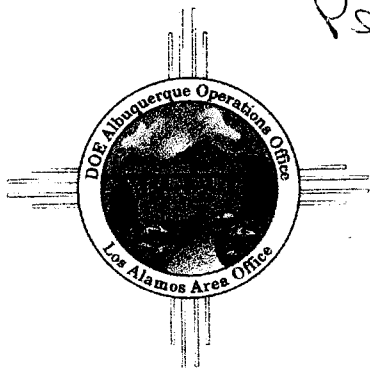


LANL  
Permit 1994



Contract 003CT0008-8L  
Project No. 774830.02.03  
October 1998

# Los Alamos National Laboratory

General Part B Permit Application Revision ~~0.0~~ 1.0

**Prepared by:**

***Los Alamos National Laboratory  
Hazardous and Solid Waste Group (ESH-19)  
Los Alamos, New Mexico 87545  
For the Department of Energy - Los Alamos Area Office***

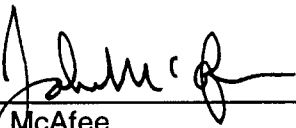


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CERTIFICATION  
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General Part B Permit Application  
(Revision 1.0)  
October 1998

CERTIFICATION BY TECHNICAL AREAS 14, 15, 36, AND 39 REPRESENTATIVES

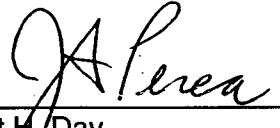
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage 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.

  
\_\_\_\_\_  
John M. McAfee  
Group Leader for Dynamic Experimentation Division  
Field Operations and Experiment Support Group  
Los Alamos National Laboratory

10/3/98  
\_\_\_\_\_  
Date Signed

  
\_\_\_\_\_  
Christine A. Nelson  
Deputy Facility Manager for Dynamic Experimentation  
Division Office Environment, Safety, and Health  
Los Alamos National Laboratory

10-1-98  
\_\_\_\_\_  
Date Signed

 *for R.H.D.*  
\_\_\_\_\_  
Robert H. Day  
Division Director for Dynamic Experimentation  
Division  
Los Alamos National Laboratory

10/02/98  
\_\_\_\_\_  
Date Signed



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October 1998

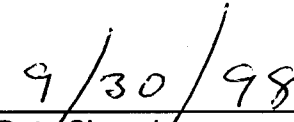
CERTIFICATION BY TECHNICAL AREA 16 REPRESENTATIVES

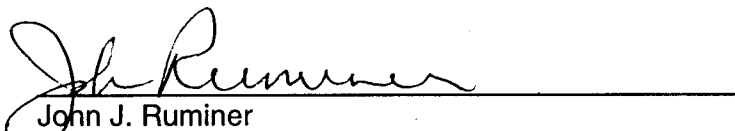
TA-16 Burn Ground

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.

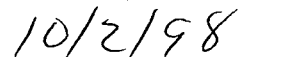
  
\_\_\_\_\_  
Ricardo V. Ortiz

Group Leader for Engineering Sciences  
and Applications Division Weapon Materials and  
Manufacturing Group  
Los Alamos National Laboratory

  
\_\_\_\_\_  
Date Signed

  
\_\_\_\_\_  
John J. Ruminer

Acting Division Director for Engineering Sciences  
and Applications Division  
Los Alamos National Laboratory

  
\_\_\_\_\_  
Date Signed

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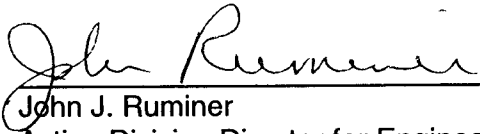
TA-16-88 Container Storage Area

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.



Steven P. Girrens  
Group Leader for Engineering Sciences  
Applications Division Engineering Analysis Group  
Los Alamos National Laboratory

9-30-98  
Date Signed




John J. Ruminer  
Acting Division Director for Engineering Sciences  
and Applications Division  
Los Alamos National Laboratory

10/2/98  
Date Signed

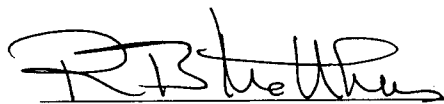
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Los Alamos National Laboratory  
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(Revision 1.0)  
October 1998

CERTIFICATION BY TECHNICAL AREAS 3, AND 55 REPRESENTATIVES

I certify under penalty of law that this document and attachments were reviewed and approved for consistency with the waste management operations of the Nuclear Materials Technology (NMT) Division 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 reviewing the information, submitted is, to the best of my knowledge and belief, true, accurate, and complete as it applies to NMT operations at Technical Area (TA) 55 and the Chemistry and Metallurgy Research Building at TA-3. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

  
\_\_\_\_\_  
James J. Balkey  
Group Leader for NMT Division  
Waste Management and Environmental  
Compliance Group  
Los Alamos National Laboratory

10/6/98  
\_\_\_\_\_  
Date Signed

  
\_\_\_\_\_  
R. Bruce Matthews  
Division Director for NMT Division  
Los Alamos National Laboratory

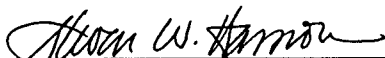
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Date Signed

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Los Alamos National Laboratory  
General Part B Permit Application  
(Revision 1.0)  
October 1998


CERTIFICATION BY TECHNICAL AREA 50 REPRESENTATIVES

TA-50 Radioactive Liquid Waste

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.

  
\_\_\_\_\_  
Steven W. Hanson  
Group Leader for Environmental Management-  
Radioactive Liquid Waste Group; Facility Manager  
for Facility Management Unit 84  
Los Alamos National Laboratory

9-30-98  
\_\_\_\_\_  
Date Signed


  
\_\_\_\_\_  
Thomas E. Baca  
Division Director for Environmental Management  
Division  
Los Alamos National Laboratory

9-30-98  
\_\_\_\_\_  
Date Signed

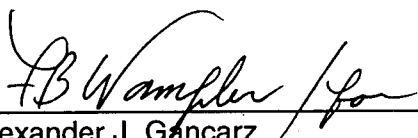
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Los Alamos National Laboratory  
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(Revision 1.0)  
October 1998

TA-50-Waste Characterization, Reduction, and Repackaging Facility and Radioactive Materials Research, Operations, and Demonstration Facility

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.

  
Sara B. Helmick  
Facility Manager for Facility Management  
Unit 66  
Los Alamos National Laboratory

9/28/98  
Date Signed

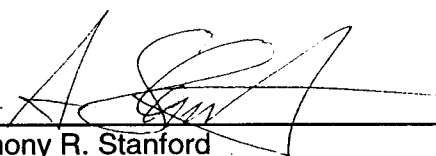
  
Alexander J. Gancarz  
Division Director for Chemical Science and  
Technology Division  
Los Alamos National Laboratory

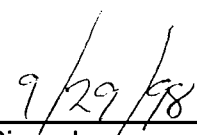
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Date Signed


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(Revision 1.0)  
October 1998

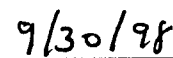
CERTIFICATION BY TECHNICAL AREA 54, AREAS L AND G REPRESENTATIVES

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.

  
\_\_\_\_\_  
Anthony R. Stanford  
Group Leader for Environmental Management-Solid  
Waste Operations Group; Facility  
Manager for Facility Management Unit 64  
Los Alamos National Laboratory

  
\_\_\_\_\_  
Date Signed

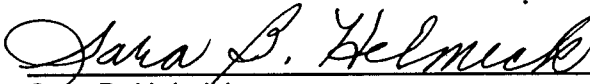
  
\_\_\_\_\_  
Thomas E. Baca  
Division Director for Environmental Management  
Division  
Los Alamos National Laboratory

  
\_\_\_\_\_  
Date Signed


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Los Alamos National Laboratory  
General Part B Permit Application  
(Revision 1.0)  
October 1998

CERTIFICATION BY TECHNICAL AREA 54 WEST REPRESENTATIVES

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.

  
\_\_\_\_\_  
Sara B. Helmick  
Facility Manager for Facility Management Unit 66  
Los Alamos National Laboratory

9/29/98  
\_\_\_\_\_  
Date Signed

  
\_\_\_\_\_  
Alexander J. Ganca/z  
Division Director for Chemical Science and  
Technology Division  
Los Alamos National Laboratory

9/29/98  
\_\_\_\_\_  
Date Signed

Document: LANL General Part B  
Revision No.: 1.0  
Date: October 1998

# **Los Alamos National Laboratory General Part B Permit Application**

## **Revision 1.0**

*Prepared by:*  
Los Alamos National Laboratory  
Hazardous and Solid Waste Group (ESH-19)  
Los Alamos, New Mexico 87545

October 1998



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<u>APPENDIX</u>	<u>TITLE</u>
A	Facility Description
B	Waste Analysis Plan
C	Inspection Plan
D	Personnel Training Plan
E	Contingency Plan
F	Closure Plan

## LIST OF SUPPLEMENTS

<u>SUPPLEMENT</u>	<u>TITLE</u>
1	Contract Between the U.S. Department of Energy and the Incorporated County of Los Alamos
2	Memorandum of Understanding Between the United States Department of Energy Los Alamos Area Office and the Incorporated County of Los Alamos, New Mexico Concerning Mutual Aid and Emergency Response
3	Memorandum of Understanding Between the United States Department of Energy and the Los Alamos Medical Center Concerning Mutual Assistance and Emergency Support
4	1997 and 1998 Traffic Studies at Intersection of Diamond Drive and Trinity Drive
5	Determination of 100-Year Floodplain Elevations at Los Alamos National Laboratory
6	Off-Site Waste Information

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1-1	Regulatory References and Corresponding Permit Application Location
2-1	List of Off-Site Potential Release Sites (PRS) and/or Off-Site Solid Waste Management Units (SWMU) That May Have Investigation-Derived Waste or Remediation Waste Brought onto Los Alamos National Laboratory
2-2	List of Off-Site Waste Management Facilities That May Return Treatment-Derived Waste or Waste Residuals to the Los Alamos National Laboratory
2-3	List of Off-Site Waste Management Facilities That May Send Waste to Los Alamos National Laboratory

## LIST OF ABBREVIATIONS/ACRONYMS

HRMB	Hazardous and Radioactive Materials Bureau
LANL	Los Alamos National Laboratory
20 NMAC 4.1	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
PRS	potential release site
SWMU	solid waste management unit
TA	technical area
TSD	treatment, storage, and disposal

## 1.0 INTRODUCTION

This Los Alamos National Laboratory (LANL) General Part B Permit Application is submitted to address requirements that apply to hazardous and mixed waste treatment, storage, and disposal facility operations at all LANL technical areas (TA). This General Part B serves as Revision 1.0 to the General Part B submitted in August 1996 (LANL, 1996). It is intended to meet the permitting strategy outlined by the New Mexico Environment Department Hazardous and Radioactive Materials Bureau (HRMB) in correspondence dated February 5, 1998. As stated in the correspondence, the General Part B will serve in the operating permit as an "umbrella" document, covering the requirements of the New Mexico Hazardous Waste Act and implementing regulations, specifically, the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20 NMAC 4.1), revised January 1, 1997 [1-1-97], common to all TAs. Other applicable 20 NMAC 4.1 requirements are or will be addressed in TA-specific permit applications, permit modification requests, or permit renewal documents. Together, information provided in this document and in the TA-specific documents will meet the applicable Part B requirements specified in 20 NMAC 4.1, Subparts V and IX [1-1-97].

In accordance with HRMB's permitting strategy, LANL submitted a General Part A permit application in April 1998 (LANL, 1998). The General 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 as of April 30, 1998, that are subject to 20 NMAC 4.1, Subparts V, VI, and IX [1-1-97]. The General Part A serves as a companion document to the General Part B and TA-specific permit applications, permit modification requests, and permit renewal documents.

In both the General Part A and General Part B permit applications, a unit to be permitted may sometimes be referred to as a "facility" (e.g., the Drum Prep 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 NMAC 4.1, Subpart I, 260.10 [1-1-97]. However, pursuant to 20 NMAC 4.1, Subpart I, 260.10 [1-1-97], 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

**Document:** LANL General Part B  
**Revision No.:** 1.0  
**Date:** October 1998

20 NMAC 4.1, which adopts, with a few limited 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 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 <sup>b</sup>
§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 <sup>b</sup>



**Table 1-1 (Continued)**  
**Regulatory References and**  
**Corresponding Permit Application Location**

Regulatory Citation(s)	Description of Requirement	Location in this Document
§270.14(b)(8)(i)	Prevention of hazards in unloading operations (ramps and special forklifts)	NA <sup>b</sup>
§270.14(b)(8)(ii)	Runoff prevention with berms, trenches, and dikes	NA <sup>b</sup>
§270.14(b)(8)(iii)	Prevention of contamination of water supplies	NA <sup>b</sup>
§270.14(b)(8)(iv)	Mitigation effects of equipment failure and power outages	NA <sup>b</sup>
§270.14(b)(8)(v)	Prevention of undue exposure of personnel by use of personal protective equipment	NA <sup>b</sup>
§270.14(b)(8)(vi)	Prevention of release to the atmosphere	NA <sup>b</sup>
§270.14(b)(9)	Prevention of accidental ignition or reaction	2.0 <sup>b</sup>
§264.17(c)	Documentation of compliance with 264.17 (general requirements for ignitable, reactive, or incompatible wastes)	NA <sup>b</sup>
§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)]	Appendix A
§270.14(b)(11)(ii)	Seismic standard requirements	Appendix A <sup>b</sup>
§270.14(b)(11)(ii)(A)	No fault within 3,000 feet (ft) with displacement in Holocene time	NA <sup>b</sup>
§270.14(b)(11)(ii)(A)(1)	Published geological studies	NA <sup>b</sup>
§270.14(b)(11)(ii)(A)(2)	Aerial reconnaissance of a five-mile radius from the facility	NA <sup>b</sup>
§270.14(b)(11)(ii)(A)(3)	Analysis of aerial photographs covering 3,000-ft radius from the facility/unit	NA <sup>b</sup>
§270.14(b)(11)(ii)(A)(4)	Reconnaissance based on walking portions of the area within 3,000 ft of the facility	NA <sup>b</sup>

**Table 1-1 (Continued)**  
**Regulatory References and**  
**Corresponding Permit Application Location**

Regulatory Citation(s)	Description of Requirement	Location in this Document
§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 <sup>b</sup>
§270.14(b)(11)(iii)	100-year floodplain standard	Appendix A <sup>b</sup>
§270.14(b)(11)(iv)	If facility is within 100-year floodplain	Appendix A <sup>b</sup>
§270.14(b)(11)(iv)(A)	Engineering analyses of hydrostatic forces expected in a 100-year flood	NA <sup>b</sup>
§270.14(b)(11)(iv)(B)	Structural engineering studies for flood protection to prevent washout	NA <sup>b</sup>
§270.14(b)(11)(iv)(C)	Detailed description of procedures to remove hazardous waste to safety before flood reaches the waste	NA <sup>b</sup>
§270.14(b)(11)(iv)(C)(1)	Timing of removal	NA <sup>b</sup>
§270.14(b)(11)(iv)(C)(2)	Location to be moved to	NA <sup>b</sup>
§270.14(b)(11)(iv)(C)(3)	Dedicated equipment and personnel to ensure removal	NA <sup>b</sup>
§270.14(b)(11)(iv)(C)(4)	Potential for accidental discharge during movement	NA <sup>b</sup>
§270.14(b)(11)(v)	Plan to show how the facility will be brought into compliance with 264.18(b)	NA <sup>b</sup>
§270.14(b)(12)	Personnel training program	Appendix D
§270.14(b)(13)	Closure and post-closure plans	Appendix F
§264.112	Amendment of closure plan	Appendix F
§264.118	Post-closure plan; amendment of plan	Appendix F <sup>b</sup>
§264.178	Closure/containers	NA <sup>b</sup>
§264.197	Closure/tanks	NA <sup>b</sup>
§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	NA
§264.351	Closure/incinerators	NA
§264.601	Miscellaneous units	NA <sup>b</sup>

**Table 1-1 (Continued)**  
**Regulatory References and**  
**Corresponding Permit Application Location**

Regulatory Citation(s)	Description of Requirement	Location in this Document
§264.603	Post-closure care	NA <sup>b</sup>
§270.14(b)(14)	Post-closure notices (264.119)	Appendix F
§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 F
	Post-closure care financial assurance (264.145)	Appendix F
§270.14(b)(17)	Liability insurance (264.147)	Appendix F
§270.14(b)(18)	Proof of financial coverage (264.149-150)	Appendix F
§270.14(b)(19)	Topographic map requirements	Appendix A <sup>c</sup>
§270.14(b)(19)(i)	Map scale and date	Appendix A <sup>c</sup>
§270.14(b)(19)(ii)	100-year floodplain	Appendix A
§270.14(b)(19)(iii)	Surface waters	Appendix A <sup>c</sup>
§270.14(b)(19)(iv)	Land use	Appendix A
§270.14(b)(19)(v)	Wind rose	Appendix A
§270.14(b)(19)(vi)	Map orientation	Appendix A <sup>c</sup>
§270.14(b)(19)(vii)	Legal boundaries	Appendix A <sup>c</sup>
§270.14(b)(19)(viii)	Access controls	NA <sup>b</sup>
§270.14(b)(19)(ix)	Wells	Appendix A <sup>c</sup>
§270.14(b)(19)(x)	Buildings	Appendix A <sup>c</sup>
	Treatment, storage, and disposal (TSD) operations	Appendix A <sup>c</sup>
	Run-on/run-off control systems	NA <sup>b</sup>
	Storm sewer systems	Appendix A
	Sanitary sewer systems	Appendix A
	Process sewer systems	Appendix A
	Loading/unloading areas	NA <sup>b</sup>
	Fire control facilities	Appendix E
§270.14(b)(19)(xi)	Drainage barriers	NA <sup>b</sup>
§270.14(b)(19)(xii)	Location of operational units	Appendix A <sup>c</sup>

**Table 1-1 (Continued)**  
**Regulatory References and**  
**Corresponding Permit Application Location**

Regulatory Citation(s)	Description of Requirement	Location in this Document
§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	NA
§270.14(c)(3)	A topographic map required under 270.14(b)(19) that identifies proposed point of compliance	NA
	Proposed location of groundwater monitoring wells under 264.97.	NA
§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
§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)	NA
§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

**Table 1-1 (Continued)**  
**Regulatory References and**  
**Corresponding Permit Application Location**

Regulatory Citation(s)	Description of Requirement	Location in this Document
§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 <sup>b</sup>
§270.14(d)(1)(i)	Location of SWMUs on topographic map	NA <sup>b</sup>
§270.14(d)(1)(ii)	Types of SWMUs	NA <sup>b</sup>
§270.14(d)(1)(iii)	Dimensions and descriptions of SWMUs	NA <sup>b</sup>
§270.14(d)(1)(iv)	Dates of operation	NA <sup>b</sup>
§270.14(d)(1)(v)	Waste types managed at SWMU	NA <sup>b</sup>
§270.14(d)(2)	Information on releases from SWMUs	NA <sup>b</sup>
§270.15	Containers	NA <sup>b</sup>
§270.16	Tank systems	NA <sup>b</sup>
§270.16(a)	Written assessment and certification	NA <sup>b</sup>
§270.16(b)	Capacity/dimensions	NA <sup>b</sup>
§270.16(c)	Systems and controls	NA <sup>b</sup>
§270.16(d)	Piping and process flow	NA <sup>b</sup>
§270.16(e)	External corrosion protection	NA <sup>b</sup>
§270.16(f)	Installation	NA <sup>b</sup>
§270.16(g)	Secondary containment system	NA <sup>b</sup>
§270.16(h)	Request for variance from secondary containment	NA <sup>b</sup>
§270.16(i)	Spill prevention	NA <sup>b</sup>
§270.16(j)	Ignitable, reactive, or incompatible wastes	2.0 <sup>b</sup>

<sup>a</sup> NA = not applicable

<sup>b</sup> Special requirements or information is addressed in technical area-specific permit applications, permit modification requests, or permit renewal documents, as appropriate.

<sup>c</sup> Some of the topographic map requirements are addressed in the "Los Alamos National Laboratory General Part A Permit Application," Revision 0.0 (LANL, 1998a) and in the "Los Alamos National Laboratory's Response to Request for Supplemental Information: General Part A Permit Application, Revision 0.0" (LANL, 1998b).

## **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 documents. Together, this information addresses the applicable Part B information requirements of the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20 NMAC 4.1), Subpart IX, Part 270, and 20 NMAC 4.1, Subpart V, Part 264, revised January 1, 1997 [1-1-97].

In accordance with 20 NMAC 4.1, Subpart V, 264.31 [1-1-97], 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 documents for the following subject areas:

- Security procedures and equipment (20 NMAC 4.1, Subpart IX, 270.14(b)(4) and 20 NMAC 4.1, Subpart V, 264.14 [1-1-97]);
- Access control (20 NMAC 4.1, Subpart IX, 270.14(b)(19)(viii) [1-1-97]);
- Preparedness and prevention requirements (20 NMAC 4.1, Subpart IX, 270.14(b)(8) and 20 NMAC 4.1, Subpart V, Part 264, Subpart C [1-1-97]);
- Procedures, structures, and equipment for preventing hazards (20 NMAC 4.1, Subpart IX, 270.14(b)(8) [1-1-97]);
- General waste management practices for ignitable, reactive, and incompatible waste (20 NMAC 4.1, Subpart IX, 270.14(b)(9) and 20 NMAC 4.1, Subpart V, 264.17 [1-1-97]).

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 documents.

## 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 documents. 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 NMAC 4.1, Subpart V, Part 264 [1-1-97]. The facility standards in Subparts I through X of 20 NMAC 4.1, Subpart V, Part 264 [1-1-97], will be addressed as applicable to waste management units included in TA-specific permit applications, permit modification requests, and permit renewal documents.

### 2.1.1 Security Procedures and Equipment/Access Control [20 NMAC 4.1, Subpart IX, 270.14(b)(4) and (b)(19)(viii); 20 NMAC 4.1, Subpart V, 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 documents.

### 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 NMAC 4.1, Subpart IX, 270.14(b)(8) and 20 NMAC 4.1, Subpart V, Part 264, Subpart C [1-1-97], is provided in TA-specific permit applications, permit modification requests, or permit renewal documents. 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 documents.

#### 2.1.2.1 Required Equipment [20 NMAC 4.1, Subpart V, 264.32]

Information on required equipment for each waste management unit is provided in TA-specific permit applications, permit modification requests, or permit renewal documents. 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 NMAC 4.1, Subpart V, 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. 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 NMAC 4.1, Subpart V, 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 documents, 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 NMAC 4.1, Subpart V, 264.37(a)]

The U.S. Department of Energy maintains support agreements in the form of contracts and memoranda of understanding with various outside response agencies 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., Johnson Controls Northern New Mexico) during emergency response. The "Contract Between the United States Department of Energy and the Incorporated County of Los Alamos" provides 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, the associated hazards, and the possible evacuation routes. The "Memorandum of Understanding Between the United States Department of Energy Los Alamos Area Office and the Incorporated County of Los Alamos, New Mexico Concerning Mutual Aid and Emergency Response" summarizes the agreement for local police assistance. The "Memorandum of Understanding Between the United States Department of Energy and the Los Alamos Medical Center Concerning Mutual Assistance and Emergency Support" allows 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) and copies are presented as Supplements 1, 2, and 3 of this document. Responsibilities of internal and external emergency response groups and agencies are discussed fully in Appendix E of this document.

#### 2.1.3 Hazards Prevention [20 NMAC 4.1, Subpart IX, 270.14(b)(8)]

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

#### 2.1.4 Prevention of Accidental Ignition or Reaction of Ignitable, Reactive, or Incompatible Waste [20 NMAC 4.1, Subpart IX, 270.14(b)(9), 270.15(c) and (d), 270.16(j); 20 NMAC 4.1, Subpart V, 264.17, 264.176, 264.177, 264.198, 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 NMAC 4.1, Subpart V, 264.17(a) [1-1-97]. Together, these measures meet the requirements of 20 NMAC 4.1, Subpart V, 264.17(a) and (b) [1-1-97].

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 documents.

#### 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 generated by sources other than LANL or its contractor(s) operating on site. Wastes generated by LANL at TA-57 (the Fenton Hill site), wastes generated through investigation of potential release sites (PRS) and/or solid waste management units (SWMU) (Table 2-1), and wastes generated through the restoration of PRS/SWMU sites (Table 2-1) may be accepted for storage or treatment if the waste is 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 2-2). Waste may be received from the off-site facilities listed in Table 2-3 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, 2-2, and 2-3, a permit modification will be requested in accordance with 20 NMAC 4.1, Subpart IX, 270.42 [1-1-97].

**2.2 AIR EMISSION STANDARDS FOR PROCESS VENTS [20 NMAC 4.1, 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 documents, pursuant to 20 NMAC 4.1, Subpart V, Part 264, Subpart AA [1-1-97].

**2.3 AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS [20 NMAC 4.1, 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 documents, pursuant to 20 NMAC 4.1, Subpart V, Part 264, Subpart BB [1-1-97].

**2.4 AIR EMISSION STANDARDS FOR TANKS, SURFACE IMPOUNDMENTS, AND CONTAINERS [20 NMAC 4.1, 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 documents, pursuant to 20 NMAC 4.1, Subpart V, Part 264, Subpart CC [1-1-97].

**2.5 CONTAINMENT BUILDINGS [20 NMAC 4.1, Subpart V, Part 264, Subpart DD]**

Containment buildings are addressed, as appropriate, in TA-specific permit applications, permit modification requests, or permit renewal documents, pursuant to 20 NMAC 4.1, Subpart V, Part 264, Subpart DD [1-1-97].

**Table 2-1**

**List of Off-Site Potential Release Sites (PRS) and/or Off-Site Solid Waste Management Units (SWMU) That May Have Investigation-Derived Waste or Remediation Waste Brought onto Los Alamos National Laboratory**

PRS/SWMU Number	Technical Area	Operational Unit	Unit Type
00-003	0	1071	Container Storage
00-005	0	1071	Landfill
00-011(a)	0	1071	Mortar Impact Area
00-011(c)	0	1071	Mortar Impact Area
00-011(d)	0	1071	Mortar Impact Area
00-011(e)	0	1071	Mortar Impact Area
00-012	0	1071	Underground Storage Tank
00-016	0	1071	Firing Range
00-017	0	1071	Waste Lines
00-018(a)	0	1071	Pueblo Waste Water Treatment Plant
00-019	0	1071	Waste Water Treatment Plant
00-028(a)	0	1071	Effluent Discharge
00-028(b)	0	1071	Effluent Discharge
00-030(a)	0	1071	Septic System
00-030(b)	0	1071	Septic System (6th St.)
00-030(g)	0	1071	Septic System
00-030(l)	0	1071	Septic System
00-030(m)	0	1071	Septic System
00-033	0	1071	Warehouse
00-039	0	1071	Underground Storage Tank
01-001(a)	01	1078	Septic System
01-001(b)	01	1078	Septic System
01-001(c)	01	1078	Septic System
01-001(d)	01	1078	Septic System
01-001(e)	01	1078	Septic System
01-001(f)	01	1078	Septic System
01-001(g)	01	1078	Septic System
01-001(h)	01	1078	Septic System
01-001(i)	01	1078	Septic System
01-001(j)	01	1078	Septic System
01-001(k)	01	1078	Septic System
01-001(l)	01	1078	Septic System
01-001(n)	01	1078	Septic Tank #276
01-001(o)	01	1078	Ind. or San. Waste Water Treatment
01-001(s)	01	1078	Septic System
01-001(t)	01	1078	Septic System
01-001(u)	01	1078	Septic System
01-002	45	1079	Outfall TA-01
01-003(a)	01	1078	Landfill
01-003(d)	01	1078	Surface Disposal Site
01-003(e)	01	1078	Surface Disposal Site

**Table 2-1 (Continued)**

**List of Off-Site Potential Release Sites (PRS) and/or Off-Site Solid Waste Management Units (SWMU) That May Have Investigation-Derived Waste or Remediation Waste Brought onto Los Alamos National Laboratory**

PRS/SWMU Number	Technical Area	Operational Unit	Unit Type
01-006(a)	01	1078	Drain, Liner and Outfall
01-006(b)	01	1078	Drain, Liner and Outfall
01-006(c)	01	1078	Drain, Liner and Outfall
01-006(d)	01	1078	Drain, Liner and Outfall
01-006(h)	01	1078	Drain, Liner and Outfall
01-006(n)	01	1078	Drain, Liner and Outfall
01-006(o)	01	1078	Drain, Liner and Outfall
01-007(a)	01	1078	Soil Contamination Area
01-007(b)	01	1078	Soil Contamination Area
01-007(c)	01	1078	Soil Contamination Area
01-007(d)	01	1078	Soil Contamination Area
01-007(e)	01	1078	Soil Contamination Area
01-007(j)	01	1078	Soil Contamination Area
01-007(l)	01	1078	Soil Contamination Area
10-001(a)	10	1079	Firing Site
10-001(b)	10	1079	Firing Site
10-001(c)	10	1079	Firing Site
10-001(d)	10	1079	Firing Site
10-002(a)	10	1079	Disposal Pit
10-002(b)	10	1079	Disposal Pit
10-003(c)	10	1079	Disposal Pit
10-003(d)	10	1079	Disposal Pit
10-003(e)	10	1079	Disposal Pit
10-003(f)	10	1079	Disposal Pit
10-003(g)	10	1079	Manholes
10-003(h)	10	1079	Manholes
10-003(i)	10	1079	Septic Tank
10-003(j)	10	1079	Tank
10-003(k)	10	1079	Tank
10-003(l)	10	1079	Tank
10-003(m)	10	1079	Waste Line
10-003(n)	10	1079	Leach Field
10-003(o)	10	1079	Leach Field
10-004(a)	10	1079	Septic System
10-004(b)	10	1079	Septic System
10-005	10	1079	Surface Disposal Area
10-007	10	1079	Landfill
19-001	19	1071	Septic System
19-002	19	1071	Septic System
19-003	19	1071	Septic System
31-001	31	1079	Septic System
32-001	32	1079	Incinerator
32-002(a)	32	1079	Septic System

**Table 2-1 (Continued)**

**List of Off-Site Potential Release Sites (PRS) and/or Off-Site Solid Waste Management Units (SWMU) That May Have Investigation-Derived Waste or Remediation Waste Brought onto Los Alamos National Laboratory**

PRS/SWMU Number	Technical Area	Operational Unit	Unit Type
32-002(b)	32	1079	Septic System
45-001	45	1079	Waste Water Treatment Facility
45-002	45	1079	Vehicle Decontamination Area
45-003	45	1079	Waste Line
45-004	45	1079	Sanitary Sewer Outfall
73-001(a)	73	1071	Landfill
73-001(b)	73	1071	Surface Disposal Area
73-001(c)	73	1071	Landfill
73-001(d)	73	1071	Landfill
73-002	73	1071	Incinerator and Surface Disposal Area
73-004(a)	73	1071	Septic System
73-004(b)	73	1071	Septic System
73-004(c)	73	1071	Septic System
73-005	73	1071	Septic System
73-006	73	1071	Industrial or Sanitary Waste Water Treatment Facility

**Table 2-2**

**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	E.P.A. 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

**Table 2-2 (Continued)**

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

<u>Off-Site Facility</u>	<u>E.P.A. Identification Number</u>
EG&G Mound Applied Technologies, Miamisburg, OH	OH6890008984
Waste Control Specialists, Andrews, TX	TXD988088464
Colorado Minerals Research Institute, Golden, CO	COD17944308

**Table 2-3**

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

Off-Site Facility	E.P.A. 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, Subpart IX, 270.3 and 270.14(b)(20), revised January 1, 1997 [1-1-97], 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. 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

Document: LANL General Part B  
Revision No.: 1.0  
Date: October 1998

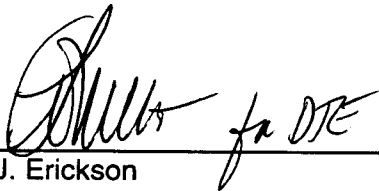
followed. Requirements for Executive Orders are reserved in 20 NMAC 4.1, Subpart IX, 270.3(f) [1-1-97].

#### **4.0 CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS**

In accordance with the New Mexico Administrative Code, Title 20, Chapter 4, Part 1, Subpart IX, 270.14(d), revised January 1, 1997, information on solid waste management units in the vicinity of the hazardous and mixed waste units at Los Alamos National Laboratory is presented in Section 4.0 of technical area-specific permit applications, permit modification requests, or permit renewal documents.

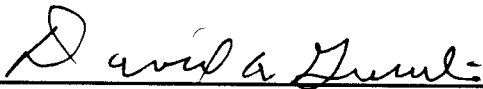
## 5.0 CERTIFICATION

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.



Dennis J. Erickson  
Division Director for Environment, Safety, and  
Health Division  
Los Alamos National Laboratory  
Operator

10/8/98  
Date Signed



David A. Gurule  
Area Manager, Los Alamos Area Office  
U.S. Department of Energy  
Albuquerque Operations  
Owner/Operator

10/9/98  
Date Signed

## **6.0 REFERENCES**

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

LANL, 1998b, "Los Alamos National Laboratory's Response to Request for Supplemental Information: General Part A Permit Application, Revision 0.0," July 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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### MAP NO.

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A-1

Los Alamos National Laboratory Sanitary Sewer and Storm Drain Systems

## LIST OF ABBREVIATIONS/ACRONYMS

AASHTO	American Association of State Highway & Transportation Officials
amsl	above mean sea level
cm/s	centimeters per second
cm/yr	centimeters per year
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
HE	high explosives
LANL	Los Alamos National Laboratory
20 NMAC 4.1	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
pCi/L	picocuries per liter
R&D	research and development
RCRA	Resource Conservation and Recovery Act
TA	technical area

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## 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 NMAC 4.1), revised ~~January 1, 1997 [1-1-97]~~ **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 documents:

- A general description of the Los Alamos National Laboratory (LANL) facility (20 NMAC 4.1, Subpart IX, 270.14(b)(1) ~~[1-1-97]~~ **[6-14-00]**);
- Traffic patterns, volume, and control (20 NMAC 4.1, Subpart IX, 270.14(b)(10) ~~[1-1-97]~~ **[6-14-00]**);
- Facility location information for compliance with the seismic standard and floodplain requirements (20 NMAC 4.1, Subpart IX, 270.14(b)(11), 270.14(b)(19)(ii), and 20 NMAC 4.1, Subpart V, 264.18(a) and (b) ~~[1-1-97]~~ **[6-14-00]**);
- Topographic map requirements (20 NMAC 4.1, Subpart IX, 270.14(b)(19) ~~[1-1-97]~~ **[6-14-00]**).

#### A.1 GENERAL DESCRIPTION [20 NMAC 4.1, Subpart IX, 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 43 square miles, and the associated residential and commercial areas of Los Alamos County, which occupy an area of 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 above mean sea level (amsl) at the flank of the Jemez Mountains, located to the west of Los Alamos, to about 6,200 feet 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 safeguards and stockpile stewardship; 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; 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. The facility mailing address is P.O. Box 1663, Los Alamos, New Mexico, 87545.

LANL is an existing treatment, storage, and disposal facility. Hazardous waste is generated at LANL primarily from research and development (R&D) activities, general facility operations, 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 environmental restoration 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, environmental restoration activities, water 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 documents. Waste generated from R&D activities, processing and recovery operations, and environmental restoration activities may be received from off-site facilities, as described in Supplement 6 of this General Part B Permit Application.

## A.2 TRAFFIC PATTERNS [20 NMAC 4.1, Subpart IX, 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 documents.

### 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 Figure A-3. 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 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-foot-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. Waste collection areas for these off-site wastes will be discussed in TA-specific permit applications, permit modification requests, or permit renewal documents.

#### **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 documents.

#### **A.2.4 Traffic Volumes**

According to a 1997 traffic study, the peak traffic periods are between 7:30 and 8:30 a.m., 12:15 and 1:15 p.m., and 4:30 and 5:30 p.m. (Los Alamos County, 1997). The 1997 traffic study was limited to the intersection of Diamond Drive and Trinity Drive, just north of the TA-3 area. Consequently, the data presented in the study should reflect the existing traffic conditions in the TA-3 area at LANL. TA-3 will typically have higher vehicular volumes than the rest of LANL; thus, this study provides a conservative estimate of facilitywide traffic volumes. Maps and data from the cited study depicting vehicular traffic-count movements at the intersection of Diamond and Trinity Drives are included in Supplement 4 of this document. Based on the 1997 traffic study, the Diamond Drive and Trinity Drive intersection had a volume of 3,152 vehicles from 7:30 to 8:30 in the morning, and 2,815 vehicles from 4:30 to 5:30 in the afternoon.

Maps and data from a traffic count conducted at the same intersection in April 1998 are also included in Supplement 4 (Los Alamos County, 1998). The peak traffic periods for the 1998 study are between 7:15 and 8:15 a.m., 12:30 and 1:30 p.m., and 5:00 and 6:00 p.m. The traffic volume from 7:15 to 8:15 in the morning was 2,428 vehicles. From 5:00 to 6:00 in the afternoon, the volume was 2,648 vehicles. The count is biased low because Los Alamos High School was on spring break during this traffic study.

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

#### A.2.5 Traffic Control Signals

Sitewide 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 documents.

#### 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. They were designed and built in conformance with American Association of State Highway & Transportation Officials (AASHTO) specification HS-20. 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 NMAC 4.1, Subpart IX, 270.14(b)(11)(i and ii) and 20 NMAC 4.1, Subpart V, 264.18(a)]

LANL is located in Los Alamos, New Mexico; therefore, pursuant to 20 NMAC 4.1, Subpart IX, 270.14(b)(11)(i) and 20 NMAC 4.1, Subpart V, Appendix VI [~~1-1-97~~] [6-14-00], the seismic standard of 20 NMAC 4.1, Subpart V, 264.18(a) [~~1-1-97~~] [6-14-00], is applicable. Unit-specific information addressing the seismic standard requirements of 20 NMAC 4.1, Subpart IX, 270.14(b)(11)(ii), and 20 NMAC 4.1, Subpart V, 264.18(a) [~~1-1-97~~] [6-14-00], is presented in Attachment A of TA-specific permit applications, permit modification requests, or permit renewal documents.

#### A.3.2 Floodplain Standard [20 NMAC 4.1, Subpart IX, 270.14(b)(11)(iii through v) and 270.14(b)(19)(ii); 20 NMAC 4.1, Subpart V, 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 has mapped all 100-year floodplain boundaries within the LANL complex. A report was published documenting the floodplain mapping procedures (McLin, 1992). This report is included as Supplement 5 of this document. A LANL-wide 100-year floodplain map is provided on page 36 of that report. The floodplain-boundary map resides on LANL's Facility for Information Management, Analysis, and Display system, a geographical information system. **These maps are being revised as a result of the Cerro Grande Fire, and new maps and supporting calculations will be submitted, as they become available.**

In accordance with 20 NMAC 4.1, Subpart IX, 270.14(b)(11)(iii through v) [~~1-1-97~~] [6-14-00], any waste management units located within a 100-year floodplain at LANL will be addressed in Attachment A of TA-specific permit applications, permit modification requests, or permit renewal documents.

### A.4 TOPOGRAPHIC MAPS [20 NMAC 4.1, Subpart IX, 270.14(b)(19)]

Due to the size of LANL, several maps and figures are provided or referenced to meet the requirements of 20 NMAC 4.1, Subpart IX, 270.14(b)(19) [~~1-1-97~~] [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:

- A LANL-wide 100-year floodplain map is provided on page 36 of the report included as Supplement 5 of this document.

- A map showing surface waters, including intermittent streams, and flow direction is included in the LANL General Part A Permit Application (LANL, 1998a) and in the "Los Alamos National Laboratory's Response to Request for Supplemental Information: General Part A Permit Application, Revision 0.0" (LANL, 1998b).
- Surrounding land uses are shown on Figure A-1 of this appendix.
- Wind roses for LANL are shown on Figures A-4 and A-5 of this appendix.
- A map showing the legal boundaries of LANL is included in the LANL General Part A Permit Application (LANL, 1998a).
- Access ways and internal roads are shown on Figure A-3 in this appendix and on a figure(s) in Attachment A of TA-specific permit applications, permit modification requests, or permit renewal documents.
- Access control features (e.g., fences, gates) are shown on a figure(s) in Attachment A of TA-specific permit applications, permit modification requests, or permit renewal documents.
- A map showing supply wells, monitoring wells, test wells, springs, and surface-water sampling stations is included in the LANL General Part A Permit Application (LANL, 1998a) and in the "Los Alamos National Laboratory's Response to Request for Supplemental Information: General Part A Permit Application, Revision 0.0" (LANL, 1998b).
- Buildings and structures are shown on maps in the LANL General Part A Permit Application (LANL, 1998a).
- The locations of the hazardous and/or mixed waste management units at LANL are shown on maps in the LANL General Part A Permit Application (LANL, 1998a).
- A map showing National Pollutant Discharge Elimination System discharge structure locations is included in the LANL General Part A Permit Application (LANL, 1998a).
- Storm, sanitary, and process sewer systems at LANL are shown on Map A-1 of 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 documents.
- Natural surface drainages are shown on maps in the LANL General Part A Permit Application (LANL, 1998a).
- Fire stations serving LANL and the County of Los Alamos are shown on Figure E-2 of Appendix E.
- An equipment cleanup area is located at TA-50-1. The location of TA-50-1 is shown on a map in the LANL General Part A Permit Application (LANL, 1998a).

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 NMAC 4.1, Subpart IX, 270.14(b)(19) [~~4-4-97~~] [~~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.

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A.5 GROUNDWATER MONITORING [20 NMAC 4.1, Subpart IX, 270.14(c) and 20 NMAC 4.1, Subpart V, 264.90(a)]

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.

Alluvium that is as much as 100 feet 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. Saturated hydraulic conductivity of the alluvium typically ranges from  $10^{-2}$  centimeters per second (cm/s) for a sand to  $10^{-4}$  cm/s for a silty sand (Abeele et al., 1981).

Unlike the underlying volcanic tuff and sediments, the alluvium is quite permeable. 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 preclude its use as a viable source of municipal and industrial supply to LANL and the surrounding community. Lateral flow of the alluvial groundwaters is down canyon and in an easterly direction. In Mortandad Canyon, tracer studies have shown that the velocity of alluvial water ranges from about 60 feet per day in the upper reach to about 7 feet per day in the lower reach of the canyon (Purtymun, 1974).

Intermediate perched zone groundwater is found in areas where a sufficient water source is present to maintain saturation within the deeper units. The presence of a perched zone is controlled by the occurrence of a perching layer that exhibits a lower permeability and causes

water to pond in a more permeable overlying horizon. Localized bodies of perched groundwater occur beneath several canyons in the eastern portion of LANL, along the eastern flanks of the Jemez Mountains west of LANL, and beneath the mesas and canyons at TA-16, which is located in the southwestern part of LANL near the Jemez Mountains. Perched groundwater bodies may also exist beneath other canyons in the south and central portions of LANL, which have not yet been investigated by drilling. Perched groundwater may be maintained beneath canyon bottoms by infiltration from the overlying stream, and within the Bandelier Tuff near the Jemez Mountains by seepage from streams exiting the mountains. In Los Alamos Canyon, for example, 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. On the flanks of the Jemez Mountains and at TA-16, the presence of perched groundwater is apparently controlled by lithologic property contrasts within the Bandelier Tuff; these contrasts may exist at boundaries between flow units.

Intermediate perched zone groundwater occurs in the conglomerates and basalts beneath the alluvium in the mid- and lower reaches of Pueblo and Los Alamos Canyons and in the lower reach of Sandia Canyon. Depth to perched groundwater ranges from about 90 feet in the midreach of Pueblo Canyon to about 450 feet in lower Sandia Canyon. 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 are not yet fully understood.

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 feet per day, or about 6 months from recharge to discharge (Purtymun, 1975).

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 feet at this well, and water samples contained about 6,000 pCi/L of tritium.

The regional aquifer of the Los Alamos area is the only aquifer known to be capable of providing a large-scale municipal 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 ranges from about 600 feet at the eastern margin of the plateau to about 1,200 feet along the western margin. 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.

Thirteen deep water-supply wells in three well fields 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 seven wells, six of which had significant production during 1998. Due to their age, these older wells were planned to be retired after 1999. Four new wells were drilled in this field in 1998 to replace the older wells. The five wells comprising 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 consist of two wells. Municipal water-supply pumpage during 1992 was 1.43 billion gallons, and yields from individual wells ranged from about 175 to 1,400 gallons per minute (Stoker et al., 1992).

The exact source of recharge to the regional aquifer is unknown. Groundwater elevation measurements suggest that groundwater flows from the Jemez Mountains east and southeast toward the Rio Grande, where a portion discharges into the river through seeps and springs. There is considerable uncertainty regarding recharge along the Jemez Mountains. Infiltration of stream flow probably occurs along the mountain flanks. Major recharge of the regional aquifer from the west is inferred because the piezometric surface slopes downward to the east. Three sources of recharge have been suggested by Cushman (1965): infiltration of runoff in canyons; underflow from the Valles caldera through the Tschicoma Formation; and infiltration on mesas. Natural recharge through undisturbed Bandelier Tuff on the mesa tops is believed to be insignificant (Purtymun and Kennedy, 1971; Kearl et al., 1986).

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 sampled and 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 feet, these ages are composite water ages. These ages may support an easterly flow direction, with younger water recharging at the plateau's western boundary and flowing towards the east. Another possibility is that these ages represent two separate groundwater bodies of different ages, and that a groundwater divide in the regional aquifer is located west of the Rio Grande. The region of waters with higher recharge elevations identified by Goff and Sayer (1980) correspond to the older ages near the Rio Grande, and the much older ages could reflect the longer flow path from the possible Sangre de Cristo recharge area. Groundwater samples collected at five locations in the regional aquifer near Los Alamos appear to show the presence of some recent (within the last 40 years) recharge, as indicated by several measurements of tritium 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.

Based on an overall decline in regional aquifer levels across the Pajarito Plateau since pumping began in the 1950s, the total volume of annual recharge near the plateau is apparently less than the quantity of municipal water production, which is approximately 5,000 acre-feet per year. Rogers and Gallaher (1995) tabulated Bandelier Tuff core hydraulic properties from several boreholes at LANL to estimate recharge rates beneath the Pajarito Plateau. The direction and flux of water through the unsaturated zone were evaluated by Rogers et al. (1996) using hydraulic properties from seven boreholes that had sufficient data. 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 feet 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. The flux estimates presume that flow is vertical only. 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 beneath the TA-53 surface impoundments. It is believed that high precipitation or surface disturbances (e.g., man-made ponds) lead to higher fluxes beneath some mesas, and that hypothesized evaporation resulting from air movement through Mesita del Buey at TA-54 apparently creates a barrier to infiltration beneath Area G. 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 only relatively wet canyon for which data are currently available, the canyon-bottom infiltration rates range from 1 to 10 cm/yr. Canyon-bottom infiltration rates beneath wetter canyons (e.g., Los Alamos Canyon) could be much greater; however, no data for those sites are currently available.

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The hydraulic gradient of the regional aquifer averages about 60 to 80 feet per mile within the Puye Formation but increases to 80 to 100 feet per mile along the eastern edge of the Pajarito Plateau as the groundwater enters the less permeable sediments of the Santa Fe Group. In the upper section of the regional aquifer, the rate of movement of groundwater varies, depending on the materials in the aquifer. Groundwater travel time between Characterization Well R-25 and a distance equal to that of the nearest water supply well, PM-2, is estimated to range from 50 to 200 years based on plateau-wide average groundwater flow rates of between 95 and 345 feet per year, determined by Purtymun (1995). However, actual groundwater flow rates and flow direction in the vicinity of Well R-25 and elsewhere are not yet known.

Through Fiscal Year 1999, five deep characterization wells have been drilled, as required by the "Hydrogeologic Workplan" (LANL, 1998c) and as summarized in the "Groundwater Annual Status Report for Fiscal Year 1999" (LANL, 2000a). The characterization wells were drilled using air rotary/casing advance methods, and geologic core and water samples were collected at defined intervals during the drilling operations and analyzed for the presence of both natural and man-made constituents. The five characterization wells include Wells R-9, R-12, R-15, R-25, and R-31. Characterization 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 feet, five perched water zones were encountered. The regional aquifer was reached at a depth of 688 feet. 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. Characterization Well R-12 is located in Sandia Canyon at the eastern boundary of LANL. This well was drilled to a total depth of 847 feet. An intermediate-depth perched groundwater zone was encountered at a depth of 424 feet, and the regional aquifer was reached at a depth of 805 feet. The perched groundwater at the 424-foot depth was found to contain 208.1 pCi/L of tritium. The presence of some recent recharge water is indicated at this regional aquifer location by tritium levels of 46.9 pCi/L. Characterization Well R-15 is located in Mortandad Canyon about 1.5 miles east of the Radioactive Liquid Waste Treatment Facility 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 feet, and the regional aquifer was reached at a depth of 964 feet. The total depth of Well R-15 is 1,107 feet. The deep perched zone contained tritium at concentrations of 3,770

$\pm$  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 parts per billion was detected in the perched water zone at Well R-15 in December 1999 (LANL, 2000b). LANL personnel are working to reduce perchlorate discharges with an eventual goal of zero discharges in the coming years. In addition, LANL personnel are monitoring the influent and effluent of the TA-50 Radioactive Liquid Waste Treatment Facility, which discharges treated effluent to Mortandad Canyon, to determine what levels of perchlorate are being discharged and to establish treatment and removal efficiencies. Modifications to treatment operations are also planned to reduce perchlorate concentrations in water discharged from the treatment facility. Characterization 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 feet, and the regional aquifer was reached at a depth of 1,286 feet. Groundwater samples were collected at depths ranging from 747 to 1,942 feet, and most of these samples were found to contain HE compounds and their associated degradation products. The two contaminants of most concern are RDX and TNT because they exceeded EPA health advisory limits (2  $\mu$ g/L) for drinking water. Down-gradient drinking water-supply wells were also sampled and found to contain no HE; the closest drinking water-supply well to R-25 is three miles to the east. Discharges from past HE-manufacturing activities at TA-16 are believed to be the source of the constituents found in Well R-25. Steps have been taken to reduce the amount of HE-processing water being discharged at TA-16, including installation of the High Explosives Wastewater Treatment Facility and elimination of 99 percent of the previous annual discharges to wastewater outfalls. Characterization 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 feet. The regional aquifer was encountered at 520 feet; no intermediate perched zones were encountered in this well (John Marin, 2000). Published geochemical data for this well are not yet available.

Low-level concentrations (2 to 3 parts per billion) 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, 2000c). 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. The Otowi-1 well, which is part of the Los Alamos water-supply

system, has been in production status since 1998 and is sampled regularly as part of LANL's water-quality-assurance activities. 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 parts per billion. A drinking water standard for perchlorate has not been established by the EPA, and an action level or regulatory standards have not been established by the State of New Mexico. The State of California has established a perchlorate water-supply action level for concentrations greater than 18 parts per billion. 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. In the past, LANL has detected very low concentrations of tritium and nitrate in the Otowi-1 well. Samples collected from 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.

The moisture content of the Bandelier Tuff at LANL varies. Generally, at depths below 10 feet, the moisture content of the tuff varies from approximately 6 percent to saturation in the canyons with perched aquifers and from about 4 to 6 percent on the mesas. In canyons where no perched aquifers are present, the moisture content of the tuff at depths below ten feet generally ranges from about 4 to 10 percent. At Characterization Well R-15 in Mortandad Canyon, the moisture content in the Otowi Member is about 20%. Moisture content in the underlying Cerros del Rio Basalt ranges from 0.5 to 14.6% (LANL, 2000a). At the mesa top Characterization 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%. Additional information on Los Alamos groundwater and vadose zone characteristics will be published in groundwater annual status reports and in drill hole completion reports.

Regulated units (surface impoundments, waste piles, land treatment units, and landfills, as provided by 20 NMAC 4.1, Subpart V, 264.90(a)(2) [6-14-00]), will meet the requirements



specified in 20 NMAC 4.1, Subpart V, 260.90-101 [6-14-00], as appropriate. The LANL "Hydrogeologic Workplan" will be used to characterize the hydrogeologic regime at the facility as a preliminary basis for potential monitoring or demonstration of groundwater monitoring waiver. The groundwater wells constructed in the workplan program may be used for monitoring regulated units, if deemed necessary and appropriate. Relevant groundwater monitoring provisions for regulated units will be addressed in TA-specific permit applications, permit modification requests, and permit renewal documents. Appropriate groundwater monitoring provisions for LANL's solid waste management units will be addressed through the HSWA portion of the permit.

~~Requirements for groundwater monitoring and protection specified in 20 NMAC 4.1, Subpart IX, 270.14(c), and 20 NMAC 4.1, Subpart V, 264.90(a) [1-1-97], apply to owners and operators of the following "regulated units" only: surface impoundments, waste piles, land treatment units, and landfills. Any units subject to permitting requirements that have associated groundwater monitoring requirements are included in the "Hydrogeologic Workplan," approved by the NMED on March 25, 1998 (LANL, 1998c).~~

#### A.6 OTHER PERMIT ACTIVITIES

Other types of RCRA permits will be addressed in TA-specific permit applications, permit modification requests, or permit renewal documents.

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# **APPENDIX A**

## **FACILITY DESCRIPTION**

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Document: LANL General Part B  
Revision No.: 1.0  
Date: October 1998

## LIST OF MAPS

<u>MAP NO.</u>	<u>TITLE</u>
A-1	Los Alamos National Laboratory Sanitary Sewer and Storm Drain Systems

## LIST OF ABBREVIATIONS/ACRONYMS

AASHTO	American Association of State Highway & Transportation Officials
amsl	above mean sea level
D&D	decontamination and decommissioning
DOE	U.S. Department of Energy
HE	high explosives
LANL	Los Alamos National Laboratory
20 NMAC 4.1	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
R&D	research and development
RCRA	Resource Conservation and Recovery Act
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 NMAC 4.1), revised January 1, 1997 [1-1-97]. 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 documents:

- A general description of the Los Alamos National Laboratory (LANL) facility (20 NMAC 4.1, Subpart IX, 270.14(b)(1) [1-1-97]);
- Traffic patterns, volume, and control (20 NMAC 4.1, Subpart IX, 270.14(b)(10) [1-1-97]);
- Facility location information for compliance with the seismic standard and floodplain requirements (20 NMAC 4.1, Subpart IX, 270.14(b)(11), 270.14(b)(19)(ii), and 20 NMAC 4.1, Subpart V, 264.18(a) and (b) [1-1-97]);
- Topographic map requirements (20 NMAC 4.1, Subpart IX, 270.14(b)(19) [1-1-97]).

#### **A.1 GENERAL DESCRIPTION [20 NMAC 4.1, Subpart IX, 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 43 square miles, and the associated residential and commercial areas of Los Alamos County, which occupy an area of 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 above mean sea level (amsl) at the flank of the Jemez Mountains, located to the west of Los Alamos, to about 6,200 feet 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 safeguards and stockpile stewardship; 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; 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. The facility mailing address is P.O. Box 1663, Los Alamos, New Mexico, 87545.

LANL is an existing treatment, storage, and disposal facility. Hazardous waste is generated at LANL primarily from research and development (R&D) activities, general facility operations, 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 environmental restoration 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, environmental restoration activities, water 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 documents. Waste generated from R&D activities, processing and recovery operations, and environmental restoration activities may be received from off-site facilities, as described in Supplement 6 of this General Part B Permit Application.

## A.2 TRAFFIC PATTERNS [20 NMAC 4.1, Subpart IX, 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 documents.

### 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 Figure A-3. 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 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-foot-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. Waste collection areas for these off-site wastes will be discussed in TA-specific permit applications, permit modification requests, or permit renewal documents.

#### 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 documents.

#### A.2.4 Traffic Volumes

According to a 1997 traffic study, the peak traffic periods are between 7:30 and 8:30 a.m., 12:15 and 1:15 p.m., and 4:30 and 5:30 p.m. (Los Alamos County, 1997). The 1997 traffic study was limited to the intersection of Diamond Drive and Trinity Drive, just north of the TA-3 area. Consequently, the data presented in the study should reflect the existing traffic conditions in the TA-3 area at LANL. TA-3 will typically have higher vehicular volumes than the rest of LANL; thus, this study provides a conservative estimate of facilitywide traffic volumes. Maps and data from the cited study depicting vehicular traffic-count movements at the intersection of Diamond and Trinity Drives are included in Supplement 4 of this document. Based on the 1997 traffic study, the

Diamond Drive and Trinity Drive intersection had a volume of 3,152 vehicles from 7:30 to 8:30 in the morning, and 2,815 vehicles from 4:30 to 5:30 in the afternoon.

Maps and data from a traffic count conducted at the same intersection in April 1998 are also included in Supplement 4 (Los Alamos County, 1998). The peak traffic periods for the 1998 study are between 7:15 and 8:15 a.m., 12:30 and 1:30 p.m., and 5:00 and 6:00 p.m. The traffic volume from 7:15 to 8:15 in the morning was 2,428 vehicles. From 5:00 to 6:00 in the afternoon, the volume was 2,648 vehicles. The count is biased low because Los Alamos High School was on spring break during this traffic study.

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

#### **A.2.5 Traffic Control Signals**

Sitewide 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 documents.

#### **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. They were designed and built in conformance with American Association of State Highway & Transportation Officials (AASHTO) specification HS-20. 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 NMAC 4.1, Subpart IX, 270.14(b)(11)(i and ii) and 20 NMAC 4.1, Subpart V, 264.18(a)]

LANL is located in Los Alamos, New Mexico; therefore, pursuant to 20 NMAC 4.1, Subpart IX, 270.14(b)(11)(i) and 20 NMAC 4.1, Subpart V, Appendix VI [1-1-97], the seismic standard of 20 NMAC 4.1, Subpart V, 264.18(a) [1-1-97], is applicable. Unit-specific information addressing the seismic standard requirements of 20 NMAC 4.1, Subpart IX, 270.14(b)(11)(ii), and 20 NMAC 4.1, Subpart V, 264.18(a) [1-1-97], is presented in Attachment A of TA-specific permit applications, permit modification requests, or permit renewal documents.

#### A.3.2 Floodplain Standard [20 NMAC 4.1, Subpart IX, 270.14(b)(11)(iii through v) and 270.14(b)(19)(ii); 20 NMAC 4.1, Subpart V, 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 has mapped all 100-year floodplain boundaries within the LANL complex. A report was published documenting the floodplain mapping procedures (McLin, 1992). This report is included as Supplement 5 of this document. A LANL-wide 100-year floodplain map is provided on page 36 of that report. The floodplain-boundary map resides on LANL's Facility for Information Management, Analysis, and Display system, a geographical information system.

In accordance with 20 NMAC 4.1, Subpart IX, 270.14(b)(11)(iii through v) [1-1-97], any waste management units located within a 100-year floodplain at LANL will be addressed in Attachment A of TA-specific permit applications, permit modification requests, or permit renewal documents.

### A.4 TOPOGRAPHIC MAPS [20 NMAC 4.1, Subpart IX, 270.14(b)(19)]

Due to the size of LANL, several maps and figures are provided or referenced to meet the requirements of 20 NMAC 4.1, Subpart IX, 270.14(b)(19) [1-1-97]. 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:

- A LANL-wide 100-year floodplain map is provided on page 36 of the report included as Supplement 5 of this document.
- A map showing surface waters, including intermittent streams, and flow direction is included in the LANL General Part A Permit Application (LANL, 1998a) and in the

"Los Alamos National Laboratory's Response to Request for Supplemental Information: General Part A Permit Application, Revision 0.0" (LANL, 1998b).

- Surrounding land uses are shown on Figure A-1 of this appendix.
- Wind roses for LANL are shown on Figures A-4 and A-5 of this appendix.
- A map showing the legal boundaries of LANL is included in the LANL General Part A Permit Application (LANL, 1998a).
- Access ways and internal roads are shown on Figure A-3 in this appendix and on a figure(s) in Attachment A of TA-specific permit applications, permit modification requests, or permit renewal documents.
- Access control features (e.g., fences, gates) are shown on a figure(s) in Attachment A of TA-specific permit applications, permit modification requests, or permit renewal documents.
- A map showing supply wells, monitoring wells, test wells, springs, and surface-water sampling stations is included in the LANL General Part A Permit Application (LANL, 1998a) and in the "Los Alamos National Laboratory's Response to Request for Supplemental Information: General Part A Permit Application, Revision 0.0" (LANL, 1998b).
- Buildings and structures are shown on maps in the LANL General Part A Permit Application (LANL, 1998a).
- The locations of the hazardous and/or mixed waste management units at LANL are shown on maps in the LANL General Part A Permit Application (LANL, 1998a).
- A map showing National Pollutant Discharge Elimination System discharge structure locations is included in the LANL General Part A Permit Application (LANL, 1998a).
- Storm, sanitary, and process sewer systems at LANL are shown on Map A-1 of 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 documents.
- Natural surface drainages are shown on maps in the LANL General Part A Permit Application (LANL, 1998a).
- Fire stations serving LANL and the County of Los Alamos are shown on Figure E-2 of Appendix E.
- An equipment cleanup area is located at TA-50-1. The location of TA-50-1 is shown on a map in the LANL General Part A Permit Application (LANL, 1998a).

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 NMAC 4.1, Subpart IX, 270.14(b)(19) [1-1-97], 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 MONITORING [20 NMAC 4.1, Subpart IX, 270.14(c) and 20 NMAC 4.1, Subpart V, 264.90(a)]

Requirements for groundwater monitoring and protection specified in 20 NMAC 4.1, Subpart IX, 270.14(c), and 20 NMAC 4.1, Subpart V, 264.90(a) [1-1-97], apply to owners and operators of the following "regulated units" only: surface impoundments, waste piles, land treatment units, and landfills. Any units subject to permitting requirements that have associated groundwater monitoring requirements are included in the "Hydrogeologic Workplan", approved by the NMED on March 25, 1998 (LANL, 1998c).

#### A.6 OTHER PERMIT ACTIVITIES

Other types of RCRA permits will be addressed in TA-specific permit applications, permit modification requests, or permit renewal documents.

#### A.7 REFERENCES

EPA, 1994, "Module VIII: Special Conditions Pursuant to the 1984 Hazardous and Solid Waste Amendments to RCRA for Los Alamos National Laboratory, EPA I.D. NM0890010515," U.S. Environmental Protection Agency, Region 6, Dallas, Texas.

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

LANL, 1998b, "Los Alamos National Laboratory's Response to Request for Supplemental Information: General Part A Permit Application, Revision 0.0," July 1998, Los Alamos National Laboratory, Los Alamos, New Mexico.

LANL, 1998c, "Hydrogeologic Workplan," May 22, 1998, Los Alamos National Laboratory, Los Alamos, New Mexico.

Los Alamos County, 1998, "Traffic Counts," Los Alamos County Public Works Department, Traffic Engineering Group.

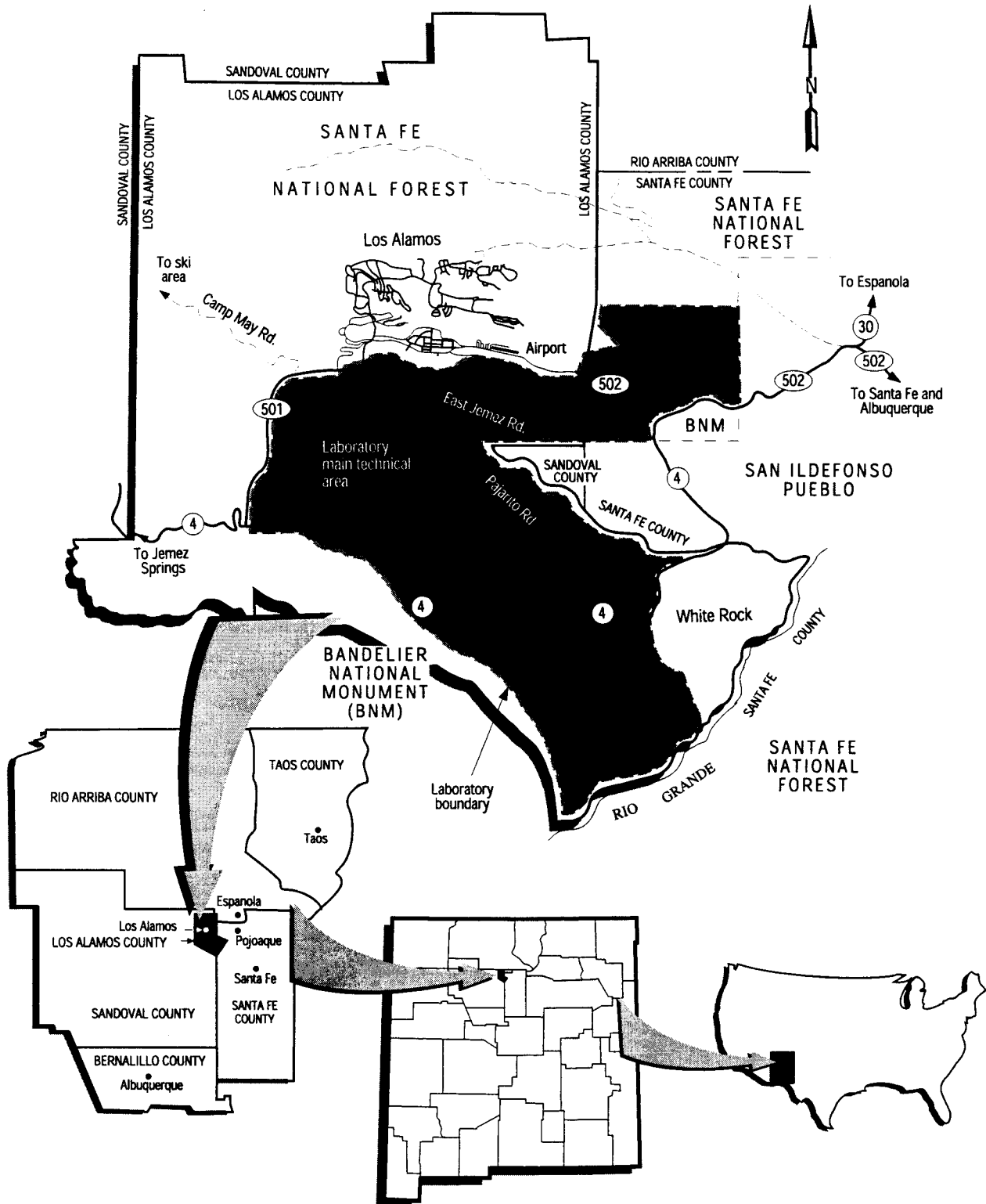
Los Alamos County, 1997, "Traffic Counts," Los Alamos County Public Works Department, Traffic Engineering Group.

Document: LANL General Part B  
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Date: October 1998

McLin, S. G., 1992, "Determination of 100-Year Floodplain Elevations at Los Alamos National Laboratory," LA-12195-MS, Los Alamos National Laboratory, Los Alamos, New Mexico.

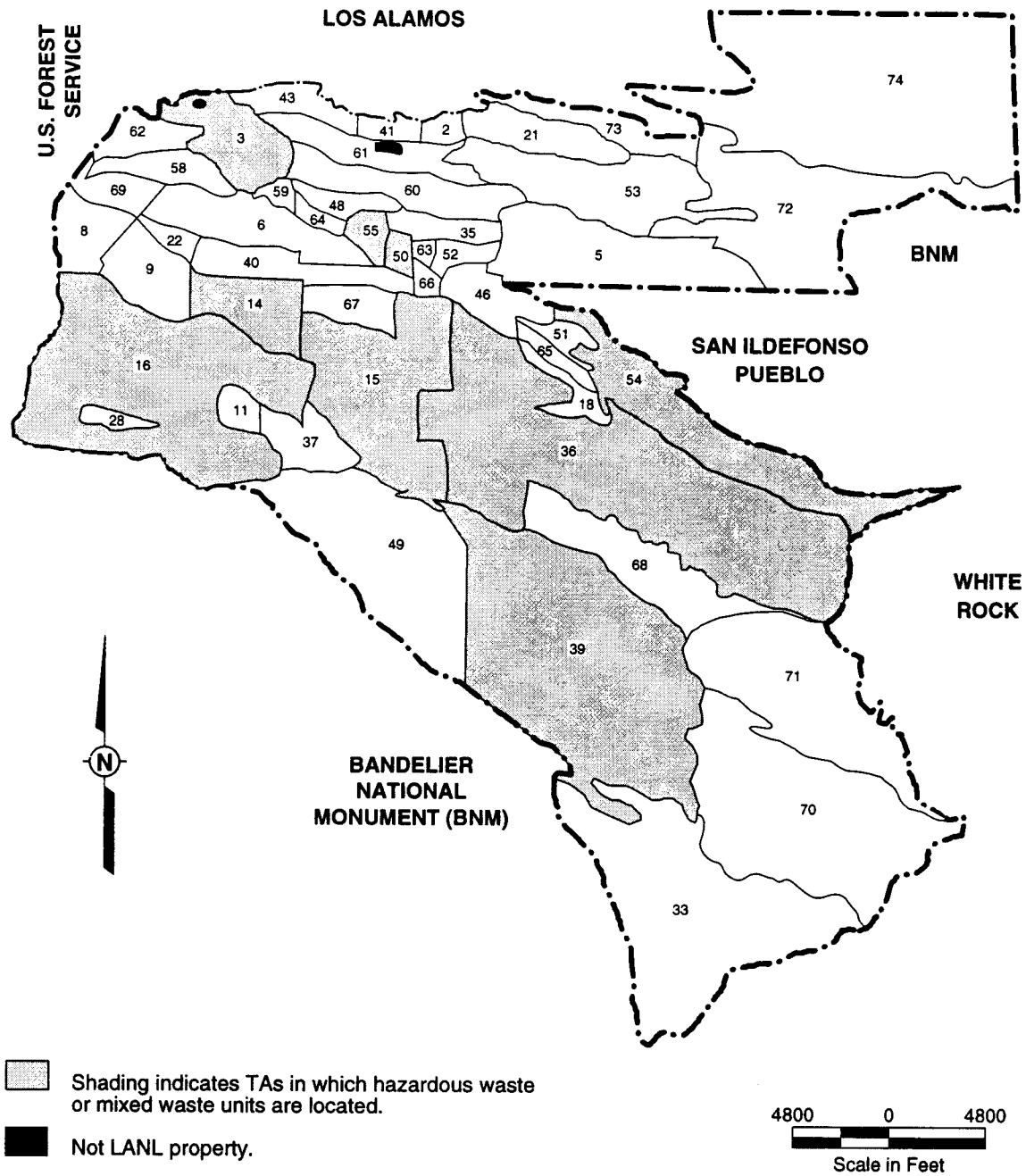
Pan Am World Services, Inc., 1986, "Asphalt Road Maintenance Report," Los Alamos National Laboratory, Los Alamos, New Mexico.





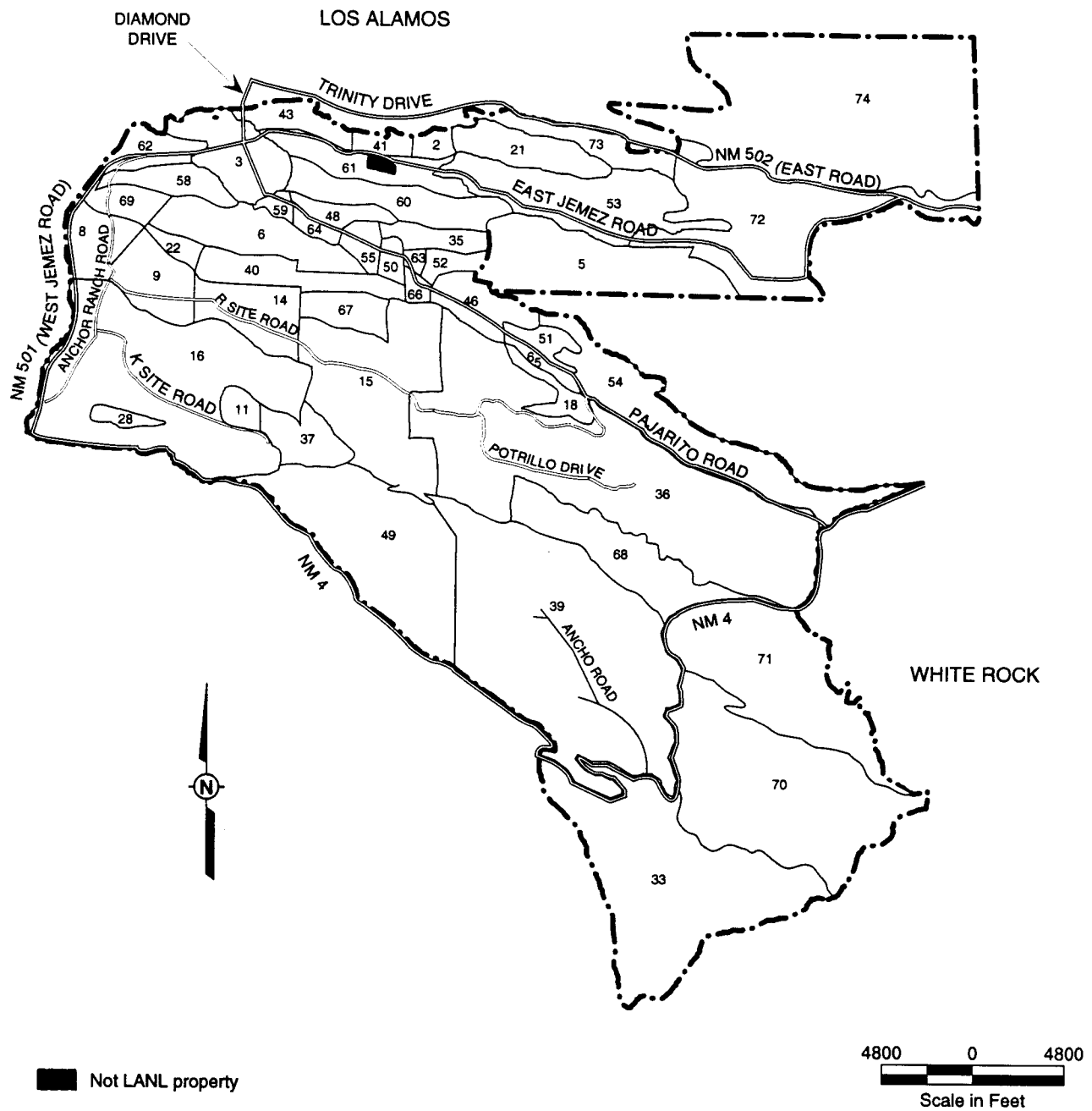
Modified from: "Environmental Surveillance and Compliance at Los Alamos During 1996," 1997, LA-13343-ENV, Los Alamos National Laboratory, Los Alamos, New Mexico.

**Figure A-1**  
Regional Location Map of Los Alamos National Laboratory and Surrounding Land Use

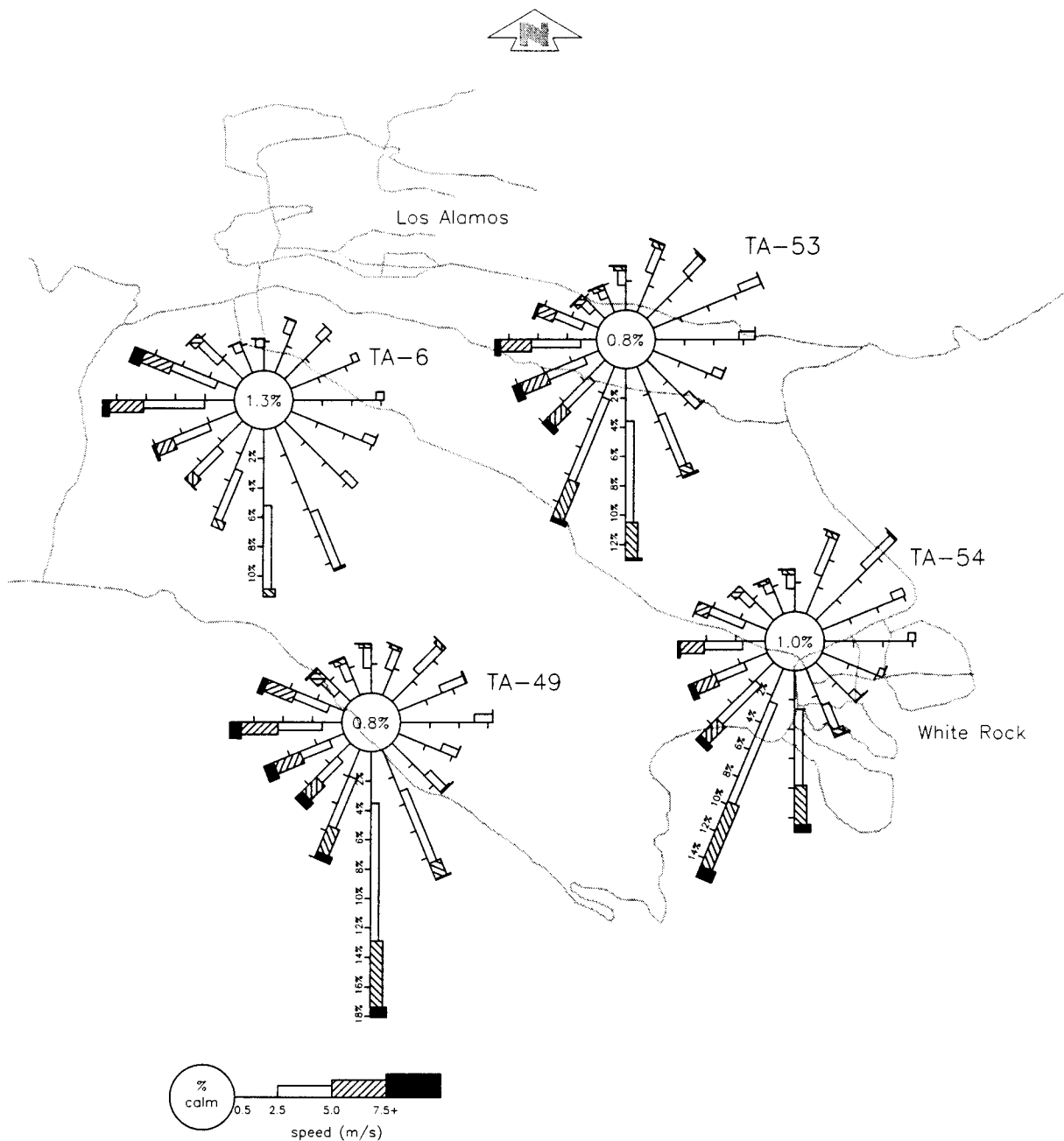


Note: TA-57 is not shown on this figure.

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

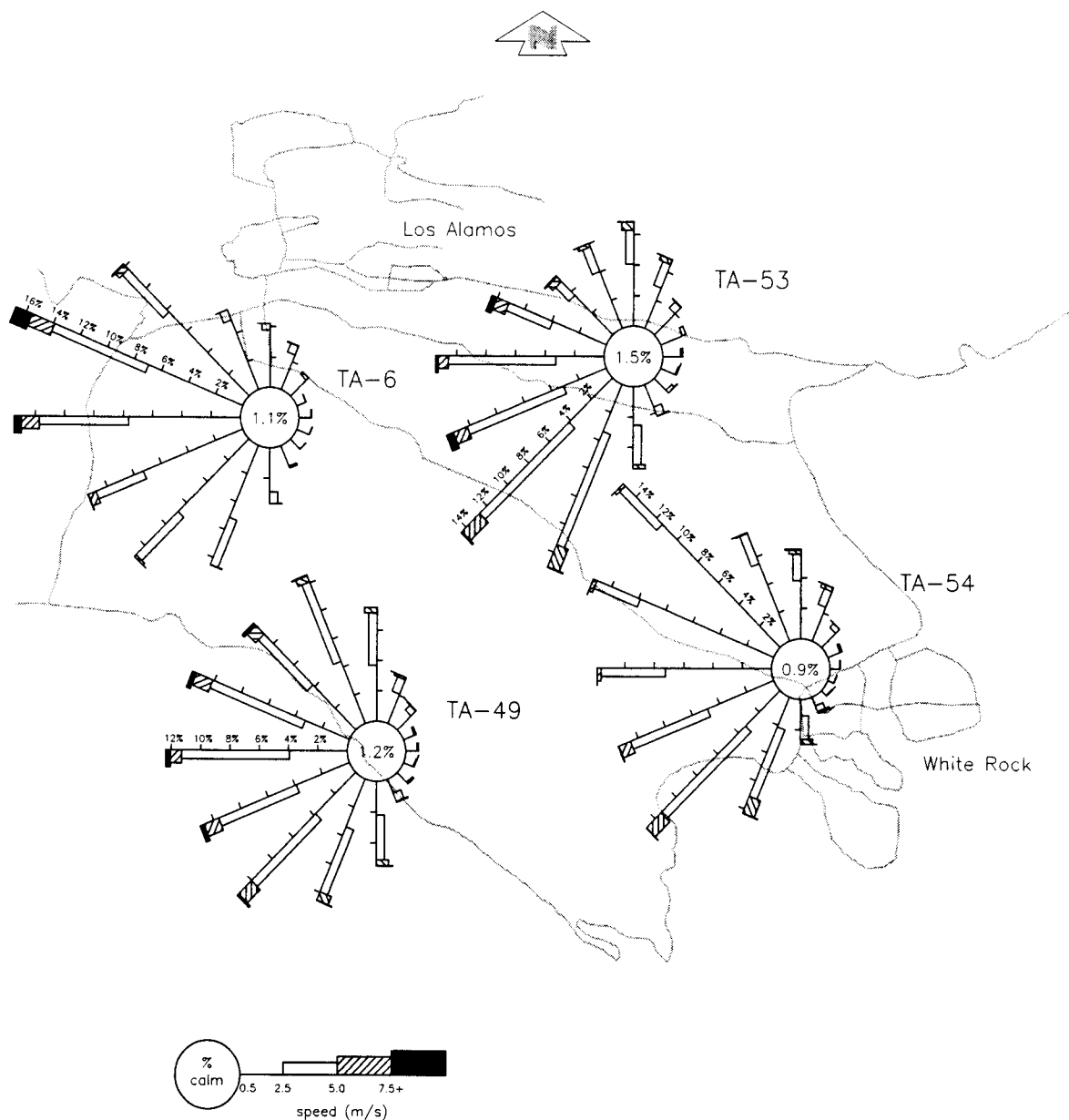


**Figure A-3**  
 Major Roads at Los Alamos National Laboratory (LANL)



Modified from: "Environmental Surveillance and Compliance at Los Alamos During 1996," 1997, LA-13343-ENV, Los Alamos National Laboratory, Los Alamos, New Mexico.

**Figure A-4**  
Annual Wind Roses for Los Alamos National Laboratory (LANL)—Day



Modified from: "Environmental Surveillance and Compliance at Los Alamos During 1996," 1997, LA-13343-ENV, Los Alamos National Laboratory, Los Alamos, New Mexico.

**Figure A-5**  
Annual Wind Roses for Los Alamos National Laboratory (LANL)—Night



# LOS ALAMOS NATIONAL LABORATORY SANITARY SEWER AND STORM DRAIN SYSTEMS

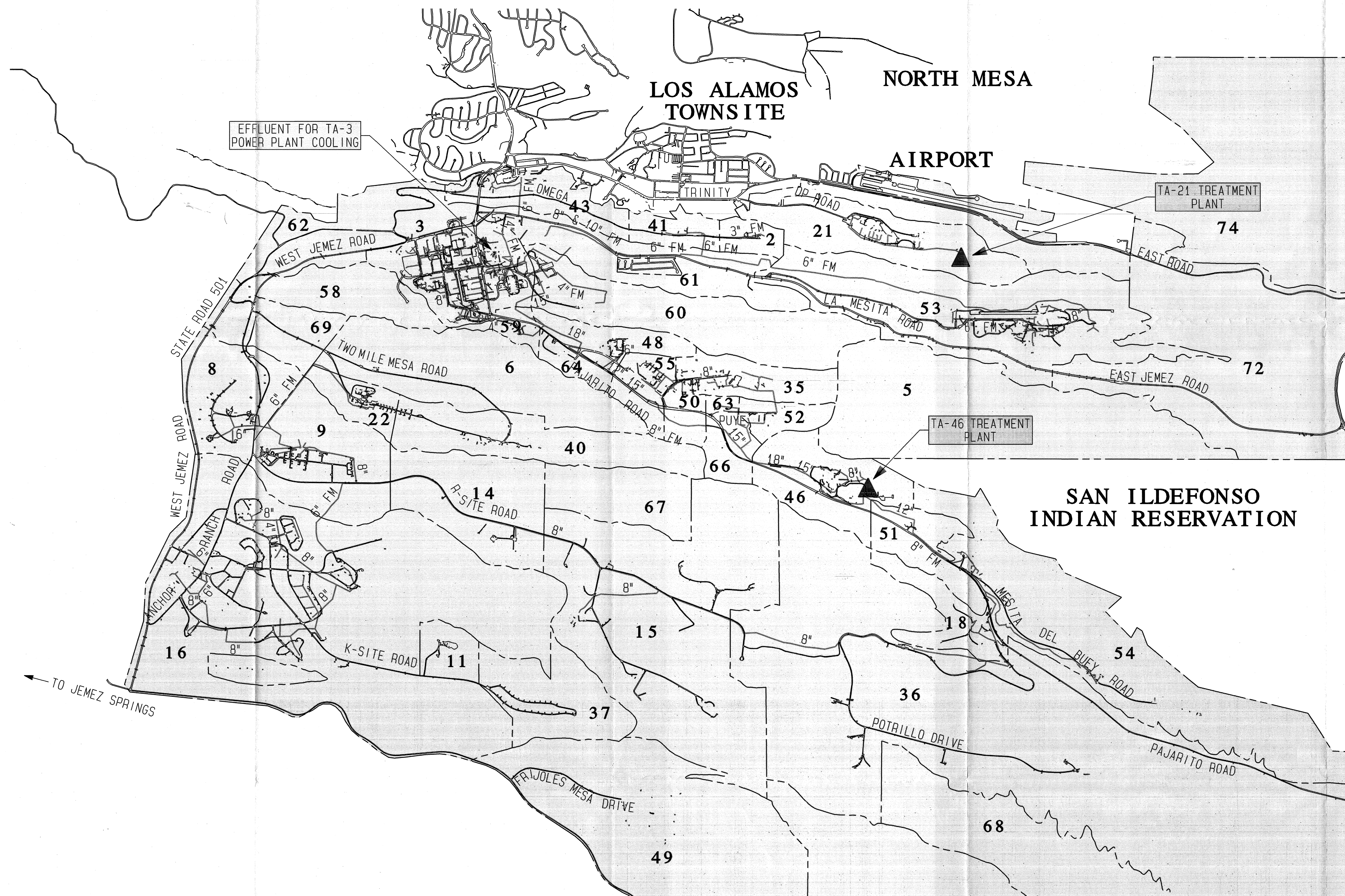
Map Prepared by:  
**Johnson Controls**  
Northern New Mexico

## UTILITY MAPPING SECTION

Combining advanced technology and well trained personnel to bring you high quality services for all your Mapping needs.

Note: The data shown on this map has not been checked for accuracy. Map should not be relied upon to establish legal claims or boundary lines.

Basemap Data Sources: Plan data shown is from the Los Alamos National Laboratory Engineering Division 1986 aerial survey, As-Built survey and field measurement updates. Utility data shown is from TGS Technology Computer Mapping Division.



54 MILES OF  
SANITARY SEWER LINES

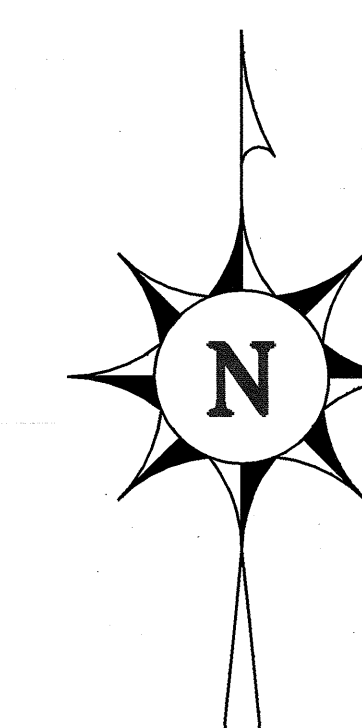
2 TREATMENT PLANTS

48 SEPTIC TANKS

22 MILES OF  
STORM DRAIN LINES

### LEGEND

- SANITARY SEWER SYSTEM
- TREATMENT PLANTS
- STORM DRAIN SYSTEM
- DOE PROPERTY



SCALE: 1:18000  
1500 0 1500 3000 6000  
FEET

Revised by: RAG

State Plane Coordinate System, New Mexico Central Zone,  
1927 North American Datum

15734

Date: June 11, 1998

Phone: (505)665-0559

MAP A-1



## **APPENDIX B**

### **WASTE ANALYSIS PLAN**

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Date: June 2000

## LIST OF ATTACHMENTS

### ATTACHMENT

### TITLE

B-1

Waste Management Units at Los Alamos National Laboratory

### LIST OF ABBREVIATIONS/ACRONYMS

20 NMAC 4.1	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
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 remediation/restoration
HE	high explosives
INEEL	Idaho National Engineering and Environmental Laboratory
LANL	Los Alamos National Laboratory
LDR	land disposal restrictions
NA	not applicable
NMED	New Mexico Environment Department
NOD	Notice of Deficiency
OB	open burning
OD	open detonation
ppm	parts per million
QA	quality assurance
QC	quality control
R&D	research and development
RCRA	Resource Conservation and Recovery Act
RIDS	records inventory and disposition schedule
RTL	regulatory threshold limit
RTR	real-time radiography

**LIST OF ABBREVIATIONS/ACRONYMS**  
**(Continued)**

SVOC	semivolatile organic compound
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
TRUCON	TRUPACT-II Content
TRUPACT-II	Transuranic Package Transporter-II
TSDF	treatment, storage, and disposal facility
TWCP	TRU Waste Certification Plan
VOC	volatile organic compound
WAC	waste acceptance criteria
WAP	waste analysis plan
WIPP	Waste Isolation Pilot Plant

## APPENDIX B

### WASTE ANALYSIS PLAN

This waste analysis plan (WAP) presents information on the chemical and physical nature of hazardous, mixed low-level, mixed transuranic (TRU), and high explosives (HE) and HE-contaminated wastes 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 NMAC 4.1), Subpart V, 264.13, revised January 1, 1997 [1-1-97]. The waste analysis information contained in this WAP is used for characterization of wastes managed in containers and tanks, and may be used for information supporting treatment by open burning (OB), open detonation (OD), and stabilization (cementation). Waste analysis plan requirements specific for other types of storage or treatment and for additional operation-specific waste characterization procedures will be developed and submitted in Attachment B in technical area (TA)-specific permit applications, permit modification requests, or permit renewal documents. Additional waste analysis requirements are specified in 20 NMAC 4.1, Subpart IX, 270.14(b); and 20 NMAC 4.1, Subpart VIII, 268.7 [1-1-97], "Waste Analysis and Record Keeping." 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 list of 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.

#### B.1 FACILITY DESCRIPTION [20 NMAC 4.1, Subpart V, 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 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 safeguards and stockpile stewardship; 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; 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 remediation/restoration (ER) activities. Wastes generated from these types of processes and activities may also be received from off-site facilities, as described in Supplement 6 of this General Part B Permit Application. Tables B-2 through B-7 provide information on potential hazardous, mixed low-level, mixed TRU, HE, and HE-contaminated wastes 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), potential hazardous constituents in and/or characteristics of the waste, and regulatory limits.

### B.1.2 Stored Waste

Hazardous, mixed low-level, and mixed TRU wastes are stored at various container storage areas throughout LANL. The following sections contain general descriptions of these wastes and the processes which generate them.

#### B.1.2.1 Hazardous Waste

The criteria for establishing a waste as a hazardous waste are provided in 20 NMAC 4.1, Subpart II [1-1-97]. A waste is considered hazardous if it meets the definition of a solid waste described in 20 NMAC 4.1, Subpart II, 261.2 [1-1-97]; is not exempted from regulation as a hazardous waste under 20 NMAC 4.1, Subpart II, 261.4 [1-1-97]; and exhibits any of the characteristics of hazardous waste identified in 20 NMAC 4.1, Subpart II, Part 261, Subpart C, or is listed in 20 NMAC 4.1, Subpart II, Part 261, Subpart D [1-1-97].

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; noncorrosive aqueous and nonaqueous solutions and slurries; aqueous solutions and sludges; mercury wastes; used batteries and battery fluids; unused off-specification commercial chemical products; ER soils and sludges; ER aqueous liquids; and ER debris. Hazardous waste streams may be of uniform composition (i.e., homogeneous) or of dissimilar/diverse composition (i.e., heterogeneous). 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 homogeneous waste stream consists of liquid 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 chemical research, cleaning, and degreasing.

#### Contaminated Solid Wastes

Contaminated solid wastes (i.e., wastes of a solid physical form) are typically heterogeneous mixtures of rags, spill cleanup materials, Kimwipes<sup>TM</sup>, 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, chemical research, D&D projects, metal finishing operations, and general maintenance operations.

#### Paint and Related Wastes

Paint and paint-related wastes generally 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. These waste matrices may be homogeneous or heterogeneous, depending on the specific waste-generating process.

#### 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 typically homogeneous and is generated primarily from photographic film processing and photocopier operations.

#### Corrosive Liquid Wastes

These homogeneous 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 homogeneous wastes including 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 constituents. These wastes are typically homogeneous. 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. This waste stream may be homogeneous or heterogeneous, depending on the specific waste-generating activity.

#### Used Batteries and Battery Fluids

This waste stream consists of used batteries and battery fluids that may contain heavy metals such as cadmium, lead, mercury, and silver. Waste-generating activities include routine equipment maintenance. This waste stream may be homogeneous or heterogeneous, depending on the specific waste-generating activity.

#### 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 may also include 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, that may contain regulated hazardous metals, organic compounds, or exhibit hazardous characteristics of ignitability, corrosivity, and reactivity.

#### ER Soils and Sludges

This homogeneous 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 homogeneous 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 heterogeneous 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 5820.2A, "Radioactive Waste Management" (DOE, 1988), as "waste that contains radioactivity and is not classified as high-level waste, transuranic waste, spent nuclear fuel, or 11(e)(2) by-product material as defined by the Order. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level, provided that the concentration of transuranics is less than 100 nanocuries per gram of waste." By-product material, as defined in Section 11(e)(2) of the Atomic Energy Act of 1954, as amended, consists of uranium and thorium mill tailings. Section 11(e)(2) by-product material is not generated at LANL. Mixed low-level waste is any waste that has both a hazardous waste component and a low-level waste component, as defined above. For mixed low-level waste, this WAP addresses only the hazardous component.

Mixed low-level waste is generated at LANL primarily from R&D activities, processing and recovery operations, D&D projects, and ER activities. Descriptions of the mixed low-level wastes 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).

##### B.1.2.2.1 Mixed Low-Level Solid Homogeneous Waste

Homogeneous mixed low-level solid waste is of uniform composition. Waste streams of this type are generally described below.

#### Soils with Heavy Metals

Soil waste contaminated with heavy metals is generated during D&D and ER activities at various locations throughout LANL. Typically, this waste consists of soils contaminated with varying concentrations of lead or other heavy metals resulting from contact with small shapes, typically in the form of small pieces, shot, or pellets.

#### Environmental Restoration Soils

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

#### Inorganic Solid Oxidizers

Many different types of 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 R&D and D&D of research laboratories.

#### B.1.2.2.2 Mixed Low-Level Solid Heterogeneous Waste

Heterogeneous mixed low-level solid waste streams contain components that are dissimilar or have a diverse composition. Waste streams of this type are generally described below.

#### Lead for Surface Decontamination

Lead for surface decontamination consists of contaminated lead shielding used as radiation shielding. 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, and special shapes. The radioactive material on the surface of the lead may be removable by decontamination and the lead can then be recycled or reused.

#### Other Lead Wastes

Other lead waste consists of activated or inseparable lead, lead blankets, and lead requiring sorting. This lead may also have been used as shielding for radiation, but is not amenable to surface decontamination because the waste is either activated or has a physical form that prevents decontamination. It is generated primarily from radioisotope experiments and other reactor, accelerator, laser, and x-ray activities. The waste may be in the form of sheets, pigs, bricks, special shapes, shot, shavings, slag, and dross.

### Noncombustible Debris

Noncombustible debris typically 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. The waste may be contaminated with residues such as cadmium, cyanide, lead, and mercury.

### Combustible Debris

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

### Organic-Contaminated Noncombustible Solids

This waste stream typically includes absorbed oils, laboratory trash, and discarded equipment. Absorbed oil waste is typically comprised of drums containing vermiculite or corncob fractions used to absorb many different types of oil from spills and routine maintenance operations. The oil generally originates from vacuum pumps and may be contaminated by mercury, lead, or cadmium. **Mercury is a common constituent in the waste stream because of its use at various LANL locations** as a vacuum-pumping fluid for early vacuum systems. Cadmium contamination may be the result of soldering and brazing-fume-hood operations. Lead contamination is the result of lead turnings contained in cooling oil. Absorbent is routinely added to these waste oils as required by standard operating procedures.

Laboratory trash typically consists of noncombustible solid materials with residual solvent contamination. The laboratory debris includes reagent bottles, broken glassware, and discarded disposable materials (e.g., syringes and drying dishes). Large quantities of chemicals were not placed in this trash; however, residual liquids or powders may have remained on some of the disposed 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 typically consists of waste similar to the combustible debris, 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 from electronics applications, vacuum pumps with residual mercury, activated or nondecontaminatable 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 Chemicals

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

#### B.1.2.2.3 Mixed Low-Level Liquid Waste

Mixed low-level liquid waste streams stored at LANL are described generally in the following paragraphs.

#### Spent Solvents and Contaminated Solvent Mixtures

This waste stream is comprised of spent solvents and spent solvent mixtures that may contain organic or inorganic compounds, heavy metals, oils, and 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 may contain organics, inorganics, metals, oils, or other contaminants. Waste-generating activities include radiochemistry research, plutonium processing, and analytical chemistry.

#### Aqueous Liquids Contaminated with Heavy Metals

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

#### Oil Wastes

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

#### Unused Liquid Reagent Chemicals

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

##### B.1.2.2.4 Mixed Low-Level Gas Cylinder Waste

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

##### B.1.2.3 Mixed TRU Waste

TRU waste is defined in DOE Order 5820.2A, "Radioactive Waste Management" (DOE, 1988), as follows: "Without regard to source or form, waste that is contaminated with alpha emitting transuranic radionuclides with half-lives greater than 20 years and concentrations greater than 100 nanocuries per gram at the time of assay and has atomic numbers greater than 92. Heads of Field Elements can determine that other alpha contaminated waste, peculiar to a specific site, must be managed as TRU waste." Mixed TRU waste contains both a hazardous waste component and a TRU waste component. For mixed TRU waste, this WAP addresses only the hazardous component.

Mixed TRU waste is generated at LANL primarily from R&D activities, processing and recovery operations, and D&D projects. Limited quantities of mixed TRU waste from off-site facilities will be accepted at LANL for additional characterization and management. Mixed TRU waste streams at LANL are divided into four broad categories and described by a matrix parameter code. Matrix parameter codes 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 matrix parameter codes are available in "DOE Waste Treatability Groups Guidance" (DOE, 1995). The matrix parameter codes that are applicable to the mixed TRU wastes stored at LANL are listed below.

- **Matrix Parameter Code S3000, Homogeneous Solids:** defined as solid waste materials, excluding soil/gravel, that do not meet the EPA LDR criteria for classification as debris.
- **Matrix Parameter Code S4000, Soil/Gravel:** defined as solid waste materials that are at least 50 percent by volume soil/gravel.
- **Matrix Parameter Code 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 neutral geologic material.
- **Matrix Parameter Code 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).

Matrix parameter codes are applied to mixed TRU waste streams as a general categorization scheme to distinguish between waste types. More specific waste identification systems are used for supplementary purposes as part of waste management operations at LANL. To better identify wastes containing hazardous constituents, mixed TRU wastes are assigned to a numbered waste stream. These numbered waste streams are based on the following prioritized criteria: waste generation process (including location of the process); bulk material content of the waste (e.g., combustible debris, noncombustible debris, cemented sludge, or organics absorbed on vermiculite); and/or hazardous constituents in the waste. These numbered waste streams also correspond to other identification systems used by LANL in the past. Table B-4 lists the mixed TRU waste streams stored at LANL by their matrix parameter code and provides a cross-reference between past and present waste stream identification systems. This includes identification of the waste streams by Transuranic Package Transporter-II (TRUPACT-II) Content (TRUCON) codes, described below.



TRUCON codes were developed by DOE to provide consistent waste content descriptions for TRU and mixed TRU waste generated throughout all of DOE's facilities (DOE, 1996). The TRUCON codes describe the bulk material and chemical characteristics of TRU and mixed TRU waste to be certified for transportation in the TRUPACT-II. LANL TRUCON codes consists of a three digit number preceded by the letters "LA" and followed by a letter that further defines the waste packaging. The following paragraphs provide consolidated waste descriptions for the mixed TRU wastes stored at LANL. Mixed TRU waste information is summarized in Table B-5.

#### TRUCON Code LA 111/211

This waste consists of solidified inorganic process solids and liquids. It is generated as a result of plutonium processing operations and D&D activities. It generally includes hydroxide filtrate cakes, plutonium-contaminated soils, and aqueous waste (dewatered treatment sludges). These wastes are typically solidified with cement to form a noncorrosive solid matrix.

#### TRUCON Code 112/212

This waste consists primarily of absorbed organics on vermiculite.

#### TRUCON Code LA 114/214

This waste consists of solidified inorganic process solids and is generated as a result of plutonium-processing operations. Solidified process solids include process residue from evaporator bottoms and other discardable solutions, process leached solids, ash, filter cakes, salts, metal oxides, and fines. These process solids are immobilized in cement to form a noncorrosive solid matrix.

#### TRUCON Code LA 115/215

Graphite waste generated from plutonium-processing activities is packaged as TRUCON Code LA 115/215 waste. The waste consists of discarded graphite mold and furnace equipment from plutonium casting operations. A small fraction of combustible waste, such as plastic (mainly packaging), may also comprise this waste type.

#### TRUCON Code LA 116/216

This waste is comprised of combustible waste generated from R&D, process and recovery, and D&D operations at LANL. The combustible solids consist primarily of paper, rags, plastic, and rubber. A

small fraction of noncombustible solids, such as scrap metal, may also be contained in this waste form.

TRUCON Code LA 117/217

This waste is comprised of noncombustible (primarily metal) waste generated by R&D, process and recovery, and D&D operations at LANL. It may consist of motors, pumps, tools, and process equipment and may contain some small fraction of combustible waste, such as plastics (mainly packaging). This waste may also contain glass in the form of discarded laboratory glassware, windows, and bottles with a small fraction of combustibles.

TRUCON Code LA 118/218

This waste consists of mixed TRU glass waste generated from plutonium processing. This glass waste consists of discarded laboratory glassware, windows, and bottles. It may also contain small fractions of combustible waste, such as plastic (mainly packaging).

TRUCON Code LA 119/219

This waste consists of discarded high-efficiency particulate air filters.

TRUCON Code 120/220

This waste consists of isotopic source waste. It includes isotopic source waste generated as a result of R&D activities.

TRUCON Code 122/222

This waste consists of inorganic solid waste. It includes noncombustible building debris, glovebox debris, and other solid waste debris. Waste-generating activities include R&D, process and recovery, and D&D operations.

TRUCON Code LA 123

This waste consists of leaded rubber and metal waste generated from plutonium-processing activities. This waste type consists of lead-lined glovebox gloves discarded along with metal waste, such as discarded metals, motors, and tools.

#### TRUCON Code 124/224

This waste consists primarily of used chloride salts from pyrochemical processes (i.e., electrorefining, molten salts extraction, salt stripping, fluoride reduction, and direct oxide reduction) and a small fraction of combustible waste (i.e., plastic).

#### TRUCON Code LA 125/225

This waste consists of metal equipment, either whole or sectioned, along with its combustible components. This waste also contains a small volume of combustibles generated during decommissioning, sectioning, and packaging.

#### TRUCON Code LA 126

This waste consists of solidified organic process solids. The waste is generated as a result of plutonium-processing operations. Solidified process solids include process residue from evaporator bottoms and other discardable solutions, process-leached solids, ash, filter cakes, salts, metal oxides, and fines. These process solids are immobilized in cement to form a noncorrosive solid matrix.

#### Sandia National Laboratories/New Mexico - Generated Waste

Mixed TRU waste 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, cellulose, rubber, plastics, organic matrices, and inorganic materials (see Table B-8).

#### B.1.3 Treated Wastes

Mixed TRU waste, HE waste, and HE-contaminated waste are treated at various waste management units throughout LANL. The mixed TRU waste is treated by cementation to stabilize the waste for storage and to meet waste acceptance criteria (WAC) for disposal at the Waste Isolation Pilot Plant (WIPP). The HE waste and HE-contaminated waste are treated by open burning or open detonation to remove its reactive characteristic.

##### B.1.3.1 Treated Mixed TRU Wastes

Mixed TRU wastes that require treatment are generated primarily from R&D and processing and recovery operations. Matrix parameter codes are applied to mixed TRU wastes as a general categorization scheme. The TRUCON codes which are used to more specifically describe mixed

TRU wastes are cross-referenced to matrix parameter codes in Table B-4. The TRUCON-coded mixed TRU wastes treated at LANL are LA 111/211, LA 114/214, and LA 126. These TRUCON codes are fully described in Section B.1.2.3. The EPA Hazardous Waste Numbers that potentially apply to these wastes are provided in Table B-5. The matrix parameter codes that are applicable to the mixed TRU wastes treated at LANL are listed below.

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

Complete descriptions of the matrix parameter codes are available in "DOE Waste Treatability Groups Guidance" (DOE, 1995).

Treatment of mixed TRU wastes at LANL may consist of immobilization/solidification in cement to form a noncorrosive solid matrix. Additional specific information on cementation treatment processes is provided in TA-specific permit applications, permit modification requests, or permit renewal documents.

#### **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 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 which 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 NMAC 4.1, Subpart II, 261.23 [1-1-97], 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 R&D activities, D&D, and ER activities. Table B-6 provides a summary of available information on HE waste and HE-contaminated waste treated by OB. This table includes brief waste descriptions, waste-generating activities, the characterization basis for hazardous waste designation (i.e., process knowledge and/or analysis), potential EPA Hazardous Waste Number(s), potential hazardous constituents in and/or

characteristics of the waste, and regulatory limits. These waste streams include homogeneous and heterogeneous wastes and are described in the following paragraphs.

#### HE-Contaminated Water with Trace Solvents and/or Metals

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, and maintenance activities.

#### HE-Contaminated Spent Solvent Waste

This waste stream consists of HE-contaminated solvents. It is generated primarily by laboratory analysis and the dissolving of HE and polymers.

#### HE-Contaminated Water

This waste stream consists of HE-contaminated water generated primarily from pressure washing walls, equipment, and floors. It is also generated by water-cooled HE-machining operations.

#### 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-machining operations.

#### Solid and Scrap HE

This waste stream consists of off-specification or obsolete HE. It is generated primarily from machining and forming processes and consists primarily of discrete pieces of explosives left over from R&D activities and testing operations.

#### HE-Contaminated ER Soil and/or Debris

This waste stream consists of ER soils, debris, and investigation-derived waste (e.g., personal protective equipment, samples, and sampling equipment). These wastes are generated during remediation and D&D activities.

#### HE-Contaminated Commercial Chemical Products

HE-contaminated commercial chemical products may be generated at various TAs throughout LANL that manage HE. This waste generally consists of spilled or off-specification unused commercial chemical products potentially contaminated with HE.

#### Wastewater Treatment Residues

This waste stream consists of sludges, spent activated carbon, and filter solids that result primarily from the filtration of HE wastewater.

#### HE-Contaminated Solid Waste

This waste stream may include solvent-contaminated paper, glassware, tools, and other waste. It is generated primarily from HE-processing activities, plastic forming, and general office and laboratory use.

#### HE-Contaminated Equipment

This waste stream consists of HE-contaminated equipment, which includes discarded, noncombustible equipment and material from HE-processing areas, D&D, and ER activities.

#### HE-Contaminated Waste Rags, Wipes, and Other Combustibles

This waste stream includes solvent-soaked rags and wipes used at HE-processing areas. It is generated primarily from hydraulic press operations and laboratory analysis.

#### 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.

#### Liquid Process Explosive Waste

This waste stream consists of off-specification or obsolete liquid HE waste. It is generated from R&D activities and testing operations.

#### Treatment Residues

Ash and/or debris generated during the thermal treatment of HE-contaminated waste by OB is characterized for the toxicity characteristic prior to disposal. Ash/debris generated from any waste stream which contains listed hazardous waste is considered "derived from" waste subject to 20 NMAC 4.1, Subpart II, 261.3(c)(2)(i) [1-1-97], and is sent to a permitted treatment, storage, and disposal facility (TSDF) for proper disposal.

#### 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. This table includes a brief waste description, waste-generating activities, the characterization basis for hazardous waste designation, potential hazardous constituents in and/or characteristics of the waste, and regulatory limits. These waste streams include homogeneous and heterogeneous wastes and are described briefly below.

##### Solid/Scrap Process Explosive Waste

This waste stream consists of scrap or off-specification HE waste. It is generated from HE machining, forming, and preparation processes and consists primarily of discrete pieces of explosives left over from R&D activities and testing operations.

##### Liquid Process Explosive Waste

This waste stream consists of off-specification or obsolete liquid HE waste. It is generated from R&D activities and testing operations.

#### 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 informational 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 NMAC 4.1, Subpart V, 264.13(a)(1)]

A detailed chemical and physical characterization will be performed on all hazardous, mixed low-level, mixed TRU, HE, and HE-contaminated wastes for management purposes, as required by 20 NMAC 4.1, Subpart V, 264.13. Waste analysis parameters will be selected to ensure that the characterization documentation will contain all information necessary to properly treat, store, or dispose of waste in accordance with Resource Conservation and Recovery Act (RCRA) general

facility standards and LDR requirements. These waste parameters will be selected to ensure that the characterization will provide all of the necessary information to properly treat the waste in accordance with RCRA general facility standards and LDR requirements.

**B.2.1 Proposed Analytical Parameters and Methods [20 NMAC 4.1, Subpart V, 264.13(b)(1), and 20 NMAC 4.1, Subpart IX, 270.14(b)(2)]**

Analytical parameters and characterization methods that may be used for hazardous, mixed low-level, mixed TRU, and HE and HE-contaminated wastes generated at LANL are summarized in Tables B-9 through B-12. Some or all of the parameters listed below will be used to determine the RCRA regulatory status of the wastes listed previously.

- Acceptable knowledge
- 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)
- Mixed TRU waste 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 visual examination to verify the absence of free liquids.
- Flash point characterization
- pH characterization
- Additional characterization data

**B.2.2 Criteria and Rationale for Parameter Selection [20 NMAC 4.1, Subpart V, 264.13(b)(1)]**

Waste analysis parameters are selected to characterize hazardous and mixed low-level wastes in conformance with 20 NMAC 4.1. Mixed TRU waste characterization incorporates characterization procedures from the WIPP permit (NMED, 1999) requirements, which are based on knowledge of raw materials and physical/chemical processes of waste-generating activities and may be supported by analytical results. Additional characterization procedures will be implemented as needed to meet the requirements of the final WIPP WAP permit conditions. The analytical parameters selected to confirm knowledge-based waste characterization for hazardous, mixed low-level, and mixed TRU waste, and the rationale for the selected parameters, are identified in Tables B-9, B-10, and B-11,



respectively. 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 are identified in Table B-12.

**B.3 CHARACTERIZATION PROCEDURES [20 NMAC 4.1, Subpart V, 264.13(a)(1) and 264.13(b)(2), and 20 NMAC 4.1, Subpart IX, 270.14(b)(2)]**

The characterization of hazardous, mixed low-level, mixed TRU, HE, and HE-contaminated waste is conducted by the waste generator before the waste is treated or stored. The approach to the characterization of hazardous, mixed low-level, mixed TRU, HE, and HE-contaminated wastes is based on the chemical, physical, and radiological nature of the waste stream. Characterization procedures require that each waste generator provide documented information on the waste stream. This is accomplished by using acceptable knowledge and/or sampling and analysis, which are described in the following sections. The completion of characterization documentation allows for the assignment of EPA Hazardous Waste Numbers and the proper management of the waste. All waste generators must certify, based on their knowledge of the waste, that the information included in the characterization documentation is complete and accurate.

The following sections describe the characterization procedures that apply specifically to each waste type.

**B.3.1 Hazardous and Mixed Low-Level Waste Characterization**

Characterization procedures for hazardous and mixed low-level wastes are selected based on the physical nature of the waste stream (e.g., homogeneous or heterogeneous waste). Homogeneous solid waste may be characterized for the presence of hazardous constituents (i.e., VOCs, SVOCs, and metals) on the basis of acceptable knowledge and/or sampling and analysis. Heterogeneous solid waste will be characterized largely on the basis of acceptable knowledge because of the difficulty in obtaining representative samples, the lack of appropriate sampling methodology, and for mixed low-level wastes, safety concerns associated with unnecessary exposure to the radioactive component of the waste.

Occasionally, chemicals of an unknown nature require disposal. These wastes are handled on a case-by-case basis. The individual waste may be tentatively 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 small population of chemicals.

For purposes of managing unknown wastes, a small volume is defined at LANL as less than one liquid gallon (or approximately four liters). The rationale for the small volume designation is that this is the minimum quantity of sample which is needed to test if the waste is hazardous. At and below this limit, the sample is actually 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 handling.

Volumes greater than one gallon or 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 to the waste. Characterization methods that may be used are provided in Tables B-9 and B-10.

**B.3.1.1 Acceptable Knowledge [20 NMAC 4.1, Subpart V, 264.13(a)(2), and 264.13(b)(5), and 20 NMAC 4.1, Subpart IX, 270.14(b)(2)]**

The physical, chemical, and radiological nature of some waste forms makes the 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 or explosive material. Acceptable knowledge is a method used to characterize the waste forms utilizing process knowledge and additional forms of waste analysis data. Acceptable knowledge can be used to meet all or part of the waste analysis requirements.

According to EPA guidance, *acceptable knowledge* is broadly defined to include process knowledge, additional characterization data, and/or facility records of analysis (EPA, 1994). *Process knowledge* is described in 20 NMAC 4.1, Subpart V, Section 264.13(a)(2) [1-1-97], as data developed under Part 261 (i.e., 20 NMAC 4.1, Subpart II) and existing published or documented data on a specific hazardous waste or hazardous waste generated from similar processes. Additional characterization data includes data obtained from chemical or physical analysis or review that is not subject to RCRA

protocols such as "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) and other approved methods, or through testing of similar or surrogate waste streams. These data are 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).

Examples presented in the EPA guidance (EPA, 1994) for the appropriate use of acceptable knowledge include:

- Hazardous constituents 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 constituents.
- 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.

#### **B.3.1.1.1 Process Knowledge**

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 constituents 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 will obtain, assemble, and prepare the process knowledge documentation for each waste stream in a separate auditable file or maintain a waste stream reference file that identifies the documents and their locations. The documentation must be explicitly relevant and traceable to a given waste stream and cannot merely be a list of information sources for a particular operation and waste. There are many sources of applicable documentation at LANL that may be used to substantiate process knowledge for a specific waste stream. Examples of documentation that may be used include 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 constituents 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 acceptable knowledge includes information for the waste stream provided by the generator. These data may be qualitative in nature, not be 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 NMAC 4.1, Subpart V, 264.13(a)(3), 264.13(b)(2), (3), and (4), and 20 NMAC 4.1, Subpart IX, 270.14(b)(2)]

This section discusses proposed sampling and analytical procedures and frequency of sampling applicable to hazardous and mixed low-level wastes. The approach described for characterizing these waste types is based on the radiological, physical, chemical, and hazardous properties of the waste. Solid and liquid waste sampling techniques are typically used to obtain the chemical data necessary for waste characterization.

Sampling and analysis is generally performed when a waste lacks sufficient process information to adequately characterize the waste based on acceptable knowledge. 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 with certain technical performance criteria and to be consistent with regulatory guidelines. Personnel involved in sampling and analysis comply with LANL-specific protocol consistent with "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) or other approved methods (EPA, 1986).

B.3.1.2.1 Solid Waste Sampling [20 NMAC 4.1, Subpart V, 264.13(b)(3)]

Solid wastes that may be sampled are typically homogeneous waste streams. These solids may be sampled and analyzed for total metal content, VOCs, and SVOCs. The sampling protocol for solid hazardous and low-level mixed wastes at LANL is based on sampling methods approved by EPA for solid waste and soil sampling in SW-846, as well as methods approved by the American Society for Testing and Materials (ASTM). 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.

Homogeneous waste streams may be sampled and analyzed for the toxicity characteristic (TC) contaminants listed in 20 NMAC 4.1, Subpart II, 261.24 [1-1-97]. Analysis for total concentration of

TC contaminants may be performed on samples in a screening step, as described in Section 1.2 of Method 1311, Toxicity Characteristic Leaching Procedure (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 Sampling

The liquid wastes generated at LANL typically consist of aqueous solutions, slurries, and organic liquids. These wastes may 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, may be characterized by filtering the waste, measuring total constituent concentrations in the resulting filtrate, and comparing these concentrations to the TC regulatory levels in 20 NMAC 4.1, Subpart II, 261.24 [1-1-97].

To ensure the collection of a representative sample of the liquid, the sample is 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. The samples are typically collected using a glass tube or composite liquid waste sampler, in accordance with SW-846 or other approved methods.

Wastes that contain both a liquid and a solid phase may be 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 and using the multiple phase formula from Method 1311.

#### B.3.1.2.3 Sample Handling, Preservation, and Storage

Table B-13 presents requirements specified in 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.

**B.3.1.2.4 Analytical Laboratory Selection and Analytical Methods [20 NMAC 4.1, Subpart V, 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-14 and B-15 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
- Constituents 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-14 and B-15. Qualified analytical laboratories at LANL and/or approved subcontractor laboratories that meet the above criteria will analyze waste samples for RCRA-regulated hazardous constituents (VOCs, SVOCs, and metals) and characteristics, according to SW-846 or documented equivalent methods.

**B.3.1.3 Verification and Reevaluation Frequencies [20 NMAC 4.1, Subpart V, 264.13(a)(3) and 264.13(b)(4)]**

Reevaluation of initial characterization information may be performed to verify the accuracy of the initial waste characterization; to verify 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.

Hazardous waste received at the waste management unit for storage will be randomly selected for verification by acceptable knowledge or sampling and analysis at a rate of 1 percent of received waste streams characterized by acceptable knowledge per year. Verification analyses, if needed, will be conducted at LANL's or an approved subcontractor's laboratory facilities, in conformance with appropriate methods. Other methods of verification may include RTR and visual examination. Factory sealed containers and original containers redistributed for use within the facility will not be included in this analysis. Lab packed chemicals in original containers will not be verified.

All routinely generated waste streams will be reevaluated annually to verify that they have not changed. This annual reevaluation will be accomplished through review and recertification of applicable waste characterization documentation. Any information that indicates a change in the process that generates the waste and may affect the waste shall cause the waste to be recharacterized no later than the next time the waste is generated.

#### **B.3.2 Mixed TRU Waste Characterization**

Characterization of mixed TRU waste stored at LANL is performed in accordance with the procedures described in the "Los Alamos National Laboratory TRU Mixed Waste Analysis Plan NOD Response" (LANL, 1996). Initial characterization of both homogeneous and heterogeneous mixed TRU waste is primarily based on process knowledge, which is suitable for safe storage of these waste streams. Additional characterization to meet WIPP certification procedures will be implemented at appropriate LANL facilities to meet requirements of the final WIPP WAP permit conditions. Pursuant to WIPP certification and WIPP WAP requirements, further characterization of homogeneous waste may 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 facilities using process knowledge, headspace gas sampling, RTR, and visual examination.

The mixed TRU waste streams described in Section B.1.2.3 are categorized by matrix parameter codes based on the physical and chemical form of the waste. Homogeneous waste streams in the solid process residue (Matrix Parameter Code S3000), soil/gravel (Matrix Parameter Code S4000), or aqueous liquids/slurries (Matrix Parameter Code L1000) categories may contain RCRA-regulated VOCs, SVOCs, and metals (see Table B-5) and may be characterized using acceptable knowledge and/or sampling and analysis. Debris waste streams (Matrix Parameter Code 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 constituents (i.e., VOCs, SVOCs, and metals) using acceptable knowledge based on examination of the original materials from which the waste was generated.

The documents referenced above address mixed TRU waste characterization procedures to be utilized after the waste is stored at LANL. These procedures were developed primarily to meet 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. These documents are referenced for informational purposes only, as they constitute requirements established for another facility's operating permit conditions. Because these references 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 will prepare a records inventory and disposition schedule (RIDS) or an equivalent system for all waste characterization data and related QA/QC records for mixed TRU waste to be shipped to the WIPP facility. These documents will be designated as Lifetime Records or Non-Permanent Records as defined by the RIDS and Table B-7 of the WIPP permit. Lifetime Records shall be maintained for the life of the LANL mixed TRU waste characterization program plus six years and then offered to WIPP or the appropriate Federal Records Center for permanent archival. Non-Permanent Records shall be maintained for ten years after the date of record generation and then disposed according to the RIDS.

#### B.3.2.1 Mixed TRU Waste Certification Plan

The "Los Alamos TRU Waste Certification Plan" (TWCP) (LANL, 1991) incorporates the certification requirements of the "Waste Acceptance Criteria for the Waste Isolation Pilot Plant" (WIPP WAC) (DOE, 1999 or most recent version) for mixed TRU waste that will be sent to that site. The TWCP establishes the programmatic framework and requirements within which waste generators must 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 acceptable knowledge information are evaluated. Once this documentation has been prepared, it is subject to review and approval by certification program personnel. Waste generators must also participate in external audits, as

required by the TWCP, to verify the certification process. If the requirements of the WIPP WAC are met, the waste will be certified and transported to WIPP.

#### **B.3.2.2 Acceptable Knowledge**

The TWCP described above includes an acceptable knowledge certification program in accordance with the WIPP permit requirements (NMED, 1999). LANL-specific protocol consistent with the WIPP WAP will be used to implement acceptable knowledge as part of the LANL TRU waste certification program for WIPP. The acceptable knowledge certification program will include the following elements:

- A description of the waste certification program.
- Written procedures outlining the specific methodology used to assemble acceptable knowledge records, including document origins, guidelines for use of documents or information, auditable record guidelines, and potential limitations associated with the information.
- Procedures to evaluate acceptable knowledge information and to resolve discrepancies in documentation.
- Guidelines for the identification of RCRA hazardous constituents and assignment of appropriate EPA Hazardous Waste Numbers to each waste stream.
- Procedures to ensure that unacceptable wastes are identified, documented, and segregated.
- Procedures to verify or confirm acceptable knowledge.
- A cross reference to the applicable waste summary category group (i.e., matrix parameter codes) to verify the required confirmation data have been evaluated and the proper EPA Hazardous Waste Numbers have been assigned.
- Administrative control procedures that identify organization responsibility for compliance, oversight procedures, on-the-job procedure training, stop-work procedures, and nonconformance process and corrective action procedures.

##### **B.3.2.2.1 Real-Time Radiography [20 NMAC 4.1, Subpart V, 264.13(b)(2), and 20 NMAC 4.1, Subpart IX, 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 that the physical form requirements of the WIPP WAC are met. At the same time, RTR will verify the waste classification (i.e., matrix parameter code) and waste form determined using acceptable knowledge. All mixed TRU waste 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 drum.

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 may 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 mixed TRU waste are based on Attachment B-1, "Waste Characterization Sampling Methods," Section B1-3, "Radiography" (NMED, 1999).

**B.3.2.2.2 Visual Examination [20 NMAC 4.1, Subpart V, 264.13(b)(2), and 20 NMAC 4.1, Subpart IX, 270.14(b)(2)]**

The contents of select mixed TRU waste containers will be visually examined to confirm RTR results. Visual examination will also verify aspects of acceptable knowledge amenable to visual confirmation. For example, the visual examination will verify the physical characteristics of a waste and the associated matrix parameter code (i.e., Matrix Parameter Code 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 acceptable knowledge 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 mixed TRU waste are based on Attachment B-1, "Waste Characterization Sampling Methods," Section B1-3, "Radiography" (NMED, 1999).

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 drums by selecting a number of drums 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, 1999). The following table is an example of how the number of mixed TRU waste 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	NA	22	NA	22	NA	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

NA = not applicable

For the first year of container examination, LANL will use the 2 percent miscertification rate observed at the Idaho National Engineering and Environmental Laboratory (INEEL). In subsequent years, LANL will use the miscertification rate observed at LANL in the previous year(s) to determine the appropriate number of containers for visual examination.

**B.3.2.2.3 Headspace Gas Sampling [20 NMAC 4.1, Subpart V, 264.13(b)(2) and (3), and 20 NMAC 4.1, Subpart IX, 270.14(b)(2)]**

Headspace gas sampling and analysis is a qualitative screening technique used to confirm the presence of regulated hazardous constituents. This method of characterization includes sampling and analysis of headspace gas from the drum headspace (i.e., directly under the drum lid).

The drum headspace of all previously unvented drums is sampled for hydrogen when filters are inserted. A statistically selected subset of waste drums are sampled for flammable gases and selected VOCs in order to assure that health and safety criteria for safe storage of these drums are met. The statistical basis for selection of drums to be sampled is described in Section B.3.2.2.5. In order to meet the proposed characterization requirements in the WIPP permit, the headspace of all remaining drums in retrievable storage will be sampled and analyzed as the drums are characterized for shipment to WIPP. Headspace gas sampling and analysis also serves to confirm the presence of regulated hazardous constituents. 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 TWCP QA objectives through analysis of field QC samples and adherence to QC

practices. Analytical methods for the determination of VOCs in the headspace of mixed TRU waste containers must meet technical performance criteria, be consistent with regulatory guidance, and be compatible with the operational constraints associated with the analysis of actinide-contaminated materials. Methods for the collection of headspace gases are based on SW-846, on the "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air" (EPA, 1988), and in accordance with the requirements of the WIPP permit.

#### **B.3.2.2.4 Solid Waste Sampling and Analysis**

The following describes the methods for collecting samples of mixed TRU waste classified as homogeneous solids or soils. Sampling protocol is based on sampling methods similar to those approved by EPA for solid waste and soil sampling in 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 statistical basis for sampling is described in Section B.3.2.2.5.

The mixed TRU waste classified as homogeneous solids or soils is packaged in either 55-gallon drums or in smaller containers within 55-gallon drums. Drums may contain mixed TRU waste within a 55-gallon polyethylene bag or may consist of up to 20 or more small containers within a 55-gallon polyethylene bag. For drums 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 may be analyzed are listed in Table B-16.

To accomplish sampling of these wastes, the techniques described below have been developed for sample and subsample collection. The sampling techniques are designed to obtain a representative sample from the container (e.g., 55-gallon drum, 1-gallon polyethylene bottle); the subsampling techniques are designed to obtain a representative subsample from the sample. Subsampling is conducted to provide laboratories the minimum amount of required sample, thus minimizing the quantity of investigation-derived waste.

The methods used to collect samples of mixed TRU waste classified as homogeneous solids or soils from 55-gallon drums and smaller containers must be such that the samples are representative of the waste from which they are taken. For 55-gallon drums containing 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 drum.

#### Sample Core Collection

Coring tools must be used to collect cores of homogeneous solids or soils from 55-gallon drums and smaller 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 may be used in lieu of a rotational coring tool.

Rotational coring tools (i.e., lightweight augers) and nonrotational coring tools (i.e., thin-walled samplers) have each been tested for their ability to collect a vertical core of simulated solidified waste contained in 55-gallon drums and 1-gallon polyethylene bottles, as described in "Idaho National Engineering Laboratory Simulated Solidified Transuranic Waste Sampling Program" (EG&G, 1994). The rotational coring tool used at the INEEL has demonstrated core recoveries greater than 75 percent for soft simulated wastes and greater than 94 percent for hard simulated waste. The sampling tool has been designed to minimize the transfer of frictional heat to the core, thereby minimizing potential loss of VOCs. The nonrotational coring tool has demonstrated core recoveries greater than 88 percent for soft simulated wastes. LANL will use coring tools similar to those developed at the INEEL.

#### Subsample Collection

To obtain representative subsamples, subsampling of the sample core is required. Subsampling must be conducted as soon as possible after sample core collection to minimize the loss of VOCs. If a substantial delay (e.g., several minutes) is expected between sample core collection and subsampling, the sample core must remain in the sleeve and the sleeve must be capped at each end. Subsamples for VOCs must be collected prior to extruding the sample core from the sleeve. The sampling location must be randomly selected along the long axis of the sleeve and access to the waste must be gained by making a perpendicular cut through the sleeve and the waste it contains.

#### B.3.2.2.5 Statistical Approach for Headspace Gas and Solid Waste Sampling

A statistical approach will be used to select heterogeneous waste containers for headspace gas sampling. The same approach will be used 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 process knowledge and, thus, represent populations that contain similar waste. Drums are first segregated into waste streams based on existing characterization information. The methods used to segregate drums into waste streams and lots for sampling within waste streams are detailed in the LANL TRU Waste Characterization Sampling Plan (LANL, 1995c), a site-specific document required by the WIPP permit. An initial number of drums is selected from each waste stream for sampling and analysis using the method described in the WIPP permit. A minimum of five containers per waste stream are sampled. For waste streams with less than three drums, a total of three samples is taken. The analytical results from the initial round of sampling are used to calculate upper 90 percent one-sided confidence limits for the mean concentrations of RCRA-regulated constituents. Those limits are compared to the RTLs for the constituents. If a hazardous waste determination cannot be made based on the results from the initial round of sampling, an additional number of drums is selected. The number of additional drums for the second round of sampling depends on the variance of the analytical results from the first round. The specific method for calculating the number of drums for additional sampling is found in the WIPP permit.

The objective is to classify specific waste streams as hazardous or nonhazardous by determining the average, or mean, and associated variance of the concentration of regulated hazardous constituents in the waste stream. 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.3.2.3 Characterization Procedures for Mixed TRU Wastes to be Treated

Chemical and physical characterization is performed prior to treatment of mixed TRU waste, in accordance with 20 NMAC 4.1, Subpart V, 264.13 [1-1-97]. Characterization of mixed TRU waste is accomplished by applying process knowledge or by obtaining chemical analytical data from representative samples of mixed TRU liquid waste (e.g., evaporator bottoms solutions) to be treated by solidification. Preliminary mixed TRU waste characterization is developed using process knowledge and through the use of a radioactive and mixed waste certification program. Documented and auditable acceptable knowledge, as described in Section B.3.2.2, is used to determine whether the waste stream is regulated as a hazardous waste. If a homogeneous mixed TRU waste cannot be adequately characterized because of insufficient process information, sampling and analysis are performed.



Homogeneous solids and liquids are the only mixed TRU waste types treated. Waste streams in the homogeneous solids (Matrix Parameter Code S3000) category may contain RCRA-regulated metals. These homogeneous waste streams are periodically sampled and analyzed for the TC metal contaminants listed in 20 NMAC 4.1, Subpart II, 261.24 [1-1-97]. For liquids (Matrix Parameter Code L1000), the total values are directly correlated to the maximum concentration of contaminants listed in 20 NMAC 4.1, Subpart II, 261.24 [1-1-97].

Initial predictions of hazardous constituents present in each treated waste stream will be based on process knowledge, with waste sampling and analysis performed as necessary to obtain qualitative and quantitative data for hazardous constituents (i.e., metals). Table B-11 summarizes characterization methods by matrix parameter code. Parameters and analytical methods for specific hazardous constituents are presented in Table B-16.

Sampling of treated mixed TRU waste may be performed at other appropriate LANL facilities. For this additional sampling effort, LANL will use statistically-based sampling and analysis, along with RTR, visual examination, and headspace gas analysis, as described in Section B.3.2.

Mixed TRU liquid waste is periodically sampled and analyzed for total metal content, VOCs, and SVOCs. Alternatively, core samples of post-treatment cemented waste may be analyzed. 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 mixed TRU waste comply with LANL-specific protocol consistent with SW-846. For purposes of collecting a representative sample of mixed TRU waste, 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. Sampling of mixed TRU waste to be treated is conducted according to the procedures described in the applicable TA-specific Part B permit application. Specific information relative to sampling, parameters, and analytical methods is outlined in Tables B-11 and B-16.

#### B.3.2.4 Sample Handling, Preservation, and Storage

Table B-13 presents 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 laboratories at LANL and/or approved subcontractor laboratories will perform the detailed qualitative and quantitative chemical analyses specified in Table B-16 of this WAP. These laboratories must have:

- The capability of handling TRU waste
- A documented comprehensive QA/QC program that meets the WIPP permit requirements
- 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 mixed TRU waste 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)
- Meet requirements of the WIPP permit.

Collectively, these factors contributed to the selection of the analytical methods specified in Table B-16. Qualified analytical laboratories at LANL and/or approved subcontractor laboratories that meet the above criteria will analyze mixed TRU waste samples for RCRA-regulated hazardous constituents (VOCs, SVOCs, and metals) and characteristics, according to SW-846 or documented and approved equivalent methods.

#### **B.3.3 HE Waste and HE-Contaminated Waste Characterization**

HE waste and HE-contaminated waste at LANL are treated by OB or OD to remove the characteristic of reactivity. 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. Wastes that may contain concentrated HE are characterized by process knowledge, as described in Section B.3.1.1.1. 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." 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, is used.
- If the waste contains visible HE, it is considered reactive.
- If the waste came into direct contact with HE and all of the surfaces cannot be tested (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 by High Performance Liquid Chromatography, SW-846 Method 8330. 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-17.

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 a TCLP test. This creates the need for further characterization of the residue ash/debris after a burn. Sampling and analysis for ash generated by OB is summarized in Table B-18. The residue ash/debris from metal containing wastes is analyzed using TCLP and recharacterized according to the results. The residues from the treating of wastes with F002, F004, and F005 materials continue to carry these EPA Hazardous Waste Numbers and are disposed of accordingly.

#### B.4 OFF-SITE WASTE ACCEPTANCE PROCEDURES [20 NMAC 4.1, Subpart V, 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 NMAC 4.1, Subpart V, 264.13(a)(3)(ii), 264.13(a)(4), 264.13(b)(5),

and 264.13(c) [1-1-97]. Table 2-3 of this General Part B Permit 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 6 of the General Part B Permit 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 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.

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 the treatment, storage, and disposal facility (TSDF), 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.

**Additional waste characterization activities in support of WIPP certification will generally be the purpose of mixed TRU waste 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 NMAC 4.1, Subpart V, 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 NMAC 4.1, Subpart V, 264.17 [1-1-97], 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, they are labeled appropriately, and the waste types are physically segregated within each container storage area. The wastes are segregated specifically 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 NMAC 4.1, Subpart V, 264.17 [1-1-97]. LANL personnel will take the necessary precautions to prevent accidental ignition or reaction of wastes to be treated by OB and OD. LANL relies on standard operating 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 and 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.

#### **B.5.3 Procedures to Ensure Compliance with LDR Requirements [20 NMAC 4.1, Subpart VIII, 268.7(a) and 268.7(b)(3), (4), and (5)]**

In accordance with LDR requirements, waste to be shipped off site may need to be analyzed to determine whether it meets the applicable LDR treatment standards in 20 NMAC 4.1, Subpart VIII, Part 268, Subpart D [1-1-97]. Treatment standards are expressed in two ways: (1) as constituent concentrations in the waste (from either an extract of the waste, as determined by the TCLP, or from the total volume of the waste, referred to as total waste analysis) or (2) as specified treatment technologies. Waste that must meet concentration-based treatment standards prior to shipment off site for disposal will be evaluated to determine if applicable constituent concentration levels have been attained. This will be accomplished by testing the waste or by using acceptable knowledge. Testing will be conducted only to certify that a waste meets LDR treatment standards. If a waste meets applicable LDR treatment standards based on acceptable knowledge, then testing to certify LDR compliance is not necessary. All analytical results completed in support of LDR requirements will be retained within the facility operating record.

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 NMAC 4.1, Subpart VIII, 268.7(b) [1-1-97].

Wastes that exceed applicable LDR treatment standards will be sent to a permitted TSDF if treatment options are available. For off-site shipment of these wastes, LDR notifications, with information required under 20 NMAC 4.1, Subpart VIII, 268.7 [1-1-97], will be supplied. In addition to the LDR notification, additional data for the waste stream (e.g., generator's characterization documentation and analytical data) may be provided to the designated TSDF.

Any wastes that are determined through analysis to meet treatment standards as specified in 20 NMAC 4.1, Subpart VIII, Part 268, Subpart D [1-1-97], will be land disposed in a permitted TSDF without further treatment, with the exception of wastes that have been specifically exempted from LDR requirements, or disposed of or treated in other than a land disposal waste management unit. For example, mixed TRU wastes destined for WIPP will not be subject to LDR. An LDR notification, including applicable analytical records to support the notification, will be prepared and will accompany the shipment of waste to the receiving TSDF.

#### **B.5.4 Procedures to Ensure Compliance with Subpart CC Requirements [40 CFR, Part 264.1082, Subpart CC]**

LANL waste streams described in this document may be subject to Code of Federal Regulations, Title 40 (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 §264.1082, LANL will address the applicable Subpart CC requirements for control of air pollutant emissions from each hazardous waste management unit subject to the regulations. LANL requires that Subpart CC requirements be met by the generator as part of the waste characterization process. The generator determines whether the concentration of VOCs in a waste stream at the point of generation is less than 500 parts per million (ppm), or equal to or greater than 500 ppm by weight. The generator documents this determination for that waste stream. Acceptable knowledge or process knowledge may 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-14, B-15, B-16, and B-17.

## B.6 REFERENCES

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Date: June 2000

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

NMED, 1999, Waste Isolation Pilot Plant (WIPP) Hazardous Waste Facility Permit, NM 4890139088, November 26, 1999.



**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.3.1.1, B.3.2.2
§264.13(a)(3)	Analysis must be repeated as necessary to ensure that it is accurate and up to date	B.3.1.3, B.3.2.2
§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.3.1.3, B.3.2.2
§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-14, B-15, 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.3.1.2, B.3.2.2
§264.13(b)(3)(ii)	An equivalent sampling method	B.3.1.2, B.3.2.2
§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.3.1.3, B.3.2.2

**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

<sup>a</sup> NA = not applicable

**Table B-2**

**Descriptions of Hazardous Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste-Generating Process Description <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
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 <sup>d</sup> Sampling and Analysis	D001	Ignitability	NA <sup>e</sup>
			D002	Corrosivity	NA <sup>e</sup>
			D003	Reactivity	NA <sup>e</sup>
			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
			D028	1,2-Dichloroethane	0.5
			D030	2,4-Dinitrotoluene	0.13
			D032	Hexachlorobenzene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			D040	Trichloroethylene	0.5
			D043	Vinyl chloride	0.2
			F001	Tetrachloroethylene, Trichloroethylene, Methylene chloride, 1,1,1-Trichloroethane, Carbon tetrachloride, Chlorofluorocarbons	NA <sup>e</sup>
			F002	Tetrachloroethylene, Trichloroethylene, 1,1,1-Trichloroethane, 1,1,2-Trichloro-1,2,2-trifluoroethane	NA <sup>e</sup>
			F003	Xylene, Acetone, Ethyl acetate, Ethyl ether, Methanol Methyl isobutyl ketone, n-Butyl alcohol	NA <sup>e</sup>
			F005	Toluene, Methyl ethyl ketone,	

Table B-2 (continued)

Descriptions of Hazardous Waste Stored at LANL

Waste Description <sup>a</sup>	Waste-Generating Process Description <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
Spent Solvents (continued)				Carbon disulfide, Isobutanol, Pyridine, Benzene	NA <sup>*</sup>
Contaminated Solid Wastes	Machining operations, chemical research, decontamination and decommissioning (D&D) projects, metal finishing operations, and general maintenance operations.	Acceptable Knowledge <sup>d</sup>	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011 D018 D022 D030 D032 D033 D034 D036 D039 D040 D042 F001 F002 F003 F005	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Chloroform 2,4-Dinitrotoluene Hexachlorobenzene Hexachlorobutadiene Hexachloroethane Nitrobenzene Tetrachloroethylene Trichloroethylene 2,4,6-Trichlorophenol 1,1,1-Trichloroethane, Carbon tetrachloride 1,1,1-Trichloroethane Acetone, Methanol Toluene, Benzene	NA <sup>*</sup> NA <sup>*</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 6.0 0.13 <sup>f</sup> 0.13 <sup>f</sup> 0.5 3.0 2.0 0.7 0.5 2.0 NA <sup>*</sup> NA <sup>*</sup> NA <sup>*</sup> NA <sup>*</sup>
Paint and Related Wastes	Painting and finishing operations, and general facility maintenance.	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001 D005 D006 D007 D008 D009 D011 F003	Ignitability Barium Cadmium Chromium Lead Mercury Silver Xylene	NA <sup>*</sup> 100.0 1.0 5.0 5.0 0.2 5.0 NA <sup>*</sup>

Refer to footnotes at end of table.

Table B-2 (continued)

## Descriptions of Hazardous Waste Stored at LANL

Waste Description <sup>a</sup>	Waste-Generating Process Description <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
			F005	Toluene	NA <sup>e</sup>
Photographic and Photocopier Wastes	Photographic film processing and photocopying operations.	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001 D002 D007 D008 D011	Ignitability Corrosivity Chromium Lead Silver	NA <sup>e</sup> NA <sup>e</sup> 5.0 5.0 5.0
Corrosive Liquid Wastes	Analytical Chemistry, electroetching, and electropolishing.	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001 D002 D004 D005 D006 D007 D008 D009 D010 D011 D038 F002   F003 F005	Ignitability Corrosivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Pyridine Tetrachloroethylene, Methylene chloride, Trichloroethylene, 1,1,1-Trichloroethane, Chlorobenzene, 1,1,2-Trichloro-1,2,2-trifluoroethane, Ortho-dichlorobenzene, Trichlorofluoromethane, 1,1,2-Trichloroethane Methanol Toluene, Methyl ethyl ketone, Carbon disulfide, Isobutanol, Pyridine, Benzene, 2-Ethoxyethanol, 2-Nitropropane	NA <sup>e</sup> NA <sup>e</sup> 5.0 100.0 1.0 5.0 5.0 5.0 0.2 1.0 5.0 5.0 NA <sup>e</sup>      NA <sup>e</sup> NA <sup>e</sup>

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

<b>Waste Description<sup>a</sup></b>	<b>Waste-Generating Process Description<sup>a</sup></b>	<b>Basis for Characterization<sup>a</sup></b>	<b>Potential EPA<sup>b</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>c</sup> (milligrams per liter)</b>
Solid Metals and Metallic Compounds	Machining and cutting operations; synthesis reactions; solder from electronic manufacturing, repair, and brazing operations; and grinding operations.	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001	Ignitability	NA <sup>e</sup>
			D003	Reactivity	NA <sup>e</sup>
			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
Contaminated Noncorrosive Aqueous and Nonaqueous Solutions and Sludges	Vacuum pump maintenance, spectrometry, equipment cleaning and maintenance, vehicle maintenance, synthesis reactions, metal polishing operations, and chemical research	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001	Ignitability	NA <sup>e</sup>
			D003	Reactivity	NA <sup>e</sup>
			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
			D038	Pyridine	5.0 <sup>g</sup>
			D040	Trichloroethylene	0.5
			F002	Tetrachloroethylene, Methylene chloride, Trichloroethylene, 1,1,1-Trichloroethane, Chlorobenzene, 1,1,2-Trichloro-1,2,2-trifluoroethane, Ortho-dichlorobenzene, Trichlorofluoromethane, 1,1,2-Trichloroethane	NA <sup>e</sup>
			F003	Xylene, Acetone, Ethyl acetate, Ethyl benzene, Ethyl ether, Methyl isobutyl ketone, n-Butyl Alcohol, Cyclohexanone, Methanol	NA <sup>e</sup>

Refer to notes at end of table.

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

<b>Waste Description<sup>a</sup></b>	<b>Waste-Generating Process Description<sup>a</sup></b>	<b>Basis for Characterization<sup>a</sup></b>	<b>Potential EPA<sup>b</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>c</sup> (milligrams per liter)</b>
Contaminated Noncorrosive Aqueous and Nonaqueous Solutions and Sludges (continued)			F005	Toluene, Methyl ethyl ketone, Carbon disulfide, Isobutanol, Pyridine, Benzene, 2-Ethoxyethanol, 2-Nitropropane	NA <sup>e</sup>
Mercury Wastes	Lamp replacement, chemical research, mercury spill cleanup, and equipment cleaning and maintenance.	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D009 U151	Mercury Mercury	0.2 NA <sup>e</sup>
Used Batteries and Battery Fluids	Equipment Maintenance.	Acceptable Knowledge <sup>d</sup>	D002 D006 D007 D008 D009 D011	Corrosivity Cadmium Chromium Lead Mercury Silver	NA <sup>e</sup> 1.0 5.0 5.0 0.2 5.0
Unused/off-specification Commercial Chemical Products	R&D and general facility operations.	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001 D002 D003 D004 through D043  All P- and U-listed EPA Hazardous Waste Numbers <sup>g</sup>	Ignitability Corrosivity Reactivity Toxicity characteristic wastes  Discarded commercial chemical products and off-specification species	NA <sup>e</sup> NA <sup>e</sup> NA <sup>e</sup> - <sup>e</sup>  NA <sup>e</sup>
Gas Cylinder Waste	R&D and general facility operations	Acceptable Knowledge <sup>d</sup>	D001 D002 D003 Potential D-coded EPA Hazardous Waste Numbers  Potential P-and U-listed EPA Hazardous Waste Numbers <sup>g</sup>	Ignitability Corrosivity Reactivity Toxicity characteristic wastes  Discarded commercial chemical products and off-specification species	NA <sup>e</sup> NA <sup>e</sup> NA <sup>e</sup> - <sup>e</sup>  NA <sup>e</sup>

Refer to footnotes at end of table.



Table B-2 (continued)

Descriptions of Hazardous Waste Stored at LANL

Waste Description <sup>a</sup>	Waste-Generating Process Description <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
Environmental Restoration 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 closure.	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001	Ignitability	NA <sup>e</sup>
			D003	Reactivity	NA <sup>e</sup>
			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 <sup>f</sup>
			D032	Hexachlorobenzene	0.13 <sup>f</sup>
			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	1,1,1-Trichloroethane, Carbon tetrachloride	NA <sup>e</sup>
			F002	1,1,1-Trichloroethane	NA <sup>e</sup>
			F003	Acetone, Methanol	NA <sup>e</sup>
			F005	Toluene, Benzene	NA <sup>e</sup>
Environmental Restoration Aqueous Liquids	Decontamination of remedial equipment, drilling fluids and well development fluids, septic tank liquids, and contaminated stormwater runoff	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001	Ignitability	NA <sup>e</sup>
			D002	Corrosivity	NA <sup>e</sup>
			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	Tetrachloroethylene,	NA <sup>e</sup>

Refer to notes at end of table.

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

Waste Description <sup>a</sup>	Waste-Generating Process Description <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
Environmental Restoration Aqueous Liquids (continued)			F003 F005	Methylene chloride, Trichloroethylene, 1,1,1-Trichloroethane, Chlorobenzene, 1,1,2-Trichloro-1,2,2-trifluoroethane, Ortho-dichlorobenzene, Trichlorofluoromethane, 1,1,2-Trichloroethane Methanol Toluene, Methyl ethyl ketone, Carbon disulfide, Isobutanol, Pyridine, Benzene, 2-Ethoxyethanol, 2-Nitropropane	NA <sup>*</sup> NA <sup>*</sup>
Environmental Restoration Debris	Site decommissioning, site characterization, and site remediation; includes septic tank and detention basin closure, removal actions, and other remedial actions and site closure.	Acceptable Knowledge <sup>d</sup>	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011 D018 D022 D030 D032 D033 D034 D036 D039 D040 D042 F001 F002	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Chloroform 2,4-Dinitrotoluene Hexachlorobenzene Hexachlorobutadiene Hexachloroethane Nitrobenzene Tetrachloroethylene Trichloroethylene 2,4,6-Trichlorophenol 1,1,1-Trichloroethane, Carbon tetrachloride 1,1,1-Trichloroethane	NA <sup>*</sup> NA <sup>*</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 6.0 0.13' 0.13' 0.5 3.0 2.0 0.7 0.5 2.0 NA <sup>*</sup> NA <sup>*</sup>

Refer to footnotes at end of table.

Table B-2 (continued)

Descriptions of Hazardous Waste Stored at LANL

Waste Description <sup>a</sup>	Waste-Generating Process Description <sup>a</sup>	Basis for Characterization <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
Environmental Restoration Debris (continued)			F003 F005	Acetone, Methanol Toluene, Benzene	NA <sup>d</sup> NA <sup>d</sup>

- a Denotes information from the Los Alamos National Laboratory Waste Profile Form 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 NMAC 4.1), Subpart II, Part 261, Subpart C [1-1-97].
- 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 No 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 NMAC 4.1, Subpart II, 261.24, Table 1) [1-1-97].
- g Refers to the P- and U-listed wastes found in the Los Alamos National Laboratory, 1998, "Los Alamos Laboratory General Part A Permit Application," Revision 0.0, Los Alamos National Laboratory, Los Alamos, New Mexico.

**Table B-3**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
<b>Solid Homogeneous Wastes</b>					
Soils with Heavy Metals	Decontamination and decommissioning (D&D) and environmental restoration (ER) activities	Acceptable Knowledge <sup>d</sup> and Preliminary Analysis <sup>a</sup>	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
Environmental Restoration Soils	Remediation of release sites and D&D activities	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D028 D029 F001 F002	1,2-Dichloroethane 1,1-Dichloroethylene 1,1,1-Trichloroethane 1,1,1-Trichloroethane	0.5 0.7 NA <sup>f</sup> NA <sup>f</sup>
Inorganic Solid Oxidizers	Research and development (R&D) and D&D of research laboratories	Acceptable Knowledge <sup>d</sup>	D001 D003 D005	Ignitability Reactivity Barium	NA <sup>f</sup> NA <sup>f</sup> 100.0
<b>Solid Heterogeneous Wastes</b>					
Lead for Surface Decontamination	Radioisotope experiments and other reactor, accelerator, laser, and x-ray applications	Acceptable Knowledge <sup>d</sup>	D008	Lead	5.0
Other Lead Wastes	Radioisotope experiments and other reactor, accelerator, laser, and x-ray applications (where the lead is not amenable to decontamination)	Acceptable Knowledge <sup>d</sup>	D003 D007 D008 D009	Reactivity Chromium Lead Mercury	NA <sup>f</sup> 5.0 5.0 0.2
Noncombustible Debris	Maintenance, D&D of research laboratories or equipment, R&D, and ER activities	Acceptable Knowledge <sup>d</sup>	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	NA <sup>f</sup> NA <sup>f</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0
Combustible Debris	Maintenance, R&D, D&D, and ER activities	Acceptable Knowledge <sup>d</sup>	D001 D003 D005 D006 D007 D008 D009 D011 F001 F002 F003 F005	Ignitability Reactivity Barium Cadmium Chromium Lead Mercury Silver 1,1,1-Trichloroethane 1,1,1-Trichloroethane Spent nonhalogenated solvents Spent nonhalogenated solvents	NA <sup>f</sup> NA <sup>f</sup> 100.0 1.0 5.0 5.0 0.2 5.0 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>

Table B-3 (continued)  
Descriptions of Mixed Low-Level Waste Stored at LANL

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
<b>Solid Heterogeneous Wastes (Continued)</b>					
Organic-Contaminated Noncombustible Solids	Vacuum pump maintenance, R&D, D&D, and ER activities	Acceptable Knowledge <sup>d</sup>	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
			D027	1,4-Dichlorobenzene	7.5
			D030	2,4-Dinitrotoluene	0.13 <sup>e</sup>
			D032	Hexachlorobenzene	0.13 <sup>e</sup>
			D033	Hexachlorobutadiene	0.5
			D034	Hexachloroethane	3.0
			D042	2,4,6-Trichlorophenol	2.0
			F001	1,1,1-Trichloroethane, Trichloroethylene	NA <sup>f</sup>
			F002	Chlorobenzene <sup>h</sup> , Methylene chloride, Tetrachloroethylene <sup>h</sup> , Trichloroethylene	NA <sup>f</sup>
			F004	Cresol <sup>h</sup> , Nitrobenzene <sup>h</sup>	NA <sup>f</sup>
			F005	Toluene, Methyl ethyl ketone <sup>h</sup> , Benzene <sup>h</sup>	NA <sup>f</sup>
Organic-Contaminated Combustible Solids (continued)	Maintenance, D&D, and ER activities	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>f</sup>
			D003	Reactivity	NA <sup>f</sup>
			D007	Chromium	5.0
			D008	Lead	5.0
			D009	Mercury	0.2
			D030	2,4-Dinitrotoluene	0.13 <sup>e</sup>
			D035	Methyl ethyl ketone <sup>h</sup>	
			F001	1,1,1-Trichloroethane, Carbon tetrachloride	NA <sup>f</sup>
			F002	1,1,1-Trichloroethane, Tetrachloroethylene <sup>h</sup> , Trichloroethylene	NA <sup>f</sup>
			F003	Acetone, Ethyl Acetate, Methanol, Methyl isobutyl ketone, Xylene	NA <sup>f</sup>

Refer to footnotes at end of table.

**Table B-3 (continued)**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
Organic-Contaminated Combustible Solids (continued)			F005	Toluene, Methyl ethyl ketone <sup>h</sup> , Carbon Disulfide, Isobutanol	NA <sup>f</sup>
<b>Solid Heterogeneous Wastes (Continued)</b>					
Water-Reactive Wastes	Preparative machining and debris cleanup	Acceptable Knowledge <sup>d</sup>	D001 D003 D005 F002	Ignitability Reactivity Barium 1,1,1-Trichloroethane	NA <sup>f</sup> NA <sup>f</sup> 100.0 NA <sup>f</sup>
Mercury Wastes	Cleanup operations	Acceptable Knowledge <sup>d</sup>	D007 D008 D009 F001	Chromium Lead Mercury 1,1,1-Trichloroethane	5.0 5.0 0.2 NA <sup>f</sup>
Unused Solid Reagent Chemicals	R&D activities	Acceptable Knowledge <sup>d</sup>	D001 D002 All P- and U-listed EPA Hazardous Waste Numbers <sup>i</sup>	Ignitability Corrosivity Discarded commercial chemical products and off-specification species	NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>
<b>Liquid Wastes</b>					
Spent Solvents and Contaminated Solvent Mixtures	Extraction operations, bench-scale experimental inorganic chemistry, environmental analysis, radiochemistry; maintenance, cleaning, and degreasing activities	Acceptable Knowledge <sup>d</sup>	D001 D002 D004 D005 D007 D008 D009 D010 D011 D018 D019 D021 D022 D027 D028 D030 D032 D033 D034 D036	Ignitability Corrosivity Arsenic Barium Chromium Lead Mercury Selenium Silver Benzene Carbon tetrachloride Chlorobenzene Chloroform 1,4-Dichlorobenzene 1,2-Dichloroethane 2,4-Dinitrotoluene Hexachlorobenzene Hexachlorobutadiene Hexachloroethane Nitrobenzene	NA <sup>f</sup> NA <sup>f</sup> 5.0 100.0 5.0 5.0 0.2 1.0 5.0 0.5 0.5 100.0 6.0 7.5 0.5 0.13 <sup>g</sup> 0.13 <sup>g</sup> 0.5 3.0 2.0

**Table B-3 (continued)**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
<b>Liquid Wastes (Continued)</b>					
Spent Solvents and Contaminated Solvent Mixtures (continued)			D042	2,4,6-Trichlorophenol	2.0
			D043	Vinyl chloride	0.2
			F001	Tetrachloroethylene <sup>h</sup> , Trichloroethylene <sup>h</sup> , Methylene chloride, 1,1,1-Trichloroethane, Carbon tetrachloride, Chlorinated fluorocarbons	NA <sup>i</sup>
			F002	Tetrachloroethylene <sup>h</sup> , Trichloroethylene <sup>h</sup> , 1,1,1-Trichloroethane, 1,1,2-Trichloro-1,2,2-trifluoroethane	NA <sup>i</sup>
			F003	Xylene, Acetone, Ethyl acetate, Ethyl ether, Methyl isobutyl ketone, n-Butyl alcohol, Methanol	NA <sup>i</sup>
			F005	Toluene, Methyl ethyl ketone <sup>h</sup> , Carbon disulfide, Isobutanol, Pyridine <sup>h</sup> , Benzene	NA <sup>i</sup>
Corrosive Liquid Wastes	Radiochemistry research, plutonium-processing operations, and analytical chemistry	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>i</sup>
			D002	Corrosivity	NA <sup>i</sup>
			D007	Chromium	5.0
			D009	Mercury	0.2
			D010	Selenium	1.0
			D011	Silver	5.0
			D036	Nitrobenzene	2.0
Aqueous Liquids Contaminated with Heavy Metals	ER activities, metal polishing operations, and radiochemistry research	Acceptable Knowledge <sup>d</sup> Sampling and Analysis <sup>i</sup>	D001	Ignitability	NA <sup>i</sup>
			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

Refer to footnotes at end of table.

**Table B-3 (continued)**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
<b>Liquid Wastes (Continued)</b>					
Oil Wastes	Equipment maintenance operations	Acceptable Knowledge <sup>d</sup>	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
			D028	1,2-Dichloroethane	0.5
			F001	Tetrachloroethylene <sup>h</sup> , Trichloroethylene <sup>h</sup> , Methylene chloride, 1,1,1-Trichloroethane, Carbon tetrachloride <sup>h</sup> , Chlorinated fluorocarbons	NA <sup>f</sup>
			F002	Tetrachloroethylene <sup>h</sup> , Trichloroethylene <sup>h</sup> , 1,1,1-Trichloroethane, 1,1,2-Trichloro-1,2,2-trifluoroethane	NA <sup>f</sup>
			F003	Xylene, Acetone, Ethyl acetate, Ethyl ether, Methyl isobutyl ketone, n-Butyl alcohol, Methanol	NA <sup>f</sup>
			F005	Toluene, Methyl ethyl ketone <sup>h</sup> , Carbon disulfide, Isobutanol, Pyridine <sup>h</sup> , Benzene <sup>h</sup>	NA <sup>f</sup>
Unused Liquid Reagent Chemicals	R&D activities	Acceptable Knowledge <sup>d</sup>	D001 D002 All P- and U-listed EPA Hazardous Waste Numbers <sup>i</sup>	Ignitability Corrosivity Discarded commercial chemical products and off-specification species	NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>

Refer to footnotes at end of table.



Table B-3 (continued)  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

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

<sup>a</sup> Denotes information from the "Report for the Characterization Review of Low-Level Mixed Waste," 1995, Los Alamos National Laboratory, Los Alamos, New Mexico.  
<sup>b</sup> U.S. Environmental Protection Agency.

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 NMAC 4.1), Subpart II, Part 261, Subpart C [1-1-97].

<sup>c</sup> 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.

<sup>d</sup> Limited and/or preliminary analysis: In reference to the basis for hazardous waste classification, indicates that sampling and analysis has been performed but that the data may not be completely documented or that data may exist but may not be verifiable.

<sup>e</sup> Not applicable: Refers to the absence of regulatory limits for ignitable, corrosive, and reactive characteristic wastes and F-, P-, and U-listed wastes.

<sup>f</sup> The quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level (20 NMAC 4.1, Subpart II, 261.24, Table 1 [1-1-97]).

Process knowledge provided information that these constituents may have been used as solvents. Toxicity characteristic regulatory levels may also apply and will be evaluated.

Refers to the P- and U-listed wastes found in the Los Alamos National Laboratory, 1998, "Los Alamos National Laboratory General Part A Permit Application," Revision 0.0, Los Alamos National Laboratory, Los Alamos, New Mexico.

**Table B-4**

**Cross Reference of Matrix Parameter Codes with  
TRUCON<sup>a</sup>, IDC<sup>b</sup>, and RSWD<sup>c</sup> Codes**

Matrix Parameter Code <sup>d</sup>	TRUCON Code(s)	IDC Code(s)	RSWD Code(s)	Waste Description
S3000 (Homogeneous Solids)	LA 111/211	002 003	A75	Stabilized Inorganic Process Solids and Aqueous Waste
			A76	
			A25	
			A26	
			A29	
	LA 114/214	006	A24	Solidified Inorganic Process Solids
			A25	
			A26	
	LA 124/224	005P2S	A27	Uncemented Inorganics
			A28	
			A29	
	LA 126	006	A24	Solidified Organic Process Solids
			A25	
			A26	
			A29	
			A46	
	LA 112/212	none	A20	Absorbed Organics on Vermiculite
			A21	
			A70	
S4000 (Soils/ Gravel)	none	none	A90	Contaminated Soils
S5000 (Debris Waste)	LA 115/215	005P2G	A10	Graphite Waste
			A46	
	LA 116/216	004	A14	Combustible Waste
			A15	
			A16	
			A17	
			A18	
			A19	
			A35	
	LA 117/217	005LM	A40	
			A60	
			A30	Metal Waste
			A31	
			A41	
			A50	
			A51	
	LA 118/218	005LG	A52	
			A61	
			A80	
			A85	
			A47	Glass Waste/Noncombustible Waste
			A95	
	LA 119/219	005	A55	High-Efficiency Particulate Air Filters
			A56	
	LA 120/220	none	A80	Isotopic Source Waste
	LA 122/222	none	A36	Inorganic Solid Waste
	LA 123	005P1	A61	Lead-Lined Gloves and Metal Waste

Refer to footnotes at end of table.

**Table B-4 (continued)**

**Cross Reference of Matrix Parameter Codes with  
TRUCON<sup>a</sup>, IDC<sup>b</sup>, and RSWD<sup>c</sup> Codes**

Matrix Parameter Code <sup>d</sup>	TRUCON Code(s)	IDC Code(s)	RSWD Code(s)	Waste Description
	LA 125/225	001	A14 A19 A30 A31 A36 A40 A41 A47 A52 A55 A56 A61 A72 A74 A77	Combustible/Noncombustible Waste

<sup>a</sup> TRUCON = Transuranic Package Transporter-II (TRUPACT-II) Content

<sup>b</sup> IDC = Item Description Code

<sup>c</sup> RSWD = Radioactive Solid Waste Disposal

<sup>d</sup> Information in this column was extracted from the "TRU Waste Characterization Quality Assurance Program Plan," U.S. Department of Energy, 1994 and all approved updates, CAO-94-1010, U.S. Department of Energy, Carlsbad Area Office, Carlsbad, New Mexico.

**Table B-5**  
**Descriptions of Mixed TRU Waste Stored at LANL<sup>a</sup>**

TRUCON Codes	Waste Description	Waste Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
LA 111/211	Stabilized Inorganic Process Solids and Aqueous Waste	Plutonium (Pu)-processing operations and D&D activities	Acceptable Knowledge <sup>d</sup>	D004 D005 D006 D007 D008 D009 None	Arsenic Barium hydroxide Cadmium Chromium Lead Mercury Beryllium hydroxide	5.0 100.0 1.0 5.0 5.0 0.2 None
LA 112/212	Absorbed Organics on Vermiculite	Organics absorbed on vermiculite as a result of Pu-processing	Acceptable Knowledge <sup>d</sup>	TBD <sup>e</sup>	TBD <sup>e</sup>	TBD <sup>e</sup>
LA 114/214	Solidified 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 Pu-processing	Acceptable Knowledge <sup>d</sup>	D002 D004 D006 D007 D008 D009	Hydrofluoric acid Arsenic Cadmium Chromium Lead Mercury	NA <sup>f</sup> 5.0 1.0 5.0 5.0 0.2
LA 115/215	Graphite Waste	Discarded graphite molds, furnace equipment, and a small fraction of combustible waste generated from Pu-processing and casting operations	Acceptable Knowledge <sup>d</sup>	D004 D006 D008 None None	Arsenic Cadmium Lead Beryllium Nickel	5.0 1.0 5.0 None None
LA 116/216	Combustible Waste	Combustible solids (e.g., paper, rags, plastic, rubber) and a small fraction of noncombustible (e.g., metal scrap) generated from research and development (R&D), process and recovery, and D&D operations	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D002 D004 D005 D006 D008 D009 D019 D022 D028 D040 F002 F003 F005 None None None None None	Hydrofluoric acid Arsenic Barium Cadmium Lead Mercury Carbon tetrachloride Chloroform Dichloroethane Trichloroethylene 1,1,1-Trichloroethane Acetone Toluene Beryllium Beryllium hydroxide Bromobenzene Nickel Tributyl phosphate	NA <sup>f</sup> 5.0 100.0 1.0 5.0 0.2 0.5 6.0 0.5 0.5 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> None None None None None

<sup>a</sup>Refer to footnotes at end of table.

Table B-5 (continued)

Descriptions of Mixed TRU Waste Stored at LANL<sup>a</sup>

TRUCON Codes	Waste Description	Waste Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
LA 117/217	Metal Waste	Metal waste (e.g., motors, pumps, tools, process equipment) with a small fraction of combustible waste (e.g., plastics) generated by R&D, process and recovery, and D&D operations	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D002 D005 D008 D019 None	Hydrofluoric acid Barium Lead Carbon tetrachloride Beryllium	NA <sup>e</sup> 100.0 5.0 0.5 None
LA 118/218	Glass Waste/Noncombustible Waste	Glass waste (e.g., discarded labware, windows, bottles) with a small fraction of combustibles (e.g., plastics) generated from Pu-processing	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D002 D005 D008 D009 D019	Hydrofluoric acid Barium Lead Mercury Carbon tetrachloride	NA <sup>e</sup> 100.0 5.0 0.2 0.5
LA 119/219	High-Efficiency Particulate Air (HEPA) Filters	HEPA filters from exhaust air systems associated with Pu-processing	Acceptable Knowledge <sup>d</sup>	TBD <sup>a</sup>	TBD <sup>a</sup>	TBD <sup>a</sup>
LA 120/220	Isotopic Source Waste	R&D activities	Acceptable Knowledge <sup>d</sup>	TBD <sup>a</sup>	TBD <sup>a</sup>	TBD <sup>a</sup>
LA 122/222	Inorganic Solid Waste	Noncombustible building debris, glovebox debris, and other solid waste debris generated by R&D, process and recovery, and D&D operations	Acceptable Knowledge <sup>d</sup>	TBD <sup>a</sup>	TBD <sup>a</sup>	TBD <sup>a</sup>
LA 123	Lead-Lined Gloves and Metal Waste	Lead-lined glovebox gloves and metal waste (e.g., motors, tools, discarded metals) generated from Pu-processing	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D002 D004 D006 D008 D009 D019 None None None	Hydrofluoric acid Arsenic Cadmium Lead Mercury Carbon tetrachloride Beryllium hydroxide Bromobenzene Nickel	NA <sup>e</sup> 5.0 1.0 5.0 0.2 0.5 None None None
LA 124/224	Uncemented Inorganics	Used chloride salts from pyrochemical processes (e.g., electrolysis, molten salt extraction, salt stripping, fluoride reduction, direct oxide reduction) and a small fraction of combustible waste (e.g., plastic) generated from Pu-processing	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D004 D006 D008 D009 None None	Arsenic Cadmium Lead Mercury Beryllium hydroxide Nickel	5.0 1.0 5.0 0.2 None None
LA 125/225	Combustible/Noncombustible Waste	Metal equipment from decommissioning (e.g., gloveboxes, process equipment, ductwork); small volumes of combustibles from decommissioning, sectioning, and packaging	Acceptable Knowledge <sup>d</sup>	D006 D008	Cadmium Lead	1.0 5.0

Refer to footnotes at end of table.

Table B-5 (continued)  
**Descriptions of Mixed TRU Waste Stored at LANL<sup>a</sup>**

TRUCON Codes	Waste Description	Waste Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
LA 126	Solidified Organic Process Solids	Solidified process residues (e.g., evaporator bottoms and other discardable solutions; processed leached solids, ash, filter cakes, salts, metal oxides, fines that are immobilized in cement) generated from Pu-processing operations	Acceptable Knowledge <sup>d</sup>	D002 D004 D006 D007 D008 D009 D019 D021 D022 D028 D040 F002 None None None None None None None None None	Hydrofluoric acid Arsenic Cadmium Chromium Lead Mercury Carbon tetrachloride Chlorobenzene Chloroform Dichloroethane Trichloroethylene 1,1,1-Trichloroethane Acetone Beryllium Bromobenzene Ethanol Methanol Methylene chloride n-Butyl alcohol Toluene Xylene	NA <sup>e</sup> 5.0 1.0 5.0 5.0 0.2 0.5 100.0 6.0 0.5 0.5 NA <sup>e</sup> None None None None None None None None None None

This table is based on preliminary information from the Los Alamos National Laboratory, 1994, "Draft Transuranic Waste Stream Hazardous Material Characterization Study," Revision 0.0, Los Alamos National Laboratory, Los Alamos, New Mexico.  
U.S. Environmental Protection Agency.

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 [1-1-97].

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.

To be determined.

Not Applicable.

**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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
High Explosives (HE)-Contaminated Water with Trace Solvents and/or Metals	Laboratory analysis, HE processing, maintenance activities	Acceptable Knowledge <sup>c</sup>	D003 D005 D006 D007 D008 D009 D011 D018 D022 D030 D035 D036 D038 F002 F003 F004 F005	Reactivity Barium Cadmium Chromium Lead Mercury Silver Benzene Chloroform 2,4-Dinitrotoluene Methyl ethyl ketone Nitrobenzene Pyridine Spent halogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents	NA <sup>d</sup> 100.0 1.0 5.0 5.0 0.2 5.0 0.5 6.0 0.13 200.0 2.0 5.0 NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup>
HE-Contaminated Spent Solvent Waste	Laboratory analysis, dissolving HE and polymers	Acceptable Knowledge <sup>c</sup>	D001 D002 D003 D018 D022 D028 D030 D035 D036 D038 F002 F003 F004 F005	Ignitability Corrosivity Reactivity Benzene Chloroform 1,2-Dichloroethane 2,4-Dinitrotoluene Methyl ethyl ketone Nitrobenzene Pyridine Spent halogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents	NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> 0.5 6.0 0.5 0.13 200.0 2.0 5.0 NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup>
HE-Contaminated Water	Pressure-washing walls, equipment, and floors; water-cooled HE-machining operations	Acceptable Knowledge <sup>c</sup>	D003 D030	Reactivity 2,4-Dinitrotoluene	NA <sup>d</sup> 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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
HE-Contaminated Used Oil	HE-machining operations	Acceptable Knowledge <sup>c</sup>	D003 D005 D006 D007 D008 D030	Reactivity Barium Cadmium Chromium Lead 2,4-Dinitrotoluene	NA <sup>d</sup> 100.0 1.0 5.0 5.0 0.13
Solid and Scrap HE	Off-specification or obsolete HE from machining and forming processes; discrete pieces of HE from research and development (R&D) and testing operations	Acceptable Knowledge <sup>c</sup>	D001 D003 D005 D030	Ignitability Reactivity Barium 2,4-Dinitrotoluene	NA <sup>d</sup> NA <sup>d</sup> 100.0 0.13
HE-Contaminated Environmental Restoration (ER) Soil and/or Debris	Waste generated during ER and decontamination and decommissioning (D&D) activities; investigation-derived waste (personal protective equipment, samples, and sampling equipment)	Acceptable Knowledge <sup>c</sup>	D003 D005 D006 D007 D008 D009 D011 D018 D022 D030 D035 D038 D036 F002 F003 F004 F005	Reactivity Barium Cadmium Chromium Lead Mercury Silver Benzene Chloroform 2,4-Dinitrotoluene Methyl ethyl ketone Pyridine Nitrobenzene Spent halogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents	NA <sup>d</sup> 100.0 1.0 5.0 5.0 0.2 5.0 0.5 6.0 0.13 200.0 2.0 5.0 NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup>

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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
HE-Contaminated Commercial Chemical Products	Spilled or off-specification products that become contaminated with HE	Acceptable Knowledge <sup>c</sup>	U022	Acetone	NA <sup>d</sup>
			U019	Benzene	NA <sup>d</sup>
			U044	Chloroform	NA <sup>d</sup>
			U112	Ethyl acetate	NA <sup>d</sup>
			U154	Methanol	NA <sup>d</sup>
			U159	Methyl ethyl ketone	NA <sup>d</sup>
			U196	Pyridine	NA <sup>d</sup>
			U169	Nitrobenzene	NA <sup>d</sup>
			U220	Toluene	NA <sup>d</sup>
			U239	Xylene	NA <sup>d</sup>
Wastewater Treatment Residues	Sludges, spent activated carbon, and filter solids resulting from HE wastewater filtration	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>
			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
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			F002	Spent halogenated solvents	NA <sup>d</sup>
			F003	Spent nonhalogenated solvents	NA <sup>d</sup>
			F004	Spent nonhalogenated solvents	NA <sup>d</sup>
			F005	Spent nonhalogenated solvents	NA <sup>d</sup>
			K044	Wastewater sludges	NA <sup>d</sup>
			K045	Spent carbon	NA <sup>d</sup>

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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
HE-Contaminated Solid Waste	HE processing activities and general office and laboratory use	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>
			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
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			F002	Spent halogenated solvents	NA <sup>d</sup>
			F003	Spent nonhalogenated solvents	NA <sup>d</sup>
HE-Contaminated Equipment	HE processing, D&D, and ER activities	Acceptable Knowledge <sup>c</sup>	F004	Spent nonhalogenated solvents	NA <sup>d</sup>
			F005	Spent nonhalogenated solvents	NA <sup>d</sup>
			D003	Reactivity	NA <sup>d</sup>
			D005	Barium	100.0
			D006	Cadmium	1.0
			D007	Chromium	5.0
			D008	Lead	5.0
HE-Contaminated Waste Rags, Wipes, and Other Combustibles	HE processing, (e.g., hydraulic press operations, laboratory analysis)	Acceptable Knowledge <sup>c</sup>	D009	Mercury	0.2
			D011	Silver	5.0
			D030	2,4-Dinitrotoluene	0.13
			D001	Ignitability	NA <sup>d</sup>
			D002	Corrosive	NA <sup>d</sup>
			D003	Reactivity	NA <sup>d</sup>
			F003	Spent nonhalogenated solvents	NA <sup>d</sup>

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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
HE-Contaminated Liquid Acids, Bases, and/or Inorganic Salt Solutions	Materials used as titrants, solvents, and cleaning fluids and material from hydrolysis research	Acceptable Knowledge <sup>c</sup>	D002 D003 D018 D022 D030 D035 D036 D038 F002 F003 F004 F005	Corrosivity Reactivity Benzene Chloroform 2,4-Dinitrotoluene Methyl ethyl ketone Nitrobenzene Pyridine Spent halogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents	NA <sup>d</sup> NA <sup>d</sup> 0.5 6.0 0.13 200.0 2.0 5.0 NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup>
Liquid Process Explosive Waste	Off-specification or obsolete HE from explosives preparation, R&D, and testing operations	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>

- <sup>a</sup> U.S. Environmental Protection Agency. Note that these constituents will likely be present only in trace amounts.
- <sup>b</sup> 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 [1-1-97]. 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.
- <sup>c</sup> 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.
- <sup>d</sup> 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**

<b>Waste Description</b>	<b>Waste Generating Activity</b>	<b>Basis for Hazardous Waste Designation</b>	<b>Potential EPA<sup>a</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>b</sup> (milligrams per liter)</b>
Solid/Scrap Process Explosive Waste	Off-specification or obsolete from machining, forming, and preparation of HE; discrete pieces of HE from research and development (R&D) and testing operations	Acceptable Knowledge <sup>c</sup>	D003 D003 D005 D006 D007 D008 D009 D010 D011 D030	Reactivity Lithium Hydride Barium Cadmium Chromium Lead Mercury Selenium Silver 2,4-Dinitrotoluene	NA <sup>d</sup> NA <sup>d</sup> 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.13
Liquid Process Explosive Waste	Off-specification or obsolete HE from explosives preparation, R&D, and testing operations	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>

- <sup>a</sup> U.S. Environmental Protection Agency. Note that these constituents will likely be present only in trace amounts.
- <sup>b</sup> 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 [1-1-97]. 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.
- <sup>c</sup> 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.
- <sup>d</sup> 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 Off-Site Waste Received at LANL**

<b>Off-Site Waste Generating Facility</b>	<b>Waste Description</b>	<b>Waste-Generating Activity</b>	<b>Basis for Hazardous Waste Designation</b>	<b>Potential EPA Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>
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**

<b>Waste Description<sup>a</sup></b>	<b>Parameters<sup>b</sup></b>	<b>Characterization Methods</b>	<b>Rationale</b>
Spent Solvents	<ul style="list-style-type: none"> <li>- Flash point (for liquid waste)</li> <li>- pH (for liquid waste)</li> <li>- RCRA<sup>c</sup>-regulated metals</li> <li>- Volatile organic compounds (VOC)</li> <li>- Semivolatile organic compounds (SVOC)</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> <li>- Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability, corrosivity, reactivity, and toxicity</li> <li>- Determine concentration of F-listed solvents</li> </ul>
Contaminated Solid Wastes	<ul style="list-style-type: none"> <li>- RCRA<sup>c</sup>-regulated metals</li> <li>- VOCs</li> <li>- SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability, reactivity, and toxicity</li> <li>- Determine concentration of F-listed solvents</li> </ul>
Paint and Related Wastes	<ul style="list-style-type: none"> <li>- Flash point (for liquid waste)</li> <li>- RCRA<sup>c</sup>-regulated metals</li> <li>- VOCs</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> <li>- Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability and toxicity</li> <li>- Determine concentration of F-listed solvents</li> </ul>
Photographic and Photocopier Wastes	<ul style="list-style-type: none"> <li>- Flash point (for liquid waste)</li> <li>- pH (for liquid waste)</li> <li>- RCRA<sup>c</sup>-regulated metals</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> <li>- Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability, corrosivity, and toxicity</li> </ul>
Corrosive Liquid Wastes	<ul style="list-style-type: none"> <li>- Flash point (for liquid waste)</li> <li>- pH (for liquid waste)</li> <li>- RCRA<sup>c</sup>-regulated metals</li> <li>- VOCs</li> <li>- SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> <li>- Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability, corrosivity, and toxicity</li> <li>- Determine concentration of F-listed solvents</li> </ul>
D Metals and metallic Compounds	<ul style="list-style-type: none"> <li>- RCRA<sup>c</sup>-regulated metals</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> <li>- Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability, reactivity, and toxicity</li> </ul>
Contaminated Noncorrosive Aqueous and Nonaqueous Solutions and Sludges	<ul style="list-style-type: none"> <li>- Flash point</li> <li>- RCRA<sup>c</sup>-regulated metals</li> <li>- VOCs</li> <li>- SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> <li>- Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability, reactivity, and toxicity</li> <li>- Determine concentration of F-listed solvents</li> </ul>
Mercury Wastes	<ul style="list-style-type: none"> <li>- RCRA<sup>c</sup>-regulated metal</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> <li>- Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for toxicity</li> <li>- Determine the presence of a U-listed unused commercial chemical product</li> </ul>
Used Batteries and Battery Fluids	<ul style="list-style-type: none"> <li>- pH (for liquid waste)</li> <li>- RCRA<sup>c</sup>-regulated metals</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for corrosivity and toxicity</li> </ul>
Unused/Off-specification Commercial Chemical Products	<ul style="list-style-type: none"> <li>- Flash point (for liquid waste)</li> <li>- pH (for liquid waste)</li> <li>- RCRA<sup>c</sup>-regulated metals</li> <li>- VOCs</li> <li>- SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> <li>- Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability, corrosivity, reactivity, and toxicity</li> <li>- Determine presence of P-listed or U-listed unused commercial chemical products</li> </ul>
Gas Cylinder Waste	<ul style="list-style-type: none"> <li>- RCRA<sup>c</sup>-regulated metals</li> <li>- VOCs</li> <li>- SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability, corrosivity, and reactivity</li> <li>- Determine presence of D-coded and U- and P-listed wastes</li> </ul>
Environmental Restoration Soils and Sludges	<ul style="list-style-type: none"> <li>- RCRA<sup>c</sup>-regulated metals</li> <li>- VOCs</li> <li>- SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability, reactivity, and toxicity</li> <li>- Determine concentration of F-listed solvents</li> </ul>

<sup>a</sup> to footnotes at end of table.

**Table B-9 (continued)**

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

Waste Description <sup>a</sup>	Parameters <sup>b</sup>	Characterization Methods	Rationale
Environmental Restoration Aqueous Liquids	<ul style="list-style-type: none"> <li>- pH</li> <li>- RCRA<sup>c</sup>-regulated metals</li> <li>- VOCs</li> <li>- SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability, corrosivity, reactivity, and toxicity</li> <li>- Determine concentration of F-listed solvents</li> </ul>
Environmental Restoration Debris	<ul style="list-style-type: none"> <li>- RCRA<sup>c</sup>-regulated metals</li> <li>- VOCs</li> <li>- SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable Knowledge<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability, reactivity, and toxicity</li> <li>- Determine concentration of F-listed solvents</li> </ul>

<sup>a</sup> Information contained in this column is from the Los Alamos National Laboratory Waste Profile Form database.

<sup>b</sup> Parameter selection is based on acceptable knowledge for each waste stream. Additional parameters may be selected for each waste stream as necessary.

<sup>c</sup> 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 [1-1-97].

<sup>d</sup> 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 <sup>a</sup>	Parameter <sup>b</sup>	Characterization Method	Rationale
<b>Solid Homogeneous Wastes</b>			
Soils with Heavy Metals	- RCRA-regulated metals <sup>c</sup>	- Acceptable Knowledge <sup>d</sup> - Sample and analyze randomly selected drums in waste stream	- Determine toxicity characteristic
Environmental Restoration Soils	- RCRA-regulated metals <sup>c</sup> - VOCs	- Acceptable Knowledge <sup>d</sup> - Sample and analyze randomly selected drums in waste stream	- Determine presence of F-listed solvents - Determine toxicity characteristic
Inorganic Solid Oxidizers	- RCRA-regulated metals <sup>c</sup>	- Acceptable Knowledge <sup>d</sup> - Sample and analyze randomly selected drums in waste stream	- Determine toxicity characteristic - Determine characteristic for ignitability and reactivity
<b>Solid Heterogeneous Wastes</b>			
Lead for Surface Decontamination	- RCRA-regulated metals <sup>c</sup>	- Acceptable Knowledge <sup>d</sup>	- Determine toxicity characteristic
Other Lead Wastes	- RCRA-regulated metals <sup>c</sup>	- Acceptable Knowledge <sup>d</sup>	- Determine characteristic for reactivity - Determine toxicity characteristic
Noncombustible Debris	- RCRA-regulated metals <sup>c</sup>	- Acceptable Knowledge <sup>d</sup>	- Determine toxicity characteristic - Determine characteristic for ignitability and reactivity
Combustible Debris	- RCRA-regulated metals <sup>c</sup> - VOCs	- Acceptable Knowledge <sup>d</sup>	- Determine toxicity characteristic - Determine presence of F-listed solvents - Determine characteristic for ignitability and reactivity
Organic-Contaminated Noncombustible Solids	- RCRA-regulated metals <sup>c</sup> - VOCs	- Acceptable Knowledge <sup>d</sup>	- Determine toxicity characteristic - Determine presence of F-listed solvents
Organic-Contaminated Combustible Solids	- RCRA-regulated metals <sup>c</sup> - VOCs	- Acceptable Knowledge <sup>d</sup>	- Determine characteristic for ignitability and reactivity - Determine toxicity characteristic - Determine presence of F-listed solvents
Water-Reactive Wastes	- RCRA-regulated metals <sup>c</sup> - VOCs	- Acceptable Knowledge <sup>d</sup>	- Determine toxicity characteristic - Determine characteristic for ignitability and reactivity - Determine presence of F-listed solvents

or 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 <sup>a</sup>	Parameter <sup>b</sup>	Characterization Method	Rationale
<b>Solid Heterogeneous Wastes (Continued)</b>			
Mercury Wastes	- RCRA-regulated metals <sup>c</sup> - VOCs	- Acceptable Knowledge <sup>d</sup>	- Determine toxicity characteristic - Determine presence of F-listed solvents
Unused Solid Reagent Chemicals	- RCRA-regulated metals <sup>c</sup>	- Acceptable Knowledge <sup>d</sup>	- Determine characteristic for ignitability and corrosivity - Determine the presence of P- and U-listed unused commercial chemical product
<b>Liquid Wastes</b>			
Spent Solvents and Contaminated Solvent Mixtures	- Flash point - pH - RCRA-regulated metals <sup>c</sup> - VOCs - SVOCs	- Acceptable Knowledge <sup>d</sup> - 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 <sup>c</sup> - SVOCs	- Acceptable Knowledge <sup>d</sup> - Sampling and Analysis	- Determine characteristic for ignitability, corrosivity, and toxicity - Determine concentration of F-listed solvents
Aqueous Liquids Contaminated with Heavy Metals	- Flash point - RCRA-regulated metals <sup>c</sup>	- Acceptable Knowledge <sup>d</sup> - Sampling and Analysis	- Determine characteristic for ignitability and toxicity
Oil Wastes	- RCRA-regulated metals <sup>c</sup> - VOCs - SVOCs	- Acceptable Knowledge <sup>d</sup> - Sampling and analysis	- Determine characteristic for toxicity - Determine concentration of F-listed solvents
Unused Liquid Reagent Chemicals	- Flash point - pH	- Acceptable Knowledge <sup>d</sup>	- Determine characteristic for ignitability and corrosivity - Determine the presence of P- and U-listed unused commercial chemical product
<b>Gas Wastes</b>			
Gas Cylinder Waste	- RCRA <sup>c</sup> -regulated metals - VOCs - SVOCs	- Acceptable Knowledge <sup>d</sup>	- Determine characteristic for ignitability, corrosivity, and reactivity - Determine presence of D-coded and P- and U-listed waste

<sup>a</sup> 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.

<sup>b</sup> Parameter selection is based on acceptable knowledge for each waste stream. Additional parameters may be selected for each waste stream as necessary.

<sup>c</sup> 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 [1-1-97].

<sup>d</sup> Acceptable knowledge is broadly defined as process knowledge, additional characterization data, and/or facility records of analysis, Environmental Protection Agency, 1994, "Waste Analysis at Facilities that Generate, Treat, Store, and Dispose of Hazardous Waste, A Guide 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 TRU Waste**

Matrix Parameter <sup>a</sup> Code/Description	Waste Description	Parameters	Characterization Methods	Rationale
<b>Storage</b>				
S3000—Homogeneous Solids	<ul style="list-style-type: none"> <li>- Solidified aqueous waste (e.g., concreted/cemented aqueous waste)</li> <li>- Solidified aqueous waste (e.g., dewatered sludge and chemical treatment sludge)</li> <li>- Solidified inorganic/organic process solids and liquids</li> </ul>	<ul style="list-style-type: none"> <li>- Free liquids in waste matrix</li> <li>- Physical form of the waste</li> </ul>	<ul style="list-style-type: none"> <li>- Visual examination</li> <li>- Real-time radiography (RTR)</li> <li>- Acceptable Knowledge<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>- Verify physical waste form</li> <li>- No free liquids allowed</li> </ul>
		<ul style="list-style-type: none"> <li>- Resource Conservation and Recovery Act (RCRA)-regulated metals</li> </ul>	<ul style="list-style-type: none"> <li>- Sample and analyze statistically selected number of drums in waste stream</li> </ul>	<ul style="list-style-type: none"> <li>- Determine toxicity characteristic</li> <li>- Determine concentration of metals</li> </ul>
		<ul style="list-style-type: none"> <li>- Volatile organic compounds (VOC) in container headspace gas</li> </ul>	<ul style="list-style-type: none"> <li>- Gas chromatography/mass spectrometry</li> <li>- Fourier transform infrared spectrometry</li> <li>- Gas chromatography/Flame ionization detector</li> </ul>	<ul style="list-style-type: none"> <li>- Qualitative screening to confirm the presence of VOCs</li> </ul>
S4000—Soils/Gravels	<ul style="list-style-type: none"> <li>- Contaminated soil</li> </ul>	<ul style="list-style-type: none"> <li>- Free liquids in waste matrix</li> <li>- Physical form of the waste</li> </ul>	<ul style="list-style-type: none"> <li>- Visual examination</li> <li>- RTR</li> <li>- Acceptable Knowledge<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>- Verify physical waste form</li> <li>- No free liquids allowed</li> </ul>
		<ul style="list-style-type: none"> <li>- RCRA-regulated metals</li> </ul>	<ul style="list-style-type: none"> <li>- Sample and analyze statistically selected number of drums in waste stream</li> </ul>	<ul style="list-style-type: none"> <li>- Determine toxicity characteristic</li> <li>- Determine concentration of metals</li> </ul>
		<ul style="list-style-type: none"> <li>- VOC in container headspace gas</li> </ul>	<ul style="list-style-type: none"> <li>- Gas chromatography/mass spectrometry</li> <li>- Fourier transform infrared spectrometry</li> <li>- Gas chromatography/Flame ionization detector</li> </ul>	<ul style="list-style-type: none"> <li>- Qualitative screening to confirm the presence of VOCs</li> </ul>
S5000—Debris Waste	<ul style="list-style-type: none"> <li>- Mixed metal scrap and incidental combustibles</li> <li>- Combustible waste</li> <li>- Graphite waste</li> <li>- Metal waste</li> <li>- Glass waste</li> </ul>	<ul style="list-style-type: none"> <li>- Free liquids</li> <li>- Physical form of the waste</li> <li>- VOCs in container headspace gas</li> <li>- VOCs and semivolatile organic compounds</li> </ul>	<ul style="list-style-type: none"> <li>- Visual examination</li> <li>- RTR</li> <li>- Acceptable Knowledge<sup>b</sup></li> <li>- Acceptable Knowledge<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>- Verify physical waste form</li> <li>- No free liquids allowed</li> <li>- Determine compliance with land disposal restrictions (LDR) treatment standards, if applicable</li> </ul>
	<ul style="list-style-type: none"> <li>- Lead-rubber and metal waste</li> <li>- High-efficiency particulate air filters</li> <li>- Noncombustible waste</li> <li>- Mixed combustible/noncombustible waste</li> </ul>	<ul style="list-style-type: none"> <li>- RCRA-regulated metals</li> </ul>	<ul style="list-style-type: none"> <li>- Gas chromatography/mass spectrometry</li> <li>- Fourier transform infrared spectrometry</li> <li>- Gas chromatography/Flame ionization detector</li> <li>- Acceptable Knowledge<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>- Qualitative screening to confirm the presence of VOC</li> <li>- Determine compliance with LDR treatment standards, if applicable</li> </ul>

<sup>a</sup>Refer to footnotes at end of table.

Table B-11 (continued)

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

Matrix Parameter <sup>a</sup> Code/Description	Waste Description	Parameters	Characterization Methods	Rationale
<b>Treatment</b>				
L1000—Aqueous Liquids/Slurries	<ul style="list-style-type: none"> <li>- Inorganic process solids and liquids</li> <li>- Organic process solids and liquids</li> </ul>	- Physical form of the waste	<ul style="list-style-type: none"> <li>- Visual examination</li> <li>- Acceptable Knowledge<sup>b</sup></li> </ul>	- Verify physical waste form
S3000—Homogeneous Solids		- RCRA-regulated metals	- Sampling and Analysis	<ul style="list-style-type: none"> <li>- Determine toxicity characteristic</li> <li>- Determine concentration of metals</li> </ul>

<sup>a</sup> Information in this column was extracted from the U.S. Department of Energy, 1994, "TRU Waste Characterization Quality Assurance Program Plan," CAO-94-1010, U.S. Department of Energy, Carlsbad Area Office, Carlsbad, New Mexico.

<sup>b</sup> 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**

<b>Waste Description</b>	<b>Parameter<sup>a</sup></b>	<b>Characterization Method</b>	<b>Rationale</b>
HE-Contaminated Water, with Trace Solvents and/or Metals	<ul style="list-style-type: none"> <li>- Reactivity</li> <li>- Toxicity</li> <li>- Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for reactivity</li> <li>- Determine toxicity characteristic (metals and organics)</li> <li>- Determine the presence of F-listed solvents</li> </ul>
HE-Contaminated Spent Solvent Waste	<ul style="list-style-type: none"> <li>- Corrosivity</li> <li>- Ignitability</li> <li>- Reactivity</li> <li>- Toxicity</li> <li>- Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for ignitability, corrosivity, and reactivity</li> <li>- Determine toxicity characteristic (organics)</li> <li>- Determine the presence of F-listed solvents</li> </ul>
HE-Contaminated Water	<ul style="list-style-type: none"> <li>- Reactivity</li> <li>- Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for reactivity</li> <li>- Determine toxicity characteristic (dinitrotoluene)</li> </ul>
HE-Contaminated Used Oil	<ul style="list-style-type: none"> <li>- Reactivity</li> <li>- Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for reactivity</li> <li>- Determine toxicity characteristic (metals and dinitrotoluene)</li> </ul>
Solid and Scrap HE	<ul style="list-style-type: none"> <li>- Reactivity</li> <li>- Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for reactivity</li> <li>- Determine toxicity characteristic (barium and dinitrotoluene)</li> </ul>
HE-Contaminated Environmental Restoration Soil and/or Debris	<ul style="list-style-type: none"> <li>- Reactivity</li> <li>- Toxicity</li> <li>- Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>- Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>- Determine characteristic for reactivity</li> <li>- Determine toxicity characteristic (organics and metals)</li> <li>- Determine the presence of F-listed solvents</li> </ul>

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**

<b>Waste Description</b>	<b>Parameter<sup>a</sup></b>	<b>Characterization Method</b>	<b>Rationale</b>
HE-Contaminated Commercial Chemical Products	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Spill residues from commercial products</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine the presence of U-listed wastes</li> </ul>
Wastewater Treatment Residues	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> <li>Solvents from non-specific sources</li> <li>Specific source wastes (K wastes)</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine toxicity characteristic (organics and metals)</li> <li>Determine the presence of F- and K- listed solvents</li> </ul>
HE-Contaminated Solid Waste	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> <li>Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine toxicity characteristic (organics and metals)</li> <li>Determine the presence of F-listed solvents</li> </ul>
HE-Contaminated Equipment	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine toxicity characteristic (dinitrotoluene and metals)</li> </ul>
HE-Contaminated Rags, Wipes, and Other Combustibles	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> <li>Corrosivity</li> <li>Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for ignitability, corrosivity, and reactivity</li> <li>Determine the presence of F-listed solvents</li> </ul>
HE-Contaminated Liquid Acids, Bases, and/or Inorganic Salt Solutions	<ul style="list-style-type: none"> <li>Corrosivity</li> <li>Reactivity</li> <li>Toxicity</li> <li>Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for corrosivity and reactivity</li> <li>Determine toxicity characteristic (organics)</li> <li>Determine the presence of F-listed solvents</li> </ul>
Liquid Process Explosive Waste	<ul style="list-style-type: none"> <li>Ignitability</li> <li>Corrosivity</li> <li>Reactivity</li> <li>Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristics for ignitability, corrosivity, and reactivity</li> <li>Determine toxicity characteristic</li> </ul>

<sup>a</sup> Parameter selection is based on process knowledge for each waste stream. Additional parameters may be selected for each waste stream as necessary.

<sup>b</sup> 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

Recommended Sample Containers<sup>a</sup>, Preservation Techniques, and Holding Times<sup>b</sup>

Analyte Class and Sample Type	Container	Preservative	Holding Time
<b>Volatile Organics</b>			
<u>Concentrated Waste Samples:</u>	Method 5035: 40-milliliter (mL) vials with stirring bar. Method 5021: See method. Methods 5031 & 5032: 125-mL WM <sup>c</sup> -G <sup>d</sup> . Use Teflon-lined lids for all procedures.	Cool to 4° degrees Celsius (°C) <sup>e</sup>	14 days
<u>Aqueous Samples:</u>			
No Residual Chlorine Present	Methods 5030, 5031, & 5032: 2 x 40-mL vials with Teflon-lined septum caps.	Cool to 4°C and adjust pH <sup>f</sup> to less than 2 with H <sub>2</sub> SO <sub>4</sub> , HCl, or solid NaHSO <sub>4</sub>	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 4°C and adjust pH to less than 2 with H <sub>2</sub> SO <sub>4</sub> , HCl, or solid NaHSO <sub>4</sub>	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 4°C	14 days
<u>Soil/Sediments and Sludges:</u>	Method 5035: 40-mL vials with stirring bar. Method 5021: See method. Methods 5031 & 5032: 125-mL WM <sup>c</sup> -G <sup>d</sup> . Use Teflon-lined lids for all procedures.	See the individual method	14 days

Refer to footnotes at end of table.

Table B-13 (continued)

Recommended Sample Containers<sup>a</sup>, Preservation Techniques, and Holding Times<sup>b</sup>

Analyte Class and Sample Type	Container	Preservative	Holding Time
<b>Semivolatile Organics/Organochlorine Pesticides and Herbicides</b>			
<u>Concentrated Waste Samples:</u>	125 mL WM <sup>c</sup> -G <sup>d</sup> with Teflon <sup>™</sup> -lined lid	None	Samples must be extracted within 14 days and analyzed within 40 days following extraction.
<u>Soil/Sediments and Sludges:</u>	250 mL WM <sup>c</sup> -G <sup>d</sup> with Teflon <sup>™</sup> -lined lid	Cool to 4°C	Samples must be extracted within 14 days and analyzed within 40 days following extraction.
<u>Liquid Samples:</u>			
No Residual Chlorine Present	1-gallon (gal.), 2 x 0.5 gal., or 4 x 1 liter (L) AG <sup>9</sup> container with Teflon <sup>™</sup> -lined lid	Cool to 4°C	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 <sup>9</sup> with Teflon <sup>™</sup> -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 4°C.	Samples must be extracted within 7 days and extracts analyzed within 40 days following extraction
<b>Metals</b>			
<u>Aqueous Samples:</u>			
Metals (except hexavalent chromium and mercury)	1-L P <sup>h</sup> or G <sup>d</sup>	Add nitric acid to adjust pH to less than 2.	180 days
Hexavalent chromium	500-mL P <sup>h</sup> or G <sup>d</sup>	Cool to 4°C	24 hours
Mercury	500-mL P <sup>h</sup> or G <sup>d</sup>	Add nitric acid to adjust pH to less than 2.	28 days
<u>Soil/Sediments and Sludges:</u>			
Metals (except hexavalent chromium and mercury)	500-mL WM <sup>c</sup> -P <sup>h</sup> or G <sup>d</sup>	Cool to 4°C	180 days
Hexavalent chromium	500-mL WM <sup>c</sup> -P <sup>h</sup> or G <sup>d</sup>	Cool to 4°C	Not established - analyze as soon as possible.
Mercury	500-mL WM <sup>c</sup> -P <sup>h</sup> or G <sup>d</sup>	Cool to 4°C	28 days

Refer to footnotes at end of table.

**Table B-13 (continued)**

**Recommended Sample Containers<sup>a</sup>, Preservation Techniques, and Holding Times<sup>b</sup>**

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



**Table B-14**

**Summary of Characterization Methods for Hazardous Waste**

Parameter <sup>a</sup>	Method Numbers	Test Methods	Rationale
Volatile organic compounds (VOC) in waste matrix:  Spent halogenated solvents  Spent nonhalogenated solvents	ASTM Method D4547-91 <sup>a</sup> U.S. EPA/540/4-91/001 <sup>b</sup>  SW-846 (1311, 8260B, 8275A) <sup>c</sup> or equivalent methods <sup>d</sup>	Total and/or toxicity characteristic leaching procedure (TCLP)  VOC analysis by gas chromatography/mass spectrometry (GC/MS)  SVOC analysis by thermal extraction/gas chromatography/mass spectrometry (TE/GC/MS)  Acceptable Knowledge <sup>i</sup>	Determine total and/or TCLP and SVOC/VOC concentration in samples of solids or liquids
Semivolatile organic compounds (SVOC) in waste:	SW-846 (1311 and 8270C) <sup>c,*</sup> or equivalent methods <sup>d</sup>	Total or TCLP  SVOC analysis by GC/MS  Acceptable Knowledge <sup>i</sup>	Determine total and/or TCLP and SVOC concentration in samples of solids or liquids
Metals in waste:  Arsenic Barium Cadmium Chromium  Copper Lead Mercury Manganese Nickel Silver	SW-846  (1311, 6010B, 7060A <sup>f</sup> , 7061A) <sup>c</sup> (1311, 6010B, 7080A <sup>g</sup> , 7081 <sup>h</sup> ) <sup>c</sup> (1311, 6010B, 7130 <sup>g</sup> , 7131A) <sup>c</sup> (1311, 6010B, 7190 <sup>g</sup> , 7191 <sup>h</sup> ) <sup>c</sup> (1311, 6010B, 7420 <sup>g</sup> , 7421 <sup>h</sup> ) <sup>c</sup> (1311, 7470B, 7471A, 7472 <sup>h</sup> ) <sup>c</sup> (1311, 6010B, 7740 <sup>f</sup> , 7741A, 7742 <sup>h</sup> ) <sup>c</sup> (1311, 6010B, 7760A <sup>g</sup> , 7761 <sup>h</sup> ) <sup>c</sup> or equivalent methods <sup>d</sup>	Total and/or TCLP  Inductively-coupled plasma atomic emission spectroscopy  Atomic absorption  Manual cold vapor atomic absorption  Anodic stripping voltammetry  Acceptable Knowledge <sup>i</sup>	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 <sup>h</sup> SW-846 (9030B, 9031, 9034) <sup>c</sup> or equivalent methods <sup>d</sup>	Colorimetric, titrametric, or spectrophotometric measurement of hydrogen sulfide released from waste following reflux distillation under acidic conditions	Determine concentration of reactive sulfides
Ignitability	SW-846 (1010, 1020, 1030) <sup>c</sup> or equivalent methods <sup>d</sup>	Pensky-Martens closed cup  Setaflash closed cup  Ignitability of solids	Determine ignitability
pH	SW-846 (9040B, 9041A, 9045C) <sup>c</sup> or equivalent methods <sup>d</sup>	pH electrometric measurement  pH paper  Soil and waste pH	Determine corrosivity

Table B-14 (continued)

Summary of Characterization Methods for Hazardous Waste

- <sup>a</sup> 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.
- <sup>b</sup> U.S. Environmental Protection Agency, 1991, "Soil Sampling and Analysis for Volatile Organic Compounds," EPA 154014-91001, Office of Research and Development
- <sup>c</sup> U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846.
- <sup>d</sup> Equivalent methods subject to EPA approval may be substituted.
- <sup>e</sup> Method being revised per the January 1998 SW-846 Draft Update IVA.
- <sup>f</sup> Method being integrated into Method 7000B, per the January 1998 SW-846 Draft Update IVA.
- <sup>g</sup> Method being integrated into Method 7010, per the January 1998 SW-846 Draft Update IVA.
- <sup>h</sup> SW-846, Section 7.3.4.2 contains specialized methods to determine if a sulfide-containing waste exhibits the reactivity characteristic.
- <sup>i</sup> 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**

**Summary of Characterization Methods for Mixed Low-Level Waste**

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

Refer footnotes at end of table.

**Table B-15 (continued)**

**Summary of Characterization Methods for Mixed Low-Level Waste**

Parameter	Method Numbers	Test Method	Rationale
<b>Liquid Wastes (Continued)</b>			
Ignitability	SW-846 (1010 and 1020A) <sup>c</sup> or equivalent methods <sup>d</sup>	Pensky-Martens closed cup	Determine ignitability
		Setaflash closed cup	

- <sup>a</sup> 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.
- <sup>b</sup> U.S. Environmental Protection Agency, 1991, "Soil Sampling and Analysis for Volatile Organic Compounds," EPA 154014-91991, Office of Research and Development.
- <sup>c</sup> U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846.
- <sup>d</sup> Equivalent methods, subject to EPA approval, may be substituted.
- <sup>e</sup> Method being revised per the January 1998 SW-846 Draft Update IVA.
- <sup>f</sup> Method being integrated into Method 7000B, per the January 1998 SW-846 Draft Update IVA.
- <sup>g</sup> Method being integrated into Method 7010, per the January 1998 SW-846 Draft Update IVA.
- <sup>h</sup> 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-16**

**Summary of Characterization Methods for Mixed TRU Waste**

Parameter	Method Numbers	Test Methods	Rationale
<b>Storage</b>			
Physical Waste Form		Waste inspection procedures Visual examination Acceptable Knowledge <sup>h</sup>	Verify waste container contents
Volatile organic compounds (VOC) in waste matrix:  Spent halogenated solvents  Spent nonhalogenated solvents	ASTM Method D4547-91 <sup>a</sup> U.S. EPA/540/4-91/001 <sup>b</sup>  SW-846 (1311, 8260B, 8275A) <sup>c</sup> or equivalent methods <sup>d</sup>	Total and/or toxicity characteristic leaching procedure (TCLP)  VOC analysis by gas chromatography/mass spectrometry (GC/MS)  SVOC analysis by thermal extraction/gas chromatography/mass spectrometry (TE/GC/MS)  Acceptable Knowledge <sup>h</sup>	Determine the presence or absence of VOC in samples
Semivolatile organic compounds (SVOC) in waste	SW-846 (1311 and 8270C) <sup>c,e</sup> or equivalent methods <sup>d</sup>	Total and/or TCLP SVOC analysis by GC/MS Acceptable Knowledge <sup>h</sup>	Determine the presence or absence of SVOC in samples
Metals in waste:  Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	SW-846  (1311, 6010B, 7060A <sup>f</sup> , 7061A) <sup>c</sup> (1311, 6010B, 7080A <sup>g</sup> , 7081) <sup>c</sup> (1311, 6010B, 7130 <sup>g</sup> , 7131A) <sup>c</sup> (1311, 6010B, 7190 <sup>g</sup> , 7191) <sup>c</sup> (1311, 6010B, 7420 <sup>g</sup> , 7421) <sup>c</sup> (1311, 7470B, 7471A, 7472) <sup>c</sup> (1311, 6010B, 7740 <sup>i</sup> , 7741A, 7742) <sup>c</sup> (1311, 6010B, 7760A <sup>g</sup> , 7761) <sup>c</sup> or equivalent methods <sup>d</sup>	Total and/or TCLP  Inductively-coupled plasma atomic emission spectroscopy  Atomic absorption  Manual cold vapor atomic absorption  Anodic stripping voltammetry Acceptable Knowledge <sup>h</sup>	Determine total and/or TCLP concentration in samples
Ignitability	SW-846 (1010, 1020A, 1030) <sup>c</sup> or equivalent methods <sup>d</sup>	Pensky-Martens closed cup Setaflash closed cup Ignitability of Solids	Determine ignitability
pH	SW-846 (9040B, 9041A, 9045C) <sup>c</sup> or equivalent methods <sup>d</sup>	pH electrometric measurement pH paper Soil and waste pH	Determine corrosivity
<b>Treatment</b>			
Physical Waste Form		Waste inspection procedures Visual examination Acceptable Knowledge <sup>h</sup>	Verify waste container contents

Refer to footnotes at end of table.

Table B-16 (continued)

Summary of Characterization Methods for Mixed TRU Waste

Parameter	Method Numbers	Test Methods	Rationale
Metals in waste: Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	SW-846 (1311, 6010B, 7060A <sup>f</sup> , 7061A) <sup>c</sup> (1311, 6010B, 7080A <sup>g</sup> , 7081 <sup>h</sup> ) <sup>c</sup> (1311, 6010B, 7130 <sup>g</sup> , 7131A <sup>h</sup> ) <sup>c</sup> (1311, 6010B, 7190 <sup>g</sup> , 7191 <sup>h</sup> ) <sup>c</sup> (1311, 6010B, 7420 <sup>g</sup> , 7421 <sup>h</sup> ) <sup>c</sup> (1311, 7470B, 7471A, 7472 <sup>g</sup> ) <sup>c</sup> (1311, 6010B, 7740, 7741A, 7742 <sup>g</sup> ) <sup>c</sup> (1311, 6010B, 7760A <sup>g</sup> , 7761 <sup>h</sup> ) <sup>c</sup> or equivalent methods <sup>d</sup>	Total and/or TCLP  Inductively-coupled plasma atomic emission spectroscopy  Atomic absorption  Manual cold vapor atomic absorption  Anodic stripping voltammetry  Acceptable knowledge <sup>h</sup>	Determine total and/or TCLP metals concentration in samples
pH	SW-846 (9040B, 9041A, 9045C) <sup>c</sup> or equivalent methods <sup>d</sup>	pH electrometric measurement  pH paper  Soil and waste pH	Determine corrosivity

<sup>a</sup> 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.

<sup>b</sup> U.S. Environmental Protection Agency, 1991, "Soil Sampling and Analysis for Volatile Organic Compounds," EPA 154014-91001, Office of Research and Development.

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

<sup>d</sup> Equivalent methods, subject to EPA approval, may be substituted.

<sup>e</sup> Method being revised per the January 1998 SW-846 Draft Update IVA.

<sup>f</sup> Method being integrated into Method 7000B, per the January 1998 SW-846 Draft Update IVA.

<sup>g</sup> Method being integrated into Method 7010, per the January 1998 SW-846 Draft Update IVA.

<sup>h</sup> 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, Environmental Protection Agency, Office of Solid Waste and Emergency Response, Washington, D.C.

**Table B-17**

**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 (8330) <sup>a</sup>	High Performance Liquid Chromatography	Determine HE concentrations directly in homogeneous materials.
		DX-2 Spot Test, DeTech	Determine if HE is present in the waste stream.
		Acceptable Knowledge <sup>b</sup>	If all surfaces cannot be directly tested and the waste object was potentially contaminated with HE during its use.

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

<sup>b</sup> 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 Ash Generated by Open Burning<sup>a</sup>**

Parameters	Method Numbers	Test Method	Rationale
Metals in waste:	SW-846	Total and/or toxicity characteristic leaching procedure (TCLP)	Determine total and/or TCLP metals concentrations in samples of solid process residues
Arsenic	(3051, 1311, 6010B, 7060A <sup>d</sup> , 7061A) <sup>b</sup>	Inductively-coupled plasma atomic emission spectroscopy	
Barium	(3051, 1311, 6010B, 7080A <sup>e</sup> , 7081A <sup>d</sup> ) <sup>b</sup>	Atomic absorption	
Cadmium	(3051, 1311, 6010B, 7030 <sup>e</sup> , 7031A <sup>d</sup> ) <sup>b</sup>	Manual cold vapor atomic absorption	
Chromium	(3051, 1311, 6010B, 7090 <sup>e</sup> , 7091 <sup>d</sup> ) <sup>b</sup>	Acceptable Knowledge <sup>f</sup>	
Lead	(3051, 1311, 6010B, 7420 <sup>e</sup> , 7421 <sup>d</sup> ) <sup>b</sup>		
Mercury	(1311, 7470A, 7471A) <sup>b</sup>		
Selenium	(3051, 1311, 6010A, 7740 <sup>d</sup> , 7741A, 7742) <sup>b</sup>		
Silver	(3051, 1311, 6010A, 7760A <sup>e</sup> , 7761 <sup>d</sup> ) <sup>b</sup> or equivalent methods <sup>c</sup>		

<sup>a</sup> Ash generated by open burning is characterized for all TCLP metals.

<sup>b</sup> U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-84, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C..

<sup>c</sup> Equivalent methods, subject to EPA approval, may be substituted.

<sup>d</sup> Method being integrated into Method 7000B, per the January 1998 SW-846 Draft Update IVA.

<sup>e</sup> Method being integrated into Method 7010, per the January 1998 SW-846 Draft Update IVA.

<sup>f</sup> 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.



## **Attachment B-1**

### **Waste Management Units at Los Alamos National Laboratory**

## Attachment B-1

Waste Management Units at Los Alamos National Laboratory<sup>a</sup>

Unit Location	Unit Type	Waste Types Managed <sup>b</sup>
TA-3-29, Rooms 9010, 9020, 9030	Storage - container	Hazardous Waste (HW), Mixed Low-Level Waste (MLLW), Mixed Transuranic Waste (MTRUW)
TA-14, Burn Cage	Treatment - Open Burning (OB)	High Explosives (HE)-Contaminated waste
TA-14, Detonation area	Treatment - Open Detonation (OD)	HE and HE-Contaminated waste
TA-15-184	Treatment - OD	HE and HE-Contaminated waste
TA-16-88	Storage - container	HW, MLLW
TA-16-387	Treatment - OB	HE and HE-Contaminated waste
TA-16-388	Treatment - OB	HE and HE-Contaminated waste
TA-16-394	Treatment - OB	HE and HE-Contaminated waste
TA-16-399	Treatment - OB	HE and HE-Contaminated waste
TA-16-401	Treatment - OB	HE and HE-Contaminated waste
TA-16-406	Treatment - OB	HE and HE-Contaminated waste
TA-36-8	Treatment - OD	HE and HE-Contaminated waste
TA-39-6	Treatment - OD	HE and HE-Contaminated waste
TA-39-57	Treatment - OD	HE and HE-Contaminated waste
TA-50-1, Decon Ops	Storage - container	HW, MLLW, MTRUW
TA-50-1, 59	Storage - container	MTRUW
TA-50-1, 60A	Treatment - cementation	HW, MLLW, MTRUW
TA-50-37	Storage - container	HW, MLLW, MTRUW
TA-50-69, Indoor Area	Storage - container	HW, MLLW, MTRUW
TA-50-69, Outdoor Area	Storage - container	HW, MLLW, MTRUW
TA-50-114	Storage - container	HW, MLLW, MTRUW
TA-54, L	Storage - container	HW, MLLW
TA-54, G	Storage - container	HW, MLLW, MTRUW
TA-54, West	Storage - container	HW, MLLW, MTRUW
TA-55-4, Basement	Storage - container	HW, MLLW, MTRUW
TA-55-185	Storage - container	HW, MLLW, MTRUW
TA-55, Storage Pad	Storage - container	HW, MLLW, MTRUW
TA-55-4, 401	Storage - tanks	MTRUW
TA-55-4, 401	Treatment - cementation	MTRUW

<sup>a</sup> Waste management units active or proposed as of September 1998.<sup>b</sup> Waste types managed or planned to be managed as of September 1998.

**APPENDIX B**  
**WASTE ANALYSIS PLAN**

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## LIST OF ATTACHMENTS

### ATTACHMENT

### TITLE

B-1

Waste Management Units at Los Alamos National Laboratory

## **LIST OF ABBREVIATIONS/ACRONYMS**

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 remediation/restoration
HE	high explosives
INEEL	Idaho National Engineering and Environmental Laboratory
LANL	Los Alamos National Laboratory
LDR	land disposal restrictions
NA	not applicable
20 NMAC 4.1	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
NMED	New Mexico Environment Department
NOD	Notice of Deficiency
OB	open burning
OD	open detonation
ppm	parts per million
QA	quality assurance
QAPP	Quality Assurance Program Plan
QC	quality control
R&D	research and development
RCRA	Resource Conservation and Recovery Act



**LIST OF ABBREVIATIONS/ACRONYMS**  
**(Continued)**

RTL	regulatory threshold limit
RTR	real-time radiography
SVOC	semivolatile organic compound
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
TRUCON	TRUPACT-II Content
TRUPACT-II	Transuranic Package Transporter-II
TSDF	treatment, storage, and disposal facility
TWCP	TRU Waste Certification Plan
VOC	volatile organic compound
WAC	waste acceptance criteria
WAP	waste analysis plan
WIPP	Waste Isolation Pilot Plant

## **APPENDIX B**

### **WASTE ANALYSIS PLAN**

This waste analysis plan (WAP) presents information on the chemical and physical nature of hazardous, mixed low-level, mixed transuranic (TRU), and high explosives (HE) and HE-contaminated wastes 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 NMAC 4.1), Subpart V, 264.13, revised January 1, 1997 [1-1-97]. The waste analysis information contained in this WAP is specific to storage in containers and tanks, and treatment by open burning (OB), open detonation (OD), and stabilization (cementation). Waste analysis plan requirements specific to other types of storage or treatment will be developed and submitted as Attachment B in technical area (TA)-specific permit applications, permit modification requests, or permit renewal documents. Additional waste analysis requirements are specified in 20 NMAC 4.1, Subpart IX, 270.14(b); and 20 NMAC 4.1, Subpart VIII, 268.7 [1-1-97], "Waste Analysis and Record Keeping." 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 list of 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.

**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.3.1.1, B.3.2.2
§264.13(a)(3)	Analysis must be repeated as necessary to ensure that it is accurate and up to date	B.3.1.3, B.3.2.2
§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.3.1.3, B.3.2.2
§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-14, B-15, B-16, B-17, and B-18

**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)(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.3.1.2, B.3.2.2
§264.13(b)(3)(ii)	An equivalent sampling method	B.3.1.2, B.3.2.2
§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.3.1.3, B.3.2.2
§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

**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)(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
§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

<sup>a</sup> NA = not applicable

#### **B.1 FACILITY DESCRIPTION [20 NMAC 4.1, Subpart V, 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 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 safeguards and stockpile stewardship; 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; 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 remediation/restoration (ER) activities. Wastes generated from these types of processes and activities may also be received from off-site facilities, as described in Supplement 6 of this General Part B Permit Application. Tables B-2 through B-7 provide information on potential hazardous, mixed low-level, mixed TRU, HE, and HE-contaminated wastes 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), potential hazardous constituents in and/or characteristics of the waste, and regulatory limits.

#### B.1.2 Stored Waste

Hazardous, mixed low-level, and mixed TRU wastes are stored at various container storage areas throughout LANL. The following sections contain general descriptions of these wastes and the processes which generate them.

##### B.1.2.1 Hazardous Waste

The criteria for establishing a waste as a hazardous waste are provided in 20 NMAC 4.1, Subpart II [1-1-97]. A waste is considered hazardous if it meets the definition of a solid waste described in 20 NMAC 4.1, Subpart II, 261.2 [1-1-97]; is not exempted from regulation as a hazardous waste under 20 NMAC 4.1, Subpart II, 261.4 [1-1-97]; and exhibits any of the characteristics of hazardous waste identified in 20 NMAC 4.1, Subpart II, Part 261, Subpart C, or is listed in 20 NMAC 4.1, Subpart II, Part 261, Subpart D [1-1-97].

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; noncorrosive aqueous and nonaqueous solutions and slurries;

aqueous solutions and sludges; mercury wastes; used batteries and battery fluids; unused off-specification commercial chemical products; ER soils and sludges; ER aqueous liquids; and ER debris. Hazardous waste streams may be of uniform composition (i.e., homogeneous) or of dissimilar/diverse composition (i.e., heterogeneous). 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 homogeneous waste stream consists of liquid 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 chemical research, cleaning, and degreasing.

#### Contaminated Solid Wastes

Contaminated solid wastes (i.e., wastes of a solid physical form) are typically heterogeneous 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, chemical research, D&D projects, metal finishing operations, and general maintenance operations.

#### Paint and Related Wastes

Paint and paint-related wastes generally 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. These waste matrices may be homogeneous or heterogeneous, depending on the specific waste-generating process.

#### 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 typically homogeneous and is generated primarily from photographic film processing and photocopier operations.

### Corrosive Liquid Wastes

These homogeneous 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 homogeneous wastes including 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 constituents. These wastes are typically homogeneous. 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. This waste stream may be homogeneous or heterogeneous, depending on the specific waste-generating activity.

### Used Batteries and Battery Fluids

This waste stream consists of used batteries and battery fluids that may contain heavy metals such as cadmium, lead, mercury, and silver. Waste-generating activities include routine equipment maintenance. This waste stream may be homogeneous or heterogeneous, depending on the specific waste-generating activity.



### 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 may also include 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, that may contain regulated hazardous metals, organic compounds, or exhibit hazardous characteristics of ignitability, corrosivity, and reactivity.

### ER Soils and Sludges

This homogeneous 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 homogeneous 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 heterogeneous 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 5820.2A, "Radioactive Waste Management" (DOE, 1988), as "waste that contains radioactivity and is not classified as high-level waste, transuranic waste, spent nuclear fuel, or 11(e)(2) by-product material as defined by the Order. Test specimens of fissionable material irradiated for research and development only, and not for the production of power or plutonium, may be classified as low-level, provided that the concentration of transuranics is less than 100 nanocuries per gram of waste." By-product material, as defined in Section 11(e)(2)

of the Atomic Energy Act of 1954, as amended, consists of uranium and thorium mill tailings. Section 11(e)(2) by-product material is not generated at LANL. Mixed low-level waste is any waste that has both a hazardous waste component and a low-level waste component, as defined above. For mixed low-level waste, this WAP addresses only the hazardous component.

Mixed low-level waste is generated at LANL primarily from R&D activities, processing and recovery operations, D&D projects, and ER activities. Descriptions of the mixed low-level wastes 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).

#### **B.1.2.2.1 Mixed Low-Level Solid Homogeneous Waste**

Homogeneous mixed low-level solid waste is of uniform composition. Waste streams of this type are generally described below.

##### **Soils with Heavy Metals**

Soil waste contaminated with heavy metals is generated during D&D and ER activities at various locations throughout LANL. Typically, this waste consists of soils contaminated with varying concentrations of lead or other heavy metals resulting from contact with small shapes, typically in the form of small pieces, shot, or pellets.

##### **Environmental Restoration Soils**

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

##### **Inorganic Solid Oxidizers**

Many different types of 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 R&D and D&D research laboratories.

#### B.1.2.2.2 Mixed Low-Level Solid Heterogeneous Waste

Heterogeneous mixed low-level solid waste streams contain components that are dissimilar or have a diverse composition. Waste streams of this type are generally described below.

##### Lead for Surface Decontamination

Lead for surface decontamination consists of contaminated lead shielding used as radiation shielding. 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, and special shapes. The radioactive material on the surface of the lead may be removable by decontamination and the lead can then be recycled or reused.

##### Other Lead Wastes

Other lead waste consists of activated or inseparable lead, lead blankets, and lead requiring sorting. This lead may also have been used as shielding for radiation, but is not amenable to surface decontamination because the waste is either activated or has a physical form that prevents decontamination. It is generated primarily from radioisotope experiments and other reactor, accelerator, laser, and x-ray activities. The waste may be in the form of sheets, pigs, bricks, special shapes, shot, shavings, slag, and dross.

##### Noncombustible Debris

Noncombustible debris typically 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. The waste may be contaminated with residues such as cadmium, cyanide, lead, and mercury.

##### Combustible Debris

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

### Organic-Contaminated Noncombustible Solids

This waste stream typically includes absorbed oils, laboratory trash, and discarded equipment. Absorbed oil waste is typically comprised of drums containing vermiculite or corncob fractions used to absorb many different types of oil from spills and routine maintenance operations. The oil generally originates from vacuum pumps and may be contaminated by mercury, lead, or cadmium. Mercury is a common constituent in the waste stream because of its use at various LANL locations as a vacuum-pumping fluid for early vacuum systems. Cadmium contamination may be the result of soldering and brazing-fume-hood operations. Lead contamination is the result of lead turnings contained in cooling oil. Absorbent is routinely added to these waste oils as required by standard operating procedures.

Laboratory trash typically consists of noncombustible solid materials with residual solvent contamination. The laboratory debris includes reagent bottles, broken glassware, and discarded disposable materials (e.g., syringes and drying dishes). Large quantities of chemicals were not placed in this trash; however, residual liquids or powders may have remained on some of the disposed 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 typically consists of waste similar to the combustible debris, 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 from electronics applications, vacuum pumps with residual mercury, activated or nondecontaminatable 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 Chemicals

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

#### B.1.2.2.3 Mixed Low-Level Liquid Waste

Mixed low-level liquid waste streams stored at LANL are described generally in the following paragraphs.

#### Spent Solvents and Contaminated Solvent Mixtures

This waste stream is comprised of spent solvents and spent solvent mixtures that may contain organic or inorganic compounds, heavy metals, oils, and 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 may contain organics, inorganics, metals, oils, or other contaminants. Waste-generating activities include radiochemistry research, plutonium processing, and analytical chemistry.

#### Aqueous Liquids Contaminated with Heavy Metals

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

#### Oil Wastes

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

### Unused Liquid Reagent Chemicals

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

#### B.1.2.2.4 Mixed Low-Level Gas Cylinder Waste

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

#### B.1.2.3 Mixed TRU Waste

TRU waste is defined in DOE Order 5820.2A, "Radioactive Waste Management" (DOE, 1988), as follows: "Without regard to source or form, waste that is contaminated with alpha emitting transuranic radionuclides with half-lives greater than 20 years and concentrations greater than 100 nanocuries per gram at the time of assay and has atomic numbers greater than 92. Heads of Field Elements can determine that other alpha contaminated waste, peculiar to a specific site, must be managed as TRU waste." Mixed TRU waste contains both a hazardous waste component and a TRU waste component. For mixed TRU waste, this WAP addresses only the hazardous component.

Mixed TRU waste is generated at LANL primarily from R&D activities, processing and recovery operations, and D&D projects. Limited quantities of mixed TRU waste from off-site facilities will be accepted at LANL for additional characterization and management. Mixed TRU waste streams at LANL are divided into four broad categories and described by a matrix parameter code. Matrix parameter codes 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 matrix parameter codes are available in "DOE Waste Treatability Groups Guidance" (DOE, 1995). The matrix parameter codes that are applicable to the mixed TRU wastes stored at LANL are listed below.

- *Matrix Parameter Code S3000, Homogeneous solids:* defined as solid waste materials, excluding soil/gravel, that do not meet the EPA LDR criteria for classification as debris.
- *Matrix Parameter Code S4000, Soil/Gravel:* defined as solid waste materials that are at least 50 percent by volume soil/gravel.

- *Matrix Parameter Code 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 neutral geologic material.
- *Matrix Parameter Code 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).

Matrix parameter codes are applied to mixed TRU waste streams as a general categorization scheme to distinguish between waste types. More specific waste identification systems are used for supplementary purposes as part of waste management operations at LANL. To better identify wastes containing hazardous constituents, mixed TRU wastes are assigned to a numbered waste stream. These numbered waste streams are based on the following prioritized criteria: waste generation process (including location of the process); bulk material content of the waste (e.g., combustible debris, noncombustible debris, cemented sludge, or organics absorbed on vermiculite); and/or hazardous constituents in the waste. These numbered waste streams also correspond to other identification systems used by LANL in the past. Table B-4 lists the mixed TRU waste streams stored at LANL by their matrix parameter code and provides a cross-reference between past and present waste stream identification systems. This includes identification of the waste streams by Transuranic Package Transporter-II (TRUPACT-II) Content (TRUCON) codes, described below.

TRUCON codes were developed by DOE to provide consistent waste content descriptions for TRU and mixed TRU waste generated throughout all of DOE's facilities (DOE, 1996a). The TRUCON codes describe the bulk material and chemical characteristics of TRU and mixed TRU waste to be certified for transportation in the TRUPACT-II. LANL TRUCON codes consists of a three digit number preceded by the letters "LA" and followed by a letter that further defines the waste packaging. The following paragraphs provide consolidated waste descriptions for the mixed TRU wastes stored at LANL. Mixed TRU waste information is summarized in Table B-5.

#### TRUCON Code LA 111/211

This waste consists of solidified inorganic process solids and liquids. It is generated as a result of plutonium processing operations and D&D activities. It generally includes hydroxide filtrate cakes, plutonium-contaminated soils, and aqueous waste (dewatered treatment sludges). These wastes are typically solidified with cement to form a noncorrosive solid matrix.

#### TRUCON Code 112/212

This waste consists primarily of absorbed organics on vermiculite.

#### TRUCON Code LA 114/214

This waste consists of solidified inorganic process solids and is generated as a result of plutonium-processing operations. Solidified process solids include process residue from evaporator bottoms and other discardable solutions, process leached solids, ash, filter cakes, salts, metal oxides, and fines. These process solids are immobilized in cement to form a noncorrosive solid matrix.

#### TRUCON Code LA 115/215

Graphite waste generated from plutonium-processing activities is packaged as TRUCON Code LA 115/215 waste. The waste consists of discarded graphite mold and furnace equipment from plutonium casting operations. A small fraction of combustible waste, such as plastic (mainly packaging), may also comprise this waste type.

#### TRUCON Code LA 116/216

This waste is comprised of combustible waste generated from R&D, process and recovery, and D&D operations at LANL. The combustible solids consist primarily of paper, rags, plastic, and rubber. A small fraction of noncombustible solids, such as scrap metal, may also be contained in this waste form.

#### TRUCON Code LA 117/217

This waste is comprised of noncombustible (primarily metal) waste generated by R&D, process and recovery, and D&D operations at LANL. It may consist of motors, pumps, tools, and process equipment and may contain some small fraction of combustible waste, such as plastics (mainly packaging). This waste may also contain glass in the form of discarded laboratory glassware, windows, and bottles with a small fraction of combustibles.

#### TRUCON Code LA 118/218

This waste consists of mixed TRU glass waste generated from plutonium-processing. This glass waste consists of discarded laboratory glassware, windows, and bottles. It may also contain small fractions of combustible waste, such as plastic (mainly packaging).



#### TRUCON Code LA 119/219

This waste consists of discarded high-efficiency particulate air filters.

#### TRUCON Code 120/220

This waste consists of isotopic source waste. It includes isotopic source waste generated as a result of R&D activities.

#### TRUCON Code 122/222

This waste consists of inorganic solid waste. It includes noncombustible building debris, glovebox debris, and other solid waste debris. Waste-generating activities include R&D, process and recovery, and D&D operations.

#### TRUCON Code LA 123

This waste consists of leaded rubber and metal waste generated from plutonium processing activities. This waste type consists of lead-lined glovebox gloves discarded along with metal waste, such as discarded metals, motors, and tools.

#### TRUCON Code 124/224

This waste consists primarily of used chloride salts from pyrochemical processes (i.e., electrorefining, molten salts extraction, salt stripping, fluoride reduction, and direct oxide reduction) and a small fraction of combustible waste (i.e., plastic).

#### TRUCON Code LA 125/225

This waste consists of metal equipment, either whole or sectioned, along with its combustible components. This waste also contains a small volume of combustibles generated during decommissioning, sectioning, and packaging.

#### TRUCON Code LA 126

This waste consists of solidified organic process solids. The waste is generated as a result of plutonium-processing operations. Solidified process solids include process residue from evaporator bottoms and other discardable solutions, process-leached solids, ash, filter cakes, salts, metal oxides, and fines. These process solids are immobilized in cement to form a noncorrosive solid matrix.

### Sandia National Laboratories/New Mexico - Generated Waste

Mixed TRU waste 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, cellulose, rubber, plastics, organic matrices, and inorganic materials (see Table B-8).

#### B.1.3 Treated Wastes

Mixed TRU waste, HE waste, and HE-contaminated waste are treated at various waste management units throughout LANL. The mixed TRU waste is treated by cementation to stabilize the waste for storage and to meet waste acceptance criteria (WAC) for disposal at the Waste Isolation Pilot Plant (WIPP). The HE waste and HE-contaminated waste are treated by open burning or open detonation to remove its reactive characteristic.

##### B.1.3.1 Treated Mixed TRU Wastes

Mixed TRU wastes that require treatment are generated primarily from R&D and processing and recovery operations. Matrix parameter codes are applied to mixed TRU wastes as a general categorization scheme. The TRUCON codes which are used to more specifically describe mixed TRU wastes are cross-referenced to matrix parameter codes in Table B-4. The TRUCON-coded mixed TRU wastes treated at LANL are LA 111/211, LA 114/214, and LA 126. These TRUCON codes are fully described in Section B.1.2.3. The EPA Hazardous Waste Numbers that potentially apply to these wastes are provided in Table B-5. The matrix parameter codes that are applicable to the mixed TRU wastes treated at LANL are listed below.

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

Complete descriptions of the matrix parameter codes are available in "DOE Waste Treatability Groups Guidance" (DOE, 1995).

Treatment of mixed TRU wastes at LANL consists of immobilization/solidification in cement to form a noncorrosive solid matrix. Additional specific information on cementation treatment processes is provided in TA-specific permit applications, permit modification requests, or permit renewal documents.

#### 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 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 which 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 NMAC 4.1, Subpart II, 261.23 [1-1-97] 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 R&D activities, D&D, and ER activities. Table B-6 provides a summary of available information on HE waste and HE-contaminated waste treated by OB. This table includes brief waste descriptions, waste-generating activities, the characterization basis for hazardous waste designation (i.e., process knowledge and/or analysis), potential EPA Hazardous Waste Number(s), potential hazardous constituents in and/or characteristics of the waste, and regulatory limits. These waste streams include homogeneous and heterogeneous wastes and are described in the following paragraphs.

#### HE-Contaminated Water with Trace Solvents and/or Metals

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, and maintenance activities.

#### HE-Contaminated Spent Solvent Waste

This waste stream consists of HE-contaminated solvents. It is generated primarily by laboratory analysis and the dissolving of HE and polymers.

#### HE-Contaminated Water

This waste stream consists of HE-contaminated water generated primarily from pressure washing walls, equipment, and floors. It is also generated by water-cooled HE-machining operations.

#### 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-machining operations.

#### Solid and Scrap HE

This waste stream consists of off-specification or obsolete HE. It is generated primarily from machining and forming processes and consists primarily of discrete pieces of explosives left over from R&D activities and testing operations.

#### HE-Contaminated ER Soil and/or Debris

This waste stream consists of ER soils, debris, and investigation-derived waste (e.g., personal protective equipment, samples, and sampling equipment). These wastes are generated during remediation and D&D activities.

#### HE-Contaminated Commercial Chemical Products

HE-contaminated commercial chemical products may be generated at various TAs throughout LANL that manage HE. This waste generally consists of spilled or off-specification unused commercial chemical products potentially contaminated with HE.

#### Wastewater Treatment Residues

This waste stream consists of sludges, spent activated carbon, and filter solids that result primarily from the filtration of HE wastewater.

#### HE-Contaminated Solid Waste

This waste stream may include solvent-contaminated paper, glassware, tools, and other waste. It is generated primarily from HE-processing activities, plastic forming, and general office and laboratory use.

#### HE-Contaminated Equipment

This waste stream consists of HE-contaminated equipment, which includes discarded, noncombustible equipment and material from HE-processing areas, D&D, and ER activities.

#### HE-Contaminated Waste Rags, Wipes, and Other Combustibles

This waste stream includes solvent-soaked rags and wipes used at HE-processing areas. It is generated primarily from hydraulic press operations and laboratory analysis.

#### 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.

#### Liquid Process Explosive Waste

This waste stream consists of off-specification or obsolete liquid HE waste. It is generated from R&D activities and testing operations.

#### Treatment Residues

Ash and/or debris generated during the thermal treatment of HE-contaminated waste by OB is characterized for the toxicity characteristic prior to disposal. Ash/debris generated from any waste stream which contains listed hazardous waste is considered "derived from" waste subject to 20 NMAC 4.1, Subpart II, 261.3(c)(2)(i) [1-1-97], and is sent to a permitted treatment, storage, and disposal facility (TSDF) for proper disposal.

#### 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. This table includes a brief waste description, waste-generating activities, the characterization basis for hazardous waste designation, potential hazardous constituents in and/or

characteristics of the waste, and regulatory limits. These waste streams include homogeneous and heterogeneous wastes and are described briefly below.

#### Solid/Scrap Process Explosive Waste

This waste stream consists of scrap or off-specification HE waste. It is generated from HE machining, forming, and preparation processes and consists primarily of discrete pieces of explosives left over from R&D activities and testing operations.

#### Liquid Process Explosive Waste

This waste stream consists of off-specification or obsolete liquid HE waste. It is generated from R&D activities and testing operations.

#### 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 informational purposes only. Detailed information on the waste management units is provided in TA-specific permit applications, permit modification requests, or permit renewal documents.

#### B.2 WASTE ANALYSIS PARAMETERS [20 NMAC 4.1, Subpart V, 264.13(a)(1)]

A detailed chemical and physical characterization will be performed on all hazardous, mixed low-level, mixed TRU, HE, and HE-contaminated wastes for management purposes, as required by 20 NMAC 4.1, Subpart V, 264.13. Waste analysis parameters will be selected to ensure that the characterization documentation will contain all information necessary to properly treat, store, or dispose of waste in accordance with Resource Conservation and Recovery Act (RCRA) general facility standards and LDR requirements. These waste parameters will be selected to ensure that the characterization will provide all of the necessary information to properly treat the waste in accordance with RCRA general facility standards and LDR requirements.

##### B.2.1 Proposed Analytical Parameters and Methods [20 NMAC 4.1, Subpart V, 264.13(b)(1), and 20 NMAC 4.1, Subpart IX, 270.14(b)(2)]

Analytical parameters and characterization methods that may be used for hazardous, mixed low-level, mixed TRU, and HE and HE-contaminated wastes generated at LANL are summarized in Tables B-9 through B-12. Some or all of the following parameters listed below will be used to determine the RCRA regulatory status of the wastes listed previously.

- Acceptable knowledge
- 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)
- Headspace gas sampling to determine the presence of VOCs in container headspace
- Flash point characterization
- pH characterization
- Physical waste form characterization through real-time radiography (RTR) and visual examination to verify the absence of free liquids.

#### **B.2.2 Criteria and Rationale for Parameter Selection [20 NMAC 4.1, Subpart V, 264.13(b)(1)]**

Waste analysis parameters are selected to characterize hazardous and mixed low-level wastes in conformance with 20 NMAC 4.1. Mixed TRU waste characterization incorporates characterization procedures from the WIPP "TRU Waste Characterization Quality Assurance Program Plan" (QAPP) (DOE, 1994) requirements, which are based on knowledge of raw materials and physical/chemical processes of waste-generating activities and may be supported by analytical results. Additional characterization procedures will be implemented as needed to meet the requirements of the final WIPP WAP permit conditions. The analytical parameters selected to confirm knowledge-based waste characterization for hazardous, mixed low-level, and mixed TRU waste, and the rationale for the selected parameters, are identified in Tables B-9, B-10, and B-11, respectively. 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 are identified in Table B-12.

#### **B.3 CHARACTERIZATION PROCEDURES [20 NMAC 4.1, Subpart V, 264.13(a)(1) and 264.13(b)(2), and 20 NMAC 4.1, Subpart IX, 270.14(b)(2)]**

The characterization of hazardous, mixed low-level, mixed TRU, HE, and HE-contaminated waste is conducted by the waste generator before the waste is treated or stored. The approach to the characterization of hazardous, mixed low-level, mixed TRU, HE, and HE-contaminated wastes is based on the chemical, physical, and radiological nature of the waste stream. Characterization procedures require that each waste generator provide documented information on the waste

stream. This is accomplished by using acceptable knowledge and/or sampling and analysis, which are described in the following sections. The completion of characterization documentation allows for the assignment of EPA Hazardous Waste Numbers and the proper management of the waste. All waste generators must certify, based on their knowledge of the waste, that the information included in the characterization documentation is complete and accurate.

The following sections describe the characterization procedures that apply specifically to each waste type.

#### B.3.1 Hazardous and Mixed Low-Level Waste Characterization

Characterization procedures for hazardous and mixed low-level wastes are selected based on the physical nature of the waste stream (e.g., homogeneous or heterogeneous waste). Homogeneous solid waste may be characterized for the presence of hazardous constituents (i.e., VOCs, SVOCs, and metals) on the basis of acceptable knowledge and/or sampling and analysis. Heterogeneous solid waste will be characterized largely on the basis of acceptable knowledge because of the difficulty in obtaining representative samples, the lack of appropriate sampling methodology, and for mixed low-level wastes, safety concerns associated with unnecessary exposure to the radioactive component of the waste.

Occasionally, chemicals of an unknown nature require disposal. These wastes are handled on a case-by-case basis. The individual waste may be tentatively 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 small population of chemicals.

For purposes of managing unknown wastes, a small volume is defined at LANL as less than one liquid gallon (or approximately four liters). The rationale for the small volume designation is that this is the minimum quantity of sample which is needed to test if the waste is hazardous. At and below this limit, the sample is actually 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 handling.

Volumes greater than one gallon or 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 to the waste. Characterization methods that may be used are provided in Tables B-9 and B-10.

**B.3.1.1 Acceptable Knowledge** [20 NMAC 4.1, Subpart V, 264.13(a)(2), and 264.13(b)(5), and 20 NMAC 4.1, Subpart IX, 270.14(b)(2)]

The physical, chemical, and radiological nature of some waste forms makes the 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 or explosive material. Acceptable knowledge is a method used to characterize the waste forms utilizing process knowledge and supplemental forms of waste analysis data. Acceptable knowledge can be used to meet all or part of the waste analysis requirements.

According to EPA guidance, *acceptable knowledge* is broadly defined to include process knowledge, supplemental waste analysis data, and/or facility records of analysis (EPA, 1994). *Process knowledge* is described in 20 NMAC 4.1, Subpart V, Section 264.13(a)(2) [1-1-97], as data developed under Part 261 (i.e., 20 NMAC 4.1, Subpart II) and existing published or documented data on a specific hazardous waste or hazardous waste generated from similar processes. Supplemental *waste analysis data* include concentration(s) of RCRA-regulated constituents and/or results of tests for hazardous characteristics. These data are 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).

Examples presented in the EPA guidance as to when application of acceptable knowledge may be appropriate include:

- Wastes containing hazardous constituents from specific processes that are well documented, such as F-listed and/or K-listed waste code descriptions.

- Wastes consisting of discarded unused commercial chemical products, reagents, or chemicals containing known physical and chemical constituents.
- Waste (e.g., radioactive mixed waste) containing levels of radioactivity such that health and safety risks to personnel do not justify sampling and analysis due to quantified and documented radiological concerns.
- Wastes containing heterogeneous materials, where the physical nature of the waste does not lend itself to taking a representative sample (e.g., laboratory trash and construction debris with surface contamination) (EPA, 1994).

#### B.3.1.1.1 Process Knowledge

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 constituents 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 will obtain, assemble, and prepare the process knowledge documentation for each waste stream in a separate auditable file or maintain a waste stream reference file that identifies the documents and their locations. The documentation must be explicitly relevant and traceable to a given waste stream and cannot merely be a list of information sources for a particular operation and waste. There are many sources of applicable documentation at LANL that may be used to substantiate process knowledge for a specific waste stream. Examples of documentation that may be used include 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 constituents 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 Supplemental Waste Analysis Data**

Supplemental waste analysis data used for acceptable knowledge includes information provided by the generator of the waste stream on the concentrations of hazardous constituents in the waste and/or the results of tests for hazardous characteristics. 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 NMAC 4.1, Subpart V, 264.13(a)(3), 264.13(b)(2), (3), and (4), and 20 NMAC 4.1, Subpart IX, 270.14(b)(2)]

This section discusses proposed sampling and analytical procedures and frequency of sampling applicable to hazardous and mixed low-level wastes. The approach described for characterizing these waste types is based on the radiological, physical, chemical, and hazardous properties of the waste. Solid and liquid waste sampling techniques are typically used to obtain the chemical data necessary for waste characterization.

Sampling and analysis is generally performed when a waste lacks sufficient process information to adequately characterize the waste based on acceptable knowledge. 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 with certain technical performance criteria and to be consistent with regulatory guidelines. Personnel involved in sampling and analysis comply with LANL-specific protocol consistent with "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) or other approved methods (EPA, 1986).

B.3.1.2.1 Solid Waste Sampling [20 NMAC 4.1, Subpart V, 264.13(b)(3)]

Solid wastes that may be sampled are typically homogeneous waste streams. These solids may be sampled and analyzed for total metal content, VOCs, and SVOCs. The sampling protocol for solid hazardous and low-level mixed wastes at LANL is based on sampling methods approved by EPA for solid waste and soil sampling in SW-846, as well as methods approved by the American Society for Testing and Materials (ASTM). 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.

Homogeneous waste streams may be sampled and analyzed for the toxicity characteristic (TC) contaminants listed in 20 NMAC 4.1, Subpart II, 261.24 [1-1-97]. Analysis for total concentration of TC contaminants may be performed on samples in a screening step, as described in Section 1.2 of Method 1311, Toxicity Characteristic Leaching Procedure (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 Sampling**

The liquid wastes generated at LANL typically consist of aqueous solutions, slurries, and organic liquids. These wastes may 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, may be characterized by filtering the waste, measuring total constituent concentrations in the resulting filtrate, and comparing these concentrations to the TC regulatory levels in 20 NMAC 4.1, Subpart II, 261.24 [1-1-97].

To ensure the collection of a representative sample of the liquid, the sample is 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. The samples are typically collected using a glass tube or composite liquid waste sampler, in accordance with *SW-846* or other approved methods.

Wastes that contain both a liquid and a solid phase may be 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 and using the multiple phase formula from Method 1311.

#### **B.3.1.2.3     Sample Handling, Preservation, and Storage**

Table B-13 presents requirements specified in *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.

**B.3.1.2.4 Analytical Laboratory Selection and Analytical Methods [20 NMAC 4.1, Subpart V, 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-14 and B-15 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
- Constituents 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-14 and B-15. Qualified analytical laboratories at LANL and/or approved subcontractor laboratories that meet the above criteria will analyze waste samples for RCRA-regulated hazardous constituents (VOCs, SVOCs, and metals) and characteristics, according to *SW-846*, or documented equivalent methods.

**B.3.1.3 Verification and Reevaluation Frequencies [20 NMAC 4.1, Subpart V, 264.13(a)(3) and 264.13(b)(4)]**

Reevaluation of initial characterization information may be performed to verify the accuracy of the initial waste characterization; to verify 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.

Hazardous waste received at the waste management unit for storage will be randomly selected for verification by acceptable knowledge or sampling and analysis at a rate of 1 percent of received waste streams characterized by acceptable knowledge per year. Verification analyses, if needed, will be conducted at LANL's or an approved subcontractor's laboratory facilities, in conformance with appropriate methods. Other methods of verification may include RTR and visual examination. Factory sealed containers and original containers redistributed for use within the facility will not be included in this analysis. Lab packed chemicals in original containers will not be verified.

All routinely generated waste streams will be reevaluated annually to verify that they have not changed. This annual reevaluation will be accomplished through review and recertification of applicable waste characterization documentation. Any information that indicates a change in the process that generates the waste and may affect the waste shall cause the waste to be recharacterized no later than the next time the waste is generated.

### **B.3.2 Mixed TRU Waste Characterization**

Characterization of mixed TRU waste stored at LANL is performed in accordance with the procedures described in the "Los Alamos National Laboratory TRU Mixed Waste Analysis Plan NOD Response" (LANL, 1996). Initial characterization of both homogeneous and heterogeneous mixed TRU waste is primarily based on process knowledge, which is suitable for safe storage of these waste streams. Additional characterization to meet WIPP certification procedures will be implemented at appropriate LANL facilities to meet requirements of the final WIPP WAP permit conditions. Pursuant to WIPP certification and WIPP WAP requirements, further characterization of homogeneous waste may 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 facilities using process knowledge, headspace gas sampling, RTR, and visual examination.

The mixed TRU waste streams described in Section B.1.2.3 are categorized by matrix parameter codes based on the physical and chemical form of the waste. Homogeneous waste streams in the solid process residue (Matrix Parameter Code S3000), soil/gravel (Matrix Parameter Code S4000), or aqueous liquids/slurries (Matrix Parameter Code L1000) categories may contain RCRA-regulated VOCs, SVOCs, and metals (see Table B-5) and may be characterized using acceptable knowledge and/or sampling and analysis. Debris waste streams (Matrix Parameter Code 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 constituents (i.e., VOCs, SVOCs, and metals) using acceptable knowledge based on examination of the original materials from which the waste was generated.

The documents referenced above address mixed TRU waste characterization procedures to be utilized after the waste is stored at LANL. These procedures were developed primarily to meet 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. These documents are referenced for informational purposes only, as they constitute requirements established for another facility's operating permit conditions. Because these references 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.

#### **B.3.2.1 Mixed TRU Waste Certification Plan**

The "Los Alamos TRU Waste Certification Plan" (TWCP) (LANL, 1991) incorporates the certification requirements of the "Waste Acceptance Criteria for the Waste Isolation Pilot Plant" (WIPP WAC) (DOE, 1996b) for mixed TRU waste that will be sent to that site. The TWCP establishes the programmatic framework and requirements within which waste generators must 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 acceptable knowledge information are evaluated. Once this documentation has been prepared, it is subject to review and approval by certification program personnel. Waste generators must also participate in external audits as required by the TWCP to verify the certification process. If the requirements of the WIPP WAC are met, the waste will be certified and transported to WIPP.

#### **B.3.2.2 Acceptable Knowledge**

The TWCP described above includes an acceptable knowledge certification program in accordance with the WIPP WAC and with the WIPP QAPP (DOE, 1994). LANL-specific protocol consistent with the WIPP WAP will be used to implement acceptable knowledge as part of the LANL TRU waste certification program for WIPP. The acceptable knowledge certification program will include the following elements:



- A description of the waste certification program.
- Written procedures outlining the specific methodology used to assemble acceptable knowledge records, including document origins, guidelines for use of documents or information, auditable record guidelines, and potential limitations associated with the information.
- Procedures to evaluate acceptable knowledge information and to resolve discrepancies in documentation.
- Guidelines for the identification of RCRA hazardous constituents and assignment of appropriate EPA Hazardous Waste Numbers to each waste stream.
- Procedures to ensure that unacceptable wastes are identified, documented, and segregated.
- Procedures to verify or confirm acceptable knowledge.
- A cross reference to the applicable waste summary category group (i.e., matrix parameter codes) to verify the required confirmation data have been evaluated and the proper EPA Hazardous Waste Numbers have been assigned.
- Administrative control procedures that identify organization responsibility for compliance, oversight procedures, on-the-job procedure training, stop-work procedures, and nonconformance process and corrective action procedures.

**B.3.2.2.1 Real-Time Radiography [20 NMAC 4.1, Subpart V, 264.13(b)(2), and 20 NMAC 4.1, Subpart IX, 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 that the physical form requirements of the WIPP WAC are met. At the same time, RTR will verify the waste classification (i.e., matrix parameter code) and waste form determined using acceptable knowledge. All mixed TRU waste containers will be analyzed by RTR, and the results for each waste container will be documented. The audio/visual tapes produced during the waste container scan will be maintained for a minimum of three years. In addition, an RTR data form will be used to document the types and quantities of material types observed in each drum.

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 QAPP.

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 may 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 mixed TRU waste are based on Procedure 310.1, Physical Waste Form Characterization Using Radiography, "TRU Waste Characterization Sampling and Analysis Methods Manual" (DOE, 1996c).

#### B.3.2.2.2 Visual Examination [20 NMAC 4.1, Subpart V, 264.13(b)(2), and 20 NMAC 4.1, Subpart IX, 270.14(b)(2)]

The contents of select mixed TRU waste containers will be visually examined to confirm RTR results. Visual examination will also verify aspects of acceptable knowledge amenable to visual confirmation. For example, the visual examination will verify the physical characteristics of a waste and the associated matrix parameter code (i.e., Matrix Parameter Code 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 acceptable knowledge 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 mixed TRU waste are based on Procedure 310.2, Physical Waste Form Characterization Using Visual Examination, "TRU Waste Characterization Sampling and Analysis Methods Manual," (DOE, 1996c).

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 drums by selecting a number of drums 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 QAPP. The following table is an example of how the number of mixed TRU waste 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 QAPP.

Number of Waste Containers Requiring Visual Examination:

Annual Number of Waste Containers Undergoing Characterization	Number of Waste Containers Requiring Visual Examination					
	1 percent	2 percent	3 percent	4 percent	5 percent	6 percent
50	NA	22	NA	22	NA	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

NA = not applicable

(Source: DOE, 1994)

For the first year of container examination, LANL will use the 2 percent miscertification rate observed at the Idaho National Engineering and Environmental Laboratory (INEEL). In subsequent years, LANL will use the miscertification rate observed at LANL in the previous year(s) to determine the appropriate number of containers for visual examination.

**B.3.2.2.3 Headspace Gas Sampling [20 NMAC 4.1, Subpart V, 264.13(b)(2) and (3), and 20 NMAC 4.1, Subpart IX, 270.14(b)(2)]**

Headspace gas sampling and analysis is a qualitative screening technique used to confirm the presence of regulated hazardous constituents. This method of characterization includes sampling and analysis of headspace gas from the drum headspace (i.e., directly under the drum lid).

The drum headspace of all previously unvented drums is sampled for hydrogen when filters are inserted. A statistically selected subset of waste drums are sampled for flammable gases and selected VOCs in order to assure that health and safety criteria for safe storage of these drums are met. The statistical basis for selection of drums to be sampled is described in Section B.3.2.2.5. In order to meet the proposed characterization requirements in the WIPP QAPP, the headspace of all remaining drums in retrievable storage will be sampled and analyzed as the drums are characterized for shipment to WIPP. Headspace gas sampling and analysis also serves to confirm the presence of regulated hazardous constituents. 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 TWCP QA objectives through analysis of field QC samples and adherence to QC practices. Analytical methods for the determination of VOCs in the headspace of mixed TRU waste containers must meet technical performance criteria, be consistent with regulatory guidance, and be compatible with the operational constraints associated with the analysis of actinide-contaminated materials. Methods for the collection of headspace gases are based on SW-846, on the "Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air" (EPA, 1988), and in accordance with the requirements of the WIPP QAPP. DOE has modified the EPA methods to accommodate the characteristics of mixed TRU waste headspace gas samples. These samples include SA 010 and SA 011 (DOE, 1994).

#### B.3.2.2.4 Solid Waste Sampling and Analysis

The following describes the methods for collecting samples of mixed TRU waste classified as homogeneous solids or soils. Sampling protocol is based on sampling methods similar to those approved by EPA for solid waste and soil sampling in *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 statistical basis for sampling is described in Section B.3.2.2.5.

The mixed TRU waste classified as homogeneous solids or soils is packaged in either 55-gallon drums or in smaller containers within 55-gallon drums. Drums may contain mixed TRU waste within a 55-gallon polyethylene bag or may consist of up to 20 or more small containers within a 55-gallon polyethylene bag. For drums 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 may be analyzed are listed in Table B-16.

To accomplish sampling of these wastes, the techniques described below have been developed for sample and subsample collection. The sampling techniques are designed to obtain a representative sample from the container (e.g., 55-gallon drum, 1-gallon polyethylene bottle); the subsampling techniques are designed to obtain a representative subsample from the sample. Subsampling is conducted to provide laboratories the minimum amount of required sample, thus minimizing the quantity of investigation-derived waste.

The methods used to collect samples of mixed TRU waste classified as homogeneous solids or soils from 55-gallon drums and smaller containers must be such that the samples are representative of the waste from which they are taken. For 55-gallon drums containing 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 drum.

#### Sample Core Collection

Coring tools must be used to collect cores of homogeneous solids or soils from 55-gallon drums and smaller 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 may be used in lieu of a rotational coring tool.

Rotational coring tools (i.e., lightweight augers) and nonrotational coring tools (i.e., thin-walled samplers) have each been tested for their ability to collect a vertical core of simulated solidified waste contained in 55-gallon drums and 1-gallon polyethylene bottles, as described in "Idaho National Engineering Laboratory Simulated Solidified Transuranic Waste Sampling Program" (EG&G, 1994). The rotational coring tool used at the INEEL has demonstrated core recoveries greater than 75 percent for soft simulated wastes and greater than 94 percent for hard simulated waste. The sampling tool has been designed to minimize the transfer of frictional heat to the core, thereby minimizing potential loss of VOCs. The nonrotational coring tool has demonstrated core recoveries greater than 88 percent for soft simulated wastes. LANL will use coring tools similar to those developed at the INEEL.

#### Subsample Collection

To obtain representative subsamples, subsampling of the sample core is required. Subsampling must be conducted as soon as possible after sample core collection to minimize the loss of VOCs. If a substantial delay (e.g., several minutes) is expected between sample core collection and subsampling, the sample core must remain in the sleeve and the sleeve must be capped at each end. Subsamples for VOCs must be collected prior to extruding the sample core from the sleeve. The sampling location must be randomly selected along the long axis of the sleeve and access to the waste must be gained by making a perpendicular cut through the sleeve and the waste it contains.

#### B.3.2.2.5 Statistical Approach for Headspace Gas and Solid Waste Sampling

A statistical approach will be used to select heterogeneous waste containers for headspace gas sampling. The same approach will be used 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 process knowledge and, thus, represent populations that contain similar waste. Drums are first segregated into waste streams based on existing characterization information. The methods used to segregate drums into waste streams and lots for sampling within waste streams are detailed in the LANL TRU Waste Characterization Sampling Plan (LANL, 1995c), a site-specific document required by the WIPP QAPP. An initial number of drums is selected from each waste stream for sampling and analysis using the method

described in the WIPP QAPP. A minimum of five containers per waste stream are sampled. For waste streams with less than three drums, a total of three samples is taken. The analytical results from the initial round of sampling are used to calculate upper 90 percent one-sided confidence limits for the mean concentrations of RCRA-regulated constituents. Those limits are compared to the RTLs for the constituents. If a hazardous waste determination cannot be made based on the results from the initial round of sampling, an additional number of drums is selected. The number of additional drums for the second round of sampling depends on the variance of the analytical results from the first round. The specific method for calculating the number of drums for additional sampling is found in the WIPP QAPP.

The objective is to classify specific waste streams as hazardous or nonhazardous by determining the average, or mean, and associated variance of the concentration of regulated hazardous constituents in the waste stream. 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.3.2.3 Characterization Procedures for Mixed TRU Wastes to be Treated

Chemical and physical characterization is performed prior to treatment of mixed TRU waste, in accordance with 20 NMAC 4.1, Subpart V, 264.13 [1-1-97]. Characterization of mixed TRU waste is accomplished by applying process knowledge or by obtaining chemical analytical data from representative samples of mixed TRU liquid waste (e.g., evaporator bottoms solutions) to be treated by solidification. Preliminary mixed TRU waste characterization is developed using process knowledge and through the use of a radioactive and mixed waste certification program. Documented and auditable acceptable knowledge, as described in Section B.3.2.2, is used to determine whether the waste stream is regulated as a hazardous waste. If a homogeneous mixed TRU waste cannot be adequately characterized because of insufficient process information, sampling and analysis are performed.

Homogeneous solids and liquids are the only mixed TRU waste types treated. Waste streams in the homogeneous solids (Matrix Parameter Code S3000) category may contain RCRA-regulated metals. These homogeneous waste streams are periodically sampled and analyzed for the TC metal contaminants listed in 20 NMAC 4.1, Subpart II, 261.24 [1-1-97]. For liquids (Matrix Parameter Code L1000), the total values are directly correlated to the maximum concentration of contaminants listed in 20 NMAC 4.1, Subpart II, 261.24 [1-1-97].

Initial predictions of hazardous constituents present in each treated waste stream will be based on process knowledge, with waste sampling and analysis performed as necessary to obtain qualitative and quantitative data for hazardous constituents (i.e., metals). Table B-11 summarizes characterization methods by matrix parameter code. Parameters and analytical methods for specific hazardous constituents are presented in Table B-16.

Sampling of treated mixed TRU waste may be performed at other appropriate LANL facilities. For this additional sampling effort, LANL will use statistically-based sampling and analysis, along with RTR, visual examination, and headspace gas analysis, as described in Section B.3.2.

Mixed TRU liquid waste is periodically sampled and analyzed for total metal content, VOCs, and SVOCs. Alternatively, core samples of post-treatment cemented waste may be analyzed. 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 mixed TRU waste comply with LANL-specific protocol consistent with *SW-846*. For purposes of collecting a representative sample of mixed TRU waste, 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. Sampling of mixed TRU waste to be treated is conducted according to the procedures described in the applicable TA-specific Part B permit application. Specific information relative to sampling, parameters, and analytical methods is outlined in Tables B-11 and B-16.

#### **B.3.2.4 Sample Handling, Preservation, and Storage**

Table B-13 presents *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 laboratories at LANL and/or approved subcontractor laboratories will perform the detailed qualitative and quantitative chemical analyses specified in Table B-16 of this WAP. These laboratories must have:



- The capability of handling TRU material waste
- A documented comprehensive QA/QC program that meets the WIPP QAPP requirements
- 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 mixed TRU waste 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)
- Meet requirements of the WIPP QAPP.

Collectively, these factors contributed to the selection of the analytical methods specified in Table B-16. Qualified analytical laboratories at LANL and/or approved subcontractor laboratories that meet the above criteria will analyze mixed TRU waste samples for RCRA-regulated hazardous constituents (VOCs, SVOCs, and metals) and characteristic according to *SW-846* or documented and approved equivalent methods.

### **B.3.3 HE Waste and HE-Contaminated Waste Characterization**

HE waste and HE-contaminated waste at LANL are treated by OB or OD to remove the characteristic of reactivity. 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. Wastes that may contain concentrated HE are characterized by process knowledge, as described in Section B.3.1.1.1. 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." 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 is used.

- If the waste contains visible HE, it is considered reactive.
- If the waste came into direct contact with HE and all of the surfaces cannot be tested (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 by High Performance Liquid Chromatography, *SW-846* Method 8330. 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-17.

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 a TCLP test. This creates the need for further characterization of the residue ash/debris after a burn. Sampling and analysis for ash generated by OB is summarized in Table B-18. The residue ash/debris from metal containing wastes is analyzed using TCLP and recharacterized according to the results. The residues from the treating of wastes with F002, F004, and F005 materials continue to carry these EPA Hazardous Waste Numbers and are disposed of accordingly.

#### B.4 OFF-SITE WASTE ACCEPTANCE PROCEDURES [20 NMAC 4.1, Subpart V, 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 NMAC 4.1, Subpart V, 264.13(a)(3)(ii), 264.13(a)(4), 264.13(b)(5), and 264.13(c) [1-1-97]. Table 2-3 of this General Part B Permit 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 6 of the General Part B Permit 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 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.

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 the TSDF, 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.

Additional waste characterization activities in support of WIPP certification will generally be the purpose of mixed TRU waste 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 QAPP.

#### **B.5 SPECIAL PROCEDURAL REQUIREMENTS [20 NMAC 4.1, Subpart V, 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 NMAC 4.1, Subpart V, 264.17 [1-1-97], 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, they are labeled appropriately, and the waste types are physically segregated within each container storage area. The wastes are segregated specifically 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 waste will be followed pursuant to 20 NMAC 4.1, Subpart V, 264.17 [1-1-97]. LANL personnel will take the necessary precautions to prevent accidental ignition or reaction of wastes to be treated by OB and OD. LANL relies on standard operating 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 and 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.

#### **B.5.3 Procedures to Ensure Compliance with LDR Requirements [20 NMAC 4.1, Subpart VIII, 268.7(a) and 268.7(b)(3), (4), and (5)]**

In accordance with LDR requirements, waste to be shipped off site may need to be analyzed to determine whether it meets the applicable LDR treatment standards in 20 NMAC 4.1, Subpart VIII, Part 268, Subpart D [1-1-97]. Treatment standards are expressed in two ways: (1) as constituent concentrations in the waste (from either an extract of the waste, as determined by the TCLP, or from the total volume of the waste, referred to as total waste analysis) or (2) as specified treatment technologies. Waste that must meet concentration-based treatment standards prior to shipment off site for disposal will be evaluated to determine if applicable constituent concentration levels have been attained. This will be accomplished by testing the waste or by using acceptable knowledge. Testing will be conducted only to certify that a waste meets LDR treatment standards. If a waste meets applicable LDR treatment standards based on acceptable knowledge, then testing to certify LDR compliance is not necessary. All analytical results completed in support of LDR requirements will be retained within the facility operating record.

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 NMAC 4.1, Subpart VIII, 268.7(b) [1-1-97].

Wastes that exceed applicable LDR treatment standards will be sent to a permitted TSDF if treatment options are available. For off-site shipment of these wastes, LDR notifications, with information required under 20 NMAC 4.1, Subpart VIII, 268.7 [1-1-97], will be supplied. In addition to the LDR notification, additional data for the waste stream (e.g., generator's characterization documentation and analytical data) may be provided to the designated TSDF.

Any wastes that are determined through analysis to meet treatment standards as specified in 20 NMAC 4.1, Subpart VIII, Part 268, Subpart D [1-1-97], will be land disposed in a permitted TSDF without further treatment, with the exception of wastes that have been specifically exempted from LDR requirements, or disposed of or treated in other than a land disposal waste management unit. For example, mixed TRU wastes destined for WIPP will not be subject to LDR. An LDR notification, including applicable analytical records to support the notification, will be prepared and will accompany the shipment of waste to the receiving TSDF.

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

LANL waste streams described in this document may be subject to the Code of Federal Regulations, Title 40 (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 264.1082, LANL will address the applicable Subpart CC requirements for control of air pollutant emissions from each hazardous waste management unit subject to the regulations. LANL requires that Subpart CC requirements be met by the generator as part of the waste characterization process. The generator determines whether the concentration of VOCs in a waste stream at the point of generation is less than 500 parts per million (ppm), or equal to or greater than 500 ppm by weight. The generator documents this determination for that waste stream. Acceptable knowledge or process knowledge may 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-14, B-15, B-16, and B-17.

## B.6 REFERENCES

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**Table B-2**  
**Descriptions of Hazardous Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
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 <sup>d</sup> Sampling and Analysis	D001	Ignitability	NA <sup>e</sup>
			D002	Corrosivity	NA <sup>e</sup>
			D003	Reactivity	NA <sup>e</sup>
			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
			D028	1,2-Dichloroethane	0.5
			D030	2,4-Dinitrotoluene	0.13
			D032	Hexachlorobenzene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			D040	Trichloroethylene	0.5
			D043	Vinyl chloride	0.2
			F001	Tetrachloroethylene, Trichloroethylene, Methylene chloride, 1,1,1-Trichloroethane, Carbon tetrachloride, Chlorofluorocarbons	NA <sup>e</sup>
			F002	Tetrachloroethylene, Trichloroethylene, 1,1,1-Trichloroethane, 1,1,2-Trichloro-1,2,2-trifluoroethane	NA <sup>e</sup>



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

<b>Waste Description<sup>a</sup></b>	<b>Waste Generating Activity<sup>a</sup></b>	<b>Basis for Hazardous Waste Designation<sup>a</sup></b>	<b>Potential EPA<sup>b</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>c</sup> (milligrams per liter)</b>
Spent Solvents (Continued)			F003	Xylene, Acetone, Ethyl acetate, Ethyl ether, Methanol, Methyl isobutyl ketone, n-Butyl alcohol	NA <sup>e</sup>
			F005	Toluene, Methyl ethyl ketone, Carbon disulfide, Isobutanol, Pyridine, Benzene	NA <sup>e</sup>
Contaminated Solid Wastes	Machining operations, chemical research, decontamination and decommissioning (D&D) projects, metal finishing operations, and general maintenance operations	Acceptable Knowledge <sup>d</sup>	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011 D018 D022 D030 D032 D033 D034 D036 D039 D040 D042	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver Benzene Chloroform 2,4-Dinitrotoluene Hexachlorobenzene Hexachlorobutadiene Hexachloroethane Nitrobenzene Tetrachloroethylene Trichloroethylene 2,4,6-Trichlorophenol	NA <sup>e</sup> NA <sup>e</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.5 6.0 0.13 <sup>f</sup> 0.13 <sup>f</sup> 0.5 3.0 2.0 0.7 0.5 2.0

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

<b>Waste Description<sup>a</sup></b>	<b>Waste Generating Activity<sup>a</sup></b>	<b>Basis for Hazardous Waste Designation<sup>a</sup></b>	<b>Potential EPA<sup>b</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>c</sup> (milligrams per liter)</b>
Contaminated Solid Wastes (Continued)			F001 F002 F003 F005	1,1,1-Trichloroethane, Carbon tetrachloride 1,1,1-Trichloroethane Acetone, Methanol Toluene, Benzene	NA° NA° NA° NA°
Paint and Related Wastes	Painting and finishing operations and general facility maintenance	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001 D005 D006 D007 D008 D009 D011 F003 F005	Ignitability Barium Cadmium Chromium Lead Mercury Silver Xylene Toluene	NA° 100.0 1.0 5.0 5.0 0.2 5.0 NA° NA°
Photographic and Photocopier Wastes	Photographic film processing and photocopier operations	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001 D002 D007 D008 D011	Ignitability Corrosivity Chromium Lead Silver	NA° NA° 5.0 5.0 5.0

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

<b>Waste Description<sup>a</sup></b>	<b>Waste Generating Activity<sup>a</sup></b>	<b>Basis for Hazardous Waste Designation<sup>a</sup></b>	<b>Potential EPA<sup>b</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>c</sup> (milligrams per liter)</b>
Corrosive Liquid Wastes	Analytical chemistry, electroetching, and electropolishing	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001	Ignitability	NA <sup>e</sup>
			D002	Corrosivity	NA <sup>e</sup>
			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	Tetrachloroethylene, Methylene chloride, Trichloroethylene, 1,1,1-Trichloroethane, Chlorobenzene, 1,1,2-Trichloro-1,2,2-trifluoroethane, Ortho-dichlorobenzene, Trichlorofluoromethane, 1,1,2-Trichloroethane	NA <sup>e</sup>
			F003	Methanol	NA <sup>e</sup>
			F005	Toluene, Methyl ethyl ketone, Carbon disulfide, Isobutanol, Pyridine, Benzene, 2-Ethoxyethanol, 2-Nitropropane	NA <sup>e</sup>
Solid Metals and Metallic Compounds	Machining and cutting operations; synthesis reactions; solder from electronic manufacturing, repair, and brazing operations; and grinding operations	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001	Ignitability	NA <sup>e</sup>
			D003	Reactivity	NA <sup>e</sup>
			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

Refer to footnotes at end of table.

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

<b>Waste Description<sup>a</sup></b>	<b>Waste Generating Activity<sup>a</sup></b>	<b>Basis for Hazardous Waste Designation<sup>a</sup></b>	<b>Potential EPA<sup>b</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>c</sup> (milligrams per liter)</b>
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 <sup>d</sup> Sampling and Analysis	D001	Ignitability	NA <sup>e</sup>
			D003	Reactivity	NA <sup>e</sup>
			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
			D038	Pyridine	5.0
			D040	Trichloroethylene	0.5
			F002	Tetrachloroethylene, Methylene chloride, Trichloroethylene, 1,1,1-Trichloroethane, Chlorobenzene, 1,1,2-Trichloro-1,2,2-trifluoroethane, Ortho-dichlorobenzene, Trichlorofluoromethane, 1,1,2-Trichloroethane	NA <sup>e</sup>
			F003	Xylene, Acetone, Ethyl acetate, Ethyl benzene, Ethyl ether, Methyl isobutyl ketone, n-Butyl Alcohol, Cyclohexanone, Methanol	NA <sup>e</sup>
			F005	Toluene, Methyl ethyl ketone, Carbon disulfide, Isobutanol, Pyridine, Benzene, 2-Ethoxyethanol, 2-Nitropropane	NA <sup>e</sup>
Mercury Wastes	Lamp replacement, chemical research, mercury spill cleanup, and equipment cleaning and maintenance	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D009 U151	Mercury Mercury	0.2 NA <sup>e</sup>

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

<b>Waste Description<sup>a</sup></b>	<b>Waste Generating Activity<sup>a</sup></b>	<b>Basis for Hazardous Waste Designation<sup>a</sup></b>	<b>Potential EPA<sup>b</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>c</sup> (milligrams per liter)</b>
Used Batteries and Battery Fluids	Equipment maintenance	Acceptable Knowledge <sup>d</sup>	D002 D006 D007 D008 D009 D011	Corrosivity Cadmium Chromium Lead Mercury Silver	NA <sup>e</sup> 1.0 5.0 5.0 0.2 5.0
Unused/Off-specification Commercial Chemical Products	R&D and general facility operations	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001 D002 D003 D004 through D043  All P- and U-listed EPA Hazardous Waste Numbers <sup>g</sup>	Ignitability Corrosivity Reactivity Toxicity characteristic wastes  Discarded commercial chemical products and off-specification species	NA <sup>e</sup> NA <sup>e</sup> NA <sup>e</sup> - <sup>e</sup>  NA <sup>e</sup>
Gas Cylinder Waste	R&D and general facility operations	Acceptable Knowledge <sup>d</sup>	D001 D002 D003 Potential D-coded EPA Hazardous Waste Numbers  Potential P- and U-listed EPA Hazardous Waste Numbers <sup>g</sup>	Ignitability Corrosivity Reactivity Toxicity characteristic wastes  Discarded commercial chemical products and off-specification species	NA <sup>e</sup> NA <sup>e</sup> NA <sup>e</sup> - <sup>e</sup>  NA <sup>e</sup>

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

<b>Waste Description<sup>a</sup></b>	<b>Waste Generating Activity<sup>a</sup></b>	<b>Basis for Hazardous Waste Designation<sup>a</sup></b>	<b>Potential EPA<sup>b</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>c</sup> (milligrams per liter)</b>
Environmental Restoration 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 closure.	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001	Ignitability	NA <sup>e</sup>
			D003	Reactivity	NA <sup>e</sup>
			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 <sup>f</sup>
			D032	Hexachlorobenzene	0.13 <sup>f</sup>
			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	1,1,1-Trichloroethane, Carbon tetrachloride	NA <sup>e</sup>
			F002	1,1,1-Trichloroethane	NA <sup>e</sup>
			F003	Acetone, Methanol	NA <sup>e</sup>
			F005	Toluene, Benzene	NA <sup>e</sup>

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

<b>Waste Description<sup>a</sup></b>	<b>Waste Generating Activity<sup>a</sup></b>	<b>Basis for Hazardous Waste Designation<sup>a</sup></b>	<b>Potential EPA<sup>b</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>c</sup> (milligrams per liter)</b>
Environmental Restoration Aqueous Liquids	Decontamination of remedial equipment, drilling fluids and well development fluids, septic tank liquids, and contaminated stormwater runoff	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D001	Ignitability	NA <sup>e</sup>
			D002	Corrosivity	NA <sup>e</sup>
			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	Tetrachloroethylene, Methylene chloride, Trichloroethylene, 1,1,1-Trichloroethane, Chlorobenzene, 1,1,2-Trichloro-1,2,2-trifluoroethane, Ortho-dichlorobenzene, Trichlorofluoromethane, 1,1,2-Trichloroethane	NA <sup>e</sup>
			F003	Methanol	NA <sup>e</sup>
			F005	Toluene, Methyl ethyl ketone, Carbon disulfide, Isobutanol, Pyridine, Benzene, 2-Ethoxyethanol, 2-Nitropropane	NA <sup>e</sup>

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

<b>Waste Description<sup>a</sup></b>	<b>Waste Generating Activity<sup>a</sup></b>	<b>Basis for Hazardous Waste Designation<sup>a</sup></b>	<b>Potential EPA<sup>b</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>c</sup> (milligrams per liter)</b>
Environmental Restoration Debris	Site decommissioning, site characterization, and site remediation; includes septic tank and detention basin closure, removal actions, and other remedial actions and site closure.	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>e</sup>
			D003	Reactivity	NA <sup>e</sup>
			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 <sup>f</sup>
			D032	Hexachlorobenzene	0.13 <sup>f</sup>
			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	1,1,1-Trichloroethane, Carbon tetrachloride	NA <sup>e</sup>
			F002	1,1,1-Trichloroethane	NA <sup>e</sup>
			F003	Acetone, Methanol	NA <sup>e</sup>
			F005	Toluene, Benzene	NA <sup>e</sup>



**Table B-2 (Continued)**

**Descriptions of Hazardous Waste Stored at LANL**

- <sup>a</sup> Denotes information from the Los Alamos National Laboratory Waste Profile Form database.
- <sup>b</sup> U.S. Environmental Protection Agency.
- <sup>c</sup> 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 NMAC 4.1), Subpart II, Part 261, Subpart C [1-1-97].
- <sup>d</sup> 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.
- <sup>e</sup> Not applicable: Refers to the absence of regulatory limits for ignitable, corrosive, and reactive characteristic wastes and F-, P-, and U-listed wastes.
- <sup>f</sup> The quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level (20 NMAC 4.1, Subpart II, 261.24, Table 1 [1-1-97]).
- <sup>g</sup> Refers to the P- and U-listed wastes found in the Los Alamos National Laboratory, 1998, "Los Alamos National Laboratory General Part A Permit Application," Revision 0.0, Los Alamos National Laboratory, Los Alamos, New Mexico.

**Table B-3**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
<b>Solid Homogeneous Wastes</b>					
Soils with Heavy Metals	Decontamination and decommissioning (D&D) and environmental restoration (ER) activities	Acceptable Knowledge <sup>d</sup> and Preliminary Analysis <sup>a</sup>	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
Environmental Restoration Soils	Remediation of release sites and D&D activities	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D028 D029 F001 F002	1,2-Dichloroethane 1,1-Dichloroethylene 1,1,1-Trichloroethane 1,1,1-Trichloroethane	0.5 0.7 NA <sup>e</sup> NA <sup>e</sup>
Inorganic Solid Oxidizers	Research and development (R&D) and D&D of research laboratories	Acceptable Knowledge <sup>d</sup>	D001 D003 D005	Ignitability Reactivity Barium	NA <sup>e</sup> NA <sup>e</sup> 100.0
<b>Solid Heterogeneous Wastes</b>					
Lead for Surface Decontamination	Radioisotope experiments and other reactor, accelerator, laser, and x-ray applications	Acceptable Knowledge <sup>d</sup>	D008	Lead	5.0
Other Lead Wastes	Radioisotope experiments and other reactor, accelerator, laser, and x-ray applications (where the lead is not amenable to decontamination)	Acceptable Knowledge <sup>d</sup>	D003 D007 D008 D009	Reactivity Chromium Lead Mercury	NA <sup>e</sup> 5.0 5.0 0.2

**Table B-3 (Continued)**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
<b>Solid Heterogeneous Wastes (Continued)</b>					
Noncombustible Debris	Maintenance, D&D of research laboratories or equipment, R&D, and ER activities	Acceptable Knowledge <sup>d</sup>	D001 D003 D004 D005 D006 D007 D008 D009 D010 D011	Ignitability Reactivity Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	NA <sup>f</sup> NA <sup>f</sup> 5.0 100.0 1.0 5.0 5.0 0.2 1.0 5.0
Combustible Debris	Maintenance, R&D, D&D, and ER activities	Acceptable Knowledge <sup>d</sup>	D001 D003 D005 D006 D007 D008 D009 D011 F001 F002 F003 F005	Ignitability Reactivity Barium Cadmium Chromium Lead Mercury Silver 1,1,1-Trichloroethane 1,1,1-Trichloroethane Spent nonhalogenated solvents Spent nonhalogenated solvents	NA <sup>f</sup> NA <sup>f</sup> 100.0 1.0 5.0 5.0 0.2 5.0 NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup> NA <sup>f</sup>

**Table B-3 (Continued)**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
<b>Solid Heterogeneous Wastes (Continued)</b>					
Organic-Contaminated Noncombustible Solids	Vacuum pump maintenance, R&D, D&D, and ER activities	Acceptable Knowledge <sup>d</sup>	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
			D027	1,4-Dichlorobenzene	7.5
			D030	2,4-Dinitrotoluene	0.13 <sup>g</sup>
			D032	Hexachlorobenzene	0.13 <sup>g</sup>
			D033	Hexachlorobutadiene	0.5
			D034	Hexachloroethane	3.0
			D042	2,4,6-Trichlorophenol	2.0
			F001	1,1,1-Trichloroethane, Trichloroethylene	NA <sup>f</sup>
			F002	Chlorobenzene <sup>h</sup> , Methylene chloride, Tetrachloroethylene <sup>h</sup> , Trichloroethylene	NA <sup>f</sup>
			F004	Carbon disulfide <sup>h</sup> , Nitrobenzene <sup>h</sup>	NA <sup>f</sup>
			F005	Toluene, Methyl ethyl ketone <sup>h</sup> , Benzene <sup>h</sup>	NA <sup>f</sup>

**Table B-3 (Continued)**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
<b>Solid Heterogeneous Wastes (Continued)</b>					
Organic-Contaminated Combustible Solids	Maintenance, D&D, and ER activities	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>i</sup>
			D003	Reactivity	NA <sup>i</sup>
			D007	Chromium	5.0
			D008	Lead	5.0
			D009	Mercury	0.2
			D030	2,4-Dinitrotoluene	0.13 <sup>g</sup>
			D035	Methyl ethyl ketone <sup>h</sup>	
			F001	1,1,1-Trichloroethane, Carbon tetrachloride	NA <sup>i</sup>
			F002	1,1,1-Trichloroethane, Tetrachloroethylene <sup>h</sup> , Trichlorethylene	NA <sup>i</sup>
			F003	Acetone, Ethyl Acetate, Methanol, Methyl isobutyl ketone, Xylene	NA <sup>i</sup>
Water-Reactive Wastes	Preparative machining and debris cleanup	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>i</sup>
			D003	Reactivity	NA <sup>i</sup>
			D005	Barium	100.0
			F002	1,1,1-Trichloroethane	NA <sup>i</sup>
Mercury Wastes	Cleanup operations	Acceptable Knowledge <sup>d</sup>	D007	Chromium	5.0
			D008	Lead	5.0
			D009	Mercury	0.2
			F001	1,1,1-Trichloroethane	NA <sup>i</sup>

**Table B-3 (Continued)**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

<b>Waste Description<sup>a</sup></b>	<b>Waste Generating Activity<sup>a</sup></b>	<b>Basis for Hazardous Waste Designation<sup>a</sup></b>	<b>Potential EPA<sup>b</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>c</sup> (milligrams per liter)</b>
<b>Solid Heterogeneous Wastes (Continued)</b>					
Unused Solid Reagent Chemicals	R&D activities	Acceptable Knowledge <sup>d</sup>	D001 D002 All P- and U- listed EPA Hazardous Waste Numbers <sup>i</sup>	Ignitability Corrosivity Discarded commercial chemical products and off-specification species	NA <sup>i</sup> NA <sup>i</sup> NA <sup>i</sup>

**Table B-3 (Continued)**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
<b>Liquid Wastes</b>					
Spent Solvents and Contaminated Solvent Mixtures	Extraction operations, bench-scale experimental inorganic chemistry, environmental analysis, radiochemistry; maintenance, cleaning, and degreasing activities	Acceptable Knowledge <sup>d</sup>	D001	Ignitability	NA <sup>e</sup>
			D002	Corrosivity	NA <sup>e</sup>
			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 <sup>g</sup>
			D032	Hexachlorobenzene	0.13 <sup>g</sup>
			D033	Hexachlorobutadiene	0.5
			D034	Hexachloroethane	3.0
			D036	Nitrobenzene	2.0

**Table B-3 (Continued)**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
<b>Liquid Wastes (Continued)</b>					
Spent Solvents and Contaminated Solvent Mixtures (continued)			D042 D043 F001	2,4,6-Trichlorophenol Vinyl chloride Tetrachloroethylene <sup>b</sup> , Trichloroethylene <sup>b</sup> , Methylene chloride, 1,1,1-Trichloroethane, Carbon tetrachloride, Chlorinated fluorocarbons	2.0 0.2 NA <sup>i</sup>
			F002	Tetrachloroethylene <sup>b</sup> , Trichloroethylene <sup>b</sup> , 1,1,1-Trichloroethane, 1,1,2-Trichloro-1,2,2-trifluoroethane	NA <sup>i</sup>
			F003	Xylene, Acetone, Ethyl acetate, Ethyl ether, Methyl isobutyl ketone, n-Butyl alcohol, Methanol	NA <sup>i</sup>
			F005	Toluene, Methyl ethyl ketone <sup>b</sup> , Carbon disulfide, Isobutanol, Pyridine <sup>b</sup> , Benzene	NA <sup>i</sup>
Corrosive Liquid Wastes	Radiochemistry research, plutonium-processing operations, and analytical chemistry	Acceptable Knowledge <sup>d</sup>	D001 D002 D007 D009 D010 D011 D036	Ignitability Corrosivity Chromium Mercury Selenium Silver Nitrobenzene	NA <sup>i</sup> NA <sup>i</sup> 5.0 0.2 1.0 5.0 2.0



**Table B-3 (Continued)**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
<b>Liquid Wastes (Continued)</b>					
Aqueous Liquids Contaminated with Heavy Metals	ER activities, metal polishing operations, and radiochemistry research	Acceptable Knowledge <sup>d</sup> Sampling and Analysis <sup>i</sup>	D001	Ignitability	NA <sup>j</sup>
			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
Oil Wastes	Equipment maintenance operations	Acceptable Knowledge <sup>d</sup>	D011	Silver	5.0
			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
			D028	1,2-Dichloroethane	0.5
			F001	Tetrachloroethylene <sup>h</sup> , Trichloroethylene <sup>h</sup> , Methylene chloride, 1,1,1-Trichloroethane, Carbon tetrachloride <sup>h</sup> , Chlorinated fluorocarbons	NA <sup>j</sup>
			F002	Tetrachloroethylene <sup>h</sup> , Trichloroethylene <sup>h</sup> , 1,1,1-Trichloroethane, 1,1,2-Trichloro-1,2,2-trifluoroethane	NA <sup>j</sup>

**Table B-3 (Continued)**  
**Descriptions of Mixed Low-Level Waste Stored at LANL**

Waste Description <sup>a</sup>	Waste Generating Activity <sup>a</sup>	Basis for Hazardous Waste Designation <sup>a</sup>	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
<b>Liquid Wastes (Continued)</b>					
Oil Wastes (continued)			F003	Xylene, Acetone, Ethyl acetate, Ethyl ether, Methyl isobutyl ketone, n-Butyl alcohol, Methanol	NA <sup>i</sup>
			F005	Toluene, Methyl ethyl ketone <sup>h</sup> , Carbon disulfide, Isobutanol, Pyridine <sup>h</sup> , Benzene <sup>h</sup>	NA <sup>i</sup>
Unused Liquid Reagent Chemicals	R&D activities	Acceptable Knowledge <sup>d</sup>	D001 D002 All P- and U-listed EPA Hazardous Waste Numbers <sup>i</sup>	Ignitability Corrosivity Discarded commercial chemical products and off-specification species	NA <sup>i</sup> NA <sup>i</sup> NA <sup>i</sup>
<b>Gas Cylinder Waste</b>					
Gas Cylinder Waste	R&D and general facility operations	Acceptable Knowledge <sup>d</sup>	D001 D002 D003 Potential D-coded EPA Hazardous Waste Numbers	Ignitability Corrosivity Reactivity Toxicity characteristic wastes	NA <sup>e</sup> NA <sup>e</sup> NA <sup>e</sup> - <sup>c</sup>
			Potential P- and U-listed EPA Hazardous Waste Numbers <sup>i</sup>	Discarded commercial chemical products and off-specification species	NA <sup>e</sup>

Refer to footnotes at end of table.

### Table B-3 (Continued)

#### Descriptions of Mixed Low-Level Waste Stored at LANL

- <sup>a</sup> Denotes information from the "Report for the Characterization Review of Low-Level Mixed Waste," 1995, Los Alamos National Laboratory, Los Alamos, New Mexico.
- <sup>b</sup> U.S. Environmental Protection Agency.
- <sup>c</sup> 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 NMAC 4.1), Subpart II, Part 261, Subpart C [1-1-97].
- <sup>d</sup> 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.
- <sup>e</sup> Limited and/or preliminary analysis: In reference to the basis for hazardous waste classification, indicates that sampling and analysis has been performed but that the data may not be completely documented or that data may exist but may not be verifiable.
- <sup>f</sup> Not applicable: Refers to the absence of regulatory limits for ignitable, corrosive, and reactive characteristic wastes and F-, P-, and U-listed wastes.
- <sup>g</sup> The quantitation limit is greater than the calculated regulatory level. The quantitation limit therefore becomes the regulatory level (20 NMAC 4.1, Subpart II, 261.24, Table 1 [1-1-97]).
- <sup>h</sup> Process knowledge provided information that these constituents may have been used as solvents. Toxicity characteristic regulatory levels may also apply and will be evaluated.
- <sup>i</sup> Refers to the P- and U-listed wastes found in the Los Alamos National Laboratory, 1998, "Los Alamos National Laboratory General Part A Permit Application," Revision 0.0, Los Alamos National Laboratory, Los Alamos, New Mexico.

**Table B-4**

**Cross Reference of Matrix Parameter Codes with  
TRUCON<sup>a</sup>, IDC<sup>b</sup>, and RSWD<sup>c</sup> Codes**

<b>Matrix Parameter Code<sup>d</sup></b>	<b>TRUCON Code(s)</b>	<b>IDC Code(s)</b>	<b>RSWD Code(s)</b>	<b>Waste Description</b>
S3000 (Homogeneous Solids)	LA 111/211	002 003	A75 A76 A25 A26 A29	Stabilized Inorganic Process Solids and Aqueous Waste
	LA 114/214	006	A24 A25 A26	Solidified Inorganic Process Solids
	LA 124/224	005P2S	A27 A28 A29	Uncemented Inorganics
	LA 126	006	A24 A25 A26 A29 A46	Solidified Organic Process Solids
	LA 112/212	none	A20 A21 A70	Absorbed Organics on Vermiculite
S4000 (Soils/ Gravel)	none	none	A90	Contaminated Soils
S5000 (Debris Waste)	LA 115/215	005P2G	A10 A46	Graphite Waste
	LA 116/216	004	A14 A15 A16 A17 A18 A19 A35 A40 A60	Combustible Waste
	LA 117/217	005LM	A30 A31 A41 A50 A51 A52 A61 A80 A85	Metal Waste
	LA 118/218	005LG	A47 A95	Glass Waste/Noncombustible Waste

**Table B-4 (Continued)**

**Cross Reference of Matrix Parameter Codes with  
TRUCON<sup>a</sup>, IDC<sup>b</sup>, and RSWD<sup>c</sup> Codes**

Matrix Parameter Code <sup>d</sup>	TRUCON Code(s)	IDC Code(s)	RSWD Code(s)	Waste Description
S5000 (Debris Waste) (Cont'd)	LA 119/219	005	A55 A56	High-Efficiency Particulate Air Filters
	LA 120/220	none	A80	Isotopic Source Waste
	LA 122/222	none	A36	Inorganic Solid Waste
	LA 123	005P1	A61	Lead-Lined Gloves and Metal Waste
	LA 125/225	001	A14 A19 A30 A31 A36 A40 A41 A47 A52 A55 A56 A61 A72 A74 A77	Combustible/Noncombustible Waste

<sup>a</sup> TRUCON = Transuranic Package Transporter-II (TRUPACT-II) Content

<sup>b</sup> IDC = Item Description Code

<sup>c</sup> RSWD = Radioactive Solid Waste Disposal

<sup>d</sup> Information in this column was extracted from the "TRU Waste Characterization Quality Assurance Program Plan," U.S. Department of Energy, 1994 and all approved updates, CAO-94-1010, U.S. Department of Energy, Carlsbad Area Office, Carlsbad, New Mexico.

**Table B-5**  
**Descriptions of Mixed TRU Waste Stored at LANL<sup>a</sup>**

TRUCON Codes	Waste Description	Waste Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
LA 111/211	Stabilized Inorganic Process Solids and Aqueous Waste	Plutonium (Pu)-processing operations and D&D activities	Acceptable Knowledge <sup>d</sup>	D004 D005 D006 D007 D008 D009 None	Arsenic Barium hydroxide Cadmium Chromium Lead Mercury Beryllium hydroxide	5.0 100.0 1.0 5.0 5.0 0.2 None
LA 112/212	Absorbed Organics on Vermiculite	Organics absorbed on vermiculite as a result of Pu-processing	Acceptable Knowledge <sup>d</sup>	TBD*	TBD*	TBD*
LA 114/214	Solidified 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 Pu-processing	Acceptable Knowledge <sup>d</sup>	D002 D004 D006 D007 D008 D009	Hydrofluoric acid Arsenic Cadmium Chromium Lead Mercury	NA' 5.0 1.0 5.0 5.0 0.2
LA 115/215	Graphite Waste	Discarded graphite molds, furnace equipment, and a small fraction of combustible waste generated from Pu-processing and casting operations	Acceptable Knowledge <sup>d</sup>	D004 D006 D008 None None	Arsenic Cadmium Lead Beryllium Nickel	5.0 1.0 5.0 None None
LA 116/216	Combustible Waste	Combustible solids (e.g., paper, rags, plastic, rubber) and a small fraction of noncombustible (e.g., metal scrap) generated from research and development (R&D), process and recovery, and D&D operations	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D002 D004 D005 D006 D008 D009 D019 D022 D028 D040 F002 F003 F005 None None None None None	Hydrofluoric acid Arsenic Barium Cadmium Lead Mercury Carbon tetrachloride Chloroform Dichloroethane Trichloroethylene 1,1,1-Trichloroethane Acetone Toluene Beryllium Beryllium hydroxide Bromobenzene Nickel Tributyl phosphate	NA' 5.0 100.0 1.0 5.0 0.2 0.5 6.0 0.5 0.5 NA' NA' NA' None None None None None

**Table B-5 (Continued)**  
**Descriptions of Mixed TRU Waste Stored at LANL<sup>a</sup>**

TRUCON Codes	Waste Description	Waste Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
LA 117/217	Metal Waste	Metal waste (e.g., motors, pumps, tools, process equipment) with a small fraction of combustible waste (e.g., plastics) generated by R&D, process and recovery, and D&D operations	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D002 D005 D008 D019 None	Hydrofluoric acid Barium Lead Carbon tetrachloride Beryllium	NA <sup>i</sup> 100.0 5.0 0.5 None
LA 118/218	Glass Waste/Noncombustible Waste	Glass waste (e.g., discarded labware, windows, bottles) with a small fraction of combustibles (e.g., plastics) generated from Pu-processing	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D002 D005 D008 D009 D019	Hydrofluoric acid Barium Lead Mercury Carbon tetrachloride	NA <sup>i</sup> 100.0 5.0 0.2 0.5
LA 119/219	High-Efficiency Particulate Air (HEPA) Filters	HEPA filters from exhaust air systems associated with Pu-processing	Acceptable Knowledge <sup>d</sup>	TBD <sup>*</sup>	TBD <sup>*</sup>	TBD <sup>*</sup>
LA 120/220	Isotopic Source Waste	R&D activities	Acceptable Knowledge <sup>d</sup>	TBD <sup>*</sup>	TBD <sup>*</sup>	TBD <sup>*</sup>
LA 122/222	Inorganic Solid Waste	Noncombustible building debris, glovebox debris, and other solid waste debris generated by R&D, process and recovery, and D&D operations	Acceptable Knowledge <sup>d</sup>	TBD <sup>*</sup>	TBD <sup>*</sup>	TBD <sup>*</sup>
LA 123	Lead-Lined Gloves and Metal Waste	Lead-lined glovebox gloves and metal waste (e.g., motors, tools, discarded metals) generated from Pu-processing	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D002 D004 D006 D008 D009 D019 None None None	Hydrofluoric acid Arsenic Cadmium Lead Mercury Carbon tetrachloride Beryllium hydroxide Bromobenzene Nickel	NA <sup>i</sup> 5.0 1.0 5.0 0.2 0.5 None None None
LA 124/224	Uncemented Inorganics	Used chloride salts from pyrochemical processes (e.g., electrorefining, molten salt extraction, salt stripping, fluoride reduction, direct oxide reduction) and a small fraction of combustible waste (e.g., plastic) generated from Pu-processing	Acceptable Knowledge <sup>d</sup> Sampling and Analysis	D004 D006 D008 D009 None None	Arsenic Cadmium Lead Mercury Beryllium hydroxide Nickel	5.0 1.0 5.0 0.2 None None

Refer to footnotes at end of table.

**Table B-5 (Continued)**  
**Descriptions of Mixed TRU Waste Stored at LANL<sup>a</sup>**

TRUCON Codes	Waste Description	Waste Generating Activity	Basis for Hazardous Waste Designation	Potential EPA <sup>b</sup> Hazardous Waste Numbers	Potential Hazardous Constituents in the Waste	Regulatory Limits <sup>c</sup> (milligrams per liter)
LA 125/225	Combustible/Noncombustible Waste	Metal equipment from decommissioning (e.g., gloveboxes, process equipment, ductwork); small volumes of combustibles from decommissioning, sectioning, and packaging	Acceptable Knowledge <sup>d</sup>	D006 D008	Cadmium Lead	1.0 5.0
LA 126	Solidified Organic Process Solids	Solidified process residues (e.g., evaporator bottoms and other discardable solutions; processed leached solids, ash, filter cakes, salts, metal oxides, fines that are immobilized in cement) generated from Pu-processing operations	Acceptable Knowledge <sup>d</sup>	D002 D004 D006 D007 D008 D009 D019 D021 D022 D028 D040 F002 None None None None None None None None None None	Hydrofluoric acid Arsenic Cadmium Chromium Lead Mercury Carbon tetrachloride Chlorobenzene Chloroform Dichloroethane Trichloroethylene 1,1,1-Trichloroethane Acetone Beryllium Bromobenzene Ethanol Methanol Methylene chloride n-Butyl alcohol Toluene Xylene	NA <sup>e</sup> 5.0 1.0 5.0 5.0 0.2 0.5 100.0 6.0 0.5 0.5 NA <sup>f</sup> None None None None None None None None None None

<sup>a</sup> This table is based on preliminary information from the Los Alamos National Laboratory, 1994, "Draft Transuranic Waste Stream Hazardous Material Characterization Study," Revision 0.0, Los Alamos National Laboratory, Los Alamos, New Mexico.

<sup>b</sup> U.S. Environmental Protection Agency.

<sup>c</sup> 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 [1-1-97].

<sup>d</sup> 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.

<sup>e</sup> To be determined.

<sup>f</sup> Not Applicable.



**Table B-6**

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

<b>Waste Description</b>	<b>Waste Generating Activity</b>	<b>Basis for Hazardous Waste Designation</b>	<b>Potential EPA<sup>a</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>b</sup> (milligrams per liter)</b>
High Explosives (HE)-Contaminated Water with Trace Solvents and/or Metals	Laboratory analysis, HE processing, maintenance activities	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>
			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
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			F002	Spent halogenated solvents	NA <sup>d</sup>
			F003	Spent nonhalogenated solvents	NA <sup>d</sup>
			F004	Spent nonhalogenated solvents	NA <sup>d</sup>
			F005	Spent nonhalogenated solvents	NA <sup>d</sup>

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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
HE-Contaminated Spent Solvent Waste	Laboratory analysis, dissolving HE and polymers	Acceptable Knowledge <sup>c</sup>	D001 D002 D003 D018 D022 D028 D030 D035 D036 D038 F002 F003 F004 F005	Ignitability Corrosivity Reactivity Benzene Chloroform 1,2-Dichloroethane 2,4-Dinitrotoluene Methyl ethyl ketone Nitrobenzene Pyridine Spent halogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents	NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> 0.5 6.0 0.5 0.13 200.0 2.0 5.0 NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup>
HE-Contaminated Water	Pressure-washing walls, equipment, and floors; water-cooled HE-machining operations	Acceptable Knowledge <sup>c</sup>	D003 D030	Reactivity 2,4-Dinitrotoluene	NA <sup>d</sup> 0.13
HE-Contaminated Used Oil	HE-machining operations	Acceptable Knowledge <sup>c</sup>	D003 D005 D006 D007 D008 D030	Reactivity Barium Cadmium Chromium Lead 2,4-Dinitrotoluene	NA <sup>d</sup> 100.0 1.0 5.0 5.0 0.13
Solid and Scrap HE	Off-specification or obsolete HE from machining and forming processes; discrete pieces of HE from research and development (R&D) and testing operations	Acceptable Knowledge <sup>c</sup>	D001 D003 D005 D030	Ignitability Reactivity Barium 2,4-Dinitrotoluene	NA <sup>d</sup> NA <sup>d</sup> 100.0 0.13

**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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
HE-Contaminated Environmental Restoration (ER) Soil and/or Debris	Waste generated during ER and decontamination and decommissioning (D&D) activities; investigation-derived waste (personal protective equipment, samples, and sampling equipment)	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>
			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
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D038	Pyridine	2.0
			D036	Nitrobenzene	5.0
			F002	Spent halogenated solvents	NA <sup>d</sup>
			F003	Spent nonhalogenated solvents	NA <sup>d</sup>
HE-Contaminated Commercial Chemical Products	Spilled or off-specification products that become contaminated with HE	Acceptable Knowledge <sup>c</sup>	F004	Spent nonhalogenated solvents	NA <sup>d</sup>
			F005	Spent nonhalogenated solvents	NA <sup>d</sup>
			U022	Acetone	NA <sup>d</sup>
			U019	Benzene	NA <sup>d</sup>
			U044	Chloroform	NA <sup>d</sup>
			U112	Ethyl acetate	NA <sup>d</sup>
			U154	Methanol	NA <sup>d</sup>
			U159	Methyl ethyl ketone	NA <sup>d</sup>
			U196	Pyridine	NA <sup>d</sup>
			U169	Nitrobenzene	NA <sup>d</sup>
			U220	Toluene	NA <sup>d</sup>
			U239	Xylene	NA <sup>d</sup>

**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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
Wastewater Treatment Residues	Sludges, spent activated carbon, and filter solids resulting from HE wastewater filtration	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>
			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
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			F002	Spent halogenated solvents	NA <sup>d</sup>
			F003	Spent nonhalogenated solvents	NA <sup>d</sup>
			F004	Spent nonhalogenated solvents	NA <sup>d</sup>
			F005	Spent nonhalogenated solvents	NA <sup>d</sup>
			K044	Wastewater sludges	NA <sup>d</sup>
			K045	Spent carbon	NA <sup>d</sup>

**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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
HE-Contaminated Solid Waste	HE processing activities and general office and laboratory use	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>
			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
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			F002	Spent halogenated solvents	NA <sup>d</sup>
			F003	Spent nonhalogenated solvents	NA <sup>d</sup>
			F004	Spent nonhalogenated solvents	NA <sup>d</sup>
			F005	Spent nonhalogenated solvents	NA <sup>d</sup>

**Table B-6 (Continued)**

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

<b>Waste Description</b>	<b>Waste Generating Activity</b>	<b>Basis for Hazardous Waste Designation</b>	<b>Potential EPA<sup>a</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>b</sup> (milligrams per liter)</b>
HE-Contaminated Equipment	HE processing, D&D, and ER activities	Acceptable Knowledge <sup>c</sup>	D003 D005 D006 D007 D008 D009 D011 D030	Reactivity Barium Cadmium Chromium Lead Mercury Silver 2,4-Dinitrotoluene	NA <sup>d</sup> 100.0 1.0 5.0 5.0 0.2 5.0 0.13
HE-Contaminated Waste Rags, Wipes, and Other Combustibles	HE processing, (e.g., hydraulic press operations, laboratory analysis)	Acceptable Knowledge <sup>c</sup>	D001 D002 D003 F003	Ignitability Corrosive Reactivity Spent nonhalogenated solvents	NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup>
HE-Contaminated Liquid Acids, Bases, and/or Inorganic Salt Solutions	Materials used as titrants, solvents, and cleaning fluids and material from hydrolysis research	Acceptable Knowledge <sup>c</sup>	D002 D003 D018 D022 D030 D035 D036 D038 F002 F003 F004 F005	Corrosivity Reactivity Benzene Chloroform 2,4-Dinitrotoluene Methyl ethyl ketone Nitrobenzene Pyridine Spent halogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents	NA <sup>d</sup> NA <sup>d</sup> 0.5 6.0 0.13 200.0 2.0 5.0 NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup>
Liquid Process Explosive Waste	Off-specification or obsolete HE from explosives preparation, R&D, and testing operations	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>

**Table B-6 (Continued)**

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

- <sup>a</sup> U.S. Environmental Protection Agency. Note that these constituents will likely be present only in trace amounts.
- <sup>b</sup> 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 [1-1-97]. 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.
- <sup>c</sup> 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.
- <sup>d</sup> 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**

<b>Waste Description</b>	<b>Waste Generating Activity</b>	<b>Basis for Hazardous Waste Designation</b>	<b>Potential EPA<sup>a</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>b</sup> (milligrams per liter)</b>
Solid/Scrap Process Explosive Waste	Off-specification or obsolete from machining, forming, and preparation of HE; discrete pieces of HE from research and development (R&D) and testing operations	Acceptable Knowledge <sup>c</sup>	D003 D003 D005 D006 D007 D008 D009 D010 D011 D030	Reactivity Lithium Hydride Barium Cadmium Chromium Lead Mercury Selenium Silver 2,4-Dinitrotoluene	NA <sup>d</sup> NA <sup>d</sup> 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.13
Liquid Process Explosive Waste	Off-specification or obsolete HE from explosives preparation, R&D, and testing operations	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>

- <sup>a</sup> U.S. Environmental Protection Agency. Note that these constituents will likely be present only in trace amounts.
- <sup>b</sup> 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, 261, Subpart C [1-1-97]. 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.
- <sup>c</sup> 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.
- <sup>d</sup> 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 Off-Site Waste Received at LANL**

<b>Off-Site Waste Generating Facility</b>	<b>Waste Description</b>	<b>Waste-Generating Activity</b>	<b>Basis for Hazardous Waste Designation</b>	<b>Potential EPA Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>
Sandia National Laboratories/New Mexico, Albuquerque, NM	Potential mixed transuranic waste: Combustible and noncombustible debris including metals, cellulose, 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**

<b>Waste Description<sup>a</sup></b>	<b>Parameters<sup>b</sup></b>	<b>Characterization Methods</b>	<b>Rationale</b>
Spent Solvents	<ul style="list-style-type: none"> <li>Flash point (for liquid waste)</li> <li>pH (for liquid waste)</li> <li>RCRA<sup>c</sup>-regulated metals</li> <li>Volatile organic compounds (VOC)</li> <li>Semivolatile organic compounds (SVOC)</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable Knowledge<sup>d</sup></li> <li>Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for ignitability, corrosivity, reactivity, and toxicity</li> <li>Determine concentration of F-listed solvents</li> </ul>
Contaminated Solid Wastes	<ul style="list-style-type: none"> <li>RCRA<sup>c</sup>-regulated metals</li> <li>VOCs</li> <li>SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable Knowledge<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for ignitability, reactivity, and toxicity</li> <li>Determine concentration of F-listed solvents</li> </ul>
Paint and Related Wastes	<ul style="list-style-type: none"> <li>Flash point (for liquid waste)</li> <li>RCRA<sup>c</sup>-regulated metals</li> <li>VOCs</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable Knowledge<sup>d</sup></li> <li>Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for ignitability and toxicity</li> <li>Determine concentration of F-listed solvents</li> </ul>
Photographic and Photocopier Wastes	<ul style="list-style-type: none"> <li>Flash point (for liquid waste)</li> <li>pH (for liquid waste)</li> <li>RCRA<sup>c</sup>-regulated metals</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable Knowledge<sup>d</sup></li> <li>Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for ignitability, corrosivity, and toxicity</li> </ul>
Corrosive Liquid Wastes	<ul style="list-style-type: none"> <li>Flash point (for liquid waste)</li> <li>pH (for liquid waste)</li> <li>RCRA<sup>c</sup>-regulated metals</li> <li>VOCs</li> <li>SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable Knowledge<sup>d</sup></li> <li>Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for ignitability, corrosivity, and toxicity</li> <li>Determine concentration of F-listed solvents</li> </ul>
Solid Metals and Metallic Compounds	<ul style="list-style-type: none"> <li>RCRA<sup>c</sup>-regulated metals</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable Knowledge<sup>d</sup></li> <li>Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for ignitability, reactivity, and toxicity</li> </ul>
Contaminated Noncorrosive Aqueous and Nonaqueous Solutions and Sludges	<ul style="list-style-type: none"> <li>Flash point</li> <li>RCRA<sup>c</sup>-regulated metals</li> <li>VOCs</li> <li>SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable Knowledge<sup>d</sup></li> <li>Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for ignitability, reactivity, and toxicity</li> <li>Determine concentration of F-listed solvents</li> </ul>
Mercury Wastes	<ul style="list-style-type: none"> <li>RCRA<sup>c</sup>-regulated metal</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable Knowledge<sup>d</sup></li> <li>Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for toxicity</li> <li>Determine the presence of a U-listed unused commercial chemical product</li> </ul>
Used Batteries and Battery Fluids	<ul style="list-style-type: none"> <li>pH (for liquid waste)</li> <li>RCRA<sup>c</sup>-regulated metals</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable Knowledge<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for corrosivity and toxicity</li> </ul>
Unused/Off-specification Commercial Chemical Products	<ul style="list-style-type: none"> <li>Flash point (for liquid waste)</li> <li>pH (for liquid waste)</li> <li>RCRA<sup>c</sup>-regulated metals</li> <li>VOCs</li> <li>SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable Knowledge<sup>d</sup></li> <li>Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for ignitability, corrosivity, reactivity, and toxicity</li> <li>Determine presence of P-listed or U-listed unused commercial chemical products</li> </ul>

**Table B-9 (Continued)**

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

<b>Waste Description<sup>a</sup></b>	<b>Parameters<sup>b</sup></b>	<b>Characterization Methods</b>	<b>Rationale</b>
Gas Cylinder Waste	<ul style="list-style-type: none"> <li>– RCRA<sup>c</sup>-regulated metals</li> <li>– VOCs</li> <li>– SVOCs</li> </ul>	– Acceptable Knowledge <sup>d</sup>	<ul style="list-style-type: none"> <li>– Determine characteristic for ignitability, corrosivity, and reactivity</li> <li>– Determine presence of D-coded and U- and P-listed wastes</li> </ul>
Environmental Restoration Soils and Sludges	<ul style="list-style-type: none"> <li>– RCRA<sup>c</sup>-regulated metals</li> <li>– VOCs</li> <li>– SVOCs</li> </ul>	– Acceptable Knowledge <sup>d</sup>	<ul style="list-style-type: none"> <li>– Determine characteristic for ignitability, reactivity, and toxicity</li> <li>– Determine concentration of F-listed solvents</li> </ul>
Environmental Restoration Aqueous Liquids	<ul style="list-style-type: none"> <li>– pH</li> <li>– RCRA<sup>c</sup>-regulated metals</li> <li>– VOCs</li> <li>– SVOCs</li> </ul>	– Acceptable Knowledge <sup>d</sup>	<ul style="list-style-type: none"> <li>– Determine characteristic for ignitability, corrosivity, reactivity, and toxicity</li> <li>– Determine concentration of F-listed solvents</li> </ul>
Environmental Restoration Debris	<ul style="list-style-type: none"> <li>– RCRA<sup>c</sup>-regulated metals</li> <li>– VOCs</li> <li>– SVOCs</li> </ul>	– Acceptable Knowledge <sup>d</sup>	<ul style="list-style-type: none"> <li>– Determine characteristic for ignitability, reactivity, and toxicity</li> <li>– Determine concentration of F-listed solvents</li> </ul>

<sup>a</sup> Information contained in this column is from the Los Alamos National Laboratory Waste Profile Form database.

<sup>b</sup> Parameter selection is based on acceptable knowledge for each waste stream. Additional parameters may be selected for each waste stream as necessary.

<sup>c</sup> 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 [1-1-97].

<sup>d</sup> 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.

**Table B-10**

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

<b>Waste Description<sup>a</sup></b>	<b>Parameter<sup>b</sup></b>	<b>Characterization Method</b>	<b>Rationale</b>
<b>Solid Homogeneous Wastes</b>			
Soils with Heavy Metals	– RCRA-regulated metals <sup>c</sup>	– Acceptable Knowledge <sup>d</sup> – Sample and analyze randomly selected drums in waste stream	– Determine toxicity characteristic
Environmental Restoration Soils	– RCRA-regulated metals <sup>c</sup> – VOCs	– Acceptable Knowledge <sup>d</sup> – Sample and analyze randomly selected drums in waste stream	– Determine presence of F-listed solvents – Determine toxicity characteristic
Inorganic Solid Oxidizers	– RCRA-regulated metals <sup>c</sup>	– Acceptable Knowledge <sup>d</sup> – Sample and analyze randomly selected drums in waste stream	– Determine toxicity characteristic – Determine characteristic for ignitability and reactivity
<b>Solid Heterogeneous Wastes</b>			
Lead for Surface Decontamination	– RCRA-regulated metals <sup>c</sup>	– Acceptable Knowledge <sup>d</sup>	– Determine toxicity characteristic
Other Lead Wastes	– RCRA-regulated metals <sup>c</sup>	– Acceptable Knowledge <sup>d</sup>	– Determine characteristic for reactivity – Determine toxicity characteristic
Noncombustible Debris	– RCRA-regulated metals <sup>c</sup>	– Acceptable Knowledge <sup>d</sup>	– Determine toxicity characteristic – Determine characteristic for ignitability and reactivity
Combustible Debris	– RCRA-regulated metals <sup>c</sup> – VOCs	– Acceptable Knowledge <sup>d</sup>	– Determine toxicity characteristic – Determine presence of F-listed solvents – Determine characteristic for ignitability and reactivity
Organic-Contaminated Noncombustible Solids	– RCRA-regulated metals <sup>c</sup> – VOCs	– Acceptable Knowledge <sup>d</sup>	– Determine toxicity characteristic – Determine presence of F-listed solvents

**Table B-10 (Continued)**

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

<b>Waste Description<sup>a</sup></b>	<b>Parameter<sup>b</sup></b>	<b>Characterization Method</b>	<b>Rationale</b>
<b>Solid Heterogeneous Wastes (Continued)</b>			
Organic-Contaminated Combustible Solids	<ul style="list-style-type: none"> <li>– RCRA-regulated metals<sup>c</sup></li> <li>– VOCs</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable Knowledge<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for ignitability and reactivity</li> <li>– Determine toxicity characteristic</li> <li>– Determine presence of F-listed solvents</li> </ul>
Water-Reactive Wastes	<ul style="list-style-type: none"> <li>– RCRA-regulated metals<sup>c</sup></li> <li>– VOCs</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable Knowledge<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>– Determine toxicity characteristic</li> <li>– Determine characteristic for ignitability and reactivity</li> <li>– Determine presence of F-listed solvents</li> </ul>
Mercury Wastes	<ul style="list-style-type: none"> <li>– RCRA-regulated metals<sup>c</sup></li> <li>– VOCs</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable Knowledge<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>– Determine toxicity characteristic</li> <li>– Determine presence of F-listed solvents</li> </ul>
Unused Solid Reagent Chemicals	<ul style="list-style-type: none"> <li>– RCRA-regulated metals<sup>c</sup></li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable Knowledge<sup>d</sup></li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic ignitability and corrosivity</li> <li>– Determine the presence of P- and U-listed unused commercial chemical product</li> </ul>
<b>Liquid Wastes</b>			
Spent Solvents and Contaminated Solvent Mixtures	<ul style="list-style-type: none"> <li>– Flash point</li> <li>– pH</li> <li>– RCRA-regulated metals<sup>c</sup></li> <li>– VOCs</li> <li>– SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable Knowledge<sup>d</sup></li> <li>– Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for ignitability, corrosivity, and toxicity</li> <li>– Determine concentration of F-listed solvents</li> </ul>
Corrosive Liquid Wastes	<ul style="list-style-type: none"> <li>– Flash point</li> <li>– pH</li> <li>– RCRA-regulated metals<sup>c</sup></li> <li>– SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable Knowledge<sup>d</sup></li> <li>– Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for ignitability, corrosivity, and toxicity</li> <li>– Determine concentration of F-listed solvents</li> </ul>
Aqueous Liquids Contaminated with Heavy Metals	<ul style="list-style-type: none"> <li>– Flash point</li> <li>– RCRA-regulated metals<sup>c</sup></li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable Knowledge<sup>d</sup></li> <li>– Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for ignitability and toxicity</li> </ul>
Oil Wastes	<ul style="list-style-type: none"> <li>– RCRA-regulated metals<sup>c</sup></li> <li>– VOCs</li> <li>– SVOCs</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable Knowledge<sup>d</sup></li> <li>– Sampling and analysis</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for toxicity</li> <li>– Determine concentration of F-listed solvents</li> </ul>

**Table B-10 (Continued)**

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

Waste Description <sup>a</sup>	Parameter <sup>b</sup>	Characterization Method	Rationale
<b>Liquid Wastes (Continued)</b>			
Unused Liquid Reagent Chemicals	<ul style="list-style-type: none"> <li>– Flash point</li> <li>– pH</li> </ul>	– Acceptable Knowledge <sup>d</sup>	<ul style="list-style-type: none"> <li>– Determine characteristic for ignitability and corrosivity</li> <li>– Determine the presence of P- and U-listed unused commercial chemical product</li> </ul>
<b>Gas Wastes</b>			
Gas Cylinder Waste	<ul style="list-style-type: none"> <li>– RCRA<sup>c</sup>-regulated metals</li> <li>– VOCs</li> <li>– SVOCs</li> </ul>	– Acceptable Knowledge <sup>d</sup>	<ul style="list-style-type: none"> <li>– Determine characteristic for ignitability, corrosivity, and reactivity</li> <li>– Determine presence of D-coded and P- and U-listed waste</li> </ul>

<sup>a</sup> 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.

<sup>b</sup> Parameter selection is based on acceptable knowledge for each waste stream. Additional parameters may be selected for each waste stream as necessary.

<sup>c</sup> 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 [1-1-97].

<sup>d</sup> 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.

**Table B-11**

**Parameters, Characterization Methods, and Rationale for Parameter Selection  
for Mixed TRU Waste**

Matrix Parameter <sup>a</sup> Code/Description	Waste Description	Parameters	Characterization Methods	Rationale
<b>Storage</b>				
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 <sup>b</sup>	– 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	– 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 – Fourier transform infrared spectrometry – Gas chromatography/ Flame ionization detector	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 <sup>b</sup>	– Verify physical waste form – No free liquids allowed
		– RCRA—regulated metals	– Sample and analyze statistically selected number of drums in waste stream	– Determine toxicity characteristic – Determine concentration of metals
		– VOC in container headspace gas	– Gas chromatography/ mass spectrometry – 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 <sup>b</sup> – Acceptable Knowledge <sup>b</sup>	– Verify physical waste form – No free liquids allowed – Determine compliance with land disposal restrictions (LDR) treatment standards, if applicable

**Table B-11 (Continued)**

**Parameters, Characterization Methods, and Rationale for Parameter Selection  
for Mixed TRU Waste**

<b>Matrix Parameter<sup>a</sup> Code/Description</b>	<b>Waste Description</b>	<b>Parameters</b>	<b>Characterization Methods</b>	<b>Rationale</b>
S5000—Debris Waste (continued)	<ul style="list-style-type: none"> <li>– Leaded-rubber and metal waste</li> <li>– High-efficiency particulate air filters</li> <li>– Noncombustible waste</li> <li>– Mixed combustible/noncombustible waste</li> </ul>	<ul style="list-style-type: none"> <li>– RCRA-regulated metals</li> </ul>	<ul style="list-style-type: none"> <li>– Gas chromatography/mass spectrometry</li> <li>– Fourier transform infrared spectrometry</li> <li>– Gas chromatography/Flame ionization detector</li> <li>– Acceptable Knowledge<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>– Qualitative screening to confirm the presence of VOC</li> <li>– Determine compliance with LDR treatment standards, if applicable</li> </ul>
<b>Treatment</b>				
L1000—Aqueous Liquids/Slurries	<ul style="list-style-type: none"> <li>– Inorganic process solids and liquids</li> <li>– Organic process solids and liquids</li> </ul>	<ul style="list-style-type: none"> <li>– Physical form of the waste</li> </ul>	<ul style="list-style-type: none"> <li>– Visual examination</li> <li>– Acceptable Knowledge<sup>b</sup></li> </ul>	<ul style="list-style-type: none"> <li>– Verify physical waste form</li> </ul>
S3000—Homogeneous Solids		<ul style="list-style-type: none"> <li>– RCRA-regulated metals</li> </ul>	<ul style="list-style-type: none"> <li>– Sampling and Analysis</li> </ul>	<ul style="list-style-type: none"> <li>– Determine toxicity characteristic</li> <li>– Determine concentration of metals</li> </ul>

<sup>a</sup> Information in this column was extracted from the U.S. Department of Energy, 1994, "TRU Waste Characterization Quality Assurance Program Plan," CAO-94-1010, U.S. Department of Energy, Carlsbad Area Office, Carlsbad, New Mexico.

<sup>b</sup> 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.



**Table B-12**

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

<b>Waste Description</b>	<b>Parameter<sup>a</sup></b>	<b>Characterization Method</b>	<b>Rationale</b>
HE-Contaminated Water, with Trace Solvents and/or Metals	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> <li>Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine toxicity characteristic (metals and organics)</li> <li>Determine the presence of F-listed solvents</li> </ul>
HE-Contaminated Spent Solvent Waste	<ul style="list-style-type: none"> <li>Corrosivity</li> <li>Ignitability</li> <li>Reactivity</li> <li>Toxicity</li> <li>Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for ignitability, corrosivity, and reactivity</li> <li>Determine toxicity characteristic (organics)</li> <li>Determine the presence of F-listed solvents</li> </ul>
HE-Contaminated Water	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine toxicity characteristic (dinitrotoluene)</li> </ul>
HE-Contaminated Used Oil	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine toxicity characteristic (metals and dinitrotoluene)</li> </ul>
Solid and Scrap HE	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine toxicity characteristic (barium and dinitrotoluene)</li> </ul>
HE-Contaminated Environmental Restoration Soil and/or Debris	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> <li>Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine toxicity characteristic (organics and metals)</li> <li>Determine the presence of F-listed solvents</li> </ul>

**Table B-12 (Continued)**

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

<b>Waste Description</b>	<b>Parameter<sup>a</sup></b>	<b>Characterization Method</b>	<b>Rationale</b>
HE-Contaminated Commercial Chemical Products	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Spill residues from commercial products</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine the presence of U-listed wastes</li> </ul>
Wastewater Treatment Residues	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> <li>Solvents from non-specific sources</li> <li>Specific source wastes (K wastes)</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine toxicity characteristic (organics and metals)</li> <li>Determine the presence of F- and K- listed solvents</li> </ul>
HE-Contaminated Solid Waste	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> <li>Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine toxicity characteristic (organics and metals)</li> <li>Determine the presence of F-listed solvents</li> </ul>
HE-Contaminated Equipment	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for reactivity</li> <li>Determine toxicity characteristic (dinitrotoluene and metals)</li> </ul>
HE-Contaminated Rags, Wipes, and Other Combustibles	<ul style="list-style-type: none"> <li>Reactivity</li> <li>Toxicity</li> <li>Corrosivity</li> <li>Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for ignitability, corrosivity, and reactivity</li> <li>Determine the presence of F-listed solvents</li> </ul>
HE-Contaminated Liquid Acids, Bases, and/or Inorganic Salt Solutions	<ul style="list-style-type: none"> <li>Corrosivity</li> <li>Reactivity</li> <li>Toxicity</li> <li>Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristic for corrosivity and reactivity</li> <li>Determine toxicity characteristic (organics)</li> <li>Determine the presence of F-listed solvents</li> </ul>
Liquid Process Explosive Waste	<ul style="list-style-type: none"> <li>Ignitability</li> <li>Corrosivity</li> <li>Reactivity</li> <li>Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>Determine characteristics for ignitability, corrosivity, and reactivity</li> <li>Determine toxicity characteristic</li> </ul>

<sup>a</sup> Parameter selection is based on process knowledge for each waste stream. Additional parameters may be selected for each waste stream as necessary.

<sup>b</sup> 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.

Table B-13

Recommended Sample Containers<sup>a</sup>, Preservation Techniques, and Holding Times<sup>b</sup>

Analyte Class and Sample Type	Container	Preservative	Holding Time
<b>Volatile Organics</b>			
<u>Concentrated Waste Samples:</u>	Method 5035: 40-milliliter (mL) vials with stirring bar. Method 5021: See method. Methods 5031 & 5032: 125-mL WM <sup>c</sup> -G <sup>d</sup> . Use Teflon-lined lids for all procedures.	Cool to 4° degrees Celsius (°C) <sup>e</sup>	14 days
<u>Aqueous Samples:</u>			
No Residual Chlorine Present	Methods 5030, 5031, & 5032: 2 x 40-mL vials with Teflon-lined septum caps.	Cool to 4°C and adjust pH <sup>f</sup> to less than 2 with H <sub>2</sub> SO <sub>4</sub> , HCl, or solid NaHSO <sub>4</sub>	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 4°C and adjust pH to less than 2 with H <sub>2</sub> SO <sub>4</sub> , HCl, or solid NaHSO <sub>4</sub>	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 4°C	14 days
<u>Soil/Sediments and Sludges:</u>	Method 5035: 40-mL vials with stirring bar. Method 5021: See method. Methods 5031 & 5032: 125-mL WM <sup>c</sup> -G <sup>d</sup> . Use Teflon-lined lids for all procedures.	See the individual method	14 days

**Table B-13 (Continued)**

**Recommended Sample Containers<sup>a</sup>, Preservation Techniques, and Holding Times<sup>b</sup>**

Analyte Class and Sample Type	Container	Preservative	Holding Time
<b>Semivolatile Organics/Organochlorine Pesticides and Herbicides</b>			
<u>Concentrated Waste Samples:</u>	125 mL WM <sup>c</sup> -G <sup>d</sup> with Teflon <sup>™</sup> -lined lid	None	Samples must be extracted within 14 days and analyzed within 40 days following extraction.
<u>Soil/Sediments and Sludges:</u>	250 mL WM <sup>c</sup> -G <sup>d</sup> with Teflon <sup>™</sup> -lined lid	Cool to 4°C	Samples must be extracted within 14 days and analyzed within 40 days following extraction.
<u>Liquid Samples:</u>			
No Residual Chlorine Present	1-gallon (gal.), 2 x 0.5 gal., or 4 x 1 liter (L) AG <sup>9</sup> container with Teflon <sup>™</sup> -lined lid	Cool to 4°C	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 <sup>9</sup> with Teflon <sup>™</sup> -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 4°C.	Samples must be extracted within 7 days and extracts analyzed within 40 days following extraction
<b>Metals</b>			
<u>Aqueous Samples:</u>			
Metals (except hexavalent chromium and mercury)	1-L P <sup>h</sup> or G <sup>d</sup>	Add nitric acid to adjust pH to less than 2.	180 days
Hexavalent chromium	500-mL P <sup>h</sup> or G <sup>d</sup>	Cool to 4°C	24 hours
Mercury	500-mL P <sup>h</sup> or G <sup>d</sup>	Add nitric acid to adjust pH to less than 2.	28 days
<u>Soil/Sediments and Sludges:</u>			
Metals (except hexavalent chromium and mercury)	500-mL WM <sup>c</sup> -P <sup>h</sup> or G <sup>d</sup>	Cool to 4°C	180 days

Table B-13 (Continued)

Recommended Sample Containers<sup>a</sup>, Preservation Techniques, and Holding Times<sup>b</sup>

Analyte Class and Sample Type	Container	Preservative	Holding Time
Hexavalent chromium	500-mL WM <sup>c</sup> -P <sup>h</sup> or G <sup>d</sup>	Cool to 4 °C	Not established - analyze as soon as possible.
Mercury	500-mL WM <sup>c</sup> -P <sup>h</sup> or G <sup>d</sup>	Cool to 4 °C	28 days

<sup>a</sup> Smaller sample containers may be required due to health and safety concerns associated with potential radiation exposure, transportation requirements, and waste management considerations.

<sup>b</sup> Information primarily from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846, U.S. Environmental Protection Agency, 1986 and all approved updates.

<sup>c</sup> WM = Wide-mouth

<sup>d</sup> G - Glass

<sup>e</sup> Adjust to pH of less than 2 with sulfuric acid, hydrochloric acid, or solid sodium bisulfate.

<sup>f</sup> A term used to describe the hydrogen-ion activity of a system.

<sup>g</sup> AG = Amber glass

<sup>h</sup> P = Polyethylene

Table B-14

Summary of Characterization Methods for Hazardous Waste

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

## Table B-14 (Continued)

### Summary of Characterization Methods for Hazardous Waste

- <sup>a</sup> 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.
- <sup>b</sup> U.S. Environmental Protection Agency, 1991, "Soil Sampling and Analysis for Volatile Organic Compounds," EPA 154014-91001, Office of Research and Development.
- <sup>c</sup> U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
- <sup>d</sup> Equivalent methods subject to EPA approval may be substituted.
- <sup>e</sup> Method being revised per the January 1998 *SW-846* Draft Update IVA.
- <sup>f</sup> Method being integrated into Method 7010, per the January 1998 *SW-846* Draft Update IVA.
- <sup>g</sup> Method being integrated into Method 7000B, per the January 1998 *SW-846* Draft Update IVA.
- <sup>h</sup> *SW-846*, Section 7.3.4.2 contains specialized methods to determine if a sulfide-containing waste exhibits the reactivity characteristic.
- <sup>i</sup> 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.

**Table B-15**  
**Summary of Characterization Methods for Mixed Low-Level Waste**

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



**Table B-15 (Continued)**

**Summary of Characterization Methods for Mixed Low-Level Waste**

Parameter	Method Numbers	Test Method	Rationale
<b>Liquid Wastes (Continued)</b>			
Ignitability	SW-846 (1010 and 1020A) <sup>c</sup> or equivalent methods <sup>d</sup>	Pensky-Martens closed cup	Determine ignitability
		Setaflash closed cup	

<sup>a</sup> 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.

<sup>b</sup> U.S. Environmental Protection Agency, 1991, "Soil Sampling and Analysis for Volatile Organic Compounds," EPA 154014-91991, Office of Research and Development.

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

<sup>d</sup> Equivalent methods, subject to EPA approval, may be substituted.

<sup>e</sup> Method being revised per the January 1998 SW-846 Draft Update IVA.

<sup>f</sup> Method being integrated into Method 7010, per the January 1998 SW-846 Draft Update IVA.

<sup>g</sup> Method being integrated into Method 7000B, per the January 1998 SW-846 Draft Update IVA.

<sup>h</sup> 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.

Table B-16

Summary of Characterization Methods for Mixed TRU Waste

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

**Table B-16 (Continued)**

**Summary of Characterization Methods for Mixed TRU Waste**

Parameter	Method Numbers	Test Methods	Rationale
Metals in waste: Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	SW-846 (1311, 6010B, 7060A <sup>f</sup> , 7061A) <sup>c</sup> (1311, 6010B, 7080A <sup>g</sup> , 7081) <sup>c,f</sup> (1311, 6010B, 7130 <sup>g</sup> , 7131A) <sup>c,f</sup> (1311, 6010B, 7190 <sup>g</sup> , 7191) <sup>c,f</sup> (1311, 6010B, 7420 <sup>g</sup> , 7421) <sup>c,f</sup> (1311, 7470B, 7471A, 7472) <sup>c,g</sup> (1311, 6010B, 7740, 7741A, 7742) <sup>c</sup> (1311, 6010B, 7760A <sup>g</sup> , 7761) <sup>c,f</sup> or equivalent methods <sup>d</sup>	Total and/or TCLP  Inductively-coupled plasma atomic emission spectroscopy  Atomic absorption  Manual cold vapor atomic absorption  Anodic stripping voltammetry  Acceptable knowledge <sup>h</sup>	Determine total and/or TCLP metals concentration in samples
pH	SW-846 (9040B, 9041A, 9045C) <sup>c</sup> or equivalent methods <sup>d</sup>	pH electrometric measurement  pH paper  Soil and waste pH	Determine corrosivity

<sup>a</sup> 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.

<sup>b</sup> U.S. Environmental Protection Agency, 1991, "Soil Sampling and Analysis for Volatile Organic Compounds," EPA 154014-91001, Office of Research and Development.

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

<sup>d</sup> Equivalent methods, subject to EPA approval, may be substituted.

<sup>e</sup> Method being revised per the January 1998 *SW-846* Draft Update IVA.

<sup>f</sup> Method being integrated into Method 7010, per the January 1998 *SW-846* Draft Update IVA.

<sup>g</sup> Method being integrated into Method 7000B, per the January 1998 *SW-846* Draft Update IVA.

<sup>h</sup> 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.

**Table B-17**

**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 (8330) <sup>a</sup>	High Performance Liquid Chromatography	Determine HE concentrations directly in homogeneous materials.
		DX-2 Spot Test, DeTech	Determine if HE is present in the waste stream.
		Acceptable Knowledge <sup>b</sup>	If all surfaces cannot be directly tested and the waste object was potentially contaminated with HE during its use.

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

<sup>b</sup> 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.

**Table B-18**

**Summary of Characterization Methods for Ash Generated by Open Burning<sup>a</sup>**

Parameters	Method Numbers	Test Method	Rationale
Metals in waste:	SW-846	Total and/or toxicity characteristic leaching procedure (TCLP)	Determine total and/or TCLP metals concentrations in samples of solid process residues
Arsenic	(3051, 1311, 6010B, 7060A <sup>a</sup> , 7061A) <sup>b</sup>	Inductively-coupled plasma atomic emission spectroscopy	
Barium	(3051, 1311, 6010B, 7080A <sup>d</sup> , 7081A) <sup>b,e</sup>		
Cadmium	(3051, 1311, 6010B, 7030 <sup>d</sup> , 7031A) <sup>b,e</sup>		
Chromium	(3051, 1311, 6010B, 7090 <sup>d</sup> , 7091) <sup>b,e</sup>		
Lead	(3051, 1311, 6010B, 7420 <sup>d</sup> , 7421) <sup>b,e</sup>		
Mercury	(1311, 7470A, 7471A) <sup>b</sup>	Atomic absorption	
Selenium	(3051, 1311, 6010A, 7740 <sup>e</sup> , 7741A, 7742) <sup>b</sup>	Manual cold vapor atomic absorption	
Silver	(3051, 1311, 6010A, 7760A <sup>d</sup> , 7761) <sup>b,e</sup> or equivalent methods <sup>c</sup>	Acceptable Knowledge <sup>f</sup>	

<sup>a</sup> Ash generated by open burning is characterized for all TCLP metals.

<sup>b</sup> U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-84*, U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response, U.S. Government Printing Office, Washington, D.C..

<sup>c</sup> Equivalent methods, subject to EPA approval, may be substituted.

<sup>d</sup> Method being integrated into Method 7000B, per the January 1998 *SW-846* Draft Update IVA.

<sup>e</sup> Method being integrated into Method 7010, per the January 1998 *SW-846* Draft Update IVA.

<sup>f</sup> 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.

**Attachment B-1**

**Waste Management Units at  
Los Alamos National Laboratory**

**Attachment B-1**

**Waste Management Units at Los Alamos National Laboratory<sup>a</sup>**

Unit Location	Unit Type	Waste Types Managed <sup>b</sup>
TA-3-29, Rooms 9010, 9020, 9030	Storage - container	Hazardous Waste (HW), Mixed Low-Level Waste (MLLW), Mixed Transuranic Waste (MTRUW)
TA-14, Burn Cage	Treatment - Open Burning (OB)	High Explosives (HE)-Contaminated waste
TA-14, Detonation area	Treatment - Open Detonation (OD)	HE and HE-Contaminated waste
TA-15-184	Treatment - OD	HE and HE-Contaminated waste
TA-16-88	Storage - container	HW, MLLW
TA-16-387	Treatment - OB	HE and HE-Contaminated waste
TA-16-388	Treatment - OB	HE and HE-Contaminated waste
TA-16-394	Treatment - OB	HE and HE-Contaminated waste
TA-16-399	Treatment - OB	HE and HE-Contaminated waste
TA-16-401	Treatment - OB	HE and HE-Contaminated waste
TA-16-406	Treatment - OB	HE and HE-Contaminated waste
TA-36-8	Treatment - OD	HE and HE-Contaminated waste
TA-39-6	Treatment - OD	HE and HE-Contaminated waste
TA-39-57	Treatment - OD	HE and HE-Contaminated waste
TA-50-1, Decon Ops	Storage - container	HW, MLLW, MTRUW
TA-50-1, 59	Storage - container	MTRUW
TA-50-1, 60A	Treatment - cementation	HW, MLLW, MTRUW
TA-50-37	Storage - container	HW, MLLW, MTRUW
TA-50-69, Indoor Area	Storage - container	HW, MLLW, MTRUW
TA-50-69, Outdoor Area	Storage - container	HW, MLLW, MTRUW
TA-50-114	Storage - container	HW, MLLW, MTRUW
TA-54, L	Storage - container	HW, MLLW
TA-54, G	Storage - container	HW, MLLW, MTRUW
TA-54, West	Storage - container	HW, MLLW, MTRUW
TA-55-4, Basement	Storage - container	HW, MLLW, MTRUW
TA-55-185	Storage - container	HW, MLLW, MTRUW
TA-55, Storage Pad	Storage - container	HW, MLLW, MTRUW
TA-55-4, 401	Storage - tanks	MTRUW
TA-55-4, 401	Treatment - cementation	MTRUW

<sup>a</sup> Waste management units active or proposed as of September 1998.

<sup>b</sup> Waste types managed or planned to be managed as of September 1998.

## **APPENDIX C**

### **INSPECTION PLAN**



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Document: LANL General Part B  
Revision No.: 1.0  
Date: October 1998

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### FIGURE NO.

### TITLE

C-1

Hazardous and Mixed Waste Facility Inspection Record Form

## LIST OF ABBREVIATIONS/ACRONYMS

AR	Action Required
ESH-19	LANL's Hazardous and Solid Waste Group
IRF	Inspection Record Form
LANL	Los Alamos National Laboratory
NA	Not Applicable
20 NMAC 4.1	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
RCRA	Resource Conservation and Recovery Act
TA	technical area

## **APPENDIX C**

### **INSPECTION PLAN**

In accordance with the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20 NMAC 4.1), Subpart V, 264.15, revised January 1, 1997 [1-1-97], "General Inspection Requirements," 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 documents, unless explicitly provided in those documents (e.g., the "Technical Area 55 Part B Permit Application," Revision 0.0 [LANL, 1996]). Pursuant to 20 NMAC 4.1, Subpart V, 264.15(a) [1-1-97], 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 NMAC 4.1, Subpart IX, 270.14(b)(5) [1-1-97], this inspection plan, which presents general inspection schedules, is being submitted with this permit application. Inspections will be conducted often enough to identify problems in time to correct them before they harm human health or the environment.

#### **C.1 GENERAL INSPECTION SCHEDULES AND REQUIREMENTS [20 NMAC 4.1, Subpart IX, 270.14(b)(5) and 20 NMAC 4.1, Subpart V, 264.15(b) and (c)]**

In accordance with the requirements of 20 NMAC 4.1, Subpart IX, 270.14(b)(5), and 20 NMAC 4.1, Subpart V, 264.15(b)(1) [1-1-97], 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 Hazardous and Solid Waste Group (ESH-19) and by the site operator (i.e., the division or operating group that is responsible for or manages the unit), as required in 20 NMAC 4.1, Subpart V, 264.15(b)(2) [1-1-97].

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 documents 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 is subject to change. Pursuant to 20 NMAC 4.1, Subpart V, 264.15(b)(3) [1-1-97], 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 units.

#### C.1.1 Inspection Records [20 NMAC 4.1, Subpart V, 264.15(d)]

Inspection training is provided through LANL's Environment, Safety, and Health Training Group. 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 original inspection records for a minimum of three years from the date of inspection. 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 NMAC 4.1, Subpart V, Part 264 [1-1-97], requirements for permitted hazardous and mixed waste 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. For each working day that waste is not opened, moved, received, treated, or removed, a check mark will be placed in the "No Use" block in Part I. Alternatively, other records, such as a memo to file, may be used to document a condition of no use.

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 NMAC 4.1, Subpart V, 264.15(b)(4)]**

Inspection frequencies relevant to the unit types addressed in TA-specific permit applications, permit modification requests, or permit renewal documents are presented in Sections C.2 through C.9 of this appendix. Inspection frequencies may be increased at LANL's discretion, or if unexpected malfunctions occur or an accelerated deterioration rate of containers, secondary containment systems, and/or equipment is detected.

**C.1.3 Actions Resulting From Inspections [20 NMAC 4.1, Subpart V, 264.15(c)]**

If any defects, deterioration, damage, 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.

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 AREAS** **[20 NMAC 4.1, Subpart V, 264.15(b) and 264.174]**

Container storage areas 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.2.1 On Day(s) of Waste Handling**

Inspections will be conducted every day that waste handling occurs, 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 container storage area. For inspections of container storage areas, the following items will be addressed, as appropriate:

- General information
- 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 container storage areas will be conducted every week that waste remains in storage. These weekly inspections will address the following items, as appropriate:

- General information
- 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 NMAC 4.1, Subpart V, 264.15(b), 264.193(i), and 264.195]

Resource Conservation and Recovery Act (RCRA)-regulated tank systems are inspected according to the schedule provided below. 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
- 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
- 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 NMAC 4.1, Subpart V, 264.193(i) [1-1-97], 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 NMAC 4.1, Subpart V, 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
- Secondary containment structures (if applicable)
- Detonation pad run on/off control
- (Un)loading area
- Overall condition

Monitoring controls, emergency shutdown controls, and alarms or warning systems associated with the open burning/open detonation units will be inspected and/or tested for proper operating condition prior to the initiation of treatment at the units.

##### 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
- 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
- (Un)loading area
- Overall condition

**C.5 INSPECTION SCHEDULE AND REQUIREMENTS FOR CEMENTATION UNITS [20 NMAC 4.1, Subpart V, 264.15(b) and 264.602]**

Cementation units will be inspected according to the schedule provided below. 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
- 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
- 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 NMAC 4.1, Subpart V, Part 264, Subpart AA]**

Inspection and monitoring requirements for units subject to 20 NMAC 4.1, Subpart V, Part 264, Subpart AA [1-1-97], are addressed in Attachment C of TA-specific permit applications, permit modification requests, or permit renewal documents.

**C.7 INSPECTION AND MONITORING FOR UNITS SUBJECT TO SUBPART BB REQUIREMENTS [20 NMAC 4.1, Subpart V, Part 264, Subpart BB]**

Inspection and monitoring requirements for units subject to 20 NMAC 4.1, Subpart V, Part 264, Subpart BB [1-1-97], are addressed in Attachment C of TA-specific permit applications, permit modification requests, or permit renewal documents.

**C.8 INSPECTION AND MONITORING FOR UNITS SUBJECT TO SUBPART CC REQUIREMENTS [20 NMAC 4.1, Subpart V, Part 264, Subpart CC]**

Inspection and monitoring requirements for units subject to 20 NMAC 4.1, Subpart V, Part 264, Subpart CC [1-1-97], are addressed in Attachment C of TA-specific permit applications, permit modification requests, or permit renewal documents.

**C.9 INSPECTION AND MONITORING FOR UNITS SUBJECT TO SUBPART DD REQUIREMENTS [20 NMAC 4.1, Subpart V, Part 264, Subpart DD]**

Inspection and monitoring requirements for units subject to 20 NMAC 4.1, Subpart V, Part 264, Subpart DD [1-1-97], are addressed in Attachment C of TA-specific permit applications, permit modification requests, or permit renewal documents.

**C.10 REFERENCES**

LANL, 1996, "Technical Area 55 Part B Permit Application," Revision 0.0, Los Alamos National Laboratory, Los Alamos, New Mexico.

# HAZARDOUS AND MIXED WASTE FACILITY INSPECTION RECORD FORM

<sup>1</sup> FACILITY: <sup>2</sup> Site ID #:	<sup>3</sup> <input type="checkbox"/> <90-DAY ACCUMULATION AREA <input type="checkbox"/> TREATMENT, STORAGE, OR DISPOSAL UNIT	<sup>4</sup> START DATE:	<sup>5</sup> END DATE:
---	--	--------------------------	------------------------

☐ Containers  
☐ Physical Treatment  
☐ Tank

☐ Landfill  
☐ Biological Treatment  
☐ UST

☐ Thermal Treatment  
☐ Chemical Treatment  
☐ 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
<sup>7</sup> NO USE	No waste opened, moved, received, treated, or removed; or no waste stored							
<sup>8</sup> COMMUNICATIONS EQUIPMENT	Availability and proper operating condition							
<sup>9</sup> WARNING SIGNS	Posted, legible, and bilingual							
<sup>10</sup> SECURITY	Condition of fences, gates, locks, and other access control equipment							
<sup>11</sup> WORK SURFACES/ FLOORS	Any conditions that could lead to an accident or spill							
<sup>12</sup> SPILL/FIRE EQUIPMENT	Present, appropriate, and in proper operating condition							
<sup>13</sup> EYEWASHES/ SAFETY SHOWERS	Proper operating condition							
<sup>14</sup> WIND SOCK	Proper operating condition and checked for damage							
<sup>15</sup> SECONDARY CONTAINMENT	Standing water/waste, integrity, surrounding vegetation, and erosion							
<sup>16</sup> RUN-ON/OFF CONTROL	Ponding, integrity, erosion, and damage							
<sup>17</sup> COVERS/LIDS OF CONTAINERS	Closed and secured properly							
<sup>18</sup> LABELS	Proper labels on all tanks and containers							
<sup>19</sup> ACCUMULATION START DATE	Present and legible							
<sup>20</sup> COMPATIBILITY	Separated according to compatibility							
<sup>21</sup> INTEGRITY (Containers, tanks, and ancillary equipment)	Integrity, leakage, deterioration, corrosion, and damage							
<sup>22</sup> (UN)LOADING AREA	Spills and deterioration							
<sup>23</sup> AISLE SPACE/STACKING	Appropriateness and adequacy							
<sup>24</sup> PALLETS AND RAISED CONTAINERS	Any condition that could result in failure							
<sup>25</sup> TANK SYSTEMS (Aboveground portions)	Discharge controls, leakage, fill level, and corrosion							
<sup>26</sup> TREATMENT TANKS	Proper operating condition and leakage							
<sup>27</sup> SHAFTS	Presence and condition of cover							
<sup>28</sup> FILTER VESSELS (for open burning)	Deterioration and sand condition							
<sup>29</sup> OPEN BURNING UNITS	Deterioration, vegetation, sand condition, erosion, and leakage							
<sup>30</sup> OPEN DETONATION UNITS	Condition, vegetation, and erosion							
<sup>31</sup> CEMENTATION UNITS	Structural integrity and condition of equipment and systems							

Figure C-1

# HAZARDOUS AND MIXED WASTE FACILITY INSPECTION RECORD FORM

	MON	TUE	WED	THU	FRI	SAT	SUN
<sup>32</sup> DATE							
<sup>33</sup> TIME							
<sup>34</sup> SIGNATURE OF INSPECTOR(S)							

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

**Part II-** For any AR (Action Required) in PAR 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.

<sup>35</sup>

Figure C-1 (Continued)

## 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 ESH-19 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 ESH-19 prior to use of the facility/location is available, if necessary.

**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 and <90-day accumulation areas 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, glove boxes, 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."



**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.

**TANKS SYSTEMS:**

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.

**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, and the condition of sand (as appropriate). 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.

**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.

**For Informational Purposes Only**

**APPENDIX D**

**PERSONNEL TRAINING PLAN**

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## LIST OF ABBREVIATIONS/ACRONYMS

EDS	Employee Development System
EM&R	LANL's Emergency Management and Response
EM	Environmental Management
EMP	Emergency Management Plan
ES&H	environment, safety, and health
ESH-10	LANL's Hazardous Materials Response Group
ESH-13	LANL's ES&H Training Group
ESH-19	LANL's Hazardous and Solid Waste Group
HAZWOPER	Hazardous Waste Operations and Emergency Response
JCNNM	Johnson Controls Northern New Mexico
LANL	Los Alamos National Laboratory
20 NMAC 4.1	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
OJT	on-the-job training
OSHA	Occupational Safety and Health Administration
PTLA	Protection Technology Los Alamos
RCRA	Resource Conservation and Recovery Act
TSDF	treatment, storage, and disposal facility
USC	United States Code

## **APPENDIX D**

### **PERSONNEL TRAINING**

This section describes the personnel training program for Los Alamos National Laboratory (LANL) treatment, storage, and disposal facility (TSDF) workers. Training requirements for TSDF personnel are specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20 NMAC 4.1), Subpart V, 264.16, revised January 1, 1997 [1-1-97], "Personnel Training," and are included in this document, required by 20 NMAC 4.1, Subpart IX, 270.14(b)(12) [1-1-97]. 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 NMAC 4.1, Subpart V, Part 264 [1-1-97]. 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 TSDFs 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 Environmental Management (EM) Division are responsible for most centralized waste management activities at LANL. The Hazardous and Solid Waste Group (ESH-19) 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., Johnson Controls Northern New Mexico [JCNNM]) 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 Criticality Safety Group, the Occurrence Investigation Group, the Hazardous Materials Response Group (ESH-10), the Air Quality Group, the Water Quality and Hydrology Group, the Ecology Group, and personnel in ESH-19 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 Environment, Safety, and Health Division Training Group (ESH-13) is responsible for developing and delivering LANL-wide environment, safety, and health (ES&H) training. Courses on hazardous and/or mixed waste are designed with substantial input from ESH-19 and EM waste management groups, and other subject matter experts, as appropriate.

**D.2 TRAINING CONTENT, FREQUENCY, AND TECHNIQUES** [20 NMAC 4.1, Subpart IX, 270.14(b)(12) and 20 NMAC 4.1, Subpart V, 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 TSDF, 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 TSDFs receive the appropriate level of training within six months of their date of hire or transfer for work at a TSDF. Personnel will not work in unsupervised waste handling positions at TSDFs 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 ESH-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 TSDF. 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 TSDF training records for currently employed workers until the TSDF closes.

Table D-1 presents components of the LANL-wide training program as administered through ESH-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 TSDF hazardous/mixed waste workers, managers and supervisors of TSDF 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.

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

Managers and Supervisors of TSDF Hazardous/Mixed Waste Workers are directly responsible for day-to-day operations related to TSDF 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., ESH-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 annually and updated as required to remain current with hazardous waste management regulations. Alternative forms of training (e.g., paper-based self-study courses, computer-based training) may be taken to meet specific training requirements. Such alternate forms of training must be approved by ESH-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 NMAC 4.1, Subpart V, 264.16(d)(2) [1-1-97].

#### D.2.1 LANL-Wide Courses

Hazardous waste management courses for TSDF personnel include Resource Conservation and Recovery Act (RCRA) Personnel Training, RCRA Refresher training, and Waste Generation Overview. 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.*). ESH-13, with guidance from ESH-19, provides an annual refresher of applicable hazardous waste management requirements. TSDF personnel who handle hazardous and/or mixed waste and/or clean up spills or releases of hazardous and/or mixed waste at TSDFs 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 NMAC 4.1, Subpart V, 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 TSDF-specific inspection requirements. TSDF emergency response personnel receive TSDF-specific training regarding emergency response and shutdown procedures at the TSDF to which they are assigned.

#### D.2.4 Training Coordinator [20 NMAC 4.1, Subpart V, 264.16(a)(2)]

The ESH-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 NMAC 4.1, Subpart V, 264.16(a)(3) and (c)]

If called upon by the EM&R Office, additional non-LANL emergency response personnel (e.g., JCNNM, 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, TSDF personnel involved in waste handling and emergency response must be knowledgeable about appropriate building and operating area emergency procedures. These workers receive training in TSDF-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 TSDF-specific emergency procedures are provided to all personnel under their supervision. Training in TSDF-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 TSDF-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 (OSHA) emergency response provisions. The EM&R office provides training related to implementing LANL's EMP. In addition, TSDF 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 NMAC 4.1, Subpart V, 264.16(b) and (c)]

An introductory course, Waste Generation Overview, provides information needed to identify wastes that are subject to hazardous waste regulations in 20 NMAC 4.1, Subpart II [1-1-97]. The training defines hazardous waste and hazardous constituents (including hazardous components in mixed waste) and addresses the identification of hazardous waste and hazardous constituents.

In addition to Waste Generation Overview, all TSDF workers who handle hazardous and/or mixed waste are required to complete RCRA Personnel Training and Hazardous Waste Operations and Emergency Response (HAZWOPER) Occasional Site Worker training. They must also attend annual RCRA and HAZWOPER 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 NMAC 4.1 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 <sup>a</sup>	TSDF <sup>b</sup> Hazardous/Mixed Waste Worker	Manager/Supervisor of TSDF Hazardous/Mixed Waste Workers	Emergency Responder	Uncontrolled Area Potential Release Site Worker
<b>HAZWOPER<sup>c</sup>: First Responder (Operations Level)</b> (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 <sup>d</sup>	
<b>HAZWOPER: General Site Worker (40 hours)</b> (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
<b>HAZWOPER: Occasional Site Worker (24 hours)</b> (provides general information on hazardous waste operations and emergency response for occasional and regular site workers)	X	X		
<b>HAZWOPER: Refresher</b> (provides general information on hazardous waste operations)	X	X	X	X
<b>RCRA<sup>e</sup> Personnel Training</b> (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 (1-1-97); 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	* <sub>f</sub>	*

Table D-1 (Continued)

Los Alamos National Laboratory-Wide Training Program Outline

Courses <sup>a</sup>	TSDF <sup>b</sup> Hazardous/Mixed Waste Worker	Manager/Supervisor of TSDF Hazardous/Mixed Waste Workers	Emergency Responder	Uncontrolled Area Potential Release Site Worker
<b>RCRA Refresher Training</b> (includes regulatory and legislative updates, occurrence reports and lessons learned, audit findings, modification/review of the contingency plan; provides required retraining)	X	X	*	*
<b>Waste Generation Overview</b> (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
<b>Respirators: Air-Purifying</b> (provides required annual retraining for operation and inspection of device, changing filters, donning and doffing)	*	*	X	*
<b>Respirators: Self-Contained Breathing Apparatus</b> (provides required annual retraining for operation and inspection, changing compressed air bottles, donning and doffing, safety features, care and cleaning, fitting)	*	*	X	*

- <sup>a</sup> 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.
- <sup>b</sup> TSDF = Treatment, storage, and disposal facility
- <sup>c</sup> HAZWOPER = Hazardous Waste Operations and Emergency Response
- <sup>d</sup> X indicates a required course.
- <sup>e</sup> RCRA = Resource Conservation and Recovery Act
- <sup>f</sup> \* 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, Storage, and Disposal Facility Operations**

Facility-specific and/or on-the-job training (OJT) is provided to treatment, storage, and disposal facility (TSDF) 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
- TSDF-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 TSDF.



## **APPENDIX E**

### **CONTINGENCY PLAN**

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## LIST OF ABBREVIATIONS/ACRONYMS

BEP	building emergency plan
CAS	Central Alarm Station
CFR	Code of Federal Regulations
CST	LANL's Chemical Science and Technology Division
DOE	U.S. Department of Energy
DX	Dynamic Experimentation
EM	Environmental Management
EM&R	Emergency Management and Response
EMP	Emergency Management Plan
EOC	Emergency Operations Center
ESH	Environment, Safety, and Health
ESH-1	LANL's Health Physics Operations Group
ESH-2	LANL's Occupational Medicine Group
ESH-5	LANL's Industrial Hygiene and Safety Group
ESH-7	LANL's Occurrence Investigation Group
ESH-10	LANL's Hazardous Materials Response Group
ESH-17	LANL's Air Quality Group
ESH-18	LANL's Water Quality and Hydrology Group
ESH-19	LANL's Hazardous and Solid Waste Group
ESH-20	LANL's Ecology Group
HAZMAT	Hazardous Materials
HMGS	Hazardous Materials Group Supervisor
IC	Incident Commander

## LIST OF ABBREVIATIONS/ACRONYMS (Continued)

ICS	Incident Command System
JCNNM	Johnson Controls Northern New Mexico
LAAO	Los Alamos Area Office
LACFD	Los Alamos County Fire Department
LACPD	Los Alamos County Police Department
LAMC	Los Alamos Medical Center
LANL	Los Alamos National Laboratory
LIR	Laboratory Implementation Requirement
MOU	memorandum of understanding
NAWAS	National Warning System
NIIMS	National Interagency Incident Management System
20 NMAC 4.1	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
NMED	New Mexico Environment Department
PA	public address
PPE	personal protective equipment
PTLA	Protection Technology Los Alamos
S	Security and Safeguards
S-8	LANL's EM&R Office
SM-409	ESH-2's central medical facility
TA	technical area
UCC	Utilities Control Center

## **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 documents. The contingency plan is intended to meet the requirements specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20 NMAC 4.1), Subpart V, Part 264, Subpart D, revised January 1, 1997 [1-1-97], "Contingency Plan and Emergency Procedures," and 20 NMAC 4.1, Subpart IX, 270.14(b)(7) [1-1-97], for hazardous waste treatment, storage, or disposal facilities. In addition, this plan is consistent with the LANL Emergency Management Plan (EMP) (LANL, 1998), prepared by the LANL Emergency Management and Response (EM&R) Office. The provisions of this contingency 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 NMAC 4.1, Subpart V, 264.51(b) [1-1-97]. When necessary, additional contingency plan information will be provided in Attachment E of TA-specific permit applications, permit modification requests, or permit renewal documents. 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 NMAC 4.1, Subpart V, 264.52(c) and 264.53]**

The primary resources for management of emergency incidents at LANL reside 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 (S-8). 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 Environment, Safety, and Health (ESH)



Division and the Environmental Management (EM) Division at LANL. These groups 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, Johnson Controls Northern New Mexico (JCNNM) for facility maintenance and heavy equipment operation, and the LACFD. 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 (MOU) with the U.S. Department of Energy (DOE).

Emergency response protocol at LANL is currently being modified to be consistent with 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 further modification, when required.

The IC (e.g., Duty Emergency Manager) coordinates all groups and agencies responding to the emergency and personnel operating at the scene in what is called the Incident Command System (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 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, and the Administrative Section

Chief is responsible for keeping records of expenditures. In some instances, one person may be assigned more than one of these positions. 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 current copy of this contingency plan will be retained by each of the emergency response groups/agencies and the appropriate facility operators. LANL's Hazardous and Solid Waste Group (ESH-19) is responsible for the controlled distribution of the contingency plan. Amendments to the contingency plan are discussed in Section E.12.

**E.1.1 Emergency Management and Response Office [20 NMAC 4.1, Subpart V, 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 NMAC 4.1, Subpart V, 264.55 [1-1-97]). 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. Should an EOC be activated during an emergency, all other emergency personnel, including the IC, fall under the control and direction of 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). Listed below is the name, address, and phone number of the current Primary Emergency Manager, as required by 20 NMAC 4.1, Subpart V, 264.52(d) [1-1-97].

George VanTiem  
197 El Viento St.  
Los Alamos, NM 87544  
Home phone number: 662-4623  
Laboratory phone number: 667-6211

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 in order to control and contain the waste, as necessary. In the event of an emergency, the Emergency Manager typically becomes the IC with full responsibility for field activities (including logistics, planning, and operations 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.

#### **E.1.2 Hazardous Materials Response Group**

The Hazardous Materials (HAZMAT) Team is comprised of personnel from the Hazardous Materials Response Group (ESH-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 (29 CFR), Subparts 1910.120(q)(6)(iii), (iv), and (v). The HAZMAT Team acts as part of the IC's reporting

through the HAZMAT Group Supervisor (HMGS). The LANL HMGS coordinates the HAZMAT Team and radiological field monitoring activities.

During an emergency response, ESH-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, ESH-10 may obtain resources from other ESH groups, such as the Health Physics Operations Group (ESH-1) and the Industrial Hygiene and Safety Group (ESH-5).

### E.1.3 EM and ESH Division Response Groups

At the scene, representatives and technical advisors from the EM and ESH Divisions 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 ESH 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 EM Division

Subject matter experts from the EM Division may provide guidance on proper treatment, storage, and transportation of hazardous and mixed waste at LANL.

#### E.1.3.2 Air Quality Group

The Air Quality Group (ESH-17) provides field surveys of air to determine environmental impacts and dose equivalent to members of the public after a radiological emergency. In addition, ESH-17 provides expertise in meteorology to project short- and long-term environmental effects of emergency conditions.

#### E.1.3.3 Water Quality and Hydrology Group

After an emergency, the Water Quality and Hydrology Group (ESH-18) provides sampling of surface water runoff and sediments to determine environmental effects of an emergency and performs assessments for regulatory reporting requirements. ESH-18 also provides expertise in hydrogeology to establish short- and long-term environmental effects of emergency conditions.

#### E.1.3.4 Hazardous and Solid Waste Group

ESH-19 provides guidance on regulatory requirements to other LANL groups. After an emergency, ESH-19 provides field sampling (e.g., of soil, spills, or potentially hazardous waste) to determine environmental effects of exposure.

#### E.1.3.5 Ecology Group

The Ecology Group (ESH-20) provides field surveys of soil, foodstuffs, and biota to determine environmental effects of exposure after an emergency.

#### 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-15, 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 explosive waste. Engineering Sciences and Applications Division personnel are responsible for 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 Chemical Science and Technology (CST) Division may provide guidance on proper treatment, storage, and transportation of hazardous and mixed waste at TA-50-37, TA-60-69, and TA-54 West.

#### 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 responsible 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. In addition, the CAS at TA-64-1 is manned by PTLA personnel 24 hours a day.

#### E.1.5.2 Johnson Controls Northern New Mexico

JCNNM provides a maintenance support force under contract to LANL. This support force is under LANL's direction in an emergency. JCNNM 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. A copy of the contract between the DOE and the Incorporated County of Los Alamos is provided as Supplement 1 of this document.

#### E.1.6 LANL Support Groups

##### E.1.6.1 Health Physics Operations Group

ESH-1 provides field personnel to perform routine site evaluation and monitoring to determine radiological conditions in facilities. ESH-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 (ESH-2). ESH-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, ESH-2 maintains records of the health status of employees and related occupational medicine activities.

Although ESH-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 (SM-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.

ESH-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

ESH-5 assists ESH-2 with its ability to obtain additional exposure and treatment information. In addition, ESH-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, ESH-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 Investigation Group

Occurrence Investigation Group (ESH-7) 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 has only minimal interaction with LANL in an on-site emergency. This interaction is limited to traffic control on DOE roads with public access, handling criminal activity, and criminal investigations. A copy of the MOU between DOE and the Incorporated County of Los Alamos is included as Supplement 2 of this document.

##### 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 the LAMC. In the event that a case is sent to LAMC, support for the emergency room staff is provided by ESH-2 medical personnel. ESH-1, ESH-5, and ESH-10 personnel also provide assistance to the emergency room staff; assistance from additional ESH resources are provided, as necessary. Assistance is coordinated through the EM&R Office. A copy of the MOU between the DOE and LAMC is included as Supplement 3 of this document.

## E.2 EMERGENCY EQUIPMENT AND COMMUNICATIONS [20 NMAC 4.1, Subpart V, 264.52(e)]

### E.2.1 Emergency Equipment

20 NMAC 4.1, Subpart V, Subpart D [1-1-97], 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 units. The list includes emergency equipment available in the HAZMAT vehicles and trailers as well as supplemental emergency equipment maintained by the LACFD, JCNM, and ESH-2. A list of emergency equipment available for use at specific hazardous and/or mixed waste units is presented in Attachment E of TA-specific permit applications, permit modification requests, or permit renewal documents.

### E.2.2 Emergency Communications [20 NMAC 4.1, Subpart V, 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 located at TA-64-1. This station is manned by PTLA 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 Utilities Control Center

The Utilities Control Center (UCC) is located at TA-3-223 and 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
  - Microwave telephone communication
  - 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 NMAC 4.1, Subpart V, 264.56]

The following sections discuss guidelines used to implement this contingency plan, emergency notification, emergency manager actions, and the responses to be taken in various types of emergencies.

#### E.3.1 Guidelines For Implementation [20 NMAC 4.1, Subpart V, 264.51(b) and 264.56]

The decision to implement this contingency plan depends upon whether an imminent or actual incident involving a release of hazardous or mixed waste to the environment 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 contingency 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 precipitation threatens to move spilled material off site
  - 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
  - If an earthquake or other natural disaster threatens containment integrity.
- 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.

#### E.3.2 Emergency Notification [20 NMAC 4.1, Subpart V, 264.56(a) and (b)]

Emergency notification shall be conducted in accordance with Laboratory Implementation Requirement (LIR) 201-00-04.0, "Los Alamos National Laboratory Incident Reporting Process." The LIR requires immediate notification of 911 or the EM&R Office upon discovery of an imminent or actual incident involving solid waste (including hazardous and mixed waste). During nonworking hours, personnel will report all imminent or actual incidents involving solid waste to the Emergency Manager or the CAS operator at 667-6211. In the case of fire involving solid waste, 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 (e.g., spills, fires, or explosions). 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 is being or has been generated and/or released.

#### E.3.3 Emergency Manager Actions [20 NMAC 4.1, Subpart V, 264.56(b-h)]

Upon notification of an 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 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 contingency plan is warranted.
- Recommend activation of the EOC, if necessary.

Upon deciding to implement this contingency 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 or Section Leader 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 checklist. 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, 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 ESH 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 ESH 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.
- Advise the response groups of hazards in order to minimize personnel exposure and expedite mitigation.
- 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 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 Los Alamos Area Office (LAAO) will submit a report to the Secretary, 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 NMAC 4.1, Subpart V, 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 contingency 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). ESH-5 will conduct monitoring to ensure that chemical exposure is minimized. ESH-1 will conduct health physics monitoring whenever mixed waste is involved to ensure that radiation exposure is

also 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 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 documents 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 NMAC 4.1, Subpart V, 264.196(d)(1) [1-1-97]. 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 NMAC 4.1, Subpart V, 264.197 [1-1-97].

#### 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 cemented 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 parameters listed in Table E-3. All personnel conducting decontamination verification will wear appropriate PPE. ESH-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 will 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, all contaminated soil will be excavated and containerized. ESH-5 will conduct industrial hygiene monitoring, and if mixed waste is involved, ESH-1 will conduct health physics monitoring, if deemed necessary, to minimize exposure during soil removal 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 all contaminated material has been removed.

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 contingency 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 contingency 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. Descriptions and information related to the various fire alarms at the specific units are included in Section 2.0 and Attachment E, Table E-1, of TA-specific permit applications, permit modification requests, or permit renewal documents.

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 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 documents. 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 areawide environmental monitoring network maintained by ESH. 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, groundwaters, 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 ESH-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 ESH-2 medical facility or to LAMC. An ESH-1, ESH-5, or ESH-10 representative will attempt to ascertain what, if any, exposure occurred and what corrective measure is appropriate.

#### E.9 EVACUATION [20 NMAC 4.1, Subpart V, 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 the proper equipment, clothing, and breathing apparatus. If they are on location, ESH-1, ESH-5, and/or ESH-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 documents.

##### 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 documents 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 at 667-4027 and the LACFD Battalion Chief at 667-7026 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 or Section Leader (or 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 or Section 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 or Section 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 NMAC 4.1, Subpart V, 264.56(g) and (h)]

Appropriate representatives from the ESH groups will survey the affected area before salvage and cleanup begin. They will conduct visual inspections and sampling 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 breathing apparatus and protective clothing 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/LAAO) 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, ESH groups,

JCNNM, and other on-site resources will also be used to estimate cleanup costs and operational impact.

E.11 EMERGENCY RESPONSE RECORDS AND REPORTS [20 NMAC 4.1, Subpart V, 264.56(j)]

Any emergency that requires implementation of the contingency plan will be documented by the Group or Section Leader responsible for the hazardous or mixed waste unit associated with the emergency, and reported in writing within 15 days to the NMED. The incident report, submitted by DOE/LAO, 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.

Various LANL personnel responding to the emergency will record the details of any incident requiring implementation of this plan. The CAS operator, the EOC communicator, the Emergency Manager, and/or the Group or Section Leader responsible for the hazardous or mixed waste management area in which the emergency occurred will record the date, time, location of the incident, wastes/materials involved, injuries (if any), property damage (if any), and a detailed description of the incident. This information will be maintained in the facility operating record. ESH-7 will supply information concerning any follow-up actions. Appropriate LANL personnel will provide details regarding the removal and disposition of hazardous and mixed wastes associated with the emergency.

E.12 CONTINGENCY PLAN AMENDMENT [20 NMAC 4.1, Subpart V, 264.54]

This contingency 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, 1998, "Los Alamos National Laboratory Emergency Management Plan," Los Alamos National Laboratory, Emergency Management and Response Office, LA-12900 Rev. 1, LIR 403-00-01.0, 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 <sup>a</sup> -Controlled Response Group	Telephone	Responsibilities
ESH-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).
ESH-2, Occupational Medicine	667-7251	Provides emergency medical treatment.
ESH-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).
ESH-7, Occurrence Investigation	667-0598	Reports occurrences and tracks follow-up actions.
ESH-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.
ESH-17, Air Quality	665-0235	Provides information on meteorological conditions.
ESH-18, Water Quality and Hydrology	665-1859	Provides information on hydrologic conditions.
ESH-19, Hazardous and Solid Waste	667-0677	Provides guidance on regulatory requirements. Conducts field surveys to determine spread of contamination and adequacy of cleanup.
ESH-20, Ecology	665-8961	Provides information on biotic conditions.
Environmental Management Division	667-2211	Provide guidance on proper treatment, storage, and off-site shipment of hazardous and mixed waste.
PTLA, Protection Technology Los Alamos	667-4437	Provides traffic control and security.
JCNNM, Johnson Controls Northern New Mexico	667-6191	Dispatches maintenance personnel and equipment. Assists in waste cleanup under the direction of the Recovery Manager.

**Table E-1 (Continued)**  
**Response Groups and Agencies Available to the**  
**Emergency Management and Response Office for**  
**Guidance and/or Emergency Assistance**

LANL <sup>a</sup> -Controlled Response Group	Telephone	Responsibilities
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.
ESA, Engineering Sciences and Applications Division	667-4136	Provides information and/or assistance during emergencies involving units at TA-16.
Chemical Science and Technology Division	667-4457	Provide guidance on proper treatment, storage, and off-site shipment of hazardous and mixed waste.
<hr/>		
Non-LANL <sup>a</sup> -Controlled Response Group	Telephone	Responsibilities
Los Alamos County Fire Department	911 667-7026	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 <sup>b</sup>	662-4201	Provides medical services. Provides and maintains Emergency Room.

<sup>a</sup> Los Alamos National Laboratory.

<sup>b</sup> Medical services related to hazardous and mixed waste injuries are provided under the direction of ESH-2.

## 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 Environment, Safety, and Health (ESH) Hazardous Materials Response Group (ESH-10) for emergency response to all of the TAs at Los Alamos National Laboratory (LANL). ESH-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:

- 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
- chemical burn and neutralizing solutions
- two-way radios, cellular phones, 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
- portable emergency oxygen
- decontamination equipment
- sampling equipment
- lifting equipment
- assorted tools, tape, and other supplies.

**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):**

Engine companies  
Fire engines  
Mini-pumpers  
Modular ambulances  
Rescue vehicles  
Crash-Fire-Rescue (CFR) unit  
SCBA units  
SCBA air tanks  
Ladders with pumps  
Personnel with 120 hours Emergency Medical Technician training  
Personnel with Advanced Life Support training  
Water tankers

**Table E-2 (Continued)**

**Los Alamos National Laboratory-Wide Emergency Equipment**

**Supplementary emergency equipment and personnel available from Johnson Controls Northern New Mexico (JCNNM):**

**TRANSPORTATION EQUIPMENT:**

Pickups, 1/2 through 3/4 ton  
Trucks, 1 through 3 ton  
Vans, panels, and carryalls

**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

**TRAINED PERSONNEL:**

Heavy equipment operators  
Dispatchers  
Mechanics  
Power saw operators  
Radio and telephone operators  
Truck drivers

**Table E-2 (Continued)**

**Los Alamos National Laboratory-Wide Emergency Equipment**

**Emergency equipment and personnel at the Occupational Medicine Clinic, Occupational Medicine Group (ESH-2):**

**At TA-3 (SM-409) Central Clinic:**

**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<sub>2</sub>)  
Portable physicians' bag with medications  
Portable suction unit  
Portable stretchers (ambulance, gurney, folding)  
Wheelchairs  
O<sub>2</sub> tanks  
Manual resuscitators  
Intravenous (IV) stands  
IV solutions  
Otosopes/ophthalmoscopes  
Portable sphygmomanometers  
Stethoscopes  
Anticontamination apparel  
Eye irrigation solution  
Industrial first-aid kits  
Extrication and cervical collars, crutches, canes  
Suture sets  
Protective apparel  
Morgan lends and 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, ESH-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<sup>a</sup>**

Parameter	Test Method	Reference <sup>b</sup>
Ignitability	Pensky-Martens closed-cup method Setaflash closed-cup method Ignitability of solids	(L, S) SW1010, SW1020 (S) SW1030 (L, S) ASTM D93-80
Reactivity	Test method to determine hydrogen cyanide released from waste Test method to determine hydrogen sulfide released from waste	(L, S) SW, Section 7.3
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 <sup>c</sup> , SW7061A
Barium		(L, S) SW7080A <sup>d</sup> , SW7081 <sup>e</sup>
Cadmium		(L, S) SW7130 <sup>d</sup> , SW7131A <sup>e</sup>
Chromium		(L, S) SW7190 <sup>d</sup> , SW7191 <sup>e</sup>
Lead		(L, S) SW7420 <sup>d</sup> , SW7421 <sup>e</sup>
Selenium		(L, S) SW7740 <sup>e</sup> , SW7741A
Silver		(L, S) SW7760A <sup>d</sup> , SW7761 <sup>e</sup>
Mercury	Manual cold-vapor technique	(L) SW7470A, (S) SW7471A <sup>c,g</sup>
Volatile organics	Gas chromatography (GC)/mass spectrometry (MS) GC/MS capillary column technique	(L, S) SW8260B
Semivolatile organics	GC/MS GC/MS capillary column technique	(L, S) SW8270C <sup>f</sup> (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<sup>a</sup>**

Parameter	Test Method	Reference <sup>b</sup>
Total RCRA metals <sup>f</sup>	Acid digestion Inductively coupled plasma atomic emission spectroscopy	(L, S) 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		(L) SW7470A, (S) SW7471A
	Manual cold-vapor technique	
Free liquids	Paint Filter Liquids Test	(L, S) SW9095

- <sup>a</sup> At Los Alamos National Laboratory, current analytical capabilities include limited analyses of mixed waste samples. These analyses include gross alpha, beta, and gamma screening.
- <sup>b</sup> "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.
- <sup>c</sup> Method being revised per the January 1998 SW-846 Draft Update IVA.
- <sup>d</sup> Method being integrated into Method 7000B, per the January 1998 SW-846 Draft Update IVA.
- <sup>e</sup> Method being integrated into Method 7010, per the January 1998 SW-846 Draft Update IVA.
- <sup>f</sup> See also atomic absorption methods. Total metals may be substituted for TCLP metals, if appropriate. RCRA = Resource Conservation and Recovery Act.

**Table E-4**

**Evacuation Determination and Reentry Conditions**

Reason for Evacuation	Evacuation Determination Made by	Reentry Conditions <sup>a</sup>
Fire	<sup>1</sup> 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 <sup>b</sup>
Explosion	Same as 1 above	Same as above
Loss of ventilation	<sup>2</sup> 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 ESH-1 <sup>c</sup> 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 <sup>d</sup> or PTLA <sup>e</sup> representative, R&D <sup>f</sup> Section Leader or alternate, Senior Staff Member, or Lead Engineer	Same as above

<sup>a</sup> All reentries are authorized by the EM&R Incident Commander.

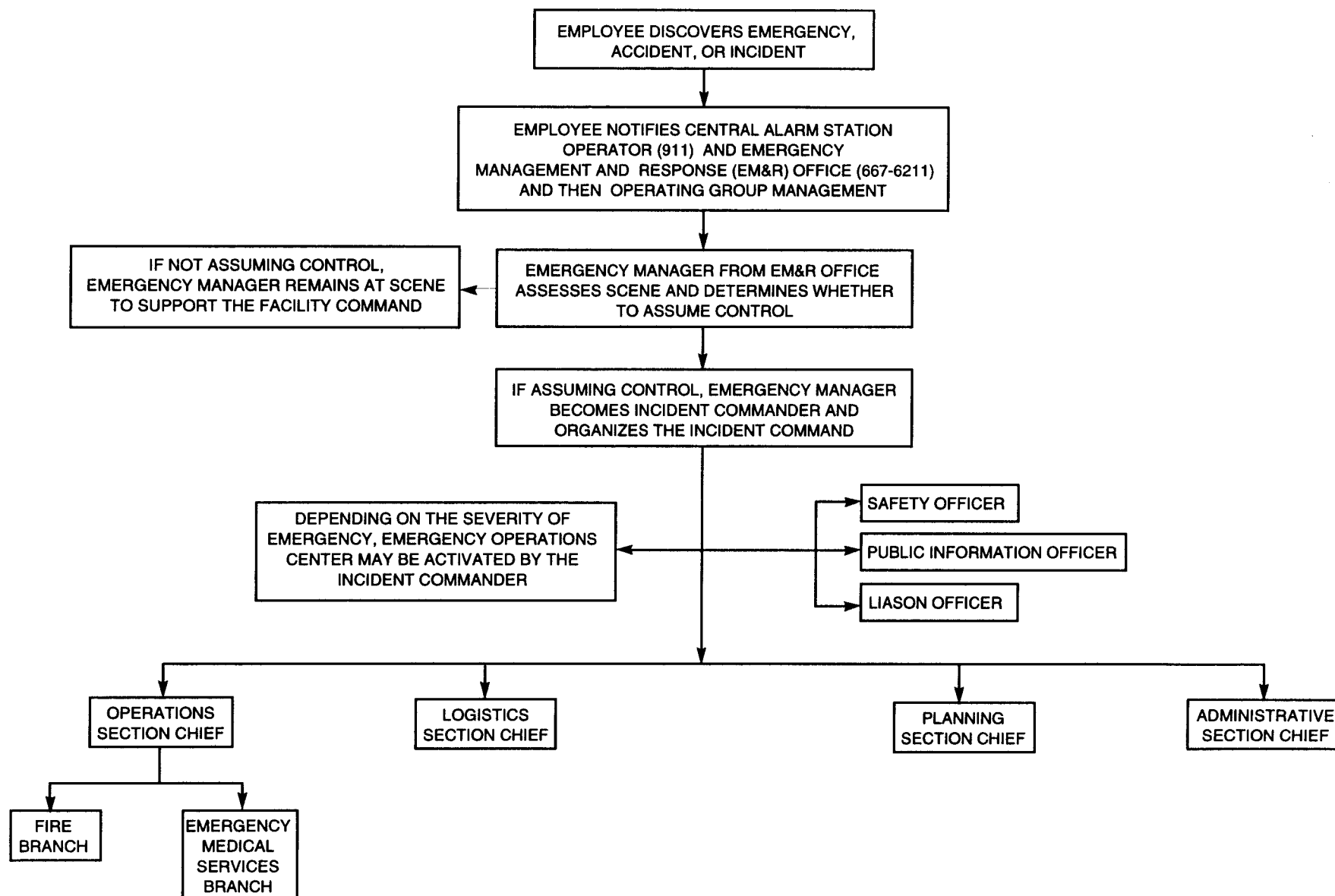
<sup>b</sup> "IC" refers to the Incident Commander as defined in 29 CFR 1910.120.

<sup>c</sup> "ESH-1" refers to the Health Physics Operations Group.

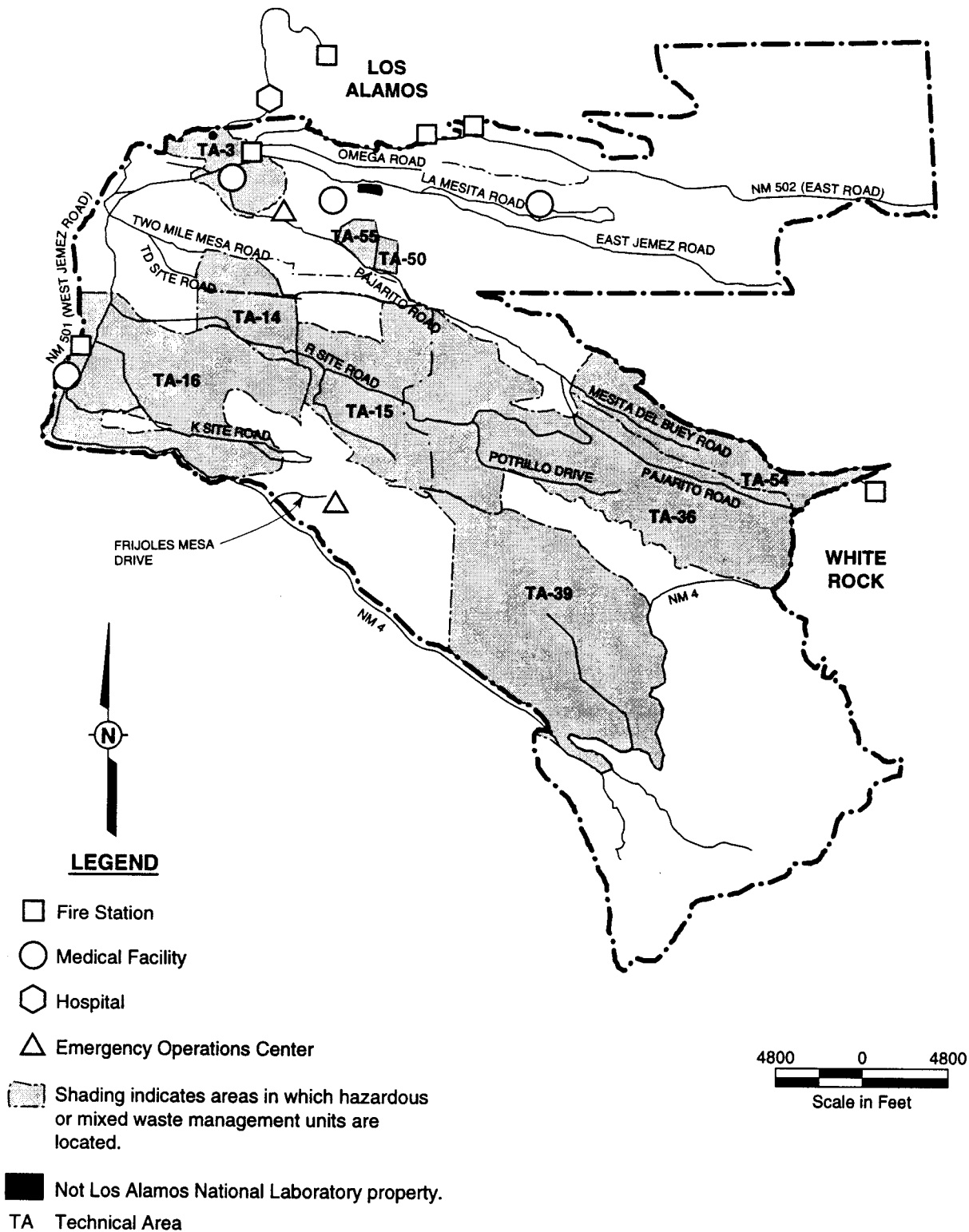
<sup>d</sup> "EM&R" refers to the Emergency Management and Response Office.

<sup>e</sup> "PTLA" refers to Protection Technology Los Alamos.

<sup>f</sup> "R&D" refers to the Research and Development Section.



**Figure E-1**  
General Hazardous and Mixed Waste Emergency Notification Structure



**Figure E-2**  
 Emergency Facilities

**APPENDIX F**  
**CLOSURE PLAN**

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## LIST OF ABBREVIATIONS/ACRONYMS

COLIWASA	composite liquid waste sampler
CST-9	LANL's Inorganic Trace Analysis Group
DOE	U.S. Department of Energy
ESH-19	LANL's Hazardous and Solid Waste Group
LANL	Los Alamos National Laboratory
LAAO	Los Alamos Area Office
20 NMAC 4.1	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
NMED	New Mexico Environment Department
QA	quality assurance
QAPP	quality assurance program plan
QC	quality control
SW-846	EPA's "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986)
TA	technical area

## **APPENDIX F**

### **CLOSURE PLAN**

This appendix describes general closure activities applicable to all hazardous and/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 documents. The activities detailed in this appendix are included to address closure requirements specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20 NMAC 4.1), Subpart IX, 270.14(b)(13), revised January 1, 1997 [1-1-97], and 20 NMAC 4.1, Subpart V, Part 264, Subparts G and H [1-1-97], as applicable. This appendix is organized as follows:

- General closure information applicable to hazardous and/or mixed waste units (Section F.1)
- Specific sampling and analytical procedures to be used during closure activities at the hazardous and mixed waste units (Section F.2).

Detailed closure procedures for hazardous and/or mixed waste units are addressed in Attachment F of TA-specific permit applications, permit modification requests, or permit renewal documents. Closure will include removal of waste from the unit to be closed and decontamination of structures and equipment that have been contaminated by waste materials. Closure activities will minimize the need for further maintenance, preclude the release of hazardous waste or constituents to environmental media, and be protective of human health.

As appropriate, radiation exposure during closure activities will be maintained as low as reasonably achievable, as required by the Atomic Energy Act, to protect worker and public health and safety. Until closure is complete and has been certified in accordance with 20 NMAC 4.1, Subpart V, 264.115 [1-1-97], as discussed in Sections F.1.5 and F.1.6, a copy of the approved closure plan and any approved revisions will be on file at LANL's Hazardous and Solid Waste Group (ESH-19) and at the U.S. Department of Energy (DOE) Los Alamos Area Office (LAAO).

#### **F.1 GENERAL CLOSURE INFORMATION**

This section is prepared in accordance with the requirements of 20 NMAC 4.1, Subpart IX, 270.14(b)(13), and 20 NMAC 4.1, Subpart V, Part 264, Subparts G and H [1-1-97], as applicable.

#### F.1.1 Closure Performance Standard [20 NMAC 4.1, Subpart V, 264.111]

The hazardous or mixed waste unit(s) addressed in TA-specific permit applications, permit modification requests, or permit renewal documents 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 NMAC 4.1, Subpart V, Subparts G and I through DD [1-1-97].

This will be accomplished by removal of waste from the unit(s) and decontamination, if necessary, of the areas that may have come into contact with wastes. Decontamination activities will ensure the removal of waste residues from the unit(s) to established cleanup levels (see Attachment F of TA-specific permit applications, permit modification requests, or permit renewal documents).

Closure of any unit will be deemed complete when decontamination has been verified; all equipment and structures associated with operation of the unit have been decontaminated, if necessary; and closure certification has been submitted to and approved by the New Mexico Environment Department (NMED).

#### F.1.2 Partial and Final Closure Activities [20 NMAC 4.1, Subpart V, 264.112(d)]

This closure plan has been written for partial closure rather than final closure of the entire LANL facility. Partial closure will consist of closing one or more of the regulated hazardous/mixed waste units, or portions thereof, at the LANL facility, while leaving the remainder of a unit or the other regulated hazardous/mixed waste units at LANL in service. In the event of a partial closure, the procedures described in the following sections and in Attachment F of TA-specific permit applications, permit modification requests, or permit renewal documents will apply to the hazardous and mixed waste unit(s), or portions thereof, to be closed. Partial closure (hereinafter referred to as closure) will be deemed complete when decontamination has been verified; the waste

management unit (or portion thereof) and related equipment and structures have been decontaminated, if necessary; the closure certification has been submitted to the NMED; and the NMED has approved the closure. Final closure will occur when LANL's remaining regulated hazardous/mixed waste management units are closed either by waste removal and decontamination or by disposal of contaminated structures and equipment.

**F.1.3 Closure Schedule [20 NMAC 4.1, Subpart V, 264.112(b)(6), 264.112(e), and 264.113]**

Written notification will be provided to the NMED 45 days before the start of closure activities for container storage areas and tanks. However, pursuant to 20 NMAC 4.1, Subpart V, 264.112(e) [1-1-97], 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 NMAC 4.1, Subpart V, 264.112(d)(2) [1-1-97]. Treatment, removal, or disposal of hazardous wastes will begin in accordance with the approved closure plan, as required by 20 NMAC 4.1, Subpart V, 264.113(a) [1-1-97], within 90 days after final receipt of waste at the hazardous or mixed waste unit. This timeframe will be met as long as facilities are available for treatment 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 20NMAC 4.1, Subpart V, 264.113(a) [1-1-97]. Closure activities and reporting requirements will then be completed within 180 days of the receipt of the final volume of waste at the unit to be closed. 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 documents. 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 NMAC 4.1, Subpart V, 264.113(b) [1-1-97].

In addition, the demonstrations in 20 NMAC 4.1, Subpart V, 264.113(a)(1) and(b)(1) [1-1-97], will be made in accordance with 20 NMAC 4.1, Subpart V, 264.113(c) [1-1-97].

**F.1.4 Amendment of the Closure Plan [20 NMAC 4.1, Subpart V, 264.112(c)]**

In accordance with 20 NMAC 4.1, Subpart IX, 264.112(c) [1-1-97], 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 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 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. If the Secretary of the NMED requests a modification of the closure plan, a plan modified in accordance with the request will be submitted 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 NMAC 4.1, Subpart V, 264.140(c)]**

In accordance with 20 NMAC 4.1, Subpart V, 264.140(c) [1-1-97], LANL, as a federal facility, is exempt from the requirements of 20 NMAC 4.1, Subpart V, Part 264, Subpart H [1-1-97], to provide a cost estimate, financial assurance mechanisms, and liability insurance for closure actions.

**F.1.6 Closure Certification [20 NMAC 4.1, Subpart V, 264.115]**

Within 60 days after completion of closure activities for any hazardous or mixed waste management unit, LANL will submit to the Secretary of the NMED, via certified mail, a certification that the unit has been closed in accordance with the specifications of the applicable closure plan, when approved. The certification will be attested to by an independent, registered professional engineer and will be signed by the appropriate DOE and LANL officials, in accordance with 20 NMAC 4.1, Subpart V, 264.115 [1-1-97]. Documentation supporting the independent, registered engineer's certification will be furnished to the Secretary of the NMED with the original certification. A copy of the certification and supporting documentation shall be maintained by both DOE/LAO and ESH-19.

#### **F.1.7    Security**

Because of the ongoing nature of waste management operations at LANL, the sites of the hazardous or mixed waste units addressed in TA-specific permit applications, permit modification requests, or permit renewal documents will be under the permanent care of the DOE or another authorized federal agency. Fences and site security will be maintained for as long as necessary to prohibit public access and to meet DOE requirements for radiation protection.

#### **F.1.8    Closure Report**

Upon completion of the closure activities for any hazardous or mixed waste management unit addressed in TA-specific permit applications, permit modification requests, or permit renewal documents, a closure report shall be prepared and submitted to the Secretary of the NMED. The report shall document the closure and contain, for example, the following:

- The certification described in Section F.1.6
- Any variance from the approved activities and the reason for the variance
- A summary of all sampling results, showing:
  - Sample identification
  - Sampling location
  - Datum reported
  - Detection limit for each datum
  - A measure of analytical precision (e.g., uncertainty, range, variance)
  - Identification of analytical procedure
  - Identification of analytical laboratory
- A quality assurance (QA)/quality control (QC) statement on analytical data validation and decontamination verification
- The location of the file of supporting documentation, including:
  - Field logbooks
  - Laboratory sample analysis reports
  - QA/QC documentation
  - Chain-of-custody forms
- Storage or disposal location of regulated hazardous/mixed waste resulting from closure activities
- A certification of accuracy of the report.

**F.1.9 Survey Plat and Post-Closure Requirements [20 NMAC 4.1, Subpart V, 264.116 and 264.117 through 264.120]**

Unless indicated otherwise in TA-specific permit applications, permit modification requests, or permit renewal documents, LANL intends to remove hazardous and mixed waste and associated constituents from permitted storage and treatment units and to decontaminate structures and equipment contained in the units or, if decontamination to the cleanup levels approved in permitted unit closure plans cannot be achieved, to dispose of the contaminated structures and equipment (clean closure). If decontamination to these cleanup levels is not achievable, LANL may propose an alternate demonstration of decontamination as circumstances indicate.

If permitted units are not clean-closed or for units subject to 20 NMAC 4.1, Subpart V, 264.110(b) [1-1-97], a survey plat prepared in accordance with 20 NMAC 4.1, Subpart V, 264.116 [1-1-97] will be filed with the appropriate authorities at certification of closure as described in that regulation. Post-closure care requirements pursuant to 20 NMAC 4.1, Subpart V, 264.117 through 264.120 [1-1-97], will begin after partial or final closure of the unit. These will include the preparation of a written post-closure care plan with provisions for amendments pursuant to 20 NMAC 4.1, Subpart V, 264.118 [1-1-97], and post-closure notices will be filed with appropriate authorities as described in 20 NMAC 4.1, Subpart V, 264.119 [1-1-97]. To meet that requirement, the DOE 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 any of the above referenced types of waste management units, 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 NMAC 4.1, Subpart V, 264.120 [1-1-97].

**F.2 SAMPLING AND ANALYTICAL PROCEDURES [20 NMAC 4.1, Subpart V, 264.112(b)(4)]**

The following sections describe procedures and methods for sampling, analysis, and documentation applicable to closure activities. While the procedures and methods are specific, other applicable procedures or methods may be used if conditions or experience show the alternate method to be more appropriate. Sampling will be conducted in accordance with procedures given in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) (EPA, 1986) or other approved procedures or methods.

## F.2.1 Soil and Sediment Sampling

When soil and/or sediment sampling is appropriate or required, the sampling procedures outlined below will be used to obtain samples to determine the amount (if any) of hazardous constituents in soil and/or sediment in the vicinity of the unit(s) undergoing closure.

### F.2.1.1 Sampling Procedures

Soil samples will be collected from a depth of six inches; sediment samples will be collected from the surface or near surface. A trowel, scoop, or Veihmeyer sampler may be used to collect soil and sediment samples. Sampling procedures will be performed as follows:

- Trowel or Scoop

- Take small, equal portions of sample from the surface or near the surface of the material to be sampled.
- Combine the samples in a container appropriate for the required analysis.
- Cap the container, attach a label and seal, and preserve as required (see Table F-1). Record in the field logbook, and complete the sample analysis request sheet and chain-of-custody form. Deliver the samples to LANL's Inorganic Trace Analysis Group (CST-9) for radiological screening and to the laboratory for analysis.

- Veihmeyer Sampler

- Assemble the sampler by screwing in the tip and the drive head on the sampling tube
- Insert the tapered handle (drive guide) of the drive hammer through the drive head
- Place the sampler in a perpendicular position on the soil to be sampled
- Drive the sampler into the soil to the desired sampling depth by pounding the drive head with the drive hammer (do not drive the tube further than the tip of the hammer's drive guide)
- Record the length of the tube that penetrated the material
- Move the drive hammer onto the drive head (in this position, the hammer serves as a handle for the sampler)
- Rotate the sampler at least two revolutions to shear off the sample at the bottom
- Lower the sampler handle (hammer) until it just clears the two ear-like protrusions on the drive head and rotate about 90 degrees



- Withdraw the sampler from the material by pulling the handle (hammer) upwards (when the sampler cannot be withdrawn by hand, as in deep soil sampling, use a puller jack and grip)
- Dislodge the hammer from the sampler, turn the sampler tube upside down, tap the head gently against the hammer, and carefully recover the sample from the tube
- Store the sample in an appropriate sample container
- Label the sample, affix the seals, preserve as required, record in the field logbook, complete the sample analysis request sheet and chain-of-custody form, and deliver the samples to CST-9 for radiological screening and to the laboratory for analysis.

#### F.2.1.2 Cleaning of Soil or Sediment Samplers

To prevent cross contamination, it is important to clean the samplers after each sample is collected. An unused, disposable sampler may be presumed clean if still in a factory-sealed wrapper. Unsealed samplers will be cleaned prior to use; they will be washed with a detergent and water solution, rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry.

#### F.2.2 Liquid Sampling

In order to determine baseline parameters, a composite liquid waste sampler (COLIWASA) or similar device will be used to sample unused washwater solutions before decontamination begins. It will also be used to sample the washwater used in cleaning structures and equipment. As an alternative to the COLIWASA, glass tubes may be used to sample liquids. The primary advantage in using a glass tube is that the tube will be disposed of appropriately after each sample is collected, thus eliminating the potential for cross contamination.

##### F.2.2.1 Sampling Procedure

Liquid sampling with a COLIWASA will be performed as follows:

- Ensure that the COLIWASA is clean
- Assemble the COLIWASA
- Check that the sampler is functioning properly

- Wear necessary personal protective equipment, and observe required sampling precautions
- Slowly lower the COLIWASA into the liquid at a rate that permits the level of the liquid inside and outside the sampler tube to be about the same (if the level of the liquid in the sampler tube is lower than that outside the sampler, the sampling rate is too fast and will result in a nonrepresentative sample)
- When the sampler stopper reaches the bottom of the liquid container, close the sampler
- Lock the sampler in the closed position
- Slowly withdraw the sampler from the container with one hand, while wiping the sampler tube with a disposable cloth with the other hand
- Carefully discharge the sample into a sample container
- Preserve as required (see Table F-2), cap the container, attach a label and seal, place immediately in an insulated container with ice (if required), record in the field logbook, and complete the sample analysis request sheet and chain-of-custody form
- Clean the sampler on site and store used rags in plastic bags for subsequent disposal or store the contaminated parts of the sampler in a plastic storage tube or bag for subsequent cleaning.

#### F.2.2.2 Cleaning of Liquid Samplers

A sampler must be clean before use. An unused, disposable sampler may be presumed clean if still in a factory-sealed wrapper. Unsealed samplers will be cleaned prior to use; they will be washed with a detergent and water solution, rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry. A necessary piece of equipment for cleaning the tube of the COLIWASA is a bottle brush that fits tightly inside the diameter of the tube. The brush is connected to a rod of sufficient length to reach the entire length of the sampler tube. To prevent cross contamination, it is important to clean the samplers after each sample is collected. Clean samplers should be stored in clean polyethylene plastic tubes or bags in a clean and protected area.

#### F.2.3 Sample Handling and Documentation

Samples will be analyzed either at LANL or at a commercial analytical laboratory. In either case, each sample will be labeled, sealed, and accompanied by chain-of-custody and sample analysis request forms. The chain-of-custody form is necessary to trace sample possession from the time

of collection to the time of analysis and must accompany every sample. The original record accompanies shipment; the copy is retained by LANL. If samples are analyzed at LANL, the original will be maintained by LANL. The request for analysis form has two parts: a field portion and a laboratory portion. The field portion of this form must be completed by the sample collection personnel. The laboratory portion is intended to be completed by the analytical laboratory personnel when the sample is received. The analytical laboratory retains the original record and sends a copy to LANL.

Sample containers appropriate for the requested analyses will be used for all samples. Samples will be collected, placed in bottles, sealed, and tagged. Sample container surfaces will be screened for radiological contamination and decontaminated, if necessary. Sample containers will then be immediately placed in packaging material, and, if refrigeration is required, in an insulated container with ice. Recommended sample containers, preservation techniques, and holding times are presented in Tables F-1 and F-2.

The sample container must be sealed with a custody seal attached to the container in such a way that the seal must be broken in order to open the container. The seal and sample tag must be completed with a waterproof pen. A sample label is necessary to prevent misidentification of samples and should include, if applicable, the grid number referenced to positions staked on the site perimeter. The sample label should be completed to include the project name, sample number, collection date/time, collector's name, sample location, sample media description, preservative, and analysis requested. In the case of soil sampling, field information may include observations such as the soil texture and surface appearance, ambient temperature and cloud cover at time of sampling, and precipitation conditions 24 hours before sampling.

A field logbook will be kept and will contain all information pertinent to field surveys and sampling. The logbook shall have bound and consecutively numbered pages in 8½- by 11-inch format. Examples of entries include:

- Purpose of sample (routine sampling, special sampling)
- Location of sampling (coordinates referenced to staked field points, if soil sample)
- Name and business address of person making log entry

- Type of process producing waste
- Number and volume of sample
- Description of each sampling location, sampling methodology, equipment used
- Date and time of sample collection
- Sample destination and transporter's name (e.g., name of laboratory, United Parcel Service)
- Map or photograph of the sampling site, if any
- Field observations, if applicable (e.g., ambient temperature, sky conditions, past 24-hour precipitation)
- Field measurements, if applicable (e.g., pH, conductivity)
- Collector's sample identification number(s)
- Signature of person responsible for the log entry.

Because sampling situations vary widely, no general rule can be given as to the extent of information that must be entered in the logbook. It is recommended, however, to record sufficient information so that someone can reconstruct the sampling situation without relying on the collector's memory.

#### **F.2.4 Analytical Procedures**

Sample analyses, including those for QA/QC, will be conducted using methods prescribed in SW-846 or other approved procedures or methods. Target detection limits, analytical methods, and instrumentation for metals and organics analyses are presented in Tables F-3 and F-4, respectively.

#### **F.2.5 Field and Laboratory QA/QC**

Field QC activities will include collection of the following QC samples: duplicate samples, trip blanks, field blanks, and equipment rinsate blanks. Field QC samples are summarized in Table F-5.

Duplicate samples are two or more samples collected simultaneously into separate containers from the same source under identical conditions. Acceptance limits for field duplicate analyses are 0 to 20 relative percent difference per analyte. Frequency of duplicate samples will be 1 in 20 samples.

or 1 per day if less than 20 samples are collected. Blank samples will include trip blanks, field blanks, and equipment rinsate blanks. A trip blank is a sample container filled with organic-free deionized water. The filled container is taken to the sampling site, remains unopened, and then is shipped to the analytical laboratory along with the samples. A trip blank is submitted whenever samples are collected for volatile organic compounds analysis. A field blank is a sample collected to assess the ambient conditions at the sampling site. It consists of a sample of organic-free deionized water poured into a sample container under normal sampling conditions. An equipment rinsate blank is collected to assess the cleanliness of sampling equipment. The equipment is cleaned according to the procedures described in Sections F.2.1.2 and F.2.2.2, then organic-free deionized water is poured over the decontaminated equipment's sampling surface and collected in a sample container. Frequency of equipment rinsate blank samples will be 1 in 20 samples, or 1 per day if less than 20 samples are collected. Blank samples and duplicate samples of liquid, soil, and sediment will be analyzed for the same parameters as the closure samples. Samples will be provided with unique identification numbers that do not indicate to the laboratory that the samples are for QA/QC purposes.

Instrument calibration and maintenance are subject to QC procedures. Field equipment will be calibrated and maintained using the manufacturer's instructions or appropriate standard procedures.

Laboratories used for analysis shall operate under a quality assurance program plan (QAPP) that meets the requirements in *SW-846*. QC procedures in the analytical laboratory are guided by the laboratory's QAPP. In the laboratory, QC samples are required to establish the accuracy and precision of the analytical data in order to determine the quality of the data. Laboratory QC procedures are summarized in Table F-6.

### **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 F**  
**CLOSURE PLAN**

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F-5	Summary of Field Quality Control Samples
F-6	Summary of Laboratory Quality Control Procedures by Analytical Method



## LIST OF ABBREVIATIONS/ACRONYMS

COLIWASA	composite liquid waste sampler
CST-9	LANL's Inorganic Trace Analysis Group
DOE	U.S. Department of Energy
ESH-19	LANL's Hazardous and Solid Waste Group
LANL	Los Alamos National Laboratory
LAO	Los Alamos Area Office
20 NMAC 4.1	New Mexico Administrative Code, Title 20, Chapter 4, Part 1
NMED	New Mexico Environment Department
QA	quality assurance
QAPP	quality assurance program plan
QC	quality control
<i>SW-846</i>	EPA's "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (EPA, 1986)
TA	technical area

## **APPENDIX F**

### **CLOSURE PLAN**

This appendix describes general closure activities applicable to all hazardous and/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 documents. The activities detailed in this appendix are included to address closure requirements specified in the New Mexico Administrative Code, Title 20, Chapter 4, Part 1 (20 NMAC 4.1), Subpart IX, 270.14(b)(13), revised January 1, 1997 [1-1-97], and 20 NMAC 4.1, Subpart V, Part 264, Subparts G and H [1-1-97], as applicable. This appendix is organized as follows:

- General closure information applicable to hazardous and/or mixed waste units (Section F.1)
- Specific sampling and analytical procedures to be used during closure activities at the hazardous and mixed waste units (Section F.2).

Detailed closure procedures for hazardous and/or mixed waste units are addressed in Attachment F of TA-specific permit applications, permit modification requests, or permit renewal documents. Closure will include removal of waste from the unit to be closed and decontamination of structures and equipment that have been contaminated by waste materials. Closure activities will minimize the need for further maintenance, preclude the release of hazardous waste or constituents to environmental media, and be protective of human health.

As appropriate, radiation exposure during closure activities will be maintained as low as reasonably achievable, as required by the Atomic Energy Act, to protect worker and public health and safety. Until closure is complete and has been certified in accordance with 20 NMAC 4.1, Subpart V, 264.115 [1-1-97], as discussed in Sections F.1.5 and F.1.6, a copy of the approved closure plan and any approved revisions will be on file at LANL's Hazardous and Solid Waste Group (ESH-19) and at the U.S. Department of Energy (DOE) Los Alamos Area Office (LAAO).

#### **F.1 GENERAL CLOSURE INFORMATION**

This section is prepared in accordance with the requirements of 20 NMAC 4.1, Subpart IX, 270.14(b)(13), and 20 NMAC 4.1, Subpart V, Part 264, Subparts G and H [1-1-97], as applicable.

#### F.1.1 Closure Performance Standard [20 NMAC 4.1, Subpart V, 264.111]

The hazardous or mixed waste unit(s) addressed in TA-specific permit applications, permit modification requests, or permit renewal documents 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 NMAC 4.1, Subpart V, Subparts G and I through DD [1-1-97].

This will be accomplished by removal of waste from the unit(s) and decontamination, if necessary, of the areas that may have come into contact with wastes. Decontamination activities will ensure the removal of waste residues from the unit(s) to established cleanup levels (see Attachment F of TA-specific permit applications, permit modification requests, or permit renewal documents).

Closure of any unit will be deemed complete when decontamination has been verified; all equipment and structures associated with operation of the unit have been decontaminated, if necessary; and closure certification has been submitted to and approved by the New Mexico Environment Department (NMED).

#### F.1.2 Partial and Final Closure Activities [20 NMAC 4.1, Subpart V, 264.112(d)]

This closure plan has been written for partial closure rather than final closure of the entire LANL facility. Partial closure will consist of closing one or more of the regulated hazardous/mixed waste units, or portions thereof, at the LANL facility, while leaving the remainder of a unit or the other regulated hazardous/mixed waste units at LANL in service. In the event of a partial closure, the procedures described in the following sections and in Attachment F of TA-specific permit applications, permit modification requests, or permit renewal documents will apply to the hazardous and mixed waste unit(s), or portions thereof, to be closed. Partial closure (hereinafter referred to as closure) will be deemed complete when decontamination has been verified; the waste management unit (or portion thereof) and related equipment and structures have been decontaminated, if necessary; the closure certification has been submitted to the NMED; and the

NMED has approved the closure. Final closure will occur when LANL's remaining regulated hazardous/mixed waste management units are closed either by waste removal and decontamination or by disposal of contaminated structures and equipment.

**F.1.3 Closure Schedule** [20 NMAC 4.1, Subpart V, 264.112(b)(6), 264.112(e), and 264.113]

Written notification will be provided to the NMED 45 days before the start of closure activities for container storage areas and tanks. However, pursuant to 20 NMAC 4.1, Subpart V, 264.112(e) [1-1-97], 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 NMAC 4.1, Subpart V, 264.112(d)(2) [1-1-97]. Treatment, removal, or disposal of hazardous wastes will begin in accordance with the approved closure plan, as required by 20 NMAC 4.1, Subpart V, 264.113(a) [1-1-97], within 90 days after final receipt of waste at the hazardous or mixed waste unit. This timeframe will be met as long as facilities are available for treatment 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 NMAC 4.1, Subpart V, 264.113(a) [1-1-97]. Closure activities and reporting requirements will then be completed within 180 days of the receipt of the final volume of waste at the unit to be closed. 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 documents. 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 NMAC 4.1, Subpart V, 264.113(b) [1-1-97]. In addition, the demonstrations in 20 NMAC 4.1, Subpart V, 264.113(a)(1) and (b)(1) [1-1-97], will be made in accordance with 20 NMAC 4.1, Subpart V, 264.113(c) [1-1-97].

**F.1.4 Amendment of the Closure Plan** [20 NMAC 4.1, Subpart V, 264.112(c)]

In accordance with 20 NMAC 4.1, Subpart IX, 264.112(c) [1-1-97], 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 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 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. If the Secretary of the NMED requests a modification of the closure plan, a plan modified in accordance with the request will be submitted 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 NMAC 4.1, Subpart V, 264.140(c)]**

In accordance with 20 NMAC 4.1, Subpart V, 264.140(c) [1-1-97], LANL, as a federal facility, is exempt from the requirements of 20 NMAC 4.1, Subpart V, Part 264, Subpart H [1-1-97], to provide a cost estimate, financial assurance mechanisms, and liability insurance for closure actions.

**F.1.6 Closure Certification [20 NMAC 4.1, Subpart V, 264.115]**

Within 60 days after completion of closure activities for any hazardous or mixed waste management unit, LANL will submit to the Secretary of the NMED, via certified mail, a certification that the unit has been closed in accordance with the specifications of the applicable closure plan, when approved. The certification will be attested to by an independent, registered professional engineer and will be signed by the appropriate DOE and LANL officials, in accordance with 20 NMAC 4.1, Subpart V, 264.115 [1-1-97]. Documentation supporting the independent, registered engineer's certification will be furnished to the Secretary of the NMED with the original certification. A copy of the certification and supporting documentation shall be maintained by both DOE/LAAO and ESH-19.

**F.1.7 Security**

Because of the ongoing nature of waste management operations at LANL, the sites of the hazardous or mixed waste units addressed in TA-specific permit applications, permit modification

requests, or permit renewal documents will be under the permanent care of the DOE or another authorized federal agency. Fences and site security will be maintained for as long as necessary to prohibit public access and to meet DOE requirements for radiation protection.

#### F.1.8 Closure Report

Upon completion of the closure activities for any hazardous or mixed waste management unit addressed in TA-specific permit applications, permit modification requests, or permit renewal documents, a closure report shall be prepared and submitted to the Secretary of the NMED. The report shall document the closure and contain, for example, the following:

- The certification described in Section F.1.6
- Any variance from the approved activities and the reason for the variance
- A summary of all sampling results, showing:
  - Sample identification
  - Sampling location
  - Datum reported
  - Detection limit for each datum
  - A measure of analytical precision (e.g., uncertainty, range, variance)
  - Identification of analytical procedure
  - Identification of analytical laboratory
- A quality assurance (QA)/quality control (QC) statement on analytical data validation and decontamination verification
- The location of the file of supporting documentation, including:
  - Field logbooks
  - Laboratory sample analysis reports
  - QA/QC documentation
  - Chain-of-custody forms
- Storage or disposal location of regulated hazardous/mixed waste resulting from closure activities
- A certification of accuracy of the report.

#### F.1.9 Survey Plat and Post-Closure Requirements [20 NMAC 4.1, Subpart V, 264.116 and 264.117 through 264.120]

Unless indicated otherwise in TA-specific permit applications, permit modification requests, or permit renewal documents, LANL intends to remove hazardous and mixed waste and associated

constituents from the permitted units and to decontaminate all structures and equipment to established cleanup levels or, if adequate decontamination cannot be achieved, to dispose of the contaminated structures and equipment. If decontamination to established cleanup levels is not achievable, LANL will amend this closure plan to address appropriate closure procedures or post-closure care requirements pursuant to 20 NMAC 4.1, Subpart V, 264.117 through 264.120 [1-1-97]. A survey plat, post-closure certification, and post-closure notices will not be required for the permitted units because, subject to this closure plan, unless amended, all wastes will be removed and the units will be decontaminated or disposed of at closure. Therefore, these requirements are not applicable.

## F.2 SAMPLING AND ANALYTICAL PROCEDURES [20 NMAC 4.1, Subpart V, 264.112(b)(4)]

The following sections describe procedures and methods for sampling, analysis, and documentation applicable to closure activities. While the procedures and methods are specific, other applicable procedures or methods may be used if conditions or experience show the alternate method to be more appropriate. Sampling will be conducted in accordance with procedures given in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (SW-846) (EPA, 1986) or other approved procedures or methods.

### F.2.1 Soil and Sediment Sampling

When soil and/or sediment sampling is appropriate or required, the sampling procedures outlined below will be used to obtain samples to determine the amount (if any) of hazardous constituents in soil and/or sediment in the vicinity of the unit(s) undergoing closure.

#### F.2.1.1 Sampling Procedures

Soil samples will be collected from a depth of six inches; sediment samples will be collected from the surface or near surface. A trowel, scoop, or Veihmeyer sampler may be used to collect soil and sediment samples. Sampling procedures will be performed as follows:

- Trowel or Scoop
  - Take small, equal portions of sample from the surface or near the surface of the material to be sampled.
  - Combine the samples in a container appropriate for the required analysis.

- Cap the container, attach a label and seal, and preserve as required (see Table F-1). Record in the field logbook, and complete the sample analysis request sheet and chain-of-custody form. Deliver the samples to LANL's Inorganic Trace Analysis Group (CST-9) for radiological screening and to the laboratory for analysis.
- Veihmeyer Sampler
  - Assemble the sampler by screwing in the tip and the drive head on the sampling tube
  - Insert the tapered handle (drive guide) of the drive hammer through the drive head
  - Place the sampler in a perpendicular position on the soil to be sampled
  - Drive the sampler into the soil to the desired sampling depth by pounding the drive head with the drive hammer (do not drive the tube further than the tip of the hammer's drive guide)
  - Record the length of the tube that penetrated the material
  - Move the drive hammer onto the drive head (in this position, the hammer serves as a handle for the sampler)
  - Rotate the sampler at least two revolutions to shear off the sample at the bottom
  - Lower the sampler handle (hammer) until it just clears the two ear-like protrusions on the drive head and rotate about 90 degrees
  - Withdraw the sampler from the material by pulling the handle (hammer) upwards (when the sampler cannot be withdrawn by hand, as in deep soil sampling, use a puller jack and grip)
  - Dislodge the hammer from the sampler, turn the sampler tube upside down, tap the head gently against the hammer, and carefully recover the sample from the tube
  - Store the sample in an appropriate sample container
  - Label the sample, affix the seals, preserve as required, record in the field logbook, complete the sample analysis request sheet and chain-of-custody form, and deliver the samples to CST-9 for radiological screening and to the laboratory for analysis.

#### F.2.1.2 Cleaning of Soil or Sediment Samplers

To prevent cross contamination, it is important to clean the samplers after each sample is collected. An unused, disposable sampler may be presumed clean if still in a factory-sealed wrapper. Unsealed samplers will be cleaned prior to use; they will be washed with a detergent and water solution, rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry.



## F.2.2 Liquid Sampling

In order to determine baseline parameters, a composite liquid waste sampler (COLIWASA) or similar device will be used to sample unused washwater solutions before decontamination begins. It will also be used to sample the washwater used in cleaning structures and equipment. As an alternative to the COLIWASA, glass tubes may be used to sample liquids. The primary advantage in using a glass tube is that the tube will be disposed of appropriately after each sample is collected, thus eliminating the potential for cross contamination.

### F.2.2.1 Sampling Procedure

Liquid sampling with a COLIWASA will be performed as follows:

- Ensure that the COLIWASA is clean
- Assemble the COLIWASA
- Check that the sampler is functioning properly
- Wear necessary personal protective equipment, and observe required sampling precautions
- Slowly lower the COLIWASA into the liquid at a rate that permits the level of the liquid inside and outside the sampler tube to be about the same (if the level of the liquid in the sampler tube is lower than that outside the sampler, the sampling rate is too fast and will result in a nonrepresentative sample)
- When the sampler stopper reaches the bottom of the liquid container, close the sampler
- Lock the sampler in the closed position
- Slowly withdraw the sampler from the container with one hand, while wiping the sampler tube with a disposable cloth with the other hand
- Carefully discharge the sample into a sample container
- Preserve as required (see Table F-2), cap the container, attach a label and seal, place immediately in an insulated container with ice (if required), record in the field logbook, and complete the sample analysis request sheet and chain-of-custody form
- Clean the sampler on site and store used rags in plastic bags for subsequent disposal or store the contaminated parts of the sampler in a plastic storage tube or bag for subsequent cleaning.

#### F.2.2.2 Cleaning of Liquid Samplers

A sampler must be clean before use. An unused, disposable sampler may be presumed clean if still in a factory-sealed wrapper. Unsealed samplers will be cleaned prior to use; they will be washed with a detergent and water solution, rinsed several times with tap water, rinsed with distilled water, drained of excess water, and air-dried or wiped dry. A necessary piece of equipment for cleaning the tube of the COLIWASA is a bottle brush that fits tightly inside the diameter of the tube. The brush is connected to a rod of sufficient length to reach the entire length of the sampler tube. To prevent cross contamination, it is important to clean the samplers after each sample is collected. Clean samplers should be stored in clean polyethylene plastic tubes or bags in a clean and protected area.

#### F.2.3 Sample Handling and Documentation

Samples will be analyzed either at LANL or at a commercial analytical laboratory. In either case, each sample will be labeled, sealed, and accompanied by chain-of-custody and sample analysis request forms. The chain-of-custody form is necessary to trace sample possession from the time of collection to the time of analysis and must accompany every sample. The original record accompanies shipment; the copy is retained by LANL. If samples are analyzed at LANL, the original will be maintained by LANL. The request for analysis form has two parts: a field portion and a laboratory portion. The field portion of this form must be completed by the sample collection personnel. The laboratory portion is intended to be completed by the analytical laboratory personnel when the sample is received. The analytical laboratory retains the original record and sends a copy to LANL.

Sample containers appropriate for the requested analyses will be used for all samples. Samples will be collected, placed in bottles, sealed, and tagged. Sample container surfaces will be screened for radiological contamination and decontaminated, if necessary. Sample containers will then be immediately placed in packaging material, and, if refrigeration is required, in an insulated container with ice. Recommended sample containers, preservation techniques, and holding times are presented in Tables F-1 and F-2.

The sample container must be sealed with a custody seal attached to the container in such a way that the seal must be broken in order to open the container. The seal and sample tag must be completed with a waterproof pen. A sample label is necessary to prevent misidentification of samples and should include, if applicable, the grid number referenced to positions staked on the

site perimeter. The sample label should be completed to include the project name, sample number, collection date/time, collector's name, sample location, sample media description, preservative, and analysis requested. In the case of soil sampling, field information may include observations such as the soil texture and surface appearance, ambient temperature and cloud cover at time of sampling, and precipitation conditions 24 hours before sampling.

A field logbook will be kept and will contain all information pertinent to field surveys and sampling. The logbook shall have bound and consecutively numbered pages in 8½- by 11-inch format. Examples of entries include:

- Purpose of sample (routine sampling, special sampling)
- Location of sampling (coordinates referenced to staked field points, if soil sample)
- Name and business address of person making log entry
- Type of process producing waste
- Number and volume of sample
- Description of each sampling location, sampling methodology, equipment used
- Date and time of sample collection
- Sample destination and transporter's name (e.g., name of laboratory, United Parcel Service)
- Map or photograph of the sampling site, if any
- Field observations, if applicable (e.g., ambient temperature, sky conditions, past 24-hour precipitation)
- Field measurements, if applicable (e.g., pH, conductivity)
- Collector's sample identification number(s)
- Signature of person responsible for the log entry.

Because sampling situations vary widely, no general rule can be given as to the extent of information that must be entered in the logbook. It is recommended, however, to record sufficient information so that someone can reconstruct the sampling situation without relying on the collector's memory.

#### F.2.4 Analytical Procedures

Sample analyses, including those for QA/QC, will be conducted using methods prescribed in *SW-846* or other approved procedures or methods. Target detection limits, analytical methods, and instrumentation for metals and organics analyses are presented in Tables F-3 and F-4, respectively.

#### F.2.5 Field and Laboratory QA/QC

Field QC activities will include collection of the following QC samples: duplicate samples, trip blanks, field blanks, and equipment rinsate blanks. Field QC samples are summarized in Table F-5.

Duplicate samples are two or more samples collected simultaneously into separate containers from the same source under identical conditions. Acceptance limits for field duplicate analyses are 0 to 20 relative percent difference per analyte. Frequency of duplicate samples will be 1 in 20 samples, or 1 per day if less than 20 samples are collected. Blank samples will include trip blanks, field blanks, and equipment rinsate blanks. A trip blank is a sample container filled with organic-free deionized water. The filled container is taken to the sampling site, remains unopened, and then is shipped to the analytical laboratory along with the samples. A trip blank is submitted whenever samples are collected for volatile organic compounds analysis. A field blank is a sample collected to assess the ambient conditions at the sampling site. It consists of a sample of organic-free deionized water poured into a sample container under normal sampling conditions. An equipment rinsate blank is collected to assess the cleanliness of sampling equipment. The equipment is cleaned according to the procedures described in Sections F.2.1.2 and F.2.2.2, then organic-free deionized water is poured over the decontaminated equipment's sampling surface and collected in a sample container. Frequency of equipment rinsate blank samples will be 1 in 20 samples, or 1 per day if less than 20 samples are collected. Blank samples and duplicate samples of liquid, soil, and sediment will be analyzed for the same parameters as the closure samples. Samples will be provided with unique identification numbers that do not indicate to the laboratory that the samples are for QA/QC purposes.

Instrument calibration and maintenance are subject to QC procedures. Field equipment will be calibrated and maintained using the manufacturer's instructions or appropriate standard procedures.

Laboratories used for analysis shall operate under a quality assurance program plan (QAPP) that meets the requirements in *SW-846*. QC procedures in the analytical laboratory are guided by the laboratory's QAPP. In the laboratory, QC samples are required to establish the accuracy and precision of the analytical data in order to determine the quality of the data. Laboratory QC procedures are summarized in Table F-6.

### 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.

**Table F-1**  
**Sample Containers, Preservation Techniques, and Holding Times**  
**for Sediment/Soil/Sludge Samples**

Analyte Group	Container	Preservative	Holding Time <sup>a</sup>
Target compound volatile organics <sup>b</sup>	125 milliliter (ml) WM <sup>c</sup> -G <sup>d</sup>	Cool to 4 degrees Celsius (°C)	14 days
Target compound semivolatile organics <sup>b</sup>	250 ml WM-G vial with Teflon-lined lid	Cool to 4°C	14 days from field collection to preparative extraction 40 days from preparative extraction to determinative analysis
Target analyte metals <sup>b</sup> (except mercury and hexavalent chromium)	200 gram (g) WM-P <sup>e</sup> or G	None	180 days
Mercury	200 g WM-P or G	Cool to 4°C	28 days
Hexavalent chromium	100 g WM-P or G	Cool to 4°C	One month to extraction 4 days from preparative extraction to determinative analysis

<sup>a</sup> Holding time information was taken from U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.

<sup>b</sup> Target compound volatile and semivolatile organics and target analyte metals are listed by respective test method numbers in U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.

<sup>c</sup> WM = Wide-mouth

<sup>d</sup> G = Glass

<sup>e</sup> P = Polyethylene

**Table F-2**  
**Sample Containers, Preservation Techniques, and Holding Times**  
**for Liquid Samples**

Analyte Group	Container	Preservative	Holding Time <sup>a</sup>
Target compound volatile organics <sup>b</sup>	2 x 40 milliliter (ml) G <sup>c</sup> vials with Teflon-lined septa	HCl <sup>d</sup> , H <sub>2</sub> SO <sub>4</sub> <sup>e</sup> , or solid NaHSO <sub>4</sub> <sup>f</sup> to pH<2; cool to 4 degrees Celsius (°C)	14 days
Target compound semivolatile organics <sup>b</sup>	4 x 1 liter AG <sup>g</sup> with Teflon-lined lid	Cool to 4°C	7 days from field collection to preparative extraction 40 days from preparative extraction to determinative analysis
Target analyte metals <sup>b</sup> (except mercury and hexavalent chromium)	600 ml P <sup>h</sup> or G	HNO <sub>3</sub> <sup>i</sup> to pH <2	180 days
Mercury	400 ml P or G	HNO <sub>3</sub> to pH <2	28 days
Hexavalent chromium	400 ml P or G	Cool to 4°C	24 hours

- <sup>a</sup> Holding time information was taken from U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
- <sup>b</sup> Target compound volatile and semivolatile organics and target analyte metals are listed by respective test method numbers in U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
- <sup>c</sup> G = Glass
- <sup>d</sup> HCl = Hydrochloric acid
- <sup>e</sup> H<sub>2</sub>SO<sub>4</sub> = sulfuric acid
- <sup>f</sup> NaHSO<sub>4</sub> = sodium sulfate
- <sup>g</sup> AG = Amber glass
- <sup>h</sup> P = Polyethylene
- <sup>i</sup> HNO<sub>3</sub> = Nitric acid

**Table F-3**  
**Target Detection Limits, Analytical Methods,  
and Instrumentation for Metals Analysis**

Analyte	Target Detection <sup>a</sup> Limit (µg/L) <sup>b</sup>	EPA SW-846 <sup>c</sup> Analytical Method	Instrumentation <sup>d</sup>
Arsenic	10	6010A, 7060A <sup>e</sup> , 7061A	ICP, GFAA
Barium	200	6010A, 7080A <sup>f</sup> , 7081 <sup>g</sup>	ICP, FLAA, GFAA
Beryllium	5	6010A, 7090 <sup>f</sup> , 7091 <sup>g</sup>	ICP, FLAA, GFAA
Cadmium	2	6010A, 7130 <sup>f</sup> , 7131A <sup>g</sup>	ICP, FLAA, GFAA
Chromium	10	6010A, 7190 <sup>f</sup> , 7191 <sup>g</sup>	ICP, FLAA, GFAA
Lead	5	6010A, 7420 <sup>f</sup> , 7421 <sup>g</sup>	ICP, FLAA, GFAA
Mercury	0.2	7470A, 7471A <sup>g</sup>	CVAA
Nickel	40	6010A, 7520 <sup>f</sup>	ICP, FLAA
Selenium	5	6010A, 7740 <sup>g</sup> , 7741A	ICP, GFAA, GHAA
Silver	10	6010A, 7760A <sup>f</sup> , 7761 <sup>g</sup>	ICP, FLAA, GFAA
Thallium	10	6010A, 7840 <sup>f</sup> , 7841 <sup>g</sup>	ICP, FLAA, GFAA

<sup>a</sup> Detection limits listed are for clean water. Actual detection limits may be higher depending on sample composition and matrix type.

<sup>b</sup> µg/L = micrograms per liter

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

<sup>d</sup> ICP = Inductively coupled plasma emission spectroscopy

GFAA = Graphite furnace atomic absorption spectroscopy

FLAA = Flame atomic absorption spectroscopy

CVAA = Cold-vapor atomic absorption spectroscopy

GHAA = Gaseous hydride atomic absorption spectroscopy

<sup>e</sup> Method being integrated into Method 7010, per the January 1998 SW-846 Draft Update IVA.

<sup>f</sup> Method being integrated into Method 7000B, per the January 1998 SW-846 Draft Update IVA.

<sup>g</sup> Method being revised per the January 1998 SW-846 Draft Update IVA.



**Table F-4**

**Target Detection Limits, Analytical Methods, and Instrumentation  
for Organics Analysis**

Analyte (Group)	Target Detection Limits <sup>a</sup>	EPA SW-846 <sup>b</sup> Analytical Method	Instrumentation <sup>c</sup>
Target compound list volatiles plus ten tentatively identified compounds (TIC)	10 mg/L <sup>d</sup> water 10–120 mg/kg <sup>e</sup> sediment	8260B	GC/MS
Target compound list semivolatiles plus 20 TICs	10 mg/L water 330–50,000 mg/kg sediment	8270C <sup>f</sup>	GC/MS

<sup>a</sup> Detection limits expressed as practical quantitation limits.

<sup>b</sup> U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.

<sup>c</sup> GC/MS = Gas chromatography/mass spectrometry

<sup>d</sup> mg/L = milligrams per liter

<sup>e</sup> mg/kg = milligrams per kilogram

<sup>f</sup> Method being revised per the January 1998 *SW-846* Draft Update IVA.

**Table F-5**  
**Summary of Field Quality Control Samples**

Quality Control Sample Type	Sample Matrix	Applicable Analysis	Frequency	Purpose	Acceptance Criteria	Corrective <sup>a</sup> Action
Trip blank	Water	Volatile organic analytes (VOA)	One set per shipping cooler containing samples to be analyzed for VOAs	Monitor contamination or cross contamination during handling and transportation	<sup>b</sup>	Advisory--no action required
Field blank	Water	VOAs, semivolatile organic analytes (SVOA), metals, radionuclides	One sample daily per analysis	Monitor field sample contamination/air contamination	<sup>b</sup>	Advisory--no action required
Field duplicate	Soil/water	VOAs, SVOAs, metals, radionuclides	One sample per day per matrix type per 20 samples	Monitor sample variability	Analytical method criteria, if applicable	Advisory--no action required
Equipment rinsate blank	Water	VOAs, SVOAs, metals, radionuclides	One sample per day per 20 samples	Monitor decontamination effectiveness and sample cross contamination	<sup>b</sup>	Advisory--no action required

<sup>a</sup> U.S. Environmental Protection Agency Functional Guidelines for Data Validation may apply.

<sup>b</sup> For volatile and semivolatile analysis, if blank shows detectable levels of any common laboratory contaminant (e.g., methylene chloride, acetone, 2-butanone, toluene, and/or any phthalate ester), sample must exhibit that contaminant at a level 10 times the quantitation limit to be considered detectable. For all other contaminants, sample must exhibit the contaminant at a level 5 times the quantitation level to be considered detectable.

**Table F-6**  
**Summary of Laboratory Quality Control Procedures<sup>a</sup>**  
**by Analytical Method**

Parameter	EPA SW-846 <sup>b</sup> Analytical Method	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action
Target compound volatile organics	8240B or 8260A	Instrument performance: mass calibration/ion abundance pattern	Every 12 hours of analysis time	Per method	Repeat until acceptance criteria satisfied
		Initial calibration: instrument sensitivity and linearity of response	Five concentration levels; after each instrument performance, check prior to sample analysis	Relative response factors (RRF) within method limits	Repeat calibration
		Continuing calibration	Every 12 hours of analysis time	Average RRFs <25% difference	Repeat calibration
		Internal standards	All calibration standards, samples, and blanks	Extracted ion current profile (EICP); D -50 to +100% Retention time shifts <0.50 minutes	Correct malfunction; reanalyze sample per method criteria
		Method blank	Every 12 hours of analysis time	<5 times quantitation limit for methylene chloride, acetone, 2-butanone; all other compounds < or = to quantitation limit	Determine source of contamination, and document corrective action; reextract and reanalyze samples

Table F-6 (Continued)

Summary of Laboratory Quality Control Procedures<sup>a</sup>  
by Analytical Method

Parameter	EPA SW-846 <sup>b</sup> Analytical Method	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action
Target compound volatile organics (continued)		System monitoring compounds	Every method blank, sample, matrix spike, matrix spike duplicate; matrix specific, per method limits	Check instrument and calculations; reanalyze per method criteria	
Target compound semivolatile organics	8250A or 8270B <sup>c</sup>	Instrument performance: mass calibration/ion abundance pattern	Every 12 hours	Per method	Repeat until acceptance criteria satisfied
		Initial calibration: instrument sensitivity and linearity of response	Five concentration levels. After each performance, check prior to sample analysis	RRFs within method limits	Repeat calibration
		Continuing calibration	Every 12 hours	Average RRFs <25% difference	Repeat calibration
		Internal standards	All calibration standards, samples, and blanks	EICP; D -50 to +100% Retention time shifts <0.50 minutes	Correct malfunction; reanalyze sample per method criteria

Table F-6 (Continued)

Summary of Laboratory Quality Control Procedures<sup>a</sup>  
by Analytical Method

Parameter	EPA SW-846 <sup>b</sup> Analytical Method	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action
Target compound semivolatile organics (continued)		Method blank	Each group of samples of similar matrix and concentration level (soils)	<5 times quantitation limit for phthalate esters; all other compounds < or = to quantitation limit	Determine source of contamination; document corrective action; reextract and reanalyze samples
		Surrogate compounds	Each sample, blank	Matrix-specific per method limits	Reextract and reanalyze per method criteria
Metals	6010A	Surrogate compounds Instrument calibration Initial/continuing calibration	Each sample and blank Daily, or each setup After instrument calibration, 10% or every 2 hours	60–150% recovery 5% of true value 10% of true value	Advisory only--no action Repeat calibration Correct problem, recalibrate and reanalyze previous ten samples
		Initial/continuing calibration blank	Every calibration, 10% or 2 hours	< contract-required detection limits	Correct problem; recalibrate and reanalyze all samples since last blank
		Preparation blank	Each batch of digested samples	< contract-required detection limits	Redigest and reanalyze all associated samples per method criteria

Table F-6 (Continued)

Summary of Laboratory Quality Control Procedures<sup>a</sup>  
by Analytical Method

Parameter	EPA SW-846 <sup>b</sup> Analytical Method	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action
Metals (continued)		Interference check sample (ICS)	Each run or twice per 8- hour shift	20% of true value	Correct problem; recalibrate and reanalyze all samples since last ICS
		Duplicate sample analysis	Once per field batch per matrix	0–20% relative percent difference when < five times detection limit; detection limit otherwise	Flag data
		Laboratory control sample (LCS)	Once per field batch or each digest group	80–120% percent recovery (except silver, antimony)	Correct problem; redigest and reanalyze all samples since last LCS
		Serial dilution analysis	Once per field batch per matrix	10% original determination	Flag data
		Instrument detection limit	Quarterly	As determined	Not applicable
		Interelement corrections	Annually	As determined	Not applicable
		Linear range analysis	Quarterly	5% of true value	Reanalyze

Document: LANL General Part B  
Revision No.: 1.0  
Date: October 1998

**Table F-6 (Continued)**

**Summary of Laboratory Quality Control Procedures<sup>a</sup>  
by Analytical Method**

- <sup>a</sup> Source: "U.S. Environmental Protection Agency Contract Laboratory Program Statement of Work for Inorganic and Organic Analysis" (EPA, 1990). Not all listed procedures may be applicable to *SW-846* protocols.
- <sup>b</sup> U.S. Environmental Protection Agency, 1986 and all approved updates, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," *SW-846*.
- <sup>c</sup> Method being revised per the January 1998 *SW-846* Draft Update IVA.

Document: LANL General Part B  
Revision No.: 1.0  
Date: October 1998

## **Supplement 1**

**Contract Between the U.S. Department of Energy and the  
Incorporated County of Los Alamos**



## AWARD/CONTRACT

1. THIS CONTRACT IS A RATED ORDER  
UNDER DPAS (15 C.F.R. 350)

CONTRACT (Proc. Inst. Ident.) NO.

DE-AC32-93AL64100

EFFECTIVE DATE

DEC 01 1992

4. REQUISITION

PURCHASE REQUEST/PROJECT NO.

32-93AL64100.000

ISSUED BY

CODE

Department of Energy  
Los Alamos Area Office  
Los Alamos, NM, 87544

6. ADMINISTERED BY (If other than item 5)

CODE

NAME AND ADDRESS OF CONTRACTOR (No., street, city, county, State and ZIP Code)

Incorporated County of Los Alamos  
P.O. Box 30  
Los Alamos, New Mexico 87544

8. DELIVERY

See Section F

☐ FOB ORIGIN☒ OTHER (See below)

9. DISCOUNT FOR PROMPT PAYMENT

10. SUBMIT INVOICES  
(4 copies unless other-  
wise specified) TO THE  
ADDRESS SHOWN IN:

ITEM

See Block 12

ODE

FACILITY CODE

1. SHIP TO/MARK FOR

CODE

See Section F

12. PAYMENT WILL BE MADE BY

CODE

U.S. Department of Energy  
Financial Management Division  
P.O. Box 5400-Albuquerque, NM 87115

3. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION:

☐ 10 U.S.C. 2304(c)(1)

1

☒ 41 U.S.C. 253(c)(1)

1

14. ACCOUNTING AND APPROPRIATION DATA

B&R Code: Appropriation: Funds Obligated:  
CR0103041 89 X 0240 \$3,675,395

5A. ITEM NO.

15B. SUPPLIES/SERVICES

15C. QUANTITY

15D. UNIT

15E. UNIT PRICE

15F. AMOUNT

(See Continuation Pages)

15G. TOTAL AMOUNT OF CONTRACT \$

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CONTRACTING OFFICER WILL COMPLETE ITEM 17 OR 18 AS APPLICABLE

7. ☒ CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is re-quired to sign this document and return 3 copies to issuing office.)  
Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following documents: (a) this award/contract, (b) the solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)18. ☐ AWARD (Contractor is not required to sign this document.) Your

offer on Solicitation Number \_\_\_\_\_ including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation, (b) your offer, and (c) this award/contract. No further contractual documents are necessary.

A. NAME AND TITLE OF SIGNER (Type or print)

ACE J. WALTERS, Council Chairman

20A. NAME OF CONTRACTING OFFICER

Jerry L. Bellows  
Area Manager

B. NAME OF CONTRACTOR

Wallace J. Walters  
(Signature of person authorized to sign)

19C. DATE SIGNED

11/24/92

20B. UNITED STATES OF AMERICA

BY *Jerry L. Bellows*  
(Signature of Contracting Officer)

2000

11-2

PART I  
THE SCHEDULE

SECTION A - AWARD/CONTRACT (STANDARD FORM 26 - COVER)

SECTION B - SUPPLIES OR SERVICES AND PRICES/COSTS

B.01 BACKGROUND AND PURPOSE OF THE CONTRACT

DOE is authorized pursuant to the Department of Energy Organization Act (Public Law 95-91) and other applicable law, including the Atomic Energy Act of 1954, as amended, to provide or otherwise arrange for fire suppression and related facilities and services at project sites where such facilities and services are not available. As permitted by this authority, DOE and the County entered into Contract No. DE-AC04-88AL44118 which was changed in Contract Modification No. M011 to Contract No. DE-AC32-88AL44118. Under Contract No. DE-AC32-88AL44118 the County operated the DOE-owned fire department serving the County of Los Alamos, the DOE's Los Alamos National Laboratory and other property and facilities of DOE, as well as persons and property, within and outside the County.

DOE and the County have now determined that it is to their mutual benefit for the County to continue operating the DOE-owned fire department. The County has the authority to and is willing to perform the services specified in this contract.

Since the transfer of the Atomic Energy Commission-owned community to the County in the 1960's, the Government has made annual assistance payments to the County pursuant to the provisions of the Atomic Energy Community Act of 1955, as amended (Public Law 84-221). During this period, it has been the goal of the Government and the County to work towards making the County self-sufficient. One step in achieving this goal has been a concentrated effort in recent years to obtain Congressional approval for a buy-out in the form of a one-time lump-sum payment which would liquidate all remaining obligations of the Government to the County. Another step toward self-sufficiency was the transfer of responsibility for providing fire suppression and related services to the County by means of DOE Contract No. DE-AC32-88AL44118. This contract represents a further step in that process by requiring the County to begin paying the cost of services for the community.

## **B.02 ITEMS BEING ACQUIRED**

The Contractor shall furnish all personnel, equipment, materials, supplies, and services (except as may be expressly set forth in this contract as furnished by the Government) and otherwise do all things necessary for, or incident to, performing and providing the services in strict accordance with all terms and conditions of this contract.

## **B.03 ESTIMATED COST**

The total net estimated cost for this five-year contract is \$39,862,355.00, broken down as follows:

	<b>Estimated Costs</b>	<b>Less: County Share (Fixed)</b>	<b>Plus: Management Allowance (Fixed)</b>	<b>Net Estimated Costs</b>
1st Year	\$7,350,790	\$ 0	\$ 0	\$ 7,350,790
2nd Year	7,568,368	0	0	7,568,368
3rd Year	7,895,868	118,800	40,600	7,817,668
4th Year	8,299,374	237,600	81,200	8,142,974
5th Year	8,738,687	356,400	121,800	8,504,087
<b>Total Net Estimated Costs</b>				<b><u>\$39,383,887</u></b>

The estimated cost for each year shall not be exceeded without prior Contracting Officer approval. No fee shall be paid to the Contractor under this contract; however, a management allowance as described in Paragraph B.05, Management Allowance, shall be paid to the County.

DOE shall reimburse the Contractor for providing the services described herein to the areas identified in Attachment D, "Los Alamos Fire Department Service Area," and to other areas outside the County to the extent provided for in this Contract. The County shall be responsible for all costs of providing these services to any residential, commercial and industrial areas outside of the Municipal Development Area developed after July 28, 1989.

## **B.04 COUNTY'S SHARE OF COST**

The County agrees to assume the cost of community fire protection based on a formula which multiplies the ratio of the 1988 appraised value of the property in the County to the combined appraised value of County and Laboratory property by Contract No. DE-AC32-88AL44118 price as of July 18, 1989,

which was \$5,669,692. Based upon this formula the County shall contribute \$594,000 annually toward Fire Department operations. This annual amount shall remain fixed at this level unless modified at the request of one of the parties upon agreement that this amount is no longer fair and reasonable.

The County will begin paying a portion of its share of the Fire Department costs as described above beginning the third year of this contract. The County shall phase such payment over a five-year period. The County shall pay 20 percent of \$594,000 the third year of the Contract for its full share; 40 percent the fourth year of the Contract; and 60 percent the fifth year of the Contract. If the parties enter into a follow-on contract following the expiration of this Contract, or if this Contract is extended, the County shall continue to phase in payment in 20 percent increments; that is 80 and 100 percent in the next two years respectively. The County's annual share of Fire Department costs shall be deposited in the Special Bank account in twelve monthly installments on the first work day of each month.

#### **B.05 MANAGEMENT ALLOWANCE**

In addition to the costs and expenses reimbursed under the Contract Clause entitled "Allowable Cost and Payment," the County shall be given a management allowance, subject to Paragraph B.04 above, of \$203,000 annually. This figure represents four percent of one year of operation under Contract No. DE-AC32-88AL44118 as of July 18, 1989, less the County's share of operating costs. This figure shall remain fixed unless the figure given in Paragraph B.04 above, representing the County's full share of Fire Department costs, is changed. DOE reserves the right, however, to request that the County reduce this figure by an amount equal to any savings or additional revenues that DOE may achieve in the County's operation by other means. The County reserves the right to refuse such a request if it does not appear to be in the County's best interest. Payment of the management allowance described in this Paragraph shall be phased in beginning the third year of this contract in 20 percent increments over a five-year period in the same manner in which the County's payment of its share of Fire Department costs is phased in as described in Paragraph B.04 above. DOE shall pay the annual management allowance to the County in twelve equal

monthly installments at the end of each month; provided, however, that in the event of termination or expiration, the final installment shall be retained pending compliance with subparagraph (e) of Paragraph H.16, Advance Payments.

#### **B.06 LIMITATION OF FUNDS**

Pursuant to the Contract Clause entitled, "Limitation of Funds," total funds in the amount of \$3,675,395 have been allotted for obligation for the first six months with funds obligated every six months thereafter with the issuance of a unilateral modification to this contract. The funds allotted for obligation are available for payment of all allowable costs to be incurred for this contract.

#### **B.07 WORK SCHEDULE**

Work schedules will be established to meet the requirements and intent of Section 7(k) of the Fair Labor Standards Act (29 USCA. Section 207[k]) for shift firefighter personnel and a 40 hour-per-week work schedule for all other Fire Department personnel.

### **SECTION C - DESCRIPTION/SPECIFICATION/WORK STATEMENT**

#### **C.01 STATEMENT OF WORK**

The Statement of Work is Attachment A to this contract.

#### **C.02 REPORTS**

Reports and deliverables shall be submitted by the Contractor in accordance with the provisions of this contract. See Attachment J for listing. This listing may not be inclusive of all the reporting requirements of this contract and the absence of a particular requirement herein does not waive the Contractors responsibility to provide it in the manner and at the time required elsewhere in this contract.

### **SECTION D - PACKAGING AND MARKING**

#### **D.01 PACKAGING**

Preservation, packaging, and packing for shipment or mailing of all work deliverable hereunder shall be in accordance with good commercial practice and adequate to insure acceptance by common carrier and safe transportation at the most economical rates.

#### **D.02 MARKING**

(a) Each package, report or other deliverable shall be accompanied by a letter or other document which:

(1) Identifies the contract by number under which the item is being delivered.

(2) Identifies the deliverable Item Number or Report Requirement which requires the delivered item(s).

(3) Indicates whether the Contractor considers the delivered item to be a partial or full satisfaction of the requirement.

(b) For any package, report or other deliverable being delivered to a party other than the Contracting Officer, a copy of the document required in (a) above shall be simultaneously provided to the office administering the contract, as identified in Section G of the contract, or if none, to the Contracting Officer.

#### **SECTION E - INSPECTION AND ACCEPTANCE**

##### **E.01 INSPECTION**

Requirements for inspection are established in FAR Clause 52.246-5 under the Contract Clauses of this contract. Inspection of all items under this contract shall be accomplished by the DOE Technical Representative, or any other duly authorized Government representative of the Contracting Officer.

##### **E.02 ACCEPTANCE**

Any acceptance or approval of services under this contract (including reporting requirements) shall be accomplished by the Contracting Officer.

#### **SECTION F - DELIVERIES OR PERFORMANCE**

##### **F.01 PERIOD OF PERFORMANCE**

This contract shall commence on the effective date of the contract and shall be for a period of five (5) years unless sooner terminated as provided in the article entitled "TERMINATION."

## SECTION G - CONTRACT ADMINISTRATION DATA

### G.01 CORRESPONDENCE PROCEDURE

- (a) To promote timely and effective administration, correspondence, including invoices and reports required by the contract to be submitted to the Government, shall be sent to the Contracting Officer.

U. S. Department of Energy  
Los Alamos Area Office  
528 35th Street  
Los Alamos, NM 87544

- (b) All correspondence, including approvals, from the Government to the Contractor shall be sent to the Contract Administrator at the address set forth below:

Contract Administrator  
County Administrator  
Incorporated County of Los Alamos  
P. O. Box 30  
Los Alamos, NM 87544

### G.02 GOVERNMENT CONTACT FOR POST AWARD ADMINISTRATION

The Contractor shall use the Contracting Officer as the focal point for all matters regarding this contract except as otherwise provided by the Contracting Officer in writing. The Los Alamos Area Office (LAAO) is the contract administration office.

### G.03 BILLING INSTRUCTIONS

In connection with the Contract Clause entitled "Allowable Cost and Payment" and Paragraph H.16, Advance Payments, and in order to support the amounts withdrawn from the Special Bank Account, the Contractor shall submit invoices to the Contracting Officer on a monthly basis. Such invoices shall be prepared in compliance with the Billing Instructions set forth in Attachment H of the contract and such other directions as may be provided by the Contracting Officer.

**G.04 ANNUAL INDIRECT COST RATE SUBMISSION**

- (a) In accordance with the contract clause entitled "Allowable Cost and Payment", the Contractor, as soon as possible but not later than one hundred eighty (180) days after the expiration of its fiscal year, shall submit to the indirect cost rate Cognizant Contracting Officer (CCO), identified in paragraph (e) of this clause, a proposed final indirect rate or rates for that period based on the Contractor's actual cost experience during that period, together with supporting data or calculations.
- (b) Allowability of costs and acceptability of cost allocation methods shall be determined in accordance with the cost principles in effect as of the date of this contract.
- (c) The settlement of final indirect cost rates and indirect costs shall be accomplished prior to the Contracting Officer's approval of the final payment.
- (d) Pending settlement of final indirect cost rates for any period, the Contractor shall be reimbursed for indirect rates at billing rates acceptable to the CCO. These billing rates are subject to appropriate adjustments when the final indirect cost rates are settled. The Contractor shall provide to the CCO annually, within 180 days after the expiration of its fiscal year, a billing rate proposal, together with supporting data. If billing rates change substantially at any time during the contract performance period, the Contractor shall notify the CCO in writing: Upon review of the annual billing rate proposal, or any notification of substantial rate change during the contract performance period, the CCO may adjust the approved billing rate. In the event that adjustment is to be applied retroactively, the Contractor shall make appropriate adjustments on its next voucher.
- (e) The indirect cost rate CCO and address is as follows:

Herman Smith  
U. S. Department of Energy  
Albuquerque Operations Office  
Financial Management Division  
P. O. Box 5400  
Albuquerque, New Mexico 87115  
Telephone No. (505) 845-4107



The Contractor shall use the CCO as the point of contact for indirect cost rate matters as defined by the contract clause entitled "Allowable Cost and Payment."

- (f) The billing rate for indirect costs for the first year of operation will be established as a provisional billing rate of 15% to be applied to salaries and benefits. If, during the period of performance of this contract, provisional rates have not been established for a subsequent period, via a contract modification, then the Contractor shall continue to bill those rates most recently approved by the Contracting Officer, or at lower rates until such time as the contract is modified to reflect the most current approved rates.

## **SECTION H - SPECIAL CONTRACT REQUIREMENTS**

### **H.01 ADDITIONAL DEFINITIONS**

With reference to the Contract Clause entitled "Definitions," and as used in the Statement of Work listed below are definitions which apply to the Contract;

- (a) The term "University" means the Regents of the University of California which manages and operates the Los Alamos National Laboratory under DOE Contract No. W-7405-ENG-36.

- (b) The terms "Laboratory" or "LANL" mean the Department of Energy owned Los Alamos National Laboratory located in Los Alamos, New Mexico.

- (c) The term "County" and "Contractor" are used interchangeably and mean the Incorporated County of Los Alamos.

Interpretation of the terms and conditions of this Agreement shall be made in accordance with the definitions of the most recently published edition of the National Fire Protection Association (NFPA) standards unless such definitions are contrary to the express terms and conditions of this Agreement.

### **H.02 UNCLASSIFIED CONTROLLED NUCLEAR INFORMATION**

- (a) **Definition.** Unclassified Controlled Nuclear Information (UCNI) is defined as, and limited to, sensitive but unclassified Atomic Energy Defense Program information concerning design, production,

utilization, and safeguards of nuclear weapons or material. (See Title 10, Code of Federal Regulations (CFR) Part 1017, for complete details.) Official procedures for access to, and protection and transmission of UCNI are given below.

- (b) **Legend.** Documents originated by the Contractor or furnished by the Government or the University to the Contractor in connection with this contract may contain UCNI as defined in Section 148 of the Atomic Energy Act of 1954, as amended. The following legend will be stamped or typed on the cover of such documents:

**UNCLASSIFIED CONTROLLED NUCLEAR INFORMATION  
NOT FOR PUBLIC DISSEMINATION**

Unauthorized dissemination subject to civil and criminal sanctions under Section 148 of the Atomic Energy Act of 1954, as amended (42 U.S.C. 2168).

The Contractor shall be responsible for protecting such information from unauthorized dissemination in accordance with DOE regulations, requirements, and instructions.

- (c) **Access.** UCNI may only be made available to authorized individuals, which, for purposes of this contract, means only to U. S. citizens who have a need to know in the performance of official duties or DOE authorized activities and who are employees of the Government, employees of a Government contractor or subcontractor, or employees of a prospective Government contractor or subcontractor for the purpose of bidding on a Government contract.
- (d) **Protection of UCNI.** All parties shall be obliged under penalty of law to protect such information as required by 10 CFR 1017.17, such responsibility including, but not limited to, the following:
- (1) **General.** UCNI required protection from unauthorized dissemination. UCNI must be protected and controlled in a manner consistent with that customarily accorded other types of unclassified but sensitive information (e.g.,

proprietary business information, personnel or medical records of employees, attorney-client information). The Contractor shall establish and maintain a system for the protection of UCNI in its possession or under its control that is consistent with the physical protection standards established in this section. Each Authorized Individual or person granted special access to UCNI who receives, acquires, or produces an UCNI or a document or material containing UCNI shall take reasonable and prudent steps to ensure that it is protected from unauthorized dissemination.

- (2) Protection in Use or Storage. An Authorized Individual or a person granted special access to UCNI shall maintain physical control over any document or materials containing an UCNI notice that is in use so as to prevent unauthorized access to it. When any document or material containing an UCNI notice is not in use, it must be stored in a secure container (e.g., locked desk or file cabinet) or in a location where access is limited (e.g., locked or guarded office, controlled access facility).
- (3) Reproduction. A document or material containing an UCNI notice may be reproduced to the minimum extent necessary consistent with the need to carry out official duties without permission of the originator provided the reproduced document or material is marked and protected in the same manner as the original document or material.
- (4) Destruction. A document or material containing an UCNI notice may be disposed of by any method which assures sufficiently complete destruction to prevent its retrieval (providing the disposal is authorized by the Archivist of the United States under 41 CFR 101-11.4 and by agency records disposition schedules).

(5) Transmission.

(i) A document or material containing an UCNI notice must be packaged to prevent disclosure of the presence of UCNI when transmitted by a means which could allow access to the document or material by a person who is not an Authorized Individual or a person granted special access to UCNI. The address and return address must be indicated on the outside of the package.

(ii) A document or material containing an UCNI notice may be transmitted by:

- A. U. S. first class, express, certified, or registered mail;
- B. Any means approved for the transmission of classified documents or material;
- C. An Authorized Individual or a person granted special access to UCNI when he or she can control access to the document or material being transmitted; or
- D. Any other means determined by the DOE Assistant Secretary for Defense Programs to be sufficiently secure.

(iii) UCNI may be discussed or transmitted over an unprotected telephone or telecommunications circuit when required by operational considerations. More secure means of communication should be utilized whenever possible.

(6) Automated Data Processing (ADP). UCNI may be processed or produced on any ADP system which is certified for classified information which complies with the guidelines of Office of Management and Budget Circular No. A-130, "Management of Federal Information Resources," or which has been approved for such use in accordance with the provisions of applicable DOE directives.

- (a) **Penalties.** Any person who violates Section 148 of the Atomic Energy Act or any regulation or order of the Head of Agency issued under Section 148 of the Atomic Energy Act, including the requirements of this Paragraph H.02, may be subject to a civil penalty; and may also be subject to a criminal penalty under Section 223 of the Atomic Energy Act of 1954, as amended. The DOE Assistant Secretary for Defense Programs may recommend to the Head of the Agency imposition of this civil penalty which shall not exceed \$100,000 for each violation.

**H.03 CONFIDENTIALITY OF INFORMATION**

- (a) To the extent that the work under this contract requires that the Contractor be given access to confidential or proprietary business, technical, or financial information belonging to the Government or other companies, the Contractor shall after receipt thereof, treat such information as confidential and agrees not to appropriate such information to its own use or to disclose such information to third parties unless specifically authorized by the Contracting Officer in writing. The foregoing obligations, however, shall not apply to:
- (1) Information which, at the time of receipt by the Contractor, is in the public domain;
  - (2) Information which is published by others after receipt thereof by the Contractor or otherwise becomes part of the public domain through no fault of the Contractor;
  - (3) Information which the Contractor can demonstrate was in its possession at the time of receipt thereof and was not acquired directly or indirectly from the Government or other companies pursuant to this contract;
  - (4) Information which the Contractor can demonstrate was received by it from a third party who did not require the Contractor to hold it in confidence.

- (b) The Contractor shall obtain the written agreement, in a form satisfactory to the Contracting Officer, of each employee permitted access, whereby the employee agrees that he or she will not discuss, divulge or disclose any such information or data to any person or entity except those persons within the Contractor's organization directly concerned with the performance of the Contract.
- (c) The Contractor agrees, if requested by the Government, to sign an agreement identical, in all material respects, to the provisions of this Para. H.03, with each company supplying information to the Contractor under this contract, and to supply a copy of such agreement to the Contracting Officer. From time to time upon request of the Contracting Officer, the Contractor shall supply the Government with reports itemizing information received as confidential or proprietary and setting forth the company or companies from which the Contractor received such information.
- (d) The Contractor agrees that upon request by the Contracting Officer it will execute a DOE approved agreement with any party whose facilities or proprietary data it is given access to or is furnished, restricting use and disclosure of the data or the information obtained from the facilities. Upon request by the Contracting Officer, such an agreement shall also be signed by Contractor personnel.

#### **H.04 REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS**

The Representations, Certifications and Other Statements of Offeror, submitted by the Contractor and that apply to this contract, are incorporated here by reference.

#### **H.05 MODIFICATION AUTHORITY**

Notwithstanding any of the other provisions of this contract, the Contracting Officer shall be the only individual authorized to:

- (a) waive any requirement of this contract, or
- (b) modify any term or condition of this contract.

## **H.06 GOVERNMENT-FURNISHED PROPERTY AND SERVICES**

This Paragraph H.06 supplements the Contract Clause entitled, "Government Property (Cost-Reimbursement, Time-and-Material, or Labor-Hour Contracts)."

- (a) **General.** Unless the Contracting Officer and the Contractor agree otherwise, DOE shall furnish, without cost to the Contractor, the property and services listed below subject to procedures prescribed by the Contracting Officer for the performance of this contract. In providing these services, the DOE may use any source available at the LANL. These sources may include the University of California, including any of its sub-contractors, or other sources as DOE may deem appropriate.
- (b) **Property.**
  - (1) **Equipment and Vehicles.** The equipment and vehicles described in Attachment B.
  - (2) **Facilities.** The facilities described in Attachment C. No alterations to the facilities shall be made without specific written permission from the Contracting Officer; however, such permission shall not be unreasonably withheld.
  - (3) **Supplies.** Supplies, parts and materials which are on hand at the termination of Contract No. DE-AC32-88AL44118 shall be furnished to the Contractor and shall be accounted for and included in the Contractor's Property Management System.
- (c) **Services**
  - (1) **Utilities.** Gas, electricity, water, steam and sewage.
  - (2) **Telephone Service.** Telephone services for local toll and long distance calls with access to the Federal Telephone System. Use of telephone services shall be in accordance with DOE Order 1450.3 dated May 26, 1988.

- (3) Central Alarm Center. The computer based alarm system established at the Laboratory will operate as it currently exists, and responsibility for this system will remain with the University. The University through the Government's Central Alarm Station/Central Guard Facility shall notify the Contractor of all alarms and requests for service. Such notification shall include all available information for the Contractor to formulate the required response and tactics.
- (4) Maintenance and Repair Services (Vehicles and Facilities). Services for repair and maintenance services for vehicles and facilities in order to keep them in a functional state of repair can be provided by the DOE, its contractors or subcontractors providing these services at the LANL to the extent that they are available.
- (5) Health, Safety, and Environmental Services.
- (i) Occupational Medicine: Pre-employment and annual physical examinations, as specified by NFPA, DOT, and substance abuse testing for Contractor Fire Department personnel as authorized by the Contracting Officer.
  - (ii) Emergency Response Training (including hazardous materials) and specific orientation and training on LANL facilities will be provided to Contractor for responses to fire suppression, emergency medical and rescue services.
  - (iii) Ionizing Radiation: Radiation monitoring services to Contractor fire suppression, emergency medical and rescue services personnel that include dosimetry, bioassay sampling, invivo counting, monitoring and instrumentation. DOE will evaluate the results and provide reports to the Contractor. The Contractor shall administer the issuance and collection of instruments, dosimetry devices, and samples and shall request and schedule services for its employees.



- (6) Training. The Contractor may use DOE-owned facilities for training to meet requirements of the contract and is authorized to attend government-sponsored training programs and services.
- (7) Communications. Access to the LANL trunk radio system and use of communications equipment is authorized by DOE. In addition, radios on the MEDNET public safety band are assigned to ambulances. In addition, the Contractor may also use the services of the Central Alarm Center, TA-64-1, to handle radio communications for the Fire Department's dispatch function.
- (8) Instrumentation. Maintenance and repair services for Government radios and associated equipment and radiation detectors assigned to the Contractor for the performance of this contract.
- (9) Security/Protective Services. Necessary Security and Protective services.
- (10) Locksmith Services. Locksmith services including locks, lock cores, and keys.
- (11) Supplies, Materials and Services Sources. The Contractor will use established sources available to DOE at Los Alamos. These sources include but are not limited to General Services Administration and the Los Alamos National Laboratory (LANL) warehouses to obtain supplies and materials if these sources are determined the most economical to meet the need. Additionally, the Contractor should also request Government rates for travel, lodging, etc., when possible.

#### **H.07 INSURANCE REQUIREMENTS**

In accordance with the Contract Clause entitled "Insurance - Liability to Third Persons," the following kinds and minimum amounts of insurance are required during the performance of this contract:

(a) **Worker's Compensation and Employer's Liability Insurance:**

(1) The amount required by the State of New Mexico under applicable Worker's Compensation and occupational disease statutes.

(2) Employer's liability insurance in the amount of \$100,000.

(b) **General Liability Insurance:** Bodily injury liability coverage written on the comprehensive form of policy of at least \$500,000 per occurrence.

(c) **Automobile Liability Insurance:** Coverage shall be on the comprehensive form of policy. It shall provide for bodily injury and property damage liability covering the operation of all automobiles used in connection with performing the contract. Policies covering automobiles operated in the United States shall provide coverage of at least \$200,000 per person and \$500,000 per occurrence for bodily injury and \$20,000 per occurrence for property damage.

(d) The amount of liability coverage on other policies shall be commensurate with any legal requirements of the locality and sufficient to meet normal and customary claims.

**H.08 LIMITATION OF LIABILITY**

Notwithstanding anything to the contrary in the Contract Clause entitled "Insurance-Liability to Third Persons" or any other clause of this contract, no provision of this contract waives any of the sovereign immunity or statutory limitation of liability of the State of New Mexico or any of its political subdivisions, governmental entities, or public employees which is applicable to the Contractor.

**H.09 PERSONNEL SECURITY "Q" CLEARANCES**

All County personnel who are assigned to or oversee the Fire Department and who require a DOE "Q" clearance to perform their contract functions will be required to hold an active DOE "Q" clearance. The Government will conduct and assume all

cost and responsibility for background investigations for "Q" clearances. However, the Contractor shall be responsible for all pre-employment checks necessary to determine an individual's suitability for employment prior to requesting the Government to perform a background investigation on the individual for the purpose of obtaining a "Q" clearance.

#### **H.10 COST PRINCIPLES FOR STATE AND LOCAL GOVERNMENTS**

The contractor shall be subject to OMB Circular A-87 , Cost Principles for State and Local Governments. Should OMB Circular A-87 as it exists on the effective date of this contract be amended to impose upon contractors the requirements of the Civilian Employee and Contractor Travel Expenses Act of 1985, Public Law 99-234, the Contractor shall thereafter be required to comply with such amended provisions of OMB Circular A-87 for the remainder of the contract performance period.

#### **H.11 AUDITS OF STATE AND LOCAL GOVERNMENTS**

The Contractor shall be subject to OMB Circular A-128, Audits of State and Local Governments

#### **H.12 SUBCONTRACTING PLAN**

In accordance with the provision set forth in the clause entitled "Small Business and Small Disadvantaged Business Subcontracting Plan," the Contractor's Subcontracting Plan is attached hereto as Attachment F to the contract and is hereby made a part of this contract.

#### **H.13 CONTRACT REPRESENTATIVES**

##### **(a) Department of Energy (DOE)**

- (1) The Contracting Officer may designate for the contract, a Contracting Officer Representative (COR) who shall be identified to the Contractor in writing by the Contracting Officer. The limitation on the authority of the COR to act for the Contracting Officer shall be set forth in writing and a copy provided to the Contractor.**

- (2) The Contracting Officer may designate a Technical Representative for this contract who may be an employee of the University of California. Such individual's name shall be identified, in writing, by the Contracting Officer. The duties of the Technical Representative shall be to monitor the contract performance by the Contractor for technical compliance with the terms of the contract and to provide technical advice to the Contracting Officer. The following duties will be performed by the Technical Representative:

(1) Assist with Technical Matters

- A. Monitor compliance of Contractor with technical requirements of Contract.
- B. Inform the Contracting Officer in writing of any performance failure.
- C. In conjunction with the contract requirements establish a tracking system to assist the Government with meeting its Contract obligations. This includes, but is not limited to Government-furnished property and services and timely Government comment on deliverables required by the Contract.
- D. Assist the Contractor in interpreting technical requirements of the Contract. All technical questions which cannot be resolved without increasing costs or requiring changes to the Contract shall be reported in writing to the Contracting Officer for immediate resolution. Such reports should contain the facts and recommendations pertinent to the questions at issue.
- E. Recommend to the Contracting Officer technical changes required to meet minimum DOE Orders requirements for fire suppression, emergency and rescue services at LANL.

(ii) Monitor the Administrative and Funds Aspects.

- A. Notify the Contracting Officer immediately, in writing of any indication that the cost to the Government, for completing performance under the Contract, will exceed the amount stated in the Contract.
- B. Report any indication that costs are being incurred which are not appropriately chargeable to the Contract.

(iii) Property Management

Review and make recommendations on the Contractor's request for Government-furnished facilities, supplies materials, and equipment and forward the request to the Contracting Officer for disposition.

(iv) Assist in Closeout of the Contract

Upon expiration or termination of the contract, forward to the Contracting Officer a written statement attesting to the acceptability of the Contractor's technical performance and attesting to the completion of certain elements of the contract work including, but not limited to, submittals, reports, and other deliverables required by the contract.

- (3) DOE and the Contractor understand and agree that all activities designated to be performed by the Technical Representative or other employees or agents of the University of California pursuant to this contract are performed for DOE under and pursuant to Contract No. W-7405-ENG-36 between the University and DOE.

(b) County of Los Alamos (County)

The County shall designate, in writing, a full time Contract Manager and an alternate who shall be responsible for the administration of this contract. The Contract Manager shall be authorized and responsible to make and implement decisions within the scope of the contract and authorized to represent the County at meetings on Contract matters.

#### H.14 PAYMENT FOR OVERTIME PREMIUMS

- (a) DOE is in the process of seeking from the Secretary of the United States Department of Labor a waiver for this contract from the requirement of the Contract Work Hours and Safety Standards Act to pay one and one-half times the basic rate of pay for all hours worked in excess of forty hours per week. The requirements of the clause entitled "Contract Work Hours and Safety Standards Act--Overtime Compensation" will not be effective until such time as the Secretary of Labor makes a determination on the request for waiver and then only in the event that the request for waiver is denied. In the event the request for waiver is denied, the clause will be effective retroactively on the effective date of this contract. The Contractor will be notified by letter of the Secretary of Labor's determination as soon as DOE receives it. Upon receipt of notice that the referenced clause is applicable, the Contractor shall submit a cost proposal for any necessary contract price adjustment necessary to cover retroactive and prospective costs of the application of the clause.
- (b) The use of overtime for hours worked in excess of the work schedules established pursuant to Paragraph B.07, Work Schedules, is authorized under this contract if the overtime premium does not exceed the amount established by the budget submitted by the Contractor and approved by the Contracting Officer as required by the Statement of Work, Part III, Attachment A, Paragraph IIIA, or the overtime premium is paid for work:
  - (1) Necessary to cope with emergencies such as those resulting from accidents or natural disasters;
  - (2) By indirect-labor employees such as those performing duties in connection with administration, protection, transportation, maintenance, standby plant protection, operation of utilities, or accounting; or
  - (3) That will result in lower overall costs to the Government. However, continued use of overtime to replace or supplement full-time personnel will not be allowed.
- (c) Each incident requiring the payment of overtime premiums in excess of the standard work week shall be documented and such documentation shall contain the following information with copies provided to the Contracting Officer:
  - (1) The identity of the work unit (e.g., department or section in which the requested overtime was used),

together with present work load, staffing, and other data of the affected unit sufficient to permit the Contracting Officer to evaluate the necessity for the overtime; and

- (2) An explanation of the effect that denial of the overtime would have had on contract performance.
- (3) Documentation explaining how Contracting Officer approval was obtained, where appropriate.

#### **H.15 PRIVACY ACT SYSTEMS OF RECORDS**

Reference is made to the Contract Clauses entitled "Privacy Act Notification" and "Privacy Act." The Contractor will be required to operate the following system of records under this contract: Personnel Radiation Exposure Records (System No.DOE-35).

#### **H.16 ADVANCE PAYMENTS**

- (a) Payments from Funds Available Under the Contract. Within the total funds obligated under this contract the Government, from time to time, shall advance funds necessary for performance of this contract. The payment for allowable costs and indirect costs, or for other payments which the Contracting Officer has specifically approved in writing, shall be made from funds advanced by the Government or otherwise available under the contract. The Contractor shall submit a separate voucher for each installment of indirect costs thirty (30) days after the end of the month covered by the voucher, and shall pay such installment of the indirect cost out of funds advanced by the Government or otherwise available under this contract.
- (b) Special Bank Accounts - Use. All advances of Government funds shall be withdrawn pursuant to a Letter of Credit in favor of a bank qualified as a depository for federal monies or, at the option of the Government, shall be made by check payable to the Contractor, and shall be deposited only in the Special Bank Account established by a Special Bank Account Agreement for Use With the Checks-Paid Method of Letter of Credit Financing in the form and containing the provisions set forth in Attachment G of this contract. The Contractor shall likewise deposit in the Special Bank Account any revenues received by the Contractor in connection with the work under this contract. No part of the funds in the Special Bank Account shall be (1) mingled with any funds of the Contractor or (2) used for a purpose other than that of making payments for the management allowance and for costs allowable under this contract or payments for other items specifically

approved in writing by the Contracting Officer and the Contractor's indirect costs as provided for elsewhere in this contract. If the Contracting Officer shall at any time determine that the balance on such bank account exceeds the Contractor's current needs, the Contractor shall promptly make such disposition of the excess as the Contracting Officer may direct.

- (c) Title to Funds Advanced. Title to the unexpended balance of any funds advanced and of any bank account established pursuant to this Paragraph H.16 shall remain in the Government and be superior to any claim or lien of the bank of deposit or others. It is understood that an advance to the Contractor hereunder is not a loan to the Contractor, and will not require the payment of interest by the Contractor, and that the Contractor acquires no right, title or interest in or to such advance other than the right to make expenditures therefrom, as provided in this Paragraph H.16.
- (d) Review and Approval of Costs Incurred. The Contractor shall prepare and submit monthly (30 days after the end of the report month) a voucher for the total of net expenditures accrued (i.e., net costs incurred) for the period covered by the voucher, and DOE, after audit and appropriate adjustment, will approve such voucher. This approval by DOE will constitute an acknowledgment by DOE that the net costs incurred are allowable under the contract and that they have been recorded in the accounts maintained by the Contractor in accordance with DOE accounting policies, but will not relieve the Contractor of responsibility for DOE's assets in its care, for appropriate subsequent adjustments, or for errors later becoming known to DOE.
- (e) Financial Settlement. The Government shall promptly pay to the Contractor the unpaid balance of allowable costs, indirect costs, and the final installment of the management allowance as provided for in Paragraph B.05, Management Allowance, upon expiration of the term of the contract, or completion of the work and its acceptance by the Government after (1) compliance by the Contractor with DOE's patent clearance requirements, and (2) the furnishing by the Contractor of:
  - (i) an assignment of the Contractor's rights to any refunds, rebates, allowances, accounts receivable, or other credits applicable to allowable costs under the contract;
  - (ii) a closing financial statement;



- (iii) the accounting for Government-owned property required by the Contract Clause entitled "Government Property (Cost-Reimbursement, Time-and-Material or Labor-Hour Contracts)"; and
- (iv) a release discharging the Government, its officers, agents, and employees from all liabilities, obligations, and claims arising out of or under this contract subject only to the following exceptions:
  - (A) specified claims in stated amounts or in estimated amounts where the amounts are not susceptible to exact statement by the Contractor.
  - (B) claims, together with reasonable expenses incidental thereto, based upon liabilities of the Contractor to third parties arising out of the performance of this contract; provided that such claims are not known to the Contractor on the date of the execution of the release; and provided further that the Contractor gives notice of such claims in writing to the Contracting Officer not more than six years after the date of the release or the date of any notice to the Contractor that the Government is prepared to make final payment, whichever is earlier; and
  - (C) Claims for reimbursement of costs (other than expenses of the Contractor by reason of any indemnification of the Government against patent liability), including reasonable expenses incidental thereto, incurred by the Contractor under the provisions of this contract relating to patents. In arriving at the amount due the Contractor under this Paragraph H.16, there shall be deducted any claim which the Government may have against the Contractor in connection with this contract, and deductions due under the terms of this contract, and not otherwise recovered by or credited to the Government. The unliquidated balance of the Special Bank Account may be applied to the amount due and any balance shall be returned to the Government forthwith.
- (f) Claims. Claims for credit against funds advanced or for payment shall be accompanied by such supporting documents and justifications as the Contracting Officer shall prescribe.
- (g) Discounts. The Contractor shall take and afford the Government the advantage of all known and available cash and trade discounts, rebates, allowances, credits, salvage, and commissions unless the Contracting Officer finds that action is not in the best interest of the Government.

- (h) Revenues. All revenues accruing to the Contractor in connection with the work under this contract shall be Government property and shall be deposited in the Special Bank Account to be available for payment of allowable costs under this contract, except as shall be otherwise directed in writing by the Contracting Officer.
- (i) Direct Payment of Charges. The Government reserves the right, upon 10 days written notice from the Contracting Officer to the Contractor, to pay directly to the persons concerned all amounts due which otherwise would be allowable under this contract. Any payment so made shall discharge the Government of all liability to the Contractor therefore.

**H.17 OWNERSHIP OF RECORDS**

**(a) Government's Records.**

- (1) Except as is provided in subparagraph (b) of this Paragraph H.17 and as may be otherwise agreed upon by the Government and the Contractor, all records acquired or generated by the Contractor under this contract shall be the property of the Government, and shall be delivered to the Government or otherwise disposed of by the Contractor either as the Contracting Officer may from time to time direct during the progress of the work or, in any event, as the Contracting Officer shall direct upon settlement of this contract. The Contractor shall, subject to DOE's security regulations and requirements and other provisions of the contract, have the right to inspect and at its own expense duplicate any records delivered or to be delivered to the Government by the Contractor under this contract; or to retain duplicates which are in excess of the Government's requirements; provided, however, that nothing in this subparagraph shall constitute any commitments on the part of the Government to retain such records for any period beyond the DOE's customary retention periods for the various types of records.
- (2) If the Contractor, pursuant to the New Mexico Public Records Act or any similar "rights to know" type of law or regulation, is requested to disclose any of the Government's records as defined in subparagraph (a)(1) above, the Contractor will not make any such disclosures and shall promptly notify DOE of such request and DOE shall be solely responsible for responding to such request and for any defense against such disclosure and shall have complete control of the defense and all litigation or negotiations associated therewith.

(b) Contractor's Own Records. The following records are considered the property of the Contractor and not within the scope of subparagraph (a) above:

- (1) Personnel and medical records and files (excluding personnel radiation exposure records) maintained on individual employees, applicants and former employees;
- (2) Worker's compensation files;
- (3) Internal health and safety files;
- (4) Employee relations records and files, such as records and files pertaining to:
  - (i) Qualifications or suitability for employment of any employee, applicant, or former employee;
  - (ii) Employee and union grievances;
  - (iii) Arbitration proceedings pursuant to the provisions of any labor contract;
  - (iv) Allegations, investigations, and resolution of employee misconduct;
  - (v) Employee discipline;
  - (vi) Employee charges of discrimination;
  - (vii) Negotiations with any labor organization in connection with any labor contract;
- (5) Records and files pertaining to wages, salaries and benefits and wage, salary and benefit administration;
- (6) Privileged or confidential Contractor financial information and correspondence between the Fire Department and other segments of the Contractor's organization located separate from the Fire Department; and
- (7) Internal legal files. Upon expiration of this contract, however, if requested by DOE, copies of any such records pertaining to employees that continue in the employ of a successor contractor operating the Los Alamos Fire Department shall be, unless otherwise prohibited by law, delivered to the successor contractor.

- (c) The provisions of subparagraph (b) above apply to all records described therein without regard to the date or origination of any such record.
- (d) Inspection and Audit of Records. All records acquired or generated by the Contractor under this contract in the possession of the Contractor, including those described in subparagraph (b) above, shall be subject to inspection and audit by DOE at all reasonable times, and the Contractor shall afford DOE proper facilities for such inspection and audit; provided, however, that upon request by the Contracting Officer, the Contractor shall deliver such records to a location specified by the Contracting Officer for inspection by DOE.

#### **H.18 FIRE DEPARTMENT MANAGEMENT TEAM**

- (a) Establishment - The County and the DOE hereby agree to establish a Fire Department Management Team (FDMT) which shall assist in the management of the Fire Department as described by the functions below. The FDMT shall be composed of equal representation from the County and DOE. A minimum of two (2) representatives from each organization shall be appointed to serve on the FDMT as voting members. A maximum of two (2) additional non-voting representatives may be appointed by the voting members of the FDMT. At least one member from each agency shall have technical knowledge and experience of Fire Department-type operations. Establishment of the FDMT shall be within 30 days after award of the contract.
- (b) Mission - The mission of the FDMT shall be to provide both the DOE and the County a vehicle by which to collectively review and communicate the Fire Department's ability to provide essential services and to meet Fire Contract requirements. The FDMT shall also provide a forum for the resolution of conflicting interests.
- (c) Functions - Specific functions to be performed by the FDMT shall include:
  - (1) Monitor the operations of the Fire Department to assure compliance with the terms of the Contract.
  - (2) Review the Fire Department operating procedures to assure that the Fire Department is operated to optimally utilize available resources in the most efficient and economical method possible.

- (3) Review the Fire Department development of long range plans to assure that they reflect the future requirements of the Fire Department to meet the Doe and Los Alamos County needs.
- (4) Provide recommendation to the Fire Chief to implement changes within the scope of the contract to meet County or DOE requirements for fire suppression, emergency medical, and rescue services.
- (5) Review and make recommendations to the County and DOE regarding changes proposed by the Fire Department for staffing and equipment assignments to stations.
- (6) Review and recommend for approval the Fire Department's annual operating budget.
- (7) Develop for County and DOE approval, written operating procedures that will be used by the FDMT to perform the duties set forth herein. These procedures shall set forth the FDMT's operating rules to be followed in performing its function for issues involving policy. These procedures shall be submitted for DOE and County approval within 60 calendar days after appointment of the FDMT.
- (8) Refer issues that cannot be resolved or that are not within the scope of the contract to the County and DOE for resolution.
- (9) The FDMT will provide an annual report to the County and DOE on the overall state of the Fire Department. This written report shall be submitted in the first week of August of each year.

#### **H.19 AUTHORITY HAVING JURISDICTION**

With respect to the Los Alamos National Laboratory Fire Service Area, as defined in the Statement of Work and Attachment D to this contract, the Contracting Officer shall be the "authority having jurisdiction," as that term is defined in National Fire Protection Association publications. This authority is limited to matters involving the approval of equipment, facilities, and procedures affecting any facility owned by DOE or operated by DOE or any of its contractors.

#### **H.20 EQUIVALENT FEDERAL WAGE RATES**

In the performance of this contract the Contractor shall comply with the requirements of U. S. Department of Labor Wage Determination a copy of which is attached to this contract (see

Part III - SECTION J, Attachment I.) Furthermore, Clause(s), "Service Contract Act of 1965, as amended" and "Statement of Equivalent for Federal Hires Rates" are applicable and located in the contract Clauses Section of this Contract.

#### **H.21 SUBCONTRACTS**

Prior to the placement of subcontracts and in accordance with the clause, "Subcontract (Cost-Reimbursement and Letter Contract), "the Contractor shall insure that:

- (a) They contain all of the clauses of this contract (altered when necessary for proper identification of the contracting parties) which contain a requirement for such inclusion in applicable subcontracts;
- (b) Any applicable subcontractor Cost or Pricing Data and a Certificate of Current Cost or Pricing Data (see FAR 15.804-2) and subcontractor Representations and Certifications (see Part IV, Section K); and
- (c) Any required prior notice and description of the subcontract is given to the Contracting Officer and any required consent is received. Except as may be expressly set forth therein, any consent by the Contracting Officer to the placement of subcontracts shall not be construed to constitute approval of the subcontractor or any subcontract terms or conditions, determination of the allowability of any cost, revision of this contract or any of the respective obligations of the parties thereunder, or creation of any subcontractor privity of contract with the Government.
- (d) The Contractor shall also obtain and furnish to the Contracting Officer either an OCI Disclosure Statement or Representation form in accordance with DEAR 909.570-7 "Organizational Conflicts of Interest Disclosure or Representation" for all subcontractors to be utilized under this contract. No work shall be performed by the subcontractor until the Contracting Officer has cleared the subcontractor for Organizational Conflicts of Interest (OCI).

#### **H.22 RELEASE OF INFORMATION**

Any proposed public release of information including publications, exhibits or audiovisual productions pertaining to this contract or the work called for by this contract shall be submitted for approval prior to printing and distribution. Approval authority is HQ DOE, OPA/HQ, Washington, DC. Proposed releases are to be submitted to the Contracting Officer. All proposed releases should conform to the requirements of DOE Order 1340.1A, and 1350.

#### **H.23 AUTOMATED DATA PROCESSING EQUIPMENT (ADPE) USAGE**

Requirements for ADPE which were not included in the Contractor's original proposal may not be acquired (leased or purchased) without the prior written consent of the Contracting Officer. Whenever Contracting Officer written consent is required, the Contractor will furnish to the Contracting Officer information concerning the need for and selection of such ADPE, the specific make(s) and model(s), and the lease versus purchase determination.

#### **H.24 AUTOMATED DATA PROCESSING EQUIPMENT (ADPE) LEASING**

- (a) If the Contractor leases ADPE equipment for use under this contract, the Contractor shall include a provision in the rental contract stating that the Government shall have the unilateral right to exercise any purchase option under the rental contract between the Contractor and the ADPE equipment vendor and to realize any other benefits earned through rental payments.
- (b) The Contractor shall furnish a copy of the rental contract to the Contracting Officer.

#### **H.25 APPRAISALS**

- (a) The Contracting Officer will perform an annual appraisal of the overall Fire Department operation to determine the adequacy of services provided as required in the Contract. Performance criteria will be based on specified service levels and adherence to developed plans, policies, and procedures referenced in the Contract.
- (b) Pursuant to paragraph (a) above, the following performance appraisal areas will be evaluated:

- (1) General Management and Planning Support. Factors in this area include the Fire Department's performance as an organization in complying with stated goals and mission, organizational planning, staffing, and coordination/cooperation with external sectors.

In addition, this area will address achievement of direct Contract-related objectives and cover activities such as program planning; quality and quantity of work; adherence to cost and schedule commitments; technical information management and reporting; and achievements in development of systems and methods to better meet requirements.

- (2) Operations Support. Included in this area are required activities addressing quality assurance; security; information classification and control; facilities

management (facilities maintenance; real and personal property management); and operational safety, health, and environmental activities.

- (3) Indirect Administrative Support. This area addresses the reimbursed indirect support to the Fire Department and includes such functions as human resource planning and management, auditing, computing resources management, procurement services, industrial relations, accounting, budgeting, and other indirect support activities (e.g., legal and public affairs) if applicable.
- (c) The Contracting Officer will develop a report which will be made available to the Contractor for review and comment; the Contractor will have the opportunity to respond to the Contracting Officer's findings and provide additional information to clarify issues on any performance findings. A final report will be provided to the Contractor which defines final findings, priorities, and timeliness for corrective action.
- (d) The following performance descriptors will be used:
  - (1) Satisfactory - Meets or exceeds the standard of performance; operational activities and tasks conducted in an efficient, timely, and acceptable manner. Deficiencies do not substantively affect performance.
  - (2) Marginal - Below the standard of performance; deficiencies are such that management attention and corrective action are required.
  - (3) Unsatisfactory - Below an acceptable standard of performance; serious deficiencies may require management attention and corrective action be taken promptly.



PART II  
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1. DEAR 952.202-1 DEFINITIONS (APR 1984)

(a) The term "Head of Agency" means the Secretary, Deputy Secretary or Under Secretary of the Department of Energy.

(b) "Contracting Officer" means a person with the authority to enter into, administer, and/or terminate contracts and make related determinations and findings. The term includes certain authorized representatives of the Contracting Officer acting within the limits of their authority as delegated by the Contracting Officer.

(c) Except as otherwise provided in this contract, the term "subcontracts" includes, but is not limited to, purchase orders and changes and modifications to purchase orders under this contract.

(d) The term "DOE" means the Department of Energy.

2. FAR 52.203-1 OFFICIALS NOT TO BENEFIT (APR 1984)

No member of or delegate to Congress, or resident commissioner, shall be admitted to any share or part of this contract, or to any benefit arising from it. However, this clause does not apply to this contract to the extent that this contract is made with a corporation for the corporation's general benefit.

3. FAR 52.203-3 GRATUITIES (APR 1984)

(a) The right of the Contractor to proceed may be terminated by written notice if, after notice and hearing, the agency head or a designee determines that the Contractor, its agent, or another representative--

(1) Offered or gave a gratuity (e.g., an entertainment or gift) to an officer, official, or employee of the Government; and

(2) Intended, by the gratuity, to obtain a contract or favorable treatment under a contract.

(b) The facts supporting this determination may be reviewed by any court having lawful jurisdiction.

(c) If this contract is terminated under paragraph (a) above, the Government is entitled--

(1) To pursue the same remedies as in a breach of the contract; and

(2) In addition to any other damages provided by law, to exemplary damages of not less than 3 nor more than 10 times the cost incurred by the Contractor in giving gratuities to the person concerned, as determined by the agency head or a designee.

(This subparagraph (c)(2) is applicable only if this contract uses money appropriated to the Department of Defense.)

(d) The rights and remedies of the Government provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this contract.

#### **4. FAR 52.203-5 COVENANT AGAINST CONTINGENT FEES (APR 1984)**

(a) The Contractor warrants that no person or agency has been employed or retained to solicit or obtain this contract upon an agreement or understanding for a contingent fee, except a bona fide employee or agency. For breach or violation of this warranty, the Government shall have the right to annul this contract without liability or, in its discretion, to deduct from the contract price or consideration, or otherwise recover, the full amount of the contingent fee.

(b) "Bona fide agency," as used in this clause, means an established commercial or selling agency, maintained by a contractor for the purpose of securing business, that neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds itself out as being able to obtain any Government contract or contracts through improper influence.

"Bona fide employee," as used in this clause, means a person, employed by a contractor and subject to the contractor's supervision and control as to time, place, and manner of performance, who neither exerts nor proposes to exert improper influence to solicit or obtain Government contracts nor holds out as being able to obtain any Government contract or contracts through improper influence.

"Contingent fee," as used in this clause, means any commission, percentage, brokerage, or other fee that is contingent upon the success that a person or concern has in securing a Government contract.

"Improper influence," as used in this clause, means any influence that induces or tends to induce a Government employee or officer to give consideration or to act regarding a Government contract on any basis other than the merits of the matter.

**5. FAR 52.203-6 RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT (JUL 1985)**

(a) Except as provided in (b) below, the Contractor shall not enter into any agreement with an actual or prospective subcontractor, nor otherwise act in any manner, which has or may have the effect of restricting sales by such subcontractors directly to the Government of any item or process (including computer software) made or furnished by the subcontractor under this contract or under any follow-on production contract.

(b) The prohibition in (a) above does not preclude the Contractor from asserting rights that are otherwise authorized by law or regulation.

(c) The Contractor agrees to incorporate the substance of this clause, including this paragraph (c), in all subcontracts under this contract.

**6. FAR 52.203-7 ANTI-KICKBACK PROCEDURES (OCT 1988)**

**(a) Definitions.**

"Kickback," as used in this clause, means any money, fee, commission, credit, gift, gratuity, thing of value, or compensation of any kind which is provided, directly or indirectly, to any prime Contractor, prime Contractor employee, subcontractor, or subcontractor employee for the purpose of improperly obtaining or rewarding favorable treatment in connection with a prime contract or in connection with a subcontract relating to a prime contract.

"Person," as used in this clause, means a corporation, partnership, business association of any kind, trust, joint-stock company, or individual.

"Prime contract," as used in this clause, means a contract or contractual action entered into by the United States for the purpose of obtaining supplies, materials, equipment, or services of any kind.

"Prime Contractor," as used in this clause, means a person who has entered into a prime contract with the United States.

"Prime Contractor employee," as used in this clause, means any officer, partner, employee, or agent of a prime Contractor.



**"Subcontract," as used in this clause, means a contract or contractual action entered into by a prime Contractor or subcontractor for the purpose of obtaining supplies, materials, equipment, or services of any kind under a prime contract.**

**"Subcontractor," as used in this clause, (1) means any person, other than the prime Contractor, who offers to furnish or furnishes any supplies, materials, equipment, or services of any kind under a prime contract or a subcontract entered into in connection with such prime contract, and (2) includes any person who offers to furnish or furnishes general supplies to the prime Contractor or a higher tier subcontractor.**

**"Subcontractor employee," as used in this clause, means any officer, partner, employee, or agent of a subcontractor.**

**(b) The Anti-Kickback Act of 1986 (41 U.S.C. 51-58) (the Act), prohibits any person from--**

**(1) Providing or attempting to provide or offering to provide any kickback;**

**(2) Soliciting, accepting, or attempting to accept any kickback; or**

**(3) Including, directly or indirectly, the amount of any kickback in the contract price charged by a prime Contractor to the United States or in the contract price charged by a subcontractor to a prime Contractor or higher tier subcontractor.**

**(c) (1) The Contractor shall have in place and follow reasonable procedures designed to prevent and detect possible violations described in paragraph (b) of this clause in its own operations and direct business relationships.**

**(2) When the Contractor has reasonable grounds to believe that a violation described in paragraph (b) of this clause may have occurred, the Contractor shall promptly report in writing the possible violation. Such reports shall be made to the inspector general of the contracting agency, the head of the contracting agency if the agency does not have an inspector general, or the Department of Justice.**

**(3) The Contractor shall cooperate fully with any Federal agency investigating a possible violation described in paragraph (b) of this clause.**

(4) The Contracting Officer may (i) offset the amount of the kickback against any monies owed by the United States under the prime contract and/or (ii) direct that the Prime Contractor withhold from sums owed a subcontractor under the prime contract, monies withheld, the amount of the kickback. The Contracting Officer may order that monies withheld under subdivision (c)(4)(ii) of this clause be paid over to the Government unless the Government has already offset those monies under subdivision (c)(4)(i) of this clause. In either case, the Prime Contractor shall notify the Contracting Officer when the monies are withheld.

(5) The Contractor agrees to incorporate the substance of this clause, including this subparagraph (c)(5) but excepting subparagraph (c)(1), in all subcontracts under this contract.

**7. FAR 52.203-9 REQUIREMENT FOR CERTIFICATE OF PROCUREMENT INTEGRITY MODIFICATION (SEP 1990)**

(a) Definition. The definitions set forth in FAR 3,104-4 are hereby incorporated in this clause.

(b) The Contractor agrees that it will execute the certification set forth in paragraph (c) of this clause when requested by the Contracting Officer in connection with the execution of any modification of this contract.

(c) Certification. As required in paragraph (b) of this clause, the officer or employee responsible for the modification proposal shall execute the following certification:

**CERTIFICATE OF PROCUREMENT INTEGRITY - MODIFICATION (SEP 1990)**

- (1) I, (Name of certifier) am the officer or employee responsible for the preparation of this modification proposal and hereby certify that, to the best of my knowledge and belief, with the exception of any information described in this certification, I have no information concerning a violation or possible violation of subsection 27(a), (b), (d), or (f) of the Office of Federal Procurement Policy Act, as amended\* (41 U.S.C. 423), (hereinafter referred to as "the Act"), as implemented in the FAR, occurring during the conduct of this procurement (contract and modification number).

(2) As required by subsection 27(e)(1)(B) of the Act, I further certify that to the best of my knowledge and belief, each officer, employee, agent, representative, and consultant of (Name of Offeror) who has participated personally and substantially in the preparation or submission of this proposal has certified that he or she is familiar with, and will comply with, the requirements of subsection 27(a) of the Act, as implemented in the FAR, and will report immediately to me any information concerning a violation or possible violation of subsections 27(a), (b), (d), or (f) of the Act, as implemented in the FAR, pertaining to this procurement.

(3) Violations or possible violations: (Continue on plain bond paper if necessary and label Certificate of Procurement Integrity - Modification (Continuation Sheet), ENTER "NONE" IF NONE EXISTS)

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(Signature of the officer or employee responsible for the modification proposal and date)  
(Typed name of the officer or employee responsible for the modification proposal)

\*The Act became effective on December 1, 1990.  
THIS CERTIFICATION CONCERNS A MATTER WITHIN THE JURISDICTION OF AN AGENCY OF THE UNITED STATES AND THE MAKING OF A FALSE, FICTITIOUS, OR FRAUDULENT CERTIFICATION MAY RENDER THE MAKER SUBJECT TO PROSECUTION UNDER TITLE 18, UNITED STATES CODE, SECTION 1001.

(End of certification)

(d) In making the certification in paragraph (2) of the certificate, the officer or employee of the competing Contractor responsible for the offer or bid, may rely upon a one-time certification to the competing Contractor, supplemented by periodic training. These certifications shall be maintained by the Contractor for a period of 6 years from the date a certifying employee's employment with the company ends or, for an agency, representative, or consultant, 6 years from the date such individual ceases to act on behalf of the contractor.

(e) The certification required by paragraph (c) of this clause is a material representation of fact upon which reliance will be placed in executing this modification.

**8. FAR 52.203-10 PRICE OR FEE ADJUSTMENT FOR ILLEGAL OR IMPROPER ACTIVITY (SEPT 1990)**

(a) The Government, at its election, may reduce the price of a fixed-price-type contract or contract modification and the total cost and fee under a cost-type contract or contract modification by the amount of profit or fee determined as set forth in paragraph (b) of this clause if the head of the contracting activity or his or her designee, determines that there was a violation of subsection 27(a) of the Office of Federal Procurement Policy Act as amended (41 U. S. C. 423) as implemented in the FAR. In the case of a contract modification, the fee subject to reduction is the fee specified in the particular contract modification at the time of execution, except as provided in subparagraph (b)(5) of this clause.

(b) The price or fee reduction referred to in paragraph (a) of this clause shall be--

(1) For cost-plus-fixed-fee contracts, the amount of the fee specified in the contract at the time of award;

(2) For cost-plus-incentive-fee contracts, the target fee specified in the contract at the time of award notwithstanding any minimum fee or "fee floor" specified in the contract.

(3) For cost-plus-award-fee contracts--

(i) The base fee established in the contract at the time of contract award;

(ii) If no base fee is specified in the contract, 10 percent of the amount of each award fee otherwise payable to the contractor for each incentive period or at each award fee determination point.

(4) For fixed-price-incentive contracts, the Government may--

(i) Reduce the contract target price and contract target profit both by an amount equal to the initial target profit specified in the contract at the time of contract award, or;

(ii) If an immediate adjustment to the contract target price and contract target profit would have a significant adverse impact on the incentive price revision relationship under the contract, or adversely affect the contract financing provisions, the Contracting Officer may defer such adjustment until establishment of the total final price of the contract.

The total final price established in accordance with the incentive price revision provisions of the contract shall be reduced by an amount equal to the initial target profit specified in the contract at the time of contract award and such reduced price shall be the total final contract price.

(5) For firm-fixed-price contract or contract modifications, by 10 percent of the initial contract price; 10 percent of the contract modification price; or a profit amount determined by the Contracting Officer from records or documents in existence prior to the date of the contract award or modification.

(c) The Government may, at its election, reduce a prime contractor's price or fee in accordance with the procedures of paragraph (b) of this clause for violations of the Act by its subcontractors by an amount not to exceed the amount of profit or fee reflected in the subcontract at the time the subcontract was first definitively priced.

(d) In addition to the remedy in paragraph (a) of this clause, the Government may terminate this contract or modification for default. The rights and remedies of the Government specified herein are not exclusive, and are in addition to any other rights and remedies provided by law or under this contract.

9. FAR 52.203-12 LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (JAN 1990)

(a) Definitions.

"Agency," as used in this clause, means executive agency as defined in 2.101.

"Covered Federal action," as used in this clause, means any of the following Federal actions:

(a) The awarding of any Federal contract.

(b) The making of any Federal grant.

(c) The making of any Federal Loan.

(d) The entering into of any cooperative agreement.

(e) The extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

"Indian tribe" and "tribal organization" as used in this clause, have the meaning provided in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450B) and include Alaskan Natives.

"Influencing or attempting to influence," as used in this clause, means making, with the intent to influence, any communication to or appearance before an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any covered Federal action.

"Local government," as used in this clause, means a unit of government in a State and, if chartered, established, or otherwise recognized by a State for the performance of a governmental duty, including a local public authority, a special district, an intrastate district, a council of governments, a sponsor group representative organization, and any other instrumentality of a local government.

"Officer or employee of an agency," as used in this clause, includes the following individuals who are employed by an agency:

(a) An individual who is appointed to a position in the Government under title 5, United States Code, including a position under a temporary appointment.

(b) A member of the uniformed services, as defined in subsection 101(3), title 37, United States Code.

(c) A special Government employee, as defined in Section 202, Title 18, United States Code.

(d) An individual who is a member of a Federal advisory committee, as defined by the Federal Advisory Committee Act, Title 5, United States Code, Appendix 2.

"Person," as used in this clause, means an individual, corporation, company, association, authority, firm, partnership, society, State, or local government, regardless of whether such entity is operated for profit, or not for profit. This term excludes an Indian tribe, tribal organization, or any other Indian organization with respect to expenditures specifically permitted by other Federal law.

"Reasonable compensation," as used in this clause, means with respect to a regularly employed officer or employee of any person, compensation that is consistent with the normal compensation for such officer or employee for work that is not furnished to, not funded by, or not furnished in cooperation with the Federal Government.

**"Reasonable payment," as used in this clause, means, with respect to professional and other technical services, a payment in an amount that is consistent with the amount normally paid for such services in the private sector.**

**"Recipient," as used in this clause, includes the Contractor and all subcontractors. This term excludes an Indian tribe, tribal organization, or any other Indian organization with respect to expenditures specifically permitted by other Federal law.**

**"Regularly employed," as used in this clause, means, with respect to an officer or employee of a person requesting or receiving a Federal contract, an officer or employee who is employed by such person for at least 130 working days within 1 year immediately preceding the date of the submission that initiates agency consideration of such person for receipt of such contract. An officer or employee who is employed by such person for less than 130 working days within 1 year immediately preceding the date of the submission that initiates agency consideration of such person shall be considered to be regularly employed as soon as he or she is employed by such person for 130 working days.**

**"State," as used in this clause, means a State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, a territory or possession of the United States, an agency or instrumentality of a State, and multi-State, regional, or interstate entity having governmental duties and powers.**

**(b) Prohibitions**

**(1) Section 1352 of Title 31, United States Code, among other things, prohibits a recipient of a Federal contract, grant, loan, or cooperative agreement from using appropriated funds to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions: the awarding of any Federal contract; the making of any Federal grant; the making of any Federal loan, the entering into of any cooperative agreement; or the modification of any Federal contract, grant, loan, or cooperative agreement.**

**(2) The Act also requires Contractors to furnish a disclosure if any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for**

influencing or attempting to influence an officer or employee of any agency, a Member of Congress, or an officer or employee of Congress, or an employee of a Member of Congress in connection with a Federal contract, grant, loan, or cooperative agreement.

(3) The prohibitions of the Act do not apply under the following conditions:

(i) Agency and legislative liaison by own employees.

(A) The prohibition on the use of appropriated funds, in subparagraph (b)(1) of this clause, does not apply in the case of a payment of reasonable compensation made to an officer or employee of a person requesting or receiving a covered Federal action if the payment is for agency and legislative liaison activities nor directly related to a covered Federal action.

(B) For purposes of subdivision (b)(3)(i)(A) of this clause, providing any information specifically requested by an agency or Congress is permitted at any time.

(C) The following agency and legislative liaison activities are permitted at any time where they are not related to a specific solicitation for any covered Federal action:

(1) Discussing with an agency the qualities and characteristics (including individual demonstrations) of the person's products or services, conditions or terms of sale, and service capabilities.

(2) Technical discussions and other activities regarding the application or adaptation of the person's products or services for an agency's use.

(D) The following agency and legislative liaison activities are permitted where they are prior to formal solicitation of any covered Federal action.

(1) Providing any information not specifically requested but necessary for an agency to make an informed decision about initiation of a covered Federal action;

(2) Technical discussions regarding the preparation of an unsolicited proposal prior to its official submission; and



(3) Capability presentations by persons seeking awards from an agency pursuant to the provisions of the Small Business Act, as amended by Pub.L.95-507, and subsequent amendments.

(E) Only those services expressly authorized by subdivision (b)(3)(i)(A) of this clause are permitted under this clause.

(ii) Professional and technical services.

(A) The prohibition on the use of appropriated funds, in subparagraph (b)(1) of this clause, does not apply in the case of:

(1) A payment of reasonable compensation made to an officer or employee of a person requesting or receiving a covered Federal action or an extension, continuation, renewal, amendment, or modification of a covered Federal action, if payment is for professional or technical services rendered directly in the preparation, submission, or negotiation of any bid, proposal, or application for that Federal action or for meeting requirements imposed by or pursuant to law as a condition for receiving that Federal action.

(2) Any reasonable payment to a person other than an officer or employee of a person requesting or receiving a covered Federal action or an extension, continuation, renewal, amendment, or modification of a covered Federal action if the payment is for professional or technical services rendered directly in the preparation, submission, or negotiation of any bid, proposal, or application for that Federal action or for meeting requirements imposed by or pursuant to law as a condition for receiving that Federal action. Persons other than officers or employees of a person requesting or receiving a covered Federal action include consultants and trade associations.

(B) For purposes of subdivision (b)(3)(ii)(A) of this clause, "professional and technical services" shall be limited to advice and analysis directly applying any professional or technical discipline. For example, drafting of a legal document accompanying a bid or proposal by a lawyer is allowable.

Similarly, technical advice provided by an engineer on the performance or operational capability of a piece of equipment rendered directly in the negotiation of a contract is allowable. However, communications with the intent to influence made by a professional (such as a licensed lawyer) or a technical person (such as a licensed accountant) are not allowable under this section unless they provided advice and analysis directly applying their professional or technical expertise and unless the

advice or analysis is rendered directly and solely in the preparation, submission or negotiation of a covered Federal action. Thus, for example, communications with the intent to influence made by a lawyer that do not provided legal advice or analysis directly and solely related to the legal aspects of his or her client's proposal, but generally advocate one proposal over another are not allowable under this section because the lawyer is not providing professional legal services. Similarly communications with the intent to influence made by an engineer providing an engineering analysis prior to the preparation or submission of a bid or proposal are not allowable under this section since the engineer is providing technical services but not directly in the preparation, submission, or negotiation of a covered Federal action.

(C) Requirements imposed by or pursuant to law as a condition for receiving a covered Federal award include those required by law or regulation and any other requirements in the actual award documents.

(D) Only those services expressly authorized by subdivisions (b)(3)(ii)(A)(1) and (2) of this clause are permitted under this clause.

(E) The reporting requirements of FAR 3.803(a) shall not apply with respect to payments of reasonable compensation made to regularly employed officers or employees of a person.

(iii) Disclosure.

(A) The Contractor who requests or receives from an agency a Federal contract shall file with that agency a disclosure form, OMB standard form LLL, Disclosure of Lobbying Activities, if such person has made or has agreed to make any payment using nonappropriated funds (to include profits from any covered Federal action), which would be prohibited under subparagraph (b)(1) of this clause, if paid for with appropriated funds.

(B) The Contractor shall file a disclosure form at the end of each calendar quarter in which there occurs any event that materially affects the accuracy of the information contained in any disclosure form previously filed by such person under subparagraph (c)(1) of this clause. An event that materially affects the accuracy of the information reported includes--

(1) A cumulative increase of \$25,000 or more in the amount paid or expected to be paid for influencing or attempting to influence a covered Federal action; or

(2) A change in the person(s) or individual(s) influencing or attempting to influence a covered Federal action;  
or

(3) A change in the officer(s), employee(s), or Member(s) contacted to influence or attempt to influence a covered Federal action.

(C) The Contractor shall require the submittal of a certification, and if required, a disclosure form by any person which requests or received any subcontract exceeding \$100,000 under the Federal contract.

(D) All subcontractor disclosure forms (but not certifications) shall be forwarded from tier to tier until received by the prime Contractor. The prime Contractor shall submit all disclosures to the Contracting Officer at the end of the calendar quarter in which the disclosure form is submitted by the subcontractor. Each subcontractor certification shall be retained in the subcontract file of the awarding Contractor.

(iv) Agreement. The Contractor agrees not to make any payment prohibited by the clause.

(v) Penalties.

(A) Any person who makes an expenditure prohibited under paragraph (a) of this clause or who fails to file or amend the disclosure form to be filed or amended by paragraph (b) of this clause shall be subject to civil penalties as provided for by 31 U.S.C. 1352. An imposition of a civil penalty does not prevent the Government from seeking any other remedy that may be applicable.

(B) Contractors may rely without liability on the representation made by their subcontractors in the certification and disclosure form.

(vi) Cost allowability. Nothing in this clause makes allowable or reasonable any cost which would otherwise be unallowable or unreasonable. Conversely, costs made specifically unallowable by the requirements in this clause will not be made allowable under any other provision.

10. DEAR 952.204-2 SECURITY (OCT 1987)

(a) Responsibility. It is the contractor's duty to safeguard all classified information, special nuclear material, and other DOE property. The Contractor shall, in accordance with DOE security regulations and requirements, be responsible for safeguarding all classified information, and protecting against sabotage, espionage, loss and theft, the classified documents and material in the Contractor's possession in connection with the performance of work under this contract. Except as otherwise expressly provided in this contract, the Contractor shall, upon completion or termination of this contract, transmit to DOE any classified matter in the possession of the Contractor or any person under the Contractor's control in connection with performance of this contract. If retention by the Contractor of any classified matter is required after the completion or termination of the contract and such retention is approved by the Contracting Officer, the Contractor will complete a certificate of possession to be furnished to DOE specifying the classified matter to be retained. The certification shall identify the items and types or categories of retained, the conditions governing the retention of the matter, and the period of retention, if known. If the retention is approved by the Contracting Officer, the security provisions of the contract will continue to be applicable to the matter retained. Special nuclear material will not be retained after the completion or termination of the contract.

(b) Regulations. The Contractor agrees to conform to all security regulations and requirements of DOE.

(c) Definition of Classified Information. The term "Classified Information" means Restricted Data, Formerly Restricted Data, or National Security Information.

(d) Definition of Restricted Data. The term "Restricted Data" means all data concerning (1) design, manufacture, or utilization of atomic weapons; (2) the production of special nuclear material; or (3) the use of special nuclear material in the production of energy, but shall not include data declassified or removed from the Restricted Data category pursuant to Section 142 of the Atomic Energy Act of 1954, as amended.

(e) Definition of Formerly Restricted Data. The term "Formerly Restricted Data" means all data removed from the Restricted Data category under section 142 d. of the Atomic Energy Act of 1954, as amended.

(f) Definition of National Security Information. The term "National Security Information" means any information or material, regardless of its physical form or characteristics,

that is owned by, produced for or by, or is under the control of the United States Government, that has been determined pursuant to Executive Order 12356 or prior Orders to require protection against unauthorized disclosure, and which is so designated.

(g) Definition of Special Nuclear Material (SNM). SNM means (1) plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which pursuant to the provisions of Section 51 of the Atomic Energy Act of 1954, as amended, has been determined to be special nuclear material, but does not include source material; or (2) any material artificially enriched by any of the foregoing, but does not include source material.

(h) Security clearance of personnel. The Contractor shall not permit any individual to have access to any classified information, except in accordance with the Atomic Energy Act of 1954, as amended, Executive Order 12356, and the DOE's regulations or requirements applicable to the particular level and category of classified information to which access is required.

(i) Criminal liability. It is understood that disclosure of any classified information relating to the work or services ordered hereunder to any person not entitled to receive it, or failure to safeguard any classified information that may come to the Contractor or any person under the Contractor's control in connection with work under this contract, may subject the Contractor, its agents, employees, or subcontractors to criminal liability under the laws of the United States. (See the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2011 et seq.; 18 U.S.C. 793 and 794; and Executive Order 12356).

(j) Subcontracts and purchase orders. Except as otherwise authorized in writing by the Contracting Officer, the Contractor shall insert provisions similar to the foregoing in all subcontracts and purchase orders under this contract.

11. DEAR 952.204-70 CLASSIFICATION (APR 1984)

In the performance of the work under this contract, the Contractor shall ensure that an Authorized Original Classifier or Derivative Classifier shall assign classifications to all documents, material, and equipment originated or generated under the contract in accordance with classification regulations and guidance furnished to the Contractor by the DOE. Every subcontract and purchase order issued hereunder involving the origination or generation of classified documents, material, or equipment shall include a provision to the effect that in the performance of such subcontract or purchase order, the subcontractor or supplier shall ensure that an Authorized

Original Classifier or Derivative Classifier shall assign classifications to all such documents, materials, and equipment in accordance with classification regulations and guidance furnished to such subcontractor or supplier by the Contractor.

12. DEAR 952.204-74 FOREIGN OWNERSHIP, CONTROL, OR INFLUENCE OVER CONTRACTOR (APR 1984)

(a) For purposes of this clause, a foreign interest is defined as any of the following:

(1) A foreign government or foreign government agency;

(2) Any form of business enterprise organized under the laws of any country other than the United States or its possessions;

(3) Any form of business enterprise organized or incorporated under the laws of the U.S., or a State or other jurisdiction within the U.S., which is owned, controlled, or influenced by a foreign government, agency, firm, corporation or person; or

(4) Any person who is not a U.S. citizen.

(b) Foreign Ownership, Control, or Influence (FOCI) means the situation where the degree of ownership, control, or influence over a contractor by a foreign interest is such that a reasonable basis exists for concluding that compromise of classified information, special nuclear material as defined in 10 CFR Part 710, may result.

(c) For purposes of this clause, subcontractor means any subcontractor at any tier and the term "contracting officer" shall mean DOE contracting officer. When this clause is included in a subcontract, the term "contractor" shall mean subcontractor and the term "contract" shall mean subcontract.

(d) The contractor shall immediately provide the contracting officer written notice of any changes in the extent and nature of FOCI over the contractor which would affect the answers to the questions presented in DEAR 952.204-73. Further, notice of changes in ownership or control which are required to be reported to the Securities and Exchange Commission, the Federal Trade Commission, or the Department of Justice shall also be furnished concurrently to the contracting officer.

(e) In those cases where a contractor has changes involving FOCI, the DOE must determine whether the changes will pose an undue risk to the common defense and security. In making

this determination, the contracting officer shall consider proposals made by the contractor to avoid or mitigate foreign influences.

(f) If the contracting officer at any time determines that the contractor is, or is potentially, subject to FOCI, the contractor shall comply with such instructions as the contracting officer shall provide in writing to safeguard any classified information or significant quantity of special nuclear material.

(g) The contractor agrees to insert terms that conform substantially to the language of this clause including this paragraph (g) in all subcontracts under this contract that will require access to classified information or a significant quantity of special nuclear material. Additionally, the contractor shall require such subcontractors to submit a completed certification required in DEAR 952.204-73 prior to award of a subcontract. Information to be provided by a subcontractor pursuant to this clause may be submitted directly to the contracting officer.

(h) Information submitted by the contractor or any affected subcontractor as required pursuant to this clause shall be treated by DOE to the extent permitted by law, as business or financial information submitted in confidence to be used solely for purposes of evaluating FOCI.

(i) The requirements of this clause are in addition to the requirement that a contractor obtain and retain the security clearances required by the contract. This clause shall not operate as a limitation on DOE's rights, including its rights to terminate this contract.

(j) The contracting officer may terminate this contract for default either if the contractor fails to meet obligations imposed by this clause, e.g., provide the information required by this clause, comply with the contracting officer's instructions about safeguarding classified information, or make this clause applicable to subcontractors, or if, in the contracting officer's judgment, the contractor creates a FOCI situation in order to avoid performance or a termination for default. The contracting officer may terminate this contract for convenience if the contractor becomes subject to FOCI and for reasons other than avoidance of performance of the contract, cannot, or chooses not to, avoid or mitigate the FOCI problem.

### 13. DEAR 952.208-70 PRINTING (APR 1984)

The contractor shall not engage in, nor subcontract for, any printing (as that term is defined in Title I of the U.S. Government Printing and Binding Regulations in effect on the

effective date of this contract) in connection with the performance of work under this contract. Provided, however, that performance of a requirement under this contract involving the duplication of less than 5,000 copies of a single unit, or no more than 25,000 units in the aggregate of multiple units, will not be deemed to be printing. A unit is defined as one sheet, size 8 1/2 by 11 inches one side only, one color. A requirement is defined as a single publication document.

(1) The term "printing" includes the following processes: composition, plate making, presswork, binding, microform publishing, or the end items produced by such processes.

(2) If fulfillment of the contract will necessitate reproduction in excess of the limits set forth above, the contractor shall notify the contracting officer in writing and obtain the contracting officer's approval prior to acquiring on DOE's behalf production, acquisition, and dissemination of printed matter. Such printing must be obtained from the Government Printing Office (GPO), a contract source designated by GPO or a Joint Committee on Printing authorized federal printing plant.

(3) Printing services not obtained in compliance with this guidance will result in the cost of such printing being disallowed.

(4) The Contractor will include in each of his subcontracts hereunder a provision substantially the same as this clause including this paragraph (4).

14. FAR 52.209-6 PROTECTING THE GOVERNMENT'S INTEREST WHEN SUBCONTRACTING WITH CONTRACTORS DEBARRED, SUSPENDED, OR PROPOSED FOR DEBARMENT (JUN 1991)

(a) The Government suspends or debar Contractors to protect the Government's interests. Contractors shall not enter into any subcontract in excess of the small purchase limitation at FAR 13.000 with a Contractor that has been debarred, suspended, or proposed for debarment unless there is a compelling reason to do so.

(b) The Contractor shall require each proposed first-tier subcontractor, whose subcontract will exceed the small purchase limitation at FAR 13.000, to disclose to the Contractor, in writing, whether as of the time of award of the subcontract, the subcontractor, or its principals, is or is not debarred, suspended, or proposed for debarment by the Federal Government.



(c) A corporate officer or designee of the Contractor shall notify the Contracting Officer, in writing, before entering into such subcontract with a party that is debarred, suspended, or proposed for debarment (see FAR 9.404 for information on the List of Parties Excluded from Procurement Programs). The notice must include the following:

- (1) The name of the subcontractor;
- (2) The Contractor's knowledge of the reasons for the subcontractor being on the list of Parties Excluded from Procurement Programs;
- (3) The compelling reason(s) for doing business with the subcontractor notwithstanding its inclusion on the list of Parties Excluded from Procurement Programs; and
- (4) The systems and procedures the Contractor has established to ensure that it is fully protecting the Government's interests when dealing with such subcontractor in view of the specific basis for the party's debarment, suspension, or proposed debarment.

(End of Clause)

15. DEAR 952.209-71 ORGANIZATIONAL CONFLICTS OF INTEREST-GENERAL (APR 1984)

(a) The Contractor warrants that, to the best of his knowledge and belief, and except as otherwise disclosed, there are no relevant facts which could give rise to organizational conflicts of interest, as defined in CFR 909.570 or that the Contractor has disclosed all relevant information.

(b) The Contractor agrees that, if after award, an organizational conflict of interest with respect to this contract is discovered, an immediate and full disclosure in writing shall be made to the Contracting Officer which shall include a description of the action which the contractor has taken or proposes to take to avoid or mitigate such conflicts. The Department may, however, terminate the contract for its convenience if it deems such termination to be in the best interest of the Government.

(c) In the event that the Contractor was aware of an organizational conflict of interest prior to the award of this contract and did not disclose the conflict to the Contracting Officer, the Government may terminate the contract for default.

(d) The provisions of this clause shall be included in all subcontracts for work to be performed similar to the service provided by the prime Contractor, and the terms "contract," "Contractor," and "Contracting Officer" modified appropriately to preserve the Government's rights.

(e) Prior to a contract modification when the Statement of Work is modified to add new work, the period of performance is significantly increased, or the parties to the contract are changed, the Department will request and the Contractor is required to submit either an organizational conflict of interest disclosure or representation (see 48 CFR 904.70 and 909.5), or an update of the previously submitted disclosure or representation.

**16. FAR 52.212-13 STOP-WORK ORDER - (AUG 1989) ALTERNATE I**

(a) The Contracting Officer may, at any time, by written order to the Contractor, require the Contractor to stop all, or any part, of the work called for by this contract for a period of 90 days after the order is delivered to the Contractor, and for any further period to which the parties may agree. The order shall be specifically identified as a stop-work order issued under this clause. Upon receipt of the order, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of costs allowable to the work covered by the order during the period of work stoppage. Within a period of 90 days after a stop-work order is delivered to the Contractor, or within any extension of that period to which the parties shall have agreed, the Contracting Officer shall either-

- (1) Cancel the stop-work order; or
- (2) Terminate the work covered by the order as provided in the Termination clause of this contract.

(b) If a stop-work order issued under this clause is canceled or the period of the order or any extension thereof expires, the Contractor shall resume work. The Contracting Officer shall make an equitable adjustment in the delivery schedule, the estimated cost, the fee, or a combination thereof, and in any other terms of the contract that may be affected and the contract shall be modified, in writing, accordingly, if--

- (1) The stop-work order results in an increase in the time required for, or in the Contractor's cost properly allowable to, the performance of any part of this contract; and

(2) The Contractor asserts a claim for the adjustment within 30 days after the end of the period of work stoppage; provided, that, if the Contracting Officer decides to justify the action, the Contracting Officer may receive and act upon the claim asserted at any time before payment under this contract.

(c) If a stop-work order is not canceled and the work covered by the order is terminated for the convenience of the Government, the Contracting Officer shall allow reasonable costs resulting from the stop-work order in the termination settlement.

(d) If a stop-work order is not canceled and the work covered by the order is terminated for default, the Contracting Officer shall allow, by equitable adjustment or otherwise, reasonable costs resulting from the stop-work order.

17. DEAR 952.212-71 PRIORITIES AND ALLOCATIONS (ATOMIC ENERGY)  
(JUN 1987)

The Contractor shall follow the provisions of the Defense Priorities and Allocations System (DPAS) regulation (see 15 CFR Part 350) in obtaining controlled materials and other products and materials needed to fill this contract.

18. FAR 52.215-1 EXAMINATION OF RECORDS BY COMPTROLLER GENERAL  
(APR 1984)

(a) This clause applies if this contract exceeds \$10,000 and was entered into by negotiation.

(b) The Comptroller General of the United States or a duly authorized representative from the General Accounting Office shall, until 3 years after final payment under this contract or for any shorter period specified in Federal Acquisition Regulation (FAR) Subpart 4.7, Contractor Records Retention, have access to and the right to examine any of the Contractor's directly pertinent books, documents, papers, or other records involving transactions related to this contract.

(c) The Contractor agrees to include in first-tier subcontracts under this contract a clause to the effect that the Comptroller General or a duly authorized representative from the General Accounting Office shall, until 3 years after final payment under the subcontract or for any shorter period specified in FAR Subpart 4.7, have access to and the right to examine any of the subcontractor's directly pertinent books, documents,

papers, or other records involving transactions related to the subcontract. "Subcontract," as used in this clause, excludes (1) purchase orders not exceeding \$10,000 and (2) subcontracts or purchase orders for public utility services at rates established to apply uniformly to the public, plus any applicable reasonable connection charge.

(d) The periods of access and examination in paragraphs (b) and (c) above for records relating to (1) appeals under the Disputes clause, (2) litigation or settlement of claims arising from the performance of this contract, or (3) costs and expenses of this contract to which the Comptroller General or a duly authorized representative from the General Accounting Office has taken exception shall continue until such appeals, litigation, claims, or exceptions are disposed of.

19. FAR 52.215-2 AUDIT--NEGOTIATION (DEC 1989)

(a) Examination of costs. If this is a cost-reimbursement, incentive, time-and-materials, labor-hour, or price-redeterminable contract, or any combination of these, the Contractor shall maintain-and the Contracting Officer or representatives of the Contracting Officer shall have the right to examine and audit books, records, documents, and other evidence and accounting procedures and practices, regardless of form (e.g. data bases, applications software, data base management software, utilities, etc.), sufficient to reflect properly all costs claimed to have been incurred or anticipated to be incurred in performing this contract. This right of examination shall include inspection at all reasonable times of the Contractor's plants, or parts of them, engaged in performing the contract.

(b) Cost or pricing data. If, pursuant to law, the Contractor has been required to submit cost or pricing data in connection with pricing this contract or any modification to this contract, the Contracting Officer or representatives of the Contracting Officer who are employees of the Government shall have the right to examine and audit all of the Contractor's books, records, documents, and other data, regardless of form (e.g., machine readable media such as disk, tape, etc.) or type (e.g., data bases, applications software, data base management software, utilities, etc.), including computations and projections related to proposing, negotiating, pricing, or performing the contract or modification in order to evaluate the accuracy, completeness, and currency of the cost or pricing data. The right of examination shall extend to all documents necessary to permit adequate evaluation of the cost or pricing data submitted, along with the computations and projections used.

(c) Reports. If the Contractor is required to furnish cost, funding, or performance reports, the Contracting Officer or representatives of the Contracting Officer who are employees of the Government shall have the right to examine and audit books, records, other documents, and supporting materials, for the purpose of evaluating (1) the effectiveness of the Contractor's policies and procedures to produce data compatible with the objectives of these reports and (2) the data reported.

(d) Availability. The Contractor shall make available at its office at all reasonable times the materials described in paragraphs (a) and (b) above, for examination, audit, or reproduction, until 3 years after final payment under this contract, or for any shorter period specified in Subpart 4.7, Contractor Records Retention, of the Federal Acquisition Regulation, or for any longer period required by statute or by other clauses of this contract. In addition-

(1) If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement; and

(2) Records relating to appeals under the Disputes clause or to litigation or the settlement of claims arising under or relating to this contract shall be made available until such appeals, litigation, or claims are disposed of.

(e) Except as otherwise provided in FAR Subpart 4.7, Contractor Records Retention, the Contractor may transfer computer data in machine readable form from one reliable computer medium to another. The Contractor's computer data retention and transfer procedures shall maintain the integrity, reliability, and security of the original data. The contractor's choice of form or type of materials described in paragraphs (a), (b), and (c) of this clause affects neither the Contractor's obligations nor the Government's rights under this clause.

(f) The Contractor shall insert a clause containing all the terms of this clause, including this paragraph (f), in all subcontracts over \$10,000 under this contract, altering the clause only as necessary to identify properly the contracting parties and the Contracting Officer under the Government prime contract.

**20. FAR 52.215-33 ORDER OF PRECEDENCE (JAN 1986)**

Any inconsistency in this solicitation or contract shall be resolved by giving precedence in the following order: (a) the Schedule (excluding the specifications); (b) representations and other instructions; (c) contract clauses; (d) other documents, exhibits, and attachments; and (e) the specifications.

(End of Clause)

**21. FAR 52.215-22 PRICE REDUCTION FOR DEFECTIVE COST OR PRICING DATA (JAN 1991)**

(a) If any price, including profit or fee, negotiated in connection with this contract, or any cost reimbursable under this contract, was increased by any significant amount because--

(1) the Contractor or a subcontractor furnished cost or pricing data that were not complete, accurate, and current as certified in its Certificate of Current Cost or Pricing Data,

(2) a subcontractor or prospective subcontractor furnished the Contractor cost or pricing data that were not complete, accurate, and current as certified in the Contractor's Certificate of Current Cost or Pricing Data, or

(3) any of these parties furnished data of any description that were not accurate, the price or cost shall be reduced accordingly and the contract shall be modified to reflect the reduction.

(b) Any reduction in the contract price under paragraph (a) above due to defective data from a prospective subcontractor that was not subsequently awarded the subcontract shall be limited to the amount, plus applicable overhead and profit markup, by which (1) the actual subcontract or (2) the actual cost to the Contractor, if there was no subcontract, was less than the prospective subcontract cost estimate submitted by the Contractor; provided, that the actual subcontract price was not itself affected by defective cost or pricing data.

(c) (1) If the Contracting Officer determines under paragraph (a) of this clause that a price or cost reduction should be made, the Contractor agrees not to raise the following matters as a defense:

(i) The Contractor or subcontractor was a sole source supplier or otherwise was in a superior bargaining position and thus the price of the contract would not have been modified even if accurate, complete, and current cost or pricing data had been submitted.

(ii) The Contracting Officer should have known that the cost or pricing data in issue were defective even though the Contractor or subcontractor took no affirmative action to bring the character of the data to the attention of the Contracting Officer.

(iii) The contract was based on an agreement about the total cost of the contract and there was no agreement about the cost of each item procured under the contract.

(iv) The Contractor or subcontractor did not submit a Certificate of Current Cost or Pricing Data.

(2) (1) Except as prohibited by subdivision (c)(2)(ii) of this clause, an offset in an amount determined appropriate by the Contracting Officer based upon the facts shall be allowed against the amount of a contract price reduction if--

(A) The Contractor certifies to the Contracting Officer that, to the best of the Contractor's knowledge and belief, the Contractor is entitled to the offset in the amount requested; and

(B) The Contractor proves that the cost or pricing data were available before the date of agreement on the price of the contract (or price of the modification) and that the data were not submitted before such date.

(ii) An offset shall not be allowed if--

(A) The understated data was known by the Contractor to be understated when the Certificate of Current Cost or Pricing Data was signed; or

(B) The Government proves that the facts demonstrate that the contract price would not have increased in the amount to be offset even if the available data had been submitted before the date of agreement on price.

(d) If any reduction in the contract price under this clause reduces the price of items for which payment was made prior to the date of the modification reflecting the price reduction, the Contractor shall be liable to and shall pay the United States at the time such overpayment is repaid --

(1) Simple interest on the amount of such overpayment to be computed from the date(s) of overpayment to the Contractor to the date the Government is repaid by the Contractor at the applicable underpayment rate effective for each quarter prescribed by the Secretary of the Treasury under 36 U.S.C. 6621(a)(2): and

(2) For Department of Defense contracts only, a penalty equal to the amount of the overpayment, if the Contractor or subcontractor knowingly submitted cost or pricing data which were incomplete, inaccurate, or noncurrent.

**22. FAR 52.215-24 SUBCONTRACTOR COST OR PRICING DATA (APR 1985)**

(a) Before awarding any subcontract expected to exceed \$100,000 when entered into, or before pricing any subcontract modification involving a pricing adjustment expected to exceed \$100,000, the Contractor shall require the subcontractor to submit cost or pricing data (actually or by specific identification in writing), unless the price is--

(1) Based on adequate price competition;

(2) Based on established catalog or market prices of commercial items sold in substantial quantities to the general public; or

(3) Set by law or regulation.

(b) The Contractor shall require the subcontractor to certify in substantially the form prescribed in Subsection 15.804-4 of the Federal Acquisition Regulation (FAR) that, to the best of its knowledge and belief, the data submitted under paragraph (a) above were accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract modification.

(c) In each subcontract that exceeds \$100,000 when entered into, the Contractor shall insert either--

(1) The substance of this clause, including this paragraph (c), if paragraph (a) above requires submission of cost or pricing data for the subcontract; or

(2) The substance of the clause at FAR 52.215-25, Subcontractor Cost or Pricing Data-Modifications.

**23. FAR 52.215-27 TERMINATION OF DEFINED BENEFIT PENSION PLANS (SEP 1989)**

The Contractor shall promptly notify the Contracting Officer in writing when it determines that it will terminate a defined benefit pension plan or otherwise recapture such pension fund assets. If pension fund assets revert to the Contractor or are



constructively received by it under a termination or otherwise, the Contractor shall make a refund or give a credit to the Government for its equitable share as required by FAR 31.205-6(j)(4). The Contractor shall include the substance of this clause in all subcontracts under this contract which meet the applicability requirement of FAR 15.804(e).

**24. DEAR 952.216-7 ALLOWABLE COST AND PAYMENT (JUL 1991)**

(a) Invoicing. The Government shall make payments to the Contractor when requested as work progresses, but (except for small business concerns) not more often than once every 2 weeks, in amounts determined to be allowable by the Contracting Officer in accordance with Subpart 31.6 of the Federal Acquisition Regulation (FAR) in effect on the date of this contract and the terms of this contract. The Contractor may submit to an authorized representative of the Contracting Officer, in such form and reasonable detail as the representative may require, an invoice or voucher supported by a statement of the claimed allowable cost for performing this contract.

(b) Reimbursing costs.

(1) For the purpose of reimbursing allowable costs (except as provided in subparagraph (2) below, with respect to pension, deferred profit sharing, and employee stock ownership plan contributions), the term "costs" includes only--

(i) Those recorded costs that, at the time of the request for reimbursement, the Contractor has paid by cash, check, or other form of actual payment for items or services purchased directly for the contract;

(ii) When the Contractor is not delinquent in paying costs of contract performance in the ordinary course of business, costs incurred, but not necessarily paid, for--

(A) Materials issued from the Contractor's inventory and placed in the production process for use on the contract;

(B) Direct labor;

(C) Direct travel;

(D) Other direct in-house costs; and

(E) Properly allocable and allowable indirect costs, as shown in the records maintained by the Contractor for purposes of obtaining reimbursement under Government contracts; and

(iii) The amount of progress payments that have been paid to the Contractor's subcontractors under similar cost standards.

(2) Contractor contributions to any pension or other postretirement benefit, profit-sharing, or employee stock ownership plan funds that are paid quarterly or more often may be included in indirect costs for payment purposes; provided, that the Contractor pays the contribution to the fund within 30 days after the close of the period covered. Payments made 30 days or more after the close of a period shall not be included until the Contractor actually makes the payment. Accrued costs for such contributions that are paid less often than quarterly shall be excluded from indirect costs for payment purposes until the Contractor actually makes the payment.

(3) Notwithstanding the audit and adjustment of invoices or vouchers under paragraph (g) below, allowable indirect costs under this contract shall be obtained by applying indirect cost rates established in accordance with paragraph (d) below.

(4) Any statements in specifications or other documents incorporated in this contract by reference designating performance of services or furnishing of materials at the Contractor's expense or at no cost to the Government shall be disregarded for purposes of cost-reimbursement under this clause.

(c) Small business concerns. A small business concern may be paid more often than every 2 weeks and may invoice and be paid for recorded costs for items or services purchased directly for the contract, even though the concern has not yet paid for those items or services.

(d) Final indirect cost rates.

(1) Final annual indirect cost rates and the appropriate bases shall be established in accordance with Subpart 42.7 of the Federal Acquisition Regulation (FAR) in effect for the period covered by the indirect cost rate proposal.

(2) The Contractor shall, within 90 days after the expiration of each of its fiscal years, or by a later date approved by the Contracting Officer, submit to the cognizant Contracting Officer responsible for negotiating its final indirect cost rates and, if required by agency procedures, to the cognizant audit activity proposed final indirect cost rates for that period and supporting cost data specifying the contract

and/or subcontract to which the rates apply. The proposed rates shall be based on the contractor's actual cost experience for that period. The appropriate Government representative and Contractor shall establish the final indirect cost rates as promptly as practical after receipt of the Contractor's proposal.

(3) The Contractor and the appropriate Government representative shall execute a written understanding setting forth the final indirect cost rates. The understanding shall specify (i) the agree-upon final annual indirect cost rates, (ii) the bases to which the rates apply, (iii) the periods for which the rates apply, (iv) any specific indirect cost items treated as direct costs in the settlement, and (v) the affected contract and/or subcontract, identifying any with advance agreements or special terms and the applicable rates. The understanding shall not change any monetary ceiling, contract obligation, or specific cost allowance or disallowance provided for in this contract. The understanding is incorporated into this contract upon execution.

(4) Failure by the parties to agree on a final annual indirect cost rate shall be a dispute within the meaning of the Disputes clause.

(e) Billing rates. Until final annual indirect cost rates are established for any period, the Government shall reimburse the Contractor at billing rates established by the Contracting Officer or by an authorized representative (the cognizant auditor), subject to adjustment when the final rates are established. These billing rates--

(1) Shall be the anticipated final rates; and

(2) May be prospectively or retroactively revised by mutual agreement, at either party's request, to prevent substantial overpayment or underpayment.

(f) Quick-closeout procedures. When the Contractor and Contracting Officer agree, the quick-closeout procedures of Subpart 42.7 of the FAR may be used.

(g) Audit. At any time or times before final payment, the Contracting Officer may have the Contractor's invoices or vouchers and statements of cost audited. Any payment may be (1) reduced by amounts found by the Contracting Officer not to constitute allowable costs or (2) adjusted for prior overpayments or underpayments.

**(h) Final payment.**

**(1) The Contractor shall submit a completion invoice or voucher, designated as such, promptly upon completion of the work, but no later than one year (or longer, as the Contracting Officer may approve in writing) from the completion date. Upon approval of that invoice or voucher, and upon the Contractor's compliance with all terms of this contract, the Government shall promptly pay any balance of allowable costs and that part of the fee (if any) not previously paid.**

**(2) The Contractor shall pay to the Government any refunds, rebates, credits, or other amounts (including interest, if any) accruing to or received by the Contractor or any assignee under this contract, to the extent that those amounts are properly allocable to costs for which the contractor has been reimbursed by the Government. Reasonable expenses incurred by the Contractor for securing refunds, rebates, credits, or other amounts shall be allowable costs if approved by the Contracting Officer. Before final payment under this contract, the Contractor and each assignee whose assignment is in effect at the time of final payment shall execute and deliver--**

**(i) An assignment to the Government, in form and substance satisfactory to the Contracting Officer, of refunds, rebates, credits, or other amounts (including interest, if any) properly allocable to costs for which the Contractor has been reimbursed by the Government under this contract; and**

**(ii) A release discharging the Government, its officers, agents, and employees from all liabilities, obligations, and claims arising out of or under this contract, except--**

**(A) Specified claims stated in exact amounts, or in estimated amounts when the exact amounts are not known;**

**(B) Claims (including reasonable incidental expenses) based upon liabilities of the Contractor to third parties arising out of the performance of this contract; provided that the claims are not known to the Contractor on the date of the execution of the release, and that the Contractor gives notice of the claims in writing to the Contracting Officer within 6 years following the release date or notice of final payment date, whichever is earlier; and**

(C) Claims for reimbursement of costs, including reasonable incidental expenses, incurred by the Contractor under the patent clauses of this contract, excluding, however, any expenses arising from the Contractor's indemnification of the Government against patent liability.

25. FAR 52.216-11 COST CONTRACT--NO FEE (APR 1984)

(a) The Government shall not pay the Contractor a fee for performing this contract.

(b) After payment of 80 percent of the total estimated cost shown in the Schedule, the Contracting Officer may withhold further payment of allowable cost until a reserve is set aside in an amount that the Contracting Officer considers necessary to protect the Government's interest. This reserve shall not exceed one percent of the total estimated cost shown in the Schedule or \$100,000, whichever is less.

26. FAR 52.216-12 COST-SHARING CONTRACT--NO FEE (APR 1984)

(a) The Government shall not pay to the Contractor a fee for performing this contract.

(b) After paying 80 percent of the Government's share of the total estimated cost of performance shown in the Schedule, the Contracting Officer may withhold further payment of allowable cost until a reserve is set aside in an amount that the Contracting Officer considers necessary to protect the Government's interest. This reserve shall not exceed one percent of the Government's share of the total estimated cost shown in the Schedule or \$100,000, whichever is less.

27. DEAR 952.217-70 ACQUISITION OF REAL PROPERTY (APR 1984)

(a) Notwithstanding any other provision of the contract, the prior approval of the contracting officer shall be obtained when, in performance of this contract, the contractor acquires or proposes to acquire use of real property by:

(1) Purchase, on the Government's behalf or in the contractor's own name, with title eventually vesting in the Government.

(2) Lease, and the Government assumes liability for, or will otherwise pay for the obligation under the lease as a reimbursable contract cost.

(3) Acquisition of temporary interest through easement, license or permit, and the Government funds the entire cost of the temporary interest.

(b) Justification of and execution of any real property acquisitions shall be in accordance and compliance with directions provided by the contracting officer.

(c) The substance of this clause, including this paragraph (c), shall be included in any subcontract occasioned by this contract under which property described in paragraph (a) of this clause shall be acquired.

**28. FAR 52.219-8 UTILIZATION OF SMALL BUSINESS CONCERNS AND SMALL DISADVANTAGED BUSINESS CONCERNS (FEB 1990)**

(a) It is the policy of the United States that small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals shall have the maximum practicable opportunity to participate in performing contracts let by any Federal agency, including contracts and subcontracts for subsystems, assemblies, components, and related services for major systems. It is further the policy of the United States that its prime contractors establish procedures to ensure the timely payment of amounts due pursuant to the terms of their subcontracts with small business concerns and small business concerns owned and controlled by socially and economically disadvantaged individuals.

(b) The Contractor hereby agrees to carry out this policy in the awarding of subcontracts to the fullest extent consistent with efficient contract performance. The Contractor further agrees to cooperate in any studies or surveys as may be conducted by the United States Small Business Administration or the awarding agency of the United States as may be necessary to determine the extent of the Contractor's compliance with this clause.

(c) As used in this contract, the term "small business concern" shall mean a small business as defined pursuant to section 3 of the Small Business Act and relevant regulations promulgated pursuant thereto. The term "small business concern owned and controlled by socially and economically disadvantaged individuals" shall mean a small business concern (1) which is at least 51 percent unconditionally owned by one or more socially and economically disadvantaged individuals; or, in the case of any publicly owned business, at least 51 per centum of the stock of which is unconditionally owned by one or more socially and economically disadvantaged individuals; and (2) whose management and daily business operations are controlled by one or more of such individuals. This term also means a small business concern that is a least 51 percent unconditionally owned by an economically disadvantaged Indian tribe or Native Hawaiian organization, or a publicly owned business having at least 51

percent of its stock unconditionally owned by one of these entities which has its management and daily business controlled by members or an economically disadvantaged Indian tribe or Native Hawaiian Organization, and which meets the requirements of 13CFR 124. The Contractor shall presume that socially and economically disadvantaged individuals include Black Americans, Hispanic Americans, Native Americans, Asian-Pacific Americans, Asian-Indian Americans and other minorities, or any other individual found to be disadvantaged by the Administration pursuant to section 8(a) of the Small Business Act. The Contractor shall presume that socially and economically disadvantaged entities also include Indian Tribes and Native Hawaiian Organizations.

(d) Contractors acting in good faith may rely on written representations by their subcontractors regarding their status as either a small business concern or a small business concern owned and controlled by socially and economically disadvantaged individuals.

**29. DEAR 952.219-9 SMALL BUSINESS AND SMALL DISADVANTAGED BUSINESS SUBCONTRACTING PLAN (JAN 1991)**

(a) This clause does not apply to small business concerns.

(b) "Commercial product," as used in this clause, means a product in regular production that is sold in substantial quantities to the general public and/or industry at established catalog or market prices. It also means a product which, in the opinion of the Contracting Officer, differs only insignificantly from the Contractor's commercial product.

"Subcontract," as used in this clause, means any agreement (other than one involving an employer-employee relationship) entered into by a Federal Government prime Contractor or subcontractor calling for supplies or services required for performance of the contract or subcontract.

(c) The offeror, upon request by the Contracting Officer, shall submit and negotiate a subcontracting plan, where applicable, which addresses separately subcontracting with small business concerns and small disadvantaged business concerns and which shall be included in and made a part of the resultant contract. The subcontracting plan shall be negotiated within the time specified by the Contracting Officer. Failure to submit and negotiate the subcontracting plan shall make the offeror ineligible for award of a contract.

(d) The offeror's subcontracting plan shall include the following:

(1) Goals, expressed in terms of percentages of total planned subcontracting dollars, for the use of small business concerns and small disadvantaged business concerns as subcontractors. The offeror shall include all subcontracts that contribute to contract performance, and may include a proportionate share of products and services that are normally allocated as indirect costs.

(2) A statement of--

(i) Total dollars planned to be subcontracted;

(ii) Total dollars planned to be subcontracted to small business concerns; and

(iii) Total dollars planned to be subcontracted to small disadvantaged business concerns.

(3) A description of the principal types of supplies and services to be subcontracted, and an identification of the types planned for subcontracting to (i) small business concerns and (ii) small disadvantaged business concerns.

(4) A description of the method used to develop the subcontracting goals in (1) above.

(5) A description of the method used to identify potential sources for solicitation purposes (e.g., existing company source list, the Procurement Automated Source System (PASS) of the Small Business Administration, the National Minority Purchasing Council Vendor Information Service, the Research and Information Division of the Minority Business Development Agency in the Department of Commerce, or small and small disadvantaged business concerns trade associations).

(6) A statement as to whether or not the offeror included indirect costs in establishing subcontracting goals, and a description of the method used to determine the proportionate share of indirect costs to be incurred with (i) small business concerns and (ii) small disadvantaged business concerns.

(7) The name of the individual employed by the offeror who will administer the offeror's subcontracting program, and a description of the duties of the individual.



(8) A description of the efforts the offeror will make to assure that small business concerns and small disadvantaged business concerns have an equitable opportunity to compete for subcontracts.

(9) Assurances that the offeror will include the clause in this contract entitled "Utilization of Small Business Concerns and Small Disadvantaged Business Concerns" in all subcontracts that offer further subcontracting opportunities, and that the offeror will require all subcontractors (except small business concerns) who receive subcontracts in excess of \$500,000 (\$1,000,000 for construction of any public facility), to adopt a plan similar to the plan agreed to by the offeror.

(10) Assurances that the offeror will (i) cooperate in any studies or surveys as may be required, (ii) submit periodic reports in order to allow the Government to determine the extent of compliance by the offeror with the subcontracting plan, (iii) submit, not later than the 25th day of the succeeding month, Standard Form (SF) 294 only, (DOE contractors need not submit SF 295) on a quarterly basis current as the last day of March, June, September and December, and upon contract completion, in accordance with the instructions on the form except the report shall be submitted quarterly rather than semiannually and additionally shall indicate at the remarks block the number and dollar amount of award made to labor surplus area concerns to the extent such reporting is required by the terms of their contract, and (iv) ensure that its subcontractors agree to submit SF 294 in accordance with the instructions at (iii) above.

(11) A recitation of the types of records the offeror will maintain to demonstrate procedures that have been adopted to comply with the requirements and goals in the plan, including established source lists; and a description of its efforts to locate small and small disadvantaged business concerns and award subcontracts to them. The records shall include at least the following (on a plant-wide or company-wide basis, unless otherwise indicated):

(i) Source lists, guides, and other data that identify small and small disadvantaged business concerns.

(ii) Organizations contacted in an attempt to locate sources that are small or small disadvantaged business concerns.

(iii) Records on each subcontract solicitation resulting in an award of more than \$100,000, indicating (A) whether small business concerns were solicited and if not, why not, (B) whether small disadvantaged business concerns were solicited and if not, why not, and (C) if applicable, the reason award was not made to a small business concern.

(iv) Records of any outreach efforts to contact (A) trade associations, (B) business development organizations, and (C) conferences and trade fairs to locate small and small disadvantaged business sources.

(v) Records of internal guidance and encouragement provided to buyers through (A) workshops, seminars, training, etc., and (B) monitoring performance to evaluate compliance with the program's requirements.

(vi) On a contract-by-contract basis, records to support award data submitted by the offeror to the Government, including the name, address, and business size of each subcontractor. Contractors having company or division-wide annual plans need not comply with this requirement.

(e) In order to effectively implement this plan to the extent consistent with efficient contract performance, the Contractor shall perform the following functions:

(1) Assist small business and small disadvantaged business concerns by arranging solicitations, time for the preparation of bids, quantities, specifications, and delivery schedules so as to facilitate the participation by such concerns. Where the Contractor's lists of potential small business and small disadvantaged subcontractors are excessively long, reasonable effort shall be made to give all such small business concerns an opportunity to compete over a period of time.

(2) Provide adequate and timely consideration of the potentialities of small business and small disadvantaged business concerns in all "make-or-buy" decisions.

(3) Counsel and discuss subcontracting opportunities with representatives of small and small disadvantaged business firms.

(4) Provide notice to subcontractors concerning penalties and remedies for misrepresentations of business status as small business or small disadvantaged business for the purpose of obtaining a subcontract that is to be included as part or all of a goal contained in the Contractor's subcontracting plan.

(f) A master subcontracting plan on a plant or division-wide basis which contains all the elements required by (d) above, except goals, may be incorporated by reference as a part of the subcontracting plan required of the offeror by this clause; provided:

- (1) the master plan has been approved,
- (2) the offeror provides copies of the approved master plan and evidence of its approval to the Contracting Officer, and
- (3) goals and any deviations from the master plan deemed necessary by the Contracting Officer to satisfy the requirements of this contract are set forth in the individual subcontracting plan.

(g) (1) If a commercial product is offered, the subcontracting plan required by this clause may relate to the offeror's production generally, for both commercial and noncommercial products, rather than solely to the Government contract. In these cases, the offeror shall, with the concurrence of the Contracting Officer, submit one company-wide or division-wide annual plan.

(2) The annual plan shall be reviewed for approval by the agency awarding the offeror its first prime contract requiring a subcontracting plan during the fiscal year, or by an agency satisfactory to the Contracting Officer.

(3) The approval plan shall remain in effect during the offeror's fiscal year for all of the offeror's commercial products.

(h) Prior compliance of the offeror with other such subcontracting plans under previous contracts will be considered by the Contracting Officer in determining the responsibility of the offeror for award of the contract.

(i) The failure of the Contractor or subcontractor to comply in good faith with (1) the clause of this contract entitled "Utilization of Small Business Concerns and Small Disadvantaged Business Concerns," or (2) an approved plan required by this clause, shall be a material breach of the contract.

**30. FAR 52.219-13 UTILIZATION OF WOMEN-OWNED SMALL BUSINESSES  
(AUG 1986)**

(a) "Women-owned small businesses," as used in this clause, means small business concerns that are at least 51 percent owned by women who are United States citizens and who also control and operate the business.

"Control," as used in this clause, means exercising the power to make policy decisions.

"Operate," as used in this clause, means being actively involved in the day-to-day management of the business.

"Small business concern," as used in this clause, means a concern including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the criteria and size standards in 13 CFR 121.

(b) It is the policy of the United States that women-owned small businesses shall have the maximum practicable opportunity to participate in performing contracts awarded by any Federal agency.

(c) The Contractor agrees to use its best efforts to give women-owned small businesses the maximum practicable opportunity to participate in the subcontracts it awards to the fullest extent consistent with the efficient performance of its contract.

(d) The Contractor may rely on written representations by its subcontractors regarding their status as women-owned small businesses.

**31. FAR 52.219-16 LIQUIDATED DAMAGES-SMALL BUSINESS  
SUBCONTRACTING PLAN (AUG 1989)**

(a) "Failure to make a good faith effort to comply with the subcontracting plan," as used in this clause, means a willful or intentional failure to perform in accordance with the requirements of the subcontracting plan approved under the clause in this contract entitled "Small Business and Small Disadvantaged Business Subcontracting Plan," or willful or intentional action to frustrate the plan.

(b) If, at contract completion, or in the case of a commercial products plan, at the close of the fiscal year for which the plan is applicable, the Contractor has failed to meet its subcontracting goals and the Contracting Officer decides in accordance with paragraph (c) of this clause that the Contractor failed to make good faith effort to comply with its

subcontracting plan, established in accordance with the clause in this contract entitled Small and Small Disadvantaged Business Subcontracting Plans, the Contractor shall pay the Government liquidated damages in an amount stated. The amount of damages attributable to the Contractor's failure to comply shall be an amount equal to the actual dollar amount by which the Contractor failed to achieve each subcontract goal or, in the case of a commercial products plan, that portion of the dollar amount allocable to Government contracts by which the Contractor failed to achieve each subcontract goal.

(c) Before the Contracting Officer makes a final decision that the Contractor has failed to make such good faith effort, the Contracting Officer shall give the Contractor written notice specifying the failure and permitting the Contractor to demonstrate what good faith efforts have been made. Failure to respond to the notice may be taken as an admission that no valid explanation exists. If, after consideration of all the pertinent data, the Contracting Officer finds that the Contractor failed to make a good faith effort to comply with the subcontracting plan, the Contracting Officer shall issue a final decision to that effect and require that the Contractor pay the Government liquidated damages as provided in paragraph (b) of this clause.

(d) With respect to commercial products plans, i.e., company-wide or division-wide subcontracting plans approved under paragraph (g) of the clause in this contract entitled, Small Business and Small Disadvantaged Business Subcontracting Plan, the Contracting Officer of the agency that originally approved the plan will exercise the functions of the Contracting Officer under this clause on behalf of all agencies that awarded contracts covered by that commercial products plan.

(e) The Contractor shall have the right of appeal, under the clause in this contract entitled Disputes, from any final decision of the Contracting Officer.

(f) Liquidated damages shall be in addition to any other remedies that the Government may leave.

**32. FAR 52.220-3 UTILIZATION OF LABOR SURPLUS AREA CONCERNS (APR 1984)**

(a) Applicability. This clause is applicable if this contract exceeds the appropriate small purchase limitation in Part 13 of the Federal Acquisition Regulation.

(b) Policy. It is the policy of the Government to award contracts to concerns that agree to perform substantially in Labor Surplus Areas (LSA's) when this can be done consistent with the efficient performance of the contract and at prices no higher

than are obtainable elsewhere. The Contractor agrees to use its best efforts to place subcontracts in accordance with this policy.

(c) Order of preference. In complying with paragraph (b) above and with paragraph (c) of the clause of this contract entitled Utilization of Small Business Concerns and Small Disadvantaged Business Concerns, the Contractor shall observe the following order of preference in awarding subcontracts:

- (1) small business concerns that are LSA concerns,
- (2) other small business concerns, and
- (3) other LSA concerns.

(d) Definitions.

"Labor Surplus Area," as used in this clause, means a geographical area identified by the Department of Labor in accordance with 20 CFR 654, Subpart A, as an area of concentrated unemployment or underemployment or an area of labor surplus.

"Labor surplus area concern," as used in this clause, means a concern that together with its first-tier subcontractors will perform substantially in labor surplus areas. Performance is substantially in labor surplus areas if the costs incurred under the contract on account of manufacturing, production, or performance of appropriate services in labor surplus areas exceed 50 percent of the contract price.

33. FAR 52.220-4 LABOR SURPLUS AREA SUBCONTRACTING PROGRAM (APR 1984)

(a) See the Utilization of Labor Surplus Area Concerns clause of this contract for applicable definitions.

(b) The Contractor agrees to establish and conduct a program to encourage Labor Surplus Area (LSA) concerns to compete for subcontracts within their capabilities when the subcontracts are consistent with the efficient performance of the contract at prices no higher than obtainable elsewhere. The Contractor shall--

(1) Designate a liaison officer who will (i) maintain liaison with authorized representatives of the Government on LSA matters, (ii) supervise compliance with the Utilization of Labor Surplus Area Concerns clause, and (iii) administer the Contractor's labor surplus area subcontracting program;

(2) Provide adequate and timely consideration of the potentialities of LSA concerns in all make-or-buy decisions;

(3) Ensure that LSA concerns have an equitable opportunity to compete for subcontracts, particularly by arranging solicitations, time for the preparation of offers, quantities, specifications, and delivery schedules so as to facilitate the participation of LSA concerns;

(4) Include the Utilization of LSA Concerns clause in subcontracts that offer substantial LSA subcontracting opportunities; and

(5) Maintain records showing (i) the procedures adopted and (ii) the Contractor's performance, to comply with this clause. The records will be kept available for review by the Government until the expiration of 1 year after the award of this contract, or for such longer period as may be required by any other clause of this contract or by applicable law or regulations.

(c) The Contractor further agrees to insert in any related subcontract that may exceed \$500,000 and that contains the Utilization of LSA Concerns clause, terms that conform substantially to the language of this clause, including this paragraph (c), and to notify the Contracting Officer of the names of subcontractors.

34. FAR 52.222-1 NOTICE TO THE GOVERNMENT OF LABOR DISPUTES  
(APR 1984)

(a) If the Contractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the timely performance of this contract, the Contractor shall immediately give notice, including all relevant information, to the Contracting Officer.

(b) The Contractor agrees to insert the substance of this clause, including this paragraph (b), in any subcontract to which a labor dispute may delay the timely performance of this contract; except that each subcontract shall provide that in the event its timely performance is delayed or threatened by delay by any actual or potential labor dispute, the subcontractor shall immediately notify the next higher tier subcontractor or the prime Contractor, as the case may be, of all relevant information concerning the dispute.

**35. FAR 52.222-3 CONVICT LABOR (APR 1984)**

The Contractor agrees not to employ any person undergoing sentence of imprisonment in performing this contract except as provided by 18 U.S.C. 4082(c)(2) and Executive Order 11755, December 29, 1973.

**36. FAR 52.222-26 EQUAL OPPORTUNITY (APR 1984)**

(a) If, during any 12-month period (including the 12 months preceding the award of this contract), the Contractor has been or is awarded nonexempt Federal contracts and/or subcontracts that have an aggregate value in excess of \$10,000, the Contractor shall comply with subparagraphs (b)(1) through (11) below. Upon request, the Contractor shall provide information necessary to determine the applicability of this clause.

(b) During performing this contract, the Contractor agrees as follows:

(1) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin.

(2) The Contractor shall take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. This shall include, but not be limited to, (i) employment, (ii) upgrading, (iii) demotion, (iv) transfer, (v) recruitment or recruitment advertising, (vi) layoff or termination, (vii) rates of pay or other forms of compensation, and (viii) selection for training, including apprenticeship.

(3) The Contractor shall post in conspicuous places available to employees and applicants for employment the notices to be provided by the Contracting Officer that explain this clause.

(4) The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

(5) The Contractor shall send, to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, the notice to be provided by the Contracting Officer advising the labor union or workers' representative of the Contractor's



commitments under this clause, and post copies of the notice in conspicuous places available to employees and applicants for employment.

(6) The Contractor shall comply with Executive Order 11246, as amended, and the rules, regulations, and orders of the Secretary of Labor.

(7) The Contractor shall furnish to the contracting agency all information required by Executive Order 11246, as amended, and by the rules, regulations, and orders of the Secretary of Labor. Standard Form 100 (EEO-1), or any successor form, is the prescribed form to be filed within 30 days following the award, unless filed within 12 months preceding the date of award.

(8) The Contractor shall permit access to its books, records, and accounts by the contracting agency or the Office of Federal Contract Compliance Programs (OFCCP) for the purposes of investigation to ascertain the Contractor's compliance with the applicable rules, regulations, and orders.

(9) If the OFCCP determines that the Contractor is not in compliance with this clause or any rule, regulation, or order of the Secretary of Labor, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts, under the procedures authorized in Executive Order 11246, as amended. In addition, sanctions may be imposed and remedies invoked against the Contractor as provided in Executive Order 11246, as amended, the rules, regulations, and orders of the Secretary of Labor, or as otherwise provided by law.

(10) The Contractor shall include the terms and conditions of subparagraph (b)(1) through (11) of this clause in every subcontract or purchase order that is not exempted by the rules, regulations, or orders of the Secretary of Labor issued under Executive Order 11246, as amended, so that these terms and conditions will be binding upon each subcontractor or vendor.

(11) The Contractor shall take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing these terms and conditions, including sanctions for noncompliance; provided, that if the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of any direction, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

(c) Notwithstanding any other clause in this contract, disputes relative to this clause will be governed by the procedures in 41 CFR 60-1.1.

**37. FAR 52.222-28 EQUAL OPPORTUNITY PREAWARD CLEARANCE OF SUBCONTRACTS (APR 1984)**

Notwithstanding the clause entitled "Subcontractors," the Contractor shall not enter into a first-tier subcontract for an estimated or actual amount of \$1 million or more without obtaining in writing from the Contracting Officer a clearance that the proposed subcontractor is in compliance with equal opportunity requirements and therefore is eligible for award.

**38. FAR 52.222-35 AFFIRMATIVE ACTION FOR SPECIAL DISABLED AND VIETNAM ERA VETERANS (APR 1984)**

(a) Definitions. "Appropriate office of the State employment service system," as used in this clause, means the local office of the Federal-State national system of public employment offices assigned to serve the area where the employment opening is to be filled, including the District of Columbia, Guam, Puerto Rico, Virgin Islands, American Samoa, and the Trust Territory of the Pacific Islands.

"Openings that the Contractor proposes to fill from within its own organization," as used in this clause, means employment openings for which no one outside the Contractor's organization (including any affiliates, subsidiaries, and the parent companies) will be considered and includes any openings that the Contractor proposes to fill from regularly established "recall" lists.

"Openings that the Contractor proposes to fill under a customary and traditional employer-union hiring arrangement," as used in this clause, means employment openings that the Contractor proposes to fill from union halls, under their customary and traditional employer-union hiring relationship.

"Suitable employment openings," as used in this clause--

(1) Includes, but is not limited to, openings that occur in jobs categorized as--

- (i) Production and nonproduction;
- (ii) Plant and office;
- (iii) Laborers and mechanics;

- (iv) Supervisory and nonsupervisory;
- (v) Technical; and
- (vi) Executive, administrative, and professional positions compensated on a salary basis of less than \$25,000 a year; and

(2) Includes full-time employment, temporary employment of over 3 days, and part-time employment, but not openings that the Contractor proposes to fill from within its own organization or under a customary and traditional employer-union hiring arrangement, nor openings in an educational institution that are restricted to students of that institution.

**(b) General.**

(1) Regarding any position for which the employee or applicant for employment is qualified, the Contractor shall not discriminate against the individual because the individual is a special disabled or Vietnam Era veteran. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified special disabled and Vietnam Era veterans without discrimination based upon their disability or veterans' status in all employment practices such as--

- (i) Employment;
  - (ii) Upgrading;
  - (iii) Demotion or transfer;
  - (iv) Recruitment;
  - (v) Advertising;
  - (vi) Layoff or termination;
  - (vii) Rates of pay or other forms of compensation;
- and
- (viii) Selection for training, including apprenticeship.

(2) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor (Secretary) issued under the Vietnam Era Veterans' Readjustment Assistance Act of 1972 (the Act), as amended.

**(c) Listing openings.**

(1) The Contractor agrees to list all suitable employment openings existing at contract award or occurring during contract performance, at an appropriate office of the State employment service system in the locality where the opening occurs. These openings include those occurring at any Contractor facility, including one not connected with performing this contract. An independent corporate affiliate is exempt from this requirement.

(2) State and local government agencies holding Federal contracts of \$10,000 or more shall also list all their suitable openings with the appropriate office of the State employment service.

(3) The listing of suitable employment openings with the State employment service system is required at least concurrently with using any other recruitment source or effort and involves the obligations of placing a bona fide job order, including accepting referrals of veterans and nonveterans. This listing does not require hiring any particular job applicant or hiring from any particular group of job applicants and is not intended to relieve the Contractor from any requirements of Executive orders or regulations concerning nondiscrimination in employment.

(4) Whenever the Contractor becomes contractually bound to the listing terms of this clause, it shall advise the State employment service system, in each State where it has establishments, of the name and location of each hiring location in the State. As long as the Contractor is contractually bound to these terms and has so advised the State system, it need not advise the State system of subsequent contracts. The Contractor may advise the State system when it is no longer bound by this contract clause.

(5) Under the most compelling circumstances, an employment opening may not be suitable for listing, including situations when (i) the Government's needs cannot reasonably be supplied, (ii) listing would be contrary to national security, or (iii) the requirement of listing would not be in the Government's interest.

**(d) Applicability.**

(1) This clause does not apply to the listing of employment openings which occur and are filled outside the 50 states, the District of Columbia, Puerto Rico, Guam, Virgin Islands, American Samoa, and the Trust Territory of the Pacific Islands.

(2) The terms of paragraph (c) above of this clause do not apply to openings that the Contractor proposes to fill from within its own organization or under a customary and traditional employer-union hiring arrangement. This exclusion does not apply to a particular opening once an employer decides to consider applicants outside of its own organization or employer-union arrangement for that opening.

**(e) Postings.**

(1) The Contractor agrees to post employment notices stating (i) the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified special disabled veterans and veterans of the Vietnam era, and (ii) the rights of applicants and employees.

(2) These notices shall be posted in conspicuous places that are available to employees and applicants for employment. They shall be in a form prescribed by the Director, Office of Federal Contract Compliance Programs, Department of Labor (Director), and provided by or through the Contracting Officer.

(3) The Contractor shall notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of the Act, and is committed to take affirmative action to employ, and advance in employment, qualified special disabled and Vietnam Era veterans.

**(f) Noncompliance.**

If the Contractor does not comply with the requirements of this clause, appropriate actions may be taken under the rules, regulations, and relevant orders of the Secretary issued pursuant to the Act.

**(g) Subcontracts.**

The Contractor shall include the terms of this clause in every subcontract or purchase order of \$10,000 or more unless exempted by rules, regulations, or orders of the Secretary. The Contractor shall act as specified by the Director to enforce the terms, including action for noncompliance.

39. FAR 52.222-36 AFFIRMATIVE ACTION FOR HANDICAPPED WORKERS  
(APR 1984)

(a) General.

(1) Regarding any position for which the employee or applicant for employment is qualified, the Contractor shall not discriminate against any employee or applicant because of physical or mental handicap. The Contractor agrees to take affirmative action to employ, advance in employment, and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices such as--

- (i) Employment;
  - (ii) Upgrading;
  - (iii) Demotion or transfer;
  - (iv) Recruitment;
  - (v) Advertising;
  - (vi) Layoff or termination;
  - (vii) Rates of pay or other forms of compensation;
- and
- (viii) Selection for training, including apprenticeship.

(2) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor (Secretary) issued under the Rehabilitation Act of 1973 (29 U.S.C. 793) (the Act), as amended.

(b) Postings.

(1) The Contractor agrees to post employment notices stating (i) the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified handicapped individuals and (ii) the rights of applicants and employees.

(2) These notices shall be posted in conspicuous places that are available to employees and applicants for employment. They shall be in a form prescribed by the Director, Office of Federal Contract Compliance Programs, Department of Labor (Director), and provided by or through the Contracting Officer.

(3) The Contractor shall notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of Section 503 of the Act and is committed to take affirmative action to employ, and advance in employment, qualified physically and mentally handicapped individuals.

(c) Noncompliance. If the Contractor does not comply with the requirements of this clause, appropriate actions may be taken under the rules, regulations, and relevant orders of the Secretary issued pursuant to the Act.

(d) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order in excess of \$2,500 unless exempted by rules, regulations, or orders of the Secretary. The Contractor shall act as specified by the Director to enforce the terms, including action for noncompliance.

**40. FAR 52.222-37 EMPLOYMENT REPORTS ON SPECIAL DISABLED VETERANS AND VETERANS OF THE VIETNAM ERA (JAN 1988)**

(a) The contractor shall report at least annually, as required by the Secretary of Labor, on:

(1) The number of special disabled veterans and the number of veterans of the Vietnam era in the workforce of the contractor by job category and hiring location; and

(2) The total number of new employees hired during the period covered by the report, and of that total, the number of special disabled veterans, and the number of veterans of the Vietnam era.

(b) The above items shall be reported by completing the form entitled "Federal Contractor Veterans' Employment Report VETS-100."

(c) Reports shall be submitted no later than March 31 of each year beginning March 31, 1988.

(d) The employment activity report required by paragraph (a)(2) of this clause shall reflect total hires during the most recent 12-month period as of the ending date selected for the employment profile report required by paragraph (a)(1) of this clause. Contractors may select an ending date: (1) As of the end of any pay period during the period January through March 1st of the year the report is due, or (2) as of December 31, if the

contractor has previous written approval from the Equal Employment Opportunity Commission to do so for purposes of submitting the Employer Information Report EEO-1 (Standard Form 100).

(e) The count of veterans reported according to paragraph (a) of this clause shall be based on voluntary disclosure. Each contractor subject to the reporting requirements at 38 U.S.C. 2012(d) shall invite all special disabled veterans and veterans of the Vietnam era who wish to benefit under the affirmative action program at 38 U.S.C. 2012 to identify themselves to the contractor. The invitation shall state that the information is voluntarily provided, that the information will be kept confidential, that disclosure or refusal to provide the information will not subject the applicant or employee to any adverse treatment and that the information will be used only in accordance with the regulations promulgated under 38 U.S.C. 2012.

(f) Subcontracts. The Contractor shall include the terms of this clause in every subcontract or purchase order of \$10,000 or more unless exempted by rules, regulations, or orders of the Secretary.

41. FAR 52.222-41 SERVICE CONTRACT ACT OF 1965, AS AMENDED (MAY 1989)

(a) Definitions. "Act," as used in this clause, means the Service Contract Act of 1965, as amended (41. U.S.C. 351, et seq.).

"Contractor," as used in this clause or in any subcontract, shall be deemed to refer to "Government Prime Contractor."

"Service employee," as used in this clause, means any person engaged in the performance of this contract other than any person employed in a bona fide executive, administrative, or professional capacity as these terms are defined in Part 541 of Title 29, Code of Federal Regulations, as revised. It includes all such persons regardless of any contractual relationship that may be alleged to exist between a Contractor or subcontractor and such persons.

(b) Applicability. This contract is subject to the following provisions and to all other applicable provisions of the Act and regulations of the Secretary of Labor (29 CFR Part 4). This clause does not apply to contracts or subcontracts administratively exempted by the Secretary of Labor or exempted by 41 U.S.C. 356, as interpreted in Subpart C of 29 CFR Part 4.



(c) Compensation. (1) Each service employee employed in the performance of this contract by the Contractor or any subcontractor shall be paid not less than the minimum monetary wages and shall be furnished fringe benefits in accordance with the wages and fringe benefits determined by the Secretary of Labor, or authorized representative, as specified in any wage determination attached to this contract.

(2) (i) If a wage determination is attached to this contract, the Contractor shall classify any class of service employee which is not listed therein and which is to be employed under the contract (i.e., the work to be performed is not performed by any classification listed in the wage determination) so as to provide a reasonable relationship (i.e., appropriate level of skill comparison) between such unlisted classifications and the classifications listed in the wage determination. Such conformed class of employees shall be paid the monetary wages and furnished the fringe benefits as are determined pursuant to the procedures in this paragraph (c).

(ii) This conforming procedure shall be initiated by the Contractor prior to the performance of contract work by the unlisted class of employee. The Contractor shall submit Standard Form (SF) 1444, Request for Authorization of Additional Classification and Rate, to the Contracting Officer no later than 30 days after the unlisted class of employee performs any contract work. The Contracting Officer shall review the proposed classification and rate and promptly submit the completed SF 1444 (which must include information regarding the agreement or disagreement of the employees' authorized representatives or the employees' themselves together with the agency recommendation), and all pertinent information to the Wage and Hour Division, Employment Standards Administration U.S. Department of Labor. The Wage and Hour Division will approve, modify, or disapprove the action or render a final determination in the event of disagreement within 30 days of receipt or will notify the Contracting Officer within 30 days of receipt that additional time is necessary.

(iii) The final determination of the conformance action by the Wage and Hour division shall be transmitted to the Contracting Officer who shall promptly notify the Contractor of the action taken. Each affected employee shall be furnished by the Contractor with a written copy of such determination or it shall be posted as a part of the wage determination.

(iv) (A) The process of establishing wage and fringe benefit rates that bear a reasonable relationship to those listed in a wage determination cannot be reduced to any single formula. The approach used may vary from wage determination to wage determination depending on the circumstances. Standard wage

and salary administration practices which rank various job classifications by pay grade pursuant to point schemes or other job factors may, for example, be relied upon. Guidance may also be obtained from the way different jobs are rated under Federal pay systems (Federal Wage Board Pay System and the General Schedule) or from other wage determinations issued in the same locality. Basic to the establishment of any conformable wage rate(s) is the concept that a pay relationship should be maintained between job classifications based on the skill required and the duties performed.

(B) In the case of a contract modification, an exercise of an option or extension of an existing contract, or in any other case where a contractor succeeds a contract under which the classification in question was previously conformed pursuant to paragraph (c) of this clause, a new conformed wage rate and fringe benefits may be assigned to such conformed classification by indexing (i.e., adjusting) the previous conformed rate and fringe benefits by an amount equal to the average (mean) percentage increase (or decrease, where appropriate) between the wages and fringe benefits specified for all classifications to be used on the contract which are listed in the current wage determination, and those specified for the corresponding classifications in the previously applicable wage determination. Where conforming actions are accomplished in accordance with this paragraph prior to the performance of contract work by the unlisted class of employees, the Contractor shall advise the Contracting Officer of the action taken but the other procedures in subdivision (c)(2)(ii) of this clause need not be followed.

(C) No employee engaged in performing work on this contract shall in any event be paid less than the currently applicable minimum wage specified under section 6(a)(1) of the Fair Labor Standards Act of 1938, as amended.

(v) The wage rate and fringe benefits finally determined pursuant to paragraph (c)(2) of this clause shall be paid to all employees performing in the classification from the first day on which contract work is performed by them in the classification. Failure to pay such unlisted employees the compensation agreed upon by the interested parties and/or finally determined by the Wage and Hour Division retroactive to the date such class of employees commenced contract work shall be a violation of the Act and this contract.

(vi) Upon discovery of failure to comply with subparagraph (c) of this clause, the Wage and Hour Division shall make a final determination of conformed classification, wage rate, and/or fringe benefits which shall be retroactive to the date such class of employees commenced contract work.

(3) Adjustment of Compensation. If the term of this contract is more than 1 year, the minimum monetary wages and fringe benefits required to be paid or furnished thereunder to service employees under this contract shall be subject to adjustment after 1 year and not less often than once every 2 years, under wage determinations issued by the Wage and Hour Division.

(d) Obligation to Furnish Fringe Benefits. The contractor or subcontractor may discharge the obligation to furnish fringe benefits specified in the attachment or determined under subparagraph (c)(2) of this clause by furnishing equivalent combinations of bona fide fringe benefits, or by making equivalent or differential cash payments only in accordance with Subpart D of 29 CFR Part 4.

(e) Minimum Wage. In the absence of a minimum wage attachment for this contract, neither the contractor nor any subcontractor under this contract shall pay any person performing work under the contract (regardless of whether the person is a service employee) less than the minimum wage specified by section 6(a)(1) of the Fair Labor Standards Act of 1938. Nothing in this provision shall relieve the contractor or any subcontractor of any other obligation under law or contract for the payment of a higher wage to any employee.

(f) Successor Contracts. If this contract succeeds a contract, subject to the Service Contract Act of 1965 as amended, under which substantially the same services were furnished in the same locality and service employees were paid wages and fringe benefits provided for in a collective bargaining agreement, in the absence of the minimum wage attachment for this contract setting forth such collectively bargained wage rates and fringe benefits, neither the Contractor nor any subcontractor under this contract shall pay any service employee performing any of the contract work (regardless of whether or not such employee was employed under the predecessor contract), less than the wages and fringe benefits provided for in such collective bargaining agreement, to which such employee would have been entitled if employed under the predecessor contract, including accrued wages and fringe benefits and any prospective increases in wages and fringe benefits provided for under such agreement. No Contractor or subcontractor under this contract may be relieved of the foregoing obligation unless the limitations of 29 CFR Part 4.1b(b) apply or unless the Secretary of Labor or the Secretary's authorized representative finds, after a hearing as provided in 29 CFR Part 4.10 that the wages and/or fringe benefits provided for in such agreement are substantially at variance with those which prevail for services of a character similar in the locality, or determines, as provided in 29 CFR Part 4.11, that the collective bargaining agreement applicable to service

employees employed under the predecessor contract was not entered into as a result of arm's-length negotiations. Where it is found in accordance with the review procedures provided in 29 CFR 4.10 and/or 4.11 and Parts 6 and 8 that some or all of the wages and/or fringe benefits contained in a predecessor contractor's collective bargaining agreement are substantially at variance with those which prevail for services of a character similar in the locality, and/or that the collective bargaining agreement applicable to service employees employed under the predecessor contract was not entered into as a result of arm's-length negotiations, the Department will issue a new or revised wage determination setting forth the applicable wage rates and fringe benefits. Such determination shall be made part of the contract or subcontract, in accordance with the decision of the Administrator, the Administrative Law Judge, or the Board of Service Contract Appeals, as the case may be, irrespective of whether such issuance occurs prior to or after the award of a contract or subcontract. 53 Comp. Gen 401(1973). In the case of a wage determination issued solely as a result of a finding of substantial variance, such determination shall be effective as of the date of the final administrative decision.

(g) Notification to Employees. The Contractor and any subcontractor under this contract shall notify each service employee commencing work on this contract of the minimum monetary wage and any fringe benefits required to be paid pursuant to this contract, or shall post the wage determination attached to this contract. The poster provided by the Department of Labor (Publication WH 1313) shall be posted in a prominent and accessible place at the worksite. Failure to comply with this requirement is a violation of Section 2(a)(4) of the Act and of this contract.

(h) Safe and Sanitary Working Conditions. The contractor or subcontractor shall not permit any part of the services called for by this contract to be performed in buildings or surroundings or under working conditions provided by or under the control or supervision of the contractor or subcontractor which are unsanitary or hazardous or dangerous to the health or safety of service employees engaged to furnish these services, and the contractor or subcontractor shall comply with the safety and health standards applied under 29 CFR Part 1925.

(i) Records.

(1) The contractor and each subcontractor performing work subject to the Act shall make and maintain for 3 years from the completion of the work, and make them available for inspection and transcription by authorized representatives of the Wage and Hour Division, Employment Standards Administration, a record of the following:

- (i) For each employee subject to the Act--
- (A) Name and address and social security number;
  - (B) Correct work classification or classifications, rate or rates of monetary wages paid and fringe benefits provided, rate or rates of fringe benefits payments in lieu of fringe benefits, and total daily and weekly compensation.
  - (C) Daily and weekly hours worked by each employee; and
  - (D) Any deductions, rebates, or refunds from the total daily or weekly compensation of each employee.
- (ii) For those classes of services employees not included in any wage determination attached to this contract, wage rates or fringe benefits determined by the interested parties or by the Administrator or authorized representative under the terms of paragraph (c) of this clause. A copy of the report required by subdivision (c)(2)(ii) of this clause will fulfill this requirement.
- (iii) Any list of the predecessor Contractor's employees which had been furnished to the Contractor as prescribed by paragraph (n) of this clause.
- (2) The contractor shall also make available a copy of this contract for inspection or transcription by authorized representatives of the Wage and Hour Division.
- (3) Failure to make and maintain or to make available such records for inspection and transcription shall be a violation of the regulations and this contract, and in the case of failure to produce such records, the contracting officer, upon direction of the Department of Labor and notification of the contractor, shall take action to cause suspension of any further payment or advance of funds until such violation ceases.
- (4) The contractor shall permit authorized representatives of the Wage and Hour Division to conduct interviews with employees at the worksite during normal working hours.
- (j) Pay Periods. The contractor shall unconditionally pay to each employee subject to the Act all wages due free and clear and without subsequent deduction (except as otherwise provided by law or Regulations, 29 CFR Part 4), rebate, or kickback on any

account. These payments shall be made no later than one pay period following the end of the regular pay period in which such wages were earned or accrued. A pay period under this Act may not be of any duration longer than semi-monthly.

(k) **Withholding of Payments and Termination of Contract.** The contracting officer shall withhold or cause to be withheld from the Government prime contractor under this or any other Government contract with the prime contractor such sums as an appropriate official of the Department of Labor requests or such sums as the contracting officer decides may be necessary to pay underpaid employees employed by the contractor or subcontractor. In the event of failure to pay any employees subject to the Act all or part of the wages or fringe benefits due under the Act, the agency may, after authorization or by direction of the Department of Labor and written notification to the contractor, take action to cause suspension of any further payment or advance of funds until such violations have ceased. Additionally, any failure to comply with the requirements of these clauses relating to the Service Contract Act of 1965, may be grounds for termination of the right to proceed with the contract work. In such event, the Government may enter into other contracts or arrangements for completion of the work, charging the contractor in default with any additional cost.

(l) **Subcontracts.** The contractor agrees to insert this clause in all subcontracts subject to the Act.

(m) **Collective Bargaining Agreements Applicable to Service Employees.** If wages to be paid or fringe benefits to be furnished any service employees employed by the Government Prime Contractor or any subcontractor under the contract are provided for in a collective bargaining agreement which is or will be effective during any period in which the contract is being performed, the Government Prime Contractor shall report such fact to the Contracting Officer, together with full information as to the application and accrual of such wages and fringe benefits, including any prospective increases, to service employees engaged in work on the contract, and a copy of the collective bargaining agreement. Such report shall be made upon commencing performance of the contract, in the case of collective bargaining agreements effective at such time, and in the case of such agreements or provisions or amendments thereof effective at a later time during the period of contract performance, such agreements shall be reported promptly after negotiation thereof.

(n) **Seniority List.** Not less than 10 days prior to completion of any contract being performed at a Federal facility where service employees may be retained in the performance of the succeeding contract and subject to a wage determination which contains vacation or other benefit provisions based upon length

of service with a contractor (predecessor) or successor (29 CFR 4.173), the incumbent Prime Contractor shall furnish to the Contracting Officer a certified list of the names of all service employees on the contractor's or subcontractor's payroll during the last month of contract performance. Such list shall also contain anniversary dates of employment on the contract either with the current or predecessor contractors of each such service employee. The contracting officer shall turn over such list to the successor contractor at the commencement of the succeeding contract.

(o) **Rulings and Interpretations.** Rulings and interpretations of the Service Contract Act of 1965, as amended, are contained in Regulations, 29 CFR Part 4.

(p) **Contractor's Certification.**

(1) By entering into this contract, the Contractor (and officials thereof) certifies that neither it (nor he or she) nor any person or firm who has a substantial interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of the sanctions imposed pursuant to Section 5 of the Act.

(2) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract pursuant to Section 5 of the Act.

(3) The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.

(q) **Variations, Tolerances, and Exemptions Involving Employment.** Notwithstanding any of the clauses in paragraphs (b) through (o) of this clause relating to the Service Contract Act of 1965, the following employees may be employed in accordance with the following variations, tolerances, and exemptions, which the Secretary of Labor, pursuant to Section 4(b) of the Act prior to its amendment by Public Law 92-473, found to be necessary and proper in the public interest or to avoid serious impairment of the conduct of Government business:

(1) Apprentices, student-learners, and workers whose earning capacity is impaired by age, physical, or mental deficiency or injury may be employed at wages lower than the minimum wages otherwise required by Section 2(a)(1) or 2(b)(1) of the Service Contract Act without diminishing any fringe benefits or cash payments in lieu thereof required under Section 2(a)(2) of that Act, in accordance with the conditions and procedures prescribed for the employment of apprentices, student-learners,

handicapped persons, and handicapped clients of sheltered workshops under Section 14 of the Fair Labor Standards Act of 1938, in the regulations issued by the Administrator (29 CFR Parts 520, 521, 524 and 525).

(2) The Administrator will issue certificates under the Act for the employment of apprentices, student-learners, handicapped persons, or handicapped clients of sheltered workshops not subject to the Fair Labor Standards Act of 1938, or subject to different minimum rates of pay under the two acts, authorizing appropriate rates of minimum wages (but without changing requirements concerning fringe benefits or supplementary cash payments in lieu thereof), applying procedures prescribed by the applicable regulations issued under the Fair Labor Standards Act of 1938 (29 CFR Parts 520, 521, 524 and 525).

(3) The Administrator will also withdraw, annul, or cancel such certificates in accordance with the regulations in 29 CFR Parts 525 and 528.

(r) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed and individually registered in a bona fide apprenticeship program registered with a State Apprenticeship Agency which is recognized by the U. S. Department of Labor, or if no such recognized agency exists in a State, under a program registered with the Bureau of Apprenticeship and Training, Employment and Training Administration, U. S. Department of Labor. Any employee who is not registered as an apprentice in an approved program shall be paid the wage rate and fringe benefits contained in the applicable wage determination for the journeyman classification of work actually performed. The wage rates paid apprentices shall not be less than the wage rate for their level of progress set forth in the registered program, expressed as the appropriate percentage of the journeyman's rate contained in the applicable wage determination. The allowable ratio of apprentices to journeymen employed on the contract work in any craft classification shall not be greater than the ratio permitted to the contractor as to his entire work force under the registered program.

(s) Tips. An employee engaged in an occupation in which he or she customarily and regularly receives more than \$30 a month in tips may have the amount of tips credited by the employer against the minimum wage required by Section 2(a)(i) or Section 2(b)(1) of the Act in accordance with Section 3(m) of the Fair Labor Standards Act and Regulations, 29 CFR Part 531: Provided, however, that the amount of such credit may not exceed \$1.34 per hour beginning January 1, 1981. To use this provision:



(1) The employer must inform tipped employees about this tip credit allowance before the credit is utilized;

(2) The employees must be allowed to retain all tips (individually or through a pooling arrangement and regardless of whether the employer elects to take a credit for tips received);

(3) The employer must be able to show by records that the employee receives at least the applicable Service Contract Act minimum wage through the combination of direct wages and tip credit; and

(4) The use of such tip credit must have been permitted under any predecessor collective bargaining agreement applicable by virtue of Section 4(c) of the Act.

(t) Disputes Concerning Labor Standards. The U.S. Department of Labor has set forth in 29 CFR Parts 4, 6, and 8 procedures for resolving disputes concerning labor standards requirements. Such disputes shall be resolved in accordance with those procedures and not the Disputes clause of this contract. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

42. FAR 52.222-42 STATEMENT OF EQUIVALENT RATES FOR FEDERAL HIRES (MAY 1989)

In compliance with the Service Contract Act of 1965, as amended, and the regulations of the Secretary of Labor (29 CFR Part 4), this clause identifies the classes of service employees expected to be employed under the contract and states the wages and fringe benefits payable to each if they were employed by the contracting agency subject to the provisions of 5 U.S.C. 5341 or 5332.

This Statement is for Information Only: It is Not a Wage Determination.

<u>Employee class</u>	<u>Monetary wage--</u> <u>Fringe benefits</u>
Supervisory Firefighters/GS-081-7 (Station Chief)	22,214/yr.*
Lead Firefighter/GS-081-5	19,992/yr.*
Firefighter/GS-081-5	17,937/yr.*
Firefighter (Trainee II)/GS-081-4	16,031/yr.*
Firefighter (Trainee I)/GS-081-3	14,281/yr.*
Secretary/GS-318-4	16,031/yr.*

\*Fringe Benefits:

FDC-E

**Annual Leave.** Employees earn vacation or "annual" leave. The amount earned carries with the length of Federal Service. Employees earn 13 days of annual leave each year the first three years of employment, 20 days per year for 3 to 15 years. Under certain conditions, time spent in the military service is creditable towards leave earnings rates for annual leave.

**Sick Leave.** Regardless of the length of service employees earn 13 days of sick leave each year. Sick leave not used accumulates year after year and protects employees from loss of salary due to an extended illness. Accumulated sick leave also enhances retirement benefits.

**Health Insurance.** Employees can enroll in one of a variety of health plans. Regardless of the plan selected, employees and the Government contribute to the plan.

**Life Insurance.** Federal employees are eligible for basic life insurance and may select optional life insurance. This coverage will be based on their annual salary and will include payments for loss of limbs and/or eyesight in addition to accidental death.

**Retirement.** A bill creating a new retirement plan has recently been signed into law for Federal employees hired since January 1, 1987, and provides Social Security benefits earned through Federal employment; a modified retirement plan for which employees will pay 1.3 percent of their salary; and an optional, tax-deferred thrift savings plan with government-matching contributions.

**43. FAR 52:223-2 CLEAN AIR AND WATER (APR 1984)**

**NOTE:** This clause applies to this contract only if the price is (a) in excess of \$100,000; (b) a facility to be used has been the subject of a conviction under the applicable portion of the Air Act (42 U.S.C. 7413(c)(1)) or the Water Act (33 U.S.C. 1319(c)) and is listed by EPA as a violating facility; or (c) the acquisition is not exempt under FAR 23.104.

(a) "Air Act," as used in this clause, means the Clean Air Act (42 U.S.C. 7401 et seq.).

"Clean air standards," as used in this clause, means--

(1) Any enforceable rules, regulations, guidelines, standards, limitations, orders, controls, prohibitions, work practices, or other requirements contained in, issued under, or otherwise adopted under the Air Act or Executive Order 11738;

(2) An applicable implementation plan as described in section 110(d) of the Air Act (42 U.S.C. 7410(d));

(3) An approved implementation procedure or plan under section 111(c) or section 111(d) of the Air Act (42 U.S.C. 7411(c) or (d)); or

(4) An approved implementation procedure under section 112(d) of the Air Act (42 U.S.C. 7412(d)).

"Clean water standards," as used in this clause, means any enforceable limitation, control, condition, prohibition, standard, or other requirement promulgated under the Water Act or contained in a permit issued to a discharger by the Environmental Protection Agency or by a State under an approved program, as authorized by section 402 of the Water Act (33 U.S.C. 1342), or by local government to ensure compliance with pretreatment regulations as required by section 307 of the Water Act (33 U.S.C. 1317).

"Compliance," as used in this clause, means compliance with--

(1) Clean air or water standards; or

(2) A schedule or plan ordered or approved by a court of competent jurisdiction, the Environmental Protection Agency, or an air or water pollution control agency under the requirements of the Air Act or Water Act and related regulations.

"Facility," as used in this clause, means any building, plant, installation, structure, mine, vessel or other floating craft, location, or site of operations, owned, leased, or supervised by a Contractor or subcontractor, used in the performance of a contract or subcontract. When a location or site of operations includes more than one building, plant, installation, or structure, the entire location or site shall be deemed a facility except when the Administrator, or a designee, of the Environmental Protection Agency, determines that independent facilities are collocated in one geographical area.

"Water Act," as used in this clause, means Clean Water Act (33 U.S.C. 1251 et seq.).

(b) The Contractor agrees--

(1) To comply with all the requirements of section 114 of the Clean Air Act (42 U.S.C. 7414) and section 308 of the Clean Water Act (33 U.S.C. 1318) relating to inspection, monitoring, entry, reports, and information, as well as other

requirements specified in section 114 and section 308 of the Air Act and the Water Act, and all regulations and guidelines issued to implement those acts before the award of this contract;

(2) That no portion of the work required by this prime contract will be performed in a facility listed on the Environmental Protection Agency List of Violating Facilities on the date when this contract was awarded unless and until the EPA eliminates the name of the facility from the listing;

(3) To use best efforts to comply with clean air standards and clean water standards at the facility in which the contract is being performed; and

(4) To insert the substance of this clause into any nonexempt subcontract, including this subparagraph (b)(4).

44. ~~DELETED~~ FAR 52.223-3 HAZARDOUS MATERIAL IDENTIFICATION AND MATERIAL SAFETY DATA (DEC 1969)

(a) The Contractor agrees to submit a Material Safety Data Sheet (Department of Labor Form OSHA-20), as prescribed in Federal Standard No. 313B, for all hazardous materials 5 days before delivery of the material, whether or not listed in Appendix A of the Standard. This obligation applies to all materials delivered under this contract which will involve exposure to hazardous materials or items containing these materials.

(b) "Hazardous material," as used in this clause, is as defined in Federal Standard No. 313B, in effect on the date of this contract.

(c) Neither the requirements of this clause nor any act or failure to act by Government shall relieve the Contractor of any responsibility or liability for the safety of Government, Contractor, or subcontractor personnel or property.

(d) Nothing contained in this clause shall relieve the Contractor from complying with applicable Federal, state and local laws, codes, ordinances, and regulations (including the obtaining of licenses and permits) in connection with hazardous material.

(e) The Government's rights in data furnished under this contract with respect to hazardous material are as follows:

(1) To use, duplicate, and disclose any data to which this clause is applicable. The purposes of this right are to (i) apprise personnel of the hazards to which they may be exposed in using, handling, packaging, transporting, or disposing of

hazardous materials; (ii) obtain medical treatment for those affected by the material; and (iii) have others use, duplicate, and disclose the data for the Government for these purposes.

(2) To use, duplicate, and disclose data furnished under this clause, in accordance with subparagraph (e)(1) above, in precedence over any other clause of this contract providing for rights in data.

(3) That the Government is not precluded from using similar or identical data acquired from other sources.

(4) That the data shall not be duplicated, disclosed, or released outside the Government, in whole or in part for any acquisition or manufacturing purpose, if the following legend is marked on each piece of data to which this clause applies--

"This is furnished under United States Government Contract No. .... and shall not be used, duplicated, or disclosed for any acquisition or manufacturing purpose without the permission of..... This legend shall be marked on any reproduction of this data."

(5) That the Contractor shall not place the legend or any other restrictive legend on any data which (i) the Contractor or any subcontractor previously delivered to the Government without limitations or (ii) should be delivered without limitations under the conditions specified in the Federal Acquisition Regulation in the clause at 52.227-14, Rights in Data.

(f) The Contractor shall insert this clause, including this paragraph (f), with appropriate changes in the designation of the parties, in subcontracts at any tier (including purchase designations or purchase orders) under this contract involving hazardous material.

45. FAR 52.223-6 DRUG-FREE WORKPLACE (JUL 1990)

(a) Definitions. As used in this clause,

"Controlled substance" means a controlled substance in schedules I through V of section 202 of the Controlled Substances Act (21 U.S.C. 812) and as further defined in regulation at 21 CFR 1308.11 - 1308.15.

"Conviction" means a finding of guilt (including a plea of nolo contendere) or imposition of sentence, or both, by any judicial body charged with the responsibility to determine violations of the Federal or State criminal drug statutes.

"Criminal drug statute" means the Federal or non-Federal criminal statute involving the manufacture, distribution, dispensing, possession or use of any controlled substance.

"Drug-free workplace" means a site(s) for the performance of work done by the Contractor in connection with a specific contract at which employees of the contractor are prohibited from engaging in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance.

"Employee" means an employee of a Contractor directly engaged in the performance of work under a Government contract.

"Directly engaged" is defined to include all direct cost employees and any other Contractor employee who has other than a minimal impact or involvement in contract performance.

"Individual" means an offeror/contractor that has no more than one employee including the offeror/contractor.

(b) The Contractor, if other than an individual, shall--within 30 calendar days after award (unless a longer period is agreed to in writing for contracts of 30 calendar days or more performance duration); or as soon as possible for contracts of less than 30 calendar days performance duration--

(1) Publish a statement notifying its employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition;

(2) Establish an ongoing drug-free awareness program to inform such employees about--

(i) The dangers of drug abuse in the workplace;

(ii) The contractor's policy of maintaining a drug-free workplace;

(iii) Any available drug counseling, rehabilitation, and employee assistance programs; and

(iv) The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace.

(3) Provide all employees engaged in performance of the contract with a copy of the statement required by subparagraph (b)(1) of this clause;

(4) Notify such employees in writing in the statement required by subparagraph (b)(1) of this clause that, as a condition of continued employment of this contract, the employee will--

(i) Abide by the terms of the statement; and

(ii) Notify the employer in writing of the employee's conviction under a criminal drug statute for a violation occurring in the workplace no later than five (5) calendar days after such conviction.

(5) Notify the Contracting Officer in writing within 10 calendar days after receiving notice under subdivision (b)(4)(ii) of this clause, from an employee or otherwise receiving actual notice of such conviction. The notice shall include the position title of the employee;

(6) Within 30 calendar days after receiving notice under subdivision (b)(4)(ii) of this clause of a conviction, take one of the following actions with respect to any employee who is convicted of drug abuse violations occurring in the workplace:

(i) Taking appropriate personnel action against such employee, up to and including termination; or

(ii) Require such employee to satisfactorily participate in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency.

(7) Make a good faith effort to maintain a drug-free workplace through implementation of subparagraphs (b)(1) through (b)(6) of this clause.

(c) The Contractor, if an individual, agrees by award of the contract or acceptance of a purchase order, not to engage in the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance in the performance of this contract.

(d) In addition to other remedies available to the Government, the Contractor's failure to comply with the requirements of paragraphs (b) or (c) of this clause may, pursuant to FAR 23.506, render the contractor subject to suspension of contract payments, termination of the contract for default, and suspension or debarment.

**46. DEAR 952.223-75 PRESERVATION OF INDIVIDUAL OCCUPATIONAL RADIATION EXPOSURE RECORDS (APR 1984)**

Individual occupational radiation exposure records generated in the performance of work under this contract shall be subject to inspection by DOE and shall be preserved by the Contractor until disposal is authorized by DOE or at the option of the Contractor delivered to DOE upon completion or termination of the contract. If the Contractor exercises the foregoing option, title to such records shall vest in DOE upon delivery.

**47. FAR 52.224-1 PRIVACY ACT NOTIFICATION (APR 1984)**

The Contractor will be required to design, develop, or operate a system of records on individuals, to accomplish an agency function subject to the Privacy Act of 1974, Public Law 93-579, December 31, 1974 (5 U.S.C. 552a) and applicable agency regulations. Violation of the Act may involve the imposition of criminal penalties.

**48. FAR 52.224-2 PRIVACY ACT (APR 1984)**

**(a) The Contractor agrees to-**

(1) Comply with the Privacy Act of 1974 (the Act) and the agency rules and regulations issued under the Act in the design, development, or operation of any system of records on individuals to accomplish an agency function when the contract specifically identifies-

(i) The systems of records; and

(ii) The design, development, or operation work that the Contractor is to perform;

(2) Include the Privacy Act notification contained in this contract in every solicitation and resulting subcontract and in every subcontract awarded without a solicitation, when the work statement in the proposed subcontract requires the design, development, or operation of a system of records on individuals that is subject to the Act; and

(3) Include this clause, including this subparagraph (3), in all subcontracts awarded under this contract which requires the design, development, or operation of such a system of records.

(b) In the event of violations of the Act, a civil action may be brought against the agency involved when the violation concerns the design, development, or operation of a system of records on individuals to accomplish an agency function, and



criminal penalties may be imposed upon the officers or employees of the agency when the violation concerns the operation of a system of records on individuals to accomplish an agency function. For purposes of the Act, when the contract is for the operation of a system of records on individuals to accomplish an agency function, the Contractor and any employee of the Contractor is considered to be an employee of the agency.

(c) (1) "Operation of a system of records," as used in this clause, means performance of any of the activities associated with maintaining the system of records, including the collection, use, and dissemination of records.

(2) "Record," as used in this clause, means any item, collection, or grouping of information about an individual that is maintained by an agency, including, but not limited to, education, financial transactions, medical history, and criminal or employment history and that contains the person's name, or the identifying number, symbol, or other identifying particular assigned to the individual, such as a fingerprint or voiceprint or a photograph.

(3) "System of records on individuals," as used in this clause means a group of any records under the control of any agency from which information is retrieved by the name of the individual or by some identifying number, symbol, or other identifying particular assigned to the individual.

49. DEAR 952.224-70 PAPERWORK REDUCTION ACT (APR 1984)

(a) In the event that it subsequently becomes a contractual requirement to collect or record information calling either for answer to identical questions from 10 or more persons other than Federal employees, or information from Federal employees which is to be used for statistical compilations of general public interest, the Federal Reports Act will apply to this contract. No plan, questionnaire, interview guide, or other similar device for collecting information (whether repetitive or single-time) may be used without first obtaining clearance from the Office of Management and Budget (OMB).

(b) The contractor shall request the required OMB clearance from the contracting officer before expending any funds or making public contacts for the collection of data. The authority to expend funds and to proceed with the collection of data shall be in writing by the Contracting Officer. The Contractor must plan at least 90 days for OMB clearance. Excessive delay caused by the Government which arises out of

causes beyond the control and without the fault or negligence of the contractor will be considered in accordance with the clause entitled "Excusable Delays," if such clause is applicable. If not, the period of performance may be extended pursuant to this clause if approved by the Contracting Officer.

**50. FAR 52.225-3 BUY AMERICAN ACT--SUPPLIES (JAN 1989)**

(a) The Buy American Act (41 U.S.C. 10) provides that the Government give preference to domestic end products.

"Components," as used in this clause, means those articles, materials, and supplies incorporated directly into the end products.

"Domestic end product," as used in this clause, means (1) an unmanufactured end product mined or produced in the United States, or (2) an end product manufactured in the United States, if the cost of its components mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. Components of foreign origin of the same class or kind as the products referred to in subparagraphs (b)(2) or (3) of this clause shall be treated as domestic. Scrap generated, collected, and prepared for processing in the United States is considered domestic. On acquisitions above \$25,000 in value, components of Canadian origin are treated as domestic.

"End products," as used in this clause, means those articles, materials, and supplies to be acquired for public use under this contract.

(b) The Contractor shall deliver only domestic end products, except those--

(1) For use outside the United States;

(2) That the Government determines are not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality;

(3) For which the agency determines that domestic preference would be inconsistent with the public interest: or;

(4) For which the agency determines the cost to be unreasonable (see section 25.105 of the Federal Acquisition Regulation).

(The foregoing requirements are administered in accordance with Executive Order No. 10582, dated December 17, 1954, as amended, and Subpart 25.1 of the Federal Acquisition Regulation.)

51. FAR 52.225-13 RESTRICTIONS ON CONTRACTING WITH SANCTIONED PERSONS (MAY 1988) ~~SECRET~~

(a) Definitions.

(1) "Component part," means any article which is not usable for its intended functions without being imbedded or integrated into any other product and which, if used in production of a finished product, would be substantially transformed in that process.

(2) "Finished product," means any article which is usable for its intended function without being imbedded in, or integrated into, any other product. It does not include an article produced by a person, other than a sanctioned person, that contains parts or components of the sanctioned person if the parts or components have been substantially transformed during production of the finished product.

(3) "Sanctioned person," means a company or other foreign person upon whom prohibitions have been imposed.

(4) "Substantially transformed," when referring to a component part or finished product, means that the part or product has been subjected to a substantial manufacturing or processing operation by which the part or product is converted or combined into a new and different article of commerce having a new name, character, and use.

(b) General. Section 2443 of the Multilateral Export Control Enhancement Amendments Act (Pub L. 100-418) and Executive Order 12661, effective December 28, 1988, impose, for a period of 3 years, with certain exceptions, a prohibition on contracting with, or procuring (including rental and lease/purchase) directly or indirectly the products or services of (1) Toshiba Machine Company, (2) Kongsberg Trading Company, (3) Toshiba Corporation, or (4) Kongsberg Vaapenfabrikk. The Act and Executive Order also prohibit, for the same 3-year period, the importation into the United States of all products produced by Toshiba Machine Company and Kongsberg Trading Company. These prohibitions also apply to subsidiaries, successor entities or joint ventures of Toshiba Machine Company or Kongsberg Trading Company.

(c) Restriction. Unless listed by the Contractor in its offer, in the solicitation provision at FAR 52.225-12 Notice of Restrictions on Contracting with Sanctioned Persons, or unless one of the exceptions in paragraph (d) of this clause applies, the Contractor agrees that no products or services delivered to the Government under this contract will be products or services of a sanctioned person.

(d) Exceptions. The restrictions Do Not apply--

(1) To finished products of nonsanctioned persons containing components of a sanctioned person if these components have been substantially transformed during the manufacture of the finished product.

(2) To products or services of a sanctioned person provided-

(i) The products are designed to the specifications of a nonsanctioned person marketed under the trademark, brand or name of the nonsanctioned person;

(ii) The business relationship between the nonsanctioned person and the sanctioned person clearly existed prior to June 30, 1987; and

(iii) The nonsanctioned person is not directly or indirectly owned by a sanctioned person.

(3) If a determination has been made in accordance with FAR 25.1003 (a) or (b).

(e) Award. Award of any contract resulting from this solicitation will not affect the Contractor's obligation to comply with importation regulations of the Secretary of the Treasury.

## 52. FAR 52.227-1 AUTHORIZATION AND CONSENT (APR 1984)

(a) The Government authorizes and consents to all use and manufacture, in performing this contract or any subcontract at any tier, of any invention described in and covered by United States patent (1) embodied in the structure or composition of any article the delivery of which is accepted by the Government under this contract or (2) used in machinery, tools, or methods whose use necessary results from compliance by the Contractor or a subcontractor with (i) specifications or written provisions forming a part of this contract or (ii) specific written instructions given by the Contracting Officer directing the manner of performance. The entire liability to the Government for infringement of a patent of the United States shall be determined solely by the provisions of the indemnity clause, if any, included in this contract or any subcontract hereunder (including any lower-tier subcontract), and the Government assumes liability for all other infringements to the extent of the authorization and consent hereinabove granted.

(b) The Contractor agrees to include, and require inclusion of, this clause, suitably modified to identify the parties, in all subcontracts at any tier for supplies or services (including construction, architect-engineer services, and materials, supplies, models, samples, and design or testing services expected to exceed \$25,000; however, omission of this clause from any subcontract, under or over \$25,000, does not affect this authorization and consent.

**53. FAR 52.227-2 NOTICE AND ASSISTANCE REGARDING PATENT AND COPYRIGHT INFRINGEMENT (APR 1984)**

(a) The Contractor shall report to the Contracting Officer, promptly and in reasonable written detail, each notice of claim of patent or copyright infringement based on the performance of this contract of which the Contractor has knowledge.

(b) In the event of any claim or suit against the Government on account of any alleged patent or copyright infringement arising out of the performance of this contract or out of the use of any supplies furnished or work or services performed under this contract, the Contractor shall furnish to the Government, when requested by the Contracting Officer, all evidence and information in possession of the Contractor pertaining to such suit or claim. Such evidence and information shall be furnished at the expense of the Government except where the Contractor has agreed to indemnify the Government.

(c) The Contractor agrees to include, and require inclusion of, this clause in all subcontracts at any tier for supplies or services (including construction and architect-engineer subcontracts and those for material, supplies, models, samples, or design or testing services) expected to exceed the dollar amount set forth in 13.000 of the Federal Acquisition Regulation (FAR).

**54. FAR 52.228-7 INSURANCE-LIABILITY TO THIRD PERSONS (APR 1984)**

(a) (1) Except as provided in subparagraph (2) immediately following, or in paragraph (h) of this clause (if the clause has a paragraph (h)), the Contractor shall provide and maintain workers' compensation, employer's liability, comprehensive general liability (bodily injury), comprehensive automobile liability (bodily injury and property damage) insurance, and such other insurance as the Contracting Officer may require under this contract.

(2) The Contractor may, with the approval of the Contracting Officer, maintain a self-insurance program; provided that, with respect to workers' compensation, the Contractor is qualified pursuant to statutory authority.

(3) All insurance required by this paragraph shall be in a form and amount and for those periods as the Contracting Officer may require or approve and with insurers approved by the Contracting Officer.

(b) The Contractor agrees to submit for the Contracting Officer's approval, to the extent and in the manner required by the Contracting Officer, any other insurance that is maintained by the Contractor in connection with the performance of this contract and for which the Contractor seeks reimbursement.

(c) Except as provided in paragraph (h) of this clause (if the clause has a paragraph (h)), the Contractor shall be reimbursed--

(1) For that portion (i) of the reasonable cost of insurance allocable to this contract and (ii) required or approved under this clause; and

(2) For certain liabilities (and expenses incidental to such liabilities) to third persons not compensated by insurance or otherwise without regard to and as an exception to the limitation of cost or the limitation of funds clause of this contract. These liabilities must arise out of the performance of this contract, whether or not caused by the negligence of the Contractor or of the Contractor's agents, servants, or employees, and must be represented by final judgments or settlements approved in writing by the Government. These liabilities are for--

(i) Loss of or damage to property (other than property owned, occupied, or used by the Contractor, rented to the Contractor, or in the care, custody, or control of the Contractor); or

(ii) Death or bodily injury.

(d) The Government's liability under paragraph (c) of this clause is subject to the availability of appropriated funds at the time a contingency occurs. Nothing in this contract shall be construed as implying that the Congress will, at a later date, appropriate funds sufficient to meet deficiencies.

(e) The Contractor shall not be reimbursed for liabilities (and expenses incidental to such liabilities)--

(1) For which the Contractor is otherwise responsible under the express terms of any clause specified in the Schedule or elsewhere in the contract;

(2) For which the Contractor has failed to insure or to maintain insurance as required by the Contracting Officer; or

(3) That result from willful misconduct or lack of good faith on the part of any of the Contractor's directors, officers, managers, superintendents, or other representatives who have supervision or direction of--

(i) All or substantially all of the Contractor's business;

(ii) All or substantially all of the Contractor's operations at any one plant or separate location in which this contract is being performed; or

(iii) A separate and complete major industrial operation in connection with the performance of this contract.

(f) The provisions of paragraph (e) of this clause shall not restrict the right of the Contractor to be reimbursed for the cost of insurance maintained by the Contractor in connection with the performance of this contract, other than insurance required in accordance with this clause; provided, that such cost is allowable under the Allowable Cost and Payment clause of this contract.

(g) If any suit or action is filed or any claim is made against the Contractor, the cost and expense of which may be reimbursable to the Contractor under this contract, and the risk of which is then uninsured or is insured for less than the amount claimed, the Contractor shall--

(1) Immediately notify the Contracting Officer and promptly furnish copies of all pertinent papers received;

(2) Authorize Government representatives to collaborate with counsel for the insurance carrier in settling or defending the claim when the amount of the liability claimed exceeds the amount of coverage; and

(3) Authorize Government representatives to settle or defend the claim and to represent the Contractor in or to take charge of any litigation, if required by the Government, when the liability is not insured or covered by bond. The Contractor may, at its own expense, be associated with the Government representatives in any such claim or litigation.

**55. FAR 52.229-10 STATE OF NEW MEXICO GROSS RECEIPTS AND COMPENSATING TAX (OCT 1988)**

(a) Within thirty (30) days after award of this contract, the Contractor shall advise the State of New Mexico of this contract by registering with the State of New Mexico, Taxation and Revenue Department, Revenue Division, pursuant to the Tax Administration Act of the State of New Mexico and shall identify the contract number.

(b) The Contractor shall pay the New Mexico gross receipts taxes, pursuant to the Gross Receipts and Compensating Tax Act of New Mexico, assessed against the contract fee and costs paid for performance of this contract, or of any part or portion thereof, within the State of New Mexico. The allowability of any gross receipts taxes or local option taxes lawfully paid to the State of New Mexico by the Contractor or its subcontractors will be determined in accordance with the Allowable Cost and Payment clause of this contract except as provided in paragraph (d) of this clause.

(c) The Contractor shall submit applications for Nontaxable Transaction Certificates, Form CSR-3C, to the State of New Mexico Taxation and Revenue Department, Revenue Division, P.O. Box 630, Santa Fe, New Mexico 87509. When the Type 15 Nontaxable Transaction Certificate is issued by the Revenue Division, the Contractor shall use these certificates strictly in accordance with this contract, and the agreement between the U. S. Department of Energy and the New Mexico Taxation and Revenue Department.

(d) The Contractor shall provide Type 15 Nontaxable Transaction Certificates to each vendor in New Mexico selling tangible personal property to the contractor for use in the performance of this contract. Failure to provide a Type 15 Nontaxable Transaction Certificate to vendors will result in the vendor's liability for the gross receipt taxes and those taxes, which are then passed on to the Contractor, shall not be reimbursable as an allowable cost by the Government.

(e) The Contractor shall pay the New Mexico compensating user tax for any tangible personal property which is purchased pursuant to a Nontaxable Transaction Certificate if such property is not used for Federal purposes.



(f) Out-of-state purchase of tangible personal property by the Contractor which would be otherwise subject to compensation tax shall be governed by the principles of this clause. Accordingly, compensating tax shall be due from the contractor only if such property is not used for Federal purposes.

(g) The U. S. Department of Energy may receive information regarding the Contractor from the Revenue Division of the New Mexico Taxation and Revenue Department and, at the discretion of the U. S. Department of Energy, may participate in any matters or proceedings pertaining to this clause or the above-mentioned Agreement. This shall not preclude the Contractor from having its own representative nor does it obligate the U. S. Department of Energy to represent its Contractor.

(h) The Contractor agrees to insert the substance of this clause, including this paragraph (h), in each subcontract which meets the criteria in 29.401-6(b)(1) through (3) of the Federal Acquisition Regulation, 48 CFR Part 29.

(i) Paragraphs (a) through (h) of this clause shall be null and void should the Agreement referred to in paragraph (c) of this clause be terminated; provided, however, that such termination shall not nullify obligations already incurred prior to the date of the termination.

56. FAR 52.230-3 ~~COST ACCOUNTING~~ STANDARDS (SEP 1987)

(a) Unless the contract is exempt under FAR 30.201-1 and 30.201-2, the provisions of Federal Acquisition Regulation (FAR) Subpart 30.3 are incorporated herein by reference and the Contractor, in connection with this contract, shall--

(1) (National Defense Contracts Only) By submission of a Disclosure Statement, disclose in writing the Contractor's cost accounting practices as required by FAR 30.202-1 through 30.202-5. The practices disclosed for this contract shall be the same as the practices currently disclosed and applied on all other contracts and subcontracts being performed by the Contractor and which contain a Cost Accounting Standards (CAS) clause. If the Contractor has notified the Contracting Officer that the Disclosure Statement contains trade secrets and commercial or financial information which is privileged and confidential, the Disclosure Statement shall be protected and shall not be released outside of the Government.

(2) Follow consistently the Contractor's cost accounting practices in accumulating and reporting contract performance cost data concerning this contract. If any change in cost accounting practices is made for the purposes of any contract or subcontract subject to CAS requirements, the change must be applied prospectively to this contract and the Disclosure Statement must be amended accordingly. If the contract price or cost allowance of this contract is affected by such changes, adjustment shall be made in accordance with subparagraph (a)(4) or (a)(5) of this clause, as appropriate.

(3) Comply with all CAS, including any modifications and interpretations indicated thereto contained in FAR Subpart 30.4, in effect on the date of award of this contract or, if the Contractor has submitted cost or pricing data, on the date of final agreement on price as shown on the Contractor's signed certificate of current cost or pricing data. The Contractor shall also comply with any CAS (or modifications to CAS) which hereafter become applicable to a contract or subcontract of the Contractor. Such compliance shall be required prospectively from the date of applicability to such contract or subcontract.

(4) (i) Agree to an equitable adjustment as provided in the Changes clause of this contract if the contract cost is affected by a change which, pursuant to subparagraph (a)(3) of this clause, the Contractor is required to make to the Contractor's established cost accounting practices.

(ii) Negotiate with the Contracting Officer to determine the terms and conditions under which a change may be made to a cost accounting practice, other than a change made under other provisions of subparagraph (a)(4) of this clause; provided that no agreement may be made under this provision that will increase costs paid by the United States.

(iii) When the parties agree to a change to a cost accounting practice, other than a change under subdivision (a)(4)(i) of this clause, negotiate an equitable adjustment as provided in the Changes clause of this contract.

(5) Agree to an adjustment of the contract price or cost allowance, as appropriate, if the Contractor or a subcontractor fails to comply with an applicable Cost Accounting Standard, or to follow any cost accounting practice consistently and such failure results in any increased costs paid by the United States. Such adjustment shall provide for recovery of the increased costs to the United States, together with interest thereon computed at the rate determined by the Secretary of the Treasury pursuant to Pub. L. 92-41, 85 Stat. 97, from the time the payment by the United States was made to the time the adjustment is effected.

(b) If the parties fail to agree whether the Contractor or a subcontractor has complied with an applicable CAS in FAR Subpart 30.4 or a CAS rule or regulation in FAR Subpart 30.3 and as to any cost adjustment demanded by the United States, such failure to agree shall be a dispute concerning a question of fact within the meaning of the Disputes clause of this contract.

(c) The Contractor shall permit any authorized representatives of the Government to examine and make copies of any documents, papers, or records relating to compliance with the requirements of this clause.

(d) The Contractor shall include in all negotiated subcontracts which the Contractor enters into, the substance of this clause, except paragraph (b), and shall require such inclusion in all other subcontracts, of any tier, including the obligation to comply with all CAS in effect on the subcontract's award data, on the date of final agreement on price as shown on the subcontractor's signed Certificate of Current Cost or Pricing Data. This requirement shall apply only to negotiated subcontracts in excess of \$100,000 where the price negotiated is not based on--

(1) Established catalog or market prices of commercial items sold in substantial quantities to the general public; or

(2) Prices set by law or regulation, and except that the requirement shall not apply to negotiated subcontracts otherwise exempt from the requirement to include a CAS clause as specified in FAR 30.201-1.

Note (1): New or modified CAS shall be applicable to both national defense and nondefense CAS-covered contracts upon award of a new national defense CAS-covered contract containing the new or modified Standard. The award of a new nondefense CAS-covered contract shall not trigger application of new CAS or modification to CAS.

Note (2): Subcontractors shall be required to submit their Disclosure Statements to the Contractor. However, if a subcontractor has previously submitted its Disclosure Statement to a Government Administrative Contracting Officer (ACO), it may satisfy that requirement by certifying to the Contractor the date of the Statement and the address of the ACO.

Note (3): In any case where a subcontractor determines that the Disclosure Statement information is privileged and confidential and declines to provide it to the Contractor or higher tier subcontractor, the Contractor may authorize direct submission of that subcontractor's Disclosure Statement to the same Government offices to which the Contractor was required to make submission of its Disclosure Statement. Such authorization shall in no way relieve the Contractor of liability as provided in subparagraph (a)(5) of this clause. In view of the foregoing and since the contract may be subject to adjustment under this clause by reason of any failure to comply with rules, regulations, and Standards as specified in FAR Subparts 30.3 and 30.4 in connection with covered subcontracts, it is expected that the Contractor may wish to include a clause in each such subcontract requiring the subcontractor to appropriately indemnify the Contractor. However, the inclusion of such a clause and the terms thereof are matters for negotiation and agreement between the Contractor and the subcontractor, provided that they do not conflict with the Government. It is also expected that any subcontractor subject to such indemnification will generally require substantially similar indemnification to be submitted by its subcontractors.

Note (4): If the subcontractor is a business unit which, pursuant to FAR 30.201-2(b) is entitled to elect modified contract coverage and to follow 30.401 and 30.402, the clause at 52.230-5, "Disclosure Consistency of Cost Accounting Practices," of the Federal Acquisition Regulation shall be inserted in lieu of this clause.

Note (5): The terms defined in FAR 30.301 and 31.001 shall have the same meanings herein. As there defined, "negotiated subcontract" means any subcontract except a firm-fixed-price subcontract made by a Contractor or subcontractor after receiving offers from at least two persons not associated with each other or with such Contractor or subcontractor, providing (1) the solicitation to all competitors is identical, (2) price is the only consideration in selecting the subcontractor from among the competitors solicited, and (3) the lowest offer received in compliance with the solicitation from among those solicited is accepted.

57. FAR 52.230-4 ADMINISTRATION OF COST ACCOUNTING STANDARDS  
(SEP 1987)

For the purpose of administering the Cost Accounting Standards (CAS) requirements under this contract, the Contractor shall take the steps outlined in paragraphs (a) through (f) of this clause:

(a) Submit to the cognizant Contracting Officer a description of any accounting change, the potential impact of the change on contracts containing a CAS clause, and if not obviously immaterial, a general dollar magnitude cost impact analysis of the change which displays the potential shift of costs between CAS-covered contracts by contract type (i.e., firm-fixed-price, incentive, cost-plus-fixed-fee, etc.) and other contractor business activity. As related to CAS-covered contracts, the analysis should display the potential impact of funds of the various Agencies/Departments (i.e., Department of Energy, National Aeronautics and Space Administration, Army, Navy, Air Force, other Department of Defense, other Government) as follows:

(1) For any change in cost accounting practices required to comply with a new CAS in accordance with subparagraph (a)(3) and subdivision (a)(4)(i) of the CAS clause, within 60 days (or such other date as may be mutually agreed to) after award of a contract requiring this change.

(2) For any change in cost accounting practices proposed in accordance with subdivision (a)(4)(ii) or (a)(4)(iii) of the CAS clause or with subparagraph (a)(3) of the Disclosure and Consistency of Cost Accounting Practices clause, not less than 60 days (or such other date as may be mutually agreed to) before the effective date of the proposed change.

(3) For any failure to comply with an applicable CAS or to follow a disclosed practice as contemplated by subparagraph (a)(5) of the CAS clause or by subparagraph (a)(4) of the Disclosure and Consistency of Cost Accounting Practices clause, within 60 days (or such other date as may be mutually agreed to) after the date of agreement of noncompliance by the Contractor.

(b) Submit a cost impact proposal in the form and manner specified by the cognizant Contracting Officer within 60 days (or such other date as may be mutually agreed to) after the date of determination of the adequacy and compliance of a change submitted pursuant to paragraph (a) of this clause. If the cost impact proposal is not submitted within the specified time, or any extension granted by the cognizant Contracting Officer, an amount not to exceed 10 percent of each payment made after that date may be withheld until such time as a proposal has been provided in the form and manner specified by the cognizant Contracting Officer.

(c) Agree to appropriate contract and subcontract amendments to reflect adjustments established in accordance with subparagraphs (a)(4) and (a)(5) of the CAS clause or with subparagraphs (a)(3) or (a)(4) of the CAS Disclosure and Consistency of Cost Accounting Practices clause.

(d) For all subcontracts subject either to the CAS clause or to the Disclosure and Consistency of Cost Accounting Practices clause--

(1) So state in the body of the subcontract, in the letter of award, or in both (self-deleting clauses shall not be used); and

(2) Include the substance of this clause in all negotiated subcontracts.

In addition, within 30 days after award of the subcontract, submit the following information to the Contractor's cognizant contract administration officer for transmittal to the contract administration office cognizant of the subcontractor's facility:

(i) Subcontractor's name and subcontract number.  
(ii) Dollar amount and date of award.  
(iii) Name of Contractor making the award.  
(iv) Any changes the subcontractor has made or proposes to make to accounting practices that affect prime contract or subcontracts containing the CAS clause or Disclosure and Consistency of Cost Accounting Practices clause, unless these changes have already been reported. If award of the subcontract results in making one or more CAS effective for the first time, this fact shall also be reported.

(e) Notify the Contracting Officer in writing of any adjustments required to subcontracts under this contract and agree to an adjustment, based on them, to this contractor's price or estimated cost and fee. This notice is due within 30 days after proposed subcontract adjustments are received and shall include a proposal for adjusting the higher tier subcontract or the prime contract appropriately.

(f) For subcontracts containing the CAS clause, require the subcontractor to comply with all Standards in effect on the date of award or of final agreement on price, as shown on the subcontractor's signed Certificate of Current Cost or Pricing Data, whichever is earlier.

**58. FAR 52.232-9 LIMITATION ON WITHHOLDING OF PAYMENTS  
(APR 1984)**

If more than one clause or Schedule term of this contract authorizes the temporary withholding of amounts otherwise payable to the Contractor for supplies delivered or services performed, the total of the amounts withheld at any one time shall not exceed the greatest amount that may be withheld under any one clause or Schedule term at that time; provided that this limitation shall not apply to-

- (a) Withholdings pursuant to any clause relating to wages or hours of employees;
- (b) Withholdings not specifically provided for by this contract;
- (c) The recovery of overpayments; and
- (d) Any other withholding for which the Contracting Officer determines that this limitation is inappropriate.

**59. FAR 52.232-22 LIMITATION OF FUNDS (APR 1984)**

(a) The parties estimate that performance of this contract will not cost the Government more than (1) the estimated cost specified in the Schedule or, (2) if this is a cost-sharing contract, the Government's state of the estimated cost specified in the Schedule. The Contractor agrees to use its best efforts to perform the work specified in the Schedule and all obligations under this contract within the estimated cost, which, if this is a cost-sharing contract, includes both the Government's and the Contractor's share of the cost.

(b) The Schedule specifies the amount presently available for payment by the Government and allotted to this contract, the items covered, the Government's share of the cost if this is a cost-sharing contract, and the period of performance it is estimated the allotted amount will cover. The parties contemplate that the Government will allot additional funds incrementally to the contract up to the full estimated cost to the Government specified in the Schedule, exclusive of any fee. The Contractor agrees to perform, or have performed, work on the contract up to the point at which the total amount paid and payable by the Government under the contract approximates but does not exceed the total amount actually allotted by the Government to the contract.

(c) The Contractor shall notify the Contracting Officer in writing whenever it has reason to believe that the costs it expects to incur under this contract in the next 60 days, when added to all costs previously incurred, will exceed 75 percent of (1) the total amount so far allotted to the contract by the Government or, (2) if this is a cost-sharing contract, the amount then allotted to the contract by the Government plus the Contractor's corresponding share. The notice shall state the estimated amount of additional funds required to continue performance of the period specified in the Schedule.

(d) Sixty days before the end of the period specified in the Schedule, the Contractor shall notify the Contracting Officer in writing of the estimated amount of additional funds, if any, required to continue timely performance under the contract or for any further period specified in the Schedule or otherwise agreed upon, and when the funds will be required.

(e) If, after notification, additional funds are not allotted by the end of the period specified in the Schedule or another agree-upon date, upon the Contractor's written request the Contracting Officer will terminate this contract on that date in accordance with the provisions of the Termination clause of this contract. If the Contractor estimates that the funds available will allow it to continue to discharge its obligations beyond that date, it may specify a later date in its request, and the Contracting Officer may terminate this contract on that later date.

(f) Except as required by other provisions of this contract, specifically citing and stated to be an exception to this clause--

(1) The Government is not obligated to reimburse the Contractor for costs incurred in excess of the total amount allotted by; the Government to this contract; and

(2) The Contractor is not obligated to continue performance under this contract (including actions under the Termination clause of this contract) or otherwise incur costs in excess of (i) the amount then allotted to the contract by the Government or, (ii) if this is a cost-sharing contract, the amount then allotted by the Government to the contract plus the Contractor's corresponding share, until the Contracting Officer notifies the Contractor in writing that the amount allotted by the Government has been increased and specifies an increased amount, which shall then constitute the total amount allotted by the Government to this contract.



(g) The estimated cost shall be increased to the extent that (1) the amount allotted by the Government or, (2) if this is a cost-sharing contract, the amount then allotted by the Government to the contract plus the Contractor's corresponding share, exceeds the estimated cost specified in the Schedule. If this is a cost-sharing contract, the increase shall be allocated in accordance with the formula specified in the Schedule.

(h) No notice, communication, or representation in any form other than that specified in subparagraph (f)(2) above, or from any person other than the Contracting Officer, shall affect the amount allotted by the Government to this contract. In the absence of the specified notice, the Government is not obligated to reimburse the Contractor for any costs in excess of the total amount allotted by the Government to this contract, whether incurred during the course of the contract or as a result of termination.

(i) When and to the extent that the amount allotted by the Government to the contract is increased, any costs the Contractor incurs before the increase that are in excess of (1) the amount previously allotted by the Government or, (2) if this is a cost-sharing contract, the amount previously allotted by the Government to the contract plus the Contractor's corresponding share, shall be allowable to the same extent as if incurred afterward, unless the Contracting Officer issues a termination or other notice and directs that the increase is solely to cover termination or other specified expenses.

(j) Change orders shall not be considered an authorization to exceed the amount allotted by the Government specified in the Schedule, unless they contain a statement increasing the amount allotted.

(k) Nothing in this clause shall affect the right of the Government to terminate this contract. If this contract is terminated, the Government and the Contractor shall negotiate an equitable distribution of all property produced or purchased under the contract, based upon the share of costs incurred by each.

(1) If the Government does not allot sufficient funds to allow completion of the work, the Contractor is entitled to a percentage of the fee specified in the Schedule equaling the percentage of the completion of the work contemplated by this contract.

**60. FAR 52.232-23 ASSIGNMENT OF CLAIMS (JAN 1986)**

(a) The Contractor, under the Assignment of Claims Act, as amended, 31 U.S.C. 3727, 41 U.S.C. 15 (hereafter referred to as "the Act"), may assign its rights to be paid amounts due or to become due as a result of the performance of this contract to a bank, trust company, or other financing institution, including any Federal lending agency. The assignee under such an assignment may thereafter further assign or reassign its right under the original assignment to any type of financing institution described in the preceding sentence.

(b) Any assignment or reassignment authorized under the Act and this clause shall cover all unpaid amounts payable under this contract, and shall not be made to more than one party, except that an assignment or reassignment may be made to one party as agent or trustee for two or more parties participating in the financing of this contract.

(c) The Contractor shall not furnish or disclose to any assignee under this contract any classified document (including this contract) or information related to work under this contract until the Contracting Officer authorizes such action in writing.

**61. FAR 52.232-25 PROMPT PAYMENT (AUG 1989)**

Notwithstanding any other payment clause in this contract, the Government will make invoice payments and contract financing payments under the terms and conditions specified in this clause. Payment shall be considered as being made on the day a check is dated or an electronic funds transfer is made. Definitions of pertinent terms are set forth in 32.902. All days referred to in this clause are calendar days, unless otherwise specified. The term "foreign vendor" means an incorporated concern not incorporated in the United States, or an unincorporated concern having its principal place of business outside the United States.

**(a) Invoice Payments.**

(1) For purposes of this clause, "invoice payment" means a Government disbursement of monies to a Contractor under a contract or other authorization for supplies or services accepted by the Government. This includes payments for partial deliveries that have been accepted by the Government and final cost or fee payments where amounts owed have been settled between the Government and the Contractor.

(2) Except as indicated in subparagraph (a)(3) and paragraph (c) of this clause, the due date for making invoice payments by the designated payment office shall be the later of the following two events:

(i) The 30th day after the designated billing office has received a proper invoice from the Contractor.

(ii) The 30th day after Government acceptance of supplies delivered or services performed by the Contractor. On a final invoice where the payment amount is subject to contract settlement actions, acceptance shall be deemed to have occurred on the effective date of the contract settlement. However, if the designated billing office fails to annotate the invoice with the actual date of receipt the invoice payment due date shall be deemed to be the 30th day after the date the Contractor's invoice is dated, provided a proper invoice is received and there is no disagreement over quantity, quality, or Contractor compliance with contract requirements.

(3) The due date on contracts for meat and meat food products, contracts for perishable agricultural commodities, contracts for dairy products, edible fats or oils, and food products prepared from edible fats or oils, and contracts not requiring submission of an invoice shall be as follows:

(i) The due date for meat and meat food products, as defined in Section 2(a)(3) of the Packers and Stockyard Act of 1921 (7 U.S.C. 182(3)) and further defined in Pub. L. 98-181 to include any edible fresh or frozen poultry meat, any perishable poultry meat food product, fresh eggs, and any perishable egg product, will be as close as possible to, but not later than, the 7th day after product delivery.

(ii) The due date for perishable agricultural commodities, as defined in Section 1(4) of the Perishable Agricultural Commodities Act of 1930 (7 U.S.C. 499a(44)), will be as close as possible to, but not later than, the 10th day after product delivery, unless another date is specified in the contract.

(iii) The due date for dairy products, as defined in section 111(e) of the Dairy Production Stabilization Act of 1963 (7 U.S.C. 4502(e)), edible fats or oils, and food products prepared from edible fats or oils, will be as close as possible to, but not later than, the 10th day after the date on which a proper invoice has been received.

(iv) If the contract does not require submission of an invoice for payment (e.g. periodic lease payments), the due date will be as specified in the contract.

(4) An invoice is the Contractor's bill or written request for payment under the contract for supplies delivered or services performed. An invoice shall be prepared and submitted to the designated billing office specified in the contract. A proper invoice must include the items listed in subdivisions (a)(4)(i) through (a)(4)(viii) of this clause. If the invoice does not comply with these requirements, then the Contractor will be notified of the defect within 7 days after receipt of the invoice at the designated billing office (3 days for meat and meat food products and 5 days for perishable agricultural commodities, edible fats or oils, and food products prepared from edible fats or oils). Untimely notification will be taken into account in the computation of any interest penalty owed the Contractor in the manner described in subparagraph (a)(6) of this clause.

(i) Name and address of the Contractor.

(ii) Invoice date.

(iii) Contract number or other authorization for supplies delivered or services performed (including order number and contract line item number).

(iv) Description, quantity, unit of measure, unit price, and extended price of supplies delivered or services performed.

(v) Shipping and payment terms (e.g., shipment number and date of shipment, prompt payment discount terms). Bill of lading number and weight of shipment will be shown for shipments on Government bills of lading.

(vi) Name and address of Contractor official to whom payment is to be sent (must be the same as that in the contract or in a proper notice of assignment).

(vii) Name (where practicable), title, phone number and mailing address of person to be notified in event of a defective invoice.

(viii) Any other information or documentation required by other requirements of the contract (such as evidence of shipment).

(5) An interest penalty shall be paid automatically by the Government, without request from the contractor, if payment is not made by the due date and the conditions listed in

subdivisions (a)(5)(i) through (a)(5)(iii) of this clause are met, if applicable. An interest penalty shall not be paid on contracts awarded to foreign vendors outside the United States for work performed outside the United States.

(i) A proper invoice was received by the designated billing office.

(ii) A receiving report or other Government documentation authorizing payment was processed and there was no disagreement over quantity, quality, or contractor compliance with any contract term or condition.

(iii) In the case of a final invoice for any balance of funds due the Contractor for supplies delivered or services performed, the amount was not subject to further contract settlement actions between the Government and the Contractor.

(6) The interest penalty shall be at the rate established by the Secretary of the Treasury under Section 12 of the Contract Disputes Act of 1978 (41 U.S.C. 611) that is in effect on the day after the due date, except where the interest penalty is prescribed by other governmental authority. This rate is referred to as the "Renegotiation Board Interest Rate," and it is published in the Federal Register semiannually on or about January 1 and July 1. The interest penalty shall accrue daily on the invoice payment amount approved by the Government and be compounded in 30-day increments inclusive from the first day after the due date through the payment date. That is, interest accrued at the end of any 30-day period will be added to the approved invoice payment amount and be subject to interest penalties if not paid in the succeeding 30-day period. If the designated billing office failed to notify the contractor of a defective invoice within the periods prescribed in subparagraph (a)(4) of this clause, then the due date on the corrected invoice will be adjusted by subtracting the number of days taken beyond the prescribed notification of defects period. Any interest penalty owed the Contractor will be based on this adjusted due date. Adjustments will be made by the designated payment office for errors in calculating interest penalties, if requested by the Contractor.

(i) For the sole purpose of computing an interest penalty that might be due the contractor, Government acceptance shall be deemed to have occurred constructively on the 7th day (unless otherwise specified in this contract) after the Contractor delivered the supplies or performed the services in accordance with the terms and conditions of the contract, unless there is a disagreement over quantity, quality, or contractor compliance with a contract provision. In the event that actual acceptance occurs within the constructive

acceptance period, the determination of an interest penalty shall be based on the actual date of acceptance. The constructive acceptance requirement does not, however, compel Government officials to accept supplies or services, perform contract administration functions, or make payment prior to fulfilling their responsibilities.

(ii) The following periods of time will not be included in the determination of an interest penalty:

(A) The period taken to notify the contractor of defects in invoices submitted to the Government, but this may not exceed 7 days (3 days for meat and meat food products and 5 days for perishable agricultural commodities, dairy products, edible fat or oils, and food products prepared from edible fats or oils).

(B) The period between the defects notice and resubmission of the corrected invoice by the Contractor.

(iii) Interest penalties will not continue to accrue after the filing of a claim for such penalties under the clause at 52.233-1, Disputes, or for more than 1 year. Interest penalties of less than \$1.00 need not be paid.

(iv) Interest penalties are not required on payment delays due to disagreement between the Government and Contractor over the payment amount or other issues involving contract compliance or on amounts temporarily withheld or retained in accordance with the terms of the contract. Claims involving disputes, and any interest that may be payable, will be resolved in accordance with the clause at 52.233-1, Disputes.

(7) An interest penalty shall also be paid automatically by the designated payment office, without request from the contractor, if a discount for prompt payment is taken improperly. The interest penalty will be calculated as described in subparagraph (a)(6) of this clause on the amount of discount taken for the period beginning with the first day after the end of the discount period through the date when the contractor is paid.

(8) If this contract was awarded on or after October 1, 1989, a penalty amount, calculated in accordance with regulations issued by the Office of Management and Budget, shall be paid in addition to the interest penalty amount if the contractor--

(i) Is owed an interest penalty;

(ii) Is not paid the interest penalty within 10 days after the date the invoice amount is paid; and

(iii) Makes a written demand, not later than 40 days after the date the invoice amount is paid, that the agency pay such a penalty.

**(b) Contract Financing Payments**

(1) For purposes of this clause, "contract financing payment" means a Government disbursement of monies to a Contractor under a contract clause or other authorization prior to acceptance of supplies or services by the Government. Contract financing payments include advance payments, progress payments based on cost under the clause at 52.232-16, Progress Payments, progress payments based on a percentage or stage of completion (32.102(e)(1)) other than those made under the clause at 52.232-5, Payments Under Fixed-Price Construction Contracts, or the clause at 52.232-10, Payments Under Fixed-Price Architect-Engineer Contracts, and interim payments on cost type contracts.

(2) For contracts that provide for contract financing, requests for payment shall be submitted to the designated billing office as specified in this contract or as directed by the Contracting Officer. Contract financing payments shall be made on the (insert day as prescribed by Agency head; if not prescribed, insert 30th day) day after receipt of a proper contract financing request by the designated billing office. In the event that an audit or other review of a specific financing request is required to ensure compliance with the terms and conditions of the contract, the designated payment office is not compelled to make payment by the due date specified.

(3) For advance payments, loans, or other arrangements that do not involve recurrent submissions of contract financing requests, payment shall be made in accordance with the corresponding contract terms or as directed by the Contracting Officer.

(4) Contract financing payments shall not be assessed an interest penalty for payment delays.

(c) If this contract contains the clause at 5.213-1, Fast Payment Procedure, payments will be made within 15 days after the date of receipt of the invoice.

**62. FAR 52.233-1 DISPUTES ALTERNATE I (APR 1984)**

(a) This contract is subject to the Contract Disputes Act of 1978 (41 U.S.C. 601-613) (the Act).

(b) Except as provided in the Act, all disputes arising under or relating to this contract shall be resolved under this clause.

(c) "Claim," as used in this clause, means a written demand or a written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to this contract. A claim arising under a contract, unlike a claim relating to that contract, is a claim that can be resolved under a contract clause that provides for the relief sought by the claimant. However, a written demand or written assertion by the Contractor seeking the payment of money exceeding \$50,000 is not a claim under the Act until certified as required by subparagraph (d)(2) below. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim under the Act. The submission may be converted to a claim under the Act, by complying with the submission and certification requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.

(d) (1) A claim by the Contractor shall be made in writing and submitted to the Contracting Officer for a written decision. A claim by the Government against the Contractor shall be subject to a written decision by the Contracting Officer.

(2) For Contractor claims exceeding \$50,000, the Contractor shall submit with the claim a certification that--

(i) The claim is made in good faith;

(ii) Supporting data are accurate and complete to the best of the Contractor's knowledge and belief; and

(iii) The amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable.

(3) (i) If the Contractor is an individual, the certification shall be executed by that individual.



(ii) If the Contractor is not an individual, the certification shall be executed by--

(A) A senior company official in charge at the Contractor's plant or location involved; or

(B) An officer or general partner of the Contractor having overall responsibility for the conduct of the Contractor's affairs.

(e) For Contractor claims of \$50,000 or less, the Contracting Officer must, if requested in writing by the Contractor, render a decision within 60 days of the request. For Contractor-certified claims over \$50,000, the Contracting Officer must, within 60 days, decide the claim or notify the Contractor of the date by which the decision will be made.

(f) The Contracting Officer's decision shall be final unless the Contractor appeals or files a suit as provided in the Act.

(g) The Government shall pay interest on the amount found due and unpaid from (1) the date the Contracting Officer receives the claim (properly certified if required), or (2) the date payment otherwise would be due, if that date is later, until the date of payment. Simple interest on claims shall be paid at the rate, fixed by the Secretary of the Treasury as provided in the Act, which is applicable to the period during which the Contracting Officer receives the claim and then at the rate applicable for each 6-month period as fixed by the Treasury Secretary during the pendency of the claim.

(h) The Contractor shall proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under or relating to the contract, and comply with any decision of the Contracting Officer.

#### 63. FAR 52.233-3 PROTEST AFTER AWARD ALTERNATE 1 (JUN 1985)

(a) Upon receipt of a notice of protest (as defined in 33.101 of the FAR) the Contracting Officer may, by written order to the Contractor, direct the Contractor to stop performance of the work called for by this contract. The order shall be specifically identified as a stop-work order issued under this clause. Upon receipt of the order, the Contractor shall immediately comply with its terms and take all reasonable steps to minimize the incurrence of costs allocable to the work covered by the order during the period of work stoppage. Upon receipt of the final decision in the protest, the Contracting Officer shall either--

(1) Cancel the stop-work order; or

(2) Terminate the work covered by the order as provided in the Termination clause of this contract.

(b) If a stop-work order issued under this clause is canceled either before or after a final decision in the protest, the Contractor shall resume work. The Contracting Office shall make an equitable adjustment in the delivery schedule, the estimated cost, the fee, or a combination thereof, and in any other terms of the contract may be affected and the contract shall be modified, in writing, accordingly, if--

(1) The stop-work order results in an increase in the time required for, or in the Contractor's cost properly allocable to, the performance of any part of this contract; and

(2) The Contractor requests an adjustment within 30 days after the end of the period of work stoppage; provided, that if the Contracting Officer decides the facts justify the action, the Contracting Officer may receive and act upon the request at any time before final payment under this contract.

(c) If a stop-work order is not canceled and the work covered by the order is terminated for the convenience of the Government, the Contracting Officer shall allow reasonable costs resulting from the stop-work order in arriving at the termination settlement.

(d) If a stop-work order is not canceled and the work covered by the order is terminated for default, the Contracting Officer shall allow, by equitable adjustment or otherwise, reasonable costs resulting from the stop-work order.

(e) The Government's rights to terminate this contract at any time are not affected by action taken under this clause.

64. DEAR 952.235-70 KEY PERSONNEL (APR 1984)

The personnel specified below are considered to be essential to the work being performed hereunder. Prior to diverting any of the specified individuals to other programs, the Contractor shall notify the Contracting Officer reasonably in advance and shall submit justification (including proposed substitutions) in sufficient detail to permit evaluation of the impact on the program. No diversion shall be made by the Contractor without the written consent of the Contracting Officer: Provided, that the Contracting Officer may ratify in writing such diversion and such ratification shall constitute the consent of the Contracting Officer required by this clause.

The list below may be amended from time to time during the course of the contract to either add or delete personnel, as appropriate.

<u>Title</u>	<u>Name</u>
Contract Manager	<u>Richard W. Tuttle</u>
Fire Chief	<u>Douglas R. MacDonald</u>
Assistant Chief, Operations*	
*To be subsequently named.	

65. FAR 52.237-2 PROTECTION OF GOVERNMENT BUILDINGS, EQUIPMENT, AND VEGETATION (APR 1984)

The Contractor shall use reasonable care to avoid damaging existing buildings, equipment, and vegetation on the Government installation. If the Contractor's failure to use reasonable care causes damage to any of this property, the Contractor shall replace or repair the damage at no expense to the Government as the Contracting Officer directs. If the Contractor fails or refuses to make such repair or replacement, the Contractor shall be liable for the cost, which may be deducted from the contract price.

66. FAR 52.237-3 CONTINUITY OF SERVICES (APR 1984)

(a) The Contractor recognizes that the services under this contract are vital to the Government and must be continued without interruption and that, upon contract expiration, a successor, either the Government or another Contractor, may continue them. The Contractor agrees to (1) furnish phase-in training and (2) exercise its best efforts and cooperation to effect an orderly and efficient transition to a successor.

(b) The Contractor shall, upon the Contracting Officer's written notice, (1) furnish phase-in, phase-out services for up to 60 days after this contract expires and (2) negotiate in good faith a plan with a successor to determine the nature and extent of phase-in, phase-out services required. The plan shall specify a training program and a date for transferring responsibilities for each division of work described in the plan, and shall be subject to the Contracting Officer's approval. The Contractor shall provide sufficient experienced personnel during the phase-in, phase-out period to ensure that the services called for by this contract are maintained at the required level of proficiency.

(c) The Contractor shall allow as many personnel as practicable to remain on the job to help the successor maintain the continuity and consistency of the services required by this contract. The Contractor also shall disclose necessary personnel records and allow the successor to conduct onsite interviews with these employees. If selected employees are agreeable to the change, the Contractor shall release them at a mutually agreeable date and negotiate transfer of their earned fringe benefits to the successor.

(d) The Contractor shall be reimbursed for all reasonable phase-in, phase-out costs (i.e., costs incurred within the agreed period after contract expiration that result from phase-in, phase-out operations) and a fee (profit) not to exceed a pro rata portion of the fee (profit) under this contract.

**67. FAR 52.242-1 NOTICE OF INTENT TO DISALLOW COSTS (APR 1984)**

(a) Notwithstanding any other clause of this contract--

(1) The Contracting Officer may at any time issue to the Contractor a written notice of intent to disallow specified costs incurred or planned for incurrence under this contract that have been determined not to be allowable under the contract terms; and

(2) The Contractor may, after receiving a notice under subparagraph (1) above, submit a written response to the Contracting Officer, with justification for allowance of the costs. If the Contractor does respond within 60 days, the Contracting Officer shall, within 60 days of receiving the response, either make a written withdrawal of the notice or issue a written decision.

(b) Failure to issue a notice under this Notice of Intent to Disallow Costs clause shall not affect the Government's rights to take exception to incurred costs.

**68. FAR 52.243-2 CHANGES--COST-REIMBURSEMENT ALTERNATE I (AUG 1987)**

(a) The Contracting Officer may at any time, by written order, and without notice to the sureties, if any, make changes within the general scope of this contract in any one or more of the following:

(1) Description of services to be performed.

(2) Time of performance (i.e., hours of the day, days of the week, etc.).

**(3) Place of performance of the services.**

**(b) If any such change cause an increase or decrease in the estimated cost of, or the time required for, performance of any part of the work under this contract, whether or not changed by the order, or otherwise affects any other terms and conditions of this contract, the Contracting Officer shall make an equitable adjustment in the (1) estimated cost, delivery or completion schedule, or both; (2) amount of any fixed fee; and (3) other affected terms and shall modify the contract accordingly.**

**(c) The Contractor must assert its right to an adjustment under this clause within 30 days from the date of receipt of the written order. However, if the Contracting Officer decides that the facts justify it, the Contracting Officer may receive and act upon a proposal submitted before final payment of the contract.**

**(d) Failure to agree to any adjustment shall be a dispute under the Disputes clause. However, nothing in this clause shall excuse the Contractor from proceeding with the contract as changed.**

**(e) Notwithstanding the terms and conditions of paragraphs (a) and (b) above, the estimated cost of this contract and, if this contract is incrementally funded, the funds allotted for the performance of this contract, shall not be increased or considered to be increased except by specific written modification of the contract indicating the new contract estimated cost and, of this contract is incrementally funded, the new amount allotted to the contract. Until this modification is made, the Contractor shall not be obligated to continue performance or incur costs beyond the point established in the Limitation of Cost or Limitation of Funds clause of this contract.**

**69. FAR 52.244-2 SUBCONTRACTS (COST-REIMBURSEMENT AND LETTER CONTRACTS) (JUL 1985)**

**(a) "Subcontract," as used in this clause, includes but is not limited to purchase orders, and changes and modifications to purchase orders. The Contractor shall notify the Contracting Officer reasonably in advance of entering into any subcontract if--**

**(1) The proposed subcontract is of the cost-reimbursement, time-and-materials, or labor-hour type;**

(2) The proposed subcontract is fixed-price and exceeds either \$25,000 or 5 percent of the total estimated cost of this contract;

(3) The proposed subcontract has experimental, developmental, or research work as one of its purposes; or

(4) This contract is not a facilities contract and the proposed subcontract provides for the fabrication, purchase, rental, installation, or other acquisition of special test equipment valued in excess of \$10,000 or of any items of facilities.

(b) (1) In the case of a proposed subcontract that (i) is of the cost-reimbursement, time-and-materials, or labor-hour type and is estimated to exceed \$10,000, including any fee, (ii) is proposed to exceed \$100,000, or (iii) is one of a number of subcontracts with a single subcontractor, under this contract, for the same or related supplies or services that, in the aggregate, are expected to exceed \$100,000, the advance notification required by paragraph (a) above shall include the information specified in subparagraph (2) below.

(2) (i) A description of the supplies or services to be subcontracted.

(ii) Identification of the type of subcontract to be used.

(iii) Identification of the proposed subcontractor and an explanation of why and how the proposed subcontract was selected, including the competition obtained.

(iv) The proposed subcontract price and the Contractor's cost or price analysis.

(v) The subcontractor's current, complete, and accurate cost or pricing data and Certificate of Current Cost or Pricing Data, if required by other contract provisions.

(vi) The subcontractor's Disclosure Statement or Certificate relating to Cost Accounting Standards when such data are required by other provisions of this contract.

(vii) A negotiation memorandum reflecting--

(A) The principal elements of the subcontract price negotiations;

(B) The most significant consideration controlling establishment of initial or revised prices;

(C) The reason cost or pricing data were or were not required;

(D) The extent, if any, to which the Contractor did not rely on the subcontractor's cost or pricing data in determining the price objective and in negotiating the final price;

(E) The extent to which it was recognized in the negotiation that the subcontractor's cost or pricing data were not accurate, complete, or current; the action taken by the Contractor and the subcontractor; and the effect of any such defective data on the total price negotiated;

(F) The reasons for any significant difference between the Contractor's price objective and the price negotiated; and

(G) A complete explanation of the incentive fee or profit plan when incentives are used. The explanation shall identify each critical performance element, management decisions used to quantify each incentive element, reasons for the incentives, and a summary of all trade-off possibilities considered.

(c) The Contractor shall obtain the Contracting Officer's written consent before placing any subcontract for which advance notification is required under paragraph (a) above. However, the Contracting Officer may ratify in writing any such subcontract. Ratification shall constitute the consent of the Contracting Officer.

(d) If the Contractor has an approved purchasing system and the subcontract is within the scope of such approval, the Contractor may enter into the subcontracts described in subparagraphs (a)(1) and (a)(2) above without the consent of the Contracting Officer, unless this contract is for the acquisition of major systems, subsystems, or their components.

(e) Even if the Contractor's purchasing system has been approved, the Contractor shall obtain the Contracting Officer's written consent before placing subcontracts that have been selected for special surveillance and identified in the Schedule of this contract.

(f) Unless the consent or approval specifically provides otherwise, neither consent by the Contracting Officer to any subcontract nor approval of the Contractor's purchasing system shall constitute a determination (1) of the acceptability of any subcontract terms or conditions, (2) of the allowability of any cost under this contract, or (3) to relieve the Contractor of any responsibility for performing this contract.

(g) No subcontract placed under this contract shall provide for payment on a cost-plus-a-percentage-of-cost basis, and any fee payable under cost-reimbursement type subcontracts shall not exceed the fee limitations in paragraph 15.903(d) of the Federal Acquisition Regulation (FAR).

(h) The Contractor shall give the Contracting Officer immediate written notice of any action or suit filed and prompt notice of any claim made against the Contractor by any subcontractor or vendor that, in the opinion of the Contractor, may result in litigation related in any way to this contract, with respect to which the Contractor may be entitled to reimbursement from the Government.

(1) (1) The Contractor shall insert in each price redetermination or incentive price revision subcontract under this contract the substance of the paragraph "Quarterly limitation on payments statement" of the clause at 52.216-5, Price Redetermination--Prospective, 52.216-6, Price Redetermination--Retroactive, 52.216-16, Incentive Price Revision--Firm Target, or 52.216-17, Incentive Price Revision--Successive Targets, as appropriate, modified in accordance with the paragraph entitled "Subcontracts" of that clause.

(2) Additionally, the Contractor shall include in each cost-reimbursement subcontract under this contract a requirement that the subcontractor insert the substance of the appropriate modified subparagraph referred to in subparagraph (1) above in each lower tier price redetermination or incentive price revision subcontract under that subcontract.

(j) To facilitate small business participation in subcontracting, the Contractor agrees to provide progress payments on subcontracts under this contract that are fixed-price subcontracts with small business concerns in conformity with the standards for customary progress payments stated in FAR 32.502-1 and 32.504(f), as in effect on the date of this contract. The Contractor further agrees that the need for such progress payments will not be considered a handicap or adverse factor in the award of subcontracts.



(k) The Government reserves the right to review the Contractor's purchasing system as set forth in FAR Subpart 44.3.

**70. FAR 52.244-5 COMPETITION IN SUBCONTRACTING (APR 1984)**

The Contractor shall select subcontractors (including suppliers) on a competitive basis to the maximum practical extent consistent with the objectives and requirements of the contract.

**71. DEAR 952.245-5 GOVERNMENT PROPERTY (COST REIMBURSEMENT, TIME-AND-MATERIAL, OR LABOR-HOUR CONTRACTS) (JAN 1986)**

**(a) Government-furnished property.**

(1) The term "Contractor's managerial personnel," as used in paragraph (g) of this clause, means any of the Contractor's directors, officers, managers, superintendents, or equivalent representatives who have supervision or direction of--

(i) All or substantially all of the Contractor's business;

(ii) All or substantially all of the Contractor's operation at any one plant, or separate location at which the contract is being performed; or

(iii) A separate and complete major industrial operation connected with performing this contract.

(2) The Government shall deliver to the Contractor, for use in connection with and under the terms of this contract, the Government-furnished property described in the Schedule or specifications, together with such related data and information as the Contractor may request and as may be reasonably required for the intended use of the property (hereinafter referred to as "Government-furnished property").

(3) The delivery or performance dates for this contract are based upon the expectation that Government-furnished property suitable for use will be delivered to the Contractor at the times stated in the Schedule or, if not so stated, in sufficient time to enable the Contractor to meet the contract's delivery or performance dates.

(4) If Government-furnished property is received by the Contractor in a condition not suitable for the intended use, the Contractor shall, upon receipt, notify the Contracting

Officer, detailing the facts, and, as directed by the Contracting Officer and at Government expense, either effect repairs or modification or return or otherwise dispose of the property. After completing the directed action and upon written request of the Contractor, the Contracting Officer shall make an equitable adjustment as provided in paragraph (h) of this clause.

(5) If Government-furnished property is not delivered to the Contractor by the required time or times, the Contracting Officer shall, upon the Contractor's timely written request, make a determination of the delay, if any, caused the Contractor and shall make an equitable adjustment in accordance with paragraph (h) of this clause.

**(b) Changes in Government-furnished property.**

(1) The Contracting Officer may, by written notice, (i) decrease the Government-furnished property provided or to be provided under this contract or (ii) substitute other Government-furnished property for the property to be provided by the Government or to be acquired by the Contractor for the Government under this contract. The Contractor shall promptly take such action as the Contracting Officer may direct regarding the removal, shipment, or disposal of the property covered by this notice.

(2) Upon the Contractor's written request, the Contracting Officer shall make an equitable adjustment to the contract in accordance with paragraph (h) of this clause, if the Government has agreed in the Schedule to make such property available for performing this contract and there is any--

(i) Decrease or substitution in this property pursuant to subparagraph (b)(1) above; or

(ii) Withdrawal of authority to use property, if provided under any other contract or lease.

**(c) Title.**

(1) The Government shall retain title to all Government-furnished property.

(2) Title to all property purchased by the Contractor for which the Contractor is entitled to be reimbursed as a direct item of cost under this contract shall pass to and vest in the Government upon the vendor's delivery of such property.

(3) Title to all other property, the cost of which is reimbursable to the Contractor, shall pass to and vest in the Government upon--

(i) Issuance of the property for use in contract performance;

(ii) Commencement of processing of the property or use in contract performance; or

(iii) Reimbursement of the cost of the property by the Government, whichever occurs first.

(4) All Government-furnished property and all property acquired by the Contractor, title to which vests in the Government under this paragraph (collectively referred to as "Government property"), are subject to the provisions of this clause. Title to Government property shall not be affected by its incorporation into or attachment to any property not owned by the Government, nor shall Government property become a fixture or lose its identity as personal property by being attached to any real property.

(d) Use of Government property.

The Government property shall be used only for performing this contract, unless otherwise provided in this contract or approved by the Contracting Officer.

(e) Property administration.

(1) The Contractor shall be responsible and accountable for all Government property provided under this contract and shall comply with Federal Acquisition Regulation (FAR) Subpart 45.5 and DOE Acquisition Regulation Subpart 945.5 as in effect on the date of this contract.

(2) The Contractor shall establish and maintain a program for the use, maintenance, repair, protection, and preservation of Government property in accordance with sound business practice and the applicable provisions of FAR Subpart 45.5 and DOE Acquisition Regulation Subpart 945.5.

(3) If damage occurs to Government property, the risk of which has been assumed by the Government under this contract, the Government shall replace the items or the Contractor shall make such repairs as the Government directs. However, if the Contractor cannot effect such repairs within the time required, the Contractor shall dispose of the property as directed by the Contracting Officer. When any property for which the Government is responsible is replaced or repaired,

the Contracting Officer shall make an equitable adjustment in accordance with paragraph (h) of this clause.

**(f) Access.**

The Government and all its designees shall have access at all reasonable times to the premises in which any Government property is located for the purpose of inspecting the Government property.

**(g) Limited risk of loss.**

(1) The Contractor shall not be liable for loss or destruction of, or damage to, the Government property provided under this contract or for expenses incidental to such loss, destruction, or damage, except as provided in subparagraphs (2) and (3) below.

(2) The Contractor shall be responsible for loss or destruction of, or damage to, the Government property provided under this contract (including expenses incidental to such loss, destruction, or damage)--

(i) That results from a risk expressly required to be insured under this contract, but only to the extent of the insurance required to be purchased and maintained or to the extent of insurance actually purchased and maintained, whichever is greater;

(ii) That results from a risk that is in fact covered by insurance or for which the Contractor is otherwise reimbursed, but only to the extent of such insurance or reimbursement;

(iii) For which the Contractor is otherwise responsible under the express terms of this contract;

(iv) That results from willful misconduct or lack of good faith on the part of the Contractor's managerial personnel; or

(v) That results from a failure on the part of the Contractor, due to willful misconduct or lack of good faith on the part of the Contractor's managerial personnel, to establish and administer a program or system for the control, use, protection, preservation, maintenance, and repair of Government property as required by paragraph (e) of this clause.

(3) (i) If the Contractor fails to act as provided by subdivision (g)(2)(v) above, after being notified (by certified mail addressed to one of the Contractor's managerial personnel)

of the Government's disapproval, withdrawal of approval, or nonacceptance of the system or program, it shall be conclusively presumed that such failure was due to willful misconduct or lack of good faith on the part of the Contractor's managerial personnel.

(ii) In such event, any loss or destruction of, or damage to, the Government property shall be presumed to have resulted from such failure unless the Contractor can establish by clear and convincing evidence that such loss, destruction, or damage--

(A) Did not result from the Contractor's failure to maintain an approved program or system; or

(B) Occurred while an approved program or system was maintained by the Contractor.

(4) If the Contractor transfers Government property to the possession and control of a subcontractor, the transfer shall not affect the liability of the Contractor for loss or destruction of, or damage to, the property as set forth above. However, the Contractor shall require the subcontractor to assume the risk of, and be responsible for, any loss or destruction of, or damage to, the property while in the subcontractor's possession or control, except to the extent that the subcontract, with the advance approval of the Contracting Officer, relieves the subcontractor from such liability. In the absence of such approval, the subcontract shall contain appropriate provisions requiring the return of all Government property in as good condition as when received, except for reasonable wear and tear or for its use in accordance with the provisions of the prime contract.

(5) Upon loss or destruction of, or damage to, Government property provided under this contract, the Contractor shall so notify the Contracting Officer and shall communicate with the loss and salvage organization, if any, designated by the Contracting Officer. With the assistance of any such organization, the Contractor shall take all reasonable action to protect the Government property from further damage, separate the damaged and undamaged Government property, put all the affected Government property in the best possible order, and furnish to the Contracting Officer a statement of--

(i) The lost, destroyed, or damaged Government property;

(ii) The time and origin of the loss, destruction, or damage;

(iii) All known interests in commingled property of which the Government property is a part; and

(iv) The insurance, if any, covering any part of or interest in such commingled property.

(6) The Contractor shall repair, renovate, and take such other action with respect to damaged Government property as the Contracting Officer directs. If the Government property is destroyed or damaged beyond practical repair, or is damaged and so commingled or combined with property of others (including the Contractor's) that separation is impractical, the Contractor may, with the approval of and subject to any conditions imposed by the Contracting Officer, sell such property for the account of the Government. Such sales may be made in order to minimize the loss to the Government, to permit the resumption of business, or to accomplish a similar purpose. The Contractor shall be entitled to an equitable adjustment in the contract price for the expenditures made in performing the obligations under this subparagraph (g)(6) in accordance with paragraph (h) of this clause. However, the Government may directly reimburse the loss and salvage organization for any of their charges. The Contracting Officer shall give due regard to the Contractor's liability under this paragraph (g) when making any such equitable adjustment.

(7) The Contractor shall not be reimbursed for, and shall not include as an item of over head, the cost of insurance or of any reserve covering risk of loss or destruction of, or damage to, Government property, except to the extent that the Government may have expressly required the Contractor to carry such insurance under another provision of this contract.

(8) In the event the Contractor is reimbursed or otherwise compensated for any loss or destruction of, or damage to, Government property, the Contractor shall use the proceeds to repair, renovate, or replace the lost, destroyed, or damaged Government property or shall otherwise credit the proceeds to, or equitably reimburse, the Government, as directed by the Contracting Officer.

(9) The Contractor shall do nothing to prejudice the Government's rights to recover against third parties for any loss or destruction of, or damage to, Government property. Upon the request of the Contracting Officer, the Contractor shall, at the Government's expense, furnish to the Government all reasonable assistance and cooperation (including the prosecution of suit and the execution of instruments of assignment in favor of the Government) in obtaining recovery. In addition, where a subcontractor has not been relieved from

liability for any loss or destruction of, or damage to, Government property, the Contractor shall enforce for the benefit of the Government the liability of the subcontractor for such loss, destruction, or damage.

(h) Equitable adjustment.

When this clause specifies an equitable adjustment, it shall be made to any affected contract provision in accordance with the procedures of the Changes clause. When appropriate, the Contracting Officer may initiate an equitable adjustment in favor of the Government. The right to an equitable adjustment shall be the Contractor's exclusive remedy. The Government shall not be liable to suit for breach of contract for--

(1) Any delay in delivery of Government-furnished property;

(2) Delivery of Government-furnished property in a condition not suitable for its intended use;

(3) A decrease in or substitution of Government-furnished property; or

(4) Failure to repair or replace Government property for which the Government is responsible.

(i) Final accounting graph (h) of this clause may properly include restoration or rehabilitation costs.

(k) Communications.

All communications under this clause shall be in writing.

(l) Overseas contracts.

If this contract is to be performed outside the United States of America, its territories, or possessions, the words "Government" and "Government-furnished" (wherever they appear in this clause) shall be construed as "United States Government" and "United States Government-furnished," respectively.

72. FAR 52.246-5 INSPECTION OF SERVICES - COST-REIMBURSEMENT (APR 1984)

(a) Definition. "Services" as used in this clause, includes services performed, workmanship, and material furnished or used in performing services.

(b) The Contractor shall provide and maintain an inspection system acceptable to the Government covering the services under this contract. Complete records of all inspection work performed by the Contractor shall be maintained and made available to the Government during contract performance and for as long afterwards as the contract requires.

(c) The Government has the right to inspect and test all services called for by the contract, to the extent practicable at all places and times during the term of the contract. The Government shall perform inspections and tests in a manner that will not unduly delay the work.

(d) If any of the services performed do not conform with contract requirements, the Government may require the Contractor to perform the services again in conformity with contract requirements, for no additional fee. When the defects in services cannot be corrected by reperformance, the Government may (1) require the Contractor to take necessary action to ensure that future performance conforms to contract requirements and (2) reduce any fee payable under the contract to reflect the reduced value of the services performed.

(e) If the Contractor fails to promptly perform the services again or take the action necessary to ensure future performance in conformity with contract requirements, the Government may (1) by contract or otherwise, perform the services and reduce any fee payable by an amount that is equitable under the circumstances or (2) terminate the contract for default.

### 73. FAR 52.246-25 LIMITATION OF LIABILITY-SERVICES (APR 1984)

(a) Except as provided in paragraphs (b) and (c) below, and except to the extent that the Contractor is expressly responsible under this contract for deficiencies in the services required to be performed under it (including any materials furnished in conjunction with those services), the Contractor shall not be liable for loss of or damage to property of the Government that (1) occurs after Government acceptance of services performed under this contract and (2) results from any defects or deficiencies in the services performed or materials furnished.

(b) The limitation of liability under paragraph (a) above shall not apply when a defect or deficiency in, or the Government's acceptance of, services performed or materials furnished results from willful misconduct or lack of good faith on the part of any of the Contractor's managerial personnel. The term "Contractor's managerial personnel," as used in this



clause, means the Contractor's directors, officers, and any of the Contractor's managers, superintendents, or equivalent representatives who have supervision or direction of--

(1) All or substantially all of the Contractor's business;

(2) All or substantially all of the Contractor's operations at any one plant, laboratory, or separate location at which the contract is being performed; or

(3) A separate and complete major industrial operation connected with the performance of this contract.

(c) If the Contractor carries insurance, or has established a reserve for self-insurance, covering liability for loss or damage suffered by the Government through the Contractor's performance of services or furnishing of materials under this contract, the Contractor shall be liable to the Government, to the extent of such insurance or reserve, for loss of or damage to property of the Government occurring after Government acceptance of, and resulting from any defects and deficiencies in, services performed or materials furnished under this contract.

(d) The Contractor shall include this clause, including this paragraph (d), supplemented as necessary to reflect the relationship of the contracting parties, in all subcontracts over \$25,000.

#### 74. FAR 52.247-34 F.O.B. DESTINATION (NOV 1991)

(a) The term "f.o.b. destination," as used in this clause means:

(1) Free of expense to the Government, on board the carrier's conveyance, at a specified delivery point where the consignee's facility (plant, warehouse, store, lot, or other location to which shipment can be made) is located; and

(2) Supplies shall be delivered to the destination consignee's wharf (if destination is a port city and supplies are for export), warehouse unloading platform, or receiving dock, at the expense of the Contractor. The Government shall not be liable for any delivery, storage, demurrage, accessorial, or other charges involved before the actual delivery (or "constructive placement" as defined in carrier tariffs) or the supplies to the destination, unless such charges are caused by an act or order of the Government acting in its contractual capacity. If rail carrier is used, supplies shall be delivered to the specified unloading platform of the

consignee. If motor carrier (including "piggyback") is used, supplies shall be delivered to truck tailgate at the unloading platform of the consignee, except when the supplies delivered meet the requirements of Item 568 of the Material Motor Freight Classification for "heavy or bulky freight". When supplies meeting the requirements of the referenced Item 568 are delivered, unloading (including movement to the tailgate) shall be performed by the consignee, with assistance from the truck driver, if requested. If the Contractor uses rail carrier or freight forwarder for less than carload shipments, the Contractor shall assure that the carrier will furnish tailgate delivery, when required, if transfer to truck is required to complete delivery to consignee.

(b) The Contractor shall--

(1) (i) Pack and mark the shipment to comply with contract specifications; or

(ii) In the absence of specifications, prepare the shipment in conformance with carrier requirements;

(2) Prepare and distribute commercial bills of lading;

(3) Deliver the shipment in good order and condition to the point of delivery specified in the contract;

(4) Be responsible for any loss of and/or damage to the goods occurring before receipt of the shipment by the consignee at the delivery point specified in the contract;

(5) -Furnish a delivery schedule and designate the mode of delivering carrier; and

(6) Pay and bear all charges to the specified point of delivery.

#### 75. FAR 52.249-6 TERMINATION (COST-REIMBURSEMENT) (MAY 1986)

(a) The Government may terminate performance of work under this contract in whole or, from time to time, in part, if--

(1) The Contracting Officer determines that a termination is in the Government's interest; or

(2) The Contractor defaults in performing this contract and fails to cure the default within 10 days (unless extended by the Contracting Officer) after receiving a notice specifying the default. "Default" includes failure to make progress in the work so as to endanger performance.

(b) The Contracting Officer shall terminate by delivering to the Contractor a Notice of Termination specifying whether termination is for default of the Contractor or for convenience of the Government, the extent of termination, and the effective date. If, after termination for default, it is determined that the Contractor was not in default or that the Contractor's failure to perform or to make progress in performance is due to causes beyond the control and without the fault or negligence of the Contractor as set forth in the Excusable Delays clause, the rights and obligations of the parties will be the same as if the termination was for the convenience of the Government.

(c) After receipt of a Notice of Termination, and except as directed by the Contracting Officer, the Contractor shall immediately proceed with the following obligations, regardless of any delay in determining or adjusting any amounts due under this clause:

(1) Stop work as specified in the notice.

(2) Place no further subcontracts or orders (referred to as subcontracts in this clause), except as necessary to complete the continued portion of the contract.

(3) Terminate all subcontracts to the extent they relate to the work terminated.

(4) Assign to the Government, as directed by the Contracting Officer, all right, title, and interest of the Contractor under the subcontracts terminated, in which case the Government shall have the right to settle or to pay any termination settlement proposal arising out of those terminations.

(5) With approval or ratification to the extent required by the Contracting Officer, settle all outstanding liabilities and termination settlement proposals arising from the termination of subcontracts, the cost of which would be reimbursable in whole or in part, under this contract; approval or ratification will be final for purposes of this clause.

(6) Transfer title (if not already transferred) and, as directed by the Contracting Officer, deliver to the Government (i) the fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced or acquired for the work terminated, (ii) the completed or partially completed plans, drawings, information, and other property that, if the contract had been completed, would be

required to be furnished to the Government, and (iii) the jigs, dies, fixtures, and other special tools and tooling acquired or manufactured for this contract, the cost of which the Contractor has been or will be reimbursed under this contract.

(7) Complete performance of the work not terminated.

(8) Take any action that may be necessary, or that the Contracting Officer may direct, for the protection and preservation of the property related to this contract that is in the possession of the Contractor and in which the Government has or may acquire an interest.

(9) Use its best efforts to sell, as directed or authorized by the Contracting Officer, any property of the types referred to in subparagraph (6) above; provided, however, that the Contractor (i) is not required to extend credit to any purchaser and (ii) may acquire the property under the conditions prescribed by, and at prices approved by, the Contracting Officer. The proceeds of any transfer or disposition will be applied to reduce any payments to be made by the Government under this contract, credited to the price or cost of the work, or paid in any other manner directed by the Contracting Officer.

(d) After expiration of the plant clearance period as defined in Subpart 45.6 of the Federal Acquisition Regulation, the Contractor may submit to the Contracting Officer a list, certified as to quantity and quality, of termination inventory not previously disposed of, excluding items authorized for disposition by the Contracting Officer. The Contractor may request the Government to remove those items or enter into an agreement for their storage. Within 15 days, the Government will accept the items and remove them or enter into a storage agreement. The Contracting Officer may verify the list upon removal of the items, or if stored, within 45 days from submission of the list, and shall correct the list, as necessary, before final settlement.

(e) After termination, the Contractor shall submit a final termination settlement proposal to the Contracting Officer in the form and with the certification prescribed by the Contracting Officer. The Contractor shall submit the proposal promptly, but no later than 1 year from the effective date of termination, unless extended in writing by the Code.

(8) Take any action that may be necessary, or that the Contracting Officer may direct, for the protection and preservation of the property related to this contract that is in the possession of the Contractor and in which the Government has or may acquire an interest.

(9) Use its best efforts to sell, as directed or authorized by the Contracting Officer, any property of the types referred to in subparagraph (6) above; provided, however, that the Contractor (i) is not required to extend credit to any purchaser and (ii) may acquire the property under the conditions prescribed by, and at prices approved by, the Contracting Officer. The proceeds of any transfer or disposition will be applied to reduce any payments to be made by the Government under this contract, credited to the price or cost of the work, or paid in any other manner directed by the Contracting Officer.

(d) After expiration of the plant clearance period as defined in Subpart 45.6 of the Federal Acquisition Regulation, the Contractor may submit to the Contracting Officer a list, certified as to quantity and quality, of termination inventory not previously disposed of, excluding items authorized for disposition by the Contracting Officer. The Contractor may request the Government to remove those items or enter into an agreement for their storage. Within 15 days, the Government will accept the items and remove them or enter into a storage agreement. The Contracting Officer may verify the list upon removal of the items, or if stored, within 45 days from submission of the list, and shall correct the list, as necessary, before final settlement.

(e) After termination, the Contractor shall submit a final termination settlement proposal to the Contracting Officer in the form and with the certification prescribed by the Contracting Officer. The Contractor shall submit the proposal promptly, but no later than 1 year from the effective date of termination, unless extended in writing by the Contracting Officer upon written request of the Contractor within this 1-year period. However, if the Contracting Officer determines that the facts justify it, a termination settlement proposal may be received and acted on after 1 year or any extension. If the Contractor fails to submit the proposal within the time allowed, the Contracting Officer may determine, on the basis of information available, the amount, if any, due the Contractor because of the termination and shall pay the amount determined.

(f) Subject to paragraph (e) above, the Contractor and the Contracting Officer may agree on the whole or any part of the amount to be paid (including an allowance for fee) because of the termination. The contract shall be amended, and the Contractor paid the agreed amount.

(g) If the Contractor and the Contracting Officer fail to agree in whole or in part on the amount of costs and/or fee to be paid because of the termination of work, the Contracting

Officer shall determine, on the basis of information available, the amount, if any, due the Contractor, and shall pay that amount, which shall include the following:

(1) All costs reimbursable under this contract, not previously paid, for the performance of this contract before the effective date of the termination, and part of those costs that may continue for a reasonable time with the approval of or as directed by the Contracting Officer; however, the Contractor shall discontinue those costs as rapidly as practicable.

(2) The cost of settling and paying termination settlement proposals under terminated subcontracts that are properly chargeable to the terminated portion of the contract if not included in subparagraph (1) above.

(3) The reasonable costs of settlement of the work terminated, including--

(i) Accounting, legal, clerical, and other expenses reasonably necessary for the preparation of termination settlement proposals and supporting data;

(ii) The termination and settlement of subcontracts (excluding the amounts of such settlements); and

(iii) Storage, transportation, and other costs incurred, reasonably necessary for the preservation, protection, or disposition of the termination inventory. If the termination is for default, no amounts for the preparation of the Contractor's termination settlement proposal may be included.

(4) A portion of the fee payable under the contract, determined as follows:

(i) If the contract is terminated for the convenience of the Government, the settlement shall include a percentage of the fee equal to the percentage of completion of work contemplated under the contract, but excluding subcontract effort included in subcontractors' termination proposals, less previous payments for fee.

(ii) If the contract is terminated for default, the total fee payable shall be such proportionate part of the fee as the total number of articles (or amount of services) delivered to and accepted by the Government is to the total number of articles (or amount of services) of a like kind required by the contract.

(5) If the settlement includes only fee, it will be determined under subparagraph (g)(4) above.

(h) The cost principles and procedures in Part 31 of the Federal Acquisition Regulation, in effect on the date of this contract, shall govern all costs claimed, agreed to, or determined under this clause.

(i) The Contractor shall have the right of appeal, under the Disputes clause, from any determination made by the Contracting Officer under paragraph (e) or (g) above or paragraph (k) below, except that if the Contractor failed to submit the termination settlement proposal within the time provided in paragraph (e) and failed to request a time extension, there is no right of appeal. If the Contracting Officer has made a determination of the amount due under paragraph (e), (g) or (k), the Government shall pay the Contractor (1) the amount determined by the Contracting Officer if there is no right of appeal or if no timely appeal has been taken, or (2) the amount finally determined on an appeal.

(j) In arriving at the amount due the Contractor under this clause, there shall be deducted--

(1) All unliquidated advance or other payments to the Contractor, under the terminated portion of this contract;

(2) Any claim which the Government has against the Contractor under this contract; and

(3) The agreed price for, or the proceeds of sale of materials, supplies, or other things acquired by the Contractor or sold under this clause and not recovered by or credited to the Government.

(k) The Contractor and Contracting Officer must agree to any equitable adjustment in fee for the continued portion of the contract when there is a partial termination. The Contracting Officer shall amend the contract to reflect the agreement.

(1) (1) The Government may, under the terms and conditions it prescribes, make partial payments and payments against costs incurred by the Contractor for the terminated portion of the contract, if the Contracting Officer believes the total of these payments will not exceed the amount to which the Contractor will be entitled.

(2) If the total payments exceed the amount finally determined to be due, the Contractor shall repay the excess to the Government upon demand, together with interest computed at

the rate established by the Secretary of the Treasury under 50 U.S.C. App. 1215(b)(2). Interest shall be computed for the period from the date the excess payment is received by the Contractor to the date the excess is repaid. Interest shall not be charged on any excess payment due to a reduction in the Contractor's termination settlement proposal because of retention or other disposition of termination inventory until 10 days after the date of the retention or disposition, or a later date determined by the Contracting Officer because of the circumstances.

(m) The provisions of this clause relating to fee are inapplicable if this contract does not include a fee.

**76. FAR 52.249-14 EXCUSABLE DELAYS (APR 1984)**

(a) Except for defaults of subcontractors at any tier, the Contractor shall not be in default because of any failure to perform this contract under its terms if the failure arises from causes beyond the control and without the fault or negligence of the Contractor. Examples of these causes are (1) acts of God or of the public enemy, (2) acts of the Government in either its sovereign or contractual capacity, (3) fires, (4) floods, (5) epidemics, (6) quarantine restrictions, (7) strikes, (8) freight embargoes, and (9) unusually severe weather. In each instance, the failure to perform must be beyond the control and without the fault or negligence of the Contractor. "Default" includes failure to make progress in the work so as to endanger performance.

(b) If the failure to perform is caused by the failure of a subcontractor at any tier to perform or make progress, and if the cause of the failure was beyond the control of both the Contractor and subcontractor, and without the fault or negligence of either, the Contractor shall not be deemed to be in default, unless--

(1) The subcontracted supplies or services were obtainable from other sources;

(2) The Contracting Officer ordered the Contractor in writing to purchase these supplies or services from the other source; and

(3) The Contractor failed to comply reasonably with this order.

(c) Upon request of the Contractor, the Contracting Officer shall ascertain the facts and extent of the failure. If the Contracting Officer determines that any failure to perform results from one or more of the causes above, the



delivery schedule shall be revised, subject to the rights of the Government under the termination clause of this contract.

77. DEAR 952.250-70 NUCLEAR HAZARDS INDEMNITY AGREEMENT (NOV 1991)

(a) Authority. This clause is incorporated into this contract pursuant to the authority contained in subsection 170d. of the Atomic Energy Act of 1954, as amended (hereinafter called the Act).

(b) Definitions. The definitions set out in the Act shall apply to this clause.

(c) Financial protection. Except as hereafter permitted or required in writing by DOE, the contractor will not be required to provide or maintain, and will not provide or maintain at Government expense, any form of financial protection to cover public liability, as described in paragraph (d)(2) below. DOE may, however, at any time require in writing that the contractor provide and maintain financial protection of such a type and in such amount as DOE shall determine to be appropriate to cover such public liability, provided that the costs of such financial protection are reimbursed to the contractor by DOE.

(d) Indemnification.

(1) To the extent that the contractor and other persons indemnified are not compensated by any financial protection permitted or required by DOE, DOE will indemnify the contractor and other persons indemnified against (i) claims for public liability as described in subparagraph (d)(2) of this clause; and (ii) such legal costs of the contractor and other persons indemnified as are approved by DOE, provided that DOE's liability, including such legal costs, shall not exceed the amount set forth in section 170e.(1)(B) of the Act in the aggregate for each nuclear incident or precautionary evacuation occurring within the United States or \$100 million in the aggregate for each nuclear incident occurring outside the United States, irrespective of the number of persons indemnified in connection with this contract.

(2) The public liability referred to in subparagraph (d)(1) of this clause is public liability as defined in the Act which (i) arises out of or in connection with the activities under this contract, including transportation; and (ii) arises out of or results from a nuclear incident or precautionary evacuation, as those terms are defined in the Act.

**(e) Waiver of Defenses.**

(1) In the event of a nuclear incident, as defined in the Act, arising out of nuclear waste activities, as defined in the Act, the contractor, on behalf of itself and other persons indemnified, agrees to waive any issue or defense as to charitable or governmental immunity.

(2) In the event of an extraordinary nuclear occurrence which:

(i) Arises out of, results from, or occurs in the course of the construction, possession, or operation of a production or utilization facility; or

(ii) Arises out of, results from, or occurs in the course of transportation of source material, by-product material, or special nuclear material to or from a production or utilization facility; or

(iii) Arises out of or results from the possession, operation, or use by the contractor or a subcontractor of a device utilizing special nuclear material or by-product material, during the course of the contract activity; or

(iv) Arises out of, results from, or occurs in the course of nuclear waste activities, the contractor, on behalf of itself and other persons indemnified, agrees to waive:

(A) Any issue or defense as to the conduct of the claimant (including the conduct of persons through whom the claimant derives its cause of action) or fault or persons indemnified, including, but not limited to:

1. Negligence;
2. Contributory negligence;
3. Assumption of risk; or
4. Unforeseeable intervening causes; whether involving the conduct of a third person or an act of God;

(B) Any issue or defense as to charitable or governmental immunity; and

(C) Any issue or defense based on any statute of limitations, if suit is instituted within 3 years from the date on which the claimant first knew, or reasonably could have known, of his injury or damage and the cause thereof. The waiver of any such issue or defense shall be effective regardless of whether such issue or defense may otherwise be

deemed jurisdictional or relating to an element in the cause of action. The waiver shall be judicially enforceable in accordance with its terms by the claimant against the person indemnified.

(v) The term extraordinary nuclear occurrence means an event which DOE has determined to be an extraordinary nuclear occurrence as defined in the Act. A determination of whether or not there has been an extraordinary nuclear occurrence will be made in accordance with the procedures in 10 CFR part 840.

(vi) For the purposes of that determination, "offsite" as that term is used in 10 CFR part 840 means away from "the contract location" which phrase means any DOE facility, installation, or site at which contractual activity under this contract is being carried on, and any contractor-owned or controlled facility, installation, or site at which the contractor is engaged in the performance of contractual activity under this contract.

(3) The waivers set forth above:

(i) Shall be effective regardless of whether such issue or defense may otherwise be deemed jurisdictional or relating to an element in the cause of action;

(ii) Shall be judicially enforceable in accordance with its terms by the claimant against the person indemnified;

(iii) Shall not preclude a defense based upon a failure to take reasonable steps to mitigate damages;

(iv) Shall not apply injury or damage to a claimant or to a claimant's property which is intentionally sustained by the claimant or which results from a nuclear incident intentionally and wrongfully caused by the claimant;

(v) Shall not apply to injury to a claimant who is employed at the site of and in connection with the activity where the extraordinary nuclear occurrence takes place, if benefits therefor are either payable or required to be provided under any workmen's compensation or occupational disease law;

(vi) Shall not apply to any claim resulting from a nuclear incident occurring outside the United States;

(vii) Shall be effective only with respect to those obligations set forth in this clause and in insurance policies, contracts or other proof of financial protection; and

(viii) Shall not apply to, or prejudice the prosecution or defense of, any claim or portion of claim which is not within the protection afforded under (A) the limit of liability provisions under subsection 170e. of the Act, and (B) the terms of this agreement and the terms of insurance policies, contracts, or other proof of financial protection.

(f) Notification and litigation of claims. The contractor shall give immediate written notice to DOE of any known action or claim filed or made against the contractor or other person indemnified for public liability as defined in paragraph (d)(2). Except as otherwise directed by DOE, the contractor shall furnish promptly to DOE, copies of all pertinent papers received by the contractor or filed with respect to such actions of claims. DOE shall have the right to, and may collaborate with, the contractor and any other person indemnified in the settlement or defense of any action or claim and shall have the right to (1) require the prior approval of DOE for the payment of any claim that DOE may be required to indemnify hereunder; and (2) appear through the Attorney General on behalf of the contractor or other person indemnified in any action brought upon any claim that DOE may be required to indemnify hereunder, take charge of such action, and settle or defend any such action. If the settlement or defense of any such action or claim is undertaken by DOE, the contractor or other person indemnified shall furnish all reasonable assistance in effecting a settlement or asserting a defense.

(g) Continuity of DOE obligations. The obligations of DOE under this clause shall not be affected by any failure on the part of the contractor to fulfill its obligation under this contract and shall be unaffected by the death, disability, or termination of existence of the contractor, or by the completion, termination or expiration of this contract.

(h) Effect of other clauses. The provisions of this clause shall not be limited in any way by, and shall be interpreted without reference to, any other clause of this contract, including the clause entitled Contract Disputes, provided, however, that this clause shall be subject to the clauses entitled Covenant Against Contingent Fees, Officials Not to Benefit, and Examination of Records by the Comptroller General, and any provisions that are later added to this contract as required by applicable Federal law, including statutes, executive orders and regulations, to be included in Nuclear Hazards Indemnity Agreements.

(i) Civil penalties. The contractor and its subcontractors and suppliers who are indemnified under the provisions of this clause are subject to civil penalties, pursuant to 234A of the Act, for violations of applicable DOE nuclear-safety related rules, regulations, or orders.

(j) Criminal penalties. Any individual director, officer, or employee of the contractor or of its subcontractors and suppliers who are indemnified under the provisions of this clause are subject to criminal penalties, pursuant to 223c. of the Act, for knowing and willful violation of the Atomic Energy Act of 1954, as amended, and applicable DOE nuclear safety-related rules, regulations or orders which violation results in, or, if undetected, would have resulted in a nuclear incident.

(k) Inclusion in subcontracts. The contractor shall insert this clause in any subcontract which may involve the risk of public liability, as that term is defined in the Act and further described in paragraph (d)(2) above. However, this clause shall not be included in subcontracts in which the subcontractor is subject to Nuclear Regulatory Commission (NRC) financial protection requirements under section 170b. of the Act or NRC agreements of indemnification under section 170c. or k. of the Act for the activities under the subcontract.

**78. FAR 52.251-1 GOVERNMENT SUPPLY SOURCES (APR 1984)**

The Contracting Officer may issue the Contractor an authorization to use Government supply sources in the performance of this contract. Title to all property acquired by the Contractor under such an authorization shall vest in the Government unless otherwise specified in the contract. Such property shall not be considered to be "Government-furnished property," as distinguished from "Government property." The provisions of the clause entitled "Government Property," except its paragraphs (a) and (b), shall apply to all property acquired under such authorization.

**79. FAR 52.251-2 INTERAGENCY FLEET MANAGEMENT SYSTEM VEHICLES AND RELATED SERVICES (JAN 1991)**

The Contracting Officer may issue the Contractor an authorization to obtain interagency fleet management system vehicles and related services for use in the performance of this contract. The use, service, and maintenance of interagency fleet management system vehicles and the use of related services by the Contractor shall be in accordance with 41 CFR 101-39 and 41 CFR 101-38.301-1.

**80. DEAR 952.251-70 CONTRACTOR EMPLOYEE TRAVEL DISCOUNTS (APR 1989)**

(a) Contracted airlines. Airlines participating in travel discounts are listed in the Federal Travel Directory (FTD), published monthly by the General Services Administration (GSA). Regulations governing the use of contracted airlines are contained in the Federal Property Management Regulation (FPMR), Temporary Regulation A-30. Temporary Regulation A-30 stipulates that cost-reimbursable contractor employees may obtain discount air fares by use of a Government Transportation Request (GTR), Standard Form 1169, cash or personal credit cards. When the GTR is used, contracting officers may issue a blanket GTR for a period of not less than two weeks nor more than one month. In unusual circumstances, such as prolonged or international travel, the contracting officer may extend the period for which a blanket GTR is effective to a maximum of three months. Contractors will ensure that their employees traveling under GTR's provide the GTR number to the contracted airlines for entry on individual tickets and on month-end billings to the contractor.

(b) Hotels/motels. Participating hotels and motels which extend discounts are listed in the FTD, which shows rates, facilities, and identifies by code those which offer reduced rates to cost-reimbursable contractor employees while traveling on official contract business.

(c) Car rentals. The Military Traffic Management Command (MTMC) Department of Defense, negotiates rate agreements with car rental companies for special flat rates and unlimited mileage. Participating car rental companies which offer these terms on to cost-reimbursable contractor employees while traveling on official contract business are listed in the FTD.

(d) Procedures for obtaining service.

(1) Identification and method of payment requirements for participating Federal contracted airlines are listed in the FTR. Travel discount air fares may be ordered by the issuance of a GTR either directly to the contractor, or to a Scheduled Airline Travel Office (SATO) or Federal Travel Management Center (FTMC), provided the letter of identification signed by the cognizant contracting officer accompanies the order. In appropriate instances, such as geographical proximity, contractors may obtain discount air fares through a DOE office or a cooperating local travel agency when neither a SATO or FTMC is available. Some airlines allow the purchase of discounted air fares with cash or credit card.

(2) In the case of hotel and motel accommodations, reservations may be made by the contractor employee directly with the hotel or motel but the employee must display, on arrival, the letter of identification and any other identification required by the hotel or motel proprietorship.

(3) For car rentals, generally the same procedures as in (d)(2) above will be followed in arranging reservations and obtaining discounts.

(e) Standard letter of identification. Contractors shall prepare for the authorizing contracting officer a letter of identification based on the following format:

Format for Government Contractors to Qualify for Travel Discounts (To be typed on agency official letterhead)

To: (Source of ticketing, accommodations or rental)

Subject: Official Travel of Government Contractor

(Full name of traveler), bearer of this letter, is an employee of (company name) which is under contract to this agency under the Government contract (contract number). During the period of the contract (give dates), the employee is eligible and authorized to use available discount rates for contract-related travel in accordance with your contract and/or agreement with the Federal Government.

(Signature, title and telephone number of the contracting officer)

**81. FAR 52.252-6 AUTHORIZED DEVIATIONS IN CLAUSES (APR 1984)**

(a) The use in this solicitation or contract of any Federal Acquisition Regulation (48 CFR Chapter 1) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the clause.

(b) The use in this solicitation or contract of any Department of Energy Acquisition Regulation (48 CFR Chapter 9) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

**82. DEAR 970.5204-2 SAFETY AND HEALTH (GOVERNMENT-OWNED OR LEASED) (APR 1984)**

The Contractor shall take all reasonable precautions in the performance of the work under this contract to protect the safety and health of employees and of members of the public and shall comply with all applicable safety and health regulations

and requirements (including reporting requirements) of DOE. The Contracting Officer shall notify the Contractor, in writing, of any noncompliance with the provisions of the clause and the corrective action to be taken. After receipt of such notice, the Contractor shall immediately take corrective action. The Contractor shall submit a management program and implementation plan to the Contracting Officer for review and approval within 30 days after the date of award of this contract. In the event that the Contractor fails to comply with said regulations or requirements of DOE, the Contracting Officer may, without prejudice to any other legal or contractual rights of DOE, issue an order stopping all or any part of the work; thereafter, a start order for resumption of the work may be issued at the discretion of the Contracting Officer. The Contractor shall make no claim for an extension of time or for compensation or damages by reason of, or in connection with, such work stoppage.

**83. CLAUSE DOE PR 9-9.110(C) - REPORTING OF ROYALTIES**

If this contract is in an amount which exceeds \$25,000 and if any royalty payments are directly involved in the contract or are reflected in the contract price to the Government, the Contractor agrees to report in writing to the Patent Counsel (with notification by Patent Counsel to the Contracting Officer) during the performance of this contract and prior to its completion or final settlement, the amount of any royalties or other payments paid or to be paid by it directly to others in connection with the performance of this contract together with the names and addresses of licensors to who such payments are made and either the patent numbers involved or such other information as will permit the identification of the patents or other basis on which the royalties shall not estop the Government at any time from contesting the enforceability, validity or scope of, or title to, any patent under which a royalty or payments are made.

**84. FAR 52.222-4 CONTRACT WORK HOURS AND SAFETY STANDARDS ACT - OVERTIME COMPENSATION (MAR 1986)**

(a) Overtime requirements. No Contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics (see Federal Acquisition Regulation [FAR] 22.300) shall require or permit any such laborers or mechanics in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than 1 1/2 times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(b) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the provisions set



forth in paragraph (a) of this clause, the Contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such Contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory) for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic employed in violation of the provisions set forth in paragraph (a) of this clause in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by provisions set forth in paragraph (a) of this clause.

(c) Withholding for unpaid wages and liquidated damages. The Contracting Officer shall upon his or her own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the Contractor or subcontractor under any such contract or any other Federal contract with the same Prime Contractor, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same Prime Contractor, such sums as may be determined to be necessary to satisfy any liabilities of such Contractor or subcontractor for unpaid wages and liquidated damages as provided in the provisions set forth in paragraph (b) of this clause.

(d) Payrolls and basic records.

(1) The Contractor or subcontractor shall maintain payrolls and basic payroll records during the course of contract work and shall preserve them for a period of 3 years from the completion of the contract for all laborers and mechanics working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Nothing in this paragraph shall require the duplication of records required to be maintained for construction work by Department of Labor regulations at 29 CFR 5.5(a)(3) implementing the Davis-Bacon Act.

(2) The records to be maintained under paragraph (d)(1) of this clause shall be made available by the Contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the Contracting Officer or the Department of Labor. The Contractor or subcontractor shall permit such representatives to interview employees during work hours on the job.

(e) Subcontracts. The Contractor or subcontractor shall insert in any subcontracts the provisions set forth in paragraphs (a) through (e) of this clause and also a clause requiring the subcontractors to include these provisions in any lower tier subcontracts. The Prime Contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the provisions set forth in paragraphs (a) through (e) of this clause.

**85. DEAR 970.5204-58 WORKPLACE SUBSTANCE ABUSE PROGRAMS AT DOE SITES (AUG 1992)**

(a) Program Implementation. The Contractor shall, consistent with 10 CFR part 707, Workplace Substance Abuse Programs at DOE Sites, incorporated herein by reference with full force and effect, develop, implement and maintain a workplace substance abuse program.

(b) Remedies. In addition to any other remedies available to the Government, the Contractor's failure to comply with the requirements of 10 CFR Part 707 or to perform in a manner consistent with its approved program may render the Contractor subject to: the suspension of contract payments, or where applicable, a reduction in award fee; termination for default; and suspension or debarment.

(c) Subcontracts.

(1) The Contractor agrees to notify the Contracting Officer reasonably in advance of, but not later than 30 days prior to the award of any subcontract the Contractor believes may be subject to the requirements of 10 CFR part 707.

(2) The DOE Prime Contractor shall require all subcontracts subject to the provisions of 10 CFR part 707 to agree to develop and implement a workplace substance abuse program that complies with the requirements of 10 CFR part 707, Workplace Substance Abuse Programs at DOE Sites, as a condition for award of the subcontract. The DOE Prime Contractor shall review and approve each subcontractor's program and shall periodically monitor each subcontractor's implementation of the program for effectiveness and compliance with 10 CFR part 707.

(3) The Contractor agrees to include, and require the inclusion of, the requirements of this clause in all subcontracts, at any tier, that are subject to the provisions of 10 CFR part 707.



**Department of Energy**  
Field Office, Albuquerque  
Los Alamos Area Office  
Los Alamos, New Mexico 87544

**NOV 30 1992**

**CONTRACT DISTRIBUTION**

Contract No. DE-AC32-93AL64100

	<u>Executed</u>	<u>Conformed</u>
Incorporated County of Los Alamos ATTN: County Administrator P.O. Box 30 Los Alamos, NM 87544	1	
James Gourdoux, LANL, MS-M718		1
Office of the Counsel, LAAO		1
Fire Department Official File	1	
→ Eloy M. Nunez, Fire Dept Contract Mgr., LAAO		1
Alfred Geoffrion, Administrative Branch, LAAO		1
ES&H BRANCH, LAAO		1
AMG/JLB FIRE SUPPRESSION, EMERGENCY MEDICAL AND RESCUE SERVICES, LOS ALAMOS, NEW MEXICO		
Financial Management Division, AL ATTN: Rosemary Herrera	1	

Received \_\_\_\_\_ Date \_\_\_\_\_

Administrative Branch

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Part III

List of Documents, Exhibits and Other Attachments

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ATTACHMENT A

## **STATEMENT OF WORK**

### **I. SERVICES TO BE PROVIDED**

#### **A. Work Scope**

1. The Contractor shall provide personnel to operate the Department of Energy-owned Los Alamos Fire Department to provide fire suppression, emergency medical, fire prevention, and rescue services for the Los Alamos Fire Department Service Area.

#### **B. Fire Suppression Services**

1. The Contractor shall provide fire suppression services for the Los Alamos National Laboratory Fire Service Area (LANL-FSA) and the Municipal Development Area-Municipal Fire Services Area, and for brush and forest fires within the Los Alamos Fire Department Service Area. (See Attachment D). The Contractor shall not provide these services to areas outside the above-mentioned areas unless required by mutual-aid agreements to which the County or the DOE is, or becomes a party.
2. The Contractor shall provide these fire suppression services to meet the requirements of this contract, Federal Aviation Administration (FAA) regulations at 14 CFR Part 139 and 1500, as modified in Annex A to the Statement of Work, and NFPA Standards as applicable to emergency response.

3. The Contractor shall develop and submit to the Contracting Officer for approval personnel and equipment response procedures for all areas within the LANL-FSA within 30 calendar days after award of contract. The response procedures shall include a minimum of five (5) SCBA-equipped personnel and designated equipment to incidents within the LANL-FSA, except as otherwise approved by the Contracting Officer. The response procedures should take into account facility programmatic importance and hazards. In developing the response procedures, the Contractor shall take into account available personnel and equipment, overall needs throughout the Fire Department Service Area, and efficient use of personnel and equipment.
4. Response levels to incidents outside the LANL-FSA shall be determined by the Contractor or as set forth in mutual-aid agreements with local, Federal, State, other recognized agencies or communities.

**C. Emergency Medical and Rescue Services**

1. LANL-FSA Area - The Contractor shall provide emergency medical and rescue services, as set forth herein.

Medical services related to ambulance service shall be under the program direction of the ambulance service Medical Director. These services shall meet all standards required by DOE and as further outlined in New Mexico State General Order No. 35, and State Regulation No. 85-4 (HSED) may be amended from time to time. Statutory authority for these regulations is contained in the Emergency Medical Services Act, Section 24-10B-1 to 10B-11, New Mexico Statutes Annotated, 1978, and Section 9-7-6, New Mexico Statutes Annotated, 1978.

2. All Other Areas - The Contractor shall provide a level of service which at a minimum complies with applicable federal and state laws, and local ordinances.
3. Personnel and Equipment Response - Responses to medical emergencies shall be based on requirements of the ambulance service Medical Director and comply with the requirements of the State of New Mexico license requirements. Responses to the LANL-FSA shall include at least two persons, one possessing qualifications of EMT-B and one EMT-I. Compliance with the EMT-B requirement shall be required upon award of the contract. Compliance with EMT-I



requirement shall be accomplished no later than one year after approval by the Contracting Officer of the implementation plan as described below. The Contractor shall submit a proposed plan for accomplishment of the EMT-I implementation requirement. The plan shall include tasks and milestones for accomplishment thereof. The plan shall be submitted to the Contracting Officer for approval no later than 30 calendar days after award of the contract. The Contractor shall submit a monthly report to the Contracting Officer reporting the status of actions taken to accomplish tasks in the plan.

4. Non-Emergency Services - The Contractor may provide medical transport services between treatment facilities in Los Alamos and nearby communities subject to the following restrictions:
  - a. Services can be provided by standby equipment and off-duty personnel.
  - b. The use of on-line equipment and on-duty personnel is authorized only when requested by medical authorities and the situation is life-threatening.

c. When on-line equipment and personnel are used for medical transport, it will be the responsibility of the Fire Department's senior person on duty to assure that adequate personnel remain on duty or are called to duty to provide the minimum manning levels set forth in the response procedures for fire suppression, emergency medical and rescue services.

5. Emergency Medical and Rescue Services Operating Procedures -

a. The Contractor shall develop and implement written operating procedures for emergency medical and rescue services to be provided by the Fire Department. The procedures shall cover equipment assignment to stations, personnel training; response manning, including personnel qualifications; guidelines for equipment dispatching within and outside the Los Alamos Fire Department Service Area; and billing and collection of ambulance and rescue services revenues. The operating procedures shall be submitted to the Contracting Officer within 90 calendar days after award of the contract and

shall be updated as required or as directed by the Contracting Officer.

**D. Communications and Dispatch**

1. The Contractor shall be responsible for the operation of all radio and telephone systems provided by the Government under this contract. In addition, the Contractor shall be responsible for the dispatch of equipment and personnel to emergencies. Written procedures shall be developed and implemented setting forth procedures to be followed by Fire Department personnel for receiving alarms, dispatching of equipment, and tracking and coordinating of the equipment after dispatching. The Contractor shall assure that communications equipment utilized by the Fire Department has the ability to contact other agencies within the Los Alamos Fire Department Service Area, and areas covered by mutual-aid agreements, including the ability to contact off-duty personnel. Communication and dispatch procedures shall be submitted to the Contracting Officer for approval within 120 calendar days after award of the contract.

2. The DOE will allow the Contractor the use of the LANL trunked radio system for responses to emergencies that fall within the scope of the contract.
3. The Contractor shall comply with the requirements of NFPA 1221, Installation, Maintenance and Use of Public Fire Service Communications Systems, and NFPA 72F, Installation, Maintenance and Use of Emergency Voice/Alarm Communications Systems in providing services as required by this contract.
4. The DOE will provide the Contractor with a temporary communications/dispatch facility to be located at Fire Station No. 2 or other mutually agreed location. The Contractor will be responsible for providing trained personnel to operate the facility. The DOE and the Contractor hereby agree to continue negotiations for the development of a plan for a combined Fire Department/Police dispatch center. The negotiations will address the location, staffing, equipment, facility, and funding required for the operation of each facility and the transition of the dispatch function from the temporary to the permanent facility.

## **II. ORGANIZATION AND MANAGEMENT**

- A. The Contractor shall develop and maintain an organization to efficiently and effectively meet the staffing requirements of the contract.**
- B. The Contractor shall prepare an organization chart that shows lines of authority and relationships of the Contractor's organizational structure that provide direct and indirect support to the Fire Department. The chart should also include outside organizations such as other fire departments which provide support pursuant to mutual-aid agreements, other DOE contractors such as the University of California, and the Forest Service. Additionally, the Contractor shall prepare an organization chart which depicts the line functions of each position, and lines of authority of all positions assigned to the Fire Department. The organization chart shall be supported by a narrative statement which describes the function, responsibility, and authority of each position assigned to the Fire Department.**
- C. Prior to implementing any permanent changes to the Fire Department organization, the Contractor will submit for the Contracting Officer's approval, any proposed revisions to the approved organizational structure, organization chart and narrative and obtain written Contracting Officer approval for the proposed revisions.**

D. In order to maintain authorized staffing levels, the Contractor can request approval from the Contracting Officer to exceed the authorized FTE levels at the time recruitment is made to fill vacant positions. The numbers of personnel to be recruited which exceed the authorized FTE levels will be based on projections based on attrition rates or other factors as authorized by the Contracting Officer.

## **II. BUDGETING AND COST MANAGEMENT**

### **A. BUDGET -**

1. Annually the Contractor shall prepare and submit for Contracting Officer approval a budget consistent with the Government's fiscal year, which begins on October 1 and ends on September 30 of the following calendar year. The budget shall be submitted to the Contracting Officer no later than September 30th of each year and shall cover the fiscal year starting on October 1 of the next fiscal year and the two following fiscal years. For example, the submission for FY 1994 will include FY 1995 and FY 1996 and would be submitted by September 30, 1993. The budget shall be prepared in a line-item type of format as approved by the Contracting Officer. Each line-item in the budget shall be supported by a narrative description for each type of cost item that makes up each

individual line of the budget. The budget shall include all work to be performed which will be funded by for operating expense, capital equipment and capital plant type funding. The requirements of Order DOE 5100.3, Planning, Programming and Budgeting, shall be followed in preparing the budget.

2. The budget shall be updated by the Contractor as requested by the Contracting Officer. The updates shall reflect the actual costs incurred by the Contractor for each of the previous periods of the fiscal year and the Contractor's projections for the remainder of the fiscal year.

Increases or decreases of the amounts for any of the line-items shall be supported by reasons causing the variances. Projected overruns or any of the line-items that exceed 10% of the line-item amount or \$50,000, whichever is less, shall be reported to the Contracting Officer in writing immediately upon discovery of the projected overrun. The Contractor shall establish a system that will enable the development of budget projections and tracking of costs for each line-item in the budget on a minimum of a monthly basis or as required to provide budget and cost control of funds.

## **B. COST MANAGEMENT -**

1. The Contractor shall implement a cost management system that will enable each Contractor element or organization to charge costs for expenditure of funds to each applicable line-item of the budget. The system shall be submitted to the Contracting Officer for approval within 180 calendar days after award of this contract.
2. The cost management system shall allow coding by an originator of a fund expenditure request, such as purchase and work orders, contract, etc., and approval of the coding and fund expenditure by a person designated by the Contractor to approve the expenditure. The cost management system shall have a tracking system that can account for all funds expended on a given order. The Contractor shall provide the Contracting Officer a monthly report which shows the fund status on a predetermined cut-off date of each month. The report shall show a description of the expenditure, amount of funds committed, and funds costed or paid out. Costs shall be reported for each line-item and sub-item in the approved budget. The report shall be submitted to the Contracting Officer no later than 30 calendar days following the end of each month.



3. The Contracting Officer will provide the Contractor with budget and cost information on Government-furnished property and services. The type and frequency of information to be provided will be mutually determined by Contracting Officer and the Contractor.

#### **IV. PERSONNEL MANAGEMENT**

The Contractor shall develop and implement a plan for personnel management of all Fire Department personnel which, at a minimum, covers the following areas:

1. Organization for personnel management
2. Position classification and job analysis
3. Compensation and benefits
4. Human resource planning
5. Equal employment and affirmative action
6. Recruitment and selection
7. Personnel assignments
8. Performance appraisal
9. Personnel development

In development of the personnel plan, the Contractor shall incorporate applicable requirements of this contract.

Submission of the plan for Contracting Officer approval shall be 60 calendar days after award of the contract.

## **V. SECURITY PLAN-**

The Contractor shall develop a Security Plan to assure that persons not possessing a DOE "Q" clearance are not allowed access to classified matter or special nuclear material. See Contract Clauses entitled DEAR 952-204.2 , Security Requirements and DEAR 952.204-70, Classification. The Security Plan shall set forth the procedures that will be used by the Contractor to comply with the requirements of the referenced clauses. The Plan shall be submitted to the Contracting Officer for approval 30 calendar days after award of the contract.

## **VI. PROPERTY MANAGEMENT**

A. Property Management System - The Contractor shall develop and implement a system to track, inventory, report, and maintain all Government property as defined by the Contract clause entitled "Government Property (Cost Reimbursement, Time-and Materials, or Labor-Hour Contracts)" to be used by the Contractor in performing work as required by the contract. The system shall be in writing and shall as a minimum set forth procedures for:

1. Accountability of property
2. Inventory management
3. Responsibility for protection and safeguarding

4. Utilization/Disposal
5. Identification
6. Maintenance
7. Records/reporting
8. Inspection
9. Loan policy

B. Property Management Program Plan - A Property Management Plan which sets forth the Contractor's property management system shall be submitted to the Contracting Officer for approval within 180 calendar days after award of this contract.

C. Personal Property Controls -

1. Non-capital equipment

- a. Non-capital equipment is defined as those items of nonexpendable personal property with a unit acquisition cost of between \$1,000 and \$4,999 and having a life of one year or more.
- b. Property management information is to be maintained to support interrelated systems and programs such as maintenance, calibration, equipment pools, inventory, loans, storage, and excess reporting.
- c. Acquisition value shall be available to support reporting of the equipment through the disposal process.

- d. Each item of equipment shall be identified as U. S. Government property by a tag or marking and shall be assigned a specific property control number.

## **2. Sensitive Items**

- a. Sensitive items are those items of property, regardless of value, which are considered to be susceptible to being appropriated for personal use or which can be readily converted to cash; for example: firearms, portable photographic equipment, binoculars, portable tape recorders, portable calculators, and portable power tools.
- b. The Contractor shall evaluate items in the \$1,000-\$4,999 range which should be added to the sensitive items list. Examples of these items include personal computer units and associated components, computer software, radios, electronic equipment, etc.
- c. Non-sensitive property management record data similar to that used for non-capital equipment shall be established.
- d. Each item of equipment shall be identified as U.S. Government property by a tag or marking and shall be assigned a specific property control number.

### **3. Capital Equipment**

- a. Capital equipment is defined as those items of nonexpendable property with a unit acquisition cost of \$5,000 or more.**
- b. The Contractor shall include in the property management system procedures to record information, system data, property accountability, policies, etc., to meet the requirements set forth in the AL Property Management Instructions.**
- c. Each item of equipment shall be identified as U.S. Government property by a tag or marking and shall be assigned a specific property control number.**

### **4. Motor Equipment (Vehicles)**

- a. The Contractor shall develop policies and procedures for economical and efficient management and control of Government-owned motor vehicles and motor vehicles rented or leased to the Government, including report-registration, official use, and identification to comply with the applicable requirements of Federal Property Management Regulations, Part 101.38, Sub-chapter G, and Department of Energy Property Management Regulations, Subchapter G, Transportation and Motor Vehicles.**

- b. Each vehicle shall be identified as U.S. Government property by a tag or marking and shall be assigned a specific property control number.

### **C. Real Property**

1. The terms real property and real estate are synonymous and are defined as land and anything permanently affixed to the land such as buildings, fences, and those things attached to buildings such as lighting fixtures, plumbing and heating fixtures, etc.
2. The Contractor shall develop and implement a real property management system to administer, inventory, and report real property provided by DOE to the Contractor, to meet the requirements of Order DOE 4300.1B, Real Property and Site Development Planning.
3. The Contractor shall develop and implement a maintenance management program to meet the requirements of Order DOE 4330.4A, Real Property Maintenance Management and Order DOE AL 4330.4A, Maintenance of Property.

## **VII. TRAINING AND PROFESSIONAL DEVELOPMENT**

### **A. Training Program**

1. The Contractor shall develop, implement, and administer training programs that will include a new hire

training program, an in-service training program, qualification levels, and a certification program for all levels of training.

2. The Contractor shall appoint a full-time Training Officer responsible for overseeing all training and training-related qualifications, certifications, records, and reports required by this contract.

3. The Contractor shall develop the following training programs to maintain the minimum required level of service:

a. Management training for supervisory officers in accordance with NFPA 1021.

b. Training for firefighters levels 1 and 2 shall meet NFPA 1001, Fire Fighter Professional Qualifications and requirements for Emergency Medical Technician, Basic (EMT-B), as set forth in the State of New Mexico Regulations Governing the Licensing of Emergency Medical Technicians.

c. Fire Officer training which complies with the requirements of NFPA 1021, Standards for Fire Officer Professional Qualification, will be required prior to promotion into the officer ranks or before completion of the probationary period of the position.

- d. Company training which includes fire fighting tactics and strategy, hose evolutions, salvage techniques, ladder drills, hazardous materials, live fire drills, mountain rescue, relay operations, aircraft crash fire rescue training, apparatus pump operators training, and familiarization with fire suppression and detection systems. Fire apparatus driver/operator professional qualifications shall in accordance with NFPA 1002. Airport firefighter professional qualifications shall be in accordance with NFPA 1003, and Federal Aviation Administration, regulations at 14 CFR Part 139.
- e. Pre-incident training which provides a comprehensive working knowledge of building protection, including technical indoctrination of nuclear criticality, radiation protection, explosives, large electrical installations, and LANL experimental facilities. Approved pre-fire plans shall augment this training.
- f. Emergency medical services training shall comply with requirements set forth in the State of New Mexico Regulations Governing the Licensing of Emergency Medical Technicians. Training level of Emergency Medical Technician-Basic (EMT-B) and/or



Emergency Medical Technician-Intermediate (EMT-I) as required.

- g. Training on the safe and proper operation of vehicles by all personnel during normal and emergency use. As a major objective, a training program shall be established to minimize the incidence of injuries, vehicle accidents, and abuse of vehicles. Training shall comply with NFPA 1002 requirements.
  - h. Training for hazardous-materials response shall be in accordance with NFPA 471 and 472; and OSHA 29 CFR 1910.120. All Fire Department personnel who will respond to emergencies shall receive training to meet the OSHA first responder awareness and first responder operational levels as a minimum. The DOE will provide training, as required, for those responses to the LANL-FSA that involve specific types of hazardous materials that are unique to LANL operations.
  - i. Training for administrative and technical support personnel assigned to the Fire Department.
4. The Training Program shall be submitted to the Contracting Officer for approval within 60 calendar days after award of contract.

#### **B. Training Records-**

The Contractor shall establish and maintain training records and a certification program that will document specific qualifications and proficiency levels maintained for all personnel involved in fire suppression, emergency medical, and rescue operations.

#### **C. Training Exercises-**

The Contractor shall conduct exercises to assure competency in all assigned responsibilities, training, and qualification levels. In addition, the Contractor shall participate in exercises conducted by DOE for purposes of evaluating fire suppression, emergency medical, and rescue services response effectiveness. These exercises shall be conducted on at least a yearly basis and should cover all types of emergencies that the Fire Department responds to.

### **III. EMERGENCY MANAGEMENT**

#### **A. Incident Command System (ICS)**

1. In connection with providing the services described herein, the Contractor shall implement an ICS. For incidents involving the LANL-FSA, the Contractor's ICS shall follow the basic fundamentals set forth in the LANL Emergency Response Plan which shall be based on and

consistent with the National Interagency Incident Management System. The Department of Energy will provide the necessary basic training and coordination with other DOE contractors at the LANL to allow the Contractor for the development of an ICS that will be consistent with all LANL organizations. The Contractor shall participate in the development and review, and concur with the approval of the LANL Emergency Response Plan.

2. In connection with responding to incidents within the LANL-FSA, if the Fire Department is the first responder on the scene, the Fire Department's ranking officer shall be the Incident Commander. Upon arrival at the scene of a higher ranking officer, Incident Command will be transferred as set forth in the Fire Department's ICS. The Fire Department's Incident Commander will remain in charge of an incident as long as the incident remains a fire, rescue or medical incident. If the incident involves hazards or requires resources other than those possessed by the Fire Department, then the Fire Department shall request that the LANL's Emergency Manager assume Incident Command. The Fire Department's ranking officer at the scene will remain in command of all the Fire Department's elements at the incident scene and will provide fire suppression,

emergency medical and rescue services as requested by the Incident Commander.

3. A written procedure to implement an ICS shall be developed to apply to all Contractor personnel involved in emergency operations. The procedures shall, as a minimum, identify training for emergency situations, safety, chain-of-command, and special hazards. The ICS procedures shall be submitted to the Contracting Officer for approval within 60 calendar days after award of the contract.

**B. Occurrence Reporting -**

The Contractor shall develop and implement occurrence reporting procedures that comply with the requirements of Order DOE 5000.3A, Occurrence Reporting and Processing of Operations Information. This requirement is applicable to all Fire Department facilities and operations covered by this contract. Submittal of the procedures is required 30 calendar days after award of contract.

**IX. CONTINUITY OF OPERATIONS**

- A. In addition to complying with the requirements of the contract clauses entitled "Continuity of Services" and "Notice to the Government of Labor Disputes," the

Contractor shall take the actions required herein to assure a continuation of services under this contract. Any threat to the maintenance of required personnel staffing as a result of a potential or threatened work stoppage or other collective personnel actions shall be promptly reported to the Contracting Officer. The Contractor shall take all reasonable steps to minimize potential threats to operational continuity by providing for adequate planning and execution of emergency services.

- B. The Contractor shall prepare a written Contingency Plan within 90 calendar days after award of contract and submit it to the Contracting Officer for approval. The Contingency Plan shall recognize all joint resources available to the parties of this contract, and shall address the Contractor's approach to providing critical services in the event of a work stoppage or labor dispute. In addition, the Contractor shall coordinate resources that could be provided by the DOE's contractors at the Los Alamos National Laboratory in preparation of the Contingency Plan. This Contingency Plan shall be updated periodically as deemed necessary or prudent by the contracting parties, and any changes to the Plan will be subject to the approval of the Contracting Officer.

C. When a strike or work stoppage is threatened or appears likely, the Contractor shall immediately provide the notice required above, and with the approval of the Contracting Officer, commence implementing necessary elements of the approved Contingency Plan.

**X. PRE-FIRE PLANNING FOR FIRE SUPPRESSION**

A. LANL-FSA Area. The Contractor shall implement a Pre-Fire Planning Program to develop and maintain pre-fire plans for incidents which the Fire Department responds to. A list of LANL Key facilities, in priority order, shall be provided to the Contractor by the Contracting Officer for development of pre-fire plans within the LANL-FSA.

The pre-fire planning shall include development of plans for wild-land fires and support provided by Fire Department to explosive or other LANL test programs.

B. All Other Areas. The Contractor shall develop pre-fire plans on a scope and frequency to be developed by the Contractor.

C. Two copies of all approved pre-fire plans and revisions thereto, for the LANL-FSA, shall be provided to the Contracting Officer for DOE use.

- D. Each pre-fire plan within the LANL-FSA developed by the Contractor shall be submitted to the Contracting Officer for review. The Contractor shall protect all pre-fire plans as required by the assigned classification. All pre-fire plans within the LANL-FSA will, as a minimum, be handled as "Official Use Only" or Unclassified Controlled Nuclear Information (UCNI) documents.
- E. A Pre-Fire Planning Program Plan shall be developed by the Contractor and submitted to the Contracting Officer for approval within 30 calendar days after award of the contract. The Contractor shall update the Plan as required to reflect any proposed changes to the Plan or as directed by the Contracting Officer.

#### XI. MUTUAL-AID AGREEMENTS

- A. DOE is a party to one mutual-aid agreement--Memorandum of Agreement for Mutual Fire Protection, MOU DE-GB32-89AL57296. The Contractor shall be responsible for complying with DOE's commitments of this mutual-aid agreement as they apply to the services provided by the Fire Department.
- B. During the term of this Contract, DOE may enter into additional mutual-aid agreements for which responsibility will be assigned to the Contractor under this contract, or the Contractor may, with DOE's approval, enter into

mutual-aid agreements which will be carried out as part of the contract work. The parties will determine, at the time such agreements are entered into, whether they constitute a change to the contract requiring an adjustment in the estimated price of the Contract.

- C. It is contemplated by the parties that the Contractor will enter into mutual-aid agreements with local governments, federal agencies, Indian Pueblos, or other entities whose jurisdictional authority is adjacent to the Los Alamos Fire Department Service Area, when DOE determines that such mutual-aid agreements will enhance the services required under this contract and will not interfere with the performance of services to the LANL-FSA.
- D. In connection with any existing or future mutual-aid agreement, which may involve work whose costs are allowable under this contract, the Contractor shall obtain the prior written approval of the Contracting Officer before carrying out any of the following actions:
1. Conducting discussions or negotiating with the objective of entering into an agreement;
  2. Executing an agreement; or
  3. Providing any services pursuant to an existing, DOE-approved agreement which are not expressly required by the agreement.



## **XII. NON-EMERGENCY SERVICES**

### **A. Fire Hydrant Flow Testing**

1. LANL-FSA Area - The Contractor shall provide annual flow testing of all fire hydrants located on DOE property, and those used to protect property which DOE leases within Los Alamos County, in accordance with NFPA 291, latest edition. The reports of these flow tests shall be delivered to the Contracting Officer within 30 calendar days of completion of the tests.
2. All other areas of Los Alamos County - The Contractor shall determine the scope for testing of fire hydrants on Los Alamos County property, and comply with those requirements as necessary.
3. The Contractor shall develop and implement written procedures for fire-hydrant testing to be used by the Fire Department to comply with this requirement and submit to the Contracting Officer for approval within 45 calendar days after award of the contract.

### **B. Standby Services**

1. Los Alamos Airport - The Contractor shall comply with applicable Federal Aviation Administration (FAA), 14 CFR PART 139, Regulations for General Aviation

Activities and shall comply with applicable FAA, DOE, or Department of Defense (DOD) directives and regulations for specialized support for special cargo flights to suppress any fire or accomplish any rescue from take-off or landing operations.

2. LANL-FSA Area - The Contractor shall provide stand-by personnel and equipment for specific activities as deemed necessary and requested by the Contracting Officer.

3. All Other Areas - The Contractor shall provide standby personnel and equipment for specific activities as deemed necessary by the Contracting Officer.

C. Non-Emergency Alarms - The Contractor shall respond to non-emergency alarms (automatic fire protection system supervisory and trouble alarms), within a reasonable period of time, normally not to exceed fifteen (15) minutes.

D. Fire Evacuation Exercises - The Contractor shall provide personnel and equipment for building evacuation exercises at the LANL-FSA on an on-call basis subject to availability of personnel and equipment when authorized by the Contracting Officer.

**E. Fire Prevention Services -** The Contractor shall provide fire prevention services for the Municipal Development Area and shall ensure that this service is provided in accordance with applicable federal and state and local ordinances; provided, however, that with respect to local ordinances, it is understood and agreed that DOE will not reimburse the Contractor for the salaries of any personnel whose sole function is that of inspection pursuant to existing local ordinances, but that within the staffing levels agreed to, these personnel may carry out inspection duties to fulfill the requirements of existing local ordinances as adjunct duties to the duties required under this contract.

**OPERATIONAL PROCEDURES**

- A. GENERAL -** The Contractor shall develop and implement procedures to be used for the daily operations of the Fire Department. These procedures shall set forth how the Fire Department operations will be managed, organized, and conducted to assure compliance with requirements of this contract.
- B.** In the development of these operational procedures, the Contractor shall utilize specific procedures developed by the Contractor in meeting the requirements of this

contract. In addition, applicable requirements of Order DOE 5480.19, Conduct of Operations Requirements for Facilities, shall be used as a guideline to assure that the conduct of operations meets DOE guidelines and that adequate written documentation exists to demonstrate the Contractor's conformance to these requirements.

- C. Procedures developed to meet the requirements of this section shall follow a standard format. The procedures shall be placed in a loose-leaf type binder so that revisions or additions may be made as they occur. Each procedures manual shall be controlled. A procedure shall be established to keep track of manuals and distribution of changes thereto.
- D. Electronic versions of the manual that can be used by MS-DOS personal computers will be developed by the Contractor at the earliest time possible.

#### **IV SELF-ASSESSMENT PROGRAM**

- A. The Contractor shall develop and implement a self-assessment program to provide a means for the assessment of the overall performance of the Fire Department and the Contractor's support functions as they apply to the Fire Department.
- B. The Contractor shall establish, document, and implement a self-assessment program which includes a description of

each major fire department function to include managerial and operational functions. For each function, a list of criteria upon which an assessment can be based shall be developed. Criteria are to be objective and contain measurements which can be tracked over time. The Contractor shall develop an annual schedule of periodic evaluations, at least one per quarter, covering each function during the year. The Contractor shall review and modify, as needed, functions and criteria prior to producing the upcoming year's schedule. Each functional area shall contain measurements; however, each individual criteria does not necessarily have to include measurements. The Contractor shall perform and document evaluations in accordance with the annual schedule, including problems not covered by a specific criteria. In carrying out evaluations, the Contractor shall utilize internal personnel not directly responsible for the given function, and shall rate overall performance in each function in accordance with the results. The Contractor shall gather managerial and affected operational representatives together following the evaluation to formulate corrective actions and look for opportunities for continual improvement. The Contractor shall document and perform corrective actions.

C. The proposed upcoming yearly program, and goals and accomplishments from the previous year shall be discussed with the Contracting Officer on a yearly basis.

## **ANNEX A TO STATEMENT OF WORK**

### **IMPLEMENTATION OF NFPA 1500, FIRE DEPARTMENT OCCUPATIONAL SAFETY AND HEALTH PROGRAM**

The following sets forth the DOE requirements to be followed in implementing the requirements of NFPA 1500 to DOE facilities:

**Section 2-1.1** The documents required by this Section need not be consolidated into a single document. In particular, Policy, Organization, and functional statements should be available for audit and be up to date. Training documents may consist of manuals, films, and other materials prepared by others and merely referenced in a training plan, or in functional statements.

**Section 2-3.** Where the fire department, or other fire-fighting organization, is part of a larger organization that provides the requisite "research, development, implementation, and enforcement of an O&H program," the fire department program needs may be included within the larger program.

**Section 2-4.** A Safety Officer shall be designated for each organization. Where safety services, monitoring, training, etc., are provided by another on-site organization, or the parent organization, the person designated as the Safety Officer shall be responsible to coordinating the services required by the department.

Responsibility for safety at the first-response level shall be incorporated in the department's emergency procedures manual.

The fire department Safety Officer can be anyone in the organization who can show up on the scene, not necessarily with the first response, but must be someone other than the incident commander as the Safety Officer is intended to be an independent voice, advising the incident commander.

**Section 2-5.** The O&H Committee may include representatives from other organizations when the department is part of a larger organization or at a site where safety services are provided by others. The required safety meetings may be joint meetings with others if the department's safety needs are amenable to joint meetings.

**Section 2-6.** The records required in this Section may be maintained by a parent or service organization as long as they are auditable and are available to the department.

**Section 2-6.2.** The department shall have a procedure for collecting possible exposures in the incident files and individual medical records.

**Section 3-1.4.** The requirement for training and education is considered to require that all firefighters must be trained in the hazards to be encountered at the scene of an incident before they can participate in active operations requiring such training.

**Section 3-1.5.** The individuals providing the training and education need not be members of the fire department, but they should be knowledgeable in the area of instruction as it relates to the fire service.

**Section 3-1.6.** Training Officer qualifications may be met by either compliance with the stated NFPA 1041, or by obtaining local or state certification.

**Section 3-3.2.** All personnel assigned to structural firefighting positions shall receive training adequate to meet the Firefighter I qualification of NFPA 1001.

**Section 3-3.3.** Training programs for drivers/operators shall be designed to meet the intent of the referenced standard. It is understood that some licensing requirements will vary by states and/or type of equipment.

**Section 3-3.4.** All specialized training programs, i.e., fire officer, driver/operator, airport firefighter, shall be developed and implemented within each organization. This shall be so accomplished as to meet the intent of the appropriate NFPA Standard.

**Section 3-4.** Training in fire ground operations shall be based on accredited systems, such as those provided by the International Fire Service Training Association manuals, official state training manuals, etc.

**Section 3-5.** Because of the specialized operations and hazards peculiar to most DOE sites, these "special hazards" training requirements are of prime importance. Training should include not only the nature of the hazards, but familiarization with the protective systems employed, the monitoring and alarm systems peculiar to the operation, and the support services provided by other parts of the site organization in monitoring or alleviating an emergency situation.

**Section 4-2.1.** Drivers of fire department vehicles shall receive special training in the operation of the vehicle and must be certified and/or licensed, as appropriate, or as required by the State to operate fire department vehicles.

**Section 4-2.4.** An exception to the requirement is the rear attendant of an ambulance when actively attending to a patient. This exception shall stand until such time as acceptable safety restraints are available for the rear ambulance attendant.



**Section 4-3.1.** An exemption may be granted for some site-specific vehicles, such as golf cart-type vehicles used within building to deliver supplies and equipment and automatically restricted in maximum speed. However, any such exemptions must be reviewed and approved by the Safety Officer and documented in the department files.

All present and future acquisitions of used apparatus shall be brought up to the minimum standards for safety seating requirements.

**Section 4-3.4.** For ladders, see the Interpretation Note on NFPA 1932. (All test conditions are required except that the annual test requirement may be changed to not less than every five years. All other conditions noted as requiring the test are unchanged).

**Section 5-1.1.** As a clarification, all equipment must be available and donned before the individual participates in any evolutions requiring protective clothing use. It is not necessary for each member of a department or brigade to have a full set of all protective clothing as long as supplies for the anticipated needs can be delivered to the point of use in adequate quantities and sizes for anticipated needs and without incurring undue delay in the emergency response.

All new equipment needed to fulfill the requirements of this Section shall be procured by the end of FY 1990.

**Section 5-2.7.** The fire resistance of work station uniforms should be considered in applying this Section. Where firefighting is provided by personnel who have other primary jobs, such as in most fire brigades, the provisions of NFPA 1975 need not be applied to their work clothing. However, any exceptions to the requirement should be reviewed by the Safety Officer and exception documented in the department records. Training needs and turnout gear provisions should take into account the clothing normally worn by responders.

**Section 5-3.4.2.** SCBA cylinders need not be emptied quarterly if not a requirement by the manufacturer/supplier.

**Section 5-4.1.** Personal Alert Safety Systems (PASS) need be provided only for people involved in interior firefighting or hazardous responses.

**Section 5-5.3.** Life safety ropes used for rescue shall be previously unused and shall be thoroughly examined upon completion of rescue in accordance with the manufacturer's recommendations. Ropes used for rescue shall remain in the custody of the original purchasing engine company or fire department. Records shall be kept, documenting the use, inspection, and inspector, immediately after each use and prior to any future use. The date and officer in charge will also be indicated on the records. All ropes leaving

the custody of the fire department must be destroyed, or otherwise prevented from being reused in life safety operations. Any indication of wear or shock loading will be justification to destroy said rope. Life safety ropes shall be completely dry and clean prior to restoring for use as life safety lines.

Section 6-1. Some of the requirements pertaining to emergency operations may be covered by a parent organization or be provided by other on-site organizations at DOE facilities. Health physics, for example, may provide the basic personnel required by Section 6-1.7 for radiological emergencies. All of the elements of Chapter 6, however, should be in place in the overall site plan. All emergency plans should clearly identify the incident commander for each type of emergency.

Section 6-2. The minimum response requiring interior firefighting or other operations requiring the entrance of SCBA-equipped people shall be 3 persons. When less personnel are available, interior operations shall not be attempted.

Section 6-3.2. Clarification. The requirement for personnel "standing by" does not mean the required people cannot be performing some other function, but they must be able to suspend what they are doing to provide the immediate rescue efforts.

Section 6-3. The "standing by" requirement for qualified life support personnel may be relaxed if, in the Chief's opinion, "qualified personnel are readily available and are dedicated to the site. (At a small site, it should not be necessary for medical/ambulance personnel to respond on every incident).

**CAPITAL EQUIPMENT**  
**NON-CAPITAL EQUIPMENT AND**  
**SENSITIVE ITEMS**

(Incorporated here by reference is the "Semi-Annual Summary Report of DOE-Owned Plant and Capital Equipment - DOE Form 4300.3" for the period ending February 28, 1992.)

## **FACILITIES**

### **REAL PROPERTY**

(Incorporated here by reference is the "Semi-Annual Summary Report of DOE-Owned Plant and Capital Equipment - DOE Form 4300.3" for the period ending February 28, 1992.) In addition, attached are DOE/LAO Fire Station Survey Maps, pages 1 - 7.

PROJECT DOE/LAAS FIRE STATION SURVEY

SHEET	1	OF	7
DATE	3	15	88
JOB NO.	88-022		
BY	MASCARENAS		
APPR	Z		

DESCRIPTION NOTES

**BASIS OF BEARINGS**

**FIRE STATION 1: N12° 23' 47"W AS ESTABLISHED  
BY FOUND CONTROL POINTS DIAMOND 1 & DIAMOND 2 N.M.S.P. GRID  
BEARING**

**FIRE STATION 2: BEARING OF N14° 57' 06"E AS ESTABLISHED BY THE  
FOUND SOUTHWEST CORNER AND FOUND NORTHWEST ANGLE POINT OF TRACT  
DD EASTERN AREA NO.2, SAID PLAT ON FILE AT THE LOS ALAMOS COUNTY  
COURTHOUSE.**

**FIRE STATION #3 PLAT BEARING AS ESTABLISHED BY FOUND CORNERS OF  
TRACT J.A. WHITE ROCK NEW MEXICO SAID PLAT BEING ON FILE AT THE  
LOS ALAMOS COUNTY COURT HOUSE.**

**FIRE STATION #4 PLAT BEARING AS ESTABLISHED BY FOUND CORNERS OF  
TRACT 6, NORTH COMMUNITY NO.2: SAID PLAT BEING ON FILE AT THE LOS  
ALAMOS COUNTY COURT HOUSE.**

**FIRE STATION NO.5: GRID BEARING OF N43° 56' 52"E AS ESTABLISHED  
BY FOUND BRASS CAPS 1440 AND 1441 OF THE LOS ALAMOS TECHNICAL  
AREAS.**

**NOTES: WALKS SHOWN ON ENG-C-7108 HAVE BEEN OVERLAID WITH  
ASPHALT.**

**UTILITIES SHOWN ARE BASED ON EXISTING SURFACE FEATURES  
AND ARE APPROXIMATE ONLY. ALL UTILITY LOCATIONS MUST  
BE FIELD VERIFIED PRIOR TO ANY EXCAVATION OR  
CONSTRUCTION.**

**NOTE: UNDERGROUND UTILITIES ARE SHOWN FOR INFORMATION ONLY.  
FIELD VERIFY PRIOR TO ANY EXCAVATION OR CONSTRUCTION.**

## PROJECT DOE/LAAO FIRE STATION SURVEY

SHEET 2 OF 7

DATE 3 / 15 / 8

## DESCRIPTION LEGEND

JOB NO 88-022

BY APPR

LEGEND

	OVERHEAD ELEC.		GAS VALVE
	SEWER		ASPHALT
	PROPERTY		CONCRETE
	VALVE		VITRIFIED CLAY PIPE
	SET PROP. BOUNDARY		FLAG POLE
	CLEANOUT		ELEC. PANEL
	PROPERTY BOUNDARY		DRAIN
	TEL RISER		CLEANOUT
	PINON OR PINE		GAS METER
	MANHOLE		ANTENNA MAST
	WATER		RETAINING WALL
	UNDERGROUND ELEC.		METER PIT
	POWER POLE		STEAM
	GAS		STORM DRAIN
	FENCE		TELEPHONE LINE
	FIRE HYDRANT		

Pan Am World Service, Inc.

P.O. Box 5, Los Alamos, N.M. 87544-0050

PROJECT DOE/LAAO FIRE STATION SURVEY

SHEET 3 OF 7

DESCRIPTION FIRE STATION # 1 TA-3

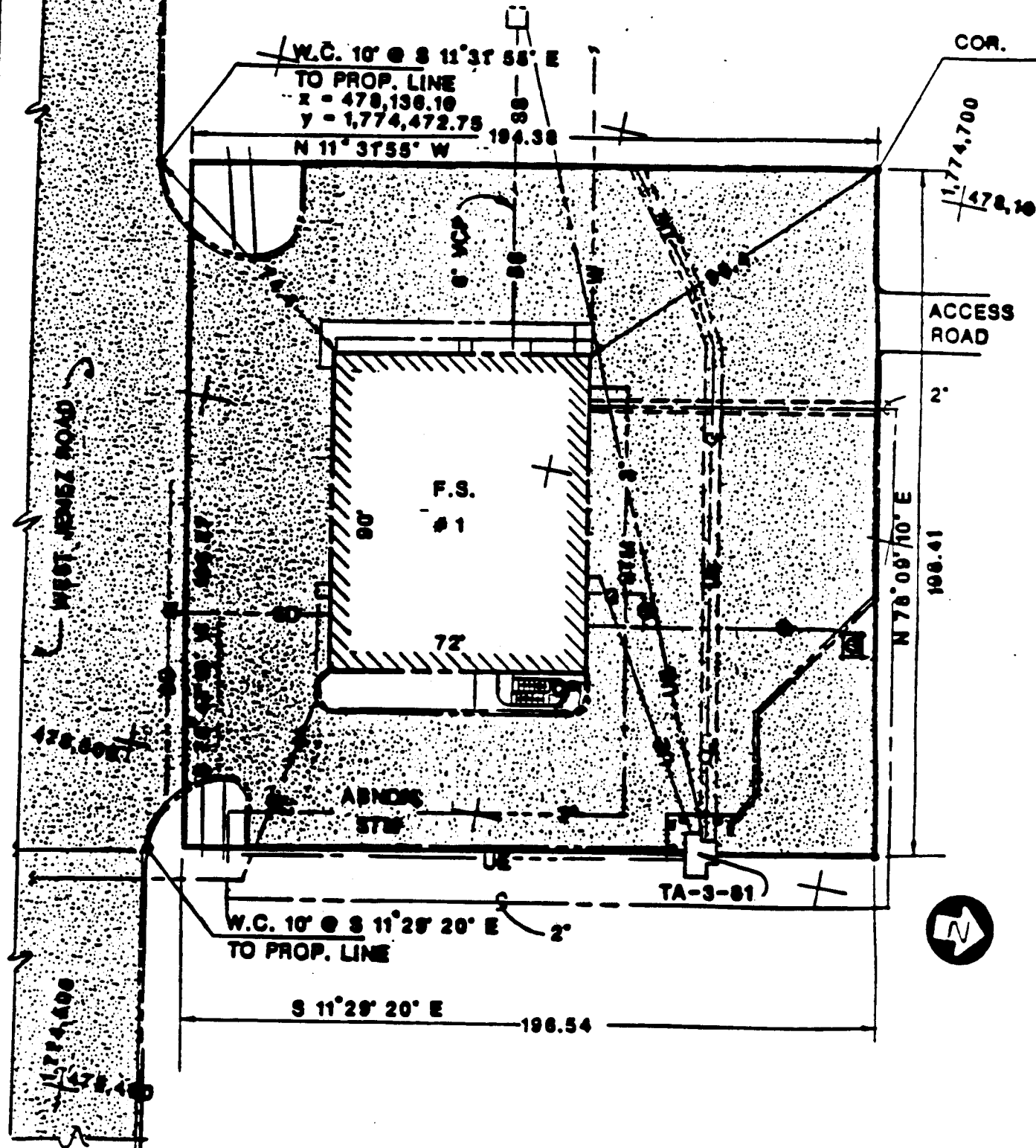
DATE 3 / 15 / 88

JOB NO. 88-022

BY MASCARENAS APPN. CT

SCALE 1"=40'

SET #5 REBAR AND  
PL CAP LS 8878



Pan Am World Services, Inc.

P.O. Box 200 Los Alamos, N.M. 87544-0050

PROJECT DOE/LAEO FIRE STATION SURVEY

DESCRIPTION FIRE STATION # 2 DP ROAD

SHEET 4 OF 7  
DATE 3 / 15 / 88  
JOB NO 88-022  
BY [signature] APPR C.T.  
SCALE 1" = 50'

- FOUND T. RAIL & SHNER
- ② SET T IP & PL CAP LS 8870

N77°33'24" E 31.15 PLAT

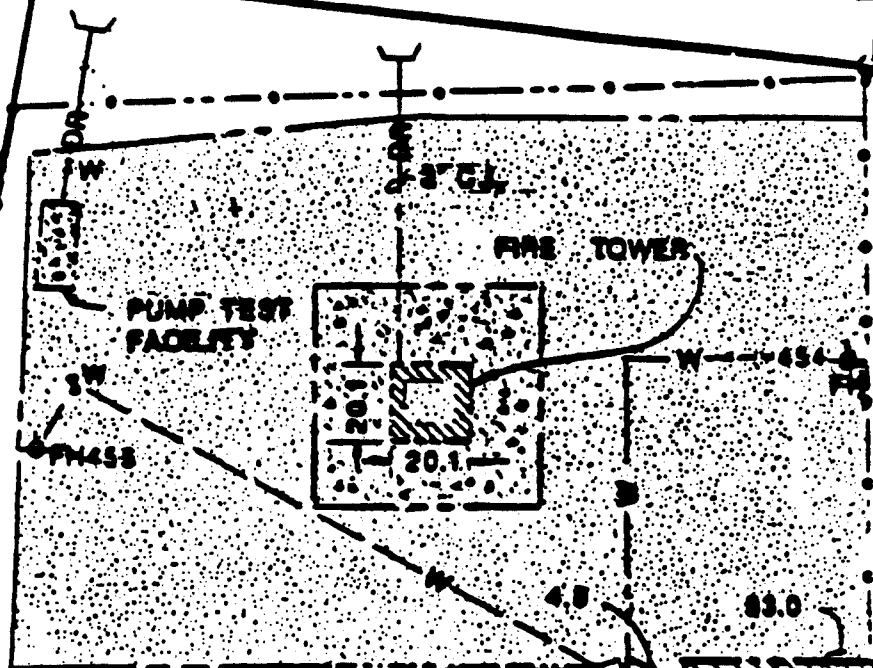
N 82°26'07" E 3.66 P

S 78°37'04" E

219.00 PLAT

N 14°12'47" E 277.07 PLAT  
N 14°12'47" E 277.34 FIELD

102' 0"



REC. S 85°34'10" E 219.53

S 85°38'52" E 219.58

DP ROAD

CURVE DATA  
A= 04 15 34' LT  
R= 1021.74  
T= 38.00  
O= 75.96

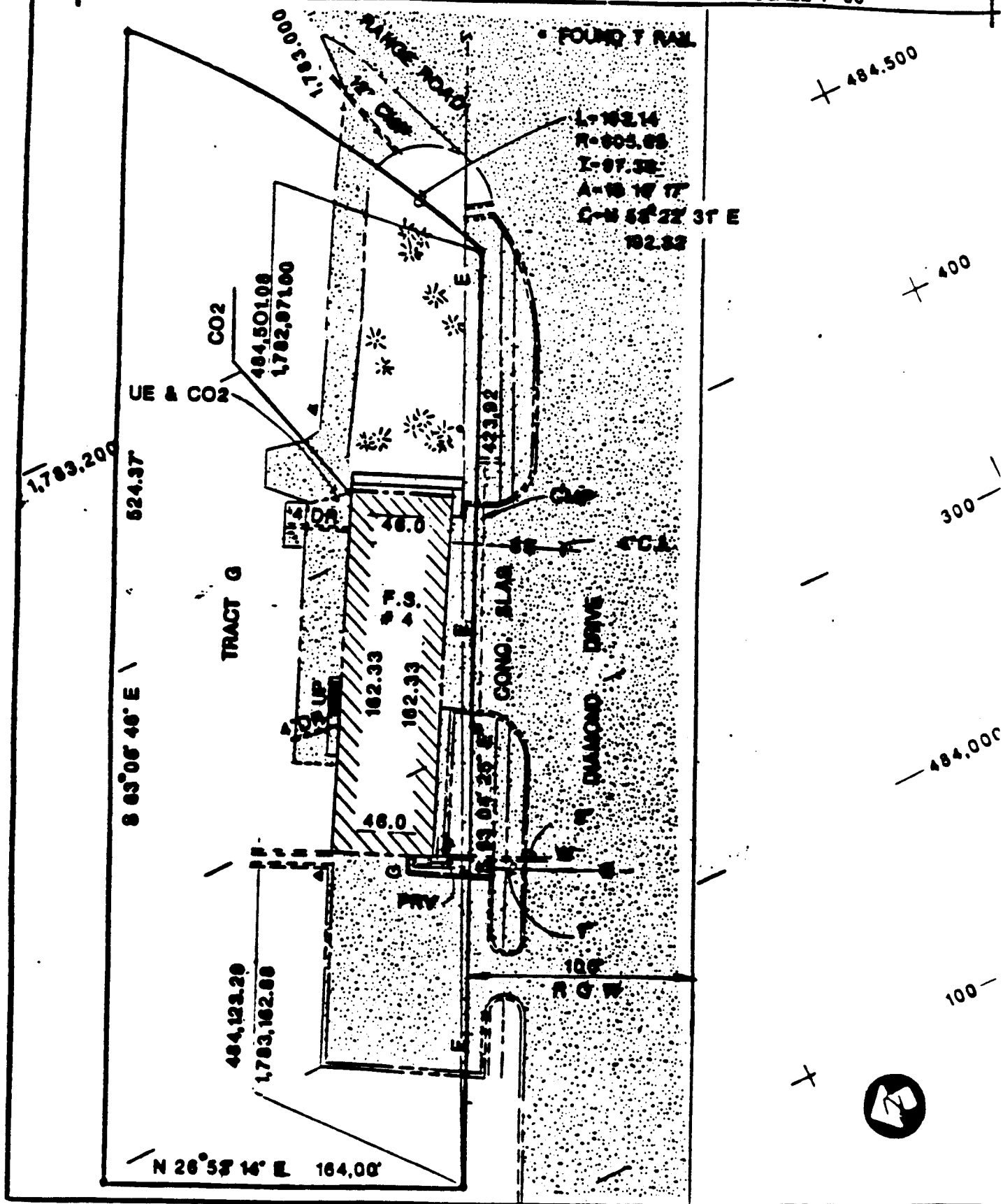


P.O. Box 5 Los Alamos, N.M. 87544-0050

**PROJECT DOE/LAO FIRE STATION SURVEY**

**DESCRIPTION FIRE STATION #4 4401 DIAMOND DRIVE**

SHEET 5 OF 7  
DATE 3 / 15 / 88  
JOB NO. 88-022  
BY Macgregor APPR. Z.  
SCALE 1"=60'



Pan Am World Servi. , Inc.

P.O. Box

Los Alamos, N.M. 87544-0050

PROJECT DOE/LAAG FIRE STATION SURVEY

SHEET 6 OF 6

DATE 3 / 15 / 88

DESCRIPTION FIRE STATION #3 WHITE ROCK

JOB NO. 88-022

BY MASCA REG. APPR. C.T.

SCALE 1"=40'

TO STATE ROAD

• FOUND ALUMINUM CAPS

TRACT J

N 64°18'00" E 170.00 REC.

FOUND AL CAP.

X = 513,215.61

Y = 1,756,636.66

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P.O. Box 5 Los Alamos, N.M. 87544-0050

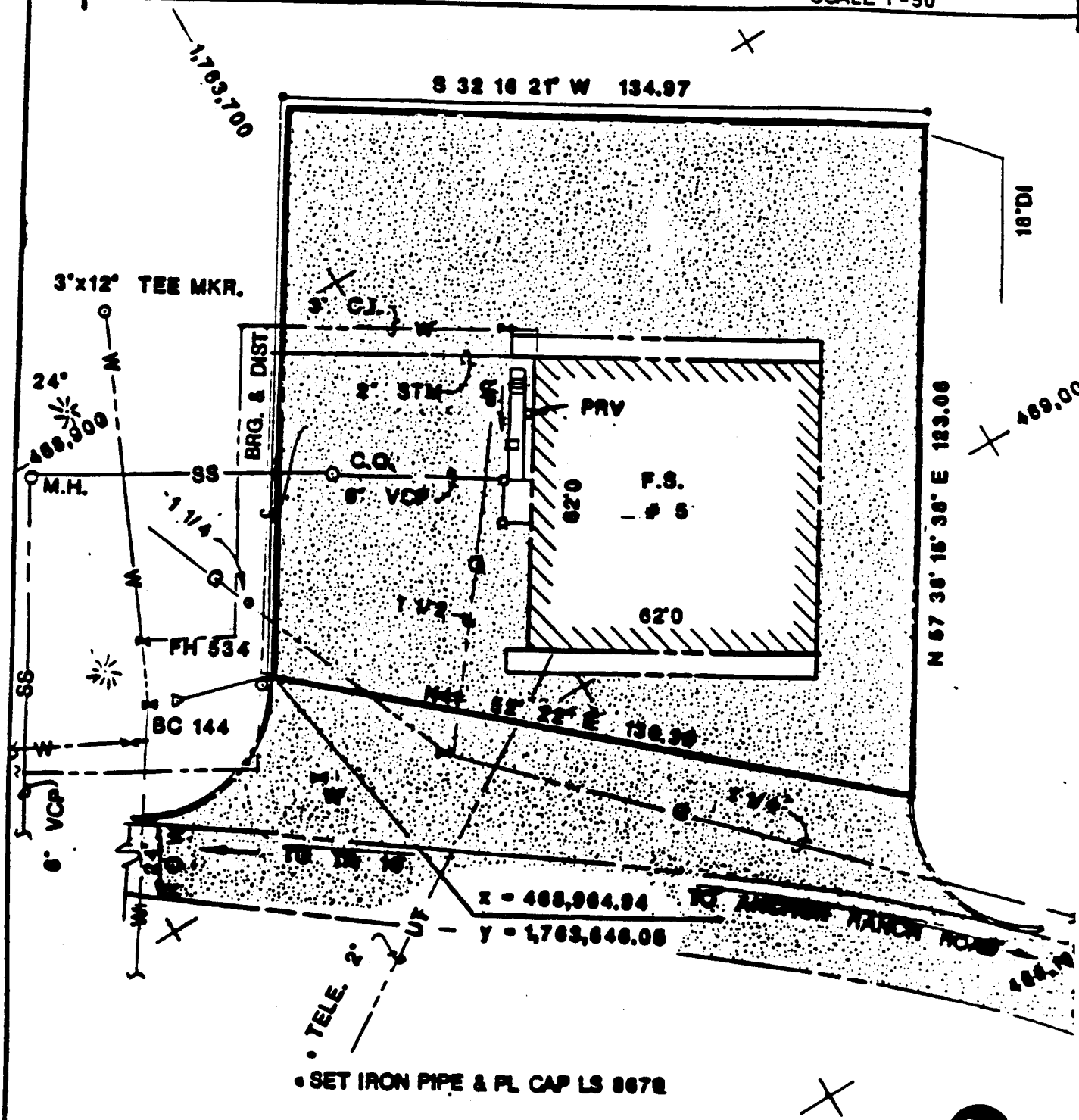
**SHEET 7 OF 7**

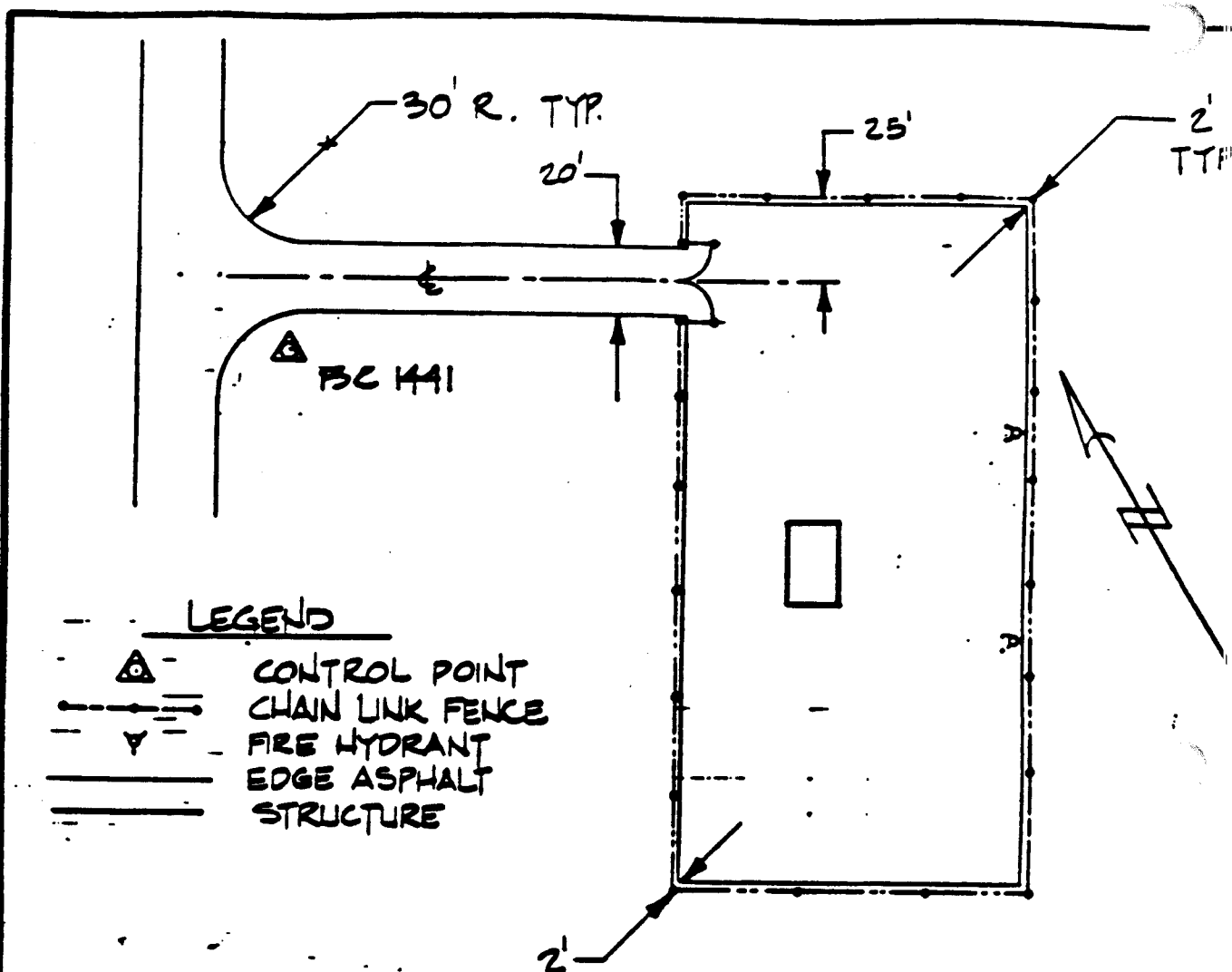
DATE 3 / 15 / 88

JOB NO. 88-022

BY MASAEFNA APPR. C. T

SCALE 1"=50'





### NOTES

- 1) BASIS OF BEARING  
N 43° 56' 51.5" E AS ESTABLISHED Δ CONTROL POINT BY FOUND  
BRASS CAPS 1440 & 1441.
- 2) LOCATION OF BUILDING & FIRE HYDRANTS ESTABLISHED FROM A  
PULIT DRAWING SINCE ACCESS TO SITE WAS LIMITED AT TIME  
OF SURVEY.

PAN-AM SURVEY DEPARTMENT

TA-16  
FIRE TRAINING CENTER

WO. # 7314-99

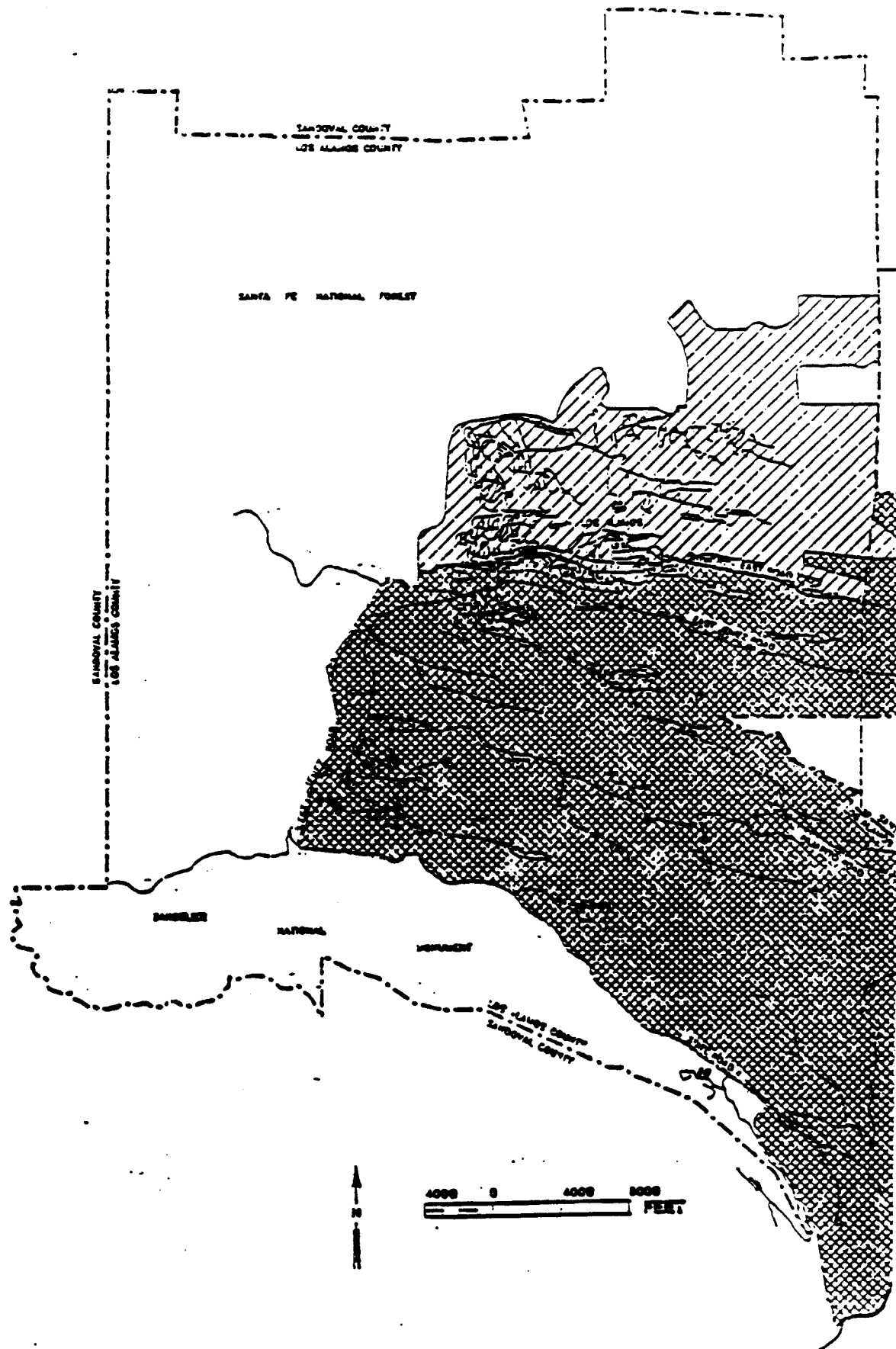
DRAWN BY: JAMES A. CATA

SCALE: 1" = 50'

SHT 1 OF 1

**LOS ALAMOS FIRE DEPARTMENT**

**FIRE SERVICE AREA**



# LEGEND



MUNICIPAL DEVELOPMENT AREA - MUNICIPAL FIRE SERVICES



LOS ALAMOS NATIONAL LABORATORY - FIRE SERVICE AREA



LOS ALAMOS FIRE DEPARTMENT, EMERGENCY MEDICAL AND RESCUE SERVICE AREA

LOS ALAMOS COUNTY  
SANTA FE COUNTY



1	3/1/81	REVISED TITLE	
NO.	DATE	REVISED	REVISIONS
FACILITIES ENGINEERING DIVISION			
LOS ALAMOS FIRE DEPARTMENT SERVICE AREA			240 250 300 350 400 450 500 550 600 650 700 750 800 850 900 950 1000
DLSG. SUBMITTED <i>[Signature]</i> RECORDED <i>[Signature]</i> APPROVED <i>[Signature]</i>			
LOS ALAMOS Los Alamos National Laboratory Los Alamos, New Mexico 87545			
CLASSIFICATION		REVISED	
LAS JOB NO.		DRAWING NO.	
		ENGR 1001	

**LISTING OF DOE OWNED STRUCTURES**  
**LISTING OF DOE LEASED STRUCTURES**

**The attached is a list of DOE owned structures and leased facilities outside of the main boundary of the Laboratory. This listing is subject to change.**



## DOE OWNED STRUCTURES

<u>TA</u>	<u>BLDG</u>	<u>NAME</u>	<u>ADDRESS</u>
0	71	Pumphouse, Water	Western Area, Los Alamos
0	1054	Well House #1	Guaje Canyon
0	1055	WellHouse #1	Guaje Canyon
0	1051	Steam Plant	3750 Finch St., Los Alamos
0	1056	Metering Station	1805 Diamond, Los Alamos
0	1058	Well House	Rendija Canyon
0	1061	Transmitter Bldg.	Star Lake
0	1062	Laborers Shack	SE Side TA-3, SM-36
0	1078	Sportsman Club	Rendiji & Gauje Canyon
0	1079	Valve House	1805 Diamond, Los Alamos
0	1080	Pump House	600 48th Street, Los Alamos
0	1082	Maintenance Bldg.	Gas Line, San Juan County
0	1084	Valve Bldg.	Gas Line, Sandoval County
0	1085	Valve Bldg.	Gas Line, Sandoval County
0	1086	Valve Bldg.	Gas Line, Sandoval County
0	1087	Valve Bldg.	Gas Line, Sandoval County
0	1088	Valve Bldg.	Gas Line, San Juan County
0	1089	Gas Valve House	691 East Road, Los Alamos
0	1090	Pumping Station	99 Gancho, Los Alamos
0	1091	Guard Tower	2471 East Rd., Los Alamos
0	1092	Booster Station	Guaje Canyon
0	1093	Booster Station	State Road 4
0	1094	Fire Station #4	White Rock
0	1095	Fire Station #2	132 DP Road, Los Alamos
0	1096	Fire Station #3	4401 Diamond, Los Alamos
0	1099	Booster Station	State Route 4
0	1100	Sand Basin Bldg.	Guaje Canyon
0	1101	Well House	Guaje Canyon
0	1102	Well House	Guaje Canyon
0	1103	Well House	Guaje Canyon
0	1104	Well House	Guaje Canyon
0	1105	Well House	Guaje Canyon
0	1107	Filter Building	4040 Diamond, Los Alamos
0	1108	Pumping Station	4084 Trinity, Los Alamos
0	1109	Booster Station	1801 Diamond, Los Alamos
0	1110	Valve House	601 48th, Los Alamos
0	1111	Pumping Station	600 48th, Los Alamos
0	1112	Booster Station	Guaje Canyon
0	1113	Booster Station	Guaje Canyon
0	1114	Booster Station	Guaje Canyon
0	1115	Metering Station	691 East Road, Los Alamos
0	1116	Drill Tower FS#2	132 DP Road, Los Alamos
0	1117	Well House	Guaje Canyon
0	1118	Well House	Guaje Canyon
0	1119	Well House	Guaje Canyon
0	1120	Well House	Guaje Canyon
0	1121	Well House	Guaje Canyon
0	1122	Valve House	Guaje Canyon
57		All Buildings	Fenton Hill

**SMALL BUSINESS AND SMALL DISADVANTAGED  
BUSINESS SUBCONTRACTING PLAN**

**ATTACHMENT F**

**SMALL BUSINESS AND SMALL DISADVANTAGED**

**BUSINESS SUBCONTRACTING PLAN**

**(Final November 12, 1992)**

**Los Alamos Fire Department  
Incorporated County of Los Alamos  
2300 Trinity Drive  
Los Alamos, New Mexico 87544**

**Solicitation No. RP 32-91AL64100**

The agreement between the Department of Energy (DOE) and the Incorporated County of Los Alamos (contractor or County)) provides for the County to be responsible for fire suppression, emergency medical and rescue services in the Los Alamos Fire Service Area, as defined in the contract, which includes Los Alamos National Laboratory.

The County and the DOE originally entered into a contract on February 9, 1988, to initiate the proposed transfer of the Los Alamos Fire Department from the DOE to the County. Phase II of this agreement, operation of the Fire Department, began September 24, 1989. Phase II, including current extensions, expires December 31, 1991. The DOE's request for proposal, RP 32-91AL64100, contemplates a subsequent five year contract with the County.

\*\*\*\*\*

In accordance with Section 8(d) of Public Law 95-507, as implemented by OFPP Policy Letter 80-2, there are six mandatory elements that must be in every subcontracting plan. The six elements are:

**I. GOALS**

Goals for subcontracting with Small Businesses (SB) and with Small Disadvantaged Businesses (SDB) are expressed in both dollars and percentages. The percentage goal is a percentage of the total dollars planned for subcontracting, not the total dollar amount of the contract. The definition of a subcontract is any agreement the County (contractor) enters into for supplies and/or services required for contractor performance that will not be conducted with their own labor forces. (This includes agreements with Large Businesses [LB] as well as SB and SDB concerns.) Indirects and Overhead were not included in the amounts to be subcontracted.

**Percentage Goals and Estimated Amounts:**

- A. 1. The total estimated cost of the proposed five year contract is \$39,853,077.
2. The total estimated dollar value of all planned subcontracting under this contract is \$3,327,718.
3. The following dollar and percentage goals (expressed in relation to the total planned subcontract dollars in A.2) are applicable to the contract cited above or to the contract awarded as a result of the solicitation cited.
- (a) Small Business concerns: Total dollars planned to be subcontracted to small business concerns: \$1,663,859. Fifty percent (50%) of the total planned subcontracting dollars under this contract goal will go to subcontractors who are SB concerns.
- (b) Small Disadvantaged Business concerns: Total dollars planned to be subcontracted to SDB concerns: \$399,326. This dollar amount is included in the amount shown under A.3(a), above, as a subset. Of the total planned subcontracting goal dollars under this contract, 12% will go to subcontractors who are SDB concerns owned and controlled by socially and economically disadvantaged individuals. This percentage is included in the percentage shown under A.3(a), above, as a subset.
- B. 1. Subcontracting Summary: The following is a summary of subcontracting under this contract, with the distribution among SB, SDB and LB concerns as follows (SBP is the total dollar amount estimated for subcontracting):
- | Category | 100%<br>SBP    | 50%<br>SB      | 12%<br>SDB    | 50%<br>LB      |
|----------|----------------|----------------|---------------|----------------|
| Services | \$1,560,989    | 780,495        | 187,319       | 780,495        |
| Supplies | 1,428,945      | 701,437        | 168,345       | 701,407        |
| Capital  | <u>363,855</u> | <u>181,927</u> | <u>43,662</u> | <u>181,927</u> |
| Total    | \$3,327,718    | \$1,663,859    | \$399,326     | \$1,663,859    |
2. Possible Subcontractors: The following is a list of possible SB and SDB subcontractors for the Services, Supplies/Materials and Capital Equipment referenced in B.1 and B.2.:

SB/SDB Sub. Plan  
County of Los Alamos  
Final 11/12/92

**Small Business Concerns:**

A-1 Signs  
Allied School and Office Products  
ALS Medical Products  
Armstrong Medical  
Artesia Fire Equipment  
Becker Fire Equipment  
Bill's Computer Shop  
Brownell's Hallmark Shop  
Business Machines Center  
C.J. Enterprises  
Camelot World Travel  
Camera and Darkroom  
Central Motive Power  
Clarey's Safety Equipment  
Clement, Benner and Fox  
Coffelt's Family Footwear  
Computer Works (Las Cruces)  
Dane Myers  
Delta Uniform  
Don Taylor's Photo  
Dr. Victor Zalma  
Finishing Touch  
G.C. Video  
Glovers Auto Parts  
Hunter Lumber Company  
Independent Fire Company  
J & J Safety  
Johnson Southwest Moving (Santa Fe)  
Knecht Automotive  
Kurts Camera Corral  
Los Alamos Parts Company  
Los Alamos Stationers  
Metzger Stores  
Michael W. Baxter, PH.D.  
Microsage  
Mobile Apparatus  
Monarch Fire Equipment  
Pajarito Travel Agency  
Peak and Plains Outfitters  
Precise Graphic Impressions  
Rapids Air, Inc.  
Red Barn Screen Prints  
Simon's Uniforms  
Thunderbird Shoe Store  
United Fire Equipment

**Small Disadvantaged Business Concerns:**

Advanced Copy Systems (Santa Fe)  
Agua Fria Wrecker Service  
Ask Mr. Foster Travel  
Capitol City Uniforms  
Destinations, Inc.

SB/SDB Sub. Plan  
County of Los Alamos  
Final 11/12/92

Healy-Matthews Stationers  
Holman's Inc.  
Joann's Floral  
Lobo Team Sales  
Mr. Carpet  
N.M. Office Products  
N.M. Pest Control  
Santa Fe World Travel  
Sierra Vista Office Products

## **II. ADMINISTRATOR**

The subcontracting plan is to be administered by the County (contractor) to assure that the provisions of the contract and the plan are implemented and performed.

The following individual will administer the subcontracting plan:

Name: Roger Bagley  
Title: Support Services Director  
Telephone: 662-8054

This individual's specific duties, as they relate to the County's (contractor's) subcontracting plan, are as follows:

- A. General overall responsibility for the County's Small Business Program, the development, preparation, and execution of individual subcontracting plans and for monitoring performance relative to contractual subcontracting requirements contained in this plan, including but not limited to:
- B. Developing and maintaining bidders lists of small and small disadvantaged business concerns from all possible sources;
- C. Ensuring that procurement packages are structured to permit small and small disadvantaged to participate to the maximum extent possible;
- D. Assuring inclusion of SB and SDB concerns in all solicitations for products or services that they are capable of providing;
- E. Reviewing solicitations to remove statements, clauses, etc. that may tend to restrict or prohibit SB and SDB participation;
- F. Ensuring that the bid proposal review board documents its reasons for not selecting low bids submitted by small and small disadvantaged business concerns;

SB/SDB Sub. Plan  
County of Los Alamos  
Final 11/12/92

- G. Ensuring the establishment and maintenance of records of solicitations and subcontract award activity;
- H. Attending or arranging for attendance of company counselors at Business Opportunity Workshops, Minority Business Enterprise Seminars, Trade Fairs, etc.;
- I. Conducting or arranging for motivational training for purchasing personnel pursuant to the intent of P.L. 95-507;
- J. Monitoring attainment of proposed goals;
- K. Preparing and submitting periodic subcontracting reports as required;
- L. Coordinating County activities during the conduct of compliance reviews by Federal agencies; and
- M. Coordinating the conduct of County activities involving its small and small disadvantaged business subcontracting program.

**III. OUTREACH EFFORTS**

The following efforts will be taken to assure that small and small disadvantaged business concerns will have an equitable opportunity to compete for subcontracts:

- A. Outreach efforts will be made as follows:
  - 1. Contacts with minority and small business trade associations;
  - 2. Contacts with business and development organizations;
  - 3. Attendance at small and minority business procurement conferences and trade fairs; and
  - 4. Sources will be requested from SBA's PASS system.
- B. The following internal efforts will be made to guide and encourage buyers:
  - 1. Workshops, seminars, and training programs will be conducted; and
  - 2. Activities will be monitored to evaluate compliance with this subcontracting plan.

- C. Small and small disadvantaged business concerns source lists, guides and other data identifying small and small disadvantaged business concerns will be maintained and utilized by buyers in soliciting subcontracts.

#### IV. SUBCONTRACTING PLAN FLOWDOWN

The subcontracting plan must include the County's (contractor's) explicit statement that the two standard subcontracting clauses will be included in all relevant subcontracts. The clauses must be included by title and the County guarantees that a "subcontracting plan" will be required of every subcontractor (except small businesses) meeting the dollar thresholds of \$500,000 or \$1,000,000 for the construction of a public facility as appropriate. The County (the prime contractor) cannot alter this requirement. Any subcontractor issuing subcontracts exceeding the thresholds must acquire a subcontracting plan and flowdown the provisions of their subcontracting plan to their lower-tier subcontractors. The following "standard" language shall be included in the plan with the understanding that the contract administrator will be responsible for assuring that the standard clauses are incorporated into appropriate subcontracts and that the subcontractors are obtaining further subcontracting plans as required:

##### Flowdown of Provisions

The County (contractor) agrees that the clause entitled "Utilization of Small Business Concerns and Small Disadvantaged Business Concerns" will be included in all subcontracts that offer further subcontracting opportunities, and all subcontractors except small business concerns who receive subcontracts in excess of \$500,000 or \$1,000,000 for construction of a public facility will be required to adopt and comply with a subcontracting plan similar to this one. Such plans will be reviewed by comparing them with the provisions of the clause, "Small Business and Small Disadvantaged Business Subcontracting Plan" (FAR 52.219-9), and assuring that all minimum requirements of an acceptable subcontracting plan have been satisfied. The acceptability of percentage and dollar goals shall be determined on a case-by-case basis depending on the supplies/services involved, the availability of potential small and small disadvantaged subcontractors, and prior experience. Once approved and implemented, plans will be monitored through the submission of periodic reports, and/or, as time and availability of funds permit, periodic visits to subcontractors' facilities to review applicable records and subcontracting program progress.



SB/SDB Sub. Plan  
County of Los Alamos  
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**V. REPORTS AND SURVEYS**

The County (contractor) will submit Standard Form 294 on a semi-annual basis and Standard Form 295 on an annual basis and agrees to submit such periodic reports and cooperate in any studies or surveys as may be required by the contracting agency (DOE) or the Small Business Administration in order to determine the extent of compliance by the bidder with the subcontracting plan and with the clause entitled "Utilization of Small Business Concerns and Small Disadvantaged Business Concerns" contained in the contract.

**VI. RECORDS AND PROCEDURES**

The County (contractor) agrees to maintain at least the following types of records to document compliance with this subcontracting plan:

- A. Small and small disadvantaged business concerns source lists, guides and other data identifying SB/SDB vendors;
- B. Organizations contacted for small and disadvantaged business sources;
- C. On a subcontract-by-subcontract basis, records on all subcontract solicitations over \$100,000, indicating on each solicitation (1) whether small business concerns were solicited, and if not, why not; (2) whether small disadvantaged business concerns were solicited, and if not, why not; and (3) reasons for the failure of solicited small or small disadvantaged business concerns to receive the subcontract award;
- D. Records to support other outreach efforts: contacts with minority and small business trade associates, etc., attendance at small and minority business procurement conferences and trade fairs;
- E. Records to support internal activities to guide and encourage buyers: workshops, seminars, training programs, etc., and monitoring activities to evaluate compliance; and
- F. On a subcontract-by-subcontract basis records to support subcontract award data to include name and address of subcontractor.

SB/SDB Sub. Plan  
County of Los Alamos  
Final 11/12/92

SUBMITTED BY:

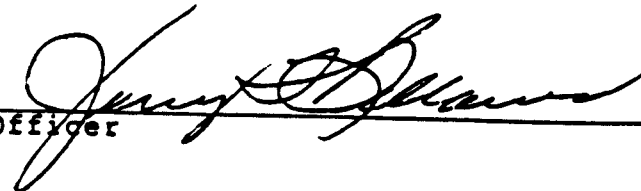
Signed: 

Typed Name: James M. Flint

Title: County Administrator

Date: November 12, 1992

PLAN ACCEPTED BY:

  
Contracting Officer

Date:

PLAN CONCURRED ON BY:

Small and Disadvantaged Business Utilization Specialist

Date:

- END -

**SPECIAL BANK ACCOUNT AGREEMENT  
FOR USE WITH THE CHECKS - PAID METHOD  
OF LETTER OF CREDIT FINANCING**

**SPECIAL BANK ACCOUNT AGREEMENT FOR USE WITH THE  
CHECKS-PAID METHOD OF LETTER OF CREDIT FINANCING**

This Agreement entered into this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_, between the United States of America (hereinafter called the Government), represented herein by the Department of Energy (hereinafter called the DOE), and [Name of contractor] (hereinafter called the Contractor), a corporation under the laws of the State of [State] and [Name of Bank] (hereinafter called the Bank), a banking corporation under the laws of the State of [State], located at [City and State].

**RECITALS**

- (a) On the date of \_\_\_\_\_ 19\_\_, DOE and the Contractor entered into a Contract No. DE-AC04-89ALXXXXX providing for the making of advances of Government funds to the contractor. A copy of such advance provisions has been furnished to the Bank.
- (b) DOE requires that amounts advanced to the Contractor under said Contract be deposited in a Special Bank Account or accounts with a bank designated by the Treasury Department as a depository and financial agent of the Government (Section 10 of the Act of June 11, 1942, 56 Stat. 356; 12 U.S.C. 265), separate from any of the Contractor's general or other funds; and, the Bank being such a bank, the parties are agreeable to so depositing said amounts with the Bank.
- (c) This Special Bank Account(s) shall be designated "[Name of contractor], Contract DE-AC04-89ALXXXXX, Department of Energy Special Bank Account."

## COVENANTS

In consideration of the foregoing, and for other good and valuable consideration, it is agreed that:

- (1) The Government shall have title to the credit balance in said Account(s) to secure the return of all advances made to the Contractor, which title shall be superior to any lien or claim of the Bank or others with respect to such Account(s).
- (2) The Bank will be bound by the provisions of said contract between DOE and the Contractor relating to the deposit and withdrawal of funds in the above Special Bank Account(s), but shall not be responsible for the application of funds properly withdrawn from said Account(s). After receipt by the Bank of written directions from DOE, the Bank shall act thereon and shall be under no liability to any party hereto for any action taken in accordance with the said written directions.
- (3) The Government, or its authorized representatives, shall have access to the books and records maintained by the Bank with respect to such Special Bank Account(s) at all reasonable times and for all reasonable purposes, including, without limitation, the inspection or copying of such books and records and any or all memoranda, checks, correspondence, or documents pertaining thereto. Except as agreed upon by the Government and the Bank, all books and records pertaining to the Special Bank Account(s) in the possession of the Bank relating to the Special Bank Account agreement shall be preserved by the Bank for a period of three (3) years after the final payment under the contract to which the Special Bank Account agreement pertains or otherwise disposed of in such manners as may agreed upon by the Government and the Bank.
- (4) In the event of the services of any writ of attachment, levy of execution, or commencement of garnishment proceedings with respect to the Special Bank Account(s), the Bank will promptly notify DOE's Area Manager at [Address of Area Office].

- (5) DOE will issue a Letter of Credit (irrevocable to the extent obligations have been incurred in good faith thereunder by the Contractor) to the Bank for the benefit of the Special Bank Account(s). The Bank agrees to honor upon presentation for payment all checks issued by the Contractor and to restrict its Letter of Credit withdrawals to an amount sufficient to maintain the account balance as close to zero as administratively possible each day.

The Bank will comply with the provisions contained in the Treasury Department Fiscal Requirements Manual (I TFRM 6-2000) which states that ordinarily, payment vouchers (FS-5401) should not be drawn more frequently than daily or for amounts less than \$5,000, and in no case more than \$5,000,000 unless so stated in the Letter of Credit. A copy of said Manual is in the Bank's possession.

The Bank agrees to service the Special Bank Account(s) in consideration of payment by the Contractor for its actual account activity at the "Per Item Cost" shown on the form entitled "Schedule of Bank Processing Charges" incorporated into this Agreement as Attachment A. The Bank agrees that the "Per Item Cost" will remain constant during the term of this Agreement.

- (6) It is anticipated that the bank balance will be zero (-0-). However, if a balance occurs, the Treasury Tax and Loan rate (TT&L) will be used to compute the amount due as follows:

- (a) Assuming a positive balance:

Positive Average Daily Collected Balance times TT&L will be the amount due and payable to the Contractor/DOE.

- (b) Assuming a negative balance:

Negative Average Daily Balance times TT&L will be the amount due and payable to the Bank.

- (7) This Agreement shall be effective from \_\_\_\_\_, 19\_\_ through \_\_\_\_\_, 19\_\_, unless earlier terminated as provided in this Agreement.
- (8) The Government, the Contractor, or the Bank may terminate this Agreement at any time upon submitting written notification to the other parties 90 days prior to the desired termination date.
- (9) The Government and the Contractor may terminate this Agreement at any time upon 30 days' notice to the Bank if the Government and/or the Contractor find that the Bank has failed to substantially perform its obligations under this Agreement.
- (10) Notwithstanding the provisions of paragraphs (8) and (9), in the event the contract (referenced in Recital (a)) between the DOE and the Contractor is not renewed or is terminated, this Agreement between the Government, the Contractor and the Bank will automatically be terminated upon the delivery of written notice to the Bank.
- (11) In the event of termination, the Bank agrees to retain the Contractor's Special Bank Account(s) for a 90-day period to allow for clearance of outstanding checks. During this 90-day period, DOE will place on deposit in the Account(s) sufficient funds to cover all outstanding checks presented for payment. During this 90-day period, it is further understood that all bank service charges will be consistent with the amounts reflected in Attachment A to this Agreement.

IN WITNESS WHEREOF the parties hereto have caused this Agreement to be executed as of the day and year first above written.

THE UNITED STATES OF AMERICA  
BY: U.S. DEPARTMENT OF ENERGY

DATE: \_\_\_\_\_

BY: \_\_\_\_\_

[Name of Contractor]

DATE: \_\_\_\_\_

BY: \_\_\_\_\_

TITLE: \_\_\_\_\_

[Name of Bank]

DATE: \_\_\_\_\_

BY: \_\_\_\_\_

TITLE: \_\_\_\_\_



CONTRACTOR CORPORATE CERTIFICATE

I, \_\_\_\_\_, certify that I am the  
\_\_\_\_\_ of the [Name of contractor] named herein, that  
\_\_\_\_\_, who signed this Agreement on behalf of said  
corporation, was then \_\_\_\_\_ of said corporation;  
that this Agreement was duly signed for and in behalf of said corporation by  
authority of its governing body and is within the scope of its corporate  
powers; and that I have set my hand and the seal of the said corporation  
hereto on this \_\_\_\_\_ day of \_\_\_\_\_, 19\_\_.

\_\_\_\_\_  
TITLE: \_\_\_\_\_

(SEAL)

BANK CORPORATE CERTIFICATE

[Name of Bank]

I, \_\_\_\_\_, certify that I am the  
\_\_\_\_\_ of the \_\_\_\_\_ Bank named  
herein, that \_\_\_\_\_, who signed this Agreement on behalf of  
said corporation, was then \_\_\_\_\_ of said Bank; that  
this Agreement was duly signed for and in behalf of said Bank by authority of  
its governing body and is within the scope of its corporate powers; and that I  
have set my hand and the seal of the said Bank hereto on this \_\_\_\_\_ day of  
\_\_\_\_\_, 19\_\_.

\_\_\_\_\_  
TITLE: \_\_\_\_\_

(SEAL)

# ATTACHMENT A TO SPECIAL BANK ACCOUNT AGREEMENT

## SCHEDULE OF BANK PROCESSING CHARGES

	<u>Per Item Cost</u>
1. Checks Debited	e _____
2. Stop Payment Orders	e _____
3. Account Maintenance (Monthly)	e _____
4. Deposits:	e _____
a. Deposit Tickets	e _____
b. Local Items	e _____
c. Out-of-Town Items	e _____
5. Reconciliation Services:	
a. Tapes Supplied	e _____
b. Check Sorting	e _____
Reconciliation and statement required monthly. Checks supporting each statement to be sorted in numerical sequence by serial number that is magnetically encoded on each check. Monthly bank analyses showing number and amount of transactions with daily ending balances.	
6. Currency Shipments of \$ _____ weekly to be transported by [contractor].	e _____

## **BILLING INSTRUCTIONS**

**BILLING INSTRUCTIONS  
U. S. DEPARTMENT OF ENERGY  
ALBUQUERQUE OPERATIONS OFFICE**

- I. These instructions are provided for the use by the Contractor in its preparation and submission of vouchers or invoices requesting reimbursement for costs incurred on negotiated cost-type contracts. Reimbursement procedures related to negotiated cost-type contracts involve the preparation and submission by the Contractor of adequately prepared vouchers to the Government. The submission of vouchers as prescribed herein will reduce correspondence and other causes for delay to a minimum and will thus assure prompt payments to the contractor.
- II. In requesting reimbursement, contractors shall use the Government voucher SF-1034, Public Voucher for Purchases and Services Other Than Personal, or an acceptable substitute which provides the same necessary information as found in Attachment Nos. 1 and 2 to these instructions.
- III. Each SF-1034 voucher will be prepared in an original and three copies. The voucher will be completed in accordance with the following numerical designations: (See Attachment No. 1.)
  - (1) All spaces numbered (1) should be left blank.
  - (2) Date voucher prepared and voucher number. It is suggested that vouchers be sequentially numbered for each contract.
  - (3) Contractor's name and mailing address and phone number.
  - (4) Contract number and date of contract.
  - (5) Where work assignments or task orders are involved in the billing, the number and date of the applicable order will be shown in this space, otherwise leave blank.
  - (6) Identify the period billing covers (i.e., month of January or January-March, 19\_\_).
  - (7) Contract number cited must be the same as the number in the contract document and in item 4 above.
  - (8) Show the dollar amount of this billing. The amount claimed must agree with amount reflected in the detailed summary statement. The amount should be rounded to the nearest whole dollar.
  - (9) Place an X in the appropriate block for the type of payment for which reimbursement is requested.

- IV. Submit an original SF-1034 and three copies with one copy of support documents for travel, nonexpendable equipment and direct labor by category (see Attachment No. 3 for sample format). If, however, the contract specifies a "Principal Investigator" or "Project Manager" by name(s), their time will be reported by the individual name(s). The Certification on Attachment No. 2 must be signed by an authorized official.
- V. Payment of fixed fee. The fixed fee, if any, shall be paid in installments based on the percentage of completion of work, as determined by the Contracting Officer. Fixed fee will not be paid in less than monthly increments. Each voucher containing fixed fee will include a supporting document justifying the fixed fee amount in terms of the percentage of work completed. For level of effort contracts, the hours expended during the period shall be reported.
- VI. At the option of the contractor, payments in excess of \$25,000 can be made using the Treasury Financial Communications System (TFCS). Otherwise, payments will be made by a check mailed to the contractor. The TFCS provides on-line access to the Federal Reserve Communications System (FRCS), enabling your payment to be made to financial institutions that have access to the FRCS. Your payment can also be made to financial institutions that do not have access to the FRCS through correspondent financial institutions or Federal Reserve Banks. If the contractor opts to use the TFCS method of payment, the Payment Information Data Form (Attachment No. 4) should be completed and returned to the DOE to ensure that the DOE has correct TFCS information for making payments to the contractor's financial institution.
- VII. The original voucher and all copies will be mailed to the following address:
- U. S. Department of Energy  
Albuquerque Operations Office  
ATTN: Office Operations Section/FMD  
P. O. Box 5400  
Albuquerque, NM 87115

An additional copy of each voucher shall be sent to:  
Contracting Officer

U. S. Department of Energy  
Los Alamos Area Office  
528 35th Street  
Los Alamos, NM 87544

4 Attachments

1. Standard Form 1034
2. Detailed Backup for SF 1034
3. Instructions for Support Documents
4. TFCS Payment Information Data Form

Standard Form 1034 Revised January 1980 Department of the Treasury ITPRM 4-2000 1034-110		PUBLIC VOUCHER FOR PURCHASES AND SERVICES OTHER THAN PERSONAL				VOUCHER NO  (2)		
U.S. DEPARTMENT, BUREAU, OR ESTABLISHMENT AND LOCATION U. S. Department of Energy Albuquerque Operations Office Attn: Office Operations Section/FMD P. O. Box 5400 Albuquerque NM 87115			DATE VOUCHER PREPARED (2)		SCHEDULE NO  PAID BY  (1)			
			CONTRACT NUMBER AND DATE (4)					
			REQUISITION NUMBER AND DATE (1)					
PAYEE'S NAME AND ADDRESS  (3)					DATE INVOICE RECEIVED (1)			
					DISCOUNT TERMS (1)			
					PAYEE'S ACCOUNT NUMBER (1)			
					GOVERNMENT S. I. NUMBER (1)			
SHIPPED FROM (1)		TO (1)		WEIGHT (1)				
NUMBER AND DATE OF ORDER (5)	DATE OF DELIVERY OR SERVICE (6)	ARTICLES OR SERVICES <small>(Enter description, item number of contract or Federal supply schedule and other information deemed necessary.)</small>  (7)		QUAN- TITY (1)	UNIT PRICE COST PER (1) (1)		AMOUNT (8)	
		FOR REIMBURSEMENT OF COSTS INCURRED UNDER CONTRACT NO.  AS DETAILED IN ATTACHED SUMMARY.						
(This continuation sheet is necessary) <span style="float: right;">(Payee must NOT use the space below)</span>								
PAYMENT: <input type="checkbox"/> PROVISIONAL <input type="checkbox"/> COMPLETE <input type="checkbox"/> PARTIAL <input type="checkbox"/> FINAL (9) <input type="checkbox"/> PROGRESS <input type="checkbox"/> ADVANCE		APPROVED FOR BY: (1)		EXCHANGE RATE (1) = \$1.00		TOTAL (8)		
						DIFFERENCES (1)		
		TITLE (1)				(Signature or initials) (1)		
Pursuant to authority vested in me, I certify that this voucher is correct and proper for payment.								
(1) (Date)		(1) (Authorized Certifying Officer)		(1) (Title)				
ACCOUNTING CLASSIFICATION								
(1)								
AND \$	CHECK NUMBER (1)		ON ACCOUNT OF U.S. TREASURY (1)		CHECK NUMBER (1)		ON (Name of bank) (1)	
	CASH (1)		DATE (1)		PAYEE (1)			
* When stated in foreign currency, insert name of currency. * If the ability to certify and authority to approve are combined in one person, one signature only is necessary; otherwise the approving officer will sign in the space provided, over his official title. * When a voucher is received in the name of a company or corporation, the name of the person writing the company or corporate name, as well as the capacity in which he signs, must appear. For example "John Doe Company, per John Smith, Secretary" or "Treasurer", as the case may be.						PER (1)  TITLE		

The ABC Company  
Anywhere, U. S. A. 01234

Contract No. DE-AC04-88ALXXXXX

Obligations: \$XXX,XXX

Period of Performance:

Voucher No.  
Date

<u>Cost Categories</u> <u>(as applicable)</u>	<u>Previous</u> <u>Payments</u>	<u>Current</u> <u>Voucher</u> <u>No.</u>	<u>Cumulative</u> <u>Payments</u>	<u>Current Contract Value</u>	
Direct Labor				Cost	\$XXX,XXX
Fringe Benefits @ X				Fee	X,XXX
Overhead @ X				Total	\$XXX,XXX
Nonexpendable Items					
Materials & Supplies					
Travel					
Subcontract #1 (Jones)					
Subcontract #2 (Smith)					
Other Direct Costs					
Adjustments (Explain)					
G&A @ X					
Subtotal					
Fee @ X					
Fee Withheld					
Contractor's Portion (if applicable)					
Government's Share (if applicable)					

NOTE: A separate break-out shall be provided for each task if contract is a task order type.

**CERTIFICATION:** I certify that this invoice is correct and in accordance with the terms of the contract and that the costs included herein have been incurred, represent the payments made by the Contractor except as otherwise authorized in the payments provisions of the contract, and properly reflect the work performed.

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Title)

(NOTE: Attach one copy of support documents as instructed in Attachment No. 3.)

## INSTRUCTIONS FOR SUPPORT DOCUMENTS

The purpose of the Support Documents is to allow the DOE technical representative to relate the progress achieved by the contractor to the cost incurred and enhance his ability to manage the program and to enable the Contracting Officer to approve payment in a timely manner. The Support Documents should be presented in enough detail to meet these objectives.

### Travel

- (1) a copy of the detailed travel expense report without copies of receipts, tickets, etc.; or
- (2) a listing reflecting the name of the individual, destination, date of departure and return, purpose of trip, and total travel costs incurred.

### Nonexpendable Equipment

- (1) listing of nonexpendable equipment purchased to reflect name of vendor, description of item purchased, date purchased, cost and DOE property tag number; or
- (2) a copy of the invoice received from the vendor with the DOE property tag number reflected.

### Direct Labor

- (1) listing by name and hours charged to this contract during the billed period; or
- (2) listing by labor category, i.e., Senior Research Scientist, Chemical Engineer, Technician, Draftsman and hours charged to this contract during the billed period.

### Subcontracts

- (1) for fixed priced subcontracts, provide a copy of the paid voucher.
- (2) for cost reimbursement subcontracts, provide detail consistent with the prime contract requirements.



**Payment Information Data Form  
Treasury Financial Communications System**

Payments under Department of Energy (DOE) contracts may be made by use of electronic funds transfers. The information requested herein concerning your financial institution will be used for that purpose. The information should be available through your company's Treasurer or financial institution.

If your financial institution has access to the Federal Reserve Communications System, please do not complete items 10-13. If your financial institution does not have access to the Federal Reserve Communications System, please complete all items, except item 7.

1. Name of Contractor Company:
2. Contractor Address:
3. Contractor Contact Person:
4. Contractor Contact Person Telephone Number: Area Code ( )
5. Name of Financial Institution:
6. Address of Financial Institution:
7. Financial Institution's nine-digit American Bankers Association (ABA) Identifying Number for Routing Transfer of Funds: \_\_\_\_\_  
(Complete only if your Financial Institution has access to the Federal Reserve Communications System.)
8. Telegraphic Abbreviation of Financial Institution:
9. Account Number at your Financial Institution to be credited with the funds:
10. Name of Correspondent Financial Institution your Financial Institution receives electronic funds transfer messages through, if it does not have access to the Federal Reserve Communications System:
11. Address of Correspondent Financial Institution:
12. Correspondent Financial Institution's nine-digit ABA Identifying Number for Routing Transfer of Funds: \_\_\_\_\_
13. Telegraphic Abbreviation of Correspondent Financial Institution:
14. Signature and Title of Authorizing Company Official:

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

Comments:

**WAGE DETERMINATION**  
**U. S. DEPARTMENT OF LABOR**

**86-0105 (Revision No. 16)**  
**86-0108 (Revision No. 12)**  
**86-0116 (Revision No. 13)**

U.S. DEPARTMENT OF LABOR  
EMPLOYMENT STANDARDS ADMINISTRATION  
WAGE AND HOUR DIVISION  
WASHINGTON, D.C. 20210

REGISTER OF WAGE DETERMINATIONS UNDER  
THE SERVICE CONTRACT ACT  
by direction of the Secretary of Labor

*Alan L. Moss*

Alan L. Moss  
Director

Division of  
Wage Determinations

LOCALITY	State: New Mexico			
	Area: NM COUNTIES: BERNALILLO, CATRON CIBOLA, COLFAX, DE BACA, GUADALUPE, HARDING LOS ALAMOS, MCKINLEY, MORA, RIO ARriba SAN JUAN, SAN MIGUEL, SANDOVAL, SANTA FE SOCORRO, TAOS, TORRANCE, VALENCIA			
Wage Determination No.: 86-0105 (Rev. 16) Date: 09/18/1991				
Class of Service Employees	Minimum Hourly Wage	Fringe Benefit Payments		
		Health & Welfare	Vacation	Holiday

Automatic Data Processing Occupations, Information and  
Data Occupations, Library and Archive Occupations, and  
Technical Occupations:

1. Computer Data Librarian	\$ 8.82
2. Computer Operator I	\$ 7.69
3. Computer Operator II	\$ 9.86
4. Computer Operator III	\$ 12.61
5. Computer Operator IV 1/	\$ 13.41
6. Computer Programmer I 1/	\$ 10.10
7. Computer Programmer II 1/	\$ 12.12
8. Computer Programmer III 1/	\$ 15.18
9. Computer Programmer IV 1/	\$ 18.36
10. Computer Systems Analyst I 1/	\$ 13.26
11. Computer Systems Analyst II 1/	\$ 15.34
12. Computer Systems Analyst III 1/	\$ 18.09
13. Computer Systems Analyst IV 1/	\$ 21.69
14. Key Entry Operator I	\$ 6.08
15. Key Entry Operator II	\$ 8.03
16. Peripheral Equipment Operator	\$ 9.27
17. Exhibits Specialist I	\$ 9.01
18. Exhibits Specialist II	\$ 11.00
19. Exhibits Specialist III	\$ 13.76
20. Illustrator I	\$ 9.01

U.S. DEPARTMENT OF LABOR  
EMPLOYMENT STANDARDS ADMINISTRATION  
WAGE AND HOUR DIVISION  
WASHINGTON, D.C. 20210

Page 2 of 5

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Alan L. Moss Division of  
Director Wage Determinations

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Wage Determination No.: 86-0105 (Rev. 16) Date: 09/18/1991				
Class of Service Employees	Minimum Hourly Wage	Fringe Benefit Payments		
		Health & Welfare	Vacation	Holiday

. Illustrator II	\$ 11.00
. Illustrator III	\$ 13.76
. Photographer I	\$ 9.01
. Photographer II	\$ 11.00
. Photographer III	\$ 13.76
. Librarian	\$ 12.78
. Library Technician	\$ 8.34
. Technical Information Specialist I	\$ 9.01
. Technical Information Specialist II	\$ 11.00
. Technical Information Specialist III	\$ 13.76
. Laboratory Tester	\$ 9.99
. Technical Writer	\$ 10.58
. Drafter I	\$ 6.16
. Drafter II	\$ 8.10
. Drafter III	\$ 9.01
. Drafter IV	\$ 11.00
. Drafter V	\$ 13.70
. Technician I 5/	\$ 9.91
. Technician II 5/	\$ 11.63
. Technician III 5/	\$ 13.36
. Instructor	\$ 11.18

U.S. DEPARTMENT OF LABOR  
EMPLOYMENT STANDARDS ADMINISTRATION  
WAGE AND HOUR DIVISION  
WASHINGTON, D.C. 20210

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Wage Determination No.: 86-0105 (Rev. 16) Date: 09/18/1991				
Class of Service Employees	Minimum Hourly Wage	Fringe Benefit Payments		
		Health & Welfare	Vacation	Holiday
				Other

Fringe benefits applicable to all classes of service employees  
engaged in contract performance:

2/

3/

4/

1/ Does not apply to employees employed in a bona fide executive, administrative, or professional capacity as defined and delineated in 29 CFR 541. (See 29 CFR 4.156)

2/ HEALTH & WELFARE: \$.74 an hour or \$29.60 a week or \$128.26 a month.

3/ VACATION: 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 10 years; 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present (successor) contractor, wherever employed, and with predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 4.173)

4/ HOLIDAYS: 10 paid holidays per year: New Year's Day, Martin Luther King Jr.'s Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day, and Christmas Day. (A contractor may substitute for any of the named holidays another day off with pay in accordance with a plan communicated to the employees involved.)

5/ The Technician classification includes all of the following: Electronics, Electromechanical, Environmental, Instrumentation, Mathematical, Mechanical, and Photo-Optics

The contracting officer shall require that any class of service employee which is not listed in and which is to be employed under the contract (i.e., the work to be performed is not formed by any classification listed in the wage determination), be classified by the contractor to provide a reasonable relationship (i.e., appropriate level of skill comparison) between unlisted classifications and the classifications listed in the wage determination. Such unlisted classes of employees shall be paid the monetary wages and furnished the fringe benefits determined. Such conforming procedures shall be initiated by the contractor prior to the performance of contract work by such unlisted class(es) of employees. A written report of the proposed conforming action, including information regarding the agreement or disagreement of the authorized representative of the employees involved or, where there is no authorized representative, the employees themselves, shall be submitted by the contractor to the contracting officer no later than 30 days after such unlisted class(es) of employees performs any contract work. The contracting officer shall review the proposed action and promptly submit a report of the action, together with the agency's recommendation and all pertinent information including the position of the contractor and the employees, to the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, for review. (See section 4.6 (b)(2) of Regulations 29

4)

**UNIFORM ALLOWANCE:** If employees are required to wear uniforms in the performance of this contract (whether by the terms of the Government contract, by the employer, by the state or local law, etc.), the cost of furnishing such uniforms and maintaining (by laundering or dry cleaning) such uniforms shall be an expense that may not be borne by an employee where such cost reduces the hourly rate below the rate required by the wage determination. The Department of Labor will accept payment in accordance with the following standards as compliance:


If a contractor or subcontractor is required to furnish all employees with an adequate number of uniforms without cost or to reimburse employees for the actual cost of the uniforms. In addition, the cost of uniform cleaning and maintenance is made the responsibility of the employee, all contractors and subcontractors subject to this wage determination shall (in the absence of a collective bargaining agreement providing for a different amount, or the furnishing of contrary affirmative proof as to the actual cost), reimburse all employees for such cleaning and maintenance at a rate of \$3.80 a week (or 76 cents a day); and effective April 1, 1991, the rate shall be \$4.25 per week (or \$.85 cents per day). However, in those instances where the uniforms furnished are made of "wash and wear" materials, may be routinely washed and dried with other personal garments, and do not require any special treatment such as dry cleaning, daily washing, or commercial laundering in order to meet the cleanliness or appearance standards set by the terms of the Government contract, by the contractor, by law, or by the nature of the work, there is no requirement that employees be reimbursed for uniform maintenance costs.

**E: The duties of employees under job titles listed are those described in the Service Contract Directory of Occupations, Second Edition, July 1986, unless otherwise indicated. See also 29 Part 4 Section 4.152.**

U.S. DEPARTMENT OF LABOR  
EMPLOYMENT STANDARDS ADMINISTRATION  
WAGE AND HOUR DIVISION  
WASHINGTON, D.C. 20210

Page 1 of 5

REGISTER OF WAGE DETERMINATIONS UNDER  
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By direction of the Secretary of Labor

  
Alan L. Moss Division of  
Director Wage Determinations

LOCALITY	State: New Mexico			
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Wage Determination No.: 86-0108 (Rev. 12) Date: 09/18/1991				
Class of Service Employees	Minimum Hourly Wage	Fringe Benefit Payments		
		Health & Welfare	Vacation	Holiday Other

Administrative Support and Clerical Occupations:

1. Accounting Clerk I	\$ 6.35
2. Accounting Clerk II	\$ 7.37
3. Accounting Clerk III	\$ 8.86
4. Accounting Clerk IV	\$ 9.92
5. Dispatcher, Motor Vehicle	\$ 6.94
6. Driver Messenger	\$ 8.52
7. File Clerk I	\$ 5.49
8. File Clerk II	\$ 6.25
9. File Clerk III	\$ 7.50
10. Audiovisual Services Clerk (Film/Tape Librarian)	\$ 7.37
11. Inventory Clerk	\$ 6.94
12. Mail Clerk	\$ 5.49
13. Messenger	\$ 5.86
14. Order Clerk I	\$ 6.96
15. Order Clerk II	\$ 9.55
16. Payroll Clerk	\$ 8.48
17. Production Control Clerk	\$ 9.92
18. Receptionist	\$ 6.64
19. Scheduler, Maintenance	\$ 8.20
20. Secretary I	\$ 8.20
21. Secretary II	\$ 8.48



U.S. DEPARTMENT OF LABOR  
EMPLOYMENT STANDARDS ADMINISTRATION  
WAGE AND HOUR DIVISION  
WASHINGTON, D.C. 20210

Page 2 of 5

REGISTER OF WAGE DETERMINATIONS UNDER  
THE SERVICE CONTRACT ACT  
By direction of the Secretary of Labor

Alan L. Moss  
Director

Division of  
Wage Determinations

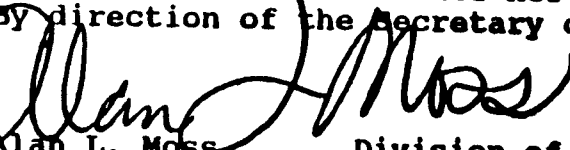
LOCALITY	State: New Mexico			
	Area: NM COUNTIES: BERNALILLO, CATRON CIBOLA, COLFAX, DE BACA, GUADALUPE, HARDING LOS ALAMOS, MCKINLEY, MORA, RIO ARRIBA SAN JUAN, SAN MIGUEL, SANDOVAL, SANTA FE SOCORRO, TAOS, TORRANCE, VALENCIA			
Wage Determination No.: 86-0108 (Rev. 12) Date: 09/18/1991				
Class of Service Employees	Minimum Hourly Wage	Fringe Benefit Payments		
		Health & Welfare	Vacation	Holiday

22. Secretary III	\$ 10.72
23. Secretary IV	\$ 12.39
24. Secretary V	\$ 12.94
25. Service Order Dispatcher	\$ 6.94
26. Stenographer I	\$ 8.02
27. Stenographer II	\$ 9.24
28. Supply Clerk/Storeworker/ Shelf Stocker/Store Clerk	\$ 6.94
29. Supply Technician	\$ 10.72
30. Switchboard Operator	\$ 6.64
31. Switchboard Operator- Receptionist	\$ 6.64
32. Transcribing-Machine Typist	\$ 8.20
33. Typist I	\$ 6.68
34. Typist II	\$ 7.59
35. Word Processor I	\$ 6.71
36. Word Processor II	\$ 8.36
37. Reservation Agent-in-charge	\$ 12.94
38. Lead Reservation Clerk	\$ 12.39
39. Reservation Clerk	\$ 10.72

U.S. DEPARTMENT OF LABOR  
EMPLOYMENT STANDARDS ADMINISTRATION  
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Wage Determinations

LOCALITY	State: New Mexico			
	Area: NM COUNTIES: BERNALILLO, CATRON CIBOLA, COLFAX, DE BACA, GUADALUPE, HARDING LOS ALAMOS, MCKINLEY, MORA, RIO ARRIBA SAN JUAN, SAN MIGUEL, SANDOVAL, SANTA FE SOCORRO, TAOS, TORRANCE, VALENCIA			
Wage Determination No.: 86-0108 (Rev. 12) Date: 09/18/1991				
Class of Service Employees	Minimum Hourly Wage	Fringe Benefit Payments		
		Health & Welfare	Vacation	Holiday

Fringe benefits applicable to all classes of service employees  
engaged in contract performance:

1/

2/

3/

1/ HEALTH & WELFARE: Life, accident, and health insurance plans, sick leave, pension plans, civic and personal leave, severance pay, and savings and thrift plans: Employer contributions costing an average of \$2.07 per hour computed on the basis of all hours worked by service employees employed in the contract.

2/ VACATION: 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 10 years; 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present (successor) contractor, wherever employed, and with predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 4.173)

3/ HOLIDAYS: 10 paid holidays per year: New Year's Day, Martin Luther King Jr.'s Birthday, Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day, Thanksgiving Day, and Christmas Day. (A contractor may substitute for any of the named holidays another day off with pay in accordance with a plan communicated to the employees involved.)

NOTE: The contracting officer shall require that any class of service employee which is not listed herein and which is to be employed under the contract (i.e., the work to be performed is not performed by any classification listed in the wage determination), be classified by the contractor so as to provide a reasonable relationship (i.e., appropriate level of skill comparison) between such unlisted classifications and the classifications listed in the wage determination. Such conformed classes of employees shall be paid the monetary wages and furnished the fringe benefits as are determined. Such conforming procedures shall be initiated by the contractor prior to the performance of contract work by such unlisted class(es) of employees. A written report of the proposed conforming action, including information regarding the agreement or disagreement of the authorized representative of the employees involved or, where there is no authorized representative, the employees themselves, shall be submitted by the contractor to the contracting officer no later than 30 days after such unlisted class(es) of employees performs any contract work. The contracting officer shall review the proposed action and promptly submit a report of the action, together with the agency's recommendation and all pertinent information including the position of the contractor and the employees, to the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, for review. (See section 4.6 (b)(2) of Regulations 29 CFR 4)

UNIFORM ALLOWANCE: If employees are required to wear uniforms in the performance of this contract (either by the terms of the Government contract, by the employer, by the state or local law, etc.), the cost of furnishing such uniforms and maintaining (by laundering or dry cleaning) such uniforms is an expense that may not be borne by an employee where such cost reduces the hourly rate below that required by the wage determination. The Department of Labor will accept payment in accordance with the following standards as compliance:

The contractor or subcontractor is required to furnish all employees with an adequate number of uniforms without cost or to reimburse employees for the actual cost of the uniforms. In addition, where uniform cleaning and maintenance is made the responsibility of the employee, all contractors and subcontractors subject to this wage determination shall (in the absence of a bona fide collective bargaining agreement providing for a different amount, or the furnishing of contrary affirmative proof as to the actual cost), reimburse all employees for such cleaning and maintenance at a rate of \$3.80 a week (or 76 cents a day); and effective April 1, 1991, the note shall be \$4.25 per week (or \$.85 cents per day). However, in those instances where the uniforms furnished are made of "wash and wear" materials, may be routinely washed and dried with other personal garments, and do not require any special treatment such as dry cleaning, daily washing, or commercial laundering in order to meet the cleanliness or appearance standards set by the terms of the Government contract, by the contractor, by law, or by the nature of the work, there is no requirement that employees be reimbursed for uniform maintenance costs.

NOTE: The duties of employees under job titles listed are those described in the Service Contract Act Directory of Occupations, Second Edition, July 1986, unless otherwise indicated. See also 29 CFR Part 4 Section 4.152.

\*\*\*\*\* OCCUPATIONS NOT INCLUDED IN THE SCA DIRECTORY OF OCCUPATIONS \*\*\*\*\*

**RESERVATION AGENT-IN-CHARGE**

Develops itineraries for worldwide travel regardless of complexity and, using an airline reservation computer system, arranges reservation and ticketing service to meet business requirements and schedules. Determines authorized and cost effective modes, carriers and routings and arranges rental car service. Is the working supervisor for a travel section consisting of two or more reservation clerks, or may be designated as a site supervisor at a small branch location.

**LEAD RESERVATION CLERK**

Develops more difficult and unique itineraries for worldwide travel and using an airline reservation computer system, arranges reservation and ticketing service to meet business requirements and schedules. Determines authorized and cost effective modes, carriers and routings and arranges rental car service. Acts as a "trouble shooter" for other reservation clerks and provides guidance and assistance with unusual or difficult routings.

**RESERVATION CLERK**

Develops relatively routine and less complicated itineraries for worldwide travel and, using an airline reservation computer system, arranges business requirements and schedules. Determines authorized and cost effective modes, carriers and routings and arranges rental car service.

U.S. DEPARTMENT OF LABOR  
EMPLOYMENT STANDARDS ADMINISTRATION  
WAGE AND HOUR DIVISION  
WASHINGTON, D.C. 20210

Page 1 of 4

REGISTER OF WAGE DETERMINATIONS UNDER  
THE SERVICE CONTRACT ACT  
By direction of the Secretary of Labor

Alan L. Moss  
Director

Division of  
Wage Determinations

LOCALITY	State: New Mexico			
	Area: NM COUNTIES: BERNALILLO, CATRON CIBOLA, COLFAX, DE BACA, GUADALUPE, HARDING LOS ALAMOS, MORA, RIO ARriba, SAN JUAN SAN MIGUEL, SANDOVAL, SANTA FE, SOCORRO, TAOS TORRANCE, VALENCIA			
Wage Determination No.: 86-0116 (Rev. 13) Date: 09/18/1991				
Class of Service Employees	Minimum Hourly Wage	Fringe Benefit Payments		
		Health & Welfare	Vacation	Holiday Other

Protective Services:

1. Court Security Officer	\$ 6.49
2. Detention Officer/Correction Officer	\$ 6.49
3. Firefighter	\$ 6.49
4. Guard I	\$ 5.17
5. Guard II	\$ 6.49
6. Police Officer	\$ 6.49

Fringe benefits applicable to all classes of service employees  
engaged in contract performance:

1/

2/

3/

1/ HEALTH & WELFARE: Life, accident, and health insurance plans, sick leave, pension plans, civic and personal leave, severance pay, and savings and thrift plans: Employer contributions costing an average of \$2.07 per hour computed on the basis of all hours worked by service employees employed in the contract.

2/ VACATION: 2 weeks paid vacation after 1 year of service with a contractor or successor; 3 weeks after 10 years; 4 weeks after 15 years. Length of service includes the whole span of continuous service with the present (successor) contractor, wherever employed, and with predecessor contractors in the performance of similar work at the same Federal facility. (Reg. 4.173)

U.S. DEPARTMENT OF LABOR  
EMPLOYMENT STANDARDS ADMINISTRATION  
WAGE AND HOUR DIVISION  
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REGISTER OF WAGE DETERMINATIONS UNDER  
THE SERVICE CONTRACT ACT  
by direction of the Secretary of Labor

Alan L. Moss  
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Wage Determinations

LOCALITY	State: New Mexico			
	Area: NM COUNTIES: BERNALILLO, CATRON CIBOLA, COLFAX, DE BACA, GUADALUPE, HARDING LOS ALAMOS, MORA, RIO ARRIBA, SAN JUAN SAN MIGUEL, SANDOVAL, SANTA FE, SOCORRO, TAOS TORRANCE, VALENCIA			
Wage Determination No.: 86-0116 (Rev. 13) Date: 09/18/1991				
Class of Service Employees	Minimum Hourly Wage	Fringe Benefit Payments		
		Health & Welfare	Vacation	Holiday

/ HOLIDAYS: 10 paid holidays per year: New Year's Day, Martin Luther King Jr.'s Birthday,  
Washington's Birthday, Memorial Day, Independence Day, Labor Day, Columbus Day, Veterans' Day,  
Thanksgiving Day, and Christmas Day. (A contractor may substitute for any of the named holidays  
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OTE: The duties of employees under job titles listed are those described in the Service Contract Directory of Occupations, Second Edition, July 1986, unless otherwise indicated. See also 29 FR Part 4 Section 4.152.



**CONTRACT NOTIFICATIONS  
AND SUBMITTALS**

**\*\*\* CONTRACT NOTIFICATIONS AND SUBMITTALS \*\*\***

(FN-NOTSUB.WK1/LOTUS)

DESCRIPTION	REFERENCE	DUE SCHEDULE	NO. OF COPIES
Confidentiality of Information Agreement	Special Contract Requirements (SCR) H.03	Upon request	1 copy
Overtime Approval	SCR H.14	As required, each occurrence	1 copy
Overtime Use Report	SCR H.14	Each occurrence, weekly	1 copy
Cost Voucher, Indirect Costs	SCR H.16.(a) and Contract Clause (CC) 24	Monthly	1 copy
Cost Voucher, Direct Costs	SCR H.16.(d), CC 24	Monthly	1 copy
Fire Department Management Team	SCR, H.18	30 days after award	1 copy
Certificate of Procurement Integrity	CC 7.(b)	Each modification	1 copy
Notification of Intent to Subcontract with Debarred Party	CC 14(c)	Each occurrence	1 copy
Organizational Conflict of Interests	CC 15(b) and SCR, H.21	Each occurrence	1 copy
Release of Information	SCR, H.22	Each occurrence	1 copy
Automatic Data Proc. Eq.	SCR, H.23	Each occurrence	1 copy
Acquisition of Real Property	CC 27	Each occurrence	1 copy
Subcontracting Plan	CC 29	As requested	1 copy
Notice of Labor Disputes	CC 34 and SOW IX.A	Each potential labor dispute	1 copy
Equal Opportunity Pre-award Clearance	CC 37	Each Subcontract over \$1M	1 copy

**\*\*\* CONTRACT NOTIFICATIONS AND SUBMITTALS \*\*\***

(FN-NOTSUB.WK1/LOTUS)

DESCRIPTION	REFERENCE	DUE SCHEDULE	NO. OF COPIES
Employment Report, Vietnam Era Veterans	CC 40	March 31 each year	1 copy Form VETS 100
Paperwork Reduction Act	CC 49(b)	Each occurrence	1 copy
Notice of Patent or Copyright Infringement	CC 53	Each occurrence	1 copy
Insurance-Liability to Third Parties	CC 54	Each occurrence	1 copy
Notice of Suit or Claim That Could be a Cost to Contract	CC 54(g)	Each occurrence	1 copy
Limitation of Funds	CC 59	When costs are expected to exceed 75% of allotted fund in next 60 days	1 copy
Disputes	CC 62	Each occurrence	1 copy
Key Personnel	CC 64	Each change of personnel	1 copy
Continuity of Operations Plan	CC 66	60 days after award of contract	5 copies draft and final
Notice of Intent to Disallow Costs	CC 67(a)(2)	60 days or less after notice to not allow costs	1 copy
Changes-Cost- Reimbursement	CC 68(c)	30 days after receipt of order	1 copy
Subcontracts	CC 69	Each occurrence, as required	1 copy of all documents
Property Management Program Plan	CC 71 and SOW VI.A	180 days after award of contract	3 copies draft 1 copy final
Nuclear Hazards Claim	CC 77	Each occurrence	1 copy
Safety and Health	CC 82	30 days after	1 copy draft

**\*\*\* CONTRACT NOTIFICATIONS AND SUBMITTALS \*\*\***

(FN-NOTSUB.WK1/LOTUS)

DESCRIPTION	REFERENCE	DUE SCHEDULE	NO. OF COPIES
Management Program		award of contract	1 copy final
Workplace Substance Abuse Program	CC 85	30 days after award of contract	3 copies draft 1 copy final
Personnel and Equipment Response Procedures	Statement of Work, (SOW) I.B.3	30 days after award of contract	3 copies draft 1 copy final
EMT-I Implementation Plan	SOW I.C.3	30 days after award of contract	3 copies draft 1 copy final
Rescue Services Operating Procedures	SOW, I.C.5	90 days after award of contract.	3 copies draft 1 copy final
Communications and Dispatch Plan	SOW I.D.4	Continuing	3 copies draft 1 copy final
Communications and Dispatch Procedures	SOW I.D.1	120 days after award of contract	3 copies draft 1 copy of final
Contractor's Organization Structure Chart	SOW II.B and C	At award and each change	3 copies draft and final
FTE Levels Overstaffing	SOW II.D	Each occurrence	1 copy
Fire Department Organization Chart/Narrative	SOW II.B	Prior to contract award and as requested by C.O.	3 copies draft and final
Annual Fire Department Budget	SOW III.A	Sept. 30th of each year and updates as requested	1 copy
Budget Overruns	SOW III.A.2	Each occurrence	1 copy
Cost Management System	SOW III.B.1	180 days after award of contract	3 copies draft and final
Monthly Cost Reports	SOW III.B.3	30 calendar days after end of month	1 copy
Personnel Management Plan	SOW IV.	60 days after award of contract	3 copies draft and final
Security Plan	SOW V.	30 days after	3 copies draft

\*\*\* CONTRACT NOTIFICATIONS AND SUBMITTALS \*\*\*

(FN-NOTSUB.WK1/LOTUS)

DESCRIPTION	REFERENCE	DUE SCHEDULE	NO. OF COPIES
		award of contract	and final
Appointment of Training Officer	SOW VII.A.2	At time of award	1 copy
Fire Department Training Program	SOW VII.A.3.j	60 days after award of contract	3 copies draft 1 copy final
Incident Command System Procedures	SOW VIII.A.3	60 days after award of contract	3 copies draft 1 copy final
Occurrence Reporting Procedures	SOW VIII.B.4	30 days after award of contract	3 copies draft 1 copy final
Occurrence Reports	SOW VIII.B	Each incident within two hours telephone, 24 hr., 10 day and final reports	Telephone and ORPS electror system.
Continuity of Operations Contingency Plan	SOW IX.B	90 days after award of contract	1 copy
Work Stoppage Notice	SOW IX.A	Each occurrence	3 copies draft and final
Pre-Fire Planning Program	SOW X.E	30 days after award of contract	3 copies
Pre-Fire Plans of Facilities	SOW X.D	At time of award and continuing	1 copy
Intent to Enter into Mutual-Aid Agreements	SOW XI.C	Each occurrence	3 copies draft and final
Mutual-Aid Agreements	SOW XI.D	Each occurrence	Copies of data to be provided as requested
Fire Hydrant Flow Testing	SOW XII.A	Reports to be delivered within 30 days of completions of the tests	3 copies draft and final
Procedures for Fire Hydrant Testing	SOW XII.A.3	45 days after award of contract	3 copies draft and final. One copy on PC dis
Operational Procedures	SOW XIII	As completed	

Document: LANL General Part B  
Revision No.: 1.0  
Date: October 1998

## **Supplement 2**

**Memorandum of Understanding Between the United States Department of Energy  
Los Alamos Area Office and the Incorporated County of Los Alamos, New Mexico  
Concerning Mutual Aid and Emergency Response**

MEMORANDUM OF UNDERSTANDING  
BETWEEN THE  
UNITED STATES DEPARTMENT OF ENERGY  
LOS ALAMOS AREA OFFICE

AND THE  
INCORPORATED COUNTY OF LOS ALAMOS, NEW MEXICO  
CONCERNING

MUTUAL AID AND EMERGENCY RESPONSE

INTRODUCTION:

THIS MEMORANDUM OF UNDERSTANDING (MOU) is between the United States of America (the Government), Department of Energy (DOE), Los Alamos Area Office (LAAO), and the Incorporated County of Los Alamos, State of New Mexico (County).

WHEREAS, both parties have certain responsibilities for protecting the public; and

WHEREAS, both parties have developed and maintain capabilities to accomplish their respective responsibilities; and

PURPOSE:

WHEREAS, both parties recognize that developing and maintaining a program of mutual assistance will enhance each party's ability to accomplish its responsibilities in a more effective and efficient manner; and

WHEREAS, both parties are willing to enter into this MOU;

AUTHORITY:

WHEREAS, the DOE is authorized to enter into this MOU by Public Law 95-91; and DOE Order 1280.1A, dated November 15, 1991; and

WHEREAS, The County is authorized to enter into this MOU by Article I, Sections 100 and 103 of the Charter for the Incorporated County of Los Alamos, Sections 2.50.020, 2.48.020, 2.16.010 and 2.16.020 of the Los Alamos County Code, the New Mexico Constitution, Art. X, Section 6 and the Community Right to Know Act of 1986 (SARA Title III), Sections 301-303 and Section 12-10-6 NMSA, 1978.

NOW, THEREFORE, it is understood and agreed by the parties that the MOU will be as follows:

MANAGEMENT AND PROGRAM GUIDELINES:

1. The DOE will provide assistance to the County, when requested, for the following:
  - a. Crisis negotiation efforts;
  - b. Bomb threats, bomb and explosive incidents;
  - c. Hazardous material emergencies or incidents; and
  - d. Natural disasters, or "Acts of God," affecting the County.

The County will provide assistance for emergencies to DOE, when requested, for Los Alamos police assistance, highway maintenance equipment, and use of County buildings and facilities on an as-needed basis.

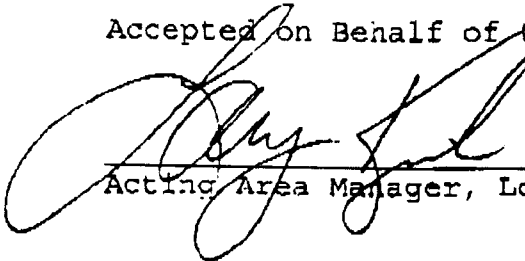
DOE and County assistance will be rendered to each entity within the incorporated boundary of Los Alamos County and areas outside the County to the extent provided for through other MOUs between the DOE, the County and other jurisdictions.

2. Both the DOE and the County reserve the right to determine the extent of the assistance either will render to the other in response to requests for assistance.
3. Mutual Aid Response Procedures will be developed and updated annually, specifying the policies and procedures to be followed in implementing this MOU.
4. The DOE and the County covenant and agree that no claim for compensation will be made against each other for any loss, damage, personal injury, or death occurring in consequence of bomb threat, natural disaster or hazardous material response assistance rendered under this agreement, and all such rights or claims are hereby expressly waived.
5. Notwithstanding any other term, condition or provision of this MOU, nothing contained in this MOU shall in any way alter the County's rights, privileges, immunities or protection under the New Mexico Tort Claims Act, Section 41-4-1, NMSA, 1978.
6. A copy of this MOU will be provided by LAAO to the Los Alamos Police and Fire Departments, the University of California Regents, the DOE Albuquerque Operations Office, the Los Alamos Medical Center, the Los Alamos Schools, and the State of New Mexico, after it has been signed by both parties.



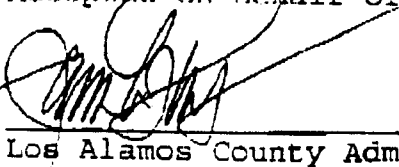
7. This MOU shall not be used to obligate or commit funds or as the basis for the transfer of funds.
8. Subject to the Freedom of Information Act (5 U.S.C. 5520), decisions on disclosure of information to the public regarding this MOU shall be made by DOE following consultation with the County-designated representative.
9. This MOU shall become effective upon the latter date of signature of the parties. It shall remain in effect for a 5-year term from the effective date. It may be terminated by the mutual written agreement of DOE and the County or by either party upon 30-day written notice to the other party.

Accepted on Behalf of the DOE by the:

  
\_\_\_\_\_  
Acting Area Manager, Los Alamos Area Office

Date 12/1/89

Accepted on Behalf of the County by the:

  
\_\_\_\_\_  
Los Alamos County Administrator

Date 1-3-95

Approved as to form:

  
\_\_\_\_\_  
Acting County Attorney

Date 1/19/95

Document: LANL General Part B  
Revision No.: 1.0  
Date: October 1998

## **Supplement 3**

### **Memorandum of Understanding Between the United States Department of Energy and the Los Alamos Medical Center Concerning Mutual Assistance and Emergency Support**

MEMORANDUM OF UNDERSTANDING  
BETWEEN THE  
UNITED STATES DEPARTMENT OF ENERGY  
AND THE  
THE LOS ALAMOS MEDICAL CENTER  
CONCERNING  
MUTUAL ASSISTANCE AND EMERGENCY SUPPORT

1. **GENERAL:** This Memorandum of Understanding (MOU), is between the United States Department of Energy (DOE), Los Alamos Area Office (LAAO), and Los Alamos Medical Center (the Hospital).

2. **INTRODUCTION**

a. **Background**

Emergency preparedness principles call for formalizing agreements with nearby medical institutions capable of rendering assistance in the event of a major catastrophe. The Planning Agreement signed on November 27, 1985, by Glen Bryant, Administrator of Los Alamos Medical Center, and on November 29, 1985, by Harold E. Valencia, Los Alamos Area Office (LAAO) Area Manager, is superseded by this document upon signature by both parties.

b. **Purpose**

This MOU establishes an agreement (Agreement) between the United States Department of Energy's Los Alamos Area Office (DOE/LAAO--hereinafter referred to as DOE) and Los Alamos Medical Center (hereinafter referred to as the Hospital), said Hospital to provide appropriate facilities for the treatment and care of patients from the DOE contractor, Los Alamos National Laboratory (LANL), in the event of an accident, emergency or other circumstance resulting in the release of radioactivity and subsequent contamination of said patients. Such accident, emergency, or circumstance is hereinafter referred to as an "incident."

c. **Authority**

(1) DOE Order 5500.3A, dated April 30, 1991, "Planning and Preparedness for Operational Emergencies," paragraph 11. c. (7) (c)/page 12, requires "documented arrangements with onsite and offsite medical facilities to accept and treat contaminated, injured personnel."

(2) DOE Order 1280.1, dated November 15, 1991, Memorandums of Understanding, provides format and policy guidance for constructing an MOU.

d. Policy

DOE will not call upon the Hospital for assistance except under emergency conditions or the DOE and its local contractors do not have the capability to resolve the crisis. When called upon, the hospital will make every effort to provide such support as it is able to render without compromising its ability to provide treatment to its patients.

3. MANAGEMENT AND PROGRAM GUIDELINES:

a. Management and Review

(1) Responsibilities of Participating Parties.

(a) DOE agrees to the following:

1. To participate in an educational program for physicians and nursing personnel at the Hospital, the particulars of which are to be determined by mutual agreement of the parties.

2. To participate in radiation emergency exercises covering LANL to evaluate the Hospital's and DOE's respective abilities to respond to an incident requiring treatment of contaminated personnel at the Hospital.

3. To provide a current list of DOE and Contractor (LANL) personnel who may be contacted for specific information and assistance in the event of an incident. DOE will provide updates to the list within a reasonable time as changes occur, but not less than annually.

4. To purchase and pre-position at the Hospital those contamination control supplies and equipment the parties agree are desirable to have on hand in the event of an incident. These supplies and equipment include, but are not limited to: Personal Protective Equipment (PPE), monitoring instrumentation,

plastic floor covering, tape, coveralls, respirators and other supplies and equipment to be used for the management of radiation emergencies.

5. To dispatch a decontamination team composed of radiation protection technologists and appropriate supervision in the event of an incident to assist the Hospital in the control of the contamination. The patient shall be decontaminated to the extent medically appropriate prior to transfer to the Hospital and a radiation protection technologist will accompany the patient to the Hospital.

6. To provide timely and accurate information to the Hospital in the event of an incident.

a. This shall include:

(1) A description of the nature of the incident;

(2) The type of radiation and extent of contamination of the patient;

(3) All available radiological information relative to a particular patient to the Hospital as soon as possible, but preferably not later than the patient's arrival at the Hospital for treatment. In the event hazardous materials are also involved, in the incident, information available with regard to those materials will also be provided.

b. If a patient is being sent to the Hospital as a result of an accident not involving radiation, the Hospital will be informed that no contamination is involved. If radiation contamination is involved, the LANL physician on call will be available for consultation to assist the hospital emergency room personnel, as needed.

c. This information will be conveyed by telephoning the nurse on duty at the Hospital Emergency Room or by some other mutually convenient mode.

7. To remove from the Hospital for disposal all waste material and equipment contaminated or potentially contaminated as a result of the Hospital's performance under this agreement.

(b) Los Alamos Medical Center agrees to the following:

1. To provide a current list of Hospital emergency preparedness personnel who are to be alerted in the event of an incident. Hospital will provide updates to the list within a reasonable time as changes occur, or by the first of January each year.

2. To provide adequate storage space at the Hospital for contamination control supplies, including but not limited to PPE, monitoring instrumentation, plastic floor covering, tape coveralls, respirators and other supplies necessary for the management of radiation emergencies.

3. To participate in radiation emergency exercises, including an annual one conducted with participation by the State of New Mexico, covering LANL to evaluate the Hospital's and DOE's respective abilities to respond to an incident requiring treatment of contaminated personnel at the Hospital.

4. To provide, in the event of an incident, such staff physicians, technicians, technologists, and related personnel (including Hospital's trauma team) as are required for the proper care and treatment of patients from the DOE, Contractor and subcontractors, even though contaminated with radioactive material, and also including the handling of expired victims.

5. To provide information to a DOE-designated representative regarding the medical condition of all patients treated by the Hospital as the result of an incident.

**(2) Periodic Review**

DOE will be responsible for reviewing this agreement annually as required by the DOE Order 5500.3A and initiating any changes deemed necessary. Either party to the agreement can initiate a change at any time.

**(3) Working Committees**

If regarded as necessary by either party to this agreement, DOE will be responsible for organizing and chairing a standing committee to resolve problems identified by either party. Discussions will be documented and recommended changes will be fully coordinated to ensure total concurrence from the management of both parties.

**(4) Special Provisions**

(a) It is understood by the parties to this Agreement that one or more drugs designated by the U. S. Food and Drug Administration as "investigational" may be necessary for the management of patient internal contamination by radioactive material. The Medical Director and full-time physicians on the staff of LANL's Medical Department are specifically identified on the applicable Investigational Drug Authorization filed with the U. S. Food and Drug Administration to administer these drugs. Therefore, the Hospital agrees to accord LANL's Medical Director and full time physicians the privilege of participating in the care of patients admitted to the hospital under this Agreement for the purpose of administering these investigational drugs, and other activities as the Hospital may permit.

(b) It is further understood that these drugs must be administered under conditions of informed consent. The Hospital will take whatever steps are necessary to preapprove the informed consent procedure in order to avoid administrative delay at the time of actual patient care.

**b. Guidelines**

Implementation of this Agreement shall be coordinated by the DOE Area Manager and Hospital Administrator, Patient Care Services, or their designees. They, or their designated representatives, shall meet as necessary to coordinate the

implementation of this Agreement; provided further, that they shall meet not less than annually to review this Agreement and revise or update it as necessary.

**c. Program Funding**

The details of the levels of support to be furnished one organization by the other with respect to funding will be developed in specific interagency agreements, subject to the availability of funds. This MOU shall not be used to obligate or commit funds or as a basis for the transfer of funds. DOE and the Hospital will provide each other mutual support in budget justification to the Office of Management and Budget and hearings before the Congress with respect to programs on which the organizations collaborate.

**d. Management Arrangements**

This MOU envisages direct communication between DOE and officials of other organizations involved in managing the work to be performed. Interagency agreements or project plans will set forth specific arrangements for program implementation. Such plans set forth necessary cooperative arrangements and procedures for handling decisions required by various Government officials. Specific funding and tasking will be implemented through interagency agreements.

**4. ADMINISTRATION**

**a. Public Information Coordination**

Subject to the Freedom of Information Act (5 U. S. C. 552), decisions on disclosure of information to the public regarding projects and programs referenced in this MOU shall be made by DOE following consultation with the other party's representatives.

**b. Security**

Nothing in this MOU authorizes access to or disclosure of classified information required to be protected in accordance with federal law or regulation in the interest of national security. The Hospital agrees to comply with, and to assure that its personnel participating in any training hereunder at LANL comply with all applicable security regulations and requirements of the DOE pertaining to their conduct while on DOE property.



**c. Amendment and Termination**

This MOU may be amended by written agreement between DOE and the Hospital. This MOU may be terminated by the mutual written agreement of DOE and the Hospital or by either party upon 90-day written notice to the other party.

**d. Effective Date**

This MOU shall become effective upon the latter date of signature of the parties. It shall remain in effect for a five-year term from the effective date.

LOS ALAMOS AREA OFFICE OF THE DOE

BY: 

Area Manager

DATE: 4-29-94

LOS ALAMOS MEDICAL CENTER

BY: 

Administrator

DATE: 4-26-94

Document: LANL General Part B  
Revision No.: 1.0  
Date: October 1998

## **Supplement 4**

### **1997 and 1998 Traffic Studies at Intersection of Diamond Drive and Trinity Drive**

# **LOS ALAMOS COUNTY TRAFFIC ENGINEERING DEPARTMENT**

Vehicular traffic count movements at the intersection of Diamond Drive and Trinity Drive.

Date of Survey: 4/24/97

Taken for 1 hour(s)

from: 07:30 to: 08:30

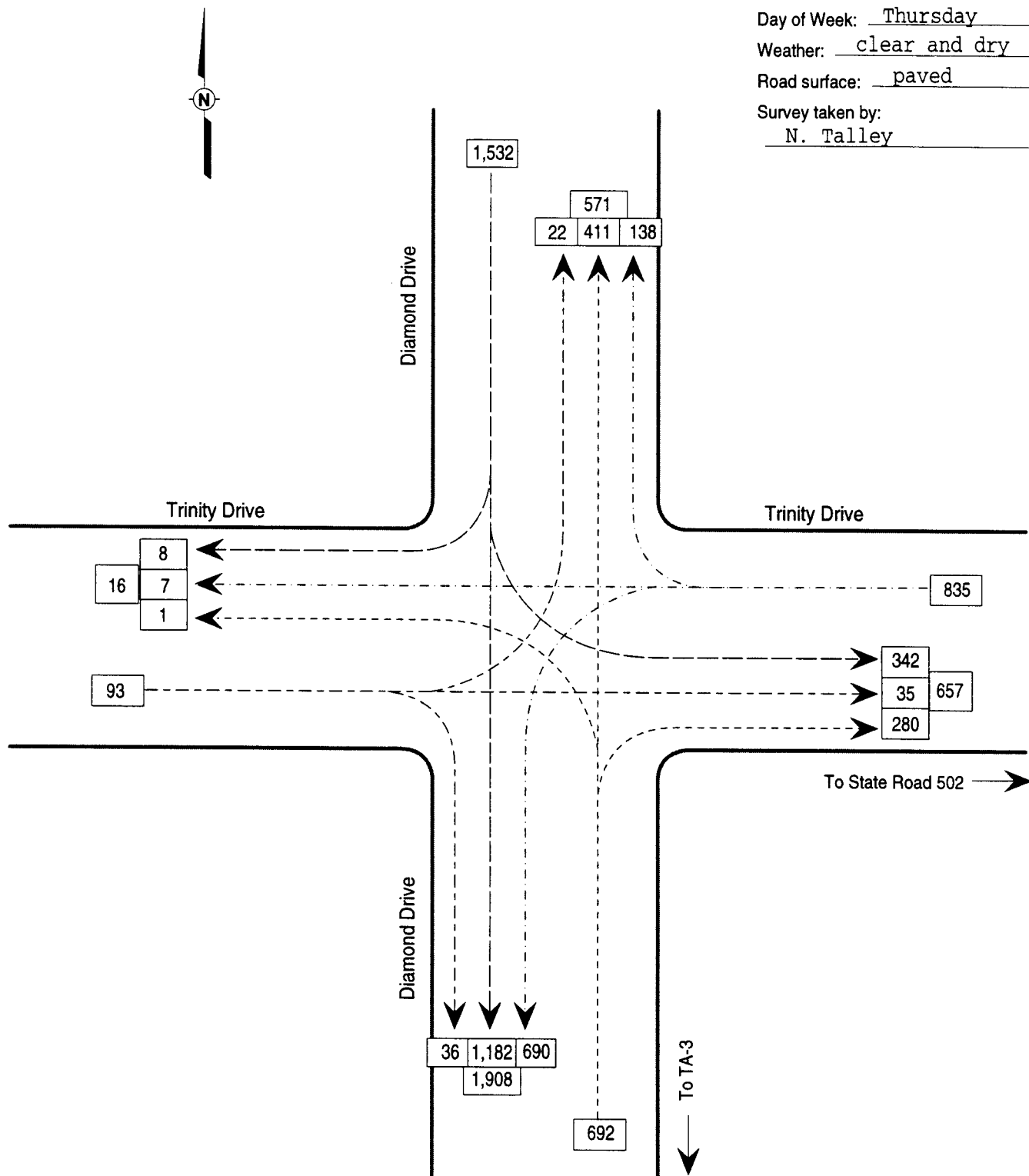
Day of Week: Thursday

Weather: clear and dry

Road surface: paved

Survey taken by:

N. Talley



# LOS ALAMOS COUNTY TRAFFIC ENGINEERING DEPARTMENT

Vehicular traffic count movements at the intersection of Diamond Drive and Trinity Drive.

Date of Survey: 4/24/97

Taken for 1 hour(s)

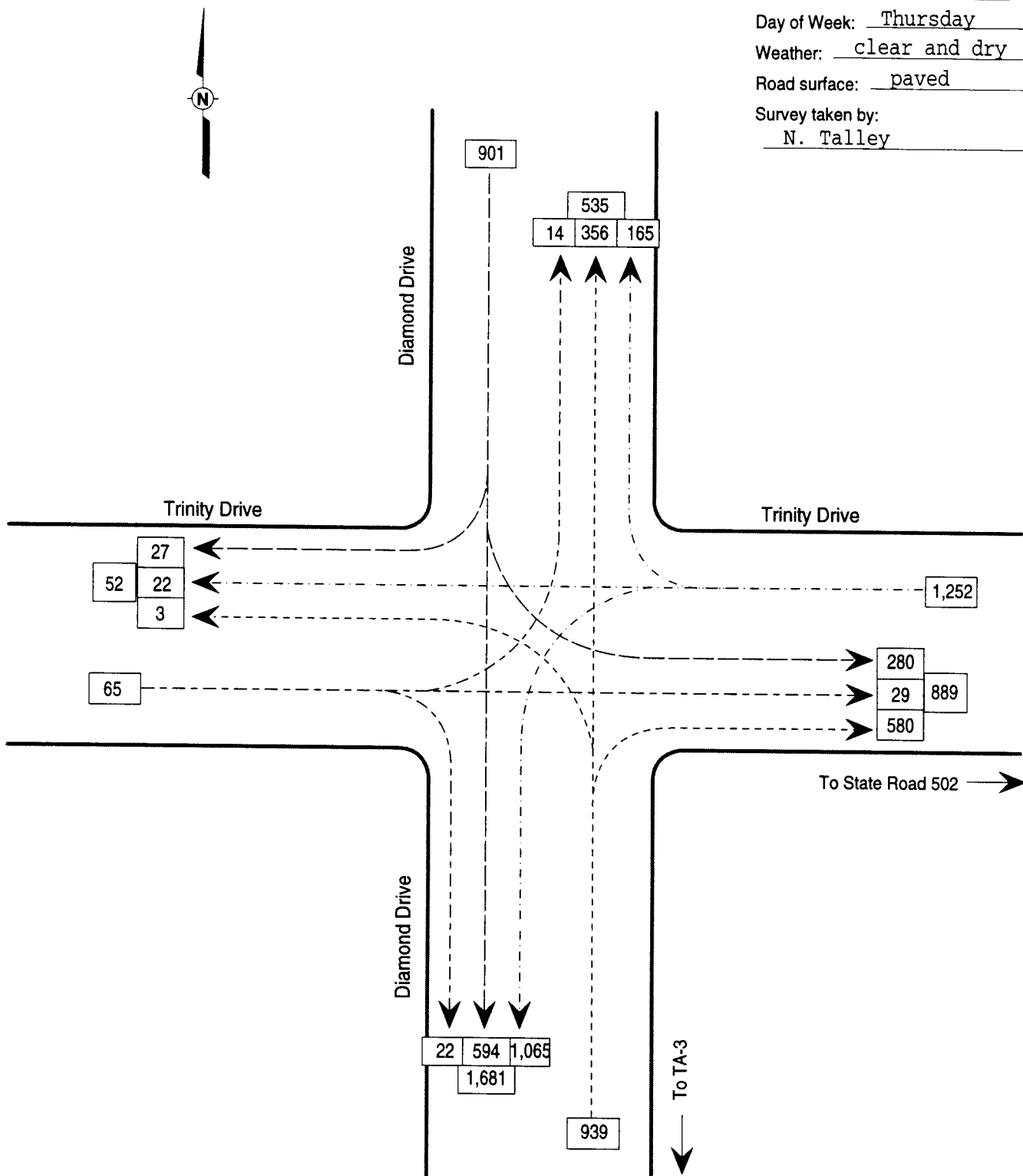
from: 12:15 to: 13:15

Day of Week: Thursday

Weather: clear and dry

Road surface: paved

Survey taken by:  
N. Talley



# **LOS ALAMOS COUNTY TRAFFIC ENGINEERING DEPARTMENT**

Vehicular traffic count movements at the intersection of Diamond Drive and Trinity Drive.

Date of Survey: 4/24/97

Taken for 1 hour(s)

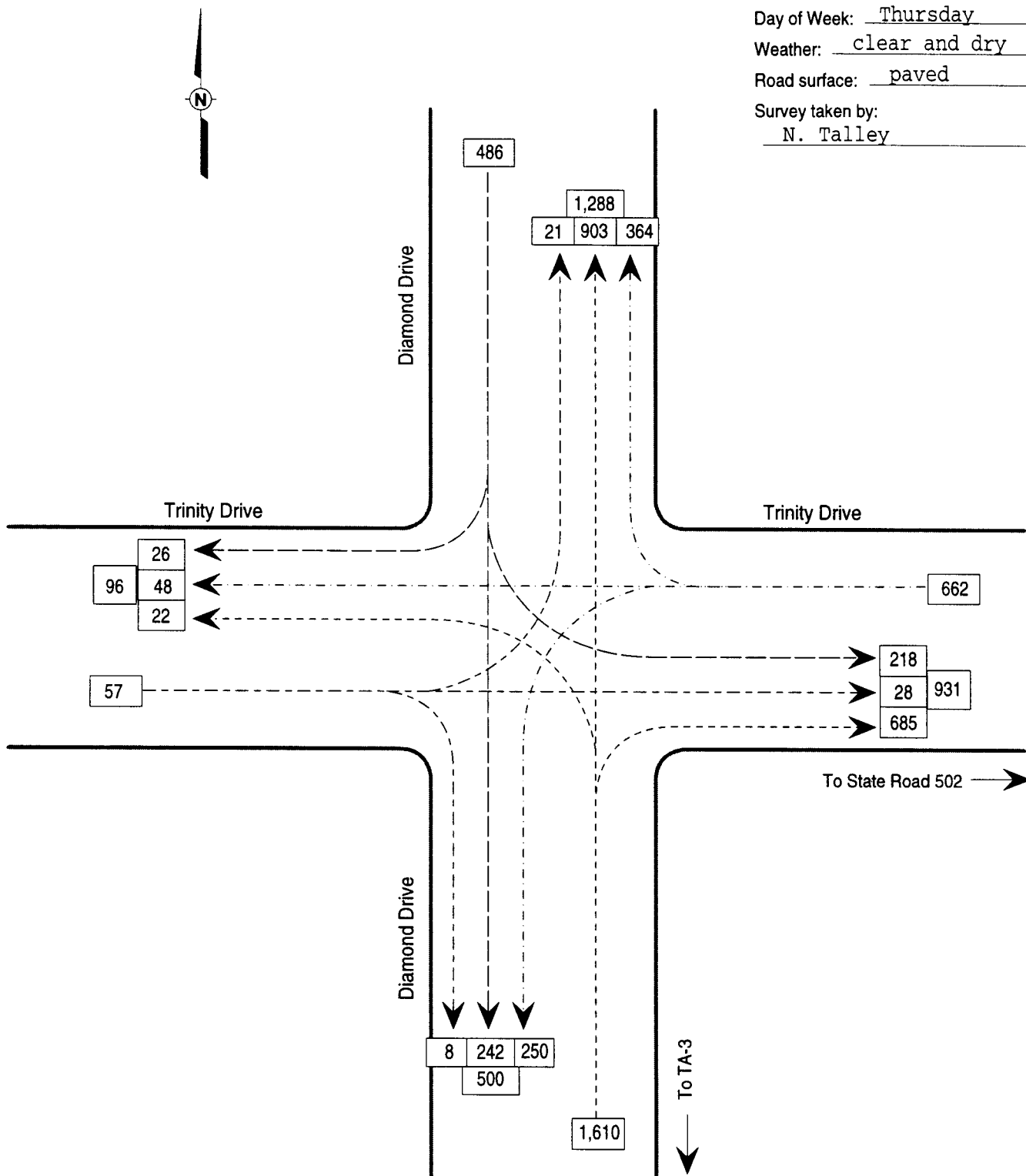
from: 16:30 to: 17:30

Day of Week: Thursday

Weather: clear and dry

Road surface: paved

Survey taken by:  
N. Talley



## LOS ALAMOS COUNTY

Location : Trinity at Diamond

Public Works Dept.

Study Name: TRINDIA1

Weather : Clear, Dry

Transportation Division

Site Code : 00000000

Counted By: Rivera, Rodriguez, Vigil

Start Date: 04/24/97

Day of Wk : Thursday

Page : 1

## Vehicle group 1

Start Time	Diamond From North					Trinity From East					Diamond From South					Trinity From West					Intvl Total
	Left	Thru	Right	Ped	Aprch Total	Left	Thru	Right	Ped	Aprch Total	Left	Thru	Right	Ped	Aprch Total	Left	Thru	Right	Ped	Aprch Total	
04/24/97																					
06:00	25	35	1	1	62	21	0	8	0	29	0	2	10	0	12	0	2	0	0	2	105
06:15	24	43	0	0	67	24	0	5	0	29	0	3	6	0	9	1	6	0	2	9	114
06:30	28	76	2	0	106	47	1	3	0	51	0	19	22	0	41	0	2	2	0	4	202
06:45	49	132	2	0	183	95	0	11	0	106	0	22	19	0	41	1	8	4	0	13	343
Hour	126	286	5	1	418	187	1	27	0	215	0	46	57	0	103	2	18	6	2	28	764
07:00	48	162	1	0	211	129	1	15	0	145	1	18	40	0	59	2	9	6	1	18	433
07:15	84	202	4	2	292	144	2	30	0	176	0	65	50	0	115	4	15	6	3	28	611
07:30	77	295	2	2	376	154	2	40	2	198	0	144	55	0	199	12	7	12	1	32	805
07:45	85	364	1	1	451	208	2	40	0	250	0	156	75	0	231	6	11	11	1	29	961
Hour	294	1023	8	5	1330	635	7	125	2	769	1	383	220	0	604	24	42	35	6	107	2810
08:00	98	307	3	0	408	174	3	34	1	212	0	65	75	0	140	2	12	10	4	28	788
08:15	82	216	2	0	300	154	0	24	1	179	1	46	75	1	123	2	5	3	2	12	614
08:30	70	144	2	0	216	124	2	36	1	163	1	46	70	0	117	3	4	3	1	11	507
08:45	52	136	2	5	195	107	4	35	3	149	1	50	93	0	144	6	7	4	2	19	507
Hour	302	803	9	5	1119	559	9	129	6	703	3	207	313	1	524	13	28	20	9	70	2416
09:00	59	69	1	4	133	118	0	34	3	155	1	31	75	0	107	2	11	5	6	24	419
09:15	66	69	0	0	135	107	5	40	0	152	1	52	68	0	121	4	6	2	0	12	420
09:30	46	57	2	0	105	92	6	26	4	128	1	55	104	0	160	1	4	3	0	8	401
09:45	52	70	3	0	125	99	6	34	1	140	2	76	109	0	187	3	7	6	1	17	469
Hour	223	265	6	4	498	416	17	134	8	575	5	214	356	0	575	10	28	16	7	61	1709
10:00	46	58	2	3	109	79	10	31	2	122	2	52	84	0	138	2	11	0	1	14	383
10:15	58	44	5	2	109	67	2	35	2	106	1	49	70	0	120	2	6	1	1	10	345
10:30	38	43	5	0	86	68	4	42	0	114	1	53	72	0	126	4	6	1	4	15	341
10:45	32	66	3	1	102	105	8	45	0	158	0	69	110	5	184	3	11	4	2	20	464
Hour	174	211	15	6	406	319	24	153	4	500	4	223	336	5	568	11	34	6	8	59	1533
11:00	45	56	6	1	108	61	11	48	0	120	2	61	154	0	217	2	8	1	0	11	456
11:15	47	53	6	2	108	105	3	47	0	155	1	125	277	0	403	2	4	3	1	10	676
11:30	68	53	3	0	124	109	16	58	1	184	3	206	308	0	517	1	4	1	2	8	833
11:45	90	78	3	0	171	141	9	55	2	207	3	212	300	0	515	6	6	0	1	13	906
Hour	250	240	18	3	511	416	39	208	3	666	9	604	1039	0	1652	11	22	5	4	42	2871
12:00	61	78	6	3	148	165	6	54	3	228	2	173	260	0	435	3	6	2	5	16	827
12:15	62	100	5	3	170	207	6	59	2	274	3	105	166	0	274	2	4	5	6	17	735
12:30	60	125	10	0	195	269	5	66	0	340	0	84	152	0	236	3	7	6	3	19	790
12:45	81	179	5	2	267	293	3	46	1	343	0	88	127	0	215	6	9	5	3	23	848
Hour	264	482	26	8	780	934	20	225	6	1185	5	450	705	0	1160	14	26	18	17	75	3200

LOS ALAMOS COUNTY

Public Works Dept.

Transportation Division

Location : Trinity at Diamond

Weather : Clear, Dry

Counted By: Rivera, Rodriguez, Vigil

Day of Wk : Thursday

Study Name: TRINDIA1

Site Code : 00000000

Start Date: 04/24/97

Page : 2

Vehicle group 1

Start Time	Diamond From North					Trinity From East					Diamond From South					Trinity From West					Intvl Total
	Left	Thru	Right	Ped	Aprch Total	Left	Thru	Right	Ped	Aprch Total	Left	Thru	Right	Ped	Aprch Total	Left	Thru	Right	Ped	Aprch Total	
13:00	77	190	7	2	276	296	8	60	2	366	0	79	135	0	214	3	9	6	6	24	880
13:15	54	96	2	1	153	219	7	44	1	271	1	63	127	0	191	3	8	4	2	17	632
13:30	74	114	8	0	196	177	2	31	0	210	0	61	123	0	184	3	7	1	1	12	602
13:45	61	66	3	0	130	133	8	55	1	197	1	57	122	0	180	3	5	3	0	11	518
Hour	266	466	20	3	755	825	25	190	4	1044	2	260	507	0	769	12	29	14	9	64	2632
14:00	45	75	0	1	121	100	5	58	1	164	2	63	104	0	169	2	8	3	0	13	467
14:15	43	51	0	0	94	98	8	50	0	156	0	49	110	0	159	1	6	1	0	8	417
14:30	44	67	1	1	113	106	6	54	1	167	1	54	100	0	155	3	7	5	0	15	450
14:45	54	70	4	0	128	90	7	58	1	156	0	76	142	0	218	3	5	1	0	9	511
Hour	186	263	5	2	456	394	26	220	3	643	3	242	456	0	701	9	26	10	0	45	1845
15:00	74	94	8	1	177	104	5	85	1	195	2	80	127	0	209	7	4	2	0	13	594
15:15	86	92	6	0	184	103	13	72	3	191	4	81	147	0	232	4	9	4	1	18	625
15:30	77	92	4	0	173	90	6	66	0	162	1	102	154	0	257	1	9	0	0	10	602
15:45	53	61	4	0	118	82	11	54	0	147	6	133	164	0	303	1	11	1	0	13	581
Hour	290	339	22	1	652	379	35	277	4	695	13	396	592	0	1001	13	33	7	1	54	2402
16:00	58	85	5	0	148	84	11	69	1	165	2	178	237	0	417	2	6	4	0	12	742
	53	69	3	1	126	62	10	66	3	141	1	124	165	0	290	1	7	0	0	8	565
16:30	64	67	4	1	136	68	13	65	0	146	3	162	136	0	301	2	4	2	2	10	593
16:45	53	60	5	1	119	56	10	93	1	160	5	149	165	0	319	4	7	1	3	15	613
Hour	228	281	17	3	529	270	44	293	5	612	11	613	703	0	1327	9	24	7	5	45	2513
17:00	38	64	8	2	112	67	12	115	1	195	8	277	180	0	465	8	7	4	1	20	792
17:15	63	51	9	0	123	59	13	91	1	164	6	315	204	0	525	7	10	1	1	19	831
17:30	50	60	8	0	118	45	14	67	0	126	6	167	112	1	286	7	6	3	1	17	547
Total	2754	4834	176	43	7807	5505	286	2254	47	8092	76	4397	5780	7	10260	150	333	152	71	706	26865
% Apr.	35.2	61.9	2.2	0.5	-	68.0	3.5	27.8	0.5	-	0.7	42.8	56.3	-	-	21.2	47.1	21.5	10.0	-	-
% Int.	10.2	17.9	0.6	0.1	-	20.4	1.0	8.3	0.1	-	0.2	16.3	21.5	-	-	0.5	1.2	0.5	0.2	-	-

# LOS ALAMOS COUNTY TRAFFIC ENGINEERING DEPARTMENT

Vehicular traffic count movements at the intersection of Diamond Drive and Trinity Drive.

Date of Survey: 4/2/98

Taken for 1 hour(s)

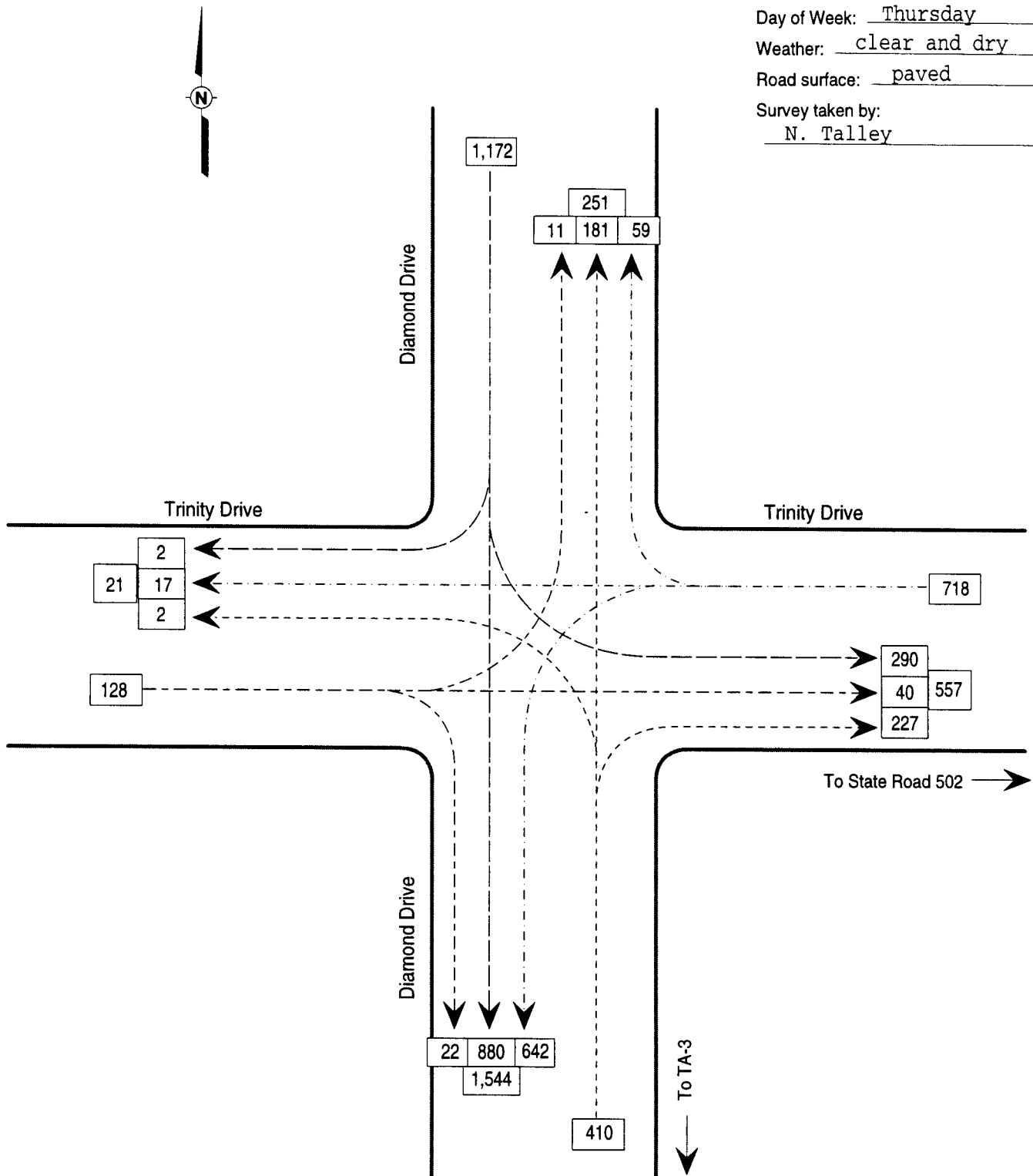
from: 07:15 to: 08:15

Day of Week: Thursday

Weather: clear and dry

Road surface: paved

Survey taken by:  
N. Talley





# LOS ALAMOS COUNTY TRAFFIC ENGINEERING DEPARTMENT

Vehicular traffic count movements at the intersection of Diamond Drive and Trinity Drive.

Date of Survey: 4/2/98

Taken for 1 hour(s)

from: 12:30 to: 13:30

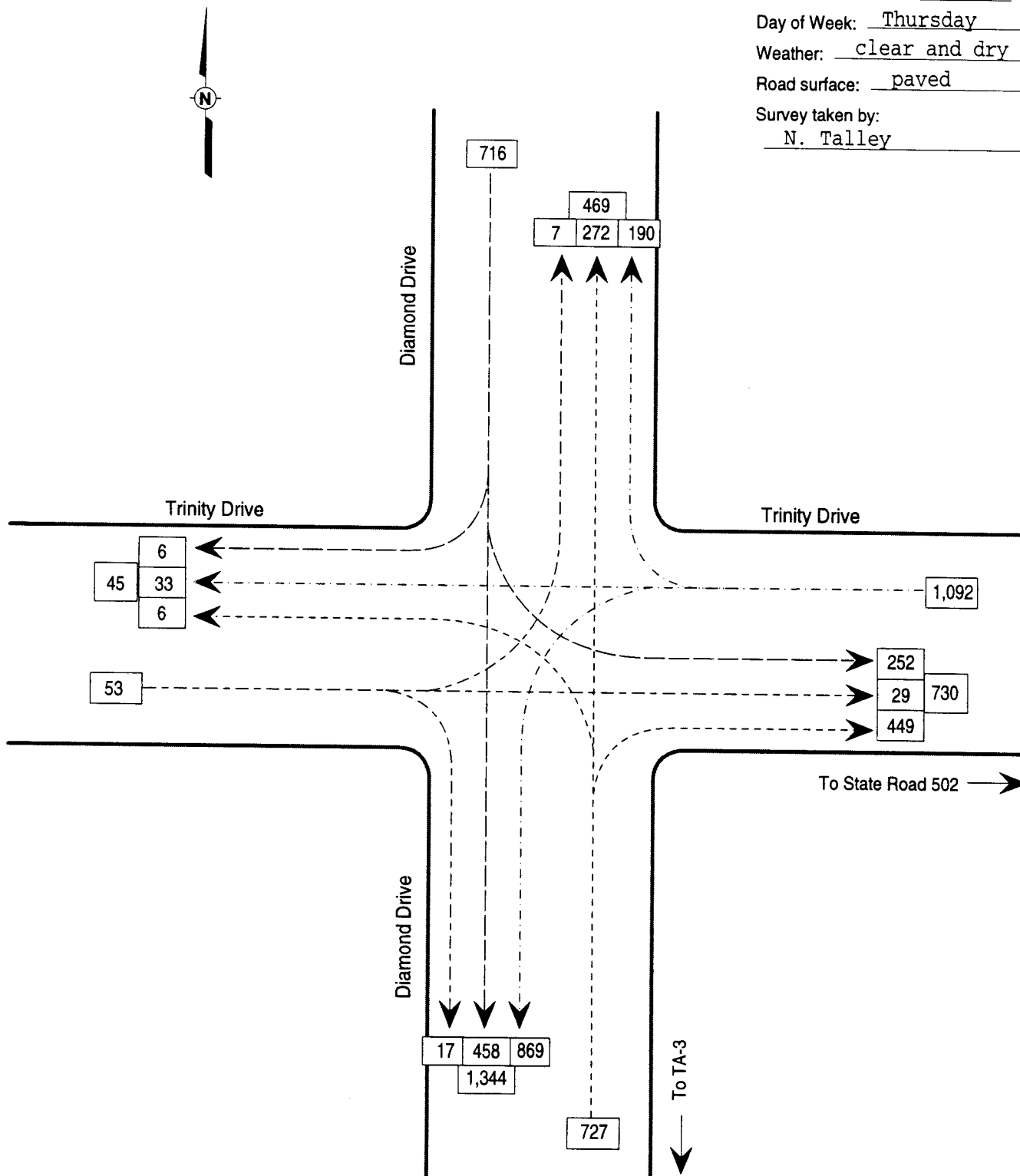
Day of Week: Thursday

Weather: clear and dry

Road surface: paved

Survey taken by:

N. Talley



# **LOS ALAMOS COUNTY TRAFFIC ENGINEERING DEPARTMENT**

Vehicular traffic count movements at the intersection of Diamond Drive and Trinity Drive.

Date of Survey: 4/2/98

Taken for 1 hour(s)

from: 17:00 to: 18:00

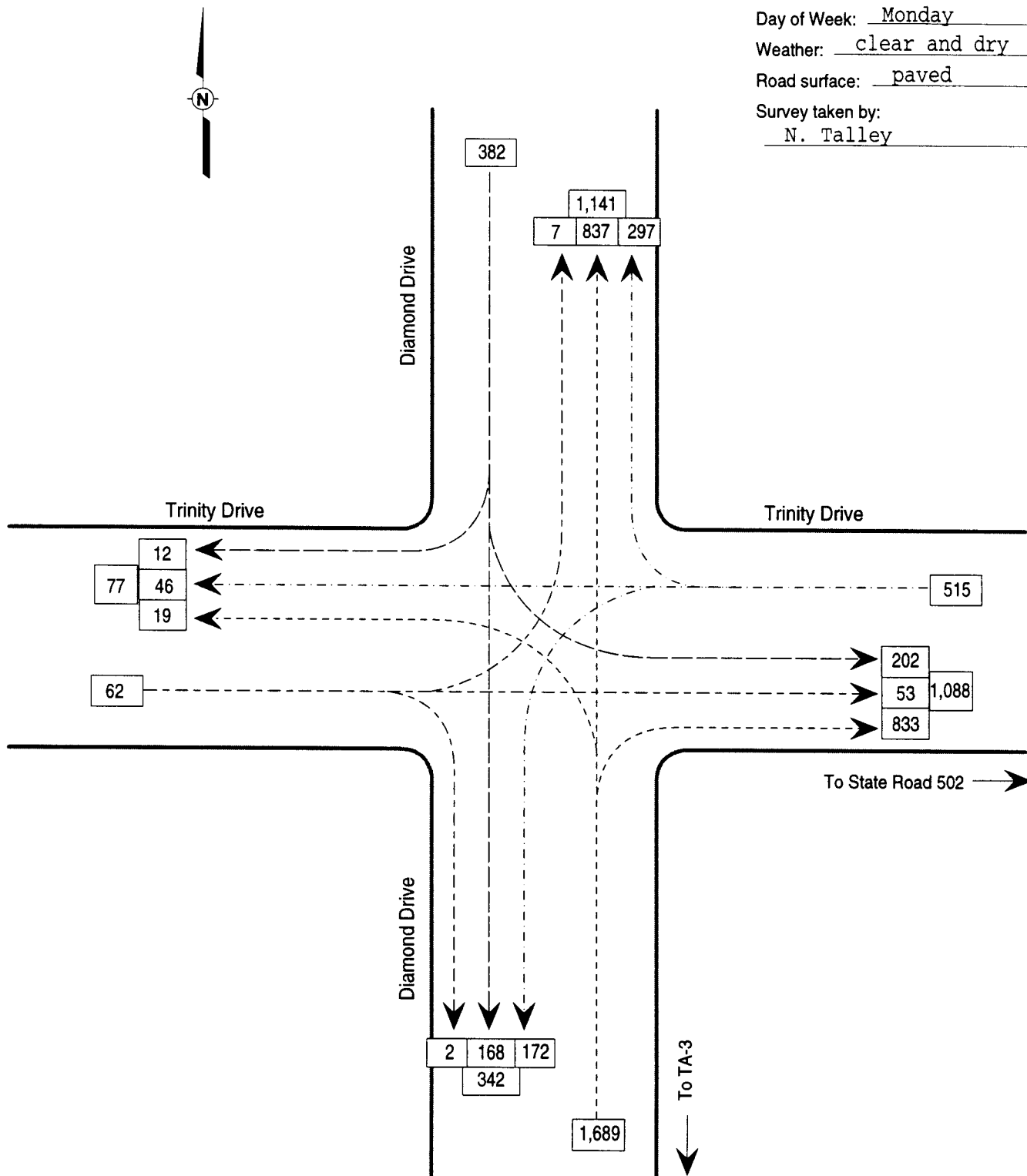
Day of Week: Monday

Weather: clear and dry

Road surface: paved

Survey taken by:

N. Talley



## LOS ALAMOS COUNTY

Public Works Dept.

Transportation Division

Location :Diamond / trinity

Weather :cool ptly cldy am; mild pm

Counted By:LA, RM, PR, DR, AS, JV

Day of Wk :thursday (NO SCHOOL SPRG BRK)

Study Name: TRINDIA

Site Code : 00000000

Start Date: 04/02/98

Page : 1

## Vehicle group 1

Start Time	Diamond From North					Trinity From East					Diamond From South					Trinity From West					Intvl Total
	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	
04/02/98																					
06:00	19	29	0	0	48	30	0	1	0	31	1	3	2	0	6	1	2	1	0	4	89
06:15	19	59	1	0	79	23	0	3	0	26	0	10	8	0	18	1	3	1	1	6	129
06:30	19	72	0	3	94	62	0	10	0	72	0	14	14	1	29	1	3	0	2	6	201
06:45	52	141	1	0	194	110	2	9	0	121	1	11	36	0	48	1	3	4	1	9	372
Hour	109	301	2	3	415	225	2	23	0	250	2	38	60	1	101	4	11	6	4	25	791
07:00	55	152	0	1	208	114	3	11	0	128	0	29	34	0	63	1	3	11	1	16	415
07:15	61	182	1	3	247	160	2	13	0	175	0	32	50	0	82	4	11	3	3	21	525
07:30	71	236	0	5	312	159	4	18	0	181	0	37	44	0	81	2	7	5	4	18	592
07:45	88	270	0	1	359	166	8	16	0	190	0	44	60	0	104	2	13	8	1	24	677
Hour	275	840	1	10	1126	599	17	58	0	674	0	142	188	0	330	9	34	27	9	79	2209
08:00	70	192	1	2	265	157	3	12	1	173	2	68	73	0	143	3	9	6	1	19	600
08:15	52	145	2	1	200	137	1	26	1	165	0	27	60	0	87	0	8	5	0	13	465
08:30	52	115	2	1	170	128	3	19	0	150	0	51	56	0	107	0	3	2	0	5	432
08:45	69	102	3	0	174	91	3	22	0	116	0	23	85	0	108	4	7	2	1	14	412
Hour	243	554	8	4	809	513	10	79	2	604	2	169	274	0	445	7	27	15	2	51	1909
09:00	53	74	2	1	130	97	6	22	0	125	3	28	54	0	85	3	5	2	0	10	350
09:15	46	53	3	1	103	87	6	31	0	124	4	46	70	0	120	0	5	1	0	6	353
09:30	57	72	3	1	133	71	5	25	0	101	0	29	66	0	95	3	6	3	0	12	341
09:45	64	48	3	1	116	82	2	24	0	108	2	36	78	0	116	3	4	2	0	9	349
Hour	220	247	11	4	482	337	19	102	0	458	9	139	268	0	416	9	20	8	0	37	1393
10:00	45	57	1	6	109	74	9	36	1	120	3	52	102	0	157	1	6	1	6	14	400
10:15	48	53	1	2	104	73	5	39	1	118	0	45	99	0	144	4	5	3	2	14	380
10:30	46	58	3	1	108	74	7	36	0	117	2	50	96	0	148	3	5	3	1	12	385
10:45	48	36	0	0	84	104	6	33	0	143	1	47	109	0	157	3	6	0	0	9	393
Hour	187	204	5	9	405	325	27	144	2	498	6	194	406	0	606	11	22	7	9	49	1558
11:00	41	43	3	0	87	85	7	33	0	125	2	55	148	0	205	1	7	1	0	9	426
11:15	49	40	1	0	90	81	2	36	2	121	1	57	195	0	253	4	4	1	0	9	473
11:30	54	43	3	1	101	81	9	27	2	119	7	112	275	0	394	1	9	4	0	14	628
11:45	47	40	2	2	91	119	11	47	0	177	5	162	345	0	512	1	17	3	0	21	801
Hour	191	166	9	3	369	366	29	143	4	542	15	386	963	0	1364	7	37	9	0	53	2328
12:00	63	56	2	2	123	167	7	60	1	235	10	237	327	20	594	2	7	0	0	9	961
12:15	51	90	0	1	142	202	9	52	0	263	4	104	196	0	304	0	7	0	0	7	716
12:30	72	109	1	1	183	231	5	47	0	283	3	79	132	0	214	0	8	4	0	12	692
12:45	62	129	0	2	193	253	11	44	1	309	2	74	123	0	199	2	4	3	1	10	711
Hour	248	384	3	6	641	853	32	203	2	1090	19	494	778	20	1311	4	26	7	1	38	3080

Location :Diamond / trinity  
Weather :cool ptly cldy am; mild pm  
Counted By:LA, RM, PR, DR, AS, JV  
Day of Wk :thursday (NO SCHOOL SPRG BRK)

LOS ALAMOS COUNTY  
Public Works Dept.  
Transportation Division

Study Name: TRINDIA  
Site Code : 00000000  
Start Date: 04/02/98  
Page : 2

Vehicle group 1																					
Start Time	Diamond From North					Trinity From East					Diamond From South					Trinity From West					Intvl Total
	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	Left	Thru	Right	Ped	Total	
13:00	50	117	3	1	171	206	7	48	2	263	1	65	100	0	166	3	9	7	0	19	619
13:15	68	103	2	0	173	179	10	51	1	241	0	54	94	0	148	2	8	3	0	13	575
13:30	50	71	5	0	126	136	13	40	0	189	4	44	90	0	138	0	6	2	0	8	461
13:45	58	80	3	0	141	137	5	33	1	176	1	48	94	0	143	4	5	1	0	10	470
Hour	226	371	13	1	611	658	35	172	4	869	6	211	378	0	595	9	28	13	0	50	2125
14:00	59	61	0	0	120	111	11	40	2	164	3	48	104	0	155	0	9	3	1	13	452
14:15	49	59	1	0	109	84	4	43	0	131	1	40	89	0	130	1	13	0	1	15	385
14:30	37	51	2	0	90	75	3	32	0	110	6	61	82	0	149	3	5	0	5	13	362
14:45	52	58	3	1	114	76	6	41	0	123	1	64	122	0	187	3	2	1	2	8	432
Hour	197	229	6	1	433	346	24	156	2	528	11	213	397	0	621	7	29	4	9	49	1631
15:00	39	53	1	0	93	80	14	45	0	139	1	66	96	0	163	4	6	1	0	11	406
15:15	46	44	1	0	91	84	6	41	1	132	1	46	123	0	170	1	12	0	0	13	406
15:30	31	38	5	1	75	73	8	37	0	118	2	65	159	0	226	2	5	0	1	8	427
15:45	51	52	4	0	107	64	7	49	0	120	1	75	165	0	241	0	5	0	0	5	473
Hour	167	187	11	1	366	301	35	172	1	509	5	252	543	0	800	7	28	1	1	37	1712
16:00	45	38	1	2	86	71	7	47	0	125	3	158	336	1	498	3	3	0	3	9	718
16:15	45	37	0	0	82	71	8	57	2	138	2	125	186	0	313	2	15	0	2	19	552
16:30	33	38	1	2	74	63	15	58	0	136	1	108	225	0	334	2	31	0	3	36	580
16:45	48	38	4	1	91	70	9	67	0	146	1	164	221	0	386	4	7	3	2	16	639
Hour	171	151	6	5	333	275	39	229	2	545	7	555	968	1	1531	11	56	3	10	80	2489
17:00	49	43	6	1	99	54	6	89	0	149	1	245	286	0	532	1	26	0	2	29	809
17:15	41	49	2	2	94	61	13	89	1	164	9	261	233	0	503	3	10	1	3	17	778
17:30	51	36	3	0	90	30	15	58	0	103	6	176	171	0	353	2	10	0	3	15	561
17:45	61	40	1	4	106	27	12	61	0	100	3	155	143	0	301	1	7	1	1	10	517
Hour	202	168	12	7	389	172	46	297	1	516	19	837	833	0	1689	7	53	2	9	71	2665
Total	2436	3802	87	54	6379	4970	315	1778	20	7083	101	3630	6056	22	9809	92	371	102	54	619	23890
% Apr.	38.1	59.6	1.3	0.8	-	70.1	4.4	25.1	0.2	-	1.0	37.0	61.7	0.2	-	14.8	59.9	16.4	8.7	-	-
% Int.	10.1	15.9	0.3	0.2	-	20.8	1.3	7.4	-	-	0.4	15.1	25.3	-	-	0.3	1.5	0.4	0.2	-	-

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## **Supplement 5**

### **Determination of 100-Year Floodplain Elevations at Los Alamos National Laboratory**

***Determination of 100-Year Floodplain Elevations  
at Los Alamos National Laboratory***

***Stephen G. McLin***

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# DETERMINATION OF 100-YEAR FLOODPLAIN ELEVATIONS AT LOS ALAMOS NATIONAL LABORATORY

by

Stephen G. McLin

## ABSTRACT

Under existing permit requirements, the US Environmental Protection Agency stipulates that facilities regulated by the Resource Conservation and Recovery Act must delineate all 100-yr floodplain elevations within their boundaries. At Los Alamos these floodplains are located within ungaged watersheds that drain Pajarito Plateau. This report documents the floodplain computational mapping procedure and, along with supporting maps, is intended to satisfy this permit requirement.

The floodplain mapping procedure outlined here uses topographic data from AUTOGIS Mapping Overlay Statistical System (AUTOGIS-MOSS), a graphical information system database. About 65% of the Laboratory has 2-ft topographic contour interval coverage, while 35% has 10-ft coverage. Targeted stream channel segments are initially specified in the MOSS system, and topographic profiles of stream channel cross sections at user-designated intervals are extracted automatically. Each 2-D profile is stored as a 3-D MOSS line feature using New Mexico state plane coordinates. This procedure is initiated at a convenient downstream location within each watershed and is continued upstream to a selected termination point. These 3-D line features are then exported in a format that satisfies the US Army Corps of Engineers' (COE's) Water-Surface Profiles (HEC-2) input data requirements.

The COE's computer-based Flood Hydrograph Package (HEC-1) and HEC-2 were used on a PC-type microcomputer to perform floodplain hydrology simulations. HEC-1 generates storm hydrographs at selected channel locations within each ungaged watershed. This information, along with the stream channel geometry extracted from the MOSS system, is then used by HEC-2 to define each floodplain. The approach used here employs a 100-yr, 6-h design storm event for Los Alamos, but alternative floodplain elevations produced by different storm events are easily computed.

The HEC-2-computed water-surface elevations for each channel section, along with the left and right channel stations where this water surface intersects the ground, are read back into the MOSS system. This information is then transformed within MOSS to determine local geographically referenced coordinates that uniquely define the 100-yr floodpool. Finally, these paired coordinates are linked together as MOSS-area features to identify each watershed floodplain. In this particular application, 11 separate watersheds traverse LANL lands; individual channels range up to 9 mi in length. The 100-yr floodplain was defined on each channel segment at 250-ft intervals, and detailed 1:4800-scale maps were generated.

## I. INTRODUCTION

The US Environmental Protection Agency (EPA) stipulates that all regulated hazardous waste treatment, storage, and disposal facilities must apply for a Resource Conservation and Recovery Act (RCRA) operating permit. Under EPA authority, the New Mexico Environment Department issued the US Department of Energy (DOE) and Los Alamos National Laboratory (LANL) a RCRA hazardous waste facility operating permit in November 1989. The EPA issued DOE and LANL the Hazardous and Solid Waste Amendments (HSWA) portion of that permit in March 1990. As a condition to the HSWA portion of the permit, LANL was required to define all 100-yr floodplain elevations within the facility boundary [40 CFR 270.14(b)(11)(iii)]. These floodplain elevations must be consistent with National Flood Insurance Program maps produced for the Federal Insurance Administration (FIA), or must use an equivalent method of mapping. Before this HSWA permit condition was mandated, these floodplain boundary locations had never been completely mapped within the LANL complex. This report describes a methodology that is recognized by the EPA and others (i.e., FIA, US Army Corps of Engineers (COE), US Bureau of Reclamation, and US Soil Conservation Service) as being an approved technique for defining floodplain elevations in ungaged watersheds.

Actual floodplain-modeling efforts used the COE Hydrologic Engineering Center (HEC) computer-based Flood Hydrograph model (HEC-1) and the Water-Surface Profiles model (HEC-2). Both the HEC-1 and HEC-2 computer programs are classified as single-event simulation models, as opposed to continuous-simulation streamflow models like the Stanford or Kentucky Watershed Models. Continuous-simulation models require extensive system observation, which is not available at LANL. Event-simulation models, on the other hand, allow greater flexibility in using distributed parameters and short time increments. They also require considerably less field observation to support input data requirements. In addition, the HEC-1 and HEC-2 event-simulation models are recognized by the EPA and COE as state-of-the-art simulation models for ungaged watershed applications.

HEC-1 is used to simulate either real or hypothetical storm hydrographs in ungaged or gaged watersheds in response to user-specified rainfall hyetographs. As used here, HEC-1 employs a traditional 100-yr, 6-h design storm event for Los Alamos, although any alternative return-period event can easily be incorporated. A representative 100-yr, 6-h design storm event is recommended by the COE for defining 100-yr floodplains in northern New Mexico (M. Magnuson, US Army COE, Albuquerque, personal communication, 1989). Predicted HEC-1 hydrograph peaks at various stream channel locations, along with stream channel geometry and watershed basin characteristics, are used by HEC-2 to compute 100-yr floodplain elevations.

Topographic profiles of stream channel cross sections at various locations were obtained from LANL's AUTOGIS computer-based Mapping Overlay Statistical System (AUTOGIS-MOSS), a graphic information system database copyrighted by Autometric, Inc. About 65% of LANL has 2-ft topographic-contour interval coverage, while 35% has 10-ft coverage. Targeted stream channel segments were initially specified in the MOSS system, and topographic profiles of cross sections at user-designated intervals along segments were extracted automatically. Each 2-D topographic profile was stored as a 3-D MOSS line feature using New Mexico state plane coordinates. This procedure was initiated at the intersection of the eastern DOE-LANL facility boundary and each watershed stream channel and was continued upstream to the western facility boundary. These 3-D line features were then exported in a format satisfying HEC-2 model input data requirements. Appendix A describes how to use the AUTOGIS-MOSS data extraction programs developed for this project; actual source code listings (LA-CC 91-3) are contained in Disk No. 1 attached to this report.

HEC-2 is used to compute floodplain elevations that are associated with user-specified hydrograph peaks. Floodplain elevations for 11 separate watersheds that included all major tributaries were defined at 250-ft intervals along stream channels within the DOE-LANL boundary. These watersheds are depicted in Fig. 1; they were subdivided into 52 separate subbasins. Peak floods were also defined with HEC-1 for two additional watersheds having a total of eight separate subbasins; however, these later watersheds do not cross the DOE-LANL facility boundary. The HEC-1

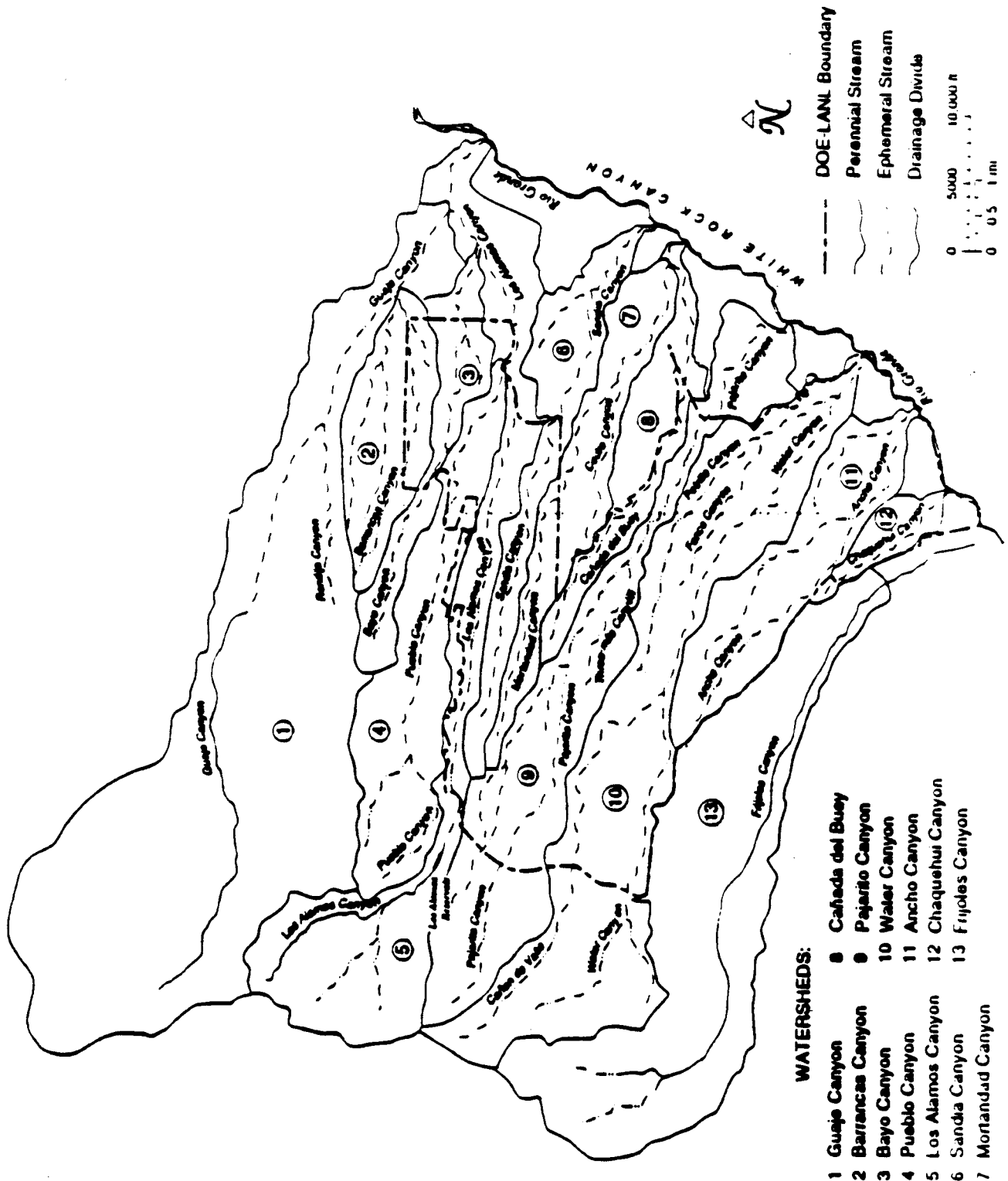


Fig. 1. Major watersheds at Los Alamos (see Table 1).

and HEC-2 input data files used to generate these hydrograph peaks and floodplain elevations are contained on disks numbered 1 and 2 attached to this report. Parameter estimation procedures and construction of input data files, including the AUTOGIS-MOSS data extraction technique used to define topographical profiles of stream channel cross sections, are described in the sections below. Once all floodplains had been defined by HEC-2, then this information was read back into the MOSS system. These data were then transformed within MOSS to determine New Mexico state plane geographically referenced coordinates that uniquely define the 100-yr floodpool at each stream cross section. Finally 1:4800-scale maps depicting the DOE-LANL boundary and all 100-yr floodplains were prepared. This packet of maps is maintained on file in LANL's Facilities Engineering Planning Group office (ENG-2 File Number R-7160) and in the Geology and Geochemistry Group office (EES-1). This report documents the identification of these floodplain elevations and, along with the above-referenced maps, is intended to satisfy the RCRA/HSWA permit requirement that all 100-yr floodplains within the DOE-LANL facility be mapped.

## II. COMPUTATIONAL METHODOLOGY

Predicting peak discharge rates and synthesizing complete discharge hydrographs for use in defining floodplain areas within ungaged watersheds are two challenging tasks in engineering hydrology. Most designs involve hydrologic analyses based upon a critical flood that imitates some hypothetical future storm event. Ideally these analyses are based on long-term rainfall-runoff observations. At LANL sufficient stream flow records are not available to support these analyses, although an extensive rain gage network with a lengthy precipitation record lends support (Bowen 1990). Hence, one may be tempted to employ some regional analysis technique, or use empirical-correlative methods. However these approaches may not accurately simulate the rainfall-runoff process. An example illustrates this point.

The US Geological Survey (USGS) has produced probabilistic techniques to estimate peak discharges in New Mexico's streams (Waltemeyer 1986; Thomas and Gold 1982; Scott 1971; and Borland 1970). These USGS studies define the regional magnitude and flood frequency within New Mexico stream channels using multiple regression techniques for the 2-, 5-, 10-, 25-, 50-, and 100-yr storm events. The empirical equations used are valid for specific watersheds under a wide range of climatic basin conditions that are considerably different from those at Los Alamos. Furthermore, these USGS studies yield significant errors in applications for which gaging records are available for direct comparison. Finally, these techniques were not intended to satisfy the RCRA/HSWA permit condition requiring floodplain definition. A direct comparison between the USGS and HEC-1 hydrograph peaks is presented later in this report.

Other analytical tools are also available to perform floodplain analyses; Viessman, et al. (1977) have summarized many of these approaches. However, the LANL site is contained within a system of ungaged, interconnected, watersheds with ephemeral stream drainage. Hence, most of these alternative approaches would not produce acceptable results. The reason for this centers around the general shape of watersheds within the LANL complex. These watersheds are elongated in the east/west direction along Pajarito Plateau, but they are extremely narrow in the north/south direction. This atypical watershed shape, coupled with variability in surficial soil type and vegetation cover, yields fairly typical rainfall-runoff time-of-concentration values for each subbasin within an individual watershed. Here, time of concentration is defined as the flow time from the most remote point in a drainage subbasin area to its outlet point. However, as one moves downstream these subbasin time-of-concentration values and unusual watershed configurations combine to yield hydrograph peaks that are atypically amplified. Hence, one tends to actually observe longer-duration runoff events with lower corresponding hydrograph peaks than some simple models would predict.

When one considers the particular application at LANL, the deterministic approach using unit hydrograph theory commonly employed by the US Army COE, the US Soil Conservation Service (SCS), and US Bureau of Reclamation is clearly appropriate. This approach is incorporated into the HEC-1 model and generates stream hydrographs at specific channel locations. An entire watershed is represented by an interconnected group of subbasins. Each subbasin generates an individual unit

hydrograph that simulates important hydrologic rainfall-runoff relationships, which are related by average subbasin characteristics. Individual subbasin hydrographs are then hydraulically routed downstream and combined with other stream-connected subbasin hydrographs. These HEC-1 peak hydrograph values are subsequently read into the HEC-2 model as a function of channel distance. HEC-2 then simulates the 100-yr water-surface elevation using a steady, gradually varied flow approximation. An iterative, standard-step method was used to compute this water-surface elevation as a function of channel distance.

Several key HEC-1 parameters represent average nonlinear temporal and spatial processes within each subbasin; they include antecedent moisture conditions, soil types, and land cover. HEC-1 also requires that a design rainfall amount and temporal distribution be specified as input data. Hence, the unit hydrograph approach is quite flexible. In addition, the HEC-1 and HEC-2 models also require basic watershed topographic and geometric characteristics, topographic profiles of stream cross sections, and bed-roughness factors as a function of channel length. All of this information for LANL watersheds was available from the MOSS mapping system or was readily obtained during short field investigations.

### III. HEC-1 FLOOD HYDROGRAPH PACKAGE

#### A. General Model Description

HEC-1 is the most widely accepted method for systematically computing runoff hydrographs in complex watersheds. It is a general-purpose model consisting of a calling program and six subroutines. Two of the subroutines determine the optimal unit hydrograph, channel loss rate, and streamflow-routing parameters. Other subroutines perform snowmelt-runoff, unit hydrograph, hydrograph-routing, and combination computations and hydrograph-balancing operations. HEC-1 is ~~capable of simulating~~ a single-storm rainfall-runoff process or computing multiple floods for the same watershed during planning studies. It can be used to forecast both pre- and post-construction flooding impacts associated with development activities. Output from the model includes design storm hydrographs at specified channel locations within the watershed. HEC-1 output is then used by the HEC-2 model as input data.

Table 1 summarizes major watersheds draining the DOE-LANL facility complex. Figure 1 shows approximate watershed locations; detailed maps are referenced later in this report. Because watershed basins within the facility complex are ungaged, the SCS synthetic unit hydrograph technique was used to characterize the relationship between rainfall-runoff and flood peak discharges. Although HEC-1 can use either the Clark, Snyder, or SCS synthetic unit hydrograph approach, the latter was selected for reasons listed below. Furthermore, the SCS rainfall-abstraction rate was also used, as this paper will describe later. Finally, by using a variety of techniques, including modified Puls, Muskingum, kinematic wave, working R&D, and level-pool reservoir routing, HEC-1 can route computed flood flows through downstream subbasins. The Muskingum method was selected for channel routing because channel losses and flood wave attenuations 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 stream channel segments. It should be emphasized that a relatively conservative design philosophy was followed here: whenever specific observational data were not available, an approach that would tend to yield larger peak hydrographs at a particular channel location was taken. It should also be noted that the HEC-1 model is extremely flexible; however, only those particular features that were used in this study are explained in detail. The interested reader is referred to the HEC-1 user's manual (US Army COE 1990) for additional model descriptions and to Viessman et al. (1977) for general hydrologic principles. Finally, it should be noted that the June 1988 FORTRAN version of HEC-1, published as PROHEC1 (March 1990 release) by Dodson & Associates, Inc., of Houston, Texas, was used in this study.

Table 1. Watersheds draining the eastern DOE-LANL boundary. See Figure 1 for approximate locations.

MAJOR WATERSHED NAME	TECH AREAS WITHIN WATERSHED
1. GUAJE CANYON WATERSHED.....	Outside DOE-LANL Boundary, Guaje municipal well field.
2. BARRANCAS CANYON WATERSHED.....	None.
3. BAYO CANYON WATERSHED.....	None.
4. PUEBLO CANYON WATERSHED.....	Historic LANL Sites, O-1 water well, and airport.
5. LOS ALAMOS CANYON WATERSHED.....	Historic LANL Sites, 3, 43, 41, 2, 21, 53, airport, O-4 water well, and Los Alamos municipal well field.
a. Canada Bonito Tributary	
b. Quemazon Canyon Tributary	
6. SANDIA CANYON WATERSHED.....	3, 53, municipal landfill, PM-1 and PM-3 water wells.
7. MORTANDAD CANYON WATERSHED.....	3, 48, 55, 42, 50, 35, 52, and 5.
a. Ten Site Canyon Tributary	
8. CANADA DEL BUEY WATERSHED.....	52, 5, 46, 51, 54, and PM-4 and PM-5 water wells.
9. PAJARITO CANYON WATERSHED.....	3, 58, 6, 8, 9, 22, 59, 69, 14, 15, 51, 18, 54, and PM-2 water supply well.
a. Two-Mile Canyon Tributary	
b. Three-Mile Canyon Tributary	
10. WATER CANYON WATERSHED.....	16, 9, 14, 11, 37, 28, 49, and 15.
a. Ski Lodge Canyon Tributary	
b. Canon de Valle Tributary	
c. Potrillo Canyon Tributary.....	15 and 36.
d. Fence Canyon Tributary	
11. ANCHO CANYON WATERSHED.....	49, 33, and 39.
a. Unnamed Tributary at State Road 4	
b. Unnamed Tributary near Rio Grande	
12. CHAQUEHUI CANYON WATERSHED.....	33.
13. FRIJOLES CANYON WATERSHED.....	Outside DOE-LANL Boundary

## B. Design Storm Events for Los Alamos

Obviously, a particular storm hydrograph for a given watershed is intimately related to the spatial and temporal storm distribution pattern generating that hydrograph. Hence, in this report we describe the 100-yr, 6-h design storm event that produces the 100-year floodplain for Los Alamos. The reader should note that other 100-yr storm durations (for example, the 100-yr, 24-h event) may produce different 100-yr floodplain definitions. Each of these aspects is described below.

Establishing a design storm event requires several important steps. These include specification of (1) storm frequency or return period; (2) storm duration, total rainfall depth, and watershed area adjustment; and (3) storm temporal distribution and duration of rainfall excess. The EPA stipulates that RCRA-permitted facilities must use the 100-yr storm to define all floodplains [40 CFR 270.11(b)(11)(iii)]. The US Army COE recommends that a 6-h storm event be used in 100-yr HEC-1 flood simulations for northern New Mexico. In addition, rainfall depths have been tabulated for Los Alamos County (Bowen 1989). Owing to the small size of individual subbasin watersheds within the Laboratory complex (typically less than 5 sq mi), no areal adjustment was made for these rainfall depths. Hence factors (1) and (2) above are fixed by institutional constraints and system observations. The recommended design rationale for factor (3) is described below.

A representative rainfall hyetograph that is based on either the worst-possible storm distribution pattern or on recorded storm distribution patterns must be selected. This hyetograph will significantly affect the shape and peak value of the resulting runoff hydrograph for a given watershed. Precipitation depths have been measured daily in Los Alamos since 1911 (Bowen 1990). Individual storm patterns have been recorded in 15-min intervals since 1979. These data were used to develop intensity/duration/frequency (IDF) relationships for Los Alamos. These IDF curves were then used to establish individual 6-h design storm distributions for the 2-, 5-, 10-, 25-, 50-, and 100-yr events. A comparison with the SCS 6-h design storm distribution (SCS, 1968) shows that the SCS curve produces a slightly more uniform rainfall distribution and somewhat lower corresponding hydrograph peaks.

Since standard IDF curves had not been developed previously for Los Alamos, they were constructed for this study using precipitation data from Bowen (1990, p. 156). Intensity is the time rate of precipitation, expressed in inches per hour (in./h). Here, average intensity is given by the expression

$$i = P/T = c/(T^e + f), \quad (III-1)$$

where  $i$  is average intensity (in./h) over time  $T$ ;  $P$  is the precipitation depth (in.) listed in Bowen (1990);  $T$  is rainfall duration (min); and  $c$ ,  $e$ , and  $f$  are coefficients that vary with location and return period ( $Tr$ ). Plots of  $i$  versus  $T$  are shown in Fig. 2; for Los Alamos, these IDF curves have the following coefficients:

$Tr$ (yr)	$c$	$e$	$f$
2	88.441	1.011	21.953
5	85.513	0.962	10.752
10	80.908	0.931	6.123
25	82.730	0.912	3.281
50	81.414	0.893	1.580
100	85.050	0.888	0.617

Once these IDF curves had been constructed, a hyetograph of a 6-h design storm was developed for each return-period event using the alternating-block method (Chow et al. 1988, pp. 454-466). Results for the 2- and 100-yr storm events are shown in Fig. 3. Figure 4 shows the cumulative 100-yr, 6-h design storm for Los Alamos and the SCS 6-h design storm for comparison. The Los Alamos cumulative 6-h design storm patterns for the 2-, 5-, 10-, 25-, 50-, and 100-yr events are listed in Table 2; note that these distributions are in dimensionless form. These hyetographs were used throughout this study in all HEC-1 simulations.

It should be noted that each of the Los Alamos storm distributions listed in Table 2 contains all of the shorter-duration events with the same recurrence interval. For example, the 100-yr, 6-h design storm contains the 100-yr, 15-min storm in its central 15-min interval. Likewise, the 100-yr, 30-min storm is contained within the central 30-min interval of the 100-yr, 6-h design distribution. Similar comments apply to the 2-, 5-, 10-, 25-, and 50-yr design storm events listed in Table 2.

While many theoretical storm distributions are available for midwestern and eastern watersheds, it was felt that none of these would adequately reflect conditions at Los Alamos. In other words, these

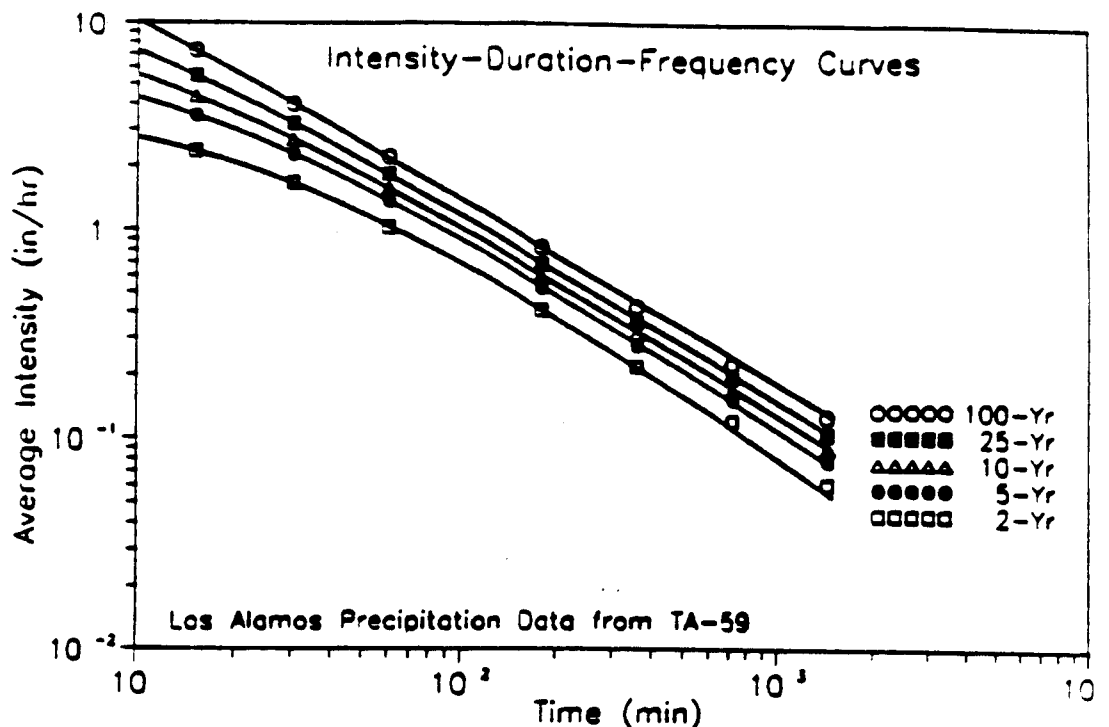


Fig. 2. Intensity-duration-frequency curves for Los Alamos County.

midwestern and eastern storm patterns tend to yield smaller peak hydrographs than those obtained from Los Alamos storm patterns. Note that one may also use instantaneous rainfall increments (Hoggan, 1989, p. 239; US Army COE, 1959; USBR, 1977, pp. 86-89) in HEC-1 simulations; however, this option was not used here. Instead, cumulative storm distribution patterns were used in all HEC-1 simulations; furthermore, they were adjusted for total rainfall depths in individual subbasin watersheds. It can be inferred from Fig. 3 that all of the 6-h design storm distribution patterns used in this study have a midpoint peak intensity near 3 h. Figure 3 also implies that gradually increasing and decreasing intensities precede and follow these peak values. This general worst-possible design storm pattern essentially satisfies abstractions with low rainfall intensity early in the storm. As a result, this design pattern yields higher hydrographs in response to higher rainfall intensities at later times. It should be added that observed New Mexico summer thunderstorms typically result from intense prefrontal squall lines moving south to north. While an observed 100-yr 6-h storm has never been recorded at Los Alamos, its characteristic distribution would probably show the highest rainfall intensities in the first hour and gradually decreasing rainfall intensities over the next 5 h. Furthermore, observed thunderstorms are exceptionally localized events and rarely cover an entire watershed. However, each subbasin's design storm was assumed to occur simultaneously with all other subbasin events in HEC-1 simulations. Hence, the Los Alamos design storm distribution patterns are conservative and tend to yield larger hydrograph peaks than would likely be obtained from observed hyetographs. Finally, it should be noted that observed rainfall data were obtained from Bowen (1989, Table 9.1) and are summarized here in Table 3. Linear interpolation was used to adjust these precipitation depth values for elevation differences between rain gages at Technical Areas 54 and 59 (TA-54 and TA-59) and individual elevations of subbasin centroids (Tables 4 and 5). Centroid elevations were obtained from 7.5-min-series USGS topographic maps. Precipitation depths listed in these tables were assumed to be uniformly distributed over their



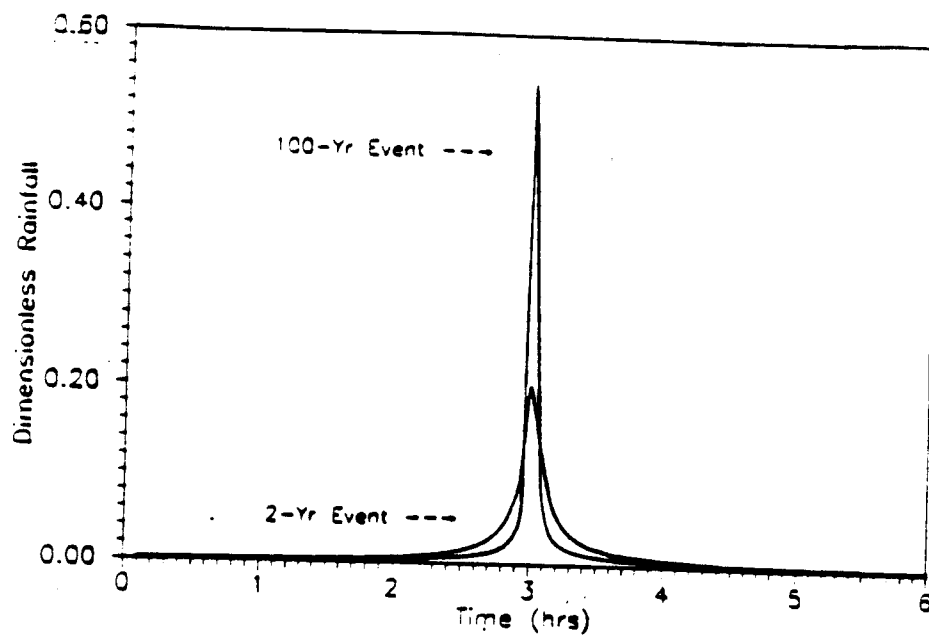


Fig. 3. Six-hour design storms for Los Alamos County.

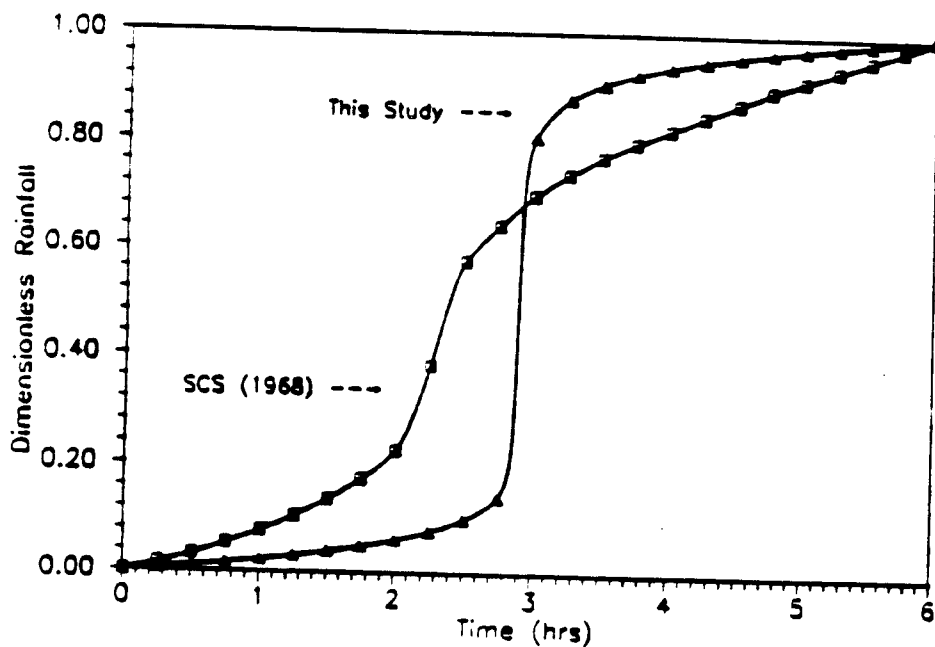


Fig. 4. Cumulative 100-yr. 6-h design storm distributions.

Table 2. Individual 6-hour design storm distributions for Los Alamos County. See Figures 1 through 3.

Time (min)	Time (hr)	Cumulative Storm Distribution (dimensionless)					
		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
0	0.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
15	0.25	0.0021	0.0033	0.0041	0.0045	0.0051	0.0051
30	0.50	0.0046	0.0071	0.0087	0.0095	0.0106	0.0106
45	0.75	0.0078	0.0114	0.0139	0.0151	0.0167	0.0167
60	1.00	0.0118	0.0165	0.0199	0.0213	0.0235	0.0235
75	1.25	0.0169	0.0227	0.0268	0.0285	0.0312	0.0312
90	1.50	0.0238	0.0303	0.0351	0.0369	0.0401	0.0401
105	1.75	0.0334	0.0402	0.0454	0.0471	0.0507	0.0507
120	2.00	0.0476	0.0537	0.0588	0.0599	0.0637	0.0637
135	2.25	0.0704	0.0739	0.0778	0.0774	0.0808	0.0808
150	2.50	0.1125	0.1087	0.1088	0.1045	0.1060	0.1060
165	2.75	0.2121	0.1894	0.1770	0.1608	0.1542	0.1542
180	3.00	0.6644	0.7017	0.7289	0.7617	0.7833	0.7833
195	3.25	0.8493	0.8598	0.8637	0.8718	0.8726	0.8726
210	3.50	0.9113	0.9100	0.9070	0.9087	0.9057	0.9057
225	3.75	0.9416	0.9358	0.9307	0.9300	0.9260	0.9260
240	4.00	0.9594	0.9521	0.9465	0.9448	0.9408	0.9408
255	4.25	0.9709	0.9636	0.9581	0.9562	0.9525	0.9525
270	4.50	0.9790	0.9722	0.9673	0.9654	0.9622	0.9622
285	4.75	0.9849	0.9790	0.9749	0.9731	0.9704	0.9704
300	5.00	0.9894	0.9846	0.9813	0.9798	0.9776	0.9776
315	5.25	0.9930	0.9893	0.9868	0.9857	0.9841	0.9841
330	5.50	0.9958	0.9934	0.9917	0.9909	0.9899	0.9899
345	5.75	0.9981	0.9969	0.9961	0.9957	0.9951	0.9951
360	6.00	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

respective subbasins in all HEC-1 simulations. These depths were also assumed to have the temporal distributions listed in Table 2 using 15-min rainfall increments.

### C. SCS Unit Hydrograph

Obviously, not all rainfall from a storm contributes to direct runoff, because some is lost during the overland flow process. Four theoretical rainfall-abstraction calculation techniques are incorporated in HEC-1; these include the initial and uniform, the exponential, the SCS, and the Holtan techniques. However, the SCS calculation method is the only one which provides reasonably good estimates when geographic watershed characteristics are used to estimate time-of-concentration or basin lag time values. Here, basin lag time is defined as the time between the centroid of excess rainfall and the resulting stream hydrograph peak. The SCS technique uses an SCS curve number (CN) to relate accumulated rainfall excess or runoff to accumulated rainfall with an empirical CN value. In equation form we have

$$R = (P-I)^2 / (P-I+S), \quad S = 1000/CN - 10, \quad \text{and} \quad I = 0.2S,$$

where

Table 3. Precipitation depths for various return periods and storm durations at Los Alamos (TA-59) and White Rock (TA-54)

Los Alamos - TA-59: Elevation = 7379 ft above MSL.

TR (yrs)	Precipitation Depth (inches)					
	1 hr	3 hr	6 hr	12 hr	24 hr	Annual
2	1.03	1.24	1.34	1.47	1.45	18.10
5	1.38	1.60	1.71	1.84	1.90	22.90
10	1.59	1.83	1.94	2.07	2.18	25.80
25	1.86	2.10	2.21	2.35	2.54	29.00
50	2.06	2.32	2.42	2.55	2.80	31.70
100	2.25	2.52	2.61	2.74	3.06	34.00
500	2.70	3.01	3.08	3.19	3.66	39.87

White Rock - TA-54: Elevation = 6690 ft above MSL.

TR (yrs)	Precipitation Depth (inches)					
	1 hr	3 hr	6 hr	12 hr	24 hr	Annual
2	0.69	0.81	0.89	1.06	1.18	13.10
5	0.96	1.08	1.17	1.36	1.55	16.40
10	1.15	1.27	1.36	1.55	1.78	18.40
25	1.38	1.50	1.59	1.78	2.08	21.00
50	1.56	1.68	1.77	1.95	2.31	22.90
100	1.75	1.86	1.94	2.11	2.52	24.40
500	2.18	2.28	2.39	2.49	3.03	28.41

R = runoff (in.),  
P = rainfall (in.),  
I = infiltration abstraction (in.),  
S = potential maximum retention after rainfall begins (in.), and  
CN = SCS curve number (% of runoff).

The CN is a function of land use, vegetation cover, soil classification, hydrologic conditions, and antecedent moisture and runoff conditions. Variations in infiltration rates of different soil types are incorporated in the CN through the classification of soils into four hydrologic soil groups possessing high (Group A), moderate (Group B), low (Group C), and very low (Group D) infiltration capacities. Group A soils have a water transmission rate  $>0.30$  in./h; Group B soils have a transmission rate of  $0.15$ – $0.30$  in./h; Group C soils have a rate of  $0.05$ – $0.15$  in./h; and Group D soils have a rate  $<0.05$  in./h. These soil types have been previously mapped in Los Alamos County (Nyhan et al. 1978) and were used here. In addition, CN values have been tabulated in Hoggan (1989, pp. 33–36). Antecedent moisture conditions (AMC) that are typically used for design applications are called AMC-II (average AMC). Techniques for converting CN values under AMC-II to CN values under AMC-I (very dry soil, but above the average plant-wilting point) and AMC-III (nearly saturated soil—heavy rainfall or light rainfall with low temperatures has occurred within the previous five days) are available (Viessman et al. 1977, Tables 12–15, p. 622). However, no such adjustments

Table 4. Tabulated 2-year and 100-year, 6-hour precipitation totals for individual watershed sub-basins.

Watershed Name	Sub-Basin Control Elevation (ft MSL)	Precipitation (in)	
		2-year	100-year
<b>Guaje</b>			
1. Above RM-7172 <sup>1</sup>	8100	1.69	3.29
2. Above RM-6253	6700	0.96	2.89
3. Ranzaya at RM-6253	7159	1.17	2.46
4. Above RM-5997 at Sarrancas	6400	0.90	1.83
5. Above LA Canyon Confluence	5920	3.38	1.44
<b>Sarrancas</b>			
1. Townsite Tributary at El 6000	6500	0.80	1.90
2. Southern Tributary at El 6000	6200	0.60	1.66
3. Northern Tributaries El 5940	6500	0.90	2.00
4. Above RM-5997 at Guaje	6140	0.66	1.61
<b>Sayo</b>			
1. Townsite Tributary at El 6019	7220	1.33	2.33
2. Main Channel at El 6080	6500	0.88	1.92
3. Southern Tributary at Totavi	6100	0.66	1.37
<b>Pueblo</b>			
1. Trib Confluence at El 7220	8400	1.86	3.34
2. Above County Line at El 6326	7300	1.27	2.60
3. RM-4 Y & LA Confluence	6400	0.80	1.90
<b>Los Alamos</b>			
1. Above Reservoir at El 7697	9200	2.20	4.23
2. Above Bridge at El 7126	7700	1.40	2.94
3. RM-4 Y & Pueblo Canyon	7030	1.14	2.39
4. Above Totavi at Sayo Confluence	6000	0.99	1.49
5. Above Guaje Confluence	5740	0.48	1.29
6. Above Rio Grande Confluence	5600	0.30	1.18
<b>Sandia</b>			
1. Above RM-4 at El 6460	6900	1.00	2.26
2. Main Channel at El 6090	6400	0.80	1.83
3. Townsite Drainage at El 6090	6300	0.79	1.78
4. Above Rio Grande Confluence	5800	0.40	1.32
<b>Hortland</b>			
1. Ten-Gate Conflu at El 7060	7200	1.31	2.67
2. Above 1st Ice Trap at El 6793	7043	1.16	2.38
3. At East DOE Boundary Line	6730	0.97	2.11
4. Above RM-4 at El 6485 & Cedro	6640	0.90	2.04
5. Cedro Canyon at Hortland	6630	0.93	2.08
6. Canada del Suey Confluence	6340	0.77	1.78
<b>Canada del Suey</b>			
1. Above RM-4 at White Rock <sup>1</sup>	6665	1.04	2.23
2. Above Rio Grande Confluence	6300	0.80	1.82
<b>Pajarito</b>			
1. Above RM-903 at W. DOE Line	8720	2.01	3.83
2. Above J-ma Canyon Confluence	7500	1.37	2.77
3. J-ma Canyon at Pajarito	7500	1.37	2.77
4. Above J-ma Canyon Confluence	6890	1.63	2.23
5. J-ma Canyon at Pajarito	7300	1.13	2.37
6. Above RM-4 & White Rock	6610	0.91	2.01
7. Above Rio Grande Confluence	6330	3.76	1.77
<b>Petrilla</b>			
1. Above Fence Confluence	6750	0.90	2.13
2. Fence Canyon at Petrilla	6700	0.90	2.09
3. Above Water Canyon Confluence	6400	0.80	1.83
<b>Water</b>			
1. Above RM-903 at West DOE Line	8400	1.86	3.34
2. Above Valle Canyon Confluence	7400	1.22	2.60
3. Above RM-4 at El 6418	6600	0.90	2.00
4. Above Petrilla C. Confluence	6300	0.80	1.83
5. Above Rio Grande Confluence	5700	0.43	1.23
<b>Valle</b>			
1. Above RM-903 at W. DOE Line	8600	1.99	3.70
2. Above TR-16 Area F Landfill	7510	1.30	2.70
3. Above Water Canyon Confluence	7300	1.27	2.60
<b>Ambo</b>			
1. West Fork and RM-4 at El 6246	6900	1.00	2.26
2. East Fork and RM-4 at El 6246	6900	1.01	2.17
3. Lower East Fork at El 5350	6400	0.80	1.83
4. Main Channel at El 5350	6300	0.75	1.78
5. Above Rio Grande Confluence	5750	0.46	1.28
<b>Chaqueza</b>			
1. Above Rio Grande Confluence	6450	0.82	1.87
<b>Frigeles</b>			
1. Main Channel at El 7200	8900	2.10	3.97
2. Below Burn Rock at El 6670	7300	1.27	2.60
3. Above USGS Gage Station	7000	1.11	2.38

<sup>1</sup>Location of sub-basin outflow point in main stream channel; see watershed boundary and USGS 7.5 minute topographic map.

Table 5. Tabulated 5-, 10-, 25-, and 50-year, 6-hour precipitation totals for individual watershed sub-basins.

Watershed Name	6-hr Precipitation Totals (in)			
	5-yr	10-yr	25-yr	50-yr
<b>Guaje</b>				
1. Above RM-71721	2.16	2.44	2.77	3.03
2. Above RM-6253	1.27	1.47	1.72	1.91
3. Rendija at RM-6253	1.53	1.75	2.02	2.23
4. Above RM-5897 at Barrancas	1.57	1.26	1.49	1.67
5. Above LA Canyon Confluence	3.77	3.92	4.13	4.29
<b>Barrancas</b>				
1. Townsite Tributary at El 6000	1.19	1.38	1.63	1.81
2. Southern Tributary at El 6000	2.95	1.12	1.34	1.51
3. Northern 2 Tributaries El 5940	1.23	1.40	1.64	1.83
4. Above RM-5897 at Guaje	0.91	1.08	1.29	1.48
<b>Bayo</b>				
1. Townsite Tributary at El 6615	1.60	1.83	2.11	2.32
2. Main Channel at El 6380	1.14	1.33	1.57	1.79
3. Southern Tributary at Totavi	2.88	1.25	1.26	1.43
<b>Pueblo</b>				
1. Trib Confluence at El 7223	2.35	2.63	3.00	3.27
2. Above County Line at El 6326	1.65	1.88	2.17	2.39
3. RM-6 Y & LA Confluence	2.13	1.31	1.58	1.73
<b>Los Alamos</b>				
1. Above Reservoir at El 7457	2.86	3.21	3.60	3.90
2. Above Bridge at El 7126	1.90	2.18	2.47	2.71
3. RM-6 Y & Pueblo Canyon	1.49	1.71	1.98	2.19
4. Above Totavi at Bayo Confluence	0.82	2.98	1.18	1.38
5. Above Guaje Confluence	0.65	2.80	2.99	1.14
6. Above Rio Grande Confluence	3.56	3.70	0.89	1.03
<b>Tandia</b>				
1. Above RM-4 at El 6468	1.39	1.61	1.87	2.07
2. Main Channel at El 6090	1.37	1.26	1.49	1.67
3. Tandiara Drainage at El 6090	1.31	1.19	1.42	1.39
4. Above Rio Grande Confluence	0.69	2.84	2.36	1.19
<b>Hortanad</b>				
1. Ten-Site Conflu at El 7060	1.70	1.94	2.23	2.48
2. Above 1st Ion Trap at El 6783	1.49	1.71	1.98	2.18
3. At East DGS Boundary Line	1.30	1.49	1.78	1.93
4. Above RM-4 at El 6458 & Cedro	1.23	1.43	1.67	1.86
5. Cedro Canyon at Hortanad	1.23	1.42	1.68	1.87
6. Canada del Buoy Confluence	1.34	1.22	1.45	1.62
<b>Canada del Buoy</b>				
1. Above RM-4 at White Rock	1.37	1.38	1.84	2.04
2. Above Rio Grande Confluence	1.14	1.33	1.57	1.75
<b>Pajarito</b>				
1. Above RM-503 at W. DGS Line	2.56	2.87	3.24	3.52
2. Above 2-na Canyon Confluence	1.78	2.02	2.32	2.58
3. 2-na Canyon at Pajarito	1.78	2.02	2.32	2.58
4. Above 3-na Canyon Confluence	1.36	1.57	1.83	2.03
5. 3-na Canyon at Pajarito	1.48	1.70	1.97	2.17
6. Above RM-4 at White Rock	1.21	1.40	1.65	1.84
7. Above Rio Grande Confluence	1.03	1.21	1.44	1.61
<b>Potrillo</b>				
1. Above Fence Confluence	1.38	1.58	1.76	1.98
2. Fence Canyon at Potrillo	1.27	1.47	1.72	1.91
3. Above Motor Canyon Confluence	1.07	1.26	1.49	1.67
<b>Weger</b>				
1. Above RM-503 at West DGS Line	2.38	2.68	3.08	3.27
2. Above Valle Canyon Confluence	1.71	1.95	2.28	2.47
3. Above RM-4 at El 6418	1.28	1.40	1.64	1.83
4. Above Potrillo C. Confluence	1.14	1.33	1.57	1.75
5. Above Rio Grande Confluence	0.63	0.77	0.96	1.11
<b>Valle</b>				
1. Above RM-503 at W. DGS Line	2.53	2.85	3.21	3.48
2. Above TR-16 Area 9 Landfill	1.78	2.03	2.33	2.58
3. Above Motor Canyon Confluence	1.65	1.80	2.17	2.39
<b>Ambo</b>				
1. West Fork and RM-4 at El 6246	1.39	1.61	1.87	2.07
2. East Fork and RM-4 at El 6246	1.33	1.54	1.79	1.99
3. Lower East Fork at El 5598	1.37	1.26	1.49	1.67
4. Main Channel at El 5598	1.01	1.19	1.42	1.59
5. Above Rio Grande Confluence	0.66	0.81	1.00	1.15
<b>Chaquena</b>				
1. Above Rio Grande Confluence	1.11	1.29	1.53	1.71
<b>Frijoles</b>				
1. Main Channel at El 7208	2.67	3.00	3.38	3.66
2. Below Burn Hole at El 6678	1.68	1.88	2.17	2.39
3. Above USGS Gage Station	1.46	1.68	1.94	2.18

Location of sub-basin outflow point is on stream channel; see watershed boundary and USGS 7.5 minute topographic maps.

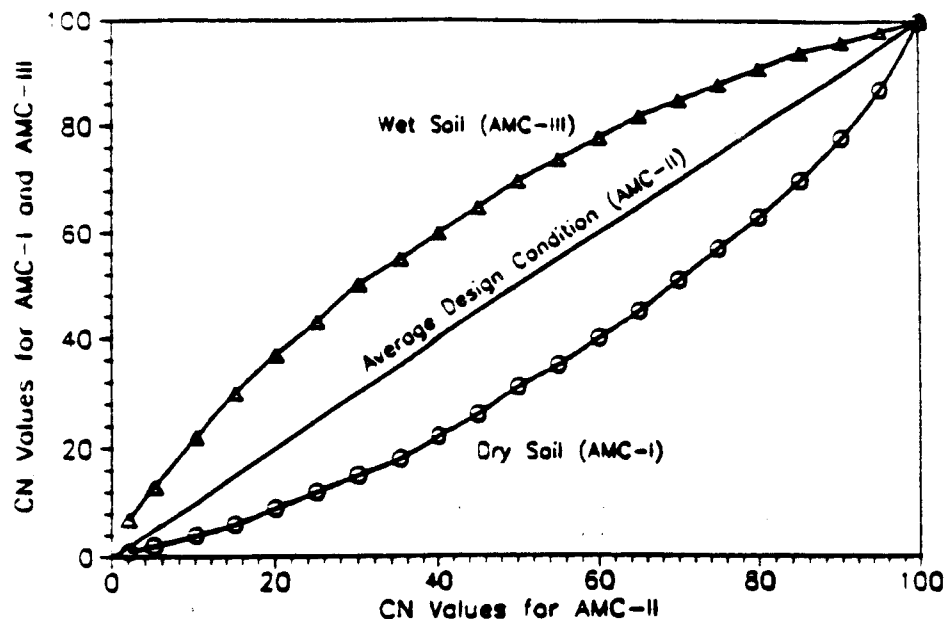


Fig. 5. Variations of SCS curve numbers for different moisture conditions.

were made in this study. Figure 5 shows the relationship of CN values under AMC-I and AMC-III conditions as a function of CN values under AMC-II conditions. Once rainfall excess has been determined, a unit hydrograph can be computed for each subbasin.

The SCS synthetic unit hydrograph procedure is based on a dimensionless unit hydrograph developed from an analysis of numerous unit hydrographs from small geographically diverse, rural watersheds. This dimensionless unit hydrograph represents the ratio of discharge to peak discharge versus the ratio of time to lag time. This lag time is a fundamental watershed characteristic and directly depends upon overland flow path length and mean flow velocity. As such, lag time is influenced by drainage basin area, main channel slope and geometry, land cover, and temporal and spatial storm patterns. In concept, the lag time incorporates the effect of basin size and much of the effect of basin shape. The advantage of the SCS approach is that it only requires the determination of time-to-peak ( $t_p$ ) and peak discharge ( $Q_p$ ), which are given by (Viessman et al. 1977, pp. 138-139)

$$t_p = D/2 + t_l \text{ and } Q_p = 454 A/t_p, \quad (\text{III-3})$$

where

- $t_p$  = time from rainfall beginning to peak discharge (h).
- $D$  = rainfall duration (h).
- $t_l$  = basin lag time from centroid of rainfall excess to peak discharge (h).
- $Q_p$  = peak discharge (cfs),
- $A$  = watershed drainage area (sq mi).

The basin lag time ( $t_l$ ) in Equation (III-3) can be expressed as

$$t_l = [10^5 (S + 1)^{0.7}] / [1900 Y^{0.5}], \quad (\text{III-4})$$

where  $l$  is the water course length (ft) going upstream to the watershed divide,  $Y$  is the average watershed slope (%) along the flow path, and all other terms are as previously defined.

Figure 6 uses Equation (III-4) and the tabulated data contained in Appendix B to depict basin lag time as a function of subbasin drainage area for Los Alamos. According to Graf (1988, p. 90), these lag times are comparable to those from northeastern US watersheds. However, he does not indicate how his values were determined. In Fig. 7 Los Alamos watershed data are used to show SCS basin lag times from Equation (III-4) as a function of Snyder basin lag times. Data used to compute these Snyder lag times are summarized in Table 6. The upper curve in Fig. 7 was obtained from a relationship derived by the US Army COE for mountainous watersheds near Los Angeles, California (Linsley et al. 1982, pp. 223-225). This relationship is given by

$$t_{sl} = C_1[(L - L_c)/(s^{0.5})]^n \quad (III-5)$$

where

- $t_{sl}$  = Snyder lag time (h) for mountainous watersheds,
- $C_1$  = coefficient accounting for slope and storage effects,
- $L$  = channel length (mi) from basin outlet to divide,
- $L_c$  = channel length (mi) from basin outlet to centroid,
- $s$  = weighted channel slope (ft/ft), and
- $n$  = an empirical coefficient.

For mountainous watersheds near Los Angeles, California, Linsley reports values for  $C_1$  and  $n$  of 1.2 and 0.38, respectively. The lower curve in Fig. 7 represents Snyder lag times based on the US Army COE's studies from the Rio Puerco, in New Mexico, and from El Paso, Texas. For this second curve, the standard Snyder lag time equation was used. This expression is given by

$$t_{sl} = C_1(L - L_c)^{0.30} \quad (III-6)$$

where all terms are as previously defined. Values for  $C_1$  were obtained from a logarithmic plot of  $C_1$  versus  $s$  (M. Magnuson, personal communication 1989). Figure 7 clearly shows that the SCS basin lag times used in this study are bracketed by extremes produced with the Snyder technique.

As mentioned above, the SCS runoff CN relates accumulated rainfall excess or runoff to accumulated rainfall. In addition to ease of use, Equation (III-4) has the advantage that the impacts of development within a watershed can be evaluated because changes in CN over time are easily estimated. As previously mentioned, tables exist that list CN values for a variety of conditions, ranging from urban to semiarid (Hoggan 1989, pp. 33-36). These same impacts cannot be estimated with the Snyder or Clark methods. In fact, if one originally employed either the Snyder or the Clark unit hydrograph method and land use patterns changed over time, there would be no systematic methodology for evaluating corresponding changes in the hydrograph peak, unless the SCS technique was subsequently used.

The US Army COE in Albuquerque has developed Snyder's synthetic unit hydrograph method for applications in north central New Mexico (M. Magnuson, personal communication, 1989). Regardless, it was felt that the Snyder's coefficients representing basin slopes and storage were generally not applicable to Pajarito Plateau. It can be inferred from Fig. 7 that either smaller or larger hydrograph peaks can be obtained from HEC-1 simulations if the Snyder unit hydrograph approach is used instead of the SCS technique. The potential for generating larger hydrograph peaks is obviously of interest. However, as discussed in Subsection E, use of this alternative approach in Los Alamos County cannot be justified.

#### D. Model Input Parameters

Because all watersheds within the DOE-LANL complex are similar, individual HEC-1 input data files have a similar structure (see Disk No. 1). This generic file structure is illustrated in Table 7. Individual watershed boundary location maps were constructed from 7.5-min USGS topographic

Table 6. Parameters used to compute inshore basin lag times using equations (III-5 and 6). See Figure 6 and text for definitions.

Waterbody Sub-Basin	Area (sq mi)	L (mi)	L <sub>0</sub> (mi)	S-05 (%)	S-10 (%)	Slope (%)	C <sub>L</sub>
<b>Canby</b>							
1	11.30	6.44	2.41	6840	7300	6.84 <sup>2</sup>	0.94
2	3.25	4.38	3.60	7020	6340	3.70	0.63
3	9.59	8.71	4.83	7800	6400	4.23	0.60
4	2.13	2.41	1.61	6160	5900	2.40	0.68
5	1.45	1.70	0.99	5845	5675	2.32	0.66
<b>Sasteneas</b>							
1	1.79	4.83	2.37	6800	6120	3.97	0.61
2	3.33	1.37	0.32	6385	6020	6.71	0.52
3	2.32	4.36	2.41	6840	6020	4.73	0.50
4	0.21	0.62	0.47	5940	5800	3.20	0.69
<b>Bayo</b>							
1	1.57	3.17	1.66	7130	6670	3.62	0.40
2	1.16	2.89	1.20	6300	6130	3.30	0.49
3	1.19	2.42	1.23	6220	5820	4.18	0.50
<b>Pueblo</b>							
1	2.24	2.84	1.56	7820	7260	4.00	0.57
2	4.61	4.38	3.17	7130	6832	2.66	0.72
3	1.58	2.68	1.56	6420	6295	1.19	0.94
<b>Los Alamos</b>							
1	6.33	3.79	2.18	6900	7740	7.73	0.50
2	0.74	1.89	0.98	7520	7160	4.00	0.50
3	3.31	6.63	3.50	6900	6330	2.40	0.74
4	1.96	2.23	0.99	6170	5775	6.40	0.59
5	0.77	0.88	0.32	5740	5670	1.87	0.77
6	0.67	1.67	0.99	5830	5800	2.24	0.73
<b>Jandia</b>							
1	2.48	6.96	3.22	7230	6530	2.61	0.72
2	0.65	2.23	1.18	6420	6260	2.04	0.70
3	1.32	1.89	1.18	6360	6160	2.67	0.72
4	0.75	1.70	1.04	5700	5810	4.00	0.61
<b>Hortland</b>							
1	0.55	1.70	0.70	7300	7113	3.63	0.63
2	0.81	1.99	1.00	7020	6800	2.79	0.60
3	0.38	1.14	0.37	6765	6670	2.11	0.73
4	1.61	2.32	1.89	6830	6470	1.74	0.70
5	0.60	3.03	1.88	6700	6490	2.33	0.74
6	1.72	2.56	1.33	6425	5720	6.06	0.52
<b>Canada del Sur</b>							
1	2.10	5.30	2.04	6900	6400	2.20 <sup>2</sup>	0.74
2	2.42	2.79	2.79	6360	5810	7.05	0.50
<b>Pajarito</b>							
1	1.80	3.27	1.61	6915	7990	15.10	0.42
2	2.57	3.46	2.60	7570	6900	4.31	0.60
3	3.28	5.18	2.56	8440	6990	6.86	0.52
4	0.67	2.08	1.04	6910	6740	2.00	0.70
5	1.70	3.60	1.70	7200	6782	3.61	0.60
6	1.15	2.84	1.42	6700	6530	1.32	0.83
7	2.24	2.94	1.67	6460	5840	7.95	0.50
<b>Potrillo</b>							
1	2.70	5.40	2.70	7020	6400	2.02	0.70
2	1.03	3.41	2.84	6900	6000	2.74	0.60
3	0.96	1.88	0.90	6410	5800	7.20	0.51
<b>Wagon</b>							
1	4.07	3.41	1.75	9100	7000	11.07	0.60
2	2.63	3.16	1.75	7400	6900	3.95	0.61
3	1.42	3.60	1.85	6750	6450	2.11	0.73
4	1.97	2.60	1.28	6360	5800	4.40	0.59
5	0.12	0.96	0.57	5770	5400	9.87	0.47
<b>Valle</b>							
1	2.33	4.26	2.46	9400	7800	9.72	0.47
2	0.70	1.42	0.90	7600	7320	4.00	0.57
3	1.17	2.37	1.61	7220	6800	3.08	0.63
<b>Archie</b>							
1	2.19	4.60	2.60	7000	6275	4.00	0.50
2	2.40	4.17	2.80	6600	6290	3.40	0.52
3	1.11	2.46	1.33	6400	5810	6.00	0.60
4	1.04	1.80	0.90	6310	5670	7.20	0.51
5	0.19	0.47	0.47	5330	5410	6.00	0.54
<b>Chaparral</b>							
1	1.50	3.13	1.56	6540	5650	7.13	0.51
<b>Frijoles</b>							
1	4.97	3.83	1.89	9500	7800	10.63	0.46
2	4.92	4.62	2.46	7500	6700	4.26	0.60
3	8.13	4.58	4.17	6320	6090	2.59	0.72

See Table 4 for locations of sub-basin outlet points.  
 Imagined sub-basin slope =  $(685 - 510)/100/0.75\%$ .



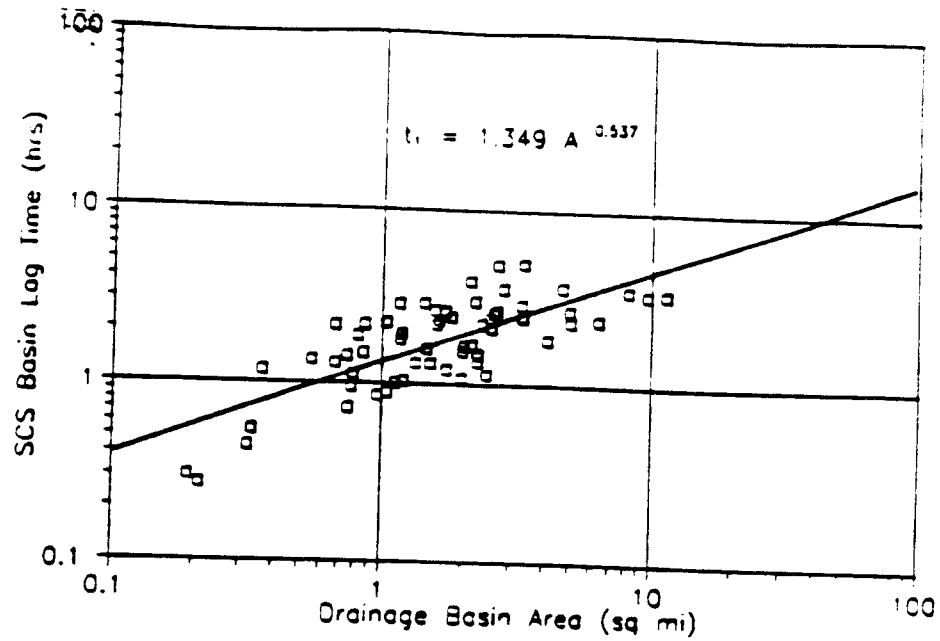


Fig. 6. Drainage basin area vs SCS basin lag time at Los Alamos.

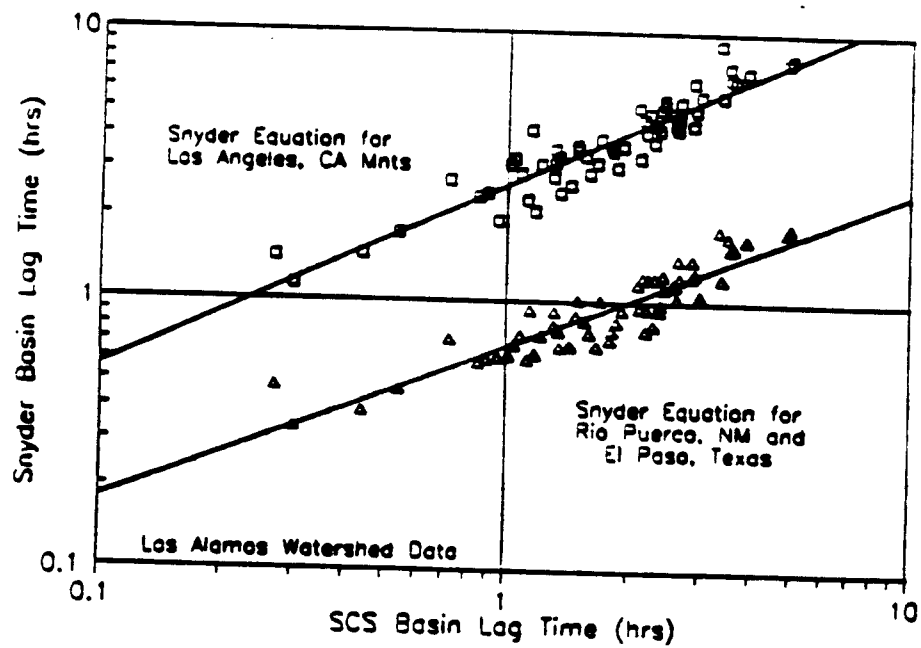


Fig. 7. SCS basin lag time vs Snyder lag times at Los Alamos.

Table 7. Typical HEC-1 input file identification scheme. See HEC-1 user manual for complete listing of other options.

Data Category	Record Identification	Data Description
Job Initialization	ID IT IO IN	Job Identification Job Time Control General Output Control Input Data Time Control
Precipitation Data	PC <sup>1</sup> PG <sup>2</sup> PR PW PT	Cumulative Prec Time Series Storm Gage Total Precipitation Recording Gage to be Weighted Precipitation Gage Weight Factor Total Storm Gages to be Weighted
Job Step Control	KK KM KO	Stream Station Identifier Alphanumeric Comment Message Output Control for this Station
Basin Data	BA <sup>3</sup>	Basin Area
Loss Rate Data	LS <sup>3</sup>	SCS Curve Number Loss Technique
Unitgraph Data	UD <sup>3</sup>	SCS Dimensionless Unitgraph
Routing Data	RL RM <sup>3</sup>	Channel Loss Rates Muskingum Routing Parameters
Hydrograph Transformations	HC	Combine Hydrographs
End of Job	ZZ	Required to End Job

<sup>1</sup>See Table 2 for design storm distribution.

<sup>2</sup>See Tables 4 and 5 for individual sub-basin values.

<sup>3</sup>See individual watershed sub-basin values in Appendix A.

maps; they are located with the floodplain boundary maps in the Facilities Engineering Planning Group Office (Comer and McLin 1991). Equations to compute individual input file parameters were listed in the previous section. Results of these calculations are listed in Appendix B. Tabulated watershed characteristics include subbasin area, subbasin main channel length to water divide or upstream subbasin boundary, elevation change over channel length, average subbasin CN value, and computed SCS basin lag time from Equation (III-4). All watersheds were outlined on the USGS topographic maps, and individual subbasin areas were measured with a planimeter. Measurements obtained from four repeated area calculations for each subbasin yielded variances that deviated <1% from average values. Selected watershed areas are listed in Table 8, and all subbasin area mean values are given in Appendix B and Disk No. 1. Channel lengths and elevation changes were also taken directly from topographic maps with similar measurement repeatability. It should also be mentioned that predicted HEC-1 hydrographs are relatively insensitive to minor measurement

**Table 8a.** Hydrograph peaks (cfs) corresponding to individual 6-hour  
 E. Los Alamos design storm events at east DOE-LANL boundary.  
 See Table 9 for description of exact locations. See  
 Table 2 for cumulative storm distribution patterns.

Watershed Name	Basin Area	Recurrence Interval			Hydrograph Peaks (cfs)		
		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Guaje <sup>1</sup>	26.27 <sup>2</sup>	20	137	265	472	666	888
Barrancas	2.12	1	12	25	47	67	90
Bayo	3.92	2	21	43	79	111	147
Pueblo	8.40	8	65	121	211	292	383
Los Alamos	10.38	19	115	204	332	447	589
Los Alamos	20.74	24	166	300	502	686	902
Sandia	2.65	1	10	21	38	54	71
Mortandad	1.72	1	6	11	19	27	35
Canada del Buey	2.10	1	11	21	38	54	72
Pajarito	11.36	5	71	143	263	372	498
2-Mile	3.28	1	19	40	77	111	149
3-Mile	1.70	1	12	24	43	60	80
Fence	1.03	1	8	16	29	41	55
Potrillo	2.78	1	14	28	53	75	99
Potrillo	4.77	2	15	30	56	81	108
Canon de Valle	4.28	2	21	41	75	104	141
Water	12.40	4	68	139	255	361	485
Ancho	4.67	2	27	57	105	150	198
Chaquehui	1.50	1	13	27	53	78	103
Frijoles <sup>1</sup>	18.02	33	160	284	479	654	853

<sup>1</sup>Watershed boundary is outside DOE-LANL complex.  
<sup>2</sup>Drainage basin area in square miles.

Table 8b. Total 24-hr runoff volumes (ac-ft) corresponding to individual 6-hour Los Alamos design storm events at east DOE-LANL boundary. See Table 9 for description of exact locations. See Table 2 for cumulative storm distribution patterns.

Watershed Name	Basin Area	Recurrence Interval		24-hr Runoff (ac-ft)			
		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Guaje <sup>1</sup>	26.27 <sup>2</sup>	8	67	133	236	333	442
Barrancas	2.12	<1	4	8	18	24	32
Bayo	3.92	<1	8	16	30	44	58
Pueblo	8.40	4	26	48	85	119	155
Los Alamos	10.38	8	48	83	137	184	240
Los Alamos	20.74	12	75	141	236	325	424
Sandia	2.65	<1	6	12	22	32	42
Mortandad	1.72	<1	1	2	4	6	9
Canada del Buey	2.10	<1	6	10	18	24	30
Pajarito	11.36	2	26	54	99	141	186
2-Mile	3.28	<1	6	14	26	38	50
3-Mile	1.70	<1	4	8	16	22	28
Fence	1.03	<1	2	4	10	12	16
Potrillo	2.78	<1	6	12	24	34	44
Potrillo	4.77	<1	8	18	32	46	60
Canon de Valle	4.28	<1	6	10	18	26	38
Water	12.40	2	24	48	87	125	169
Ancho	4.67	<1	10	20	38	54	71
Chaquehui	1.50	<1	2	6	12	16	22
Frijoles <sup>1</sup>	18.02	12	65	119	200	276	359

<sup>1</sup>Watershed boundary is outside DOE-LANL complex.

<sup>2</sup>Drainage basin area in square miles.

errors in subbasin area, main channel length, and elevation differences as implied by Equation (III-4). In addition, Manning's equation was used to compute Muskingum routing parameters from average channel flow velocities (Appendix B). Finally, it should be pointed out that all watershed parameters are listed in the HEC-1 input data files on Disk No. 1 and are not discussed in detail here.

Note that Guaje and Frijoles Canyons have been included in Tables 4 and 5, Appendix B, and on Disk No. 1 even though these watershed stream channels do not cross the DOE-LANL complex. Guaje Canyon was included because the Guaje municipal well field is located there. Frijoles Canyon was included because a USGS gaging station is located at the Bandelier National Park Headquarters. Also note that the tabulated watershed characteristics are listed according to subbasins within a given watershed. Each subbasin boundary division was selected according to several factors. These included (1) tributary inflow, (2) significant change in CN value, (3) an important geographic feature or manmade boundary marker, or (4) another unspecified feature for which a hydrograph peak value was required in HEC-2 simulations. Finally, it should be noted that these subbasins extend from the topographic peaks that define watershed boundaries located to the west of the DOE-LANL complex to the Rio Grande drainage confluence located to the east. Hence, hydrograph peak values were obtained for numerous points along individual watercourses within the DOE-LANL complex, for individual stream channels as they exit the DOE-LANL complex, and for confluent channels merging with the Rio Grande. Only 100-yr floodplains within the DOE-LANL complex were computed, however, because the AUTOCIS-MOSS topographic data do not extend beyond this boundary.

#### E. Peak Hydrographs for Major Watersheds

Once all subbasin characteristic parameters (Appendix B) and HEC-1 input data files (Disk No. 1) had been prepared, individual watershed hydrographs could be generated. Before this was done, however, a parameter sensitivity analysis was made. With the approach that was used here, all model parameters, except for composite subbasin CNs, are constrained to a very narrow range of observed values. These CN values could be estimated from county soil maps (Nyhan et al. 1978) and standard tables (Hoggan 1989). In actual practice, an individual, composite, subbasin CN value was computed as an area-weighted average according to mapped soil and vegetation types and variable CN values. However, it is reasonable to expect that composite CN values can vary by as much as 10% above or below their originally estimated values. Hence, in order to reduce the uncertainty in these estimated CN values, hydrograph peaks produced by the 2-yr, 6-h design storm event for LANL were examined for all subbasin watersheds. The logic for this design procedure is straightforward: from physical observation, one can quickly develop a general appreciation for flood magnitudes associated with individual 2-yr storm events within Los Alamos County. These qualitative observations suggest that 2-yr flood peaks in Los Alamos County vary between zero and a few hundred gallons per minute. This same appreciation cannot be easily developed for 100-yr magnitude events. Following this logic, all HEC-1 simulations should accurately reflect 2-yr events if one is to have confidence in larger recurrence-interval floods. Note that once all subbasin characteristic parameters have been determined for a given HEC-1 watershed, changing the subbasin rainfall totals (i.e., the PG data card shown in Table 7 for each HEC-1 input data file) and the design storm distribution patterns (i.e., the PC cards shown in Table 7) generates different recurrence interval hydrographs. Results obtained from this design methodology are outlined below.

Each HEC-1 watershed simulation was made for the 2-yr, 6-h LANL design storm event, as described above. If a given subbasin yielded a hydrograph peak that was unreasonably high or low, then the composite CN value was adjusted either downward or upward, respectively, and a new simulation was made. Note that a change in CN value implies a corresponding change in basin lag time, as suggested by Equation (III-4). This iterative process was repeated several times for each watershed. Individual composite CN values were typically adjusted <3% until the 2-yr hydrograph peak was greater than zero but less than about 2 cfs for an average-sized subbasin. Approximately half of all subbasins required a composite CN value adjustment; these adjustments were nearly

equally divided between increases and decreases in CN values. Once these CN values were fixed, the 2-, 5-, 10-, 25-, 50-, and 100-yr hydrographs were computed using the 6-h rainfall totals listed in Tables 4 and 5 and the design storm distribution patterns listed in Table 2. Resulting hydrograph peaks and 24-h runoff volumes for all watersheds crossing the eastern DOE-LANL boundary are given in Tables 8 and 9. Table 10 lists hydrograph peaks and 24-h runoff volumes for confluent stream channels at the Rio Grande. One should use care in referring to these tables. For example, the Los Alamos Canyon watershed is listed in both tables. In Table 8, the second Los Alamos hydrograph peak includes Pueblo Canyon flows because these streams are confluent above the eastern DOE-LANL boundary. In Table 10, the Los Alamos values include flows from Guaje, Rendija, Barrancas, Bayo, Pueblo, and Los Alamos Canyons because all of these streams are confluent above the Rio Grande. Similar comments apply to other listed watersheds. It should also be mentioned that these combined hydrograph peaks cannot simply be arithmetically added together. Instead they must be hydraulically routed downstream and then combined. In other words, each stream hydrograph abscissa must be aligned to account for flood wave travel time. This procedure is automatically performed in the HEC-1 hydrograph-combining subroutine. Finally, it should be pointed out that all stream channels were assumed to have zero baseflow because all streams within the DOE-LANL boundary are normally ephemeral.

#### F. Comparison with USGS Flood-Flow Frequencies

The USGS has developed regression equations (Waltermeyer 1986) for estimating flood discharges for the 2-, 5-, 10-, 25-, 50-, and 100-yr recurrence intervals from ungaged watersheds in New Mexico. A comparison between hydrograph peaks produced by the HEC-1 and USGS techniques was made in order to illustrate their differences. Generally, one might expect both methods to yield 100-yr peak flows of similar magnitude for Pajarito Plateau watersheds. However, the USGS approach consistently yields higher peak flows than does the HEC-1 technique employed above. At lower recurrence intervals, these differences become more pronounced. For 2-yr floods, the USGS procedure yields hydrograph peaks that are typically one or more orders of magnitude larger than HEC-1 peaks using equivalent subbasin watershed parameters. The reason for these differences is centered on the storm pattern incorporated into each technique and the fact that the HEC-1 model theoretically simulates the rainfall-runoff process more realistically.

Los Alamos County is located within the Central Mountain-Valley Region, according to Waltermeyer (1986, pp. 3 and 47). His regression equation for hydrograph peaks is given by

$$Q_n = (aA^b)(Ec/1000)^c(I^d), \quad (\text{III-7})$$

where

- $Q_n$  = hydrograph peak (cfs) for yearly recurrence interval  $n$ ,
- $A$  = watershed area (sq mi),
- $Ec$  = average channel elevation at points that are 10% and 85% of the stream length upstream from the hydrograph peak (ft), and
- $I$  = rainfall total (in.) for the 10-yr, 24-h storm.

In Equation (III-7), parameters  $a$ ,  $b$ ,  $c$ , and  $d$  are the regression coefficients. For Los Alamos, these parameters are listed below.

Table 9. Channel locations of hydrograph peaks listed in Table 8; also see USGS 7.5 minute topographic maps.

Watershed Name	Stream-channel locations of hydrograph peaks
Guaje <sup>1</sup>	Above Barrancas Canyon confluence.
Barrancas	Tributary confluence below east DOE-LANL boundary.
Bayo	Tributary confluence above east DOE-LANL boundary.
Pueblo	Above Los Alamos Canyon confluence at HW-4.
Los Alamos	Above Pueblo Canyon confluence at HW-4.
Los Alamos	Above Bayo Canyon confluence at Totavi.
Sandia	At DOE-LANL eastern boundary.
Mortandad	At DOE-LANL eastern boundary.
Canada del Buey	At DOE-LANL eastern boundary.
Pajarito	At DOE-LANL eastern boundary.
2-Mile	Above Pajarito Canyon confluence.
3-Mile	Above Pajarito Canyon confluence.
Fence	Above Potrillo Canyon confluence at gravel pit.
Potrillo	Above Fence Canyon confluence.
Potrillo	Above Water Canyon confluence.
Canon de Valle	Above Water Canyon confluence.
Water	Stream crossing at HW-4.
Ancho	Stream confluence below HW-4.
Chaquehui	At DOE-LANL eastern boundary.
Frijoles <sup>1</sup>	At USGS gaging station above Rio Grande.

<sup>1</sup>Watershed boundary is outside DOE-LANL complex.

Table 10a Hydrograph peaks (cfs) corresponding to individual 6-hour Los Alamos design storm events at the Rio Grande confluence. See Table 2 for cumulative storm distribution patterns.

Watershed Name	Basin <sup>1</sup> Area	Recurrence Interval			Hydrograph Peaks (cfs)		
		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Los Alamos	58.67	39	302	573	997	1392	1845
Sandia	5.57	2	23	50	96	137	182
Canada del Buey	10.43	33	74	127	220	300	395
Pajarito	13.60	24	71	142	260	369	495
Water	19.46	5	80	165	305	434	580
Ancho	7.01	2	32	67	124	179	236
Chaquehui	1.50	1	13	27	53	78	103
Frijoles <sup>2</sup>	18.02	33	160	284	479	654	853

<sup>1</sup>Drainage basin area in square miles.

<sup>2</sup>At USGS gaging station above Rio Grande confluence.

Table 10b Total 24-hr runoff volumes (ac-ft) corresponding to individual 6-hour Los Alamos design storm events at the Rio Grande confluence. See Table 2 for cumulative storm distribution patterns.

Watershed Name	Basin <sup>1</sup> Area	Recurrence Interval			24-hr Runoff (ac-ft)		
		2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
Los Alamos	58.67	22	161	309	543	764	1010
Sandia	5.57	<1	10	24	44	61	81
Canada del Buey	10.43	6	24	44	75	103	135
Pajarito	13.60	6	36	67	121	169	222
Water	19.46	2	36	71	135	190	258
Ancho	7.01	1	14	30	54	77	103
Chaquehui	1.50	<1	2	6	12	16	22
Frijoles <sup>2</sup>	18.02	12	65	119	200	276	359

<sup>1</sup>Drainage basin area in square miles.

<sup>2</sup>At USGS gaging station above Rio Grande confluence.



$Q_n$	a	b	c	d
2	55200	0.17	-1.05	1.79
5	170000	0.14	-1.13	1.67
10	289000	0.42	-1.11	1.59
25	497000	0.40	-1.13	1.51
50	685000	0.39	-1.11	1.45
100	896000	0.38	-1.09	1.40

All other parameters for Equation (11-7) are listed in Table 11 for watersheds draining the eastern DOE-LANL facility boundary. Note that Waltemeyer (1986, p. 6) indicates that 1 is the maximum precipitation intensity for the 10-yr, 24-h storm event. He indicates that these I-values can be obtained from precipitation-frequency maps for New Mexico (Miller et al. 1973). However, these maps give precipitation totals rather than intensity, which is given in inches per hour. Thus, the 10-yr, 24-h precipitation total is listed in Table 11. Comparison of 2- and 100-yr hydrograph peaks, as a function of drainage basin area are shown in Figs. 8 and 9. The USGS and HEC-1 methods were used for Los Alamos County. Obviously, for Pajarito Plateau watersheds the USGS approach consistently yields larger hydrograph peaks than does the HEC-1 model. The 2-yr floods obtained from the USGS method are especially interesting because they are so large. In fact, it is this obvious discrepancy that prompted the use of the HEC-1 approach in the first place. Any long-term county resident will readily agree that the predicted 2-yr USGS hydrograph peak flows grossly disagree with his or her personal experience. By logical extension, one must also question the 100-yr flood peaks. For this reason the USGS approach was rejected for use on Pajarito Plateau watersheds. One should not infer that other New Mexico watersheds outside Los Alamos County cannot be accurately represented with the USGS technique, however.

Figures 8-10 depict the HEC-1 hydrograph peaks at the eastern DOE-LANL boundary and at the Rio Grande. These peaks are also listed in Tables 8-10. These and other peak values were used as input data in HEC-2 simulations for final definition of all 100-yr floodplains. Figure 11 shows 100-yr peak flows along the Los Alamos Canyon watershed and includes data from Los Alamos, Guaje, Rendija, Barrancas, Bayo, and Pueblo canyons.

#### G. Comparison with Other Flood-Flow Frequencies

Lane et al. (1985, pp. 30-37) have generated synthetic streamflow and sediment transport data for Los Alamos Canyon above the Rio Grande confluence. Many of these data were previously unpublished but have recently been reported by Graf (1991, Appendix B4). These data are summarized in Table 12. Weibull plotting positions were used to conduct a log-Pearson Type-III analysis (WRC 1967, WRC 1981, US Army COE 1982) for these data. Figure 12 clearly shows that Lane's synthetic streamflow data are statistically identical to HEC-1 hydrograph peaks obtained in this study for Los Alamos Canyon at the Rio Grande.

### IV. HEC-2 WATER-SURFACE PROFILES

#### A. General Model Description

The HEC-2 model is similar in concept to the HEC-1 model in that it contains a calling program and multiple subroutines. The HEC-2 calculates and plots water-surface profiles for subcritical, critical, and supercritical gradually varied steady flows in channels of any cross-sectional configuration. The principal uses of the model are for floodplain definition; for evaluation of the hydraulic effects of bridges, culverts, and weirs; and for calculating stream profiles for various frequency floods for both

Table 11. Watershed parameters for estimating hydrograph peaks at east DOE-LANL boundary using equation (III-7). See Table 9 for basin locations. See text for discussion.

Watershed Name	Basin Area	E85 (ft)	E10 (ft)	E <sub>c</sub> (ft)	I (in)
Guaje <sup>1</sup>	26.27 <sup>2</sup>	8480	6060	7270	2.12
Barrancas	2.12	6880	6120	6500	1.67
Bayo	3.92	7035	6220	6628	1.74
Pueblo	8.40	7900	6395	7148	2.05
Los Alamos	10.38	8235	6415	7325	2.15
Sandia	2.65	7250	6530	6890	1.86
Mortandad	1.72	7235	6710	6973	1.94
Canada del Buey	2.10	6980	6480	6730	1.80
Pajarito	11.36	8560	6590	7575	2.29
Potrillo	4.77	6470	6050	6260	1.53
Canon de Valle	4.28	9100	7000	8050	2.57
Water	19.46	8155	5960	7058	1.99
Ancho	7.01	6960	5685	6323	1.57
Chaquehui	1.50	6540	5640	6090	1.43
Frijoles <sup>1</sup>	18.02	8790	6185	7488	2.24

<sup>1</sup>Watershed boundary is outside DOE-LANL complex.

<sup>2</sup>Drainage basin area in square miles.

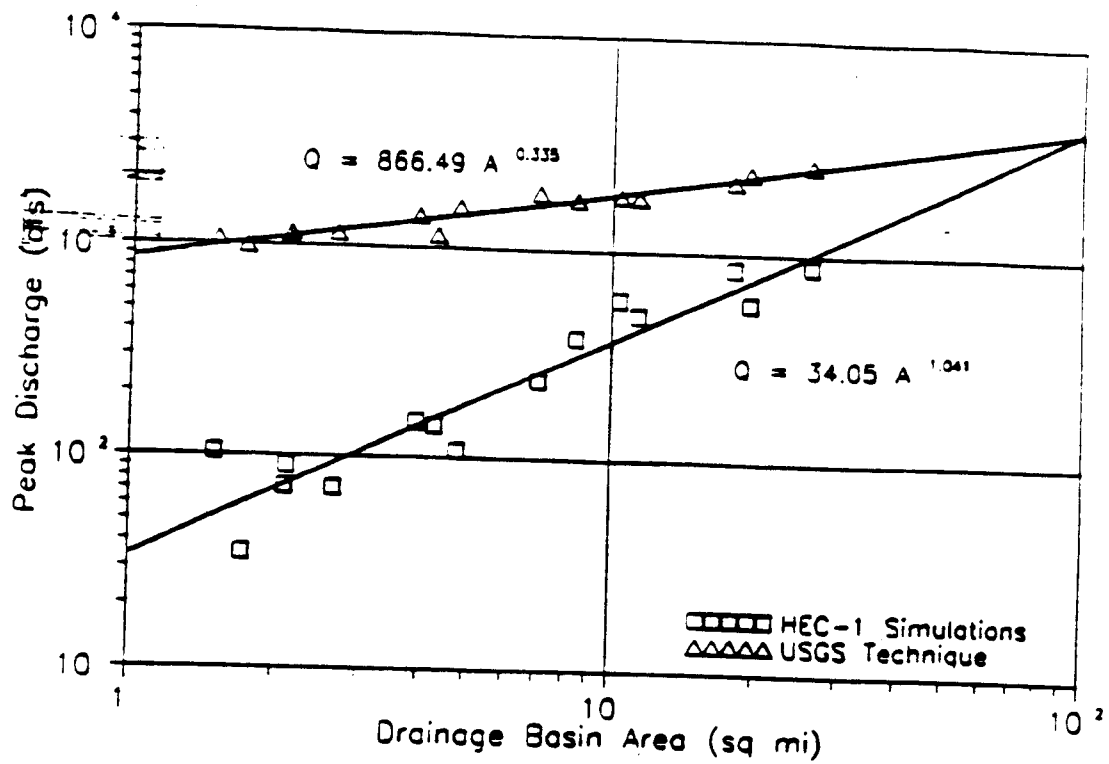


Fig. 8. Comparison of HEC-1 and USGS 100-yr peak discharges at eastern DOE-LANL boundary.

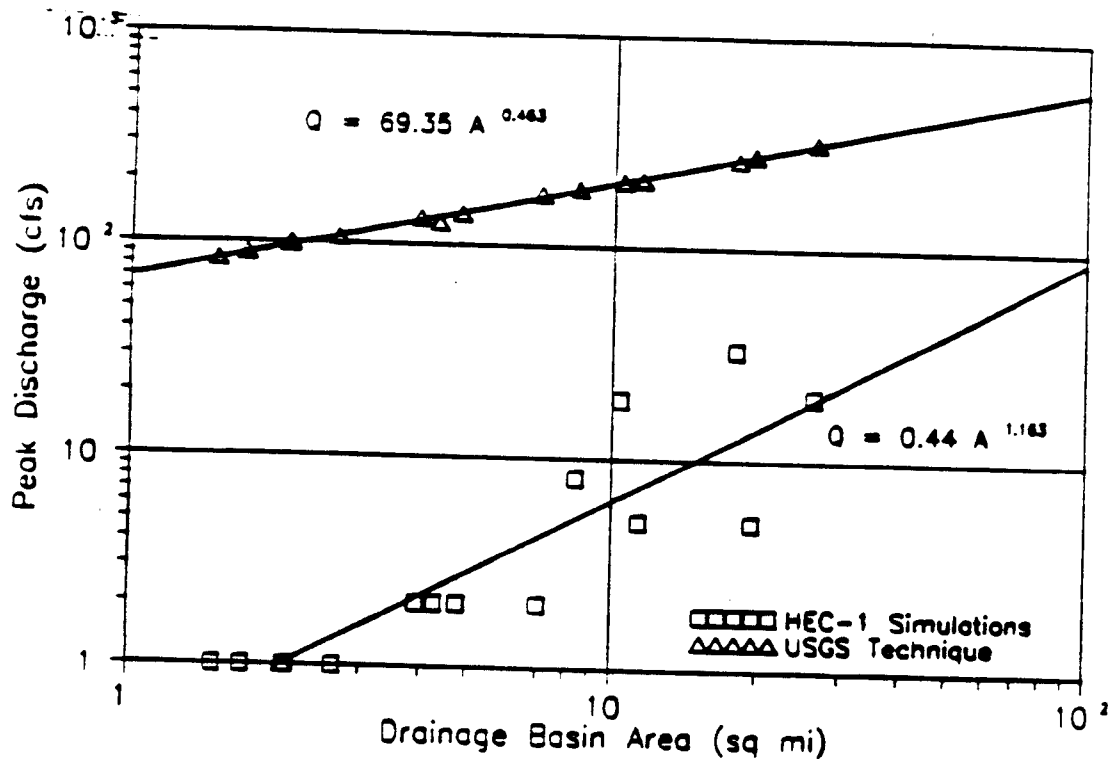


Fig. 9. Comparison of HEC-1 and USGS 2-yr peak discharges at eastern DOE-LANL boundary.

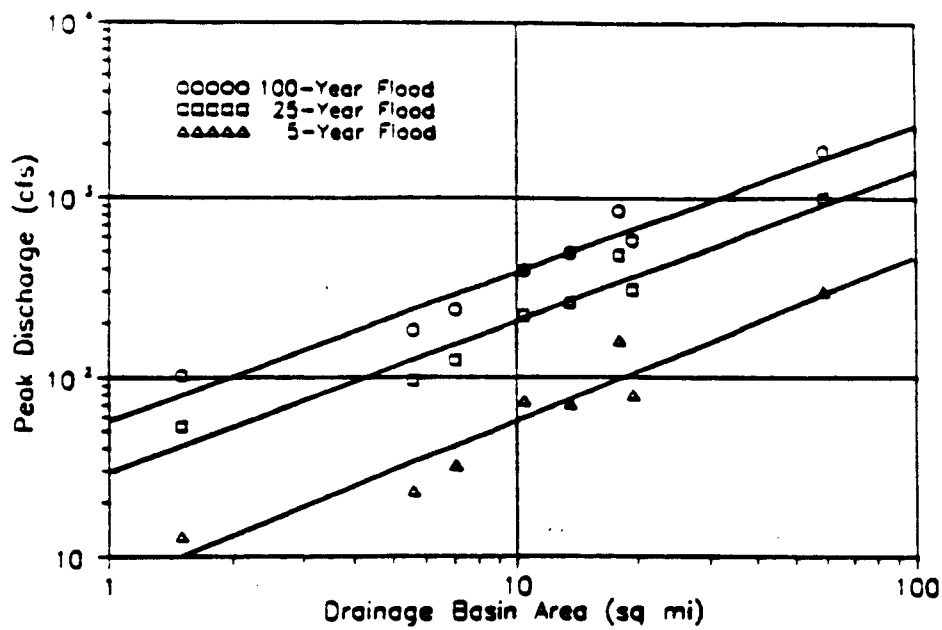


Fig. 10. Drainage basin area vs peak discharge at Rio Grande for Pajarito Plateau streams.

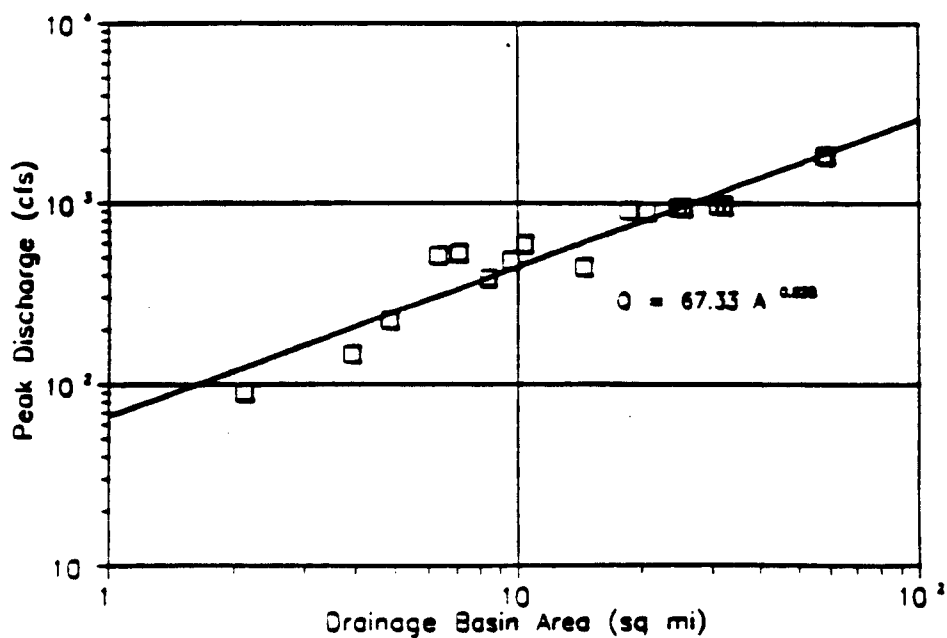


Fig. 11. Drainage basin area vs 100-yr peak discharge for Los Alamos Canyon.

Table 12. Synthetic streamflow data for Los Alamos Canyon at the Rio Grande confluence, as reported in Graf (1991, Appendix B4).

Year	Peak Flood (cfs)	Sediment Yield (tons)
1943	66	466
1944	631	8393
1945	0	61
1946	80	611
1947	2	65
1948	0	61
1949	0	61
1950	20	77
1951	687	9814
1952	386	6316
1953	4	12
1954	129	1006
1955	283	2783
1956	0	0
1957	649	16470
1958	203	2062
1959	59	532
1960	0	154
1961	53	443
1962	1	138
1963	283	2772
1964	0	0
1965	233	3163
1966	32	165
1967	361	4197
1968	924	14120
1969	149	2899
1970	0	0
1971	42	247
1972	0	0
1973	349	3955
1974	20	129
1975	6	99
1976	20	77
1977	4	8
1978	293	3198
1979	312	426
1980	0	183

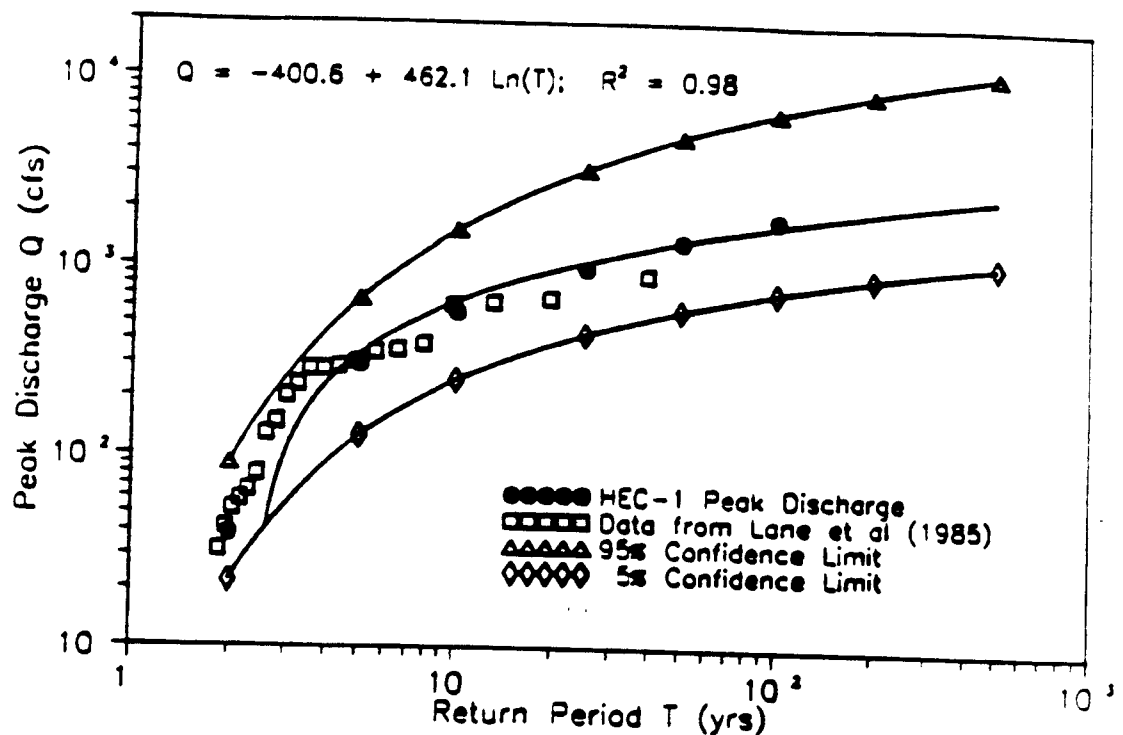


Fig. 12. Log-Pearson Type III analysis of synthetic and HEC-1 flood flows for Los Alamos Canyon at the Rio Grande.

natural and modified channel conditions. Water-surface profile analyses are commonly used to determine flood protection levee heights and flood hazard zones for insurance purposes. The HEC-1 and HEC-2 models are typically used in conjunction with one another for complex floodplain-assessment studies.

The HEC-2 program uses the standard-step numerical method that is based on energy losses to compute water-surface elevation changes between adjacent stream channel cross sections. These computed water-surface elevations correspond to hydrograph peak discharges obtained from HEC-1 simulations. Because energy, or friction, losses are intimately tied to Manning's equation for open channel flow, stream cross sections are required at locations where changes in discharge, slope, shape, and channel roughness occur. Here Manning's equation for English units is given by

$$Q = (1.49/n)AR^{2/3}S^{1/2} \text{ and } R = A/P, \quad (\text{IV-1})$$

where

- $Q$  = discharge (cfs),
- $A$  = area perpendicular to flow ( $\text{ft}^2$ ),
- $R$  = hydraulic radius (ft),
- $P$  = wetted perimeter (ft),
- $S$  = energy slope (ft/ft), and
- $n$  = boundary surface roughness coefficient (dimensionless).

Water-surface profile calculations in HEC-2 begin at the downstream cross section for subcritical flow conditions and at the upstream cross section for supercritical flow. The same data rearranged

into a different order are used to make separate model simulations for each of these flow conditions. Model calculations sequentially progress either upstream (subcritical) or downstream (supercritical) from cross section to cross section. At bridge crossings and culverts, where flow hydraulics are more complex, momentum and other equations may be used to compute water-surface elevation changes. This model also takes into account losses resulting from contraction and expansion and from eddies, bends, and tributary junctions when adjustments are made to friction loss coefficients.

The HEC-2 computational methodology is based on the following flow conditions: (1) gradually varied steady flow, (2) one-dimensional flow with horizontal-velocity distribution corrections, (3) small channel slopes not exceeding  $\sim 10\%$ , (4) a constant average friction slope between adjacent cross sections, and (5) rigid stream channel cross-sectional boundaries. Some hydraulic flow conditions that violate one or more of the above include (1) rapid downstream flood wave propagation resulting from dam breaching; (2) significant backwater effects caused by downstream boundary conditions such as tidal flows or tributary inflow effects; and (3) wide, flat floodplains that cause hydraulic flow disparities between the main channel and overbank areas.

It is not uncommon for many channel segments to have mixed flow regimes that are characterized by subcritical and supercritical flows that occur simultaneously in different parts of a single cross section or in adjacent cross sections. In these situations, the HEC-2 model must be run for both subcritical and supercritical flow conditions to determine the complete water-surface profile. However, most natural stream channels, including most mountain stream channels, exhibit subcritical flow conditions over the major part of their watercourses. The HEC-2 model is undoubtedly the most widely used technique for defining complex water-surface profiles. Many of the HEC-2 modeling capabilities are not described in detail here. Instead, the interested reader is referred to the HEC-2 user's manual (US Army COE 1982) for a complete description. Finally, it should be noted that the September 1988 FORTRAN version of the HEC-2 model, published as PROHEC2 (March 1990 release with modification 03) by Dodson & Associates, Inc., of Houston, Texas, was used in this study.

## B. Stream Channel Geometries

In the HEC-2 model, flow-regime boundary geometry is defined by cross sections and the reach distances between adjacent cross sections. These cross sections, which characterize the flow capacity in the stream channel and overbank areas, are located at user-specified intervals along the stream channel. The model's accuracy can be increased if the distance between adjacent cross sections is reduced to allow more accurate computation of energy losses. Criteria for locating stream cross sections are given by Hoggan (1989, p. 335). According to him, reach lengths should not exceed 0.5 mi for wide floodplains having slopes  $< 2$  ft/mi, 1800 ft for slopes  $< 3$  ft/mi and 1200 ft for slopes  $> 3$  ft/mi. Obviously, there is a tradeoff between stream channel surveying costs and model accuracy requirements. Throughout this study, a constant reach distance of 250 ft was used to describe the geometries of all stream channel cross sections contained within the DOE-LANL complex. This implies literally hundreds of cross sections. However, costly field surveys were kept to a minimum because the majority of this topographic detail was automatically extracted from LANL's AUTOGIS-MOSS graphic information package.

There are actually three separate reach lengths required for each stream's cross section in HEC-2: one for the channel and one for each of the overbanks. HEC-2 uses a discharge-weighted, average reach length between adjacent cross sections and multiplies this distance by the average conveyance in energy loss calculations. Individual channel thalweg lengths were fixed at 250-ft intervals within MOSS. Actual stream channel locations were digitized from USGS 7.5 min base maps and read into MOSS. Cross-sections were uniquely located by MOSS using topographic profiles and geographically referenced coordinates. Because of thalweg meandering, it was assumed that both of the overbank reach lengths between all cross sections of stream channels within the DOE-LANL complex were fixed at 300 ft.

Once individual cross sections had been located within MOSS, a perpendicular topographic profile could be defined for the stream channel. Topographic data for cross sections were extracted from

Table 13. Typical HEC-2 input file identification scheme. See HEC-2 user manual for complete listing of all options.

Data Category	Record Identification	Data Description
Job	T1	Job ID Title Card (required)
Initialization	T2	Job ID Title Card (required)
	T3	Job ID Title Card (required)
	C	Comment Card for Documentation
Job Output	J1	Start Conditions and Options
Print Control	J2	Print Control and Options
	J3	Special Summary Printout Options
	J5	Special Summary Printout Options
	J6	Specify Friction Loss Equations
Job Control	QT	Peak Discharge Table from HEC-1
and Input	NC	Manning cross-section n values
Data Cards	NH	Horizontal Distance n values
	NV	Vertical Distance n values
	X1	Cross-Section ID and Data
	X3	Ineffective Flow Areas
	GR	Elevation and Station Data
	SB	Special Bridge Data Card
	BT	Bridge Geometry Data
	EJ	End of Run in Multiple Run Job
End of Job	ER	Required to End Job

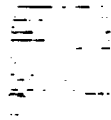
MOSS and the cross sections were sequentially grouped. These groupings were then formatted within MOSS into an ASCII file, consistent with HEC-2 input data requirements, and exported to 5.25-in. magnetic disks for subsequent use. The actual input data file structure for all watersheds is very similar (see Disk No. 2). Table 13 illustrates a generic file structure for a typical subcritical flow simulation. All X1, X3, and GR data cards were generated in this fashion for each HEC-2 watershed simulation. These data files still required additional input parameters, as described below. Separate file configurations for both supercritical and subcritical conditions were generated for each stream channel, but only the latter configurations are given on Disk No. 2.

In spite of this procedure, the MOSS 2- and 10-ft topographic contour data were insufficient to hydraulically define main channel flows in HEC-2. Hence, an idealization of the main stream channel configuration was subsequently inserted into each profile as described below. These trapezoid-shaped channel inserts had a maximum top width of 4 ft, a maximum bottom width of 2 ft, and a fixed depth of 0.3 ft. Channel capacities for this idealized configuration do not exceed 1% of the specified 100-yr peak discharge for any section. Typically, this main channel insert is located near each profile midpoint and accounts for hydraulic variations in Manning's n-values between the main channel and overbank areas. In addition, this insert shape is characteristic of main channel geometries throughout Pajarito Plateau watersheds. Inclusion of these channel inserts proved satisfactory, and they were included in all subsequent HEC-2 simulations.



### C. Channel Friction Losses

In HEC-2, the well-known Bernoulli equation is used to determine depths of flow between adjacent stream channel cross sections.



$$WL_2 + a_2 V_2^2 / 2g = WL_1 + a_1 V_1^2 / 2g + h_e$$

$$h_e = LS_f + C(a_2 V_2^2 / 2g - a_1 V_1^2 / 2g) \quad (IV-2)$$

where

$WL_1$ and $WL_2$	= upstream and downstream water elevations (ft).
$V_1$ and $V_2$	= upstream and downstream mean velocities (ft/s).
$a_1$ and $a_2$	= upstream and downstream velocity coefficients.
$g$	= acceleration due to gravity (ft/sec <sup>2</sup> ).
$h_e$	= energy head loss (ft).
$L$	= discharge-weighted reach length (ft).
$S_f$	= reach friction slope (dimensionless).
$C$	= expansion or contraction loss coefficient, and
$Q$	= peak discharge ( $Q = VA$ ) at a section (cfs).

In general, the coefficient  $a$  in Equation (IV-2) is determined from the relationship

$$a = [(QV^2)_1 + (QV^2)_2 + \dots + (QV^2)_k] / (QV^2)_{ave} \quad (IV-3)$$

where  $Q$  is discharge and  $V$  is velocity. The terms in the numerator represent complex velocity distribution effects in  $k$  localized subareas within a particular cross section, and the terms in the denominator represent average flow conditions in the entire cross section. Manning's Equation (IV-1) is initially used to determine how much of the cross-section's 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 therefore known if the friction (or energy) slope is assumed to be constant throughout a given cross section. The particular flow distribution between subareas at a given cross section is determined by multiplying the subarea conveyance and the square root of the friction slope. Localized mean velocities are determined by dividing subarea discharges by cross-section flow areas. Friction slope is approximated by the stream channel bottom slope because the water surface is assumed to parallel it in uniform flow. Hence, all of the terms in Equations (IV-2) and (IV-3) are known, except for 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. All of these parameters are specified as input data. Therefore, iteration by the standard-step method is used to solve Equations (IV-2) and (IV-3) for  $WL$  at all remaining cross sections.

The iteration process mentioned above is terminated when successive, unknown water-surface elevation values at a given cross section converge to within 0.01 ft. Once this elevation has been determined, additional checks are performed to see if this value is above the critical depth for a subcritical simulation or below the critical depth for a supercritical run. If these checks indicate otherwise, then the critical depth is assumed to exist at that section, and a message is printed by the program. The simulation then continues with the next unknown water surface elevation at an adjacent cross section until the last profile is reached. It should be emphasized that the computed depths are constrained to be equal to or greater than the critical depth for subcritical simulations and equal to or less than the critical depth for supercritical runs. Hence, one must run separate simulations for subcritical and supercritical flows. On occasion, changes in velocity heads between adjacent cross sections are too great for the HEC-2 model to accurately determine the energy gradient. For these situations, the HEC-2 model will automatically insert up to three interpolated cross sections between two adjacent user-specified cross sections so that the velocity head difference does not exceed a user-specified amount, typically 0.5 ft. By comparing velocity

heads at successive cross sections the program also determines whether or not the flow is contracting or expanding. The program then applies the appropriate coefficient based on this determination.

It should be noted that only the subcritical flow depths at individual cross sections were used to map 100-yr floodplains in this study. While computed water surface elevations at individual cross sections occasionally corresponded to the critical depth at that section, supercritical depths were not subsequently calculated. The reason for this is straightforward: if a critical depth were found at a given section during a subcritical run, we would know that the actual flow depth must be equal to or less than the critical depth. Thus, the actual floodplain width will be equal to or less than the computed width at that cross-section. In other words, using a computed floodplain width from a subcritical flow simulation that corresponds to the critical depth is conservative, and the mapped floodplain is depicted as being wider than it would actually be. While this procedure is conservative if we are defining floodplain widths, it should not be used for any design calculations that utilize flow velocities (i.e., embankment stability or sediment transport calculations). The reason for this statement is that supercritical flow velocities are equal to or larger than the computed critical flow velocities.

Finally, it should be mentioned that friction losses can be simulated four different ways in the HEC-2 model. The actual technique employed can be user specified or automatically selected by the HEC-2 model according to certain selection criteria. These criteria are based on flow conditions (i.e., either subcritical or supercritical) and a comparison of friction slope changes between cross sections. All of these loss equations produce similar results when short reach lengths are used. Because relatively short reach lengths were used in this study, the automatic selection option was used here. In addition, a constant Manning's  $n$ -value of 0.09 was used in all stream channels, and an  $n$ -value of 0.12 was used for all overbank areas. The first value (Hoggan 1989, pp. 327-330) corresponds to a tabulated  $n$ -value for natural mountainous channels with deep pools, large boulders, and heavy timber stands. The second value corresponds to floodplains with heavy timber stands that have flood stages below branches, little undergrowth, and downed trees. All of these conditions are typical throughout the LANL complex. If localized conditions indicated a change was warranted, individual cross sections were occasionally given different  $n$ -values from those listed above. However, standard tabulated  $n$ -values were still employed. Perhaps it should also be noted that the effects of channel improvements were also simulated in Los Alamos Canyon near TA-41 and TA-2. These improvements are not discussed in detail here. Instead the interested reader is directed to the input data file for this site. Standard expansion/contraction coefficients of 0.2 and 0.4 were also used throughout this study for all watersheds.

#### **D. Starting Water-Surface Elevations**

The starting water-surface elevation must be specified for all HEC-2 simulations. This single parameter is the most difficult starting condition to determine. Typically, one of three techniques is used to establish this value. These techniques are (1) obtaining a known water-surface elevation from a channel rating curve or from direct field observations, (2) estimating a normal flow depth from slope/area computations, and (3) assuming the critical depth. In this study, a combination of the second and third techniques was used, as explained below.

Initially, the critical depth at the down stream cross section was assumed for all HEC-2 subcritical watershed simulations. These initial simulations yielded a preliminary estimate for the energy grade line passing through the first three cross sections located immediately adjacent to the starting cross-section. Hence, refined estimates for the starting water-surface elevation and the slope of the energy grade line at the downstream cross-section were obtained through linear interpolation. These values were specified on the J1 data card in the HEC-2 input data file, as seen in Table 13. A second simulation was then performed. The program computed a discharge for uniform flow conditions and compared it to the user-specified discharge. If there was a significant difference in these two discharge values, the program adjusted the starting water-surface elevation and computed a new normal discharge. This procedure was repeated until the normal discharge agreed to within 1% of the user-specified discharge. The final computed water-surface elevation was then taken as the

starting elevation. It should be noted that this elevation was still constrained to be equal to or greater than the critical depth for subcritical flow simulations and equal to or less than critical depth for supercritical runs. Once this starting depth was fixed, the remaining cross section's flow depths were computed as previously described. This technique worked for most stream channels. Occasionally, however, it was not successful and the critical depth was finally assumed to be the starting water-surface elevation for that watershed.

The above 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 probably conservative in most natural channels. This procedure will even accommodate situations where floodplain topography is relatively uneven. It should be pointed out, however, that floodplains at the eastern boundary of the DOE-LANL complex are relatively broad and flat. Hence the above procedure proved more than adequate.

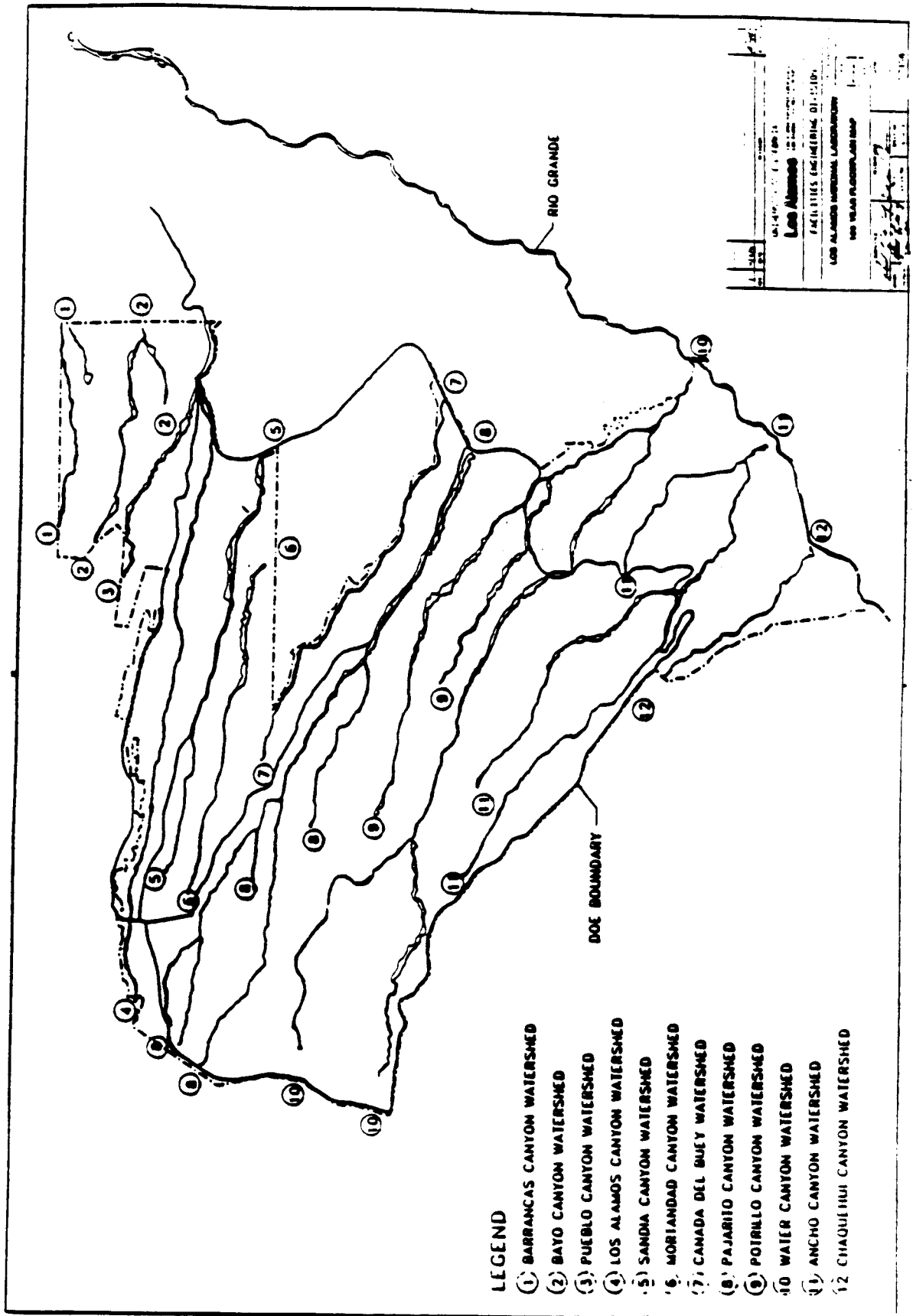
### E. Computed Water-Surface Profiles

The above procedures were used to map all 100-yr floodplain boundaries within the DOE-LANL complex. The HEC-2-computed water-surface elevation at each channel section, along with the left and right channel stations where this water surface intersects the ground, were then read back into the MOSS system. This information was then transformed within MOSS to determine New Mexico state plane geographically referenced coordinates that uniquely define the 100-yr floodpool at each cross section. These paired coordinates were linked together as MOSS area features to identify each watershed floodplain. In this particular application, 11 separate elongated watersheds traverse LANL lands, with individual channels ranging up to 9 mi in length. The 100-yr floodplain was defined on each channel segment at 250 ft intervals. Figure 13 shows these preliminary floodplain boundaries. Detailed, 1:4800-scale maps with 10-ft topographic contours and floodplains were then generated by MOSS. Floodplain boundaries were defined by connecting 100-yr floodpool elevations located at channel cross sections with straight lines. These lines were then hand smoothed, using elevation contours and floodplain widths for control. This procedure was followed because occasional small stream bends that are located between cross sections periodically meander outside the original straight-line floodplain boundaries. Finally these smoothed boundaries were digitized within the MOSS system to define floodplains within the DOE-LANL facility. These floodplain boundary maps are intended to supplement this report and are maintained on file in LANL's ENG-2 group office.

Using the information provided in the appendixes of this report, the interested reader can replicate these floodplain maps. In addition, other important hydraulic data may be generated for individual watershed cross sections. This additional information is not included here because it is quite extensive. Using the HEC-1 and HEC-2 input data files listed on Disks 1 and 2, however, the reader can simply run individual watershed simulations and generate the data as required. When the HEC-2 model is used, approximately 40 different variables may be printed for each cross-section. Standard model output includes an input data file listing, detailed output for each section, summary tables, and line printer profile plots. This output can be directed to the computer screen for review, or it may be saved to an output file for later use. The user can tailor the majority of this output for specific needs. The HEC-2 input data files listed on Disk No. 2 of this report have been customized for limited output. The interested reader should be aware that these input data files may be modified to generate as much or a little information as he or she desires.

### V. FINAL FLOODPLAIN DEFINITIONS

The procedure described in Appendix A initially defined floodplains in the MOSS system using the MOSS polygon feature to connect 100-yr floodpool elevations with straight lines. Ten-ft topographic contours were overlaid onto these floodplain boundaries and 25 maps were plotted at a scale



of 1:4800. These maps provide coverage of the entire DOE-LANL complex. However, the original stream channels occasionally crossed these straight-line floodplain boundaries at locations midway between HEC-2-defined stream cross sections. In order to correct this apparent inconsistency, the following additional mapping procedure was employed. For control, topographic contours and HEC-2 floodplain elevations and widths were used to hand smooth all straight-line floodplain boundaries between individual stream cross sections. It should be emphasized that original HEC-2 floodplain elevations and widths were not altered during this process. These new floodplain curvilinear boundaries were finally digitized and remain in MOSS system files (ENG-2 File Number R-7160).

## VI. CONCLUSIONS

The following general conclusions can be stated:

1. The HEC procedures described here are recognized by the EPA, the COE, and others as being a state-of-the-art technique for mapping 100-yr floodplain boundaries in ungaged watersheds. This report documents this mapping procedure and, along with the floodplain boundary maps (ENG-2 File Number R-7160), is intended to satisfy the RCRA/HSWA permit condition requiring complete floodplain definitions within the DOE-LANL facility boundary.
2. The 100-yr floodplain boundary maps referenced herein are only intended to satisfy the RCRA/HSWA permit condition. Other applications of these maps at specific locations within the LANL complex may warrant additional site-specific field investigations and modified HEC-1 and HEC-2 simulations. For example, individual road culverts were often omitted in HEC-2 simulations. Furthermore, only MOSS 10-ft-contour-interval data were available for a large percentage of the DOE-LANL complex. These areas tended to be located within the canyons on the eastern facility boundary but are certainly not confined to these perimeter regions. Hence, additional floodplain mapping efforts would be desirable for specific waste disposal site investigations or any safety-related site evaluations.
3. LANL's AUTOGIS-MOSS graphic information system was used in this study to define all HEC-2 stream channel profiles at 250-ft intervals. These data were automatically extracted from the MOSS system in an ASCII format compatible with HEC-2 input data requirements. Approximately 65% of the DOE-LANL facility has 2-ft-topographic contour interval data, and 35% has 10-ft contour interval data. Once the HEC-2 model had been used to define floodplain boundaries for all major watershed channels, this information was read back into the MOSS system. Floodplains were initially defined by connecting 100-yr floodpool elevations with straight lines. These boundaries were then hand smoothed using topographic contours and floodplain widths and elevations for control. All original HEC-2 floodplain widths and elevations at stream cross sections were retained during this procedure. These new floodplain line boundaries were finally digitized and remain in MOSS system files.
4. Continuous rainfall-runoff simulation models calibrated to specific gaged watersheds may represent an improvement over the HEC-1 and HEC-2 modeling procedures employed in this study. However, extensions of these research models to ungaged watersheds have not been adequately documented in the literature. Criticism of the event-simulation approach centers on the design assumption that rainfall of a given frequency results in runoff of the same frequency. However, this issue was not addressed in this work. Until the dynamic nature of the rainfall-runoff process is better understood, HEC-1 and HEC-2 represent the best available technology for the definition of floodplains in ungaged watersheds.
5. 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 extensively debated in the literature. However, Loague and Freeze (1985) have shown that physically based models

generally do not predict runoff any better than relatively simple approaches. Furthermore, the SCS method has the advantage that future changes in watershed land-use patterns can be easily simulated.

6. The procedure outlined here is flexible in that other return-period intervals for the floodplain could also be computed. For example, other storm durations and return-period intervals could be used to define other floodplain boundaries. In addition, the Nuclear Regulatory Commission does not use a return-period definition for their floodplain elevation studies. Instead, they typically specify that the probable maximum flood (PMF) be used to define the floodplain. With minor changes, the input data files contained in this report could also be used to define the PMF floodplain boundary.
7. Flood flow studies described here can provide information for sediment transport simulations that use the HEC-6 model (US Army COE, 1977). For example, once floodplain elevations have been specified for a given canyon, one can associate a peak hydrograph with that floodplain definition. One could extend this hydrograph peak association to include a mean channel stream velocity for each individual canyon location. These mean velocities would obviously have future implications for sediment transport potential.

## VII. ACKNOWLEDGMENTS

This study could not have been completed without the assistance of several key individuals. George Fuller, MOSS systems programmer with Autometric, Inc., Lakewood, Colorado, developed the software to extract topographic data from LANL's AUTOGIS-MOSS graphical information system and to insert floodplain elevations back into this system. George Tauxe, Associate Professor, School of Civil Engineering and Environmental Science, University of Oklahoma, Norman, Oklahoma, participated in invaluable discussions concerning HEC-1 and HEC-2 input file structure and parameter evaluation techniques. Brian Comer, Section Leader with ENG-2 at LANL, provided MOSS system support and plotted all floodplain maps. Finally, Molly Magnuson, hydrologist with the US Army COE in Albuquerque, New Mexico, provided valuable information on various topics including the application of Snyder's unit hydrograph theory to New Mexico streams. These individuals' contributions to this effort are greatly appreciated.

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## APPENDIX A AUTOGIS-MOSS SYSTEM

### L Extraction of MOSS Topographic Data

This section documents the procedure used to automatically extract topographic data from LANL's graphic information system for use in HEC-2 simulations. Readers who are not familiar with the procedure can skip to the next section without loss in continuity. The MOSS source codes used to extract this topographic data are given on Disk No. 1 in this report.

In order to transport MOSS topographic data to an HEC-2 input data file, a series of user-activated steps was performed on existing and derived MOSS data sets. This procedure is briefly described below. The source programs to extract this information were developed by Autometric, Inc., under contract to LANL, and are maintained on the AUTOGIS-MOSS system by ENG-2. Section III of this appendix contains a complete source listing of these programs. Note that these programs require other MOSS utility features, which are described in the MOSS users manual. The sample MOSS session listed below details all necessary interactive user responses in a typical MOSS data-extraction process. Note that MOSS computer terminal user responses are in bold letters.

MOSS data extraction requirements for HEC-2 utilization include topographic contour files and stream channel location files. The contour files already existed in the LANL's MOSS system and were originally obtained from aerial photography transformations. The stream channel location files were created for this floodplain study by digitizing major stream channel locations from USGS 7.5-min topographic maps and geographically referencing them to known bench marks. These location files, which indicate the stream center line and have the drainage basin name as their subject, were entered into MOSS in a line format. The MOSS file name containing these stream channel location files is DRAINS. The MOSS topographic data are also in a line format and have numerical subjects that equal their represented elevations. These topographic data are actually included on a series of MOSS contour maps having either 2- or 10-ft contour intervals. However, in order to obtain complete topographic coverage for a given watershed, use of both the 2- and 10-ft-contour-interval maps was required. This resulted in a total number of contour maps that exceeded the maximum allowable active IDs within MOSS. Hence, the 2- and 10-ft-contour-interval maps of the entire LANL complex were merged into a series of single maps each containing both 2- and 10-ft-contour-interval data. The resultant MOSS master project file, LANLM, contains these merged contour maps. This master project file, which represents the resultant file from the MOSS utility entitled MAPIDX, also contains the maps, DRAINS and LANLINDEX, as described below. Using the stream location file, DRAINS, and the contour map index, LANLINDEX, it is a straightforward process to identify those merged MOSS contour maps that may be required for a given watershed application.

For each watershed draining the LANL complex, a file was constructed that defined the map names containing the topographic data. This file was then used with the MOSS SELECT command using the FROM option. For more information concerning the SELECT FROM command, see the MOSS user's manual or use the MOSS HELP SELECT command. A list of the SELECT FROM files used in this study includes

FORALAMOS	FORANCHO	FORBAYO	FORCANADA	FORCHAQUE
FORINDEX	FORMORTAN	FORPAJARO	FORPAJAR1	FORPAJAR2
FORPOTRIL	FORPUBELO	FORSANDIA	FORWATER	

The file, USESPLAT, was also used with the SELECT FROM command, as illustrated by the following example:

```
SELECT FROM FORALAMOS USESPLAT
```

The content of USESPLAT is the single ASCII character "\*", which is the MOSS wild card character—that matches any character string, and is similar to the AOS/VS "+" template.



There is also a set of files that were used in conjunction with the special FORINDEX file. This file contains all the contour map minimum-bounding rectangles from the map index for each watershed. A list of the SELECT FROM FORINDEX files includes

FALAX	FANCX	FBAYX	FCANX	FCHAX
FMORX	FPAJX0	FPAJX1	FPAJX2	FPOTX
FPUEX	FSANX	FWATX		

These files replace the USESPLAT file mentioned above, as illustrated by the following example:

#### SELECT FROM FORINDEX FALAX

The result of the SELECT FROM command produces from 1 to 38 active data sets from the merged contour maps, as detailed below. For a given watershed, the stream location file will be a single active ID within MOSS, while the corresponding contour data files will be several active IDs. It is possible that more than one ID will represent the stream location data and also that only one active ID will represent the topographic data. Derived data sets include extracted topographic profiles at stream cross sections and the imported maps produced from these profiles.

Once the stream location and contour data sets have been selected and placed into the active table as IDs, then the MOSS window must be set to include all of these data sets. The first stage of the data-extraction process (AHEC2) can now begin. The MOSS source code for the program AHEC2 is contained on Disk No. 1 in this report. The output from AHEC2 is imported into MOSS and visually checked. Once verified, the second stage of the data-extraction process (EXHEC2) can be initiated. The MOSS source code for the program EXHEC2 is also contained on Disk No. 1. The following abbreviated MOSS dialog provides an example of program execution. It is procedurally correct and represents either MOSS commands or programmatic dialog.

#### FREE ALL - Start with a clean active table

The selection of contour maps required for a given data-extraction application is best determined through the use of the utility procedure MAPIDX. This procedure will make an index map based on the minimum-bounding rectangular coverages of the contour maps. After plotting the stream location data and the index map, the user must select each contour map that contains topographic data of interest. Results of this utility execution were saved in the file named LANINDEX. In this example, two files are used to select the contour data. The first file is called FORALAMOS and contains a list of the contour maps that could possibly contain topographic data on Los Alamos that may be of interest. The second file is called USESPLAT and contains the single wild-card character "\*" to match all strings. For more information about these two files, see the MOSS users manual under SELECT FROM.

**SELECT DRAINAGE Subject \*ALAMOS\*** — Select stream location files for this run.

**SELECT FROM FORALAMOS USESPLAT** — Select all contour maps around the Los Alamos Canyon drainage basin.

**WIndow ALL** — Set window to entire geographic region

**AHEC2** — Invoke the AHEC2 program

At this point, the automated topographic data-extraction and file generator program, AHEC2, will prompt the user to give definable parameters before execution. In this example, there is one active ID for the stream location data, and there are 38 IDs for the contour data. The default vertical height and horizontal distance values are displayed by MOSS in square brackets. These default values are selected by hitting NEWLINE or CARRIAGE RETURN; alternate values may also be entered by the user. Here the vertical height refers to the maximum elevation difference

between the stream channel's highest and lowest elevation points within the profile. Horizontal distance refers to the distance along the profile located perpendicular to either side of the stream channel. The extracted topographic data will be constrained to these limits.

Enter active IDs to use for DRAINAGES. 1

Enter active IDs to use for CONTOURS. 2 TH 39

Enter vertical HEIGHT from bottom of DRAINAGE [25] Carriage Return — 25 ft of vertical relief will be included in the stream channel profile.

Enter horizontal DISTANCE between PROFILES [250]. Carriage Return — the total profile width will be 250 ft on either side of the stream channel, giving a total profile distance of 500 ft.

The program could spend time determining which way is downhill or uphill. However, it is much simpler for the user to point with the graphics cursor to indicate drainage direction. After entering these points, the program will pause until the user enters an additional CARRIAGE RETURN, indicating that everything is correct and ready to proceed.

Point to DOWNHILL end of DRAINAGE — use graphics cursor. Point to UPHILL end of DRAINAGE — use graphics cursor. HIT NEWLINE TO CONTINUE.

Two MOSS IMPORT files are now generated. The first is a 2-D file containing profile lines at 250-ft intervals along the stream location file, and the second is a corresponding 3-D file containing data about stream channel cross sections. These 2-D profile lines were generated and used by AHEC2 to construct the 3-D cross sections by intersecting each 2-D profile line with all topographic contour data. The 3-D cross sections are a series of (X,Y,Z) triplets with the (x,y) portion defined by the intersection of a specific 2-D profile line with a specific contour line. The subject of the contour line determines the z portion, or elevation, of the triplet. The (x,z) data pairs in each triplet correspond to the station and elevation locations required on GR data cards in the HEC-2 input data file, as shown in Table 13. Note that this information is actually exported as (z,x) during the formatting process. It should also be noted that the first x value on a given cross section profile line is assigned a relative value of zero, and all remaining x values are referenced to this origin. This procedure is identical to that in the HEC-2 model as one looks downstream at the profile line. Hence, the first x position is located at the extreme left of the profile line as one looks downstream. The MOSS file maintains the original geographically referenced coordinate positions of all x values, but this information is not used in the HEC-2 model.

Results from the AHEC2 program are now imported to MOSS. The 2-D profile lines are not essential but allow the user to determine where contour data are missing. The 2-D profile lines are imported as a Type 2 map (line) with the input file name PROFILE.2D. The 3-D cross sections are critical to the second and final stage of the extraction process and must be imported to MOSS. The input file which is named PROFILE.3D, is imported as a Type 12 map [(x,y,z) line map]. Once imported, the resultant Type 12 map must be selected.

The selected ID will be used in the EXHEC2 program command procedure. This portion of the extraction program will take the (x,y,z) data pairs and reformat them into (z,x) pairs as required by the HEC-2 model input structure on GR cards, as seen in Table 13. The EXHEC2 program will ask the user to give an active data set for reformatting, a resultant target file name, and information on whether the file is for a subcritical or supercritical HEC-2 input data file. The program will not overwrite an existing file name unless specified by the user. The example given below illustrates this procedure.

EXHec2 — Invoke the HEC-2 reformatter program option.  
Enter active data set ID to reformat to HEC-2 standard

[CR = Exit]

40

For LOSALABD, EXHEC2 file name [EXHEC2]

SUBLOSALA — File name for Los Alamos Canyon subcritical run

Is this a SUB- or SUPER- critical run (SUB/SUPER) (SUB)

SUB

NUMBER OF DATA ITEMS TO BE REFORMATTED = 184

EXECUTING. PLEASE WAIT...

This example uses active ID 40 as the 3-D map of the cross section. The HEC-2 input data file will be called SUBLOSALA and is a subcritical run. The program informs the user that 184 3-D cross sections will be in the final HEC-2 input data file. SUBLOSALA is subsequently transferred to a 5.25-in. magnetic disk in ASCII format for direct use by the HEC-2 program. This data transfer procedure only creates T1, T2, X1, X3, and GR cards, as seen in Table 13. Hence, the HEC-2 user must still enter additional input parameters into this file before a successful HEC-2 simulation can be performed.

## II. Insertion of Floodplain Boundaries

This section documents the procedure used to automatically reinsert HEC-2 floodplain boundaries into LANL's graphic information system for final map generation. Readers who are not familiar with the procedure can skip to the next section without loss in continuity. The MOSS source code used to reinsert HEC-2 flood plan boundaries into MOSS is listed on Disk No. 1 in this report.

Once the HEC-2 simulation has been successfully completed for a given stream channel segment, the HEC-2 floodplain boundaries must be read back into MOSS. This procedure is described below. Before this second transfer, however, the HEC-2 user must tailor model output for this floodplain boundary-insertion process. Required HEC-2 output includes the cross section's number; the left- and right-station numbers where the computed water surface intersects the ground; and the computed water-surface elevation, floodplain top width, floodplain depth, and cross-sectional flow area. The HEC-2 output file name must correspond to an original MOSS data-extraction output file, and all cross-section numbers must be identical in both files. The MOSS insertion program uses this HEC-2 file name and cross-section-numbering scheme to translate floodplain boundary data into unique, geographically referenced New Mexico state plain coordinates. The HEC-2 input data files listed on Disk No. 2 of this report are set up to provide the proper output to the MOSS insertion program. The first J3 card shown in Table 13 for each file actually provides this required output for the MOSS insertion procedure. All remaining HEC-2 output is extraneous and must be stripped from the HEC-2 output file. Hence, the HEC-2 user must edit output files with an independent file editor or word processor and remove all unnecessary information from an HEC-2 output file. This modified HEC-2 output file is now transferred back to the MOSS system in ASCII format on a 5.25-in magnetic disk. The actual insertion procedure can now begin.

To insert HEC-2 floodplain elevations into the MOSS system at known cross sections, a series of user-activated steps is performed on pre-existing MOSS data sets. These data sets correspond to the modified HEC-2 output files that were described above. The actual MOSS insertion procedure is briefly described here. The source program used to complete this task was developed by Autometric, Inc., under contract to LANL, and is maintained on the AUTOGIS-MOSS system by ENG-2; this source program is listed on Disk No. 1 of this report. The sample MOSS session listed below details all necessary interactive user responses in a typical floodplain boundary-insertion process.

FPHEC2 is the AUTOGIS-MOSS data-reformatting program, or command, and is the third and final step in the floodplain-modeling process. As mentioned above, this step makes use of data files generated from the actual HEC-2 modeling process and MOSS data files created with EXHEC2. The EXHEC2 command was described above; this command generates a 3-D floodplain MOSS import file. The FPHEC2 command format is specified as follows:

FPHec2 (active data set) (output file name).

The following dialog illustrates the use of this MOSS command in a typical floodplain data ~~insertion~~ procedure. Note that user responses are in bold letters.

~~Enter Command?~~ **FPHec2**  
Enter HEC-2 model results filename [CR = EXIT]  
**CANADA.DAT**  
Enter HEC-2 model Geo-Reference filename [CR = EXIT]  
**SUBCANA.REF**  
Enter resultant MOSS IMPORT floodplain name [CR = EXIT]  
**CANAFP.EXP**  
**HEC RECORDS 158 REF RECORDS 156 CORDS 313**

This example matches the HEC-2 output file named CANADA.DAT with the MOSS EXHEC2-generated Geo-Reference file named SUBCANA.REF and produces a MOSS import file named CANAFP.EXP. For each complete stream channel profile in both the MOSS Geo-Reference and the HEC-2 files, a pair of coordinate triplets (x,y,z) are generated. Once these triplets have been calculated, they are ordered by section number to form a 3-D polygon and written to the MOSS export file specified by the user. The HEC-2 output file must include each stream channel cross section number and the computed water-surface elevation. The Geo-Reference file's section numbers are checked to insure that they match. This is the only way to determine the actual New Mexico state plane ground coordinates that delineate the floodplain. The resulting MOSS import file should then be imported into MOSS as a Type 13 (3-D polygon) file. Finally, it should be noted that any HEC-2 sections that are not exactly matched with corresponding sections in the MOSS Geo-Reference file are not included in the final MOSS export file.

# APPENDIX B TABULATED HEC-1 INPUT PARAMETERS

## **GUATE CANYON**

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 L (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 = SUB-BASIN DRAINAGE AREA (sq. 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	2.96
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

Vel =  $1.49R^{0.67}S^{0.5}/n$  (ft/sec)

K =  $L/(3600*Vel)$  (hours)

Nstps =  $60K/NMIN$  (dimensionless)

NSTPS = INTEGER VALUE FOR Nstps

NMIN = MINUTES FROM CARD IT

$1/[2(1-x)] < CHECK < 1/(2x)$

CHECK =  $(60K)/(NMIN*NSTPS)$

x = 0.20

R(ft) = 2.00

n = 0.10

NMIN = 15.00

$1/[2(1-x)] = 0.63$

$1/(2x) = 2.50$

=====

BASIN NO.	L (ft)	Vel	K	Nstps	NSTPS	CHECK	AMSKK
1	34000	7.3	1.29	5.14	5	1.03	1.29
2	24000	4.7	1.42	5.67	6	0.95	1.42
3	46000	6.6	1.93	7.72	8	0.97	1.93
4	12750	3.9	0.90	3.59	4	0.90	0.90
5	9000	3.7	0.68	2.73	3	0.91	0.68

=====

# BARRANCAS CANYON

## 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  $L$  (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 (%)  
 $A$  = SUB-BASIN DRAINAGE AREA (sq. miles)

BASIN NO.	L (ft)	X (ft)	CN	S	Y (%)	A (sqm)	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	367	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

$0.1 < x < 0.3$   
 $Vel = 1.49R^{0.67}S^{0.5}/n$  (ft/sec)  
 $K = L/(3600*Vel)$  (hours)  
 $Nsteps = 60K/NMIN$  (dimensionless)  
 $NSTPS$  = INTEGER VALUE FOR  $Nsteps$   
 $NMIN$  = MINUTES FROM CARD IT  
 $1/[2(1-x)] < CHECK < 1/(2x)$   
 $CHECK = (60K)/(NMIN*NSTPS)$

$x = 0.20$   
 $R(ft) = 2.00$   
 $n = 0.10$   
 $NMIN = 15.00$   
 $1/[2(1-x)] = 0.63$   
 $1/(2x) = 2.50$

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKK
1	25500	5.2	1.36	5.42	5	1.08	1.36
2	7250	7.6	0.26	1.06	1	1.06	0.26
3	23000	5.6	1.15	4.60	5	0.92	1.15
4	3250	7.9	0.11	0.46	1	0.46	0.11

# BAYO CANYON

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 L (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 = SUB-BASIN DRAINAGE AREA (sq. 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

=====

$0.1 < x < 0.3$   
 $Vel = 1.49R^{0.67}S^{0.5} / n$  (ft/sec) x = 0.20  
 $K = L / (3600 * Vel)$  (hours) R(ft) = 2.00  
 $Nsteps = 60K / NMIN$  (dimensionless) n = 0.10  
 NSTPS = INTEGER VALUE FOR Nsteps  
 NMIN = MINUTES FROM CARD IT NMIN = 15.00  
 $1 / [2(1-x)] < CHECK < 1 / (2x)$   $1 / [2(1-x)] = 0.63$   
 $CHECK = (60K) / (NMIN * NSTPS)$   $1 / (2x) = 2.50$

=====

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKR
1	16750	5.0	0.93	3.73	4	0.93	0.93
2	15250	4.4	0.96	3.82	4	0.96	0.96
3	12750	6.4	0.55	2.20	2	1.10	0.55

=====

# PUEBLO CANYON

## 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 L (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 = SUB-BASIN DRAINAGE AREA (sq. miles)

=====

BASIN NO.	L (ft)	X (ft)	CN	S	Y (%)	A (sqm)	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

=====

$0.1 < x < 0.3$

$Vel = 1.49R^{0.67}S^{0.5}/n$  (ft/sec) x = 0.20

$K = L/(3600*Vel)$  (hours) R(ft) = 2.00

Nsteps =  $60K/NMIN$  (dimensionless) n = 0.10

NSTPS = INTEGER VALUE FOR Nsteps

NMIN = MINUTES FROM CARD IT NMIN = 15.00

$1/[2(1-x)] < CHECK < 1/(2x)$   $1/[2(1-x)] = 0.63$

CHECK =  $(60K)/(NMIN*NSTPS)$   $1/(2x) = 2.50$

=====

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKR
1	15000	8.5	0.49	1.96	2	0.98	0.49
2	24000	4.0	1.66	6.63	7	0.95	1.66
3	14000	3.1	1.24	4.96	5	0.99	1.24

=====



# LOS ALAMOS CANYON

## 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 L (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 = SUB-BASIN DRAINAGE AREA (sq. 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) = 2.00

$K = L/(3600*Vel)$  (hours) n = 0.10

Nsteps =  $60K/NMIN$  (dimensionless)

NSTPS = INTEGER VALUE FOR Nsteps

NMIN = MINUTES FROM CARD IT NMIN = 15.00

$1/[2(1-x)] < CHECK < 1/(2x)$   $1/[2(1-x)] = 0.63$

CHECK =  $(60K)/(NMIN*NSTPS)$   $1/(2x) = 2.50$

=====

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKK
1	20000	7.4	0.75	3.01	3	1.00	0.75
2	10000	5.5	0.51	2.04	2	1.02	0.51
3	35000	3.7	2.64	10.57	11	0.96	2.64
4	11750	5.0	0.65	2.61	3	0.87	0.65
5	5000	3.3	0.42	1.66	2	0.83	0.42
6	7750	3.5	0.62	2.49	2	1.25	0.62

=====

# **SANDIA CANYON**

## **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 L (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 = SUB-BASIN DRAINAGE AREA (sq. miles)

=====

BASIN NO.	L (ft)	X (ft)	CN	S	Y (%)	A (sq mi)	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**

=====

$0.1 < x < 0.3$

$Vel = 1.49R^{0.67}S^{0.5}/n$  (ft/sec) x = 0.20

K =  $L/(3600*Vel)$  (hours) R(ft) = 2.00

Nsteps =  $60K/NMIN$  (dimensionless) n = 0.10

NSTPS = INTEGER VALUE FOR Nsteps

NMIN = MINUTES FROM CARD IT NMIN = 15.00

$1/[2(1-x)] < CHECK < 1/(2x)$   $1/[2(1-x)] = 0.63$

CHECK =  $(60K)/(NMIN*NSTPS)$   $1/(2x) = 2.50$

=====

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKK
1	36750	3.9	2.62	10.46	10	1.05	2.62
2	11750	4.2	0.78	3.11	3	1.04	0.78
3	10000	4.1	0.68	2.71	3	0.90	0.68
4	9000	6.3	0.40	1.59	2	0.80	0.40

=====

# MORTANDAD CANYON

## HEC-1 INPUT DATA FILE PARAMETER CALCULATION

SEE UD DATA CARD FOR SCS UNIT HYDROGRAPH LAG TIME DEFINITIONS

$T = \frac{L^{0.8} (S+1)^{0.7}}{(1900Y^{0.5})}$  = SCS BASIN LAG TIME (hrs)  
 L = CHANNEL LENGTH TO WATER DIVIDE (ft)  
 X = BASIN ELEVATION CHANGE OVER LENGTH L (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 = SUB-BASIN DRAINAGE AREA (sq. 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

$0.1 < x < 0.3$   
 $Vel = 1.49R^{0.67}S^{0.5}/n$  (ft/sec)  
 $K = L/(3600*Vel)$  (hours)  
 $Nsteps = 60K/NMIN$  (dimensionless)  
 $NSTPS =$  INTEGER VALUE FOR  $Nsteps$   
 $NMIN =$  MINUTES FROM CARD IT  
 $1/[2(1-x)] < CHECK < 1/(2x)$   
 $CHECK = (60K)/(NMIN*NSTPS)$

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKK
1	9000	4.9	0.51	2.03	2	1.02	0.51
2	10500	3.8	0.76	3.04	3	1.01	0.76
3	6000	3.4	0.49	1.95	2	0.98	0.49
4	12250	3.0	1.12	4.47	4	1.12	1.12
5	16000	4.0	1.10	4.41	4	1.10	1.10
6	13500	6.0	0.63	2.52	3	0.84	0.63

# CANADA DEL BUZY

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  $L$  (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 (%)  
 $A$  = SUB-BASIN DRAINAGE AREA (sq. miles)

=====

BASIN NO.	L (ft)	X (ft)	CN	S	Y (%)	A (sq)	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

=====

$0.1 < x < 0.3$   
 $Vel = 1.49R^{0.67}S^{0.5}/n$  (ft/sec)  $x = 0.20$   
 $K = L/(3600*Vel)$  (hours)  $R(ft) = 2.00$   
 $Nsteps = 60K/NMIN$  (dimensionless)  $n = 0.10$   
 $NSTPS =$  INTEGER VALUE FOR  $Nsteps$   
 $NMIN =$  MINUTES FROM CARD IT  $NMIN = 15.00$   
 $1/[2(1-x)] < CHECK < 1/(2x)$   $1/[2(1-x)] = 0.63$   
 $CHECK = (60K)/(NMIN*NSTPS)$   $1/(2x) = 2.50$

=====

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKK
1	29500	4.0	2.06	8.23	8	1.03	2.06
2	14750	7.1	0.57	2.29	2	1.15	0.57

=====

# PAJARITO CANYON

## HEC-1 INPUT DATA FILE PARAMETER CALCULATION

SEE RM DATA CARD FOR SCS UNIT HYDROGRAPH LAG TIME DEFINITIONS

$T = (L^{0.8} (S+1)^{0.7} / (1900Y^{0.5})) = \text{SCS BASIN LAG TIME (hrs)}$   
 L = CHANNEL LENGTH TO WATER DIVIDE (ft)  
 X = BASIN ELEVATION CHANGE OVER LENGTH L (ft)  
 CN = SCS CURVE NUMBER FOR AMC-II MOISTURE CONDITIONS (dim)  
 S =  $1000/CN - 10 = \text{POTENTIAL RAINFALL RETENTION (in)}$   
 Y =  $100X/L = \text{GROSS WATERSHED SLOPE (\%)}$   
 A = SUB-BASIN DRAINAGE AREA (sq. miles)

BASIN NO.	L (ft)	X (ft)	CN	S	Y (%)	A (sqm)	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
3	28250	2890	61	6.39	10.23	3.28	2.43
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

$0.1 < x < 0.3$   
 $Vel = 1.49R^{0.67}S^{0.5}/n \text{ (ft/sec)}$   
 $K = L/(3600*Vel) \text{ (hours)}$   
 $Nsteps = 60K/NMIN \text{ (dimensionless)}$   
 $NSTPS = \text{INTEGER VALUE FOR } Nsteps$   
 $NMIN = \text{MINUTES FROM CARD IT}$   
 $1/[2(1-x)] < CHECK < 1/(2x)$   
 $CHECK = (60K)/(NMIN*NSTPS)$

x = 0.20  
 R(ft) = 2.00  
 n = 0.10  
 NMIN = 15.00  
 $1/[2(1-x)] = 0.63$   
 $1/(2x) = 2.50$

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKK
1	17250	9.4	0.51	2.04	2	1.02	0.51
2	18250	4.9	1.03	4.11	4	1.03	1.03
3	28250	7.6	1.04	4.15	4	1.04	1.04
4	11000	3.2	0.95	3.78	4	0.95	0.95
5	19500	4.5	1.20	4.80	5	0.96	1.20
6	15000	2.9	1.44	5.75	6	0.96	1.44
7	15500	6.2	0.70	2.80	3	0.93	0.70

# POTRILLO CANYON

HEC-1 INPUT DATA FILE PARAMETER CALCULATION

SEE UD DATA CARD FOR SCS UNIT HYDROGRAPH LAG TIME DEFINITIONS

=====

$T = (L^{0.8} (S+1)^{0.7} / (1900Y^{0.5})) = \text{SCS BASIN LAG TIME (hrs)}$

$L = \text{CHANNEL LENGTH TO WATER DIVIDE (ft)}$

$X = \text{BASIN ELEVATION CHANGE OVER LENGTH L (ft)}$

$CN = \text{SCS CURVE NUMBER FOR AMC-II MOISTURE CONDITIONS (dim)}$

$S = 1000/CN - 10 = \text{POTENTIAL RAINFALL RETENTION (in)}$

$Y = 100X/L = \text{GROSS WATERSHED SLOPE (\%)}$

$A = \text{SUB-BASIN DRAINAGE AREA (sq. miles)}$

=====

BASIN NO.	L (ft)	X (ft)	CN	S	Y (%)	A (sqm)	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

=====

$0.1 < x < 0.3$

$Vel = 1.49R^{0.67}S^{0.5}/n \text{ (ft/sec)}$   $x = 0.20$

$K = L/(3600*Vel) \text{ (hours)}$   $R(ft) = 2.00$

$Nsteps = 60K/NMIN \text{ (dimensionless)}$   $n = 0.10$

$NSTPS = \text{INTEGER VALUE FOR Nsteps}$

$NMIN = \text{MINUTES FROM CARD IT}$   $NMIN = 15.00$

$1/[2(1-x)] < CHECK < 1/(2x)$   $1/[2(1-x)] = 0.63$

$CHECK = (60K)/(NMIN*NSTPS)$   $1/(2x) = 2.50$

=====

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKK
1	28500	4.1	1.91	7.64	8	0.95	1.91
2	18000	4.4	1.13	4.52	5	0.90	1.13
3	9750	6.0	0.45	1.82	2	0.91	0.45

=====

# WATER CANYON

## HEC-1 INPUT DATA FILE PARAMETER CALCULATION

### SEE UD DATA CARD FOR SCS UNIT HYDROGRAPH LAG TIME DEFINITIONS

$T = (L^{0.8} + (S+1)^{0.7} / (1900Y^{0.5})) = \text{SCS BASIN LAG TIME (hrs)}$   
 $L = \text{CHANNEL LENGTH TO WATER DIVIDE (ft)}$   
 $X = \text{BASIN ELEVATION CHANGE OVER LENGTH L (ft)}$   
 $CN = \text{SCS CURVE NUMBER FOR AMC-II MOISTURE CONDITIONS (dim)}$   
 $S = 1000/CN - 10 = \text{POTENTIAL RAINFALL RETENTION (in)}$   
 $Y = 100X/L = \text{GROSS WATERSHED SLOPE (\%)}$   
 $A = \text{SUB-BASIN DRAINAGE AREA (sq. miles)}$

BASIN NO.	L (ft)	X (ft)	CN	S	Y (%)	A (sq mi)	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

$0.1 < x < 0.3$   
 $Vel = 1.49R^{0.67}S^{0.5}/n \text{ (ft/sec)}$   
 $K = L/(3600*Vel) \text{ (hours)}$   
 $Nsteps = 60K/NMIN \text{ (dimensionless)}$   
 $NSTPS = \text{INTEGER VALUE FOR } Nsteps$   
 $NMIN = \text{MINUTES FROM CARD IT}$   
 $1/[2(1-x)] < CHECK < 1/(2x)$   
 $CHECK = (60K)/(NMIN*NSTPS)$

$x = 0.20$   
 $R(ft) = 2.00$   
 $n = 0.10$   
 $NMIN = 15.00$   
 $1/[2(1-x)] = 0.63$   
 $1/(2x) = 2.50$

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKK
1	18000	8.5	0.59	2.36	2	1.18	0.59
2	17750	4.7	1.05	4.18	4	1.05	1.05
3	19000	3.5	1.53	6.11	6	1.02	1.53
4	13750	5.0	0.76	3.05	3	1.02	0.76
5	5000	6.7	0.21	0.83	1	0.83	0.21

# CANON DE VALLE

## 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 L (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 = SUB-BASIN DRAINAGE AREA (sq. miles)

=====

BASIN NO.	L (ft)	X (ft)	CN	S	Y (%)	A (sq)	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) = 2.00

$K = L/(3600*Vel)$  (hours) n = 0.10

Nsteps =  $60K/NMIN$  (dimensionless)

NSTPS = INTEGER VALUE FOR Nsteps

NMIN = MINUTES FROM CARD IT NMIN = 15.00

$1/[2(1-x)] < CHECK < 1/(2x)$  1/[2(1-x)] = 0.63

CHECK =  $(60K)/(NMIN*NSTPS)$  1/(2x) = 2.50

=====

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKK
1	22500	8.3	0.75	3.02	3	1.01	0.75
2	7500	5.4	0.38	1.54	2	0.77	0.38
3	12500	4.6	0.75	3.01	3	1.00	0.75

=====



# ANCHO CANYON

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 L (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 = SUB-BASIN DRAINAGE AREA (sq. 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

=====

$0.1 < x < 0.3$

$Vel = 1.49R^{0.67}S^{0.5}/n$  (ft/sec) x = 0.20

$K = L/(3600*Vel)$  (hours) R(ft) = 2.00

Nsteps = 60K/NMIN (dimensionless) n = 0.10

NSTPS = INTEGER VALUE FOR Nsteps

NMIN = MINUTES FROM CARD IT NMIN = 15.00

$1/[2(1-x)] < CHECK < 1/(2x)$   $1/[2(1-x)] = 0.63$

CHECK = (60K)/(NMIN\*NSTPS)  $1/(2x) = 2.50$

=====

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKK
1	25750	4.8	1.50	6.01	6	1.00	1.50
2	22000	5.1	1.19	4.76	5	0.95	1.19
3	13000	6.9	0.52	2.10	2	1.05	0.52
4	10000	6.2	0.45	1.79	2	0.90	0.45
5	2500	6.1	0.11	0.45	1	0.45	0.11

=====

# CHAQUEHUI CANYON

## 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 L (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 = SUB-BASIN DRAINAGE AREA (sq. miles)

=====

BASIN NO.	L (ft)	X (ft)	CN	S	Y (%)	A (sq. miles)	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

=====

$0.1 < x < 0.3$

$Vel = 1.49R^{0.67}S^{0.5}/n$  (ft/sec) x = 0.20

K =  $L/(3600*Vel)$  (hours) R(ft) = 2.00

Nsteps =  $60K/NMIN$  (dimensionless) n = 0.10

NSTPS = INTEGER VALUE FOR Nsteps

NMIN = MINUTES FROM CARD IT NMIN = 15.00

$1/[2(1-x)] < CHECK < 1/(2x)$   $1/[2(1-x)] = 0.63$

CHECK =  $(60K)/(NMIN*NSTPS)$   $1/(2x) = 2.50$

=====

BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKK
1	16500	6.6	0.69	2.77	3	0.92	0.69

=====

# CANON DE LOS FRIJOLES

## HEC-1 INPUT DATA FILE PARAMETER CALCULATION

### SEE UD DATA CARD FOR SCS UNIT HYDROGRAPH LAG TIME DEFINITIONS

$T = (L^{0.8} (S+1)^{0.7} / (1900Y^{0.5})) = \text{SCS BASIN LAG TIME (hrs)}$   
 $L = \text{CHANNEL LENGTH TO WATER DIVIDE (ft)}$   
 $X = \text{BASIN ELEVATION CHANGE OVER LENGTH L (ft)}$   
 $CN = \text{SCS CURVE NUMBER FOR AMC-II MOISTURE CONDITIONS (dim)}$   
 $S = 1000/CN - 10 = \text{POTENTIAL RAINFALL RETENTION (in)}$   
 $Y = 100X/L = \text{GROSS WATERSHED SLOPE (\%)}$   
 $A = \text{SUB-BASIN DRAINAGE AREA (sq. miles)}$

BASIN NO.	L (ft)	X (ft)	CN	S	Y (%)	A (sqm)	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

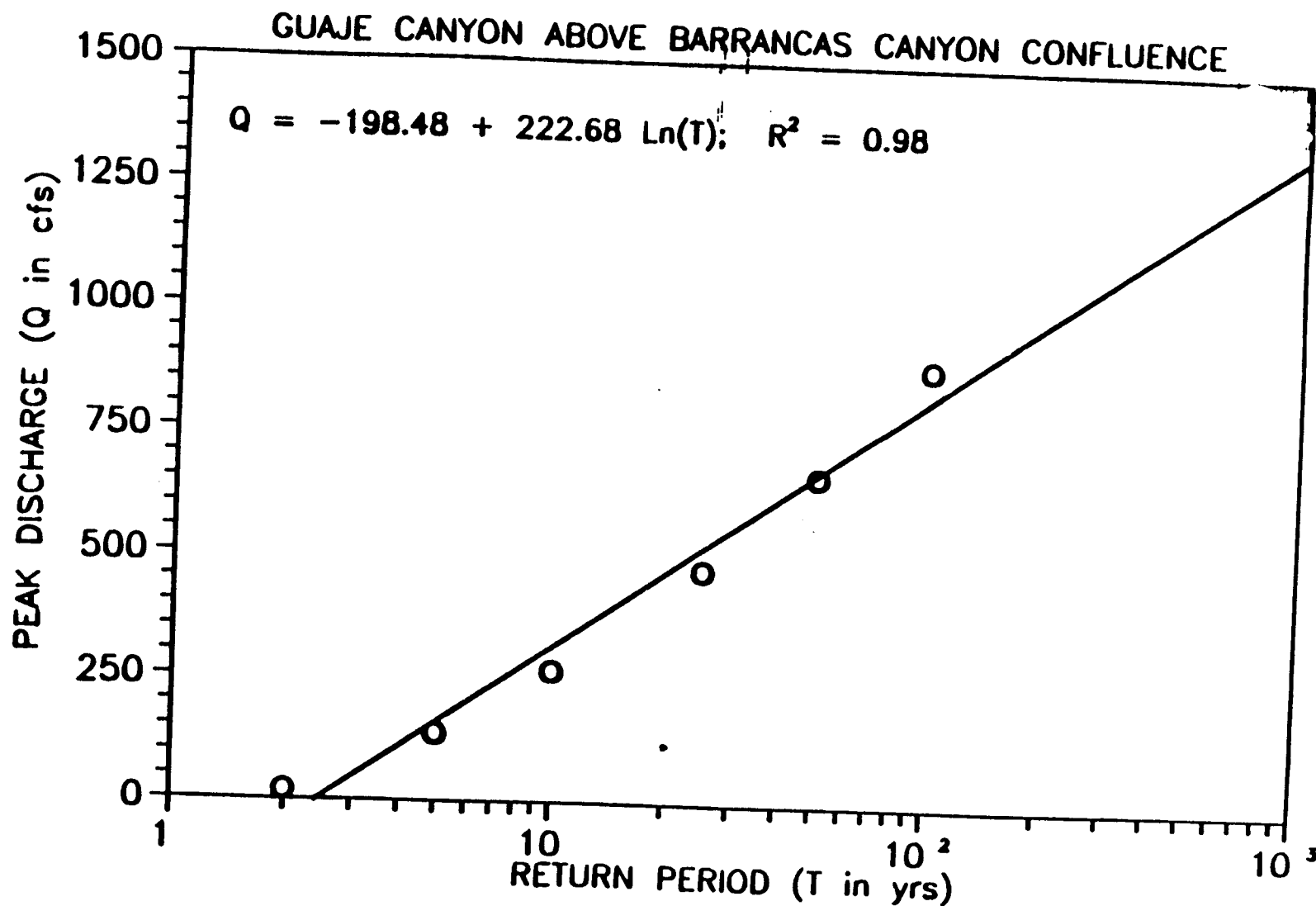
## HEC-1 INPUT DATA FILE PARAMETER CALCULATION

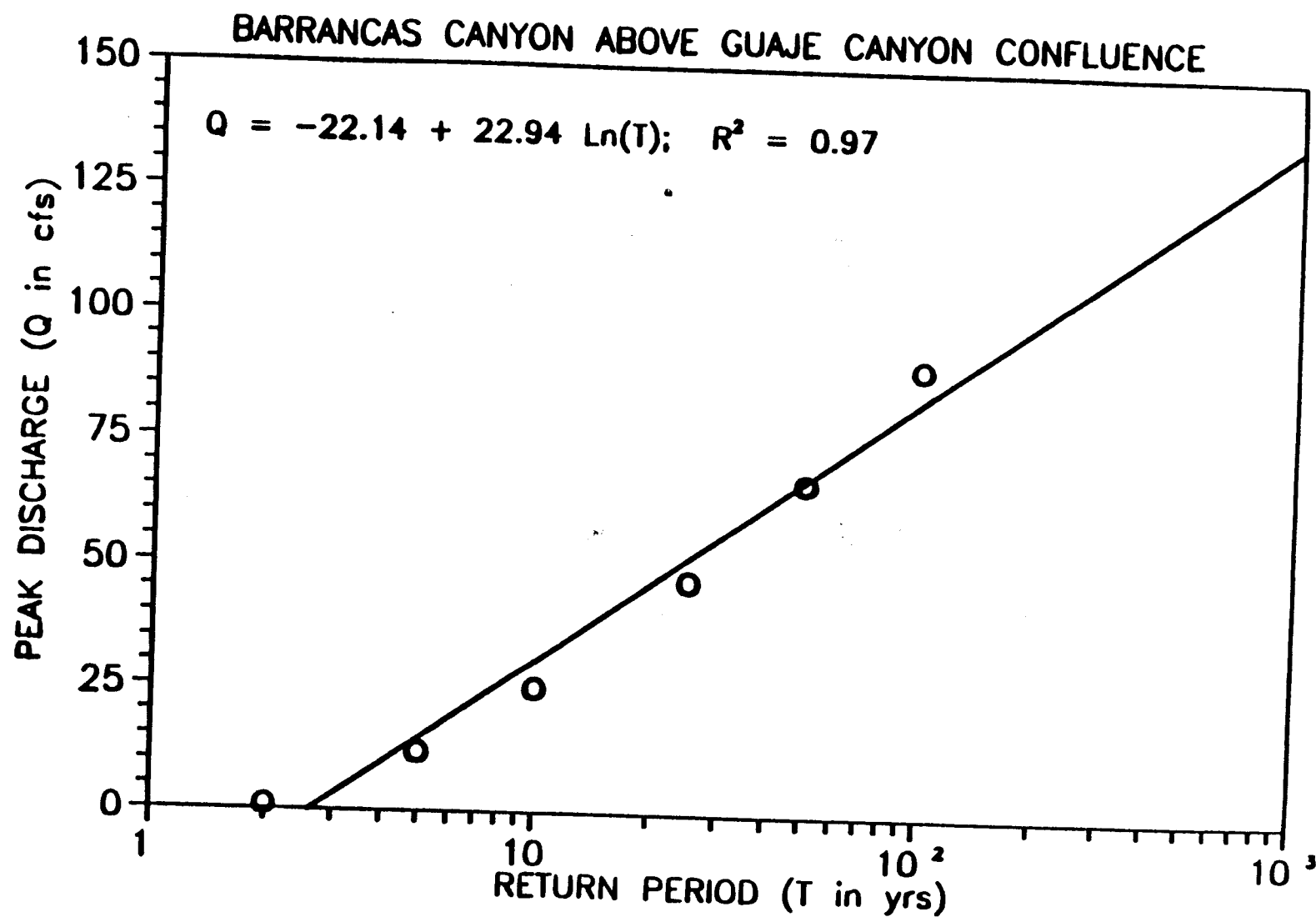
### SEE RM DATA CARD FOR MUSKINGUM ROUTING PARAMETER DEFINITIONS

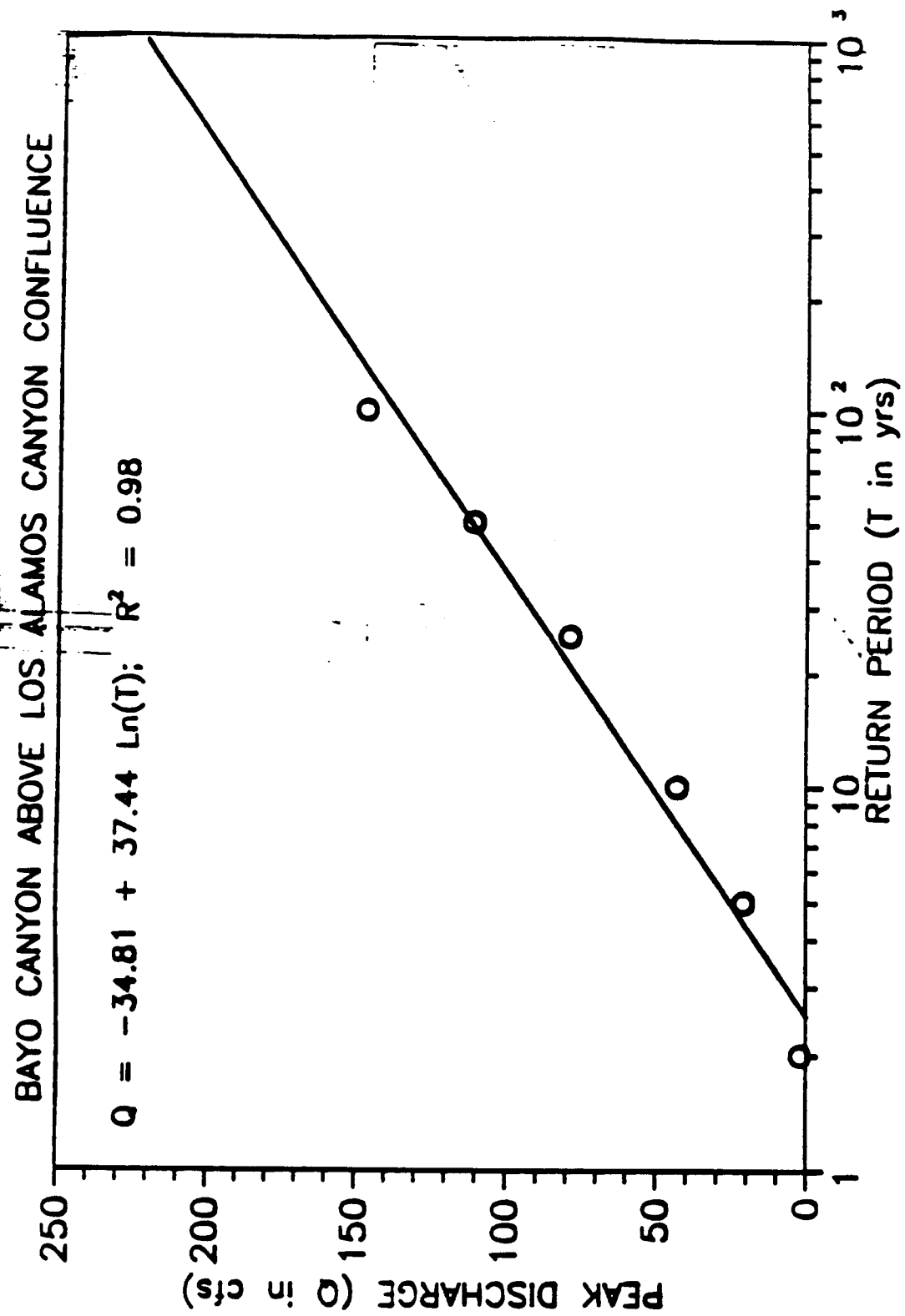
$0.1 < x < 0.3$   
 $Vel = 1.49R^{0.67}S^{0.5}/n \text{ (ft/sec)}$   
 $K = L/(3600*Vel) \text{ (hours)}$   
 $Nsteps = 60K/NMIN \text{ (dimensionless)}$   
 $NSTPS = \text{INTEGER VALUE FOR } Nsteps$   
 $NMIN = \text{MINUTES FROM CARD IT}$   
 $1/[2(1-x)] < CHECK < 1/(2x)$   
 $CHECK = (60K)/(NMIN*NSTPS)$

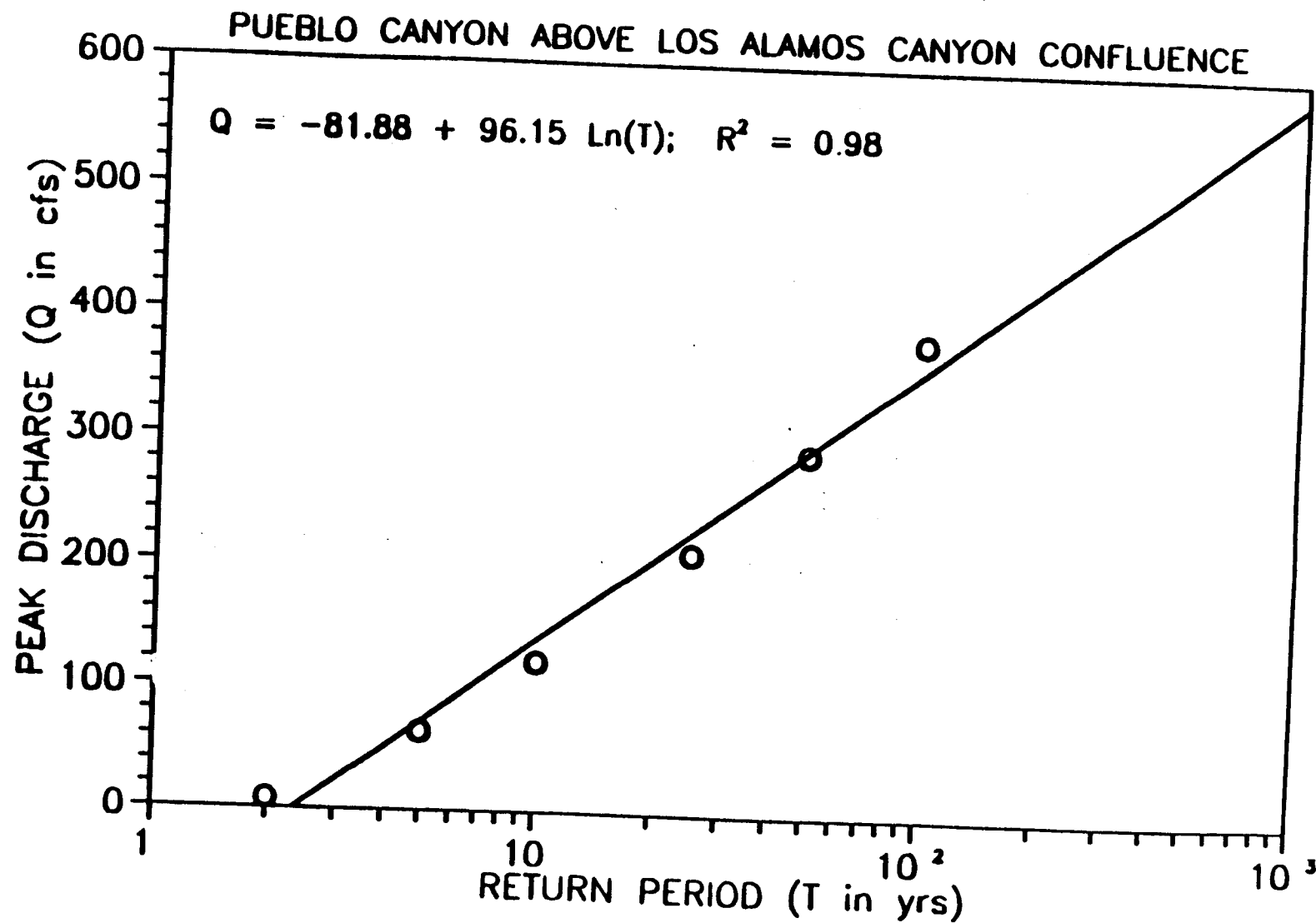
$x = 0.20$   
 $R(ft) = 2.00$   
 $n = 0.10$   
 $NMIN = 15.00$   
 $1/[2(1-x)] = 0.63$   
 $1/(2x) = 2.50$

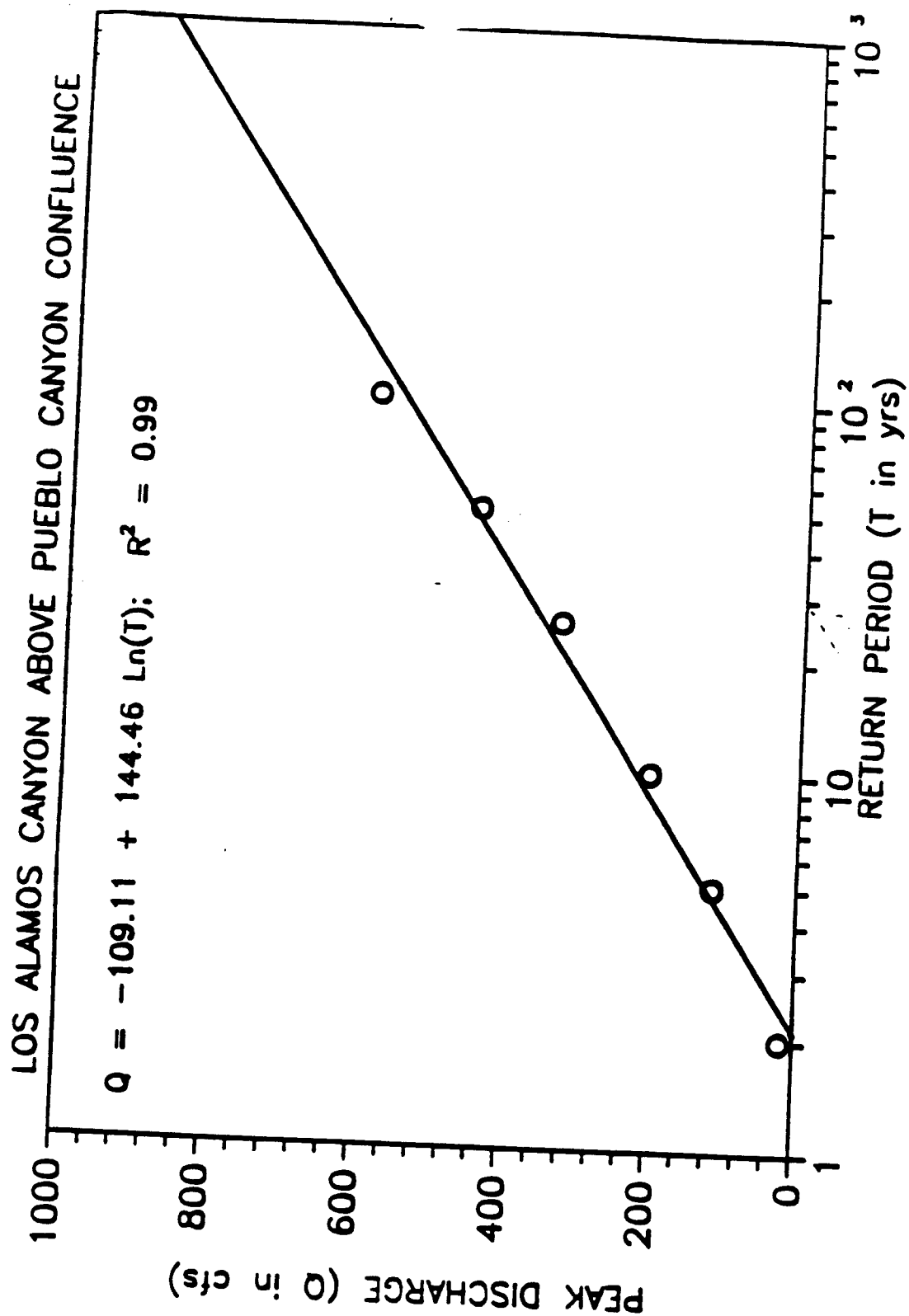
BASIN NO.	L (ft)	Vel	K	Nsteps	NSTPS	CHECK	AMSKK
1	20200	8.3	0.67	2.70	3	0.90	0.67
2	24400	4.9	1.39	5.58	6	0.93	1.39
3	24000	3.8	1.74	6.94	7	0.99	1.74



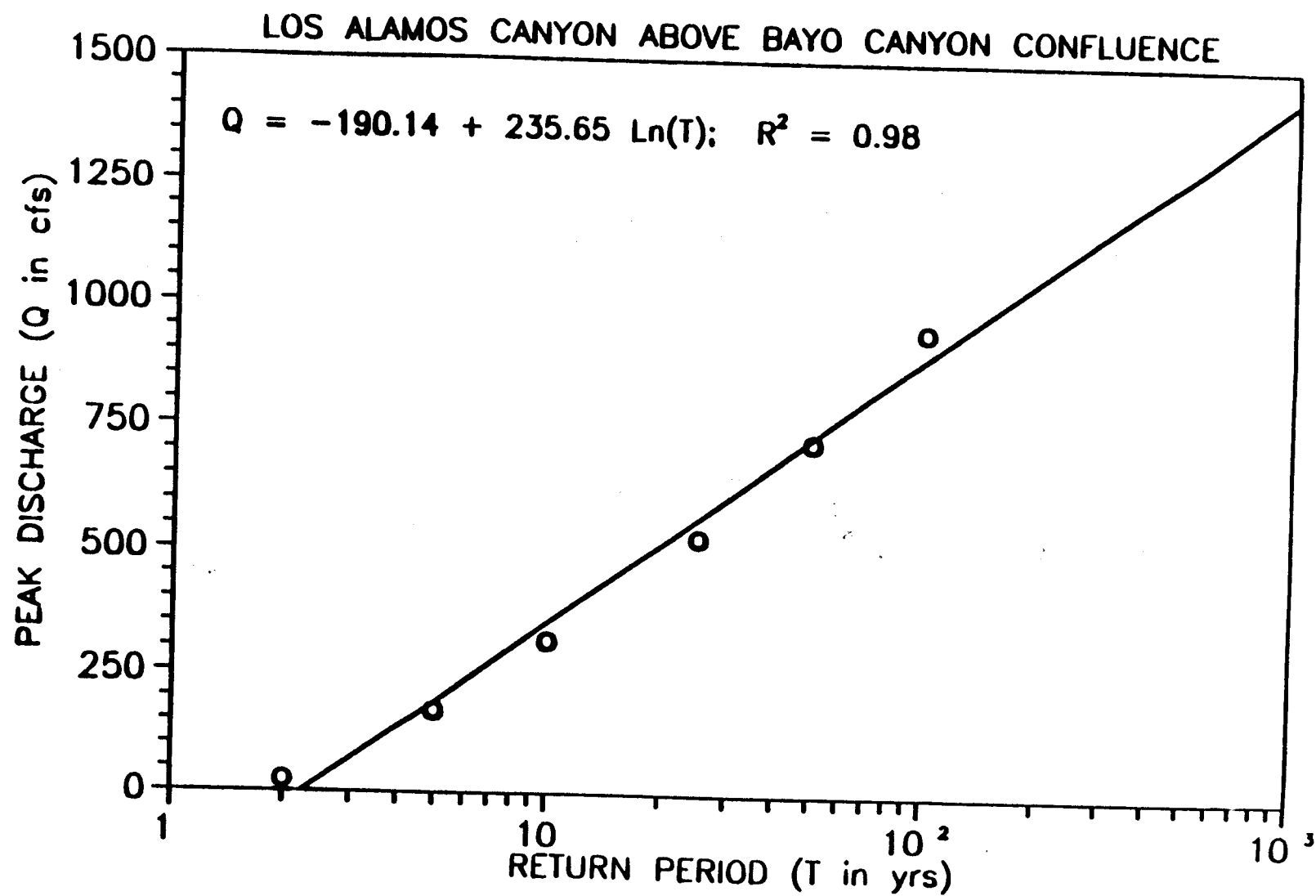


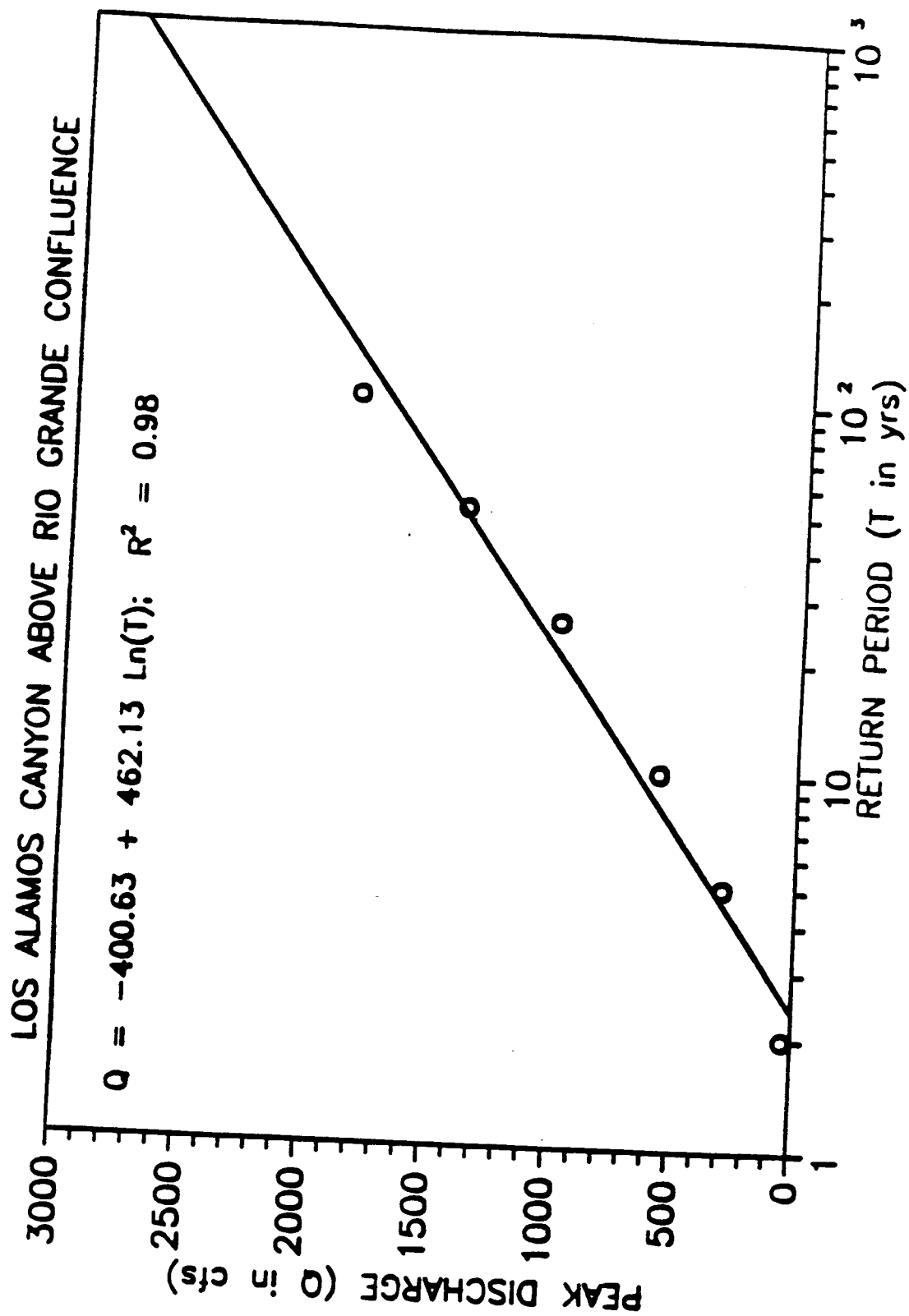


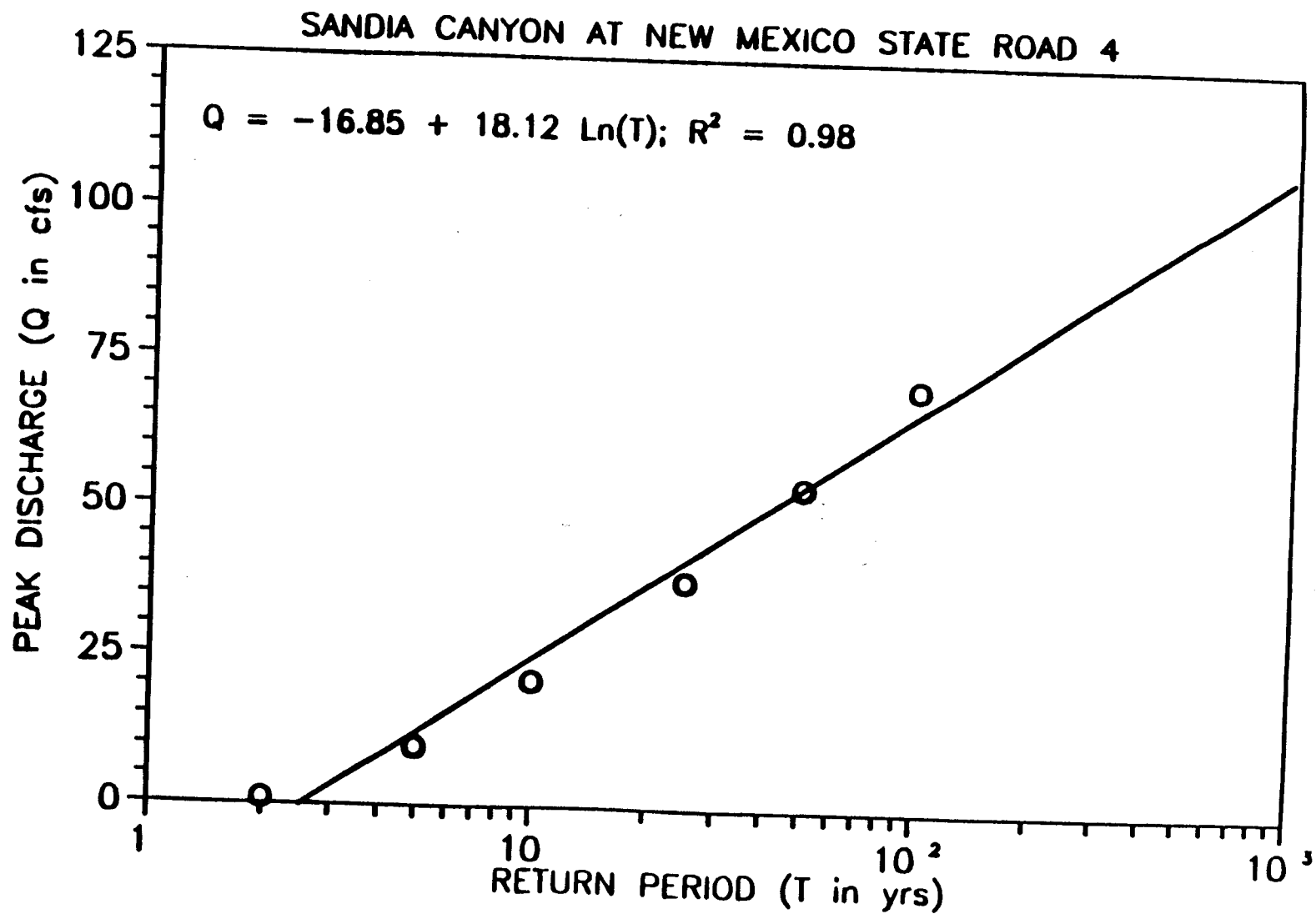


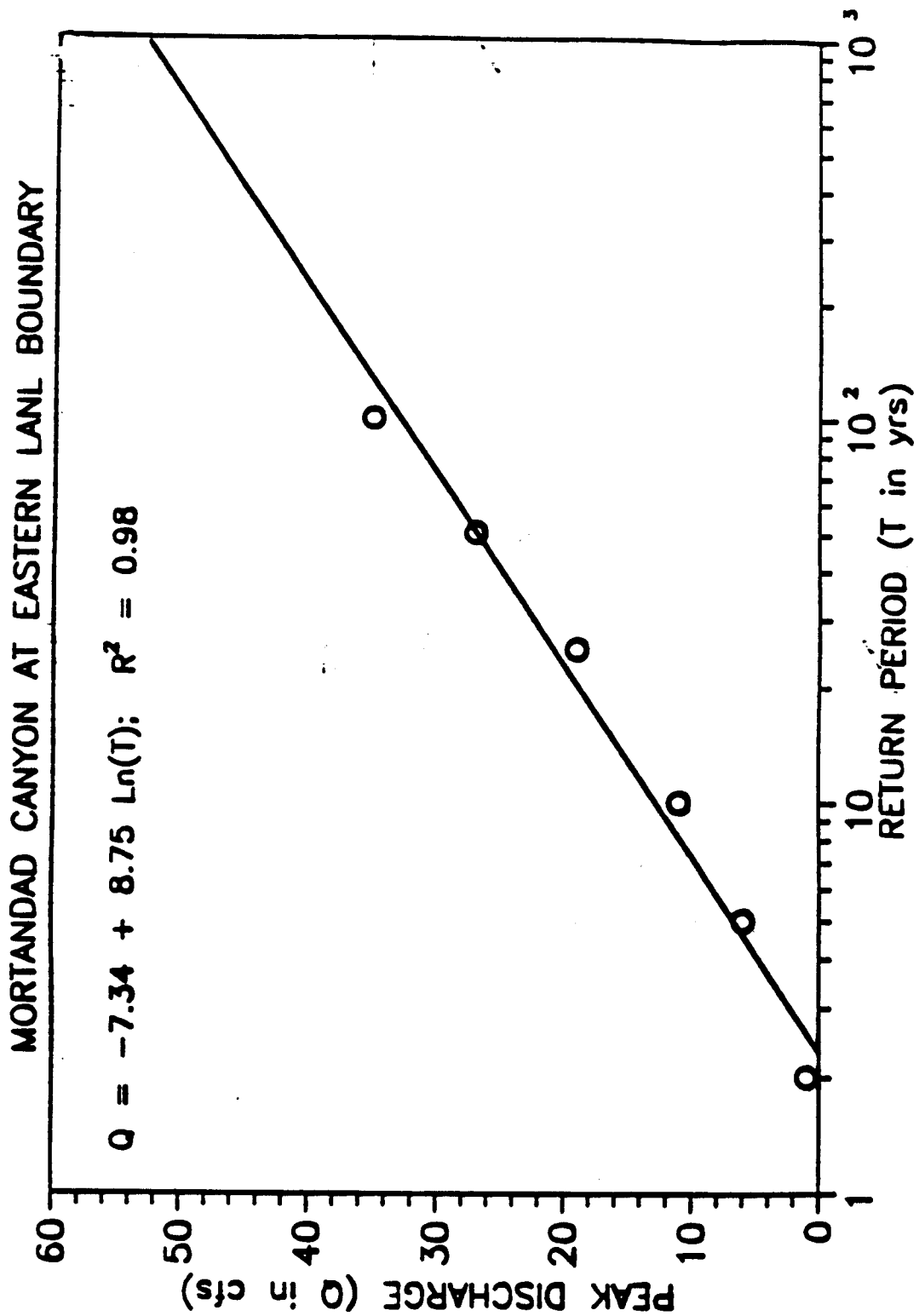






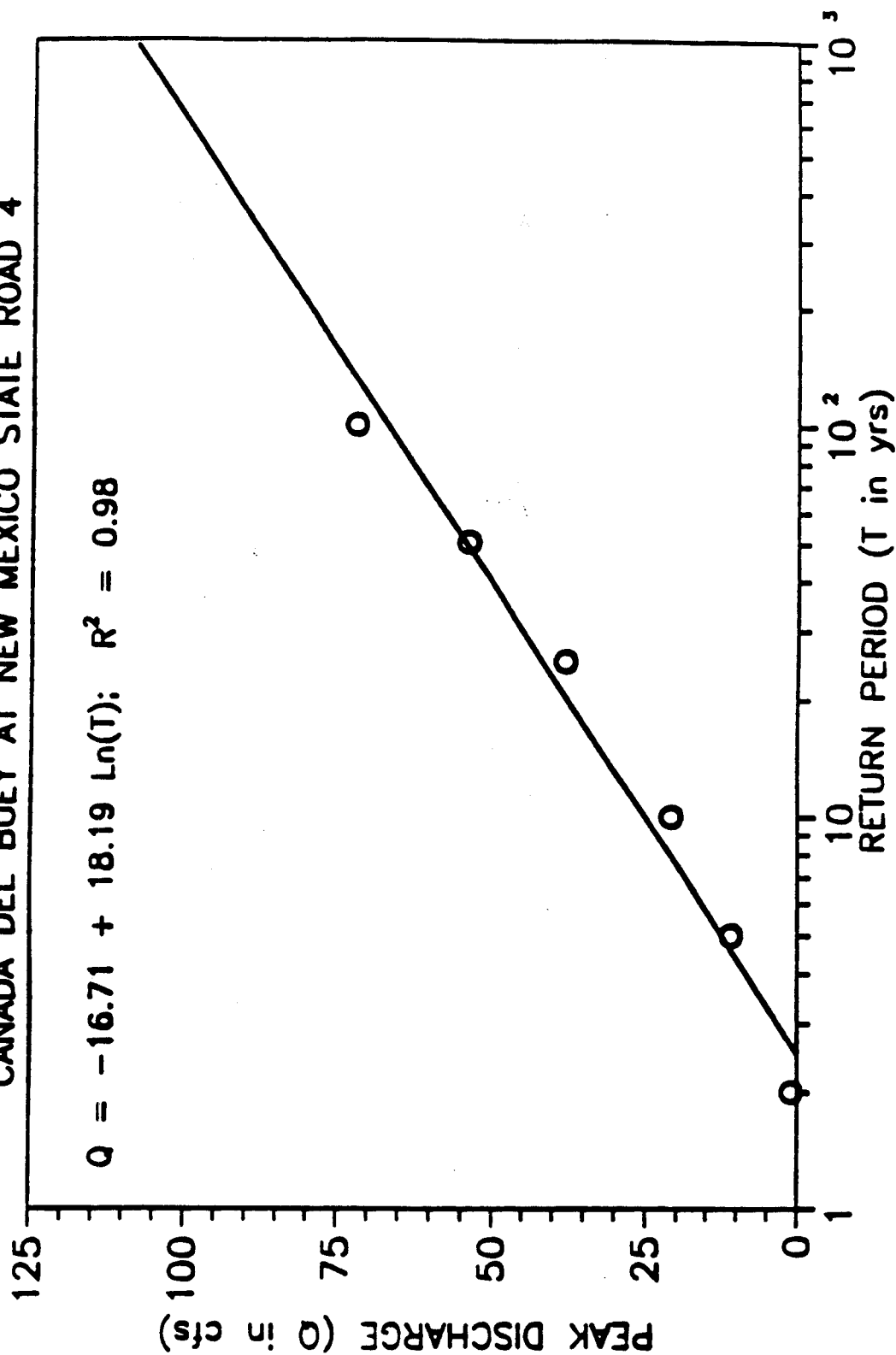






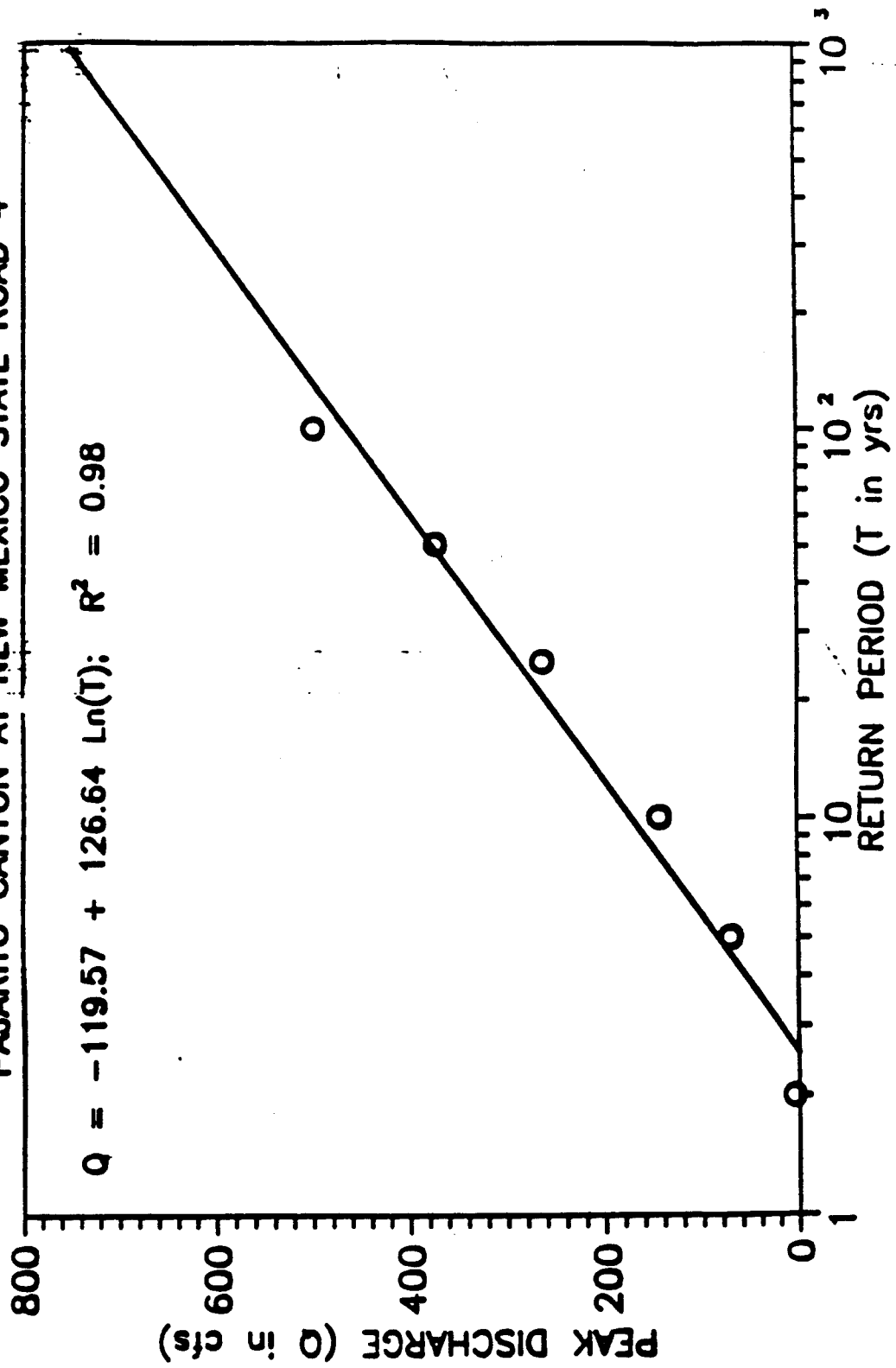
# CANADA DEL BUEY AT NEW MEXICO STATE ROAD 4

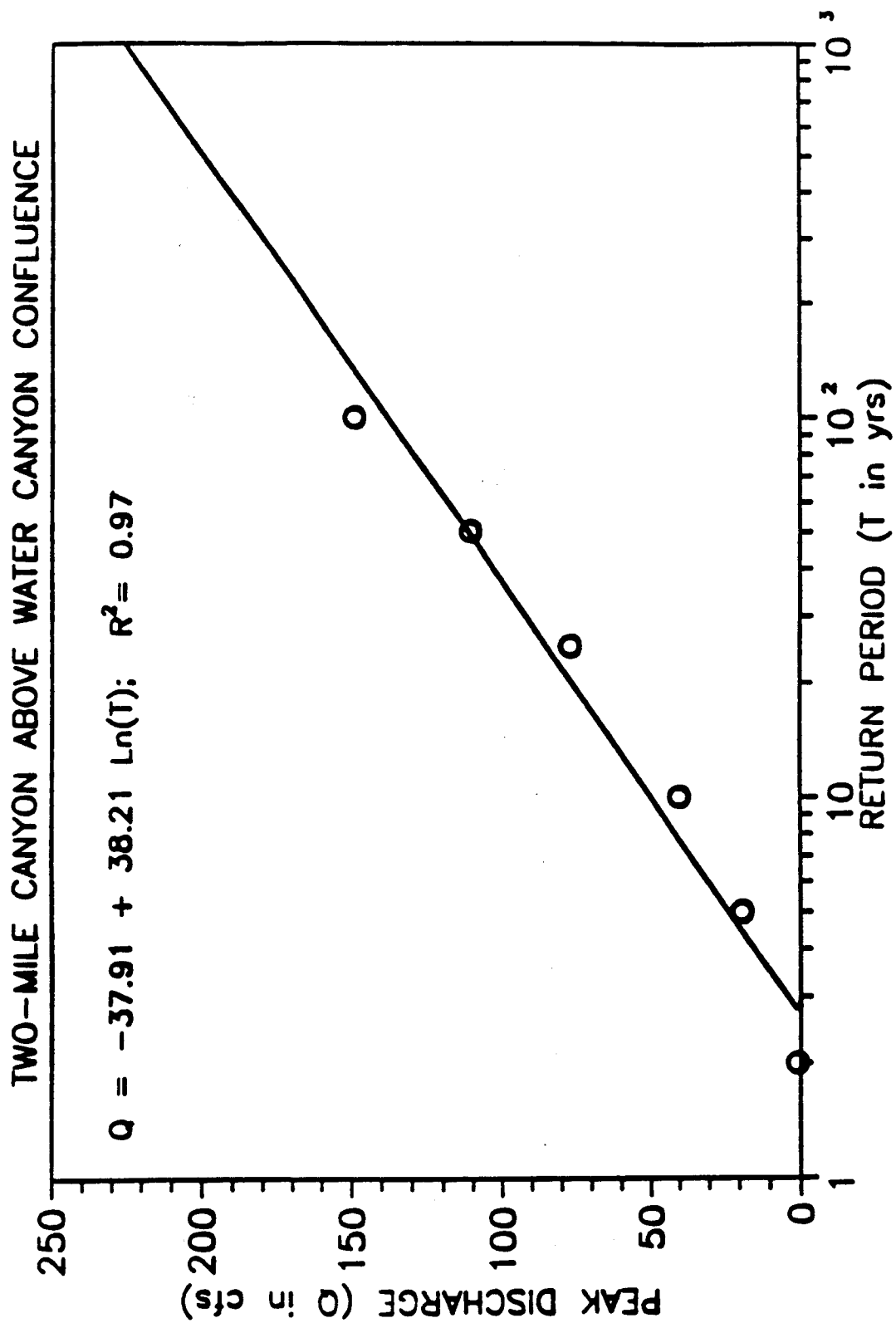
$$Q = -16.71 + 18.19 \ln(T); R^2 = 0.98$$

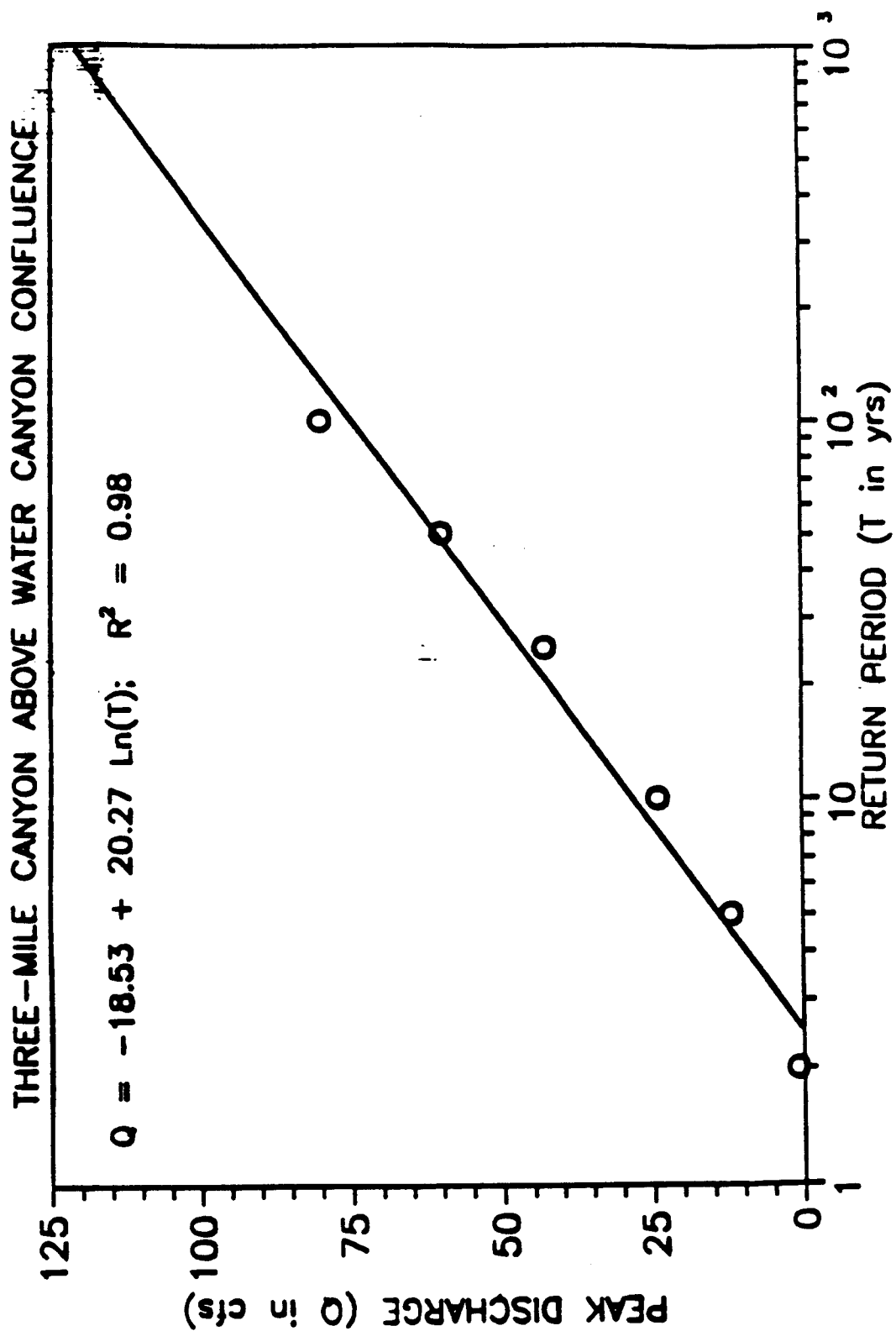


# PAJARITO CANYON AT NEW MEXICO STATE ROAD 4

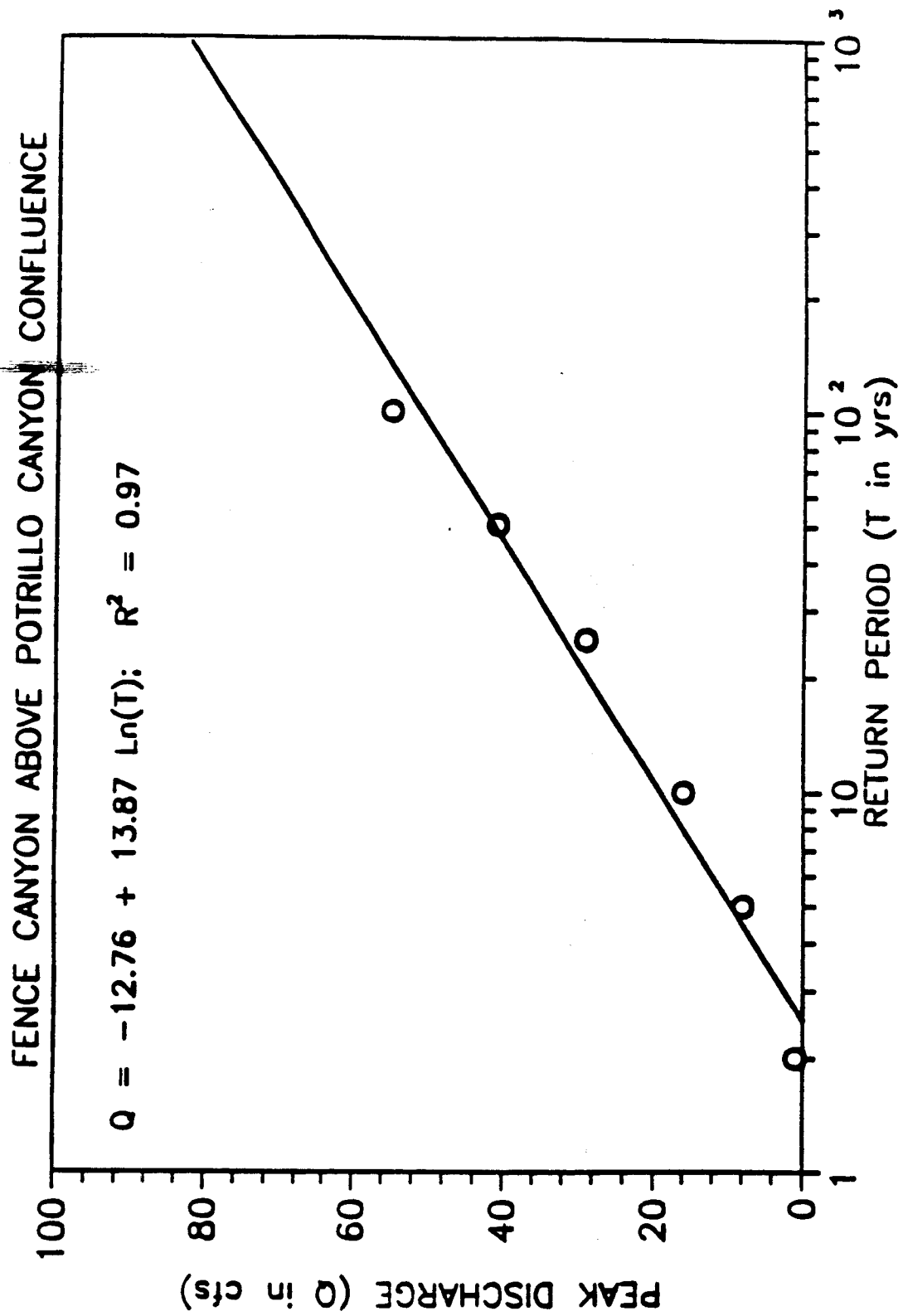
$$Q = -119.57 + 126.64 \ln(T); \quad R^2 = 0.98$$

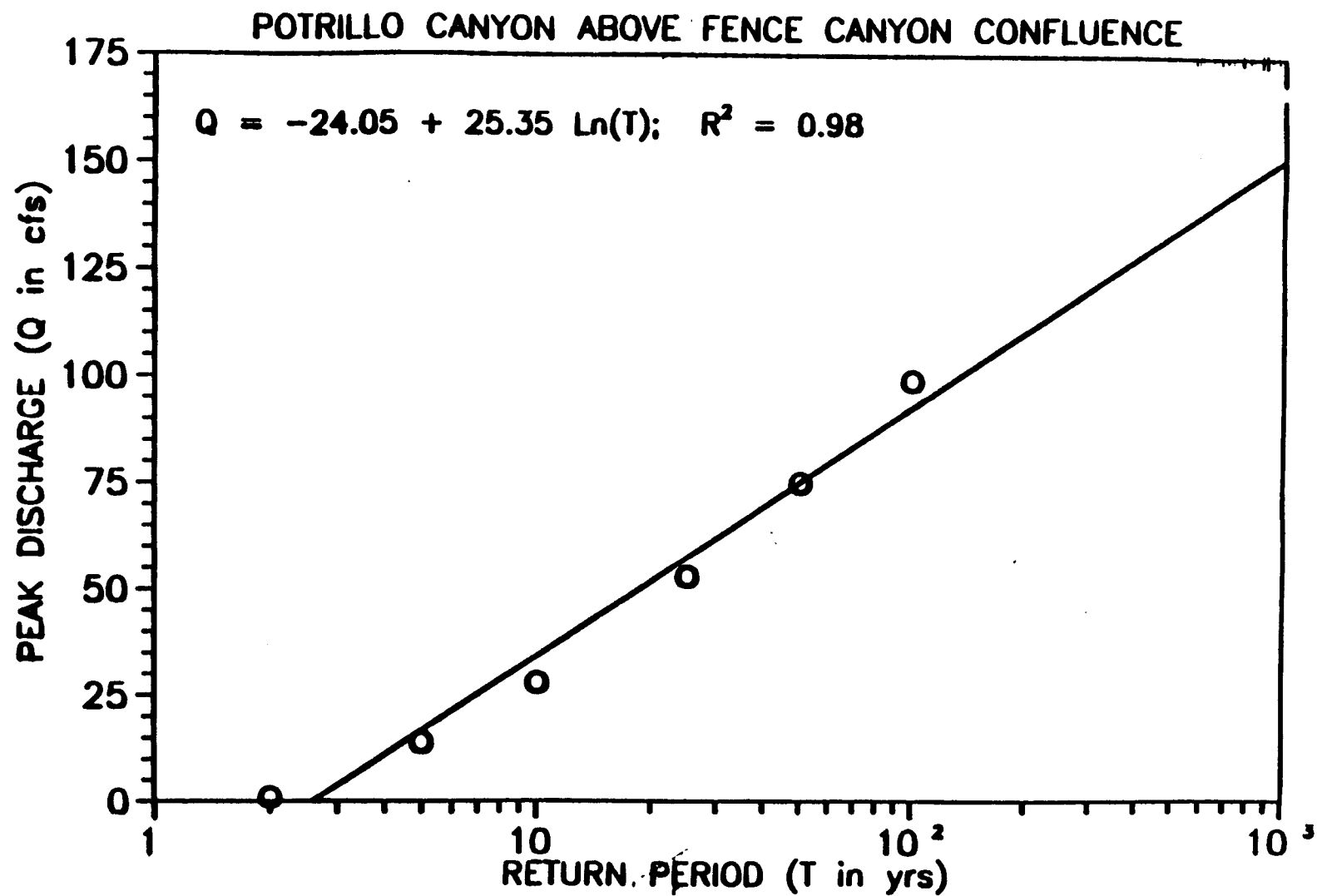




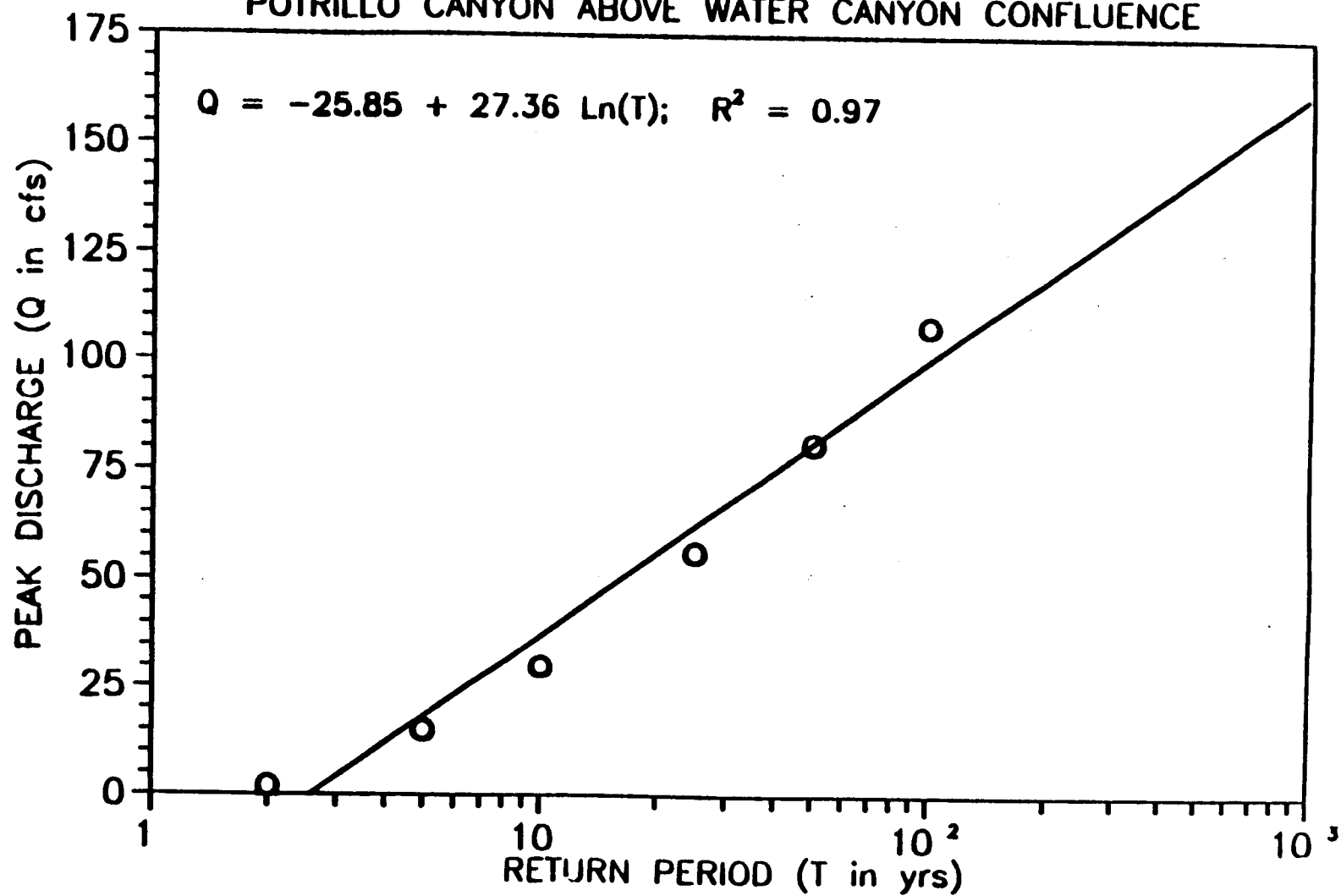


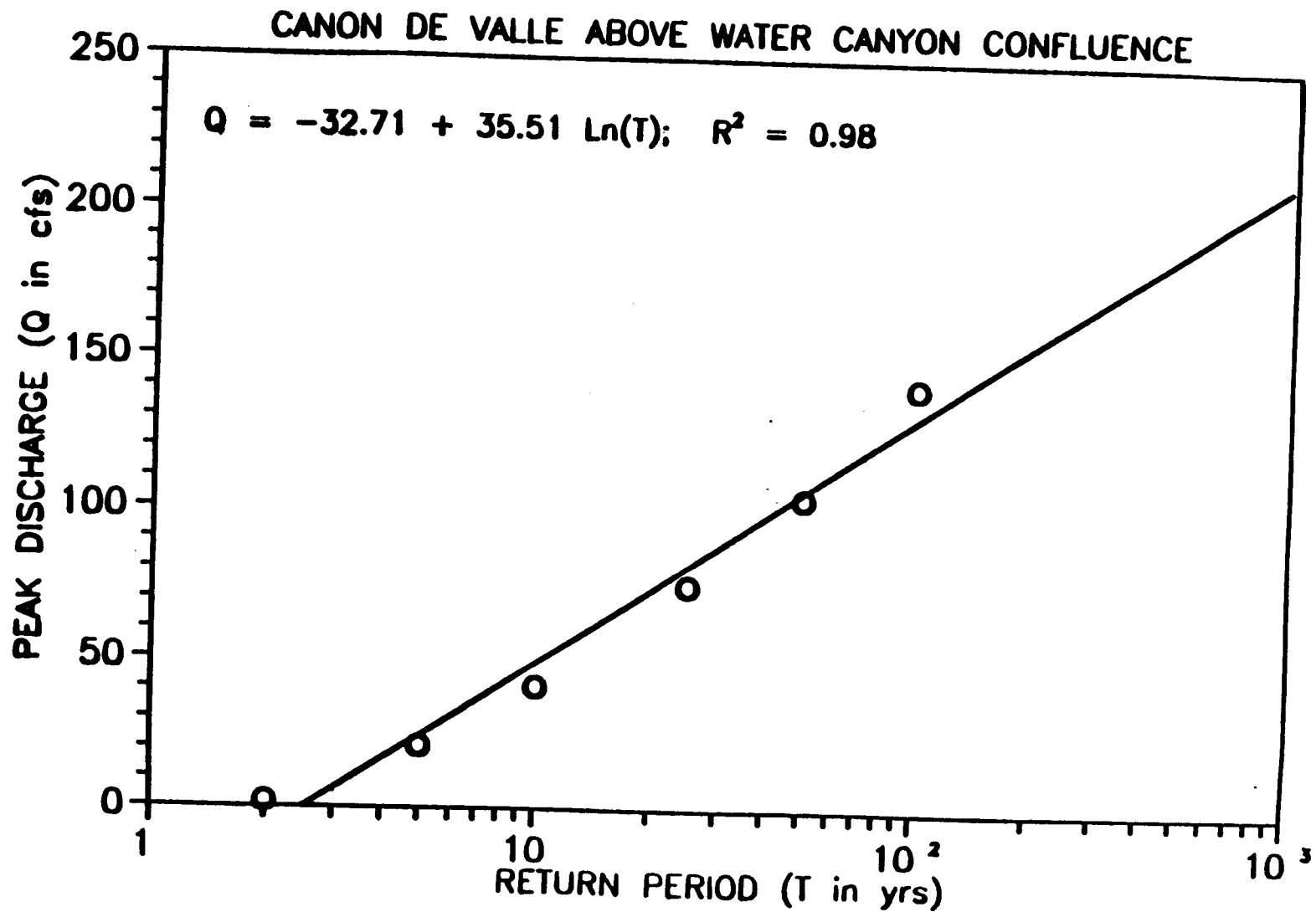


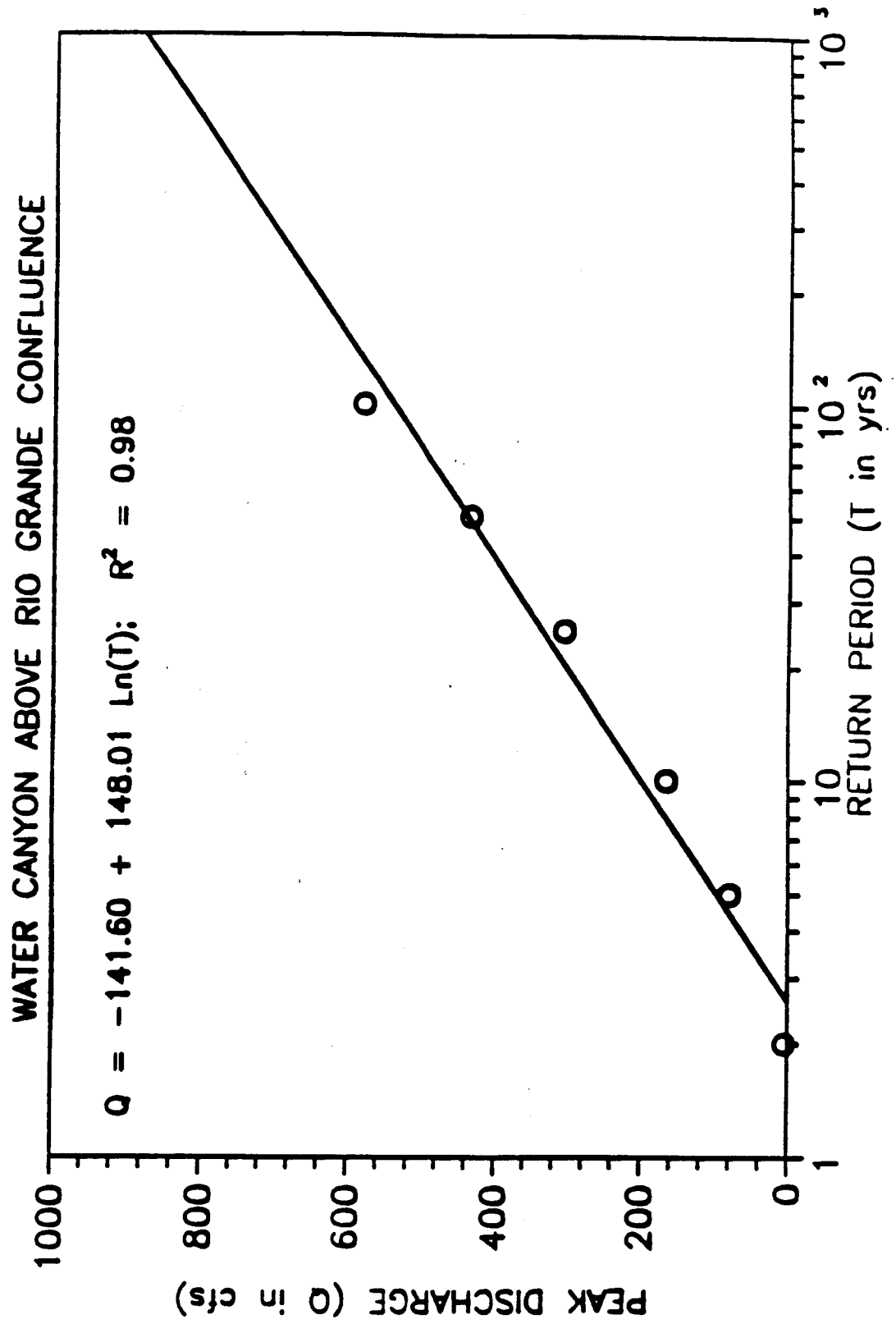


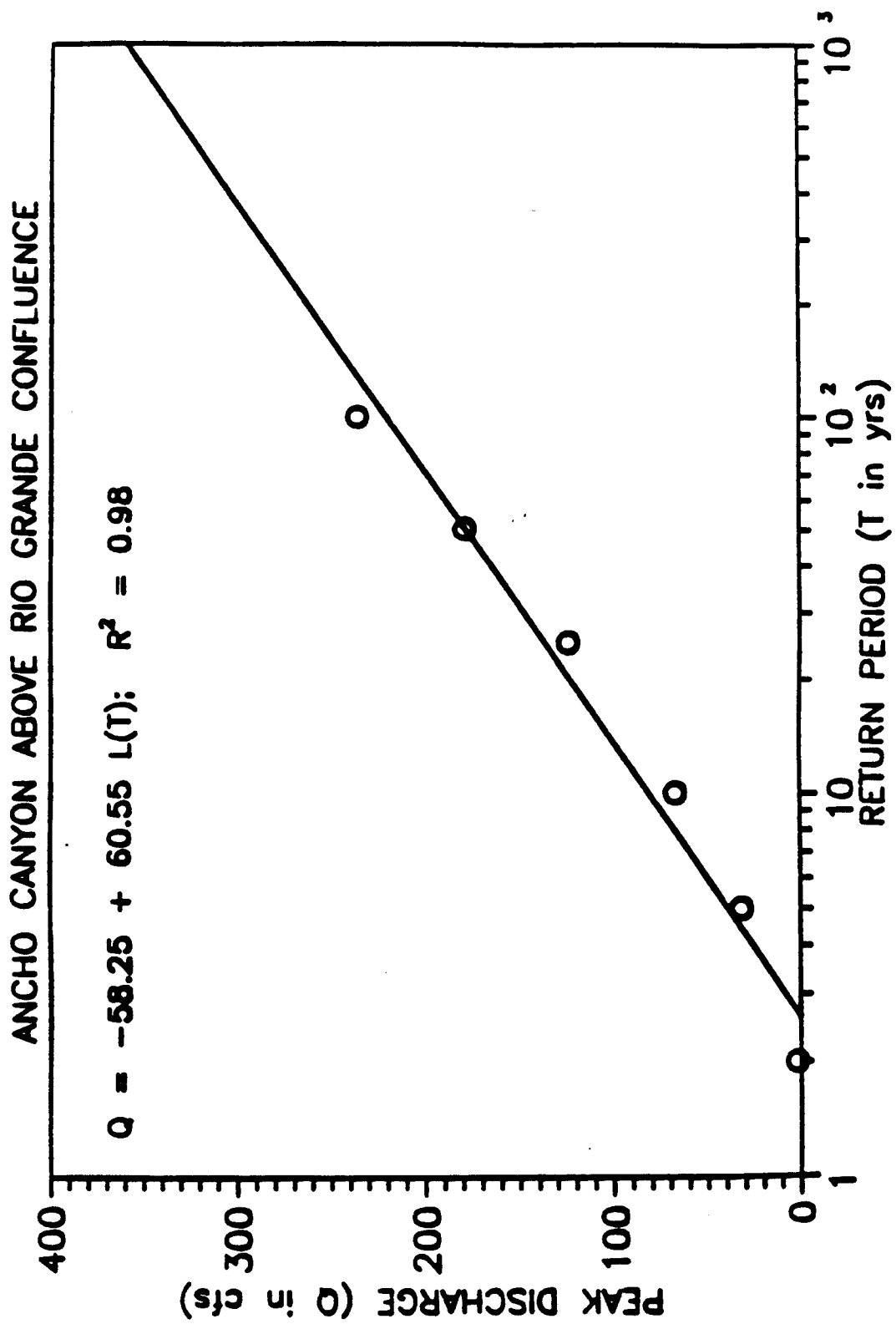


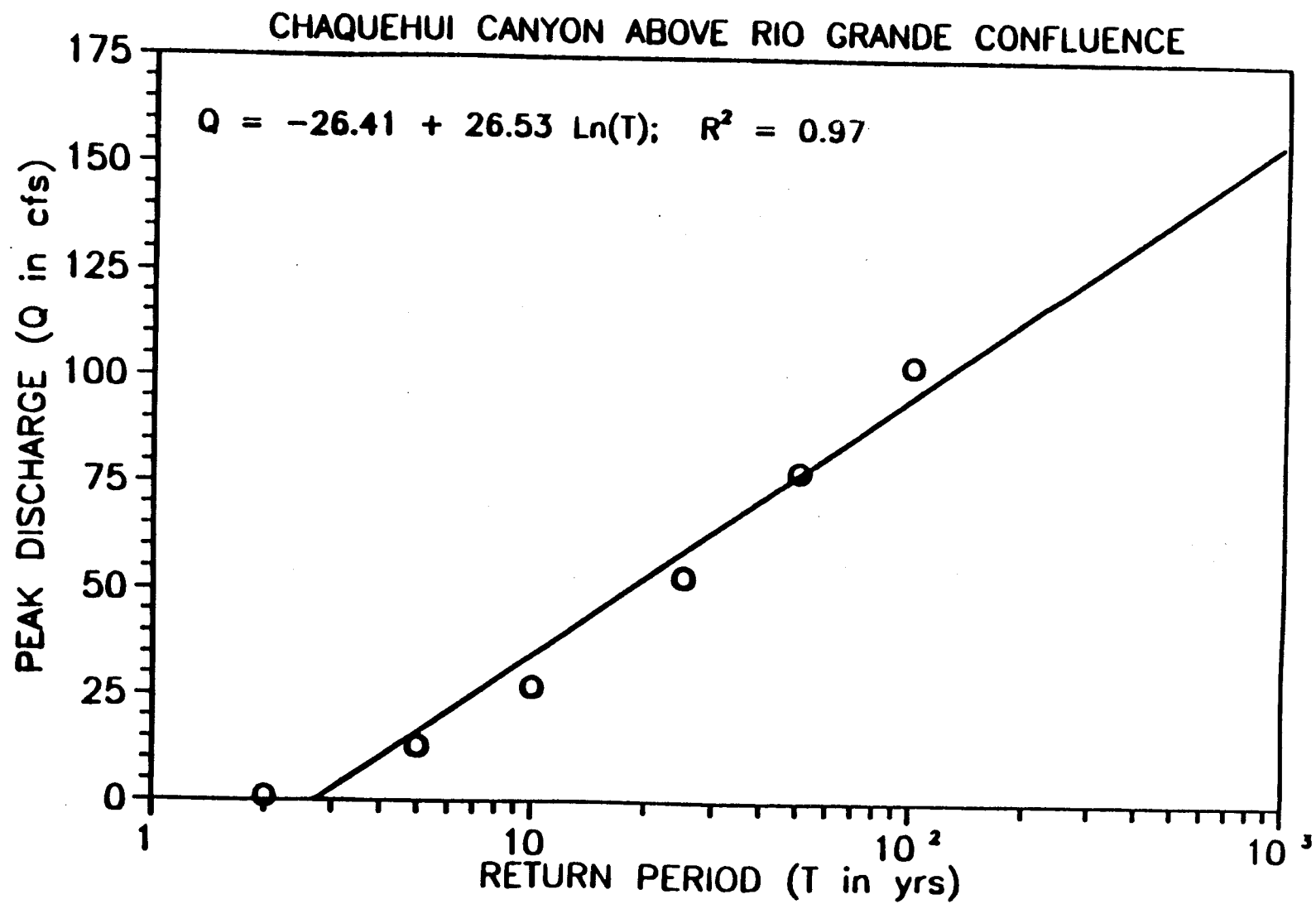
POTRILLO CANYON ABOVE WATER CANYON CONFLUENCE



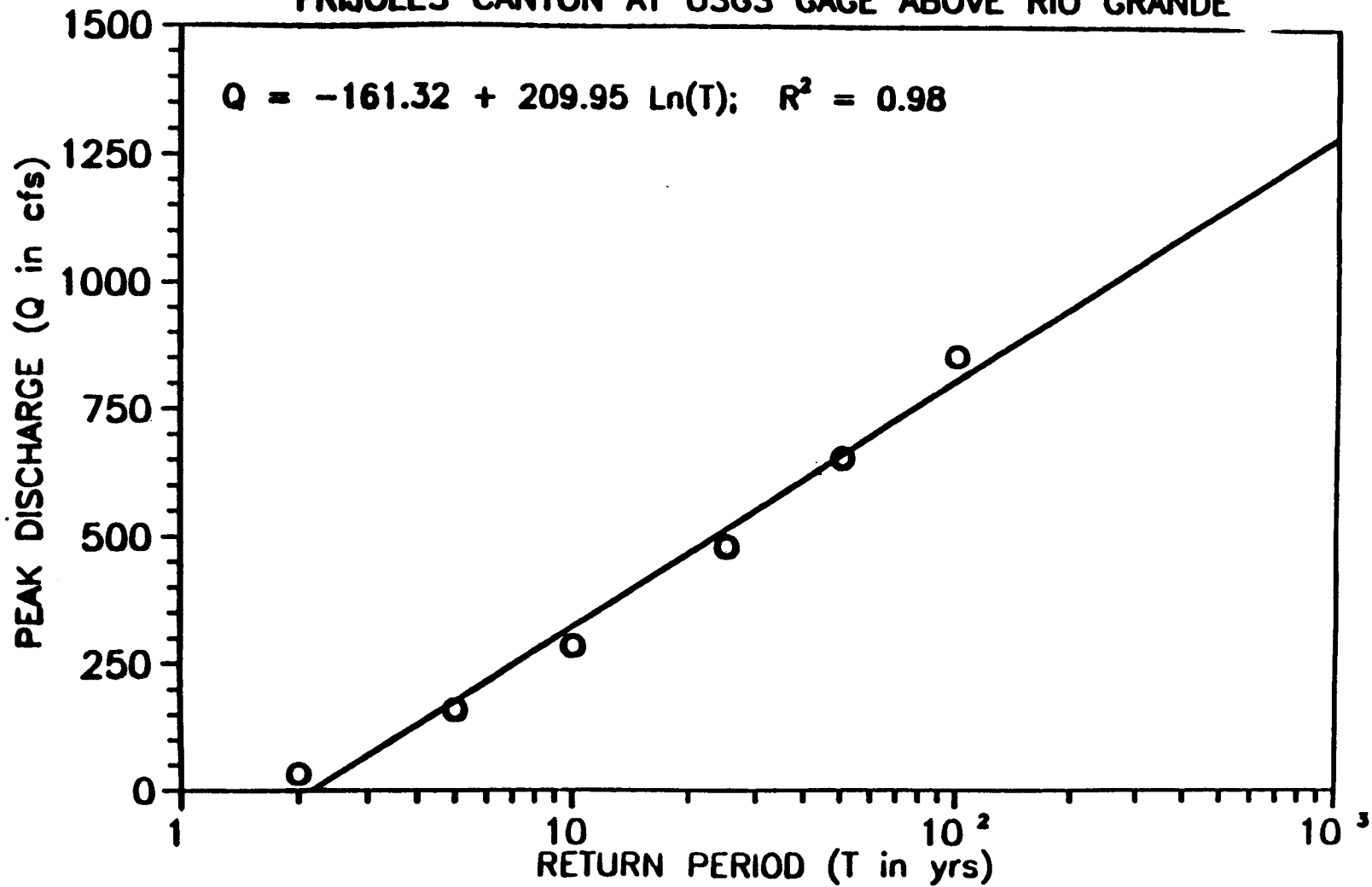








# FRIJOLES CANYON AT USGS GAGE ABOVE RIO GRANDE





**Supplement 6**  
**Off-Site Waste Information**

## **Supplement 6**

**To be Added**

**Table B-6**

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

<b>Waste Description</b>	<b>Waste Generating Activity</b>	<b>Basis for Hazardous Waste Designation</b>	<b>Potential EPA<sup>a</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>b</sup> (milligrams per liter)</b>
High Explosives (HE)-Contaminated Water with Trace Solvents and/or Metals	Laboratory analysis, HE processing, maintenance activities	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>
			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
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			F002	Spent halogenated solvents	NA <sup>d</sup>
			F003	Spent nonhalogenated solvents	NA <sup>d</sup>
			F004	Spent nonhalogenated solvents	NA <sup>d</sup>
			F005	Spent nonhalogenated solvents	NA <sup>d</sup>

**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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
HE-Contaminated Spent Solvent Waste	Laboratory analysis, dissolving HE and polymers	Acceptable Knowledge <sup>c</sup>	D001 D002 D003 D018 D022 D028 D030 D035 D036 D038 F002 F003 F004 F005	Ignitability Corrosivity Reactivity Benzene Chloroform 1,2-Dichloroethane 2,4-Dinitrotoluene Methyl ethyl ketone Nitrobenzene Pyridine Spent halogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents	NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> 0.5 6.0 0.5 0.13 200.0 2.0 5.0 NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup>
HE-Contaminated Water	Pressure-washing walls, equipment, and floors; water-cooled HE-machining operations	Acceptable Knowledge <sup>c</sup>	D003 D030	Reactivity 2,4-Dinitrotoluene	NA <sup>d</sup> 0.13
HE-Contaminated Used Oil	HE-machining operations	Acceptable Knowledge <sup>c</sup>	D003 D005 D006 D007 D008 D030	Reactivity Barium Cadmium Chromium Lead 2,4-Dinitrotoluene	NA <sup>d</sup> 100.0 1.0 5.0 5.0 0.13
Solid and Scrap HE	Off-specification or obsolete HE from machining and forming processes; discrete pieces of HE from research and development (R&D) and testing operations	Acceptable Knowledge <sup>c</sup>	D001 D003 D005 D030	Ignitability Reactivity Barium 2,4-Dinitrotoluene	NA <sup>d</sup> NA <sup>d</sup> 100.0 0.13

**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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
HE-Contaminated Environmental Restoration (ER) Soil and/or Debris	Waste generated during ER and decontamination and decommissioning (D&D) activities; investigation-derived waste (personal protective equipment, samples, and sampling equipment)	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>
			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
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D038	Pyridine	2.0
			D036	Nitrobenzene	5.0
			F002	Spent halogenated solvents	NA <sup>d</sup>
			F003	Spent nonhalogenated solvents	NA <sup>d</sup>
HE-Contaminated Commercial Chemical Products	Spilled or off-specification products that become contaminated with HE	Acceptable Knowledge <sup>c</sup>	F004	Spent nonhalogenated solvents	NA <sup>d</sup>
			F005	Spent nonhalogenated solvents	NA <sup>d</sup>
			U022	Acetone	NA <sup>d</sup>
			U019	Benzene	NA <sup>d</sup>
			U044	Chloroform	NA <sup>d</sup>
			U112	Ethyl acetate	NA <sup>d</sup>
			U154	Methanol	NA <sup>d</sup>
			U159	Methyl ethyl ketone	NA <sup>d</sup>
			U196	Pyridine	NA <sup>d</sup>
			U169	Nitrobenzene	NA <sup>d</sup>
			U220	Toluene	NA <sup>d</sup>
			U239	Xylene	NA <sup>d</sup>

**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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
Wastewater Treatment Residues	Sludges, spent activated carbon, and filter solids resulting from HE wastewater filtration	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>
			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
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			F002	Spent halogenated solvents	NA <sup>d</sup>
			F003	Spent nonhalogenated solvents	NA <sup>d</sup>
			F004	Spent nonhalogenated solvents	NA <sup>d</sup>
			F005	Spent nonhalogenated solvents	NA <sup>d</sup>
			K044	Wastewater sludges	NA <sup>d</sup>
			K045	Spent carbon	NA <sup>d</sup>

**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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
HE-Contaminated Solid Waste	HE processing activities and general office and laboratory use	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>
			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
			D030	2,4-Dinitrotoluene	0.13
			D035	Methyl ethyl ketone	200.0
			D036	Nitrobenzene	2.0
			D038	Pyridine	5.0
			F002	Spent halogenated solvents	NA <sup>d</sup>
			F003	Spent nonhalogenated solvents	NA <sup>d</sup>
			F004	Spent nonhalogenated solvents	NA <sup>d</sup>
			F005	Spent nonhalogenated solvents	NA <sup>d</sup>

**Table B-6 (Continued)**

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

<b>Waste Description</b>	<b>Waste Generating Activity</b>	<b>Basis for Hazardous Waste Designation</b>	<b>Potential EPA<sup>a</sup> Hazardous Waste Numbers</b>	<b>Potential Hazardous Constituents and/or Characteristics in the Waste</b>	<b>Regulatory Limits<sup>b</sup> (milligrams per liter)</b>
HE-Contaminated Equipment	HE processing, D&D, and ER activities	Acceptable Knowledge <sup>c</sup>	D003 D005 D006 D007 D008 D009 D011 D030	Reactivity Barium Cadmium Chromium Lead Mercury Silver 2,4-Dinitrotoluene	NA <sup>d</sup> 100.0 1.0 5.0 5.0 0.2 5.0 0.13
HE-Contaminated Waste Rags, Wipes, and Other Combustibles	HE processing, (e.g., hydraulic press operations, laboratory analysis)	Acceptable Knowledge <sup>c</sup>	D001 D002 D003 F003	Ignitability Corrosive Reactivity Spent nonhalogenated solvents	NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup>
HE-Contaminated Liquid Acids, Bases, and/or Inorganic Salt Solutions	Materials used as titrants, solvents, and cleaning fluids and material from hydrolysis research	Acceptable Knowledge <sup>c</sup>	D002 D003 D018 D022 D030 D035 D036 D038 F002 F003 F004 F005	Corrosivity Reactivity Benzene Chloroform 2,4-Dinitrotoluene Methyl ethyl ketone Nitrobenzene Pyridine Spent halogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents Spent nonhalogenated solvents	NA <sup>d</sup> NA <sup>d</sup> 0.5 6.0 0.13 200.0 2.0 5.0 NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup> NA <sup>d</sup>
Liquid Process Explosive Waste	Off-specification or obsolete HE from explosives preparation, R&D, and testing operations	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>



**Table B-6 (Continued)**

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

- <sup>a</sup> U.S. Environmental Protection Agency. Note that these constituents will likely be present only in trace amounts.
- <sup>b</sup> 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 [1-1-97]. 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.
- <sup>c</sup> 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.
- <sup>d</sup> 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 <sup>a</sup> Hazardous Waste Numbers	Potential Hazardous Constituents and/or Characteristics in the Waste	Regulatory Limits <sup>b</sup> (milligrams per liter)
Solid/Scrap Process Explosive Waste	Off-specification or obsolete from machining, forming, and preparation of HE; discrete pieces of HE from research and development (R&D) and testing operations	Acceptable Knowledge <sup>c</sup>	D003 D003 D005 D006 D007 D008 D009 D010 D011 D030	Reactivity Lithium Hydride Barium Cadmium Chromium Lead Mercury Selenium Silver 2,4-Dinitrotoluene	NA <sup>d</sup> NA <sup>d</sup> 100.0 1.0 5.0 5.0 0.2 1.0 5.0 0.13
Liquid Process Explosive Waste	Off-specification or obsolete HE from explosives preparation, R&D, and testing operations	Acceptable Knowledge <sup>c</sup>	D003	Reactivity	NA <sup>d</sup>

- <sup>a</sup> U.S. Environmental Protection Agency. Note that these constituents will likely be present only in trace amounts.
- <sup>b</sup> 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 [1-1-97]. 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.
- <sup>c</sup> 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.
- <sup>d</sup> Not applicable: refers to the absence of regulatory limits for ignitable, corrosive, reactive wastes, and F-, K-, and U-listed wastes.

**Table B-12**

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

<b>Waste Description</b>	<b>Parameter<sup>a</sup></b>	<b>Characterization Method</b>	<b>Rationale</b>
HE-Contaminated Water, with Trace Solvents and/or Metals	<ul style="list-style-type: none"> <li>– Reactivity</li> <li>– Toxicity</li> <li>– Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for reactivity</li> <li>– Determine toxicity characteristic (metals and organics)</li> <li>– Determine the presence of F-listed solvents</li> </ul>
HE-Contaminated Spent Solvent Waste	<ul style="list-style-type: none"> <li>– Corrosivity</li> <li>– Ignitability</li> <li>– Reactivity</li> <li>– Toxicity</li> <li>– Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for ignitability, corrosivity, and reactivity</li> <li>– Determine toxicity characteristic (organics)</li> <li>– Determine the presence of F-listed solvents</li> </ul>
HE-Contaminated Water	<ul style="list-style-type: none"> <li>– Reactivity</li> <li>– Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for reactivity</li> <li>– Determine toxicity characteristic (dinitrotoluene)</li> </ul>
HE-Contaminated Used Oil	<ul style="list-style-type: none"> <li>– Reactivity</li> <li>– Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for reactivity</li> <li>– Determine toxicity characteristic (metals and dinitrotoluene)</li> </ul>
Solid and Scrap HE	<ul style="list-style-type: none"> <li>– Reactivity</li> <li>– Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for reactivity</li> <li>– Determine toxicity characteristic (barium and dinitrotoluene)</li> </ul>
HE-Contaminated Environmental Restoration Soil and/or Debris	<ul style="list-style-type: none"> <li>– Reactivity</li> <li>– Toxicity</li> <li>– Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sub>b</sub> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for reactivity</li> <li>– Determine toxicity characteristic (organics and metals)</li> <li>– Determine the presence of F-listed solvents</li> </ul>

**Table B-12 (Continued)**

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

<b>Waste Description</b>	<b>Parameter<sup>a</sup></b>	<b>Characterization Method</b>	<b>Rationale</b>
HE-Contaminated Commercial Chemical Products	<ul style="list-style-type: none"> <li>– Reactivity</li> <li>– Spill residues from commercial products</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for reactivity</li> <li>– Determine the presence of U-listed wastes</li> </ul>
Wastewater Treatment Residues	<ul style="list-style-type: none"> <li>– Reactivity</li> <li>– Toxicity</li> <li>– Solvents from non-specific sources</li> <li>– Specific source wastes (K wastes)</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for reactivity</li> <li>– Determine toxicity characteristic (organics and metals)</li> <li>– Determine the presence of F- and K- listed solvents</li> </ul>
HE-Contaminated Solid Waste	<ul style="list-style-type: none"> <li>– Reactivity</li> <li>– Toxicity</li> <li>– Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for reactivity</li> <li>– Determine toxicity characteristic (organics and metals)</li> <li>– Determine the presence of F-listed solvents</li> </ul>
HE-Contaminated Equipment	<ul style="list-style-type: none"> <li>– Reactivity</li> <li>– Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for reactivity</li> <li>– Determine toxicity characteristic (dinitrotoluene and metals)</li> </ul>
HE-Contaminated Rags, Wipes, and Other Combustibles	<ul style="list-style-type: none"> <li>– Reactivity</li> <li>– Toxicity</li> <li>– Corrosivity</li> <li>– Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for ignitability, corrosivity, and reactivity</li> <li>– Determine the presence of F-listed solvents</li> </ul>
HE-Contaminated Liquid Acids, Bases, and/or Inorganic Salt Solutions	<ul style="list-style-type: none"> <li>– Corrosivity</li> <li>– Reactivity</li> <li>– Toxicity</li> <li>– Solvents from non-specific sources</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristic for corrosivity and reactivity</li> <li>– Determine toxicity characteristic (organics)</li> <li>– Determine the presence of F-listed solvents</li> </ul>
Liquid Process Explosive Waste	<ul style="list-style-type: none"> <li>– Ignitability</li> <li>– Corrosivity</li> <li>– Reactivity</li> <li>– Toxicity</li> </ul>	<ul style="list-style-type: none"> <li>– Acceptable<sup>b</sup> Knowledge</li> </ul>	<ul style="list-style-type: none"> <li>– Determine characteristics for ignitability, corrosivity, and reactivity</li> <li>– Determine toxicity characteristic</li> </ul>

<sup>a</sup> Parameter selection is based on process knowledge for each waste stream. Additional parameters may be selected for each waste stream as necessary.

<sup>b</sup> 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.