained from a normal-depth calculation. These assumptions are conservative in most natural channels. Figure 10 depicts an example of the predicted post-fire 100-year floodpools in Pajarito Canyon near TA-18 after construction of the flood control structure. Other floodplain maps are attached to this report for all canyons crossing Laboratory lands. Table 1 summarizes the Environmental Dynamics and Spatial Analysis Group's (EES-10) GISlab map numbers that define all 100-year floodplains within the Laboratory facility. These maps are the ultimate work-product of this report. However, continued refinement of these floodplain maps will continue as additional rainfall-runoff calibration data are collected.

Table 1. Identification numbers for 100-year floodplain maps.

Watershed	Map Number	GISlab ID Number
Pueblo-Los Alamos	1	110088
	2	110089
	3	110090
	4	110091
	5	110092
	6	110093
	7	110094
	8	110095
	9	110096
	10	110097
	11	110098
Sandia	1	109957
	2	109958
	3	109959
	4	109960
	5	109961
Mortandad-Canada del Buey	1	109984
	2	109985
	3	109986
	4	109987
	5	109988
	6	109989
	7	109990
	8	109991
	9	109992
Pajarito	1	106978
	2	106979
	3	106980
	4	106981
	5	106982
	6	106983
Water-Canon de Valle	1	109962
	2	109963
	3	109964
	4	109965
	5	109966
	6	109967
	7	109968
	8	109969
	9	109970
	10	109971
	11	109972

Table 1. Identification numbers for 100-year floodplain maps.

Watershed	Map Number	GISlab ID Number
Potrillo-Fence	1	110078
	2	110079
	3	110080
	4	110081
	5	110082
Ancho	1	110035
	2	110036
	3	110037
	4	110038
Chaquequi	1	110083
	2	110084

DISCUSSION AND CONCLUSIONS

Many of the maps listed in Table 1 have not been finalized. For example, maps 110092 and 110093 for Pueblo Canyon at Diamond Drive shows the 100-year floodpool overtopping the land bridge. However, the new large-diameter culvert has not been incorporated into the HEC-RAS model. When this task is accomplished, the revised floodpool may or may not be predicted to overtop the land bridge. Finally, it should be remembered that all these floodplains will continue to change as forest recovery progresses.

The successful integration of modern GIS databases and hydrologic models is an emerging technology (Maidment and Djokic, 2000). Most federal, and many State, facilities already have significant GIS topographic coverage. This paper describes an application of HEC-HMS and HEC-RAS floodplain models to complex terrain using ArcView GIS extracted topographic data. These models are recognized by the EPA, USACE, and others as the best available technology for floodplain definition in ungaged watersheds. Combining these models with a GIS capability represents a refinement in their continued use.

The SCS curve number method was used in this study to predict runoff. The relative merits of this empirical approach versus physically based representations have been openly debated in the literature for years. However, Loague and Freeze (1985) have shown that physically based models generally do not predict runoff any better than the relatively simple approach used here. In addition, extension of physical models to ungaged watersheds retains many limitations of simple approaches. Furthermore, the SCS method has the advantage that future changes in land use patterns (e.g., pre- and post-fire watershed alterations or urbanization) are easily addressed.

Most event simulation models represent the rainfall-runoff process as a linear input-output system. This implies that model calibration studies can utilize data from low recurrence-interval storm and runoff events to characterize the watershed response. Typically, these calibration results are then extended to large recurrence-interval events. This well-established practice is far from perfect because the system response may not be linear over this entire range. For example, the calibration efforts described here utilize convective summer thunderstorm data that rarely exceed three hours in duration. However, large recurrence-interval storms in the southwest are often associated with long-duration hurricanes that move inland from the Gulf of Mexico or the Baja Peninsula. One practical solution to this problem is to use a 6- or 24-hour design storm with peak rainfall intensities near the middle of the storm distribution to mimic these rare events.

Finally, observed increases in hydrograph peaks and total runoff volume following wildfires are well documented in the literature. For northern New Mexico, these increases in peak flow appear to be in the range of one to two orders of magnitude per unit drainage basin area. Furthermore, recording rain and stream gages should collect data at less than one-half the post-fire system response time, or basin lag time, to capture the dynamic nature of the rainfall-runoff process.

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Appendix A

Six-Hour Design Storm Distributions for Los Alamos

Table A-1. Individual 6-hour design storm distributions for Los Alamos County.

Time	Time	Cummulative 6-Hour Design Storm Distributions (dimensionless)						
(min)	(hrs)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
0	0.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
5	0.0833	0.000651	0.000988	0.001274	0.001410	0.001599	0.001612	0.001120
10	0.1667	0.001342	0.002017	0.002591	0.002863	0.003243	0.003267	0.002272
15	0.2500	0.002078	0.003090	0.003954	0.004361	0.004933	0.004968	0.003458
20	0.3333	0.002862	0.004211	0.005366	0.005907	0.006673	0.006716	0.004681
25	0.4167	0.003699	0.005382	0.006831	0.007504	0.008466	0.008515	0.005941
30	0.5000	0.004595	0.006609	0.008353	0.009156	0.010316	0.010369	0.007243
35	0.5833	0.005554	0.007897	0.009936	0.010868	0.012225	0.012280	0.008589
40	0.6667	0.006584	0.009251	0.011585	0.012642	0.014199	0.014253	0.009982
45	0.7500	0.007693	0.010676	0.013306	0.014486	0.016243	0.016292	0.011426
50	0.8333	0.008888	0.012181	0.015106	0.016403	0.018361	0.018403	0.012925
55	0.9167	0.010180	0.013773	0.016990	0.018400	0.020559	0.020589	0.014482
60	1.0000	0.011581	0.015462	0.018969	0.020486	0.022845	0.022859	0.016104
65	1.0833	0.013104	0.017258	0.021050	0.022666	0.025226	0.025218	0.017796
70	1.1667	0.014766	0.019174	0.023246	0.024952	0.027710	0.027674	0.019564
75	1.2500	0.016584	0.021224	0.025568	0.027354	0.030308	0.030236	0.021416
80	1.3333	0.018580	0.023425	0.028031	0.029884	0.033030	0.032915	0.023361
85	1.4167	0.020782	0.025798	0.030652	0.032557	0.035890	0.035722	0.025407
90	1.5000	0.023222	0.028367	0.033453	0.035390	0.038904	0.038671	0.027568
95	1.5833	0.025936	0.031161	0.036457	0.038404	0.042089	0.041779	0.029857
100	1.6667	0.028975	0.034217	0.039695	0.041623	0.045468	0.045063	0.032291
105	1.7500	0.032395	0.037578	0.043203	0.045077	0.049066	0.048548	0.034890
110	1.8333	0.036271	0.041301	0.047027	0.048803	0.052916	0.052260	0.037677
115	1.9167	0.040698	0.045455	0.051224	0.052848	0.057057	0.056233	0.040685
120	2.0000	0.045797	0.050132	0.055867	0.057270	0.061538	0.060510	0.043950
125	2.0833	0.051728	0.055452	0.061053	0.062146	0.066423	0.065145	0.047523
130	2.1667	0.058706	0.061574	0.066909	0.067575	0.071795	0.070206	0.051469
135	2.2500	0.067024	0.068721	0.073612	0.073697	0.077767	0.075786	0.055876
140	2.3333	0.077099	0.077209	0.081411	0.080704	0.084493	0.082010	0.060868
145	2.4167	0.089534	0.087502	0.090675	0.088881	0.092198	0.089059	0.066624
150	2.5000	0.105244	0.100318	0.101973	0.098668	0.101223	0.097201	0.073419
155	2.5833	0.125677	0.116833	0.116246	0.110789	0.112122	0.106863	0.081710
160	2.6667	0.153276	0.139117	0.135177	0.126551	0.125880	0.118788	0.092316
165	2.7500	0.192491	0.171211	0.162161	0.148639	0.144500	0.134449	0.106947
170	2.8333	0.252349	0.222289	0.205381	0.183807	0.173032	0.157470	0.130064
175	2.9167	0.354224	0.318917	0.291784	0.256815	0.230839	0.201581	0.179897
180	3.0000	0.562600	0.588462	0.614820	0.654523	0.695267	0.742916	0.750146
185	3.0833	0.703960	0.737874	0.759785	0.787259	0.803799	0.824356	0.850593
190	3.1667	0.780733	0.806111	0.818537	0.835488	0.842266	0.854579	0.882527
195	3.2500	0.828665	0.845971	0.852050	0.862773	0.864833	0.873203	0.900495

Table A-1. Individual 6-hour design storm distributions for Los Alamos County.

Time	Time	Cummulative 6-Hour Design Storm Distributions (dimensionless)						
(min)	(hrs)	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
200	3.3333	0.861321	0.872452	0.874403	0.881215	0.880662	0.886734	0.912804
205	3.4167	0.884940	0.891507	0.890721	0.894936	0.892825	0.897403	0.922113
210	3.5000	0.902783	0.905985	0.903356	0.905773	0.902698	0.906237	0.929583
215	3.5833	0.916715	0.917428	0.913548	0.914686	0.911011	0.913792	0.935816
220	3.6667	0.927879	0.926747	0.922023	0.922236	0.918192	0.920401	0.941162
225	3.7500	0.937014	0.934518	0.929237	0.928771	0.924518	0.926285	0.945843
230	3.8333	0.944619	0.941120	0.935491	0.934526	0.930174	0.931592	0.950007
235	3.9167	0.951042	0.946817	0.940993	0.939664	0.935291	0.936430	0.953757
240	4.0000	0.956534	0.951798	0.945894	0.944302	0.939965	0.940878	0.957169
245	4.0833	0.961280	0.956201	0.950303	0.948527	0.944269	0.944998	0.960300
250	4.1667	0.965418	0.960130	0.954306	0.952406	0.948259	0.948836	0.963194
255	4.2500	0.969056	0.963664	0.957965	0.955992	0.951978	0.952430	0.965883
260	4.3333	0.972277	0.966867	0.961333	0.959324	0.955463	0.955812	0.968396
265	4.4167	0.975147	0.969787	0.964450	0.962437	0.958742	0.959005	0.970756
270	4.5000	0.977719	0.972464	0.967350	0.965358	0.961839	0.962031	0.972979
275	4.5833	0.980035	0.974932	0.970058	0.968108	0.964774	0.964907	0.975081
280	4.6667	0.982131	0.977216	0.972598	0.970708	0.967564	0.967649	0.977075
285	4.7500	0.984035	0.979339	0.974988	0.973172	0.970222	0.970268	0.978972
290	4.8333	0.985772	0.981320	0.977245	0.975514	0.972762	0.972776	0.980781
295	4.9167	0.987362	0.983174	0.979382	0.977746	0.975193	0.975183	0.982510
300	5.0000	0.988822	0.984915	0.981411	0.979878	0.977525	0.977496	0.984166
305	5.0833	0.990168	0.986555	0.983341	0.981919	0.979766	0.979723	0.985756
310	5.1667	0.991410	0.988102	0.985182	0.983875	0.981924	0.981871	0.987283
315	5.2500	0.992561	0.989566	0.986942	0.985755	0.984004	0.983945	0.988754
320	5.3333	0.993629	0.990955	0.988626	0.987563	0.986012	0.985951	0.990172
325	5.4167	0.994623	0.992275	0.990242	0.989306	0.987954	0.987892	0.991541
330	5.5000	0.995549	0.993532	0.991794	0.990987	0.989833	0.989774	0.992864
335	5.5833	0.996415	0.994731	0.993286	0.992611	0.991653	0.991600	0.994146
340	5.6667	0.997225	0.995876	0.994724	0.994182	0.993419	0.993374	0.995387
345	5.7500	0.997984	0.996972	0.996112	0.995704	0.995134	0.995098	0.996591
350	5.8333	0.998698	0.998023	0.997451	0.997179	0.996801	0.996775	0.997760
355	5.9167	0.999368	0.999031	0.998746	0.998610	0.998422	0.998408	0.998895
360	6.0000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000	1.000000

Appendix B

Total 6-Hour Precipitation for Pajarito Plateau Watersheds

Table B-1. Elevation-adjusted 6-hour precipitation for Pajarito Plateau watershed basins.

Location	Elevation	500-yr Ppt	100-yr Ppt	50-yr Ppt	25-yr Ppt	10-yr Ppt	5-yr Ppt	2-yr Ppt
TA-59	7379	3.08	2.61	2.42	2.21	1.94	1.71	1.34
TA-54	6690	2.39	1.94	1.77	1.59	1.36	1.17	0.89
Regression Equation: y = ax + b where y = 6-hr prec (in) and x = watershed basin centroid elevation (ft).								
slope (a)		1.001E-03	9.724E-04	9.434E-04	8.999E-04	8.418E-04	7.837E-04	6.531E-04
intercept (b)		-4.310	-4.566	-4.541	-4.430	-4.272	-4.073	-3.479
Watershed	**Centroid**							
Guaje	**Elevation**	**500-yr Ppt**	**100-yr Ppt**	**50-yr Ppt**	**25-yr Ppt**	**10-yr Ppt**	**5-yr Ppt**	**2-yr Ppt**
1	8100	3.80	3.31	3.10	2.86	2.55	2.28	1.81
2	6700	2.40	1.95	1.78	1.60	1.37	1.18	0.90
3	7105	2.81	2.34	2.16	1.96	1.71	1.50	1.16
4	6400	2.10	1.66	1.50	1.33	1.12	0.94	0.70
5	5920	1.62	1.19	1.04	0.90	0.71	0.57	0.39
Rendija								
1	8250	3.95	3.46	3.24	2.99	2.67	2.39	1.91
2	8250	3.95	3.46	3.24	2.99	2.67	2.39	1.91
3	7420	3.12	2.65	2.46	2.25	1.97	1.74	1.37
4	7720	3.42	2.94	2.74	2.52	2.23	1.98	1.56
5	7780	3.48	3.00	2.80	2.57	2.28	2.02	1.60
6	7000	2.70	2.24	2.06	1.87	1.62	1.41	1.09
7	7420	3.12	2.65	2.46	2.25	1.97	1.74	1.37
8	6910	2.61	2.15	1.98	1.79	1.55	1.34	1.03
9	6880	2.58	2.12	1.95	1.76	1.52	1.32	1.01
10	6400	2.10	1.66	1.50	1.33	1.12	0.94	0.70
Barrancas								
1	6580	2.28	1.83	1.67	1.49	1.27	1.08	0.82
2	6200	1.90	1.46	1.31	1.15	0.95	0.79	0.57
3	6600	2.30	1.85	1.69	1.51	1.28	1.10	0.83
4	6140	1.84	1.41	1.25	1.10	0.90	0.74	0.53
Bayo								
1	7220	2.92	2.46	2.27	2.07	1.81	1.59	1.24
2	6500	2.20	1.76	1.59	1.42	1.20	1.02	0.77
3	6100	1.80	1.37	1.21	1.06	0.86	0.71	0.50
Pueblo								
1	8400	4.10	3.60	3.38	3.13	2.80	2.51	2.01
2	7300	3.00	2.53	2.35	2.14	1.87	1.65	1.29
3	6480	2.18	1.74	1.57	1.40	1.18	1.01	0.75
Los Alamos								
1	9200	4.90	4.38	4.14	3.85	3.47	3.14	2.53
2	7700	3.40	2.92	2.72	2.50	2.21	1.96	1.55
3	7050	2.75	2.29	2.11	1.91	1.66	1.45	1.13
4	6000	1.70	1.27	1.12	0.97	0.78	0.63	0.44
5	5740	1.44	1.02	0.87	0.74	0.56	0.43	0.27
6	5600	1.30	0.88	0.74	0.61	0.44	0.32	0.18
Sandia								
1	6900	2.60	2.14	1.97	1.78	1.54	1.33	1.03
2	6400	2.10	1.66	1.50	1.33	1.12	0.94	0.70
3	6300	2.00	1.56	1.40	1.24	1.03	0.86	0.64
4	5800	1.50	1.07	0.93	0.79	0.61	0.47	0.31

Table B-1. Elevation-adjusted 6-hour precipitation for Pajarito Plateau watershed basins.

Watershed	Centroid							
Mortandad	Elevation	500-yr Ppt	100-yr Ppt	50-yr Ppt	25-yr Ppt	10-yr Ppt	5-yr Ppt	2-yr Ppt
1	7200	2.90	2.44	2.25	2.05	1.79	1.57	1.22
2	7045	2.75	2.29	2.10	1.91	1.66	1.45	1.12
3	6730	2.43	1.98	1.81	1.63	1.39	1.20	0.92
4	6640	2.34	1.89	1.72	1.55	1.32	1.13	0.86
5	6650	2.35	1.90	1.73	1.55	1.33	1.14	0.86
6	6340	2.04	1.60	1.44	1.28	1.07	0.90	0.66
Canada del Buey								
1	6865	2.57	2.11	1.94	1.75	1.51	1.31	1.00
2	6500	2.20	1.76	1.59	1.42	1.20	1.02	0.77
Pajarito								
1	8720	4.42	3.91	3.69	3.42	3.07	2.76	2.22
2	7500	3.20	2.73	2.53	2.32	2.04	1.80	1.42
3	7500	3.20	2.73	2.53	2.32	2.04	1.80	1.42
4	6850	2.55	2.10	1.92	1.73	1.49	1.30	0.99
5	7030	2.73	2.27	2.09	1.90	1.65	1.44	1.11
6	6610	2.31	1.86	1.69	1.52	1.29	1.11	0.84
7	6330	2.03	1.59	1.43	1.27	1.06	0.89	0.65
Potrillo								
1	6750	2.45	2.00	1.83	1.64	1.41	1.22	0.93
2	6700	2.40	1.95	1.78	1.60	1.37	1.18	0.90
3	6400	2.10	1.66	1.50	1.33	1.12	0.94	0.70
Water								
1	8400	4.10	3.60	3.38	3.13	2.80	2.51	2.01
2	7400	3.10	2.63	2.44	2.23	1.96	1.73	1.35
3	6600	2.30	1.85	1.69	1.51	1.28	1.10	0.83
4	6500	2.20	1.76	1.59	1.42	1.20	1.02	0.77
5	5700	1.40	0.98	0.84	0.70	0.53	0.39	0.24
Valle								
1	8680	4.38	3.88	3.65	3.38	3.04	2.73	2.19
2	7510	3.21	2.74	2.54	2.33	2.05	1.81	1.43
3	7300	3.00	2.53	2.35	2.14	1.87	1.65	1.29
Ancho								
1	6900	2.60	2.14	1.97	1.78	1.54	1.33	1.03
2	6800	2.50	2.05	1.87	1.69	1.45	1.26	0.96
3	6400	2.10	1.66	1.50	1.33	1.12	0.94	0.70
4	6300	2.00	1.56	1.40	1.24	1.03	0.86	0.64
5	5750	1.45	1.03	0.88	0.74	0.57	0.43	0.28
Chaquehui								
1	6450	2.15	1.71	1.54	1.37	1.16	0.98	0.73
Frijoles								
1	8900	4.60	4.09	3.85	3.58	3.22	2.90	2.33
2	7300	3.00	2.53	2.35	2.14	1.87	1.65	1.29
3	7000	2.70	2.24	2.06	1.87	1.62	1.41	1.09

Appendix C

Pre-Cerro Grande Wildfire Watershed Data

Table C-1. Guaje Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	34000	3277	55	8.18	9.64	11.30	3.38
2	24000	947	68	4.71	3.95	3.25	2.86
3	46000	3600	69	4.49	7.83	9.59	3.33
4	12750	355	75	3.33	2.78	2.13	1.69
5	9000	215	70	4.29	2.39	1.45	1.59

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60*K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	34000	13.60	0.69	2.78	3	2.08	1.33
2	24000	8.70	0.77	3.06	4	3.06	1.00
3	46000	12.25	1.04	4.17	5	5.21	0.80
4	12750	7.31	0.48	1.94	2	0.97	2.00
5	9000	6.77	0.37	1.48	2	0.74	2.00

Table C-2. Rendija Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	12250	2180	58	7.24	17.80	1.15	1.02
2	9750	1520	58	7.24	15.59	0.71	0.91
3	9750	480	58	7.24	4.92	0.75	1.61
4	13000	1500	58	7.24	11.54	1.15	1.33
5	12500	1100	58	7.24	8.80	1.14	1.47
6	7500	215	69	4.49	2.87	1.05	1.29
7	13250	875	69	4.49	6.60	1.24	1.34
8	13250	385	69	4.49	2.91	1.67	2.02
9	6000	520	69	4.49	8.67	0.32	0.62
10	6000	280	69	4.49	4.67	0.41	0.85
All	48750	3540	63	5.98	7.26	9.59	4.20

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$ — x = 0.20

Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec) — R (ft) = 1.00

K = L/(3600*Vel) (hrs) — n = 0.060

Nstps = 60K/NMIN (dimensionless)

NSTPS = Interger Value for Nstps — NMIN = 15.00

NMIN = Minutes from Card IT — 1/[2(1-x)]= 0.63

$1/[2(1-x)] < \text{Check} < 1/(2x)$ — 1/(2x)= 2.50

Check = (60*K)/(NMIN*NSTPS)

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	12250	10.48	0.32	1.30	2	0.65	2.00
2	9750	9.81	0.28	1.10	2	0.55	2.00
3	9750	5.51	0.49	1.97	2	0.98	2.00
4	13000	8.44	0.43	1.71	2	0.86	2.00
5	12500	7.37	0.47	1.89	2	0.94	2.00
6	7500	4.20	0.50	1.98	2	0.99	2.00
7	13250	6.38	0.58	2.31	3	1.73	1.33
8	13250	4.23	0.87	3.48	4	3.48	1.00
9	6000	7.31	0.23	0.91	1	0.23	4.00
10	6000	5.36	0.31	1.24	2	0.62	2.00
All	48750	6.69	3.02	8.69	9	13.21	0.44

Table C-3. Barrancas Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	25500	1245	72	3.89	4.88	1.79	2.42
2	7250	750	76	3.16	10.34	0.33	0.54
3	23000	1267	72	3.89	5.51	2.52	2.10
4	3250	365	76	3.16	11.23	0.21	0.27

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$ — x = 0.20

Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec) — R (ft) = 5.00

K = L/(3600*Vel) (hrs) — n = 0.100

Nstps = 60K/NMIN (dimensionless)

NSTPS = Interger Value for Nstps — NMIN = 15.00

NMIN = Minutes from Card IT — 1/[2(1-x)]= 0.63

$1/[2(1-x)] < \text{Check} < 1/(2x)$ — 1/(2x)= 2.50

Check = (60*K)/(NMIN*NSTPS)

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	25500	9.68	0.73	2.93	3	2.20	1.33
2	7250	14.09	0.14	0.57	1	0.14	4.00
3	23000	10.28	0.62	2.49	3	1.86	1.33
4	3250	14.68	0.06	0.25	1	0.06	4.00

Table C-4. Bayo Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	16750	745	65	5.38	4.45	1.57	2.19
2	15250	535	74	3.51	3.51	1.16	1.79
3	12750	945	75	3.33	7.41	1.19	1.04

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	16750	9.24	0.50	2.01	3	1.51	1.33
2	15250	8.20	0.52	2.07	3	1.55	1.33
3	12750	11.92	0.30	1.19	2	0.59	2.00

Table C-5. Pueblo Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	15000	1930	56	7.86	12.87	2.24	1.48
2	24000	694	65	5.38	2.89	4.61	3.62
3	14000	246	74	3.51	1.76	1.55	2.37

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
1/[2(1-x)] < Check < 1/(2x)	1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	15000	15.71	0.27	1.06	2	0.53	2.00
2	24000	7.45	0.90	3.58	4	3.58	1.00
3	14000	5.81	0.67	2.68	3	2.01	1.33

Table C-6. Los Alamos Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	20000	1943	52	9.23	9.72	6.33	2.37
2	10000	531	62	6.13	5.31	0.74	1.43
3	35000	846	68	4.71	2.42	3.31	4.95
4	11750	525	80	2.50	4.47	1.96	1.08
5	5000	100	75	3.33	2.00	0.77	0.95
6	7750	165	75	3.33	2.13	0.67	1.30

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60*K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	20000	13.65	0.41	1.63	2	0.81	2.00
2	10000	10.09	0.28	1.10	2	0.55	2.00
3	35000	6.81	1.43	5.71	6	8.57	0.67
4	11750	9.26	0.35	1.41	2	0.71	2.00
5	5000	6.19	0.22	0.90	1	0.22	4.00
6	7750	6.39	0.34	1.35	2	0.67	2.00

Table C-7. Sandia Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	36750	1000	68	4.71	2.72	2.65	4.85
2	11750	370	75	3.33	3.15	0.85	1.49
3	10000	300	76	3.16	3.00	1.32	1.31
4	9000	635	79	2.66	7.06	0.75	0.72

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60*K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	36750	7.23	1.41	5.65	6	8.48	0.67
2	11750	7.77	0.42	1.68	2	0.84	2.00
3	10000	7.59	0.37	1.46	2	0.73	2.00
4	9000	11.63	0.21	0.86	1	0.21	4.00

Table C-8. Mortandad Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

$T = (L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	9000	390	65	5.38	4.33	0.55	1.35
2	10500	277	67	4.93	2.64	0.81	1.86
3	6000	125	72	3.89	2.08	0.36	1.17
4	12250	203	72	3.89	1.66	1.61	2.31
5	16000	465	72	3.89	2.91	0.86	2.16
6	13500	855	74	3.51	6.33	1.72	1.21

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$ — x = 0.20

$Vel = 1.49R^{0.67}S^{0.5}/n$ (ft/sec) — R (ft) = 5.00

K = L/(3600*Vel) (hrs) — n = 0.100

Nstps = 60K/NMIN (dimensionless)

NSTPS = Interger Value for Nstps — NMIN = 15.00

NMIN = Minutes from Card IT — 1/[2(1-x)]= 0.63

1/[2(1-x)] < Check < 1/(2x) — 1/(2x)= 2.50

Check = (60*K)/(NMIN*NSTPS)

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	9000	9.12	0.27	1.10	2	0.55	2.00
2	10500	7.11	0.41	1.64	2	0.82	2.00
3	6000	6.32	0.26	1.05	2	0.53	2.00
4	12250	5.64	0.60	2.41	3	1.81	1.33
5	16000	7.47	0.60	2.38	3	1.79	1.33
6	13500	11.02	0.34	1.36	2	0.68	2.00

Table C-9. Canada del Buey Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	29500	836	69	4.49	2.83	2.10	3.88
2	14750	1345	72	3.89	9.12	2.42	1.14

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$						x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)						R (ft) =	5.00
K = L/(3600*Vel) (hrs)						n =	0.100
Nstps = 60K/NMIN (dimensionless)							
NSTPS = Interger Value for Nstps						NMIN =	15.00
NMIN = Minutes from Card IT						1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$						1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)							
Basin No.	**L (ft)**	**Vel**	**K**	**Nstps**	**NSTPS**	**AMSKK**	**Check**
1	29500	7.37	1.11	4.45	5	5.56	0.80
2	14750	13.23	0.31	1.24	2	0.62	2.00

Table C-10. Pajarito Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

$T = (L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	17250	2711	52	9.23	15.72	1.99	1.66
2	18250	795	62	6.13	4.36	2.57	2.56
3A(2-Mi N)	7000	2060	61	6.39	29.43	1.29	0.47
3B(2-Mi S)	17750	930	61	6.39	5.24	1.99	2.34
4	11000	205	70	4.29	1.86	0.67	2.12
5	19500	710	67	4.93	3.64	1.70	2.59
6	15000	225	72	3.89	1.50	1.15	2.86
7	15500	1050	73	3.70	6.77	2.24	1.34

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$ — x = 0.20

$Vel = 1.49R^{0.67}S^{0.5}/n$ (ft/sec) — R (ft) = 5.00

K = L/(3600*Vel) (hrs) — n = 0.100

Nstps = 60K/NMIN (dimensionless)

NSTPS = Interger Value for Nstps — NMIN = 15.00

NMIN = Minutes from Card IT — 1/[2(1-x)]= 0.63

1/[2(1-x)] < Check < 1/(2x) — 1/(2x)= 2.50

Check = (60K)/(NMIN*NSTPS)

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	17250	17.36	0.28	1.10	2	0.55	2.00
2	18250	9.14	0.55	2.22	3	1.66	1.33
3A(2-Mi N)	7000	23.76	0.08	0.33	1	0.08	4.00
3B(2-Mi S)	17750	10.03	0.49	1.97	2	0.98	2.00
4	11000	5.98	0.51	2.04	3	1.53	1.33
5	19500	8.36	0.65	2.59	3	1.94	1.33
6	15000	5.36	0.78	3.11	4	3.11	1.00
7	15500	11.40	0.38	1.51	2	0.76	2.00

Table C-11. Potrillo Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	28500	875	70	4.29	3.07	2.78	3.53
2	18000	630	71	4.08	3.50	1.03	2.23
3	9750	620	75	3.33	6.36	0.96	0.90

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	28500	7.67	1.03	4.13	5	5.16	0.80
2	18000	8.19	0.61	2.44	3	1.83	1.33
3	9750	11.05	0.25	0.98	1	0.25	4.00

Table C-12. Water Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	18000	2305	54	8.52	12.81	4.07	1.81
2	17750	705	62	6.13	3.97	2.63	2.62
3	19000	405	72	3.89	2.13	1.42	2.90
4	13750	615	72	3.89	4.47	1.97	1.55
5	5000	405	77	2.99	8.10	0.32	0.44

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60*K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	18000	15.67	0.32	1.28	2	0.64	2.00
2	17750	8.73	0.56	2.26	3	1.69	1.33
3	19000	6.40	0.83	3.30	4	3.30	1.00
4	13750	9.26	0.41	1.65	2	0.82	2.00
5	5000	12.47	0.11	0.45	1	0.11	4.00

Table C-13. Valle Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	22500	2756	53	8.87	12.25	2.33	2.26
2	7500	393	63	5.87	5.24	0.78	1.12
3	12500	477	64	5.63	3.82	1.17	1.92

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
1/[2(1-x)] < Check < 1/(2x)	1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	22500	15.33	0.41	1.63	2	0.82	2.00
2	7500	10.03	0.21	0.83	1	0.21	4.00
3	12500	8.56	0.41	1.62	2	0.81	2.00

Table C-14. Ancho Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	25750	1044	68	4.71	4.05	2.19	2.99
2	22000	1035	69	4.49	4.70	2.48	2.38
3	13000	1102	74	3.51	8.48	1.11	1.01
4	10000	688	75	3.33	6.88	1.04	0.89
5	2500	168	75	3.33	6.72	0.19	0.30

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60*K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	25750	8.82	0.81	3.24	4	3.24	1.00
2	22000	9.50	0.64	2.57	3	1.93	1.33
3	13000	12.75	0.28	1.13	2	0.57	2.00
4	10000	11.49	0.24	0.97	1	0.24	4.00
5	2500	11.35	0.06	0.24	1	0.06	4.00

Table C-15. Chaquequi Canyon Watershed							
HEC-1 Input Data File Parameter Calculation							
See UD Data Card for SCS Unit Hydrograph Lag Time Definitions							
T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)							
L = Channel Length to Water Divide (ft)							
X = Basin Elevation Change over Length (ft)							
CN = SCS Curve Number for AMC-II Moisture Conditions (dim)							
S = 1000/CN - 10 = Potential Rainfall Retention (in)							
Y = 100X/L = Gross Watershed Slope (%)							
A = Basin Drainage Area (square miles)							
Basin No.	**L (ft)**	**X (ft)**	**CN**	**S**	**Y (%)**	**A (sm)**	**T (hrs)**
1	16500	1292	73	3.70	7.83	1.50	1.31
HEC-1 Input Data File Parameter Calculation							
See RM Data Card for Muskingum Routing Parameter Definitions							
0.1 < x < 0.3						x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)						R (ft) =	5.00
K = L/(3600*Vel) (hrs)						n =	0.100
Nstps = 60K/NMIN (dimensionless)							
NSTPS = Interger Value for Nstps						NMIN =	15.00
NMIN = Minutes from Card IT						1/[2(1-x)]=	0.63
1/[2(1-x)] < Check < 1/(2x)						1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)							
Basin No.	**L (ft)**	**Vel**	**K**	**Nstps**	**NSTPS**	**AMSKK**	**Check**
1	16500	12.26	0.37	1.50	2	0.75	2.00

Table C-16. Frijoles Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	20200	2499	50	10.00	12.37	4.97	2.23
2	24400	1030	70	4.29	4.22	4.92	2.66
3	24000	633	68	4.71	2.64	8.13	3.50

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	20200	15.41	0.36	1.46	2	0.73	2.00
2	24400	9.00	0.75	3.01	4	3.01	1.00
3	24000	7.11	0.94	3.75	4	3.75	1.00

Appendix D

Post-Cerro Grande Wildfire Watershed Data

Table D-1. Guaje Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	1992 Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
GU100	G1	7955	1050	55	8.18	13.19	1.36	0.90
GU090	G1+G1-1	7750	490	67	4.96	6.32	2.45	0.94
GU080	G1-1	14857	830	83	2.10	5.58	2.21	1.07
GUT4a	G1-2	11965	2560	78	2.75	21.39	1.12	0.52
GUT4b	G1-2	13702	2560	81	2.28	18.68	1.18	0.57
GUT4	G1-2	6273	510	83	1.99	8.13	0.33	0.43
GU070	G1-1	2991	150	86	1.56	5.01	0.15	0.27
GUT3	G1-3	15703	1600	83	1.99	10.18	1.54	0.80
GU060	G1-1+G2	18455	1710	93	0.76	9.26	1.47	0.66
GU050	G2	11453	500	78	2.73	4.36	1.26	1.12
GUT2	G2	15107	1050	81	2.33	6.95	0.70	1.02
GU040	G2	7259	265	68	4.62	3.65	0.63	1.13
GU030	G4	10989	325	75	3.33	2.95	1.41	1.45
GUT1	G4	7299	600	75	3.33	8.22	0.65	0.63
GU020	G4	1529	40	75	3.33	2.61	0.07	0.32
GU010	G5	8649	210	70	4.28	2.42	1.44	1.52

Table D-1. Guaje Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$							x =	0.20
$Vel = 1.49R^{0.67}S^{0.5}/n$ (ft/sec)							R (ft) =	2.00
K = L/(3600*Vel) (hrs)							n =	0.080
Nstps = 60K/NMIN (dimensionless)								
NSTPS = Interger Value for Nstps							NMIN =	5.00
NMIN = Minutes from Card IT							1/[2(1-x)]=	0.63
1/[2(1-x)] < Check < 1/(2x)							1/(2x)=	2.50
Check = (60*K)/(NMIN*NSTPS)								
Basin No.	**1992 Basin No.**	**L (ft)**	**Vel**	**K**	**Nstps**	**NSTPS**	**AMSKK**	**Check**
GU100	G1	7955	8.61	0.25	3.07	3	0.76	1.02
GU090	G1+G1-1	7750	5.96	0.36	4.33	4	1.44	1.08
GU080	G1-1	14857	5.60	0.73	8.83	9	6.62	0.98
GUT4a	G1-2	11965	10.96	0.30	3.63	4	1.21	0.90
GUT4b	G1-2	13702	10.24	0.37	4.45	5	1.85	0.89
GUT4	G1-2	6273	6.75	0.25	3.09	3	0.77	1.03
GU070	G1-1	2991	5.30	0.15	1.87	2	0.31	0.93
GUT3	G1-3	15703	7.56	0.57	6.91	7	4.03	0.98
GU060	G1-1+G2	18455	4.73	0.46	5.55	6	2.77	0.92
GU050	G2	11453	4.95	0.64	7.70	8	5.13	0.96
GUT2	G2	15107	6.25	0.67	8.05	8	5.37	1.00
GU040	G2	7259	4.52	0.44	5.34	5	2.22	1.06
GU030	G4	10989	4.07	0.74	8.98	9	6.73	0.99
GUT1	G4	7299	6.79	0.29	3.57	4	1.19	0.89
GU020	G4	1529	3.83	0.11	1.32	1	0.11	1.32
GU010	G5	8649	3.69	0.65	7.80	8	5.20	0.97

Table D-2. Rendija Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	1992 Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
REN050	G3	12405	2230	92	0.83	17.97	1.15	0.35
RENT4	G3	10334	1550	93	0.75	14.99	0.71	0.32
REN040	G3	10166	460	89	1.27	4.52	0.54	0.70
RENT3	G3	14594	1540	93	0.80	10.55	1.14	0.52
RENT2	G3	12596	1160	92	0.88	9.20	1.15	0.51
REN030	G3	16270	585	76	3.23	3.59	1.25	1.78
RENT1	G3	12393	845	89	1.23	6.81	1.23	0.66
REN020	G3	13971	380	74	3.45	2.71	1.99	1.87
REN010	G3	6449	280	69	4.49	4.34	0.36	0.92

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$

Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)

K = L/(3600*Vel) (hrs)

Nstps = 60K/NMIN (dimensionless)

NSTPS = Interger Value for Nstps

NMIN = Minutes from Card IT

$1/[2(1-x)] < \text{Check} < 1/(2x)$

Check = (60*K)/(NMIN*NSTPS)

							x =	0.20
							R (ft) =	2.00
							n =	0.080
							NMIN =	5.00
							1/[2(1-x)]=	0.63
							1/(2x)=	2.50

Basin No.	1992 Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
REN050	G3	12405	10.05	0.34	4.11	4	1.37	1.02
RENT4	G3	10334	9.18	0.31	3.75	4	1.25	0.93
REN040	G3	10166	5.04	0.55	6.71	7	3.91	0.95
RENT3	G3	14594	7.70	0.52	6.31	6	3.15	1.05
RENT2	G3	12596	7.19	0.48	5.83	6	2.91	0.97
REN030	G3	16270	4.03	0.58	7.00	7	4.08	1.00
RENT1	G3	12393	6.19	0.55	6.67	7	3.89	0.95
REN020	G3	13971	3.90	0.99	11.91	12	11.91	0.99
REN010	G3	6449	4.93	0.36	4.35	4	1.45	1.08

Table D-3. Barrancas Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	1992 Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
BAR070	BAR2	8058	715	76	3.15	8.87	0.33	0.63
BAR060	BAR1	27863	1280	72	3.88	4.59	1.89	2.68
BAR050	BAR4	1158	50	76	3.15	4.31	0.10	0.19
BAR040	BAR3	16708	985	72	3.88	5.89	0.74	1.57
BAR030	BAR3	17520	985	72	3.88	5.62	1.27	1.67
BAR020	BAR3	5886	265	72	3.88	4.50	0.51	0.78
BAR010	BAR4	2410	90	76	3.15	3.73	0.10	0.37

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$ — x = 0.20

Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec) — R (ft) = 2.00

K = L/(3600*Vel) (hrs) — n = 0.080

Nstps = 60K/NMIN (dimensionless)

NSTPS = Interger Value for Nstps — NMIN = 5.00

NMIN = Minutes from Card IT — 1/[2(1-x)]= 0.63

$1/[2(1-x)] < \text{Check} < 1/(2x)$ — 1/(2x)= 2.50

Check = (60*K)/(NMIN*NSTPS)

Basin No.	1992 Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
BAR070	BAR2	8058	7.06	0.31	3.80	4	1.26	0.95
BAR060	BAR1	27863	5.08	1.52	18.27	18	27.41	1.01
BAR050	BAR4	1158	4.92	0.06	0.78	1	0.05	1.00
BAR040	BAR3	16708	5.75	0.80	9.67	10	8.06	0.96
BAR030	BAR3	17520	5.62	0.86	10.38	10	8.65	1.03
BAR020	BAR3	5886	5.03	0.32	3.90	4	1.30	0.97
BAR010	BAR4	2410	4.58	0.14	1.75	2	0.29	0.87

Table D-4. Bayo Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	1992 Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
BAY020U	BAY1	17910	790	65	5.38	4.41	1.64	2.31
BAY020L	BAY2	16168	530	74	3.51	3.27	1.13	1.94
BAYT1	BAY3	6903	630	75	3.33	9.12	0.37	0.57
BAY010	BAY3	9425	320	75	3.33	3.39	0.85	1.20

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$

Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)

K = L/(3600*Vel) (hrs)

Nstps = 60K/NMIN (dimensionless)

NSTPS = Interger Value for Nstps

NMIN = Minutes from Card IT

$1/[2(1-x)] < \text{Check} < 1/(2x)$

Check = (60K)/(NMIN*NSTPS)

x = 0.20

R (ft) = 2.00

n = 0.080

NMIN = 5.00

1/[2(1-x)]= 0.63

1/(2x)= 2.50

Basin No.	1992 Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
BAY020U	BAY1	17910	4.97	0.99	11.99	12	11.99	0.99
BAY020L	BAY2	16168	4.29	1.04	12.55	13	13.60	0.96
BAYT1	BAY3	6903	7.16	0.26	3.21	3	0.80	1.07
BAY010	BAY3	9425	4.36	0.59	7.19	7	4.19	1.02

Table D-5. Pueblo Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	1992 Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
PUE020	PUE1	12744	1738	91	0.96	13.63	1.39	0.44
PUETrib1	PUE1A	17681	1828	91	0.97	10.33	0.89	0.65
PUE010uu	PUE2	1977	84	70	4.33	4.24	0.11	0.35
School	PUE2	9115	672	83	2.11	7.37	0.58	0.63
PUE010um	PUE2	4291	184	65	5.27	4.28	0.42	0.74
Acid	PUE2	8595	506	65	5.36	5.88	0.45	1.11
PUE010UL	PUE2	995	30	65	5.38	3.01	0.07	0.27
Walnut	PUE2	9400	586	67	4.88	6.23	0.62	1.09
PUE010mu	PUE2	5672	192	65	5.38	3.38	0.49	1.05
Graduation	PUE2	5950	603	65	5.38	10.13	0.21	0.63
PUE010ml	PUE2	12404	202	65	5.38	1.62	1.52	2.84
PUE010l	PUE3	11451	174	74	3.51	1.51	1.46	2.16
PUE010ll	PUE3	3081	62	74	3.51	2.01	0.13	0.65

Table D-5. Pueblo Canyon Watershed								
HEC-1 Input Data File Parameter Calculation								
See RM Data Card for Muskingum Routing Parameter Definitions								
0.1 < x < 0.3							x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)							R (ft) =	2.00
K = L/(3600*Vel) (hrs)							n =	0.080
Nstps = 60K/NMIN (dimensionless)								
NSTPS = Interger Value for Nstps							NMIN =	5.00
NMIN = Minutes from Card IT							1/[2(1-x)]=	0.63
1/[2(1-x)] < Check < 1/(2x)							1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)								
Basin No.	**1992 Basin No.**	**L (ft)**	**Vel**	**K**	**Nstps**	**NSTPS**	**AMSKK**	**Check**
PUE020	PUE1	12744	8.75	0.40	4.85	5	2.02	0.97
PUETrib1	PUE1A	17681	7.62	0.64	7.73	8	5.15	0.96
PUE010uu	PUE2	1977	4.88	0.11	1.34	2	0.22	0.67
School	PUE2	9115	6.43	0.39	4.72	5	1.96	0.94
PUE010um	PUE2	4291	4.90	0.24	2.91	3	0.72	0.97
Acid	PUE2	8595	5.75	0.41	4.98	5	2.07	0.99
PUE010UL	PUE2	995	4.11	0.06	0.80	1	0.06	0.80
Walnut	PUE2	9400	5.91	0.44	5.29	5	2.20	1.05
PUE010mu	PUE2	5672	4.36	0.36	4.33	4	1.44	1.08
Graduation	PUE2	5950	7.54	0.21	2.62	3	0.65	0.87
PUE010ml	PUE2	12404	3.02	1.13	13.66	14	15.94	0.97
PUE010l	PUE3	11451	2.92	1.08	13.06	13	14.14	1.00
PUE010ll	PUE3	3081	3.36	0.25	3.05	3	0.76	1.01

Table D-6. Los Alamos Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	1992 Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
LAT2	LA1-1	11237	2040	63	5.78	18.15	1.57	0.82
LAT1a	LA1-1	10965	1440	68	4.67	13.13	1.26	0.83
LAT1b	LA1-1	2676	202	84	1.84	7.54	0.12	0.22
LAT1	LA1	15335	1742	88	1.36	11.35	1.59	0.63
LA040U	LA1-2	6398	352	90	1.17	5.50	1.02	0.42
LA040UM	LA2	7871	420	90	1.16	5.33	0.47	0.51
LA040M	LA2+LA3	21620	622	68	4.66	2.87	1.61	3.07
DP Canyon	LA3	15474	675	75	3.33	4.36	0.57	1.58
LA040ML	LA3	11057	236	68	4.70	2.13	1.09	2.09
LA040L	LA3	4796	102	68	4.70	2.12	0.36	1.07
LA030	LA4	12286	516	80	2.50	4.19	1.93	1.15
LA020	LA5	4738	100	75	3.33	2.11	0.68	0.88
LA010	LA6	7017	144	75	3.33	2.05	0.74	1.22

Table D-6. Los Alamos Canyon Watershed								
HEC-1 Input Data File Parameter Calculation								
See RM Data Card for Muskingum Routing Parameter Definitions								
0.1 < x < 0.3							x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)							R (ft) =	2.00
K = L/(3600*Vel) (hrs)							n =	0.080
Nstps = 60K/NMIN (dimensionless)								
NSTPS = Interger Value for Nstps							NMIN =	5.00
NMIN = Minutes from Card IT							1/[2(1-x)]=	0.63
1/[2(1-x)] < Check < 1/(2x)							1/(2x)=	2.50
Check = (60*K)/(NMIN*NSTPS)								
Basin No.	**1992 Basin No.**	**L (ft)**	**Vel**	**K**	**Nstps**	**NSTPS**	**AMSKK**	**Check**
LAT2	LA1-1	11237	10.10	0.30	3.70	4	1.23	0.92
LAT1a	LA1-1	10965	8.59	0.35	4.25	4	1.41	1.06
LAT1b	LA1-1	2676	6.51	0.11	1.36	2	0.22	0.68
LAT1	LA1	15335	7.99	0.53	6.39	6	3.19	1.06
LA040U	LA1-2	6398	5.56	0.31	3.83	11	3.51	0.34
LA040UM	LA2	7871	5.47	0.39	4.79	5	1.99	0.95
LA040M	LA2+LA3	21620	4.02	1.49	17.92	4	5.97	4.48
DP Canyon	LA3	15474	4.95	0.86	10.41	10	8.68	1.04
LA040ML	LA3	11057	3.46	0.88	10.64	18	15.96	0.59
LA040L	LA3	4796	3.45	0.38	4.62	5	1.92	0.92
LA030	LA4	12286	4.85	0.70	8.42	8	5.61	1.05
LA020	LA5	4738	3.44	0.38	4.58	5	1.75	1.00
LA010	LA6	7017	3.39	0.57	6.88	7	4.01	0.98

Table D-7. Sandia Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	36750	1000	75	3.33	2.72	2.65	4.00
2	11750	370	75	3.33	3.15	0.85	1.49
3	10000	300	76	3.16	3.00	1.32	1.31
4	9000	635	79	2.66	7.06	0.75	0.72

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60*K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	36750	7.23	1.41	5.65	6	8.48	0.67
2	11750	7.77	0.42	1.68	2	0.84	2.00
3	10000	7.59	0.37	1.46	2	0.73	2.00
4	9000	11.63	0.21	0.86	1	0.21	4.00

Table D-8. Mortandad Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	9000	390	71	4.08	4.33	0.55	1.15
2	10500	277	68	4.71	2.64	0.81	1.81
3	6000	125	78	2.82	2.08	0.36	0.98
4	12250	203	73	3.70	1.66	1.61	2.25
5	16000	465	72	3.89	2.91	0.86	2.16
6	13500	855	74	3.51	6.33	1.72	1.21

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$ — x = 0.20

Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec) — R (ft) = 5.00

K = L/(3600*Vel) (hrs) — n = 0.100

Nstps = 60K/NMIN (dimensionless)

NSTPS = Interger Value for Nstps — NMIN = 15.00

NMIN = Minutes from Card IT — 1/[2(1-x)]= 0.63

1/[2(1-x)] < Check < 1/(2x) — 1/(2x)= 2.50

Check = (60*K)/(NMIN*NSTPS)

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	9000	9.12	0.27	1.10	2	0.55	2.00
2	10500	7.11	0.41	1.64	2	0.82	2.00
3	6000	6.32	0.26	1.05	2	0.53	2.00
4	12250	5.64	0.60	2.41	3	1.81	1.33
5	16000	7.47	0.60	2.38	3	1.79	1.33
6	13500	11.02	0.34	1.36	2	0.68	2.00

Table D-9. Canada del Buey Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	29500	836	71	4.08	2.83	2.10	3.68
2	14750	1345	72	3.89	9.12	2.42	1.14

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	29500	7.37	1.11	4.45	5	5.56	0.80
2	14750	13.23	0.31	1.24	2	0.62	2.00

Table D-10. Pajarito Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	17250	2711	81	2.35	15.72	1.99	0.76
2	18250	795	79	2.66	4.36	2.57	1.60
3A(2-Mi N)	7000	2060	78	2.82	29.43	1.29	0.30
3B(2-Mi S)	17750	930	74	3.51	5.24	1.99	1.66
4	11000	205	76	3.16	1.86	0.67	1.79
5	19500	710	74	3.51	3.64	1.70	2.14
6	15000	225	72	3.89	1.50	1.15	2.86
7	15500	1050	73	3.70	6.77	2.24	1.34

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	17250	17.36	0.28	1.10	2	0.55	2.00
2	18250	9.14	0.55	2.22	3	1.66	1.33
3A(2-Mi N)	7000	23.76	0.08	0.33	1	0.08	4.00
3B(2-Mi S)	17750	10.03	0.49	1.97	2	0.98	2.00
4	11000	5.98	0.51	2.04	3	1.53	1.33
5	19500	8.36	0.65	2.59	3	1.94	1.33
6	15000	5.36	0.78	3.11	4	3.11	1.00
7	15500	11.40	0.38	1.51	2	0.76	2.00

Table D-11. Potrillo Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	28500	875	77	2.99	3.07	2.78	2.90
2	18000	630	71	4.08	3.50	1.03	2.23
3	9750	620	75	3.33	6.36	0.96	0.90

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	28500	7.67	1.03	4.13	5	5.16	0.80
2	18000	8.19	0.61	2.44	3	1.83	1.33
3	9750	11.05	0.25	0.98	1	0.25	4.00

Table D-12. Water Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	18000	2305	89	1.24	12.81	4.07	0.66
2	17750	705	86	1.63	3.97	2.63	1.30
3	19000	405	72	3.89	2.13	1.42	2.90
4	13750	615	72	3.89	4.47	1.97	1.55
5	5000	405	77	2.99	8.10	0.32	0.44

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$ — x = 0.20

Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec) — R (ft) = 5.00

K = L/(3600*Vel) (hrs) — n = 0.100

Nstps = 60K/NMIN (dimensionless)

NSTPS = Interger Value for Nstps — NMIN = 15.00

NMIN = Minutes from Card IT — 1/[2(1-x)]= 0.63

$1/[2(1-x)] < \text{Check} < 1/(2x)$ — 1/(2x)= 2.50

Check = (60*K)/(NMIN*NSTPS)

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	18000	15.67	0.32	1.28	2	0.64	2.00
2	17750	8.73	0.56	2.26	3	1.69	1.33
3	19000	6.40	0.83	3.30	4	3.30	1.00
4	13750	9.26	0.41	1.65	2	0.82	2.00
5	5000	12.47	0.11	0.45	1	0.11	4.00

Table D-13. Valle Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	22500	2756	92	0.87	12.25	2.33	0.71
2	7500	393	80	2.50	5.24	0.78	0.70
3	12500	477	80	2.50	3.82	1.17	1.23

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	22500	15.33	0.41	1.63	2	0.82	2.00
2	7500	10.03	0.21	0.83	1	0.21	4.00
3	12500	8.56	0.41	1.62	2	0.81	2.00

Table D-14. Ancho Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	25750	1044	68	4.71	4.05	2.19	2.99
2	22000	1035	70	4.29	4.70	2.48	2.32
3	13000	1102	74	3.51	8.48	1.11	1.01
4	10000	688	75	3.33	6.88	1.04	0.89
5	2500	168	75	3.33	6.72	0.19	0.30

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$ — x = 0.20

Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec) — R (ft) = 5.00

K = L/(3600*Vel) (hrs) — n = 0.100

Nstps = 60K/NMIN (dimensionless)

NSTPS = Interger Value for Nstps — NMIN = 15.00

NMIN = Minutes from Card IT — 1/[2(1-x)]= 0.63

1/[2(1-x)] < Check < 1/(2x) — 1/(2x)= 2.50

Check = (60*K)/(NMIN*NSTPS)

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	25750	8.82	0.81	3.24	4	3.24	1.00
2	22000	9.50	0.64	2.57	3	1.93	1.33
3	13000	12.75	0.28	1.13	2	0.57	2.00
4	10000	11.49	0.24	0.97	1	0.24	4.00
5	2500	11.35	0.06	0.24	1	0.06	4.00

Table D-15. Chaquequi Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	16500	1292	73	3.70	7.83	1.50	1.31

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$	x =	0.20
Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec)	R (ft) =	5.00
K = L/(3600*Vel) (hrs)	n =	0.100
Nstps = 60K/NMIN (dimensionless)		
NSTPS = Interger Value for Nstps	NMIN =	15.00
NMIN = Minutes from Card IT	1/[2(1-x)]=	0.63
$1/[2(1-x)] < \text{Check} < 1/(2x)$	1/(2x)=	2.50
Check = (60K)/(NMIN*NSTPS)		

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	16500	12.26	0.37	1.50	2	0.75	2.00

Table D-16. Frijoles Canyon Watershed

HEC-1 Input Data File Parameter Calculation

See UD Data Card for SCS Unit Hydrograph Lag Time Definitions

T = $(L^{0.8})(S+1)^{0.7}/(1900Y^{0.5})$ = SCS Basin Lag Time (hrs)

L = Channel Length to Water Divide (ft)

X = Basin Elevation Change over Length (ft)

CN = SCS Curve Number for AMC-II Moisture Conditions (dim)

S = 1000/CN - 10 = Potential Rainfall Retention (in)

Y = 100X/L = Gross Watershed Slope (%)

A = Basin Drainage Area (square miles)

Basin No.	L (ft)	X (ft)	CN	S	Y (%)	A (sm)	T (hrs)
1	20200	2499	60	6.67	12.37	4.97	1.73
2	24400	1030	70	4.29	4.22	4.92	2.66
3	24000	633	68	4.71	2.64	8.13	3.50

HEC-1 Input Data File Parameter Calculation

See RM Data Card for Muskingum Routing Parameter Definitions

$0.1 < x < 0.3$ — x = 0.20

Vel = $1.49R^{0.67}S^{0.5}/n$ (ft/sec) — R (ft) = 5.00

K = L/(3600*Vel) (hrs) — n = 0.100

Nstps = 60K/NMIN (dimensionless)

NSTPS = Interger Value for Nstps — NMIN = 15.00

NMIN = Minutes from Card IT — 1/[2(1-x)]= 0.63

1/[2(1-x)] < Check < 1/(2x) — 1/(2x)= 2.50

Check = (60K)/(NMIN*NSTPS)

Basin No.	L (ft)	Vel	K	Nstps	NSTPS	AMSKK	Check
1	20200	15.41	0.36	1.46	2	0.73	2.00
2	24400	9.00	0.75	3.01	4	3.01	1.00
3	24000	7.11	0.94	3.75	4	3.75	1.00

Appendix E

HEC-HMS Input Data File for Pajarito Canyon Post-Cerro Grande Wildfire

Appendix E. HEC-HMS input data file for Pajarito Canyon.

```
ID    LOS ALAMOS NATIONAL LABORATORY
ID    POST-CERRO GRANDE WILDFIRE - PAJARITO CANYON WATERSHED
ID    HEC-1 SIMULATION - 100-YR, 6-HR DESIGN STORM FOR LOS ALAMOS
ID    S.G. McLin, ESH-18, MS-K497, 505-665-1721
IT   15 28JUN00    00    197
IO   0    0
PG  GAG1   3.91
PG  GAG2   2.73
PG  GAG3   2.73
PG  GAG4   2.10
PG  GAG5   2.27
PG  GAG6   1.86
PG  GAG7   1.59
PG  LADS
IN   15    0    0
PC .0000  .0051  .0106  .0167  .0234  .0310  .0397  .0499  .0624  .0784
PC .1012  .1424  .8081  .8797  .9090  .9278  .9418  .9530  .9624  .9705
PC .9777  .9840  .9898  .9951  1.0000
KKPAJ1
KM    PAJARITO C. ABOVE HW-501 AT WEST DOE BOUNDARY
KO                        22
BA  1.99
PR  LADS
PW    1
PT  GAG1
PW    1
LS    0    84
UD   .69
KKRTE2
KM    ROUTE FLOW THRU PAJ2
KO                        22
RM    3   1.66    0.2
KKPAJ2
KM    PAJARITO C. BELOW HW-501 AND ABOVE 2-MILE CANYON CONFLUENCE
KO                        22
BA  2.57
PR  LADS
PW    1
PT  GAG2
PW    1
LS    0    83
UD  1.41
KKQP2
KM    COMBINED PAJARITO C. FLOW ABOVE 2-MILE CONFLUENCE
KO                        22
HC    2
KK2-MI
KM    2-MILE CANYON ABOVE PAJARITO CONFLUENCE = PAJARITO BASIN #3
KO                        22
BA  3.28
PR  LADS
PW    1
```

Appendix E. HEC-HMS input data file for Pajarito Canyon (continued).

```
PT  GAG3
PW    1
LS    0     81
UD  1.39
KKQ2MI
KM     COMBINED FLOW BELOW PAJARITO-2 MILE CANYON CONFLUENCE
KO                          22
HC    2
KK2MIDAM
KMRESERVOIR AT PAJARITO AND 2MI CONFLUENCE
KO                          22
RS    1   ELEV   6928
SA    0    .37   1.33   4.02   7.46   9.78   13.17   16.9   17.6   26.6
SE 6928   6930   6940   6950   6960   6970   6980   6990   7000   7010
SL6928.7   9.62   0.55    0.5
SS6996.0  200.0    3.1    1.5
KKRTE4
KM     ROUTE FLOW THRU PAJ4
KO                          22
RM    3   1.53    0.2
KKPAJ4
KM     PAJARITO BETWEEN 2-MI & 3-MI CANYONS
KO                          22
BA  0.67
PR  LADS
PW    1
PT  GAG4
PW    1
LS    0     80
UD  1.58
KKQP4
KM     COMBINED PAJARITO C. FLOW ABOVE 3-MILE CONFLUENCE
KO                          22
HC    2
KKPAJ5
KM     3-MILE CANYON = PAJARITO BASIN #5
KO                          22
BA  1.70
PR  LADS
PW    1
PT  GAG5
PW    1
LS    0     79
UD  1.85
KKQ3MI
KM     COMBINED FLOW BELOW PAJARITO-3 MILE CANYON CONFLUENCE
KO                          22
HC    2
KKRTE6
KM     ROUTE FLOW THRU PAJ6
KO                          22
RM    4   3.11    0.2
```

Appendix E. HEC-HMS input data file for Pajarito Canyon (continued).

```
KKPAJ6
KM    PAJARITO C. AT WHITE ROCK ABOVE HW-4
KO                    22
BA  1.15
PR  LADS
PW    1
PT  GAG6
PW    1
LS    0     76
UD  2.55
KKQHW4
KM    COMBINED PAJARITO C. FLOW AT EAST DOE LINE (HW-4 AT WHITE ROCK)
KO                    22
HC    2
KKRTE7
KM    ROUTE FLOW THRU PAJ7 = PAJARITO ACRES
KO                    22
RM    2    0.76    0.2
KKPAJ7
KM    WHITE ROCK - PAJARITO ACRES BELOW HW-4
KO                    22
BA  2.24
PR  LADS
PW    1
PT  GAG7
PW    1
LS    0     77     5
UD  1.20
KKQPRIO
KM    COMBINED PAJARITO FLOW INTO RIO GRANDE
KO                    22
HC    2
ZZ
```

Appendix F

Cerro Grande Wildfire Burned Acreage by Watershed

Table F-1. Cerro Grande Burned Areages by Watershed

SUMMARY OF BURNED AREAS AND BURN INTENSITY BY DRAINAGE BASIN

Basin	Total Sq. Mi.	Fire Intensity: Low	Fire Intensity: Moderate	Fire Intensity: High	Unburned
Los Alamos Canyon					
LA-1	6.36	2.88	0.01	1.82	1.64
LA-2	0.78	0.14	0.03	0.45	0.16
LA-3	3.29				3.29
LA-4	1.98				1.98
LA-5	0.65				0.65
LA-6	0.75				0.75
TOTALS:	**13.81**	**3.02**	**0.04**	**2.28**	**8.47**
Pajarito Canyon					
PAJ-1	1.99	0.70	0.06	1.03	0.20
PAJ-2	2.52	1.94	0.10	0.44	0.05
PAJ-3	3.18	2.08	0.19	0.48	0.44
PAJ-4	0.65	0.64			0.01
PAJ-5	1.68	1.53			0.15
PAJ-6	1.08	0.01			1.07
PAJ-7	2.20				2.20
TOTALS:	**13.30**	**6.90**	**0.35**	**1.94**	**4.11**
Sandia Canyon					
SAN-1	2.64	1.01			1.63
SAN-2	0.87				0.87
SAN-3	1.39				1.39
SAN-4	0.69				0.69
TOTALS:	**5.59**	**1.01**			**4.58**

VARIABILITY IN WEIGHTED AVE CN VALUES BY DRAINAGE BASIN

Basin	Original CN	Weighted Ave CN Values: Min	Weighted Ave CN Values: Expected	Weighted Ave CN Values: Max	BAER FS
Fire Intensity CN					
Low		75	80	85	65
Moderate		80	85	90	85
High		85	90	95	90
Unburned	OCN	OCN-4	OCN	OCN+4	OCN
Los Alamos Canyon					
LA-1	52	71	76	80	69
LA-2	62	77	82	87	80
LA-3	68	64	68	72	68
LA-4	80	76	80	84	80
LA-5	75	71	75	79	75
LA-6	75	71	75	79	75
Pajarito Canyon					
PAJ-1	52	78	82	87	77
PAJ-2	62	77	82	87	70
PAJ-3	61	74	79	84	69
PAJ-4	70	75	80	85	65
PAJ-5	67	74	79	84	65
PAJ-6	72	68	72	76	72
PAJ-7	73	69	73	77	73
Sandia Canyon					
SAN-1	68	68	73	77	67
SAN-2	75	71	75	79	75
SAN-3	76	72	76	80	76
SAN-4	79	75	79	83	79

Table F-1. Cerro Grande Burned Areages by Watershed

SUMMARY OF BURNED AREAS AND BURN INTENSITY BY DRAINAGE BASIN

Basin	Total Sq. Mi.	Fire Intensity			Unburned
		Low	Moderate	High	
Mortandad Canyon					
MOR-1	0.56	0.28	0.14		0.14
MOR-2	0.82	0.81	0.02		0.00
MOR-3	0.37	0.23	0.14		0.00
MOR-4	1.56	0.73	0.11		0.72
MOR-5	0.89	0.09	0.01		0.79
MOR-6	1.69				1.69
TOTALS:	**5.89**	**2.13**	**0.42**		**3.34**
Canada del Buey					
CAN-1	2.05	0.64	0.21		1.21
CAN-2	2.41		0.00		2.41
TOTALS:	**4.47**	**0.64**	**0.21**		**3.61**
Potrillo Canyon					
POT-1	2.69	0.62			2.07
POT-2	0.98	0.01			0.98
POT-3	0.97				0.97
TOTALS:	**4.64**	**0.63**			**4.01**
Canon de Valle					
VAL-1	2.35	1.69	0.10	0.42	0.13
VAL-2	0.82	0.79	0.03		0.00
VAL-3	1.15	1.11	0.05		0.00
TOTALS:	**4.32**	**3.59**	**0.18**	**0.42**	**0.13**
Water Canyon					
WAT-1	3.85	1.99	0.19	1.62	0.05
WAT-2	2.58	1.92	0.60		0.07
WAT-3	1.36	0.21			1.15
WAT-4	1.90				1.90
WAT-5	0.32				0.32
TOTALS:	**10.01**	**4.12**	**0.78**	**1.62**	**3.47**

VARIABILITY IN WEIGHTED AVE CN VALUES BY DRAINAGE BASIN

Basin	Original CN	Weighted Ave CN Values			BAER
		Min	Expected	Max	FS
Mortandad Canyon					
MOR-1	65	73	77	82	70
MOR-2	67	75	80	85	65
MOR-3	72	77	82	87	73
MOR-4	72	72	77	81	70
MOR-5	72	69	73	77	71
MOR-6	74	70	74	78	74
Canada del Buey					
CAN-1	69	70	74	78	69
CAN-2	72	68	72	76	72
Potrillo Canyon					
POT-1	70	68	72	77	69
POT-2	71	67	71	75	71
POT-3	75	71	75	79	75
Canon de Valle					
VAL-1	53	76	81	85	70
VAL-2	63	75	80	85	66
VAL-3	64	75	80	85	66
Water Canyon					
WAT-1	54	79	84	89	76
WAT-2	62	76	81	86	70
WAT-3	72	69	73	77	71
WAT-4	72	68	72	76	72
WAT-5	77	73	77	81	77

Table F-1. Cerro Grande Burned Areages by Watershed

SUMMARY OF BURNED AREAS AND BURN INTENSITY BY DRAINAGE BASIN

Basin	Total Sq. Mi.	Fire Intensity			Unburned
		Low	Moderate	High	
Ancho Canyon					
ANC-1	2.24				2.24
ANC-2	2.42	0.18			2.24
ANC-3	1.11				1.11
ANC-4	1.04				1.04
ANC-5	0.19				0.19
TOTALS:	**7.01**	**0.18**			**6.83**
Frijoles Canyon					
FRI-1	5.10	1.25	0.06	0.05	3.74
FRI-2	5.04	0.07	0.04	0.02	4.91
FRI-3	8.30	0.31	0.01	0.08	7.89
TOTALS:	**18.43**	**1.63**	**0.12**	**0.15**	**16.54**
Pueblo Canyon					
PUE-1	2.27	0.04	0.03	2.18	0.01
PUE-2	4.61	0.13	0.08	0.24	4.16
PUE-3	1.55				1.55
TOTALS:	**8.42**	**0.17**	**0.11**	**2.42**	**5.72**
Guaje Canyon					
G-1	11.37	6.27		2.28	2.82
G-2	3.20	1.47	0.13	1.07	0.53
G-4	2.18				2.18
G-5	1.45				1.45
TOTALS:	**18.20**	**7.74**	**0.13**	**3.35**	**6.99**
Rendija Canyon					
REND	9.58	1.26	0.59	5.43	2.30

VARIABILITY IN WEIGHTED AVE CN VALUES BY DRAINAGE BASIN

Basin	Original CN	Weighted Ave CN Values			BAER
		Min	Expected	Max	FS
Ancho Canyon					
ANC-1	68	64	68	72	68
ANC-2	69	66	70	74	69
ANC-3	74	70	74	78	74
ANC-4	75	71	75	79	75
ANC-5	75	71	75	79	75
Frijoles Canyon					
FRI-1	50	54	58	62	54
FRI-2	70	66	70	74	70
FRI-3	68	65	69	73	68
Pueblo Canyon					
PUE-1	56	85	90	95	89
PUE-2	65	63	67	71	67
PUE-3	74	70	74	78	74
Guaje Canyon					
G-1	55	71	76	81	68
G-2	68	77	82	86	75
G-4	75	71	75	79	75
G-5	70	66	70	74	70
Rendija Canyon					
REND	69	79	83	88	81