

CDC's

LAHDRA

Los Alamos Historical Document Retrieval & Assessment

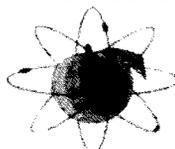
**Interim Report of the
Los Alamos
Historical Document
Retrieval and Assessment
(LAHDRA) Project**

Prepared for the Centers for Disease Control and Prevention (CDC)
National Center for Environmental Health
Division of Environmental Hazards and Health Effects
Radiation Studies Branch

Version 5 • March 2007

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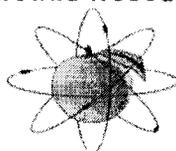
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LAHDRA PROJECT

LIST OF ACRONYMS, INITIALISMS, AND ABBREVIATIONS

25	Early code name for uranium-235; (from the isotope's atomic number (92) and atomic weight (235))
37	Early code name for neptunium-237 (from the isotope's atomic number (93) and atomic weight (237))
49	Early code name for plutonium-239 (from the isotope's atomic number (94) and atomic weight (239))
410	Early code name for plutonium-240 (from the isotope's atomic number (94) and atomic weight (240)); i.e., one higher than 239, hence the 10)
ACIS	Automated Chemical Inventory System
ADWEM	Associate Laboratory Directorate for Nuclear Weapons Engineering and Manufacturing- formerly ALDNW
AEC	U.S. Atomic Energy Commission (DOE predecessor agency)
AIRNET	A LANL network of ambient air sampling stations
AKA	"also known as"
ALDNW	Former Office of Associate Laboratory Directorate for Nuclear Weapons
ANP	Aircraft Nuclear Propulsion
ARF	Atmospheric Release Fraction
ATSDR	Agency for Toxic Substances and Disease Registry
BR Site	Bruns Railhead Site (in Santa Fe, NM)
BZ	Breathing Zone
CAS	Chemical Abstracts Service, a registry for chemicals
Case	Early code word for curie, especially when referring to polonium shipments ("200 cases of Postum" meant 200 curies of polonium).
CBD	Chronic Beryllium Disease
cc	Cubic Centimeters
CCNS	Concerned Citizens for Nuclear Safety
Cd	Cadmium
CDC	Centers for Disease Control and Prevention
CEARP	Comprehensive Environmental Assessment and Response Program
CEDE	Committed Effective Dose Equivalent, a unit of radiation dose
CFM	Cubic Feet per Minute
CFR	Code of Federal Regulations
Ci	Curie, a unit of radioactivity; 1 Ci = 3.7×10^{10} disintegrations per second.
CIC	Former Computing, Information and Communications (CIC) Division, now the Computing, Communications, and Networking Division (CCN).
CM	Chemistry and Metallurgy
CMB	Former Chemistry/Metallurgy/Baker Division, which later became MST Division
CMR	Chemistry and Metallurgical Research
CMR-12	The radiochemistry group at early LASL
CO ₂	Carbon dioxide
DARHT	Dual-Axis Radiographic Hydrodynamics Test
D-Building	Earliest plutonium processing facilities at Los Alamos
DE	Dose Equivalent, a unit of radiation dose
D&D	Decontamination and Decommissioning

DF Site	Detonator Firing Site
DOE	U.S. Department of Energy
DOEAL	Department of Energy Albuquerque Operations Office
DOP	diethyl phthalate, an aerosol often used to test effluent treatment filters
DP	DP Site ¹ , or TA-21. The site of plutonium processing at LANL from 1945 until 1978. Was also the site of polonium processing.
DPM	Disintegrations Per Minute, a rate of radioactive decay
DSF	Document Summary Form
DU	Depleted Uranium
DVD	Digital Versatile Disc
DX	Dynamic Experiments Division at LANL
EEOICPA	Energy Employees Occupational Illness Compensation Program Act
EIS	Environmental Impact Statement
EMAD	Engine Maintenance and Disassembly building at NRDS.
EMF	ElectroMagnetic Field
EML	Environmental Measurements Laboratory
ENSR	ENSR Corporation, a provider of ENvironmental SeRvices
ER	Environmental Restoration
ERDA	Energy Research and Development Administration (DOE predecessor agency)
ESA	Engineering Science and Application
ES&H	Environment, Safety, and Health
eV	Electron Volts
FACA	Federal Advisory Committee Act
fCi	Femtocurie, 10 ⁻¹⁵ curie, or 0.000000000000001 Ci
FGI	Foreign Government Information
FQ	Filter Queens- vacuum cleaners adapted at LASL to collect air samples
G-2	Army Intelligence
G/MAP	Gaseous Mixed Activation Products,
GMX	GMX Division (possibly for G adgets, M unitions, and E xplosives)
GMX-1	The Radiography Group at early LANL
GPS	Global Positioning System
GT Site	Anchor Site West
H	H Division or Health Division at LANL
HAI	History Associates Inc.
H-Division	The Health Division at LANL
HE	High Explosive
HEPA	High Efficiency Particulate Air filter
HHS	Dept of Health and Human Services
HMX	High Melting Explosive
HP Site	Hot Point Site
HSE	Health, Safety, and Environment
HSR	Health, Safety, and Radiation Protection group at LANL, formerly ESH
HT	Heat Treatment Building at TA-1
HTML	Hyper Text Markup Language
HTO	Tritiated water, water in which a hydrogen atom is replaced with tritium, ³ H

¹ There are several theories about the origin of the "DP Site" name for TA-21. It may stand for D-Prime, since it replaced D Building, "D Plant," "Displaced Persons," "D-Plutonium," or "D-Production" (Martin 1998).

HSPT	Human Studies Project Team
HYPO	Water Boiler Reactor in its high-power configuration
IAEA	International Atomic Energy Association
ICRP	International Commission on Radiological Protection
ICRU	International Commission on Radiation Units and Measurements
IH	Industrial Hygiene
IM-5	The Records Management Group within the LANL Information Management Division
INEEL	Idaho National Engineering and Environmental Laboratory
IP	Internet Protocol
IPM	Images per minute
JHSPH	Johns Hopkins School of Public Health
KW	kilowatt, one thousand watts of power
LA-	A prefix in many Los Alamos technical report designators
LAHDRA	Los Alamos Historical Document Retrieval and Assessment project
LALP	A type of LANL publication, from Los Alamos Laboratory publication
LAMS	A type of Los Alamos technical report, from Los Alamos Manuscript
LAMPF	Los Alamos Meson Physics Facility
LAMPRE	Los Alamos Molten Plutonium Reactor Experiment
LANL	Los Alamos National Laboratory (January 1981 to present)
LANSCE	Los Alamos Neutron Science Center- formerly LAMPF
LA-PR	A type of Los Alamos technical report, from Los Alamos Progress Report
LAPRE	Los Alamos Power Reactor Experiment
LAPRE I	First Los Alamos Power Reactor Experiment
LAPRE II	Second Los Alamos Power Reactor Experiment
LASL	Los Alamos Scientific Laboratory (January 1947 to December 1980; name changed to Los Alamos National Laboratory in January 1981)
LA- UR	A type of Los Alamos technical report, from Los Alamos Unlimited Release
LCLS	LANL's Legal Counsel Litigation Support Database
LMFBR	Liquid Metal Fast Breeder Reactor
LOAEL	Lowest Observed Adverse Effect Level
LOPO	Water Boiler Reactor in its low-power configuration
LSSS	Limiting Safety System Setting
mA-hr	Millampere-hours, a measure of work load for accelerators like at LANSCE
MAP	Mixed Activation Products
MDL	Minimum Detection Level
MED	Manhattan Engineer District
MeV	Million Electron Volts
MFP	Mixed Fission Products
mL	milliliter, one thousandth of a liter
mm	millimeter, one thousandth of a meter
MDA	Minimum Detectable Activity
MOU	Memorandum of Understanding
MPC	Maximum Permissible Concentration
MST	Materials Science and Technology Division
MTR	Materials Test Reactor
MW	Megawatt, one million watts of power

NASA National Aeronautics and Space Administration
 NBS National Bureau of Standards (predecessor to NIST)
 NCEH National Center for Environmental Health, part of CDC
 NCRP National Council on Radiation Protection and Measurements
 NEPA Nuclear Energy for the Propulsion of Aircraft (a USAF project)
 NERVA Nuclear Engine for Rocket Vehicle Application
 NESHAPS National Emissions Standards for Hazardous Air Pollutants
 NIOSH National Institute for Occupational Safety and Health
 NMED New Mexico Environmental Department
 NMT Nuclear Materials Technology
 NOAEL No Observed Adverse Effect level
 NO_x Oxides of nitrogen
 NRC U.S. Nuclear Regulatory Commission
 NRDS Nuclear Rocket Development Station (at NTS)
 NSA Nuclear Science Abstracts
 NTK Need-to-know
 NTS Nevada Test Site

OCR Optical Character Recognition
 ORNL Oak Ridge National Laboratory
 ORF Overall Release Fraction
 ORR Oak Ridge Reservation
 OSHA Occupational Safety and Health Administration
 OSR Off-Site Releases Database
 OSTI Office of Scientific and Technical Information
 OUO Official Use Only
 OWR Omega West Reactor
 OWREX Omega West Reactor Experiment

PARKA A Phoebus 1 reactor set up as a critical assembly
 PBX Plastic Bonded Explosive
 PCB Polychlorinated Biphenyls
 PDF Portable Document Format
 PEL Permissible Exposure Limit
 PETN pentaerythritol tetranitrate, an explosive
 PHERMEX Pulsed High-Energy Radiation Machine Emitting X-rays
 PI Priority Index
 Postum Early code word for polonium, a material used at Los Alamos.
 PPM Pages Per Minute

PROJECTS

Project Apple	Rocky Flats Plant
Project Camel	The first full-scale test firing of the "Fat Man" type bomb (minus the plutonium) at the China Lake Naval Ordnance Sta. in CA.
Project Orange	Pantex Plant
Project Royal	<i>unknown</i>
Project Sugar	Burlington Army Ordnance Plant in Iowa
Project Tee	<i>unknown</i>

PRG Preliminary Remediation Goals
 PRS Potential Release Sites
 PSR Proton Storage Ring
 P/VAP Particulate Various Activation Products

Q The top level of security clearance granted by DOE

R	Roentgen, a unit of radiation exposure
RAEHP	Rio Arriba Environmental Health Partnership
RaLa	Radioactive Lanthanum
RCRA	Resource Conservation and Recovery Act
RDX	Rapid detonating explosive
rem	A unit of radiation dose equivalent, from Roentgen Equivalent Man
RF	Respirable Fraction
RfC	Reference Concentration
RFETS	Rocky Flats Environmental Technology Site
RFI	RCRA Facility Investigation
RMAD	Reactor Maintenance, Assembly, and Disassembly building at NRDS.
RMC	Records Management Center
RPF	Records Processing Facility
RRES	Risk Reduction and Environmental Stewardship
RSAC	Radiological Safety Analysis Computer program
RSB	CDC's Radiation Studies Branch
S Site	TA-16; S is from Sawmill Site, after a former sawmill in the area.
S-7	LANL's Classification Office
SAP	Special Access Program
SCI	Sensitive Compartmented Information
SED	Special Engineering Detachment, in the Manhattan District era
SL-1	A 3-MW experimental reactor in Idaho, Stationary Low-Power Plant No. 1, that was destroyed in 1961 when a control rod was removed manually.
SM	South Mesa
SNM	Special Nuclear Material
SNPO	Space Nuclear Propulsion Office, a joint office between the AEC and NASA.
Soda Pulp	Early code name for bismuth, which was irradiated to make polonium.
SRA	Shonka Research Associates, Inc.
SRS	Savannah River Site
SUPO	Water Boiler Reactor in its highest (Super) power configuration
SWMU	Solid Waste Management Unit
TA	Technical Area; a section of land at Los Alamos, with TA number from 0 to 74, that has been the site of identified operations or activities
TATB	1,3,5-triamino-2,4,6-trinitrobenzene, an explosive
TD Site	Trap Door Site
TFF	Target Fabrication Facility
TLD	ThermoLuminescent Dosimeter
TNT	Trinitrotoluene, an explosive
TR	Transfer Record
TRU	Transuranic, that is elements having atomic numbers greater than 92
TSTA	Tritium Systems Test Assembly
TU	Tuballoy, an early code name for depleted uranium (from the British Tube Alloys project, a code name for their atomic bomb program)
UC	University of California, operator of the Los Alamos facility since its founding
UCNI	Unclassified Controlled Nuclear Information
UHTREX	Ultra High-Temperature Reactor Experiment
UK	United Kingdom
UNM	University of New Mexico
USAEC	United States Atomic Energy Commission
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

VHS	Video Home System, a video cassette format patented by JVC
Vitamin B	Early code name for the isotope boron-10, a material used at Los Alamos.
VJ Day	The day of Allied victory over Japan in WW II
VRS	Virtual ReScan technology
VTR	Vault Type Room
WB	whole body
WEM	Weapons Engineering and Manufacturing
WETF	Weapons Engineering Tritium Facility (at TA-16)
WFO	Work for Others
WIPP	Waste Isolation Pilot Plant
WNR	Weapons Neutron Research Facility
WP	Weapons Physics
WX	Weapons Group WX
Y	Site Y, the code name for Los Alamos Laboratory under the MED from April 1943 to December 1946.
Z	Z Division (named for Jerrold R. Zacharias, a physicist from MIT's Radiation Laboratory), an ordnance design, testing, and assembly group formed at LASL in July of 1945. Moved to the old Oxnard Air Field, east of Kirtland Air Base, just outside of Albuquerque between fall of 1945 and January of 1947 and became informally known as Sandia Base.

Reference:

Martin 1998. Martin, C. *Los Alamos Place Names*. Los Alamos Historical Society, Los Alamos, New Mexico.

Metric (SI) Prefixes

Factor	Prefix	Symbol	Factor	Prefix	Symbol
10 ¹⁸	exa	E	10 ⁻¹	Deci	d
10 ¹⁵	peta	P	10 ⁻²	Centi	c
10 ¹²	tera	T	10 ⁻³	Milli	m
10 ⁹	giga	G	10 ⁻⁶	Micro	μ
10 ⁶	mega	M	10 ⁻⁹	Nano	n
10 ³	kilo	k	10 ⁻¹²	Pico	p
10 ²	hecto	h	10 ⁻¹⁵	Femto	f
10 ¹	deka	da	10 ⁻¹⁸	Atto	a

Summary of New and Old Radiological Units

Quantity	Name	Symbol	In other units
radioactivity	becquerel	Bq	1 disintegrations per second (dps)
	(old) curie	Ci	3.7 x 10 ¹⁰ Bq
absorbed dose	gray	Gy	joule/kilogram (J/kg)
	(old) rad	rad	10 ⁻² Gy
dose equivalent	sievert	Sv	J/kg
	(old) rem	rem	10 ⁻² Sv
exposure	coulomb per kilogram		C/kg
	(old) roentgen	R	2.58 x 10 ⁻⁴ C/kg

Chemical Concentrations

1.0 mg/L = 0.001 g/L = 1,000 μg/L = 1,000,000 ng/L

1.0 μg/L = 0.001 mg/L = 1,000 ng/L

1.0 ng/L = 0.001 μg/L = 0.000001 mg/L

1.0 percent = 1.0 g/100g = 10 ‰ (parts per thousand) = 10 g/kg = 10,000 mg/kg

1.0 g/kg = 0.10 percent = 1,000 mg/kg

1.0 mg/kg = 0.0010 g/kg = 0.00010 percent = 1,000 μg/kg

1.0 μg/kg = 0.001 mg/kg = 1,000 ng/kg

Table of the Elements

<u>Z #*</u>	<u>Name</u>	<u>Symbol</u>	<u>Z #</u>	<u>Name</u>	<u>Symbol</u>
89	Actinium	Ac	101	Mendelevium	Md
13	Aluminum	Al	80	Mercury	Hg
95	Americium	Am	42	Molybdenum	Mo
51	Antimony	Sb	60	Neodymium	Nd
18	Argon	Ar	10	Neon	Ne
33	Arsenic	As	93	Neptunium	Np
85	Astatine	At	28	Nickel	Ni
56	Barium	Ba	41	Niobium	Nb
97	Berkelium	Bk	7	Nitrogen	N
4	Beryllium	Be	102	Nobelium	No
83	Bismuth	Bi	76	Osmium	Os
107	Bohrium	Bh	8	Oxygen	O
5	Boron	B	46	Palladium	Pd
35	Bromine	Br	15	Phosphorus	P
48	Cadmium	Cd	78	Platinum	Pt
20	Calcium	Ca	94	Plutonium	Pu
98	Californium	Cf	84	Polonium	Po
6	Carbon	C	19	Potassium	K
58	Cerium	Ce	59	Praseodymium	Pr
55	Cesium	Cs	61	Promethium	Pm
17	Chlorine	Cl	91	Protactinium	Pa
24	Chromium	Cr	88	Radium	Ra
27	Cobalt	Co	86	Radon	Rn
29	Copper	Cu	75	Rhenium	Re
96	Curium	Cm	45	Rhodium	Rh
05	Dubnium	Db	37	Rubidium	Rb
66	Dysprosium	Dy	44	Ruthenium	Ru
99	Einsteinium	Es	104	Rutherfordium	Rf
68	Erbium	Er	62	Samarium	Sm
63	Europium	Eu	21	Scandium	Sc
100	Fermium	Fm	106	Seaborgium	Sg
9	Fluorine	F	34	Selenium	Se
87	Francium	Fr	14	Silicon	Si
64	Gadolinium	Gd	47	Silver	Ag
31	Gallium	Ga	11	Sodium	Na
32	Germanium	Ge	38	Strontium	Sr
79	Gold	Au	16	Sulfur	S
72	Hafnium	Hf	73	Tantalum	Ta
108	Hassium	Hs	43	Technetium	Tc
2	Helium	He	52	Tellurium	Te
67	Holmium	Ho	65	Terbium	Tb
1	Hydrogen	H	81	Thallium	Tl
49	Indium	In	90	Thorium	Th
53	Iodine	I	69	Thulium	Tm
77	Iridium	Ir	50	Tin	Sn
26	Iron	Fe	22	Titanium	Ti
36	Krypton	Kr	74	Tungsten	W
57	Lanthanum	La	92	Uranium	U
103	Lawrencium	Lr	23	Vanadium	V
82	Lead	Pb	54	Xenon	Xe
3	Lithium	Li	70	Ytterbium	Yb
71	Lutetium	Lu	39	Yttrium	Y
12	Magnesium	Mg	30	Zinc	Zn
25	Manganese	Mn	40	Zirconium	Zr

*The Z Number, or Atomic Number, of an element is the number of protons in its atomic nucleus.

Executive Summary

The Los Alamos Historical Document Retrieval and Assessment (LAHDRA) project began in early 1999. It is being conducted by the Centers for Disease Control and Prevention (CDC), with much of the work of the project conducted by contractors to CDC, namely ChemRisk Inc., Shonka Research Associates Inc., ENSR Corporation, and Advanced Technologies and Laboratories International, Inc. The primary purpose of the LAHDRA project is to identify the information that is available concerning past releases of radionuclides and chemicals from the government complex at Los Alamos, New Mexico. "Project Y" was born as part of the Manhattan Project to create the first atomic weapons. LANL's responsibilities expanded after the wartime years, to include thermonuclear weapon design, high explosives and ordnance development and testing, weapons safety, nuclear reactor research, waste disposal or incineration, chemistry, criticality experimentation, tritium handling, biophysics, and radiobiology.

This Interim Report represents a summary of information that has been obtained by the LAHDRA project team regarding:

- historical operations at Los Alamos,
- the materials that were used,
- the materials that were likely released off site,
- development of residential areas in Los Alamos, and
- the relative importance of identified releases in terms of potential health risks.

The information in this report was obtained from records reviewed at Los Alamos by the project team, some books and reports that are publicly available, and some interviews with past and current Los Alamos workers. While millions of documents have been reviewed at Los Alamos, the information gathering is not complete.

Products of the LAHDRA Project

The products of the LAHDRA project include:

- this report and periodic updates to it;
- a database that contains bibliographic information and summaries of the content of relevant documents that were located by the project team;
- sets of copies of the most relevant documents, to be made available by DOE in a reading room in Albuquerque;
- a collection of electronic document images, as Portable Document Format (PDF) files, of all documents for which paper copies or electronic files were obtained; and
- a chronology of incidents and off-normal events identified in review of reports prepared by Los Alamos' Health Division.

A Microsoft® Access database was created to store the information reviewed and collected during this project. There are 7,059 files in the LAHDRA database. A user-friendly front-end was developed for use by the project analysts for reviewing the information collected. The database includes a form created for entering the information from the document summary forms (DSFs) filled out by document analysts in the field, and also a form to perform searches on all the information that has been entered. In the search form, users can search the data from every field on the DSF.

As the number of paper copies grew and scanning technology matured, it was decided that a better way to preserve and present the reference material being collected by the LAHDRA team would be as scanned images. Ultimately, all of the information was scanned in as PDF

files and an Adobe Acrobat full text search capability was developed. Adobe® Acrobat® Capture® 3.0 software was used with the scanner to convert paper documents into searchable Adobe Portable Document Format (PDF) files. That software applies optical character recognition (OCR), page and content recognition, and cleanup tools to convert the paper-based information into electronic documents of optimal quality. Indexing of documents was achieved using Adobe Acrobat 6.0 Professional's Catalog tool. In 2006, a new user interface and search engine based on X1 technology was put into place. This controlled-access, Internet based application allows filtered, full text searching of bibliographic data for included documents and the text of those for which image files are included.

Systematic Document Reviews Conducted

As originally specified, the LAHDRA project was divided into six phases that were planned to be completed sequentially. Each phase was meant to target a specific group of records, as outlined below:

- Phase 1: The LANL Records Management Center
- Phase 2: The LANL Archives
- Phase 3: The Technical Report Library
- Phase 4: Records at the Technical Areas
- Phase 5: Records pertaining to "Work for Others"
- Phase 6: Documents located at other sites

Because of restrictions that were placed on the number of analysts that could work in a given repository at any time, the decision was made to abandon the sequential approach and work in multiple repositories concurrently. The initial and principal focus of the effort was the LANL Central Records Management Center. The LANL Records Center is a 15,000 square foot building located at 180 6th Street in Los Alamos. The function of the Records Center is to receive and catalog records from the various LANL groups and divisions, to place and maintain these records in retrievable storage, and disposition them in accordance with DOE retention and disposition guidelines and other associated requirements (such as the moratorium on destruction of records deemed pertinent to epidemiological studies). Note that the LANL Archives is also housed in Building TA-21-1001, however, this collection is stored, maintained, and managed separately from the Central Records Center's holdings. Systematic review of the contents of the LANL Records Center that were accessioned prior to December 31, 1999 was completed in early June 2005, with all of the selected material received from LANL by the end of that month.

During the first calendar quarter of 2005, LAHDRA analysts began reviewing printouts of LANL Archives collections and the folders that exist within each collection, identifying (based on review of folder titles) folders to be reviewed by the project team. The project team began the review of records at the LANL Archives in early June of 2005, and this review was completed in early May of 2006.

From 1942 to 1992, the LANL Reports Collection was a filing point for reports issued by LANL and by other Department of Energy sites. There are three types of records in the Report Collection vault, which is located below the LANL Research Library in the Oppenheimer Study Center building at TA-3: classified reports in paper format, unclassified reports in paper format, and reports on microfiche. Approximately 3,000 classified report titles issued by LANL as LA- or LAMS- reports are located in the Report Collection. In the second half of the project, the project team was denied access to the following categories of classified information in document repositories at LANL:

- Nuclear weapons design information,
- Information falling under Sigma levels 14 and 15,
- Sensitive Compartmented Information (SCI),
- Special Access Programs (SAPs),
- Foreign Government Information (FGI), and
- Unclassified Sensitive Vendor Proprietary Information.

Access to classified reports issued by any of the following entities with publication dates after 1962 was denied beginning March 2001: LANL, Lawrence Livermore National Laboratory, Sandia National Laboratory, the Defense Nuclear Agency and its predecessor and successor agencies, and DOE Albuquerque Area Office. During 2005, C.M. Wood of CDC reviewed the Los Alamos technical reports that fell within this restriction by title and selected 18 for review. These classified technical reports were reviewed by a LAHDRA document analyst, and several were selected as relevant, summarized, and added to the project information database.

Approximately 55-60% of the classified LANL-issued technical reports had been reviewed prior to March 2001. Approximately 1,144 classified LANL reports issued after 1962 have not been reviewed by the project team because of the March 2001 decision by LANL to withhold them. LAHDRA document analysts were allowed to review the titles of these withheld reports, but that approach proved to be ineffective and problematic due to the vagueness of many titles. All of the classified "LA-" and "LAMS"-series reports issued before 1963 that were present at the Report Collection were reviewed by the LAHDRA team. Access to classified reports issued by entities other than LANL has been denied to LAHDRA analysts since November 2001. The project team had reviewed approximately 35-40% of the classified reports issued by entities other than LANL (up to letter "L" in the alphabetically-shelved documents) prior to the withdrawal of access. The remaining reports in this group were reviewed during 2005 by a LAHDRA analyst working in tandem with a LANL person trained to recognize deniable category information.

Approximately 10,000 unclassified report titles issued by LANL as LA- or LAMS- reports are located in the Report Collection vault. Images of approximately 25,000 unclassified LA-, LA-MS-, LA-UR, and LA-PR reports are available as PDF files in the LANL electronic library catalog. Prior to the heightening of security measures that followed the terrorist attacks of September 11, 2001, the unclassified "LA" reports were publicly available on the LANL Web site. The project team reviewed 100% of the unclassified "LA" reports that were formerly available without restriction on the Internet.

There are also approximately 90,000 unclassified reports in the Report Collection vault that were issued by DOE sites other than LANL, academic institutions, private corporations that conducted research on behalf of DOE, and other defense-related agencies. The project team reviewed 70 to 75% of the non-LANL unclassified reports shelved in the Report Collection vault (up to letter "P" in the alphabetically shelved documents) before work was halted in 2004, and the remainder were completed early in 2007. There are also approximately 1.5 million documents on microfiche at the LANL Reports Collection. A search of two relevant databases indicated that LANL is the authoring institution for approximately 11,000 NSA reports and 53,000 DOE Energy reports, or about 10% of each database's contents. The project team completed review of the reports on microfiche in November 2006.

The ES&H Records Center has been in operation since 1998. Its purpose is to receive records from the various ES&H Groups, catalogue and consolidate those records, and to eventually forward them on to the LANL Central Records Center. Many of the records stored at the ES&H Records Center are recent, i.e., from the 1990s. A total of 1,187 boxes were

reviewed in the ES&H Records Center. Of these, 227 were deemed to contain material relevant to the project and thus had DSFs completed for them.

Reviews completed during this project also included holdings of the Weapons Engineering and Manufacturing (WEM) and Weapons Physics (WP) divisions. These LANL divisions are organized under the Directorate's Office of the Associate Laboratory Directorate for Nuclear Weapons Engineering and Manufacturing (ADWEM). The Office of ADWEM was formerly known as Office of Associate Laboratory Directorate for Nuclear Weapons (ALDNW). There are 36 additional divisions or program offices under ADWEM that have not yet been reviewed. The WEM/WP VTR contained approximately 18,876 classified documents and 1126 classified photographs. Thirty-six classified safes within the ADWEM main offices were also reviewed for potentially relevant information. The safes contained 7,056 documents marked "RESTRICTED DATA". No titles were identified as potentially relevant to the LAHDRA project. Based on a review of a list of classified vaults and repositories at LANL, it is estimated that 21 vaults, 107 Vault-type rooms (VTRs), 5 alarmed rooms, and 1,600 repositories (file cabinets, 2-5 drawers each, with combination locks) are present. Not all of the vaults or VTRs contain only records—some contain weapon parts and/or special nuclear material.

Review of documents located at the Los Alamos Neutron Science Center (LANSCE Division, formerly LAMPF) is 80 percent complete at the time of this report. Reviews of available documents at LANSCE focused on office files within the Main Administration Building 1 located at TA-53 and the Radiological Air Monitoring Records Archive. Of these documents, 2,500 were considered potentially relevant and underwent detailed review. Copies of 36 documents were requested and summarized for the LAHDRA project database. Highlights of these records are the Shift Supervisor Logbooks that contain daily beam current and beam-hour information dating back to 1971.

Forty-five boxes of documents (3,375 documents) located at the Radiological Air Monitoring Records Archive (Building 3R) were reviewed. Copies of 97 documents were requested and summarized for the LAHDRA project database. This archive is a very useful source of relevant information for the LAHDRA project and for any future studies of off-site releases from TA-53.

During the LAHDRA project, team members made several attempts to gain access to the contents of the Legal Counsel Litigation Support Database (LCLS), sometimes called the Legal Database. While the database itself was not made available, in late 2003/early 2004 the LAHDRA team received and reviewed a hardcopy listing of the documents contained in that database. The list includes document number, title, author, addressee and copy recipient, date, status, and page count. The LCLS database consists of the following document categories: H-Division, Human Studies Project Team, Central Records Management, "Other" documents, and Records Processing Facility documents. During 2005, LAHDRA analysts reviewed the hardcopy indices of the LCLS database and selected documents for review. Images of these documents were made available to LAHDRA analysts by Legal Counsel staff, and they were reviewed between May and September of 2005. Documents selected as relevant were printed and released to the project team.

Challenges and Accomplishments in Information Gathering at Los Alamos

Access to classified documents at Los Alamos has been more difficult than LAHDRA team members have experienced at any of the other DOE sites that have been subjects of dose reconstruction investigations. The discussion of the main document access challenges experienced on the LAHDRA project that is presented in this Interim Report includes the following topics:

- The Cerro Grande Fire
- Security Stand-Downs and the Fallout of Security Incidents
- Need-to-Know Letter Received
- Security Plan Promised
- First Special Security Plan Issued
- Calls for Review by Title Alone
- Second Special Security Plan Issued
- Practices Changed in the Report Collection
- First Appeal to DOE Issued
- UK Documents Not All Made Available for Review
- Second Appeal Letter Issued to LANL
- Contract with Classification Reviewers Expires
- CDC Requests that Work be Brought to Close under Existing Contract
- Prerequisites for Continued Work at Los Alamos Outlined by CDC
- Tasks Authorized to Bring Work to Clean Breakpoints
- Reports Collection Resources Raised as an Issue
- CDC Returns to Complete Review of "UK Records"
- Response to Appeal Letter Received
- Classification Review Backlog Quantified
- Review of Documents in Backlog Begins
- LANL Resources Limit LAHDRA Team Activities
- Funding under First LAHDRA Contract id Expended
- Progress during Early 2004
- LANL Shutdown Begins in Response to Security Incident
- CDC Public Meeting, LAHDRA Interim Report Issued
- New Contract Awarded, but Site Access Not Immediately Possible
- Meeting Kicks Off Resumption of Information Gathering at LANL
- Review of Records Center Holdings Closed Out
- Contents of Litigation Support Database Reviewed
- Review of LANL Archives Contents Completed
- Review of Documents in the Report Collection Resumes
- Review of Records in the TA-63 Engineering Drawings Facility Begins
- Systematic Review of Environmental Stewardship Division Records Begins

Prioritization of Airborne Releases

During the period of LANL's existence, many operations involving radionuclides have been performed at LANL, and effluents of various kinds have been released. As the initial step towards prioritization of historical airborne releases from LANL, Priority Index (PI) values were calculated by computing the air volume required to dilute the annual activity released to be equal to the worst-case non-occupational Maximum Permissible Concentration (MPC) per federal regulations. This priority index is intended to be a guideline to determine if a nuclide set requires further iterations of calculation and refinement, or if it warrants lower priority relative to other nuclides. For example: a PI of 10^6 indicates that 10^6 mL of air would be required to dilute the released material to a concentration equal to the MPC. A Microsoft Access® Off-Site Releases (OSR) Database was created to tabulate effluent information and to link it to existing LANL documents that have been assembled by the LAHDRA project team.

Plutonium data obtained are from 1948-1996. Release estimates are not available for D Building, or at least none have been located. D Building started operation in late 1943/early 1944, so it is important to note that for the years 1944-1948, no data could be found on air emissions. In addition, the releases from DP Site reported by LANL for 1948, 1949, and 1950 are based on simple estimates first made by Jordan and Black (1958). The priority index for plutonium over the years of LANL operations ranges from 10^{14} to 10^{19} . The years

in the pre-1976 era have a sample line loss correction factor of 2.0 and a filter burial correction factor of 1.6 applied by the LAHDRA team.

The uranium data found range from 1949-1996. Some of these data are uranium inventory data from uses in experiments involving explosive tests and some data are from stack monitoring. For the explosion data, the mass was multiplied times a specific activity for the nuclide group (for instance, depleted uranium, or natural uranium). Uranium data from stack sampling also had the sample line loss and filter burial correction factors applied by the LAHDRA team to all data prior to 1976. In addition, Atmospheric Release Fractions (ARF) and Respirable Fractions (RF) were then multiplied to get a range of Overall Release Fractions (ORF). The ORF-corrected values represent the amount of the radionuclide that got into the air and contains respirable-size particles. The overall range for the priority index for uranium was from approximately 10^{19} to approximately 10^{15} . In general, in the post-1973 era, the uranium priority indices appear to indicate greater significance than plutonium. In the pre-1973 era, plutonium is of greater significance.

Airborne effluent data for tritium that were found range from 1967-1996, although tritium was used and released on-site at LANL before 1967. No correction factors were applied to tritium data by the LAHDRA team. The priority indices for tritium range from 10^{15} to 10^{17} . In the post-1973 era, tritium was more significant than uranium or plutonium, but less significant than mixed activation products (MAP). More data are required for pre-1967 tritium releases at LANL. LAHDRA staff have found and entered Document Summary Forms (DSFs) for additional documents containing tritium release data in the LAHDRA database; however, these data have not yet been released by LANL.

Radioactive Lanthanum (RaLa) has been subjected to a dose reconstruction by LANL personnel, including source term evaluation. All of the RaLa data are from explosive tests. No correction factors were applied to the activity data by the LAHDRA team. The time period is from 1944 -1962, with no testing with RaLa accomplished in 1951. The priority indices ranged from 10^{14} to 10^{16} . Since it was desired to estimate the actual RaLa releases to air, the same ORF used for uranium (0.001) was applied to RaLa data. RaLa is apparently not a high priority radionuclide compared to plutonium or uranium.

Mixed Fission Products (MFP) data begin in 1961 and are continuous until 1996. Their variability is quite high, with a maximum priority index of approximately 10^{15} and a minimum of 10^{10} . It is believed that the main source of MFP radionuclides was the Omega reactor. In some years, like 1969, 1972, 1973, and 1994, the MFP activity was reportedly much higher than normal. The reasons for these elevated values have not yet been explored.

Mixed Activation Products (MAP) make up the the largest portion of the airborne radioactive releases after 1973. Reactors and large accelerators produce MAP radionuclides. At Los Alamos, this would mean the majority of the MAP would come from TA-53 and the Los Alamos Meson Physics Facility (LAMPF), now called Los Alamos Neutron Science Center (LANSCE). Although LAMPF started operations in 1971, no pre-1976 data were found for MAP. The maximum priority index for MAP was 10^{18} and the minimum was 10^{16} .

The current results indicate that, based on LANL compilations of releases, plutonium and uranium would be of primary concern up until the early 1980s. From then until the present, the MAPs would be of primary concern. However, in some cases, limited or no data were found in LANL compilations of releases for important nuclides such as plutonium (early D Building data), polonium, pre-1967 tritium, all nuclides pre-1950, and non-point source emissions.

Of the many new documents that were found in 2006, some contain information on airborne releases. Data on stack releases from DP Site have been found and work to summarize those values and comparison to the existing LANL estimates is underway. Once these values are completed then the airborne prioritization will may be modified.

A calculation was completed in October 2006 that addresses reported releases from DP West for 1957, using the actual daily stack reports. The results show that 40% of all operating hours were not monitored, mostly weekends and holidays. Therefore, a method for estimating the hours where the stacks were not monitored is needed. The current method used by LANL is likely conservative, in that it scales from operating hours to estimate hours in which no stack measurement was made. The calculation also showed that the simple assumptions made in the early 1970s, such as stack or sampler flow rates, were used for all periods. These assumptions do not appear to have been appropriate.

Prioritization of Liquid-Borne Radionuclide Releases

Since 1944, many operations involving radionuclides have been performed at LANL, and liquid-borne wastes of various kinds have been released. Priority Indices for liquid-borne radionuclides were calculated for: total plutonium, ^{238}Pu , ^{239}Pu , ^{89}Sr , ^{90}Sr , tritium, gross alpha, and gross beta radioactivity. LANL also reported the following radionuclides at various times over the years; effluent data were tabulated but priority indices are not presented herein for Ba/La-140 (radioactive lanthanum), ^{227}Ac , ^{241}Am , ^7Be , ^{134}Cs , ^{137}Cs , ^{57}Co , ^{60}Co , ^{54}Mn , ^{22}Na , ^{83}Rb , ^{84}Rb , ^{75}Se , ^{85}Sr , and ^{88}Y .

Priority Index (PI) was calculated by computing the volume of liquid that would be required to dilute the annual activity released to be equal to the worst-case non-occupational Maximum Permissible Concentration (MPC) per federal regulations. This priority index is intended to be a guideline to determine if a nuclide set requires further iterations of calculation and refinement, or if it warrants lower priority relative to other nuclides. For example, a PI of 10^6 indicates that 10^6 mL of liquid (water) would be required to dilute the released material to a concentration equal to the MPC.

Plutonium liquid effluent data throughout the years have been reported as Pu, ^{238}Pu , or ^{239}Pu . The priority indices for plutonium range from approximately 10^{10} to around 10^{14} . Priority index values for strontium range from 10^9 to 10^{12} and PI values for tritium range from 10^8 to 10^{11} . It is important to note, however, that reported liquid releases of tritium date back to the 1940s, while the LANL compilations for tritium releases to the atmosphere were not identified for years prior to 1967. Appendix D further discusses operations involving tritium and the potential magnitude of releases before 1967.

Effluent values for other reported radionuclides are included in this report. PI values calculated for these radionuclides ranged from 10^7 to 10^{11} , except for one ^{227}Ac value at 10^{14} and several ^{241}Am values of 10^{12} . There were a number of these radionuclides present, but none in concentrations that would yield a greater approaching that for plutonium. The information for these "other" radionuclides is included for completeness.

The current results indicate that, based on this study of liquid-borne effluent data reported by LANL, plutonium would be of highest concern for liquid-borne radionuclides.

Measurements of Plutonium in Soil as Indicators of Historical Releases

Although LASL began operations in 1943, LANL compilations of historical releases include no effluent measurements from before 1951. In 1951, releases were likely substantially reduced over those of the 1940s. Effluent monitoring was of lower quality (as compared to more modern measurements) until the mid-1950s. During these early years, LASL was the

lead site for production of U.S. nuclear weapon components, as the Hanford Plutonium Finishing Plant began operations in 1949, and Rocky Flats started operations in late 1952.

Since the 1970s, measurements of plutonium concentrations in soil have been performed by LANL for the purpose of evaluating potential doses to members of the public. Because of the lack of effluent measurements from 1943 to approximately 1950, the LAHDRA team has applied several methods to gain information about the potential magnitude of historical plutonium releases. Measurements of plutonium in soil around LANL are potentially useful indicators of past releases. Members of the project team have performed several iterations of calculations to estimate the total integrated airborne plutonium release that would be consistent with the environmental record of plutonium found in soil samples in the Los Alamos area.

The Radiological Safety Analysis Computer program (RSAC version 6.2) was run with Los Alamos meteorological data to calculate ^{239}Pu deposition at various distances in each direction from a unit release (1 curie) of ^{239}Pu over 50 years. The calculated deposition at each distance was converted to a soil concentration based on the annular area involved and the soil density and sampling depth reported by LANL. The ratio of each measured soil concentration to the concentration calculated for that same area from the RSAC modeling of a unit release yielded a factor that corrects the unit source in RSAC to give agreement between the soil data and the RSAC results. For example, a ratio of 15 would indicate that 15 curies of plutonium was released rather than 1 curie.

For this prioritization assessment, results of 697 soil sample analyses near LANL were evaluated. A total uncertainty for each soil sample was calculated, and only those measurements with uncertainty in the plutonium-to-cesium ratio less than 25% were used. This resulted in a data set with 119 members. The plutonium-to-cesium ratio was studied, and the Pu/Cs ratio was used to select a 37-sample subset of the 119 samples previously selected for low uncertainty. These samples lie within 5.5 kilometers of either DP Site or D Building, the main locations of early plutonium processing. The results from use of these 37 samples were less dependent on the assumed background from fallout, since the values for plutonium were higher and the background is a smaller percentage of the value.

The results indicate that, if the release was attributed to the DP Site, an average of 60 curies and a median of 12 curies were obtained with a geometric standard deviation (factor of uncertainty) of 9. Based on application of "log-normal" distribution statistics to the data (log-normal distributions look like "bell-shaped curves" that are stretched toward larger values), the above values mean that we expect (at the 95% confidence level), the answer to be between $60 \div (2 \times 9) = 3$ curies and $60 \times (2 \times 9) = 1080$ curies. We expect the true release total to be between the average divided by two-times the geometric standard deviation and the average multiplied by two-times the geometric standard deviation. The median value of 12 indicates that half of the release totals estimated from soil data fell below 12 curies, and half fell above 12 curies.

If the site releases were attributed solely to the D Building, an average of 101 curies and a median of 46 curies were obtained with a corresponding geometric standard deviation (factor of uncertainty) of 5. The smaller uncertainty for D Building suggests that large and previously undocumented releases from D Building likely occurred.

During 2005, the LAHDRA project team and LANL scientists began a collaborative effort to resolve differences in calculations of early plutonium releases. A meeting was held in August 2005 at which LAHDRA team members and LANL scientists aired their differences and created some action items towards improving estimates of plutonium releases. At this meeting, the LAHDRA team described newly-located stack monitoring data from DP West from the point that it became operational. In the course of this collaboration, an error was

found that reduced the Project Team estimates by an order of magnitude (4.6 Ci from D Building and 1.1 Ci from DP Site). It has been agreed that the LANL estimate of 1.2 Ci released needs to be modified with "filter burial" and "sample line loss" factors, which will bring the LANL estimate to almost 5 Ci. The CAP88 and RSAC data results for similar input parameters appear to be reasonably close in value. New data (drawings of DP Site, etc.) are being used to determine appropriate values for other modeling parameters. Other LANL employees are also being interviewed to gain new insights, and another dispersion model (AERMOD) may be used to gain further insight, as it uses complex terrain modeling. It is expected that the model described in this report will be re-run during 2006 with the new data from RSAC and CAP 88 to yield updated release estimates.

A detailed review of the 1958 Jordan and Black AIHA paper was performed during 2006. In summary, the Jordan and Black data lack a basis and any supporting information that would permit its use for back-calculation of the plutonium source term in air. The soil data used by Jordan and Black have orders of magnitude variability. When plotted as a function of downwind distance, no radial dependence is observed. The air concentration data and fallout tray data are not correlated. The issues with these data lead Jordan and Black to select only six data points as representative, rejecting 85% of their own data. There is no evidence that a source term was calculated in the paper, only an assertion of what the DP West releases might have been.

The asserted release is consistent with the 1973 "Joe Graf binders" compilation assembled by LANL for the first site-wide environmental impact statement. The deficiencies in that estimate include a lack of pre-1948 data, an estimate for DP West alone for 1948-1950, absence of sample line loss and burial correction factors, no releases from non-point sources such as dumps and dump fires, and no releases from D Building.

A calculation (SRA-06-012) was completed in November 2006 for non-point source emissions from Material Disposal Area G. LANL objected to use of soil data from that area, asserting that these soil measurements would impact the source term resulting in a falsely high assertion of source term from either DP Site or D Building. The calculation demonstrated that the LANL assertion was likely correct, but indicated that the release of plutonium from MDA-G may be the most important source of plutonium released by LANL since 1981. In addition, data from one location clearly show a gradual reduction of soil concentrations over time, which has been reported by LANL. This reduction is roughly a factor of two per decade, which implies that back-calculation of source terms from the 1940's could be an order of magnitude low for data collected in the late 1970's and late 1980's if weathering is not considered.

Analysis of Measurements of Plutonium in Body Tissues of Los Alamos Residents

The human tissue analysis program was a 35-year effort by LANL to study the levels of plutonium in workers and in the general population of the United States. The general population was exposed to plutonium from atmospheric testing of nuclear weapons. Populations located near plutonium facilities, such as the D Building and DP Site in Los Alamos, were also exposed to plutonium released during operations. Compilations of the data have been published periodically, and the Los Alamos Science magazine summarized the program in the November 23, 1995 issue that was devoted to a discussion of the Human Radiation Experiments.

The LAHDRA team is attempting to prioritize off-site releases from LANL. Some of the data from the 1940s are not available as effluent (stack) measurements, but rather as room air concentrations. Even these data may not be available for all time periods. In addition, both D Building and DP Site facilities were operated at least in part at positive building pressures. This would tend to increase non-point source (non-stack) emissions as compared to modern

plutonium processing buildings. The human tissue analysis program data, even if the data did not show any added plutonium in tissue over that expected from global fallout, might provide an alternative means to place an upper bound on the potential plutonium source term from LANL.

The LAHDRA team performed an analysis of human tissue sample data using data from a 1979 Health Physics journal paper. A public records search was conducted for information on persons in the HP journal article from Los Alamos. The ratio of deposited plutonium in the lung vs. that in the vertebrae was calculated for each individual. The standard deviation of Pu Ratio was plotted for the populations of Los Alamos and Denver, and several conclusions were drawn about the individual cases in Los Alamos and potential exposures.

There were 97 non-LANL-worker resident autopsy cases for Los Alamos and White Rock. Of these, 24 were easily identified from cemetery records with at least three of the attributes positively matched (Los Alamos non-worker resident, sex, age and year of death). Most also had some notice in the Los Alamos Monitor, which added to the information, at times including a cause of death that could be matched. In addition to the 24 uniquely matched cases, an individual could not be uniquely established for two of the autopsy cases. For these two cases, one of two cemetery records could match the data. These duplicate assignments are also carried in the data set for a total of 28 addresses (that is, 26 total people with 28 address sequences where 2 of the addresses are just possibilities). Although the suspected persons have been matched to case numbers from the 1979 *Health Physics* article, the names have been redacted in this work to protect privacy.

The calculation demonstrates that excess plutonium is present in non-worker residents of Los Alamos over what would be expected from global fallout from nuclear weapons testing. It also establishes and tests a method for uncovering the history of residence locations for autopsy cases. This history establishes the range and bearing from LANL release points along with the years of occupancy at each residence. This method could be used to reduce the uncertainty in retrospective dose reconstructions and possibly permit use of the autopsy data for bounding LANL releases.

In connection with the use of human tissue sample data as an indicator of past plutonium releases, death certificates and an index key found were in the LANL Archives during 2006. These records, which associate LANL Case Numbers with death certificates, were received from LANL in June upon completion of the review process. The data were entered into spreadsheets for subsequent analysis. Those records outline the identity of each tissue donor and identify the address of each individual at time of death. Starting with those data points, members of the project team searched historical Los Alamos telephone directories and other public records and were able to add considerable information concerning the residence histories of the tissue donors. The process of geocoding associated addresses (determining latitudes and longitudes of each place of residence) is ongoing so that organ burdens can be analyzed as a function of location in Los Alamos, distance from known release points, years of residence, type of employment, and other variables.

Prioritization of Chemical Releases

Operations at LANL have involved many non-radioactive materials, including metals, inorganic chemicals, and organic chemicals including solvents. For the sake of simplicity in this report, we will refer to these materials as "chemicals". Prior to the 1970s, uses of chemicals and their ultimate fate were poorly tracked and documented compared to radionuclides. One particularly challenging portion of the LAHDRA project, for this reason, has been the collection of information concerning historical uses of chemicals, identification of those that were most likely released off site, and determination of which chemicals have been most important in terms of potential off-site health hazards. The sources of

information about chemical usage at LANL that have been most useful to the LAHDRA team include a modern-day chemical inventory, historical chemical inventories, and various types of LANL site documents.

Preliminary review of a modern-day chemical inventory database indicated that 37 chemicals were each present onsite at 250 or more individual locations and therefore represented the largest onsite quantities. Twelve of the thirteen chemicals present onsite in the highest quantities do not have USEPA recommended toxicity values for potential cancer and non-cancer systemic health effects, although some can be irritants or corrosives at high concentrations. These 37 high quantity chemicals were ranked in order of decreasing estimated on-site quantities. Of the 37 high quantity chemicals, the 13 with USEPA recommended toxicity values were also order of generic toxicity, "1" being more toxic than "13". Generic toxicity includes both cancer and non-cancer chronic health effects with no bias toward any route of potential exposure (e.g., inhalation, ingestion, and dermal contact) or to any potential environmental exposure medium (e.g., air, soil, water, food products) since little is known about how the chemicals were used and the potential for off-site release.

Attempts to locate earlier chemical inventories have not been successful. Based on historical documents that were reviewed, however, a list of chemicals documented as having been used at LANL at some point in time was prepared. Other tabulations that were prepared based on historical records include:

- a compilation of quantities of chemicals used or released historically from LANL
- reported estimates of quantities of high explosives used from 1944 through 1945
- an effluent summary for group GMX-7 that includes several explosives dispersed at TA-40 as gaseous detonation products during the period July – September 1971
- estimates of toxic materials dispersed by GMX Division shots for April and May 1971

USEPA Region 9 Preliminary Remediation Goals (PRGs) are target cleanup levels based on conservative assumptions regarding direct exposure to soil through ingestion, dermal contact and inhalation, and direct inhalation of vapors and particulates. PRGs are based on cancer as an endpoint if available cancer potency factors ("slope factors") result in a more conservative (lower) PRG than would result based solely on evaluation of non-cancer health effects. As a first step towards prioritization of potential chemical releases, PRGs for chemicals used and possibly released historically from LANL were used by the LAHDRA team to rank the potential of various chemicals to result in adverse health effects to off-site populations. The lower a PRG, the higher the potential for off-site health effects if the compound were released beyond the site boundary– this preliminary ranking does not address actual quantities released or whether real exposures occurred; however, these factors will be considered as the prioritization process advances.

PRGs for soil were used to rank chemicals usually present in the environment as particulates, and PRGs for air were used to rank volatile chemicals. Both soil and air PRGs were considered for explosives. Toxicity factors are not available for some chemicals used at LANL, and estimates of quantities used have been identified through systematic document review for only a subset of those chemicals with published toxicity factors. Estimates of quantities of a material used on an annual basis are in some cases available. "Annual use" is typically the highest known annual usage of a compound from available data, and in some cases may be based on a single year for which data are available. Reported values are often presented as quantities used, issued, lost, or released, and it is not always clear how the quantities were determined.

A ranking of Los Alamos chemicals based on PRGs for soil is presented, as is a ranking based on PRGs for air. A final table presents a ranking based on a factor equal to the annual usage (in kg) multiplied by the cancer potency slope factor or divided by the non-cancer reference dose (mg/kg-d). The analysis reflected in these tables suggests that historical releases of explosives and volatile organic chemicals from LANL operations have the greatest potential for producing off-site health effects.

Development of Housing Areas in Los Alamos

Evaluation of off-site exposures from activities at Los Alamos technical areas will require documentation of the development of nearby residential areas over time. While it was initially thought that the 31 houses commandeered from the Los Alamos Ranch School and Anchor Ranch would provide sufficient housing for the projected staff of 30 scientists and their families, it soon became clear that the scope of the challenge to provide housing for Los Alamos residents had been severely underestimated. The scarcity of housing in Los Alamos was problematic during World War II and for years to follow. Hiring at the Lab was at times severely restricted because there was nowhere for new employees to live. This pressure to provide housing and the limited availability of suitable land in the region of finger-like mesas and canyons led to the development of housing that in some cases was much closer to operational areas than has become customary for government facilities that undertake processing of nuclear materials and high explosives and/or operation of devices such as reactors or high-energy particle accelerators.

Based on reviews of historical documents performed to date, a nine locations have been identified as being among the sites where historical operations took place that appear to warrant evaluation in terms of potential off-site releases or health effects. The LAHDRA project team is collecting maps, photographs, and historical documents that describe the history of development of each Los Alamos housing area. For each of the nine locations of interest, the following parameters are being evaluated to support evaluation of the potential for public health effects:

- The distance from the area to housing areas that were in place during the period that associated operations were active,
- The direction from the location to each housing area, and
- The prevalence of winds from the location toward each the housing area.

Appendices to this Interim Report

The information outlined below is contained in appendices to this Interim Report. These appendices are intended to present additional details to support the summaries and assessments contained in the body of the report and to describe the public involvement program that was active throughout the project.

- Appendix A: Key Operational Area– Plutonium Processing
- Appendix B: Key Operational Areas– Uranium, Fission Products, Radium, Polonium, and Barium/Lanthanum
- Appendix C: Key Operational Areas– Reactors
- Appendix D: Key Operational Areas– Tritium
- Appendix E: Key Operational Areas– Beryllium
- Appendix F: Key Operational Areas– High Explosives

- Appendix G: Key Operational Areas– Accelerator Operations
- Appendix H: Key Operational Areas– the LANL Health Division
- Appendix I: Key Operational Areas– Environmental Monitoring
- Appendix J: Listing of Airborne Release Points
- Appendix K: Rules for Specifying Dates and Names in Database Records when Incomplete Information is Available
- Appendix L: Partial Chronology of Accidents and Incidents
- Appendix M: Summaries of Public Meetings Held by the LAHDRA Project Team
- Appendix N: The Trinity Test

Chapter 1: Introduction to the LAHDRA Project

The Los Alamos Historical Document Retrieval and Assessment (LAHDRA) project began in early 1999. It is being conducted by the Centers for Disease Control and Prevention (CDC), National Center for Environmental Health. Much of the work of the project was conducted by contractors to CDC, namely ChemRisk Inc., Shonka Research Associates Inc., ENSR Corporation, and Advanced Technologies and Laboratories International, Inc.

The primary purpose of the LAHDRA project is to identify the information that is available concerning past releases of radionuclides and chemicals from the government complex at Los Alamos, New Mexico. Sited in northern New Mexico and owned by the Department of Energy, the Los Alamos facilities have been managed by the University of California since 1943, when "Project Y" was born as part of the Manhattan Project to create the first atomic weapons. Project Y became known as Los Alamos Laboratory, and its name changed to Los Alamos Scientific Laboratory in 1947 and then to Los Alamos National Laboratory in 1981. For sake of simplicity in this document, we will refer to LANL for all time periods. LANL's responsibilities have expanded since the wartime years, to include thermonuclear weapon design, high explosives and ordnance development and testing, weapons safety, nuclear reactor research, waste disposal or incineration, chemistry, criticality experimentation, tritium handling, biophysics, and radiobiology.

LANL operations have not proceeded without health hazards or environmental impacts. Approximately 30 people have been killed in incidents including criticality experiments and accidents with high explosives. Significant quantities of plutonium, uranium, and a wide variety of other toxic substances have been processed and released to the environment in quantities that in some cases are not well known. The project team is investigating the materials used throughout LANL's history of operations to identify and prioritize releases in terms of their apparent relative importance from the standpoint of potential off-site health effects. Based on the project's findings, CDC will work with stakeholders to determine if more-detailed assessments of past releases are warranted. Should additional investigations be warranted, they might be in the form of screening-level evaluations, or could progress to detailed dose reconstruction for those releases of highest priority.

In more specific terms, CDC's model of dose reconstruction involves a process that can be broken up into as many as five phases:

- Retrieval and Assessment of Data
- Initial Source Term Development and Pathway Analysis
- Screening Dose and Exposure Calculations
- Development of Methods for Assessing Environmental Doses
- Calculation of Environmental Exposures, Doses, and Risks

CDC has completed various stages of this process at INEEL, Savannah River, and Los Alamos. Various stages of the process may overlap in time, and stages may be performed iteratively. All stages may not be necessary at all sites. Each stage involves CDC staff, contractors, and the public. The CDC project at Los Alamos is in the initial, information-gathering phase. The process of information gathering and assessment is partially complete.

The Products of the LAHDRA Project

The products of the LAHDRA project include:

- This Interim Report
- A database that contains bibliographic information and summaries of the content of relevant documents that were located by the project team.
- Sets of copies of the most relevant documents, to be made available by DOE in a reading room in Albuquerque.
- A collection of electronic document images, as Portable Document Format (PDF) files, of all documents for which paper copies or electronic files were obtained.
- A chronology of incidents and off-normal events identified in review of reports prepared by Los Alamos' Health Division.

The Project Information Database

A Microsoft® Access database was created to store the information reviewed and collected during this project. The CDC defined the basic database structure and values of many of the fields at the onset of the project. Throughout the project, a few additional fields were added to the database based on analyst and staff comments, the changes being mostly for administrative use. The latest revision of the database was V3-9-0032. A user-friendly front-end was developed for use by the project analysts for reviewing the information collected. The database includes a form created for entering the information from the document summary forms (DSFs) filled out by document analysts in the field, and also a form to perform searches on all the information that has been entered. In the search form, users can search on every field on the DSF. Users can choose to see the results of the search either in a report format or in HTML format. HTML format provides users with hyperlinks to open the documents associated with the DSF in a scanned searchable image format called portable document format (PDF).

As each DSF was entered into the project database, it was assigned a unique sequential Repository Number. This designation was used to track the information throughout the remainder of the project. Many of the reference citations in this report include repository numbers, often abbreviated "Repos. No." Note that a repository number may represent a number of related, individual documents.

The project database has been made available to the public by placing it in three regional libraries: the Zimmerman Library at the University of New Mexico in Albuquerque, the Mesa Public Library in Los Alamos, and the Northern New Mexico Community College library in Española. Users may search the bibliographic information captured on the document summary forms and perform full-text searches of the documents which have been scanned to PDF.



Figure 1-1: One of several sets of copies of documents selected by the LAHDRA team

Copies of Documents Obtained by the Project Team

The project repository contains paper copies of documents selected as relevant by the project team and released by LANL. This repository currently contains over 235,270 pages of documents. These documents are arranged sequentially by Repository Number. A duplicate set of the project's document repository is maintained at the Zimmerman Library at the University of New Mexico in Albuquerque. This location was selected by the U.S. Department of Energy as the official Public Reading Room for this Project.

The Zimmerman Library is located on the University of New Mexico's (UNM's) main campus. The library's Government Information Department is a regional depository for government documents. Documents can be requested at the information desk, and photocopies can be made at a nominal cost using copy machines in the immediate area.



Figure 1-2: Dan Barkley of UNM discusses project records at Zimmerman Library in Albuquerque with CDC project staff

Directions to the Public Reading Room at the University of New Mexico:

Head east from the Central Avenue exit from I-25. Continuing east on Central Avenue, pass through the signal at University Avenue. UNM will be on the left. The third light after University Avenue will be Stanford Drive. Take a left on Stanford Drive to enter the UNM campus. Take another left at the "T." On the right will be Visitor Parking. After parking, head north and slightly west across campus. Zimmerman Library is just northwest of the Student Union Building. The Government Information Department is located in the basement of the library.

Contact: Dan Barkley, phone: (505) 277-7180, fax: (505) 277-6019; barkley@unm.edu

Document Images

As the number of paper copies grew and scanning technology matured, it was decided that a better way to preserve and present the reference material being collected by the LAHDRA team would be as scanned images. Ultimately, all of the information was scanned in as PDF files and an Adobe Acrobat full text search capability was developed.

Figure 1-3 depicts the progression of a document from preparation of a handwritten DSF through input into the Access database with a link to the document image file.

The documents are scanned using a high-speed, high-capacity scanner running at 50 pages per minute in simplex mode or 45 pages per minute in duplex mode. Images may be scanned to a maximum resolution of 600 dpi, however, a resolution of 200 dpi is typically used. This resolution provides a good compromise between image quality and file size.

The scanning software used includes a proprietary "VirtualReScan" (VRS) feature, which allows mixed batches of documents to be scanned without adjustments. VRS technology automatically detects, de-skews, crops and brightens images as needed regardless of document shape, size and color.

Los Alamos Document Summary Form Document Requested: Complete Partial None

DOCUMENT TITLE: *Facts About Los Alamos Scientific Laboratory of the University of California*

DOCUMENT NUMBER: *None* PROJECT:

AUTHOR(S): *not published*

PUBLICATION DATE: *October 1954* DATA TIME PERIOD: start: end: 1954

ORGANIZATION: TECHNICAL AREA:

DOC DOCUMENT CATEGORY: 2 3 DOCUMENT TYPE: Other Document Computer File File Label

ORIGINAL LOCATION OF DOCUMENT: Other

LANL ARC: LANL Research Library LANL Reports Collection ESH Records Center

POINT OF CONTACT FOR DOCUMENT: *Chris C. DeBora*

1. *Roger Munde*

KEYWORDS: (circle or write in)

Abstracts: Biological Chemical Dynamic Systems

Designs: Fluids Environmental Radiation Electronic Materials

Ground Water: Geological Materials

Surface Water: Terrestrial Uncertainty Waste Disposal

Other:

DOCUMENT ABSTRACT: Original:

Provides overview of research and development programs at LASL, including weapons development and testing, Rn-136, plasma thermionics, Project Sherwood, neutron, critical assemblies, theoretical physics and mathematics, critical assemblies, theoretical physics and mathematics, Vela Program, accelerators, explosives research, health research, chemistry & metallurgy research, and engineering. Includes chronology of LASL "Facts" from 1943 to 1964. Includes some historical facts about LASL and the Los Alamos community.

ANALYST COMMENTS ON DOCUMENT'S RELEVANCE TO ACDU PROJECTS/TECH: *Useful historical background, employment data, housing details.*

ANALYST: *T. P. Johnson* DATE REVIEWED: *12/7/2003*

ST Reviewer Initials: ST Review Date: Page Count:

Approved For Release: Date Entered into Database: *12/7/03*

REV 6-27-03 Los Alamos Historical Documents Referral and Assessment Project



Repository Number: *628*

Document Type: *Monthly* Document as File: *Complete*

Document Number: Document Title: *Facts About Los Alamos Scientific Laboratory of the University of California*

Author(s): *Unknown* Organization(s): *Geophysics* Responsibility: *None*

Document Abstract: *Provides overview of research and development programs at LASL, including weapons development and testing, Rn-136, plasma thermionics, Project Sherwood, neutron, critical assemblies, theoretical physics and mathematics, Vela program, accelerators, explosives research, health research, chemistry and metallurgy research, and engineering. Includes a chronology of LASL "Facts" from 1943 to 1964. Includes some historical facts about LASL and the Los Alamos community.*

Language's Comments on Document's Relevance to ACDU: *Useful historical background, employment data, housing details.*

Property: *None* Analyst: *None* Review Date: *12/20/03*

Terrestrial Area(s): CDC Category: *1*

Comments: *None* ST Review: ST Review Date: ST Review Pages: Released To Public:

Original Location of Document: *LANL ARC*

Article Title: *Facts About Los Alamos Scientific Laboratory of the University of California* I/D Number: *628* DVD Number: *0*

Report Generated: *Friday, February 07, 2004*

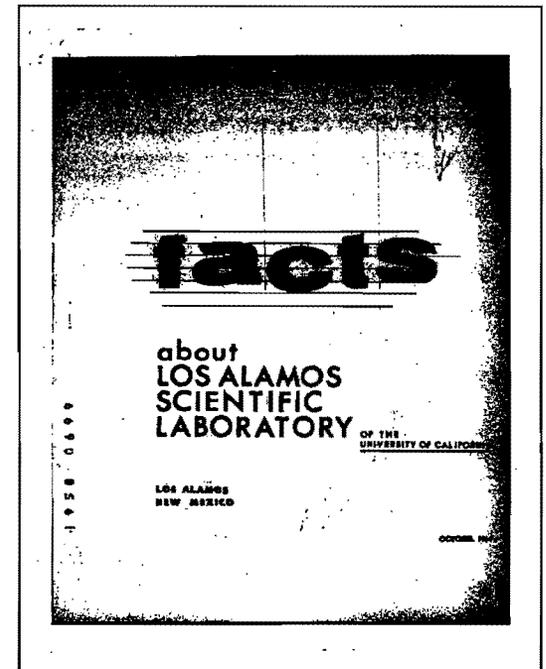


Figure 1-3: Original DSF, Access Database DSF, Original Document PDF

After the documents are scanned to optimized, interim image files, Adobe® Acrobat® Capture® is used to convert the images to searchable PDF files. The Capture® software applies optical character recognition (OCR), advanced page and content recognition, and powerful cleanup tools to convert the paper-based information into electronic documents of optimal quality.

Once documents are scanned to searchable PDF files, they are indexed using Adobe® Acrobat® Professional's Catalog tool. The Catalog tool generates an index definition file, which provides for efficient full-text searching across all of the PDF files in the index.

Currently all documents in the project repository have been scanned to PDF files. The project database and the PDFs can be stored on two DVDs for installation on a host computer. A "Readme" file is included with each software installation with instructions on how to install the database and how to perform these searches. The full-text search capability across all of the documents retrieved to date provides a powerful augmentation to the bibliographic search capabilities of the Access database. However, due to the poor quality of some of the documents retrieved, the OCR process can miss individual words or passages of text. Thus it is important both the bibliographic and full-text search capabilities be used to find information of interest. Some manual verification and correction of the OCR process has been performed, but this effort is limited by budget constraints.

Chronology of Incidents and Off-Normal Events

Progress reports issues by the Los Alamos Health Division (H Division) are particularly useful sources of information about operations, releases, episodic events, and accidents involving radionuclides and other toxic materials. The LAHDRA team has made a concerted effort to obtain as many H-Division progress reports as possible. The project information database currently contains summary data for hundreds of Health Group and H-Division progress reports. At present, these reports cover a date range from 1943 to 1990. Most of the reports cover a one month period, though there are also annual reports and, in later years, quarterly reports. The monthly reports were discontinued around early 1965 in favor of quarterly reports.

A chronology of episodic or off-normal events described in these reports will be a valuable resource for depicting historical release pathways, particularly in describing mechanisms for fugitive emissions and other unmonitored pathways that might otherwise go unaccounted for. And for hazardous chemicals, the anecdotal information contained in many H-Division reports makes up a large part of what we know about historical usage and actual or potential releases.

The review of H-Division reports was begun by the LAHDRA project team during 2004, but was not completed before project work was suspended. Now that work has resumed, this effort has continued as an element of the prioritization process as document search and retrieval progresses. The latest available version of a chronology of episodic or off-normal events, based on reports that have been reviewed as of the date of release of this report, is presented in Appendix L. Each event is described briefly, and Repository Number and page number references are provided.

The H-Division progress reports were compiled by the Division Leader and contained information submitted by the leaders of the individual groups that made up the Health Division at a given time. While the material they provide is largely of a summary nature, the reports are nonetheless detailed and provide an array of information. Collectively, the

reports provide a chronology of laboratory operations with an emphasis on experience with hazardous materials. They cover the breadth of what are now known as health physics and industrial hygiene, and provide information in a number of areas of interest to the LAHDRA Project, including:

- materials (contaminants) of concern (radionuclides, chemicals, and explosives)
- instrumentation issues
- monitoring/sampling of waste streams/effluents
- monitoring of special (short-duration) programs and experiments
- unmonitored releases and fugitive emissions
- environmental monitoring
- episodic events and incidents involving spread of materials to private property or members of the public
- facility operations (including ventilation system issues, modifications, etc.)
- waste disposal practices and issues

Of particular note is the fact the reports provide information on various chemicals and compounds that were being utilized at various times, where the materials were being used, and what they were being used for. While this information is largely qualitative, it still provides a valuable resource for prioritization of non-radioactive hazardous materials for time periods for which such information is scarce. The reports also yield valuable information regarding sources of unmonitored releases and fugitive emissions that are always difficult to evaluate in retrospective assessments.

Beyond the specific information contained in the individual H-division progress reports, the continuity of the information they provide collectively (the monthly reports in particular) gives insight into chronic and recurring concerns that may not have been apparent at the time. Applied retrospectively, this information can be used to advance both the document search tasks and the evaluation of information obtained relative to off-site releases and potential effects.

The Contents of this Report

This Interim Report represents a summary of information that has been obtained by the LAHDRA project team regarding:

- historical operations at Los Alamos,
- the materials that were used,
- the materials that were likely released off site,
- development of residential areas around Los Alamos, and
- the relative importance of identified releases in terms of potential health risks.

The information in this report was obtained from records reviewed at Los Alamos by the project team, some books and reports that are publicly available, and some interviews with past and current Los Alamos workers.

Preparation of LAHDRA project reports has been an iterative process. A preliminary draft report was issued in February 2002, so that interested parties could see the types of information the LAHDRA team was finding, be introduced to the approaches being taken to interpret the information that was found, and offer comments and criticism as to how the report could be improved as work progressed. A Draft Interim Report and then an Interim

Report were issued in 2004, as the first LAHDRA contract came to a close, and an additional iteration of the project report was issued in January 2006.

While millions of documents have been reviewed at Los Alamos, the information gathering is not complete. For various reasons that will be discussed later in this report, document review at Los Alamos has taken significantly longer than expected. There are now known to be significantly more documents at LANL than was originally estimated, and the processes for access to classified documents and for public release of relevant documents have been more complicated and time consuming than was expected.

Based on the findings of the ongoing information gathering process, which are summarized in this report and evidenced in the project information database, CDC will work with stake holders to evaluate whether historical releases for radionuclides or other toxic materials from Los Alamos operations warrant more detailed evaluation.



Figure1-4: An early photo of the main gate into Los Alamos

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Chapter 2: Overview of Historical Operations at Los Alamos

When the Los Alamos facility was initiated, it had a single mission— perfection of the design and manufacture of the first atomic bombs. The initial plan for the first atomic weapon was for a “gun assembled” device that would use slow-burning propellants, as shown in concept in Figure 1 (LANL 1983). Gun-assembled weapons may be designed on the principle of using a propellant to drive a mass of fissile material at a target of the same material to attain a supercritical assembly. To develop and build gun-assembled weapons, Los Alamos personnel initially experimented with use of enriched uranium (^{235}U) and plutonium as the fissionable material. Other materials that were needed included the explosive propellant, a detonator to set off that propellant, and precision machined housings to support assembly of the critical mass in the necessary configuration within the required time frame. Part of the housings were cases of heavy metal (such as uranium), called “tamper,” that confined the explosion, reflected some neutrons that would otherwise escape, and thereby decreased the “critical mass” of fissile material required to give rise to an atomic explosion (Serber et al., 1992).

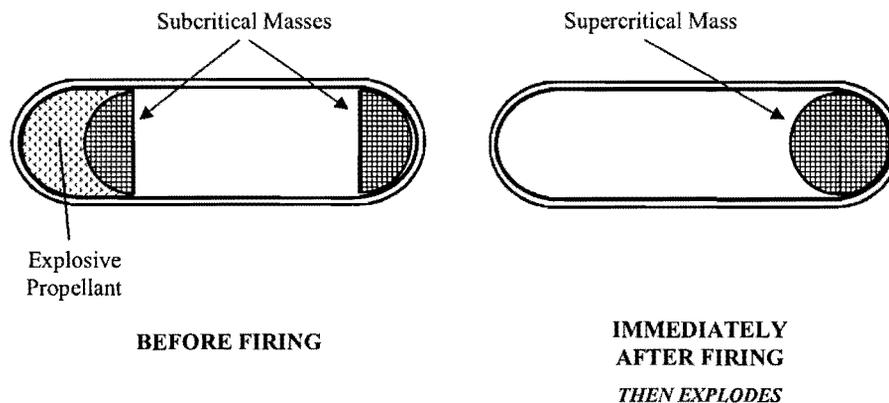


Figure 1-1: Concepts of a Gun-Assembled Atomic Weapon

Early development work centered on potential use of ^{235}U or ^{239}Pu in gun-assembled devices. Top priority was given to development of a plutonium-projectile gun device, with posed more problems than the uranium design due to tighter purity specifications and the need for a faster assembly velocity. In July 1944, it was found that the plutonium that was being received at Los Alamos would not work in gun-assembled weapons due to the presence of more of the ^{240}Pu isotope than expected amidst the desired ^{239}Pu . The spontaneous neutron emission rate from that plutonium was several hundred times greater than allowable. As a result, while research on the “certain to work” uranium gun device continued, development of a plutonium device shifted to an implosion-assembled design. A second design was needed because the delivery rate for enriched uranium would only support production of a single uranium weapon within the imposed schedule, and it was thought that more than one weapon would be necessary. Implosion-assembled weapons may be designed on the principle of squeezing (compressing) the fissile material to supercriticality by detonation of a high-explosive implosion system. The implosion type bomb is depicted conceptually in Figure 2-2 (LANL 1983).

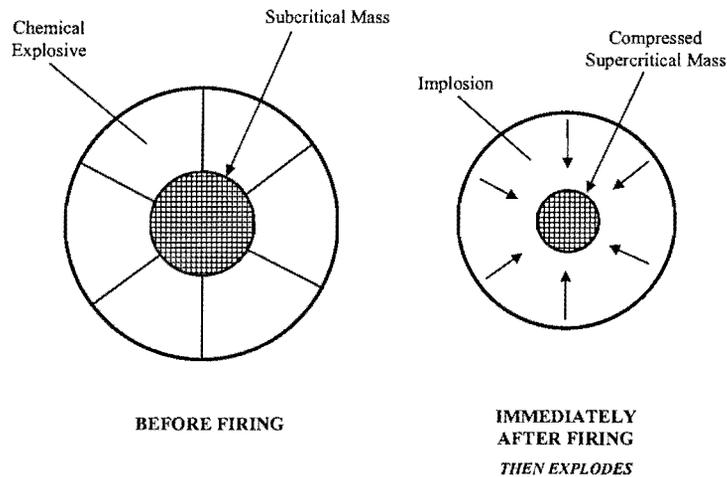


Figure 2-2: Concepts of the Implosion-Assembled Atomic Weapon

To develop and build implosion-assembled devices, much experimentation had to be done with getting chemical high explosives to precisely assemble something with great symmetry, in contrast to their typical uses in blowing things up. Work on high explosives centered on achieving precise timing of detonations at the surface of the explosive and use of "lenses" of a different explosive to focus the resulting shock waves on the metal sphere in the center of the device (Serber et al. 1992). In addition to fissionable material, high explosives, detonators, and tamper material, work on implosion-assembled devices included development of "initiators" that acted as strong sources of neutrons at the precise time that the supercritical masses came into position, to make sure that the fission chain reaction started when it had to. These initiators used materials including radium, beryllium, and polonium (Serber et al. 1992).

With the successful demonstration of fission devices, scientists were able to achieve the high temperatures necessary to bring about fusion of hydrogen nuclei for use in the "Super" bomb that had been studied for years as a theoretical possibility. Viewed by some as Los Alamos' second historic mission, development of thermonuclear or "hydrogen" devices led to the first full-scale testing in the Mike shot in the Pacific in late 1952. Thermonuclear devices rely on a two-staged process, in which energy from a fission "primary" is contained and used to trigger a fusion or fusion-fission reaction in a physically-separate "secondary" portion of the device. These concepts of a staged thermonuclear weapon are shown in Figure 2-3 (LANL, 1983).

Materials needed for thermonuclear devices included many of those needed for a gun-assembled or implosion-assembled device, plus fuel for the fusion reaction. The first thermonuclear devices used liquid fuel, such as deuterium, that required significant developments in cryogenics in order to keep the fuel below its boiling point of -250 Celsius. Later devices used lithium deuteride fuel, in solid form, which "breeds" tritium when exposed to neutrons.

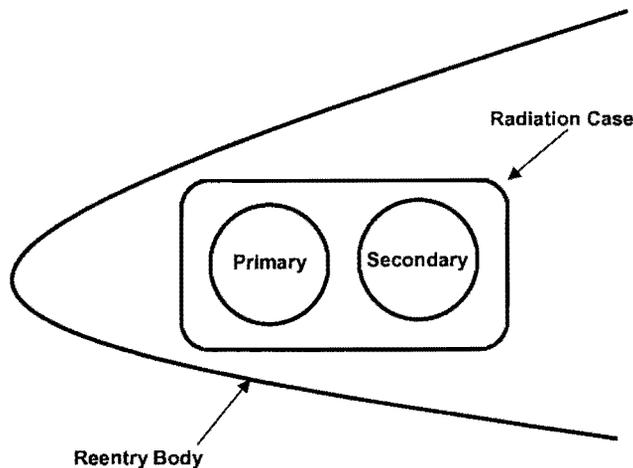


Figure 2-3: Concepts of a Staged Nuclear Weapon

After World War II, Los Alamos scientists and engineers were involved in development and testing of numerous designs of nuclear devices that were more and more powerful, compact, reliable, dependably deployable in the field, and contained in a variety of delivery vehicles suited to various combat objectives. They were involved in many tests of nuclear devices within the continental United States, in the Pacific, and in Alaska, including some that were part of the Plowshare program that aimed to develop peaceful applications for nuclear explosives.

Los Alamos was the lead site for U.S. nuclear component fabrication until 1949, when the Hanford Plutonium Finishing Plant in Washington began making "pits," the central cores of the primary stages of nuclear devices (USDOE 1997). In 1952, the Rocky Flats Plant near Denver began making pit components. After 1949, Los Alamos was a backup production facility and designed, developed, and fabricated nuclear components for test devices. Pit production stopped at the Hanford facility in 1965, and the Rocky Flats Plant ceased operations in 1989. From time to time, Los Alamos was called upon to perform special functions in its backup role. For example, because of an accident at the Hanford Plutonium Finishing Plant in 1984, plutonium was sent in oxide form to Los Alamos for conversion to metal (USDOE 1997). Special activity at Los Alamos might also have occurred after major fires in plutonium facilities at Rocky Flats in 1957 and 1969.

Operations, facilities, and capabilities that were needed to support development and production of the various types of nuclear devices expanded in many cases to support other missions after World War II. Programs in chemistry, metallurgy, and low temperature physics expanded into nonmilitary development and fundamental research. For example, Los Alamos developed one of the largest experimental machine shops in the country. The Health Division grew significantly and expanded into many areas of health physics, industrial hygiene, medicine, safety, and biomedical research regarding people and radiation.

Early reactors that were built to confirm critical masses for fissionable materials and to study properties of fission and the behavior of resulting neutrons, were the forerunners of a variety of reactors that were designed and in some cases built and operated at Los Alamos. While some of these reactors served as sources of neutrons for various types of nuclear research or for materials testing, other designs were pursued for potential applications in power generation and propulsion of nuclear rockets into deep space. Some of the first significant steps towards controlled nuclear fusion as a power source were taken at Los Alamos, and the plasma thermocouple program explored methods for direct conversion of fission energy to electricity for potential application in propulsion of spacecraft.

Operations at Los Alamos have taken place in land divisions called Technical Areas, or TAs. Table 2-1 contains a listing of these Technical Areas, including some that have been abandoned, some that were combined with other TAs, and some that were cancelled before they ever became operational. Table 1 also contains listings of some of the various radioactive materials that are documented to have been used at each technical area, based on information reviewed to date. A similar tabulation of chemicals used at each technical area has not yet been compiled.

Figure 2-5 shows the locations of the modern-day Technical Areas, and Figure 2-6 presents a timeline of some selected operations and activities at (or related to) Los Alamos.

References

LANL 1983. "Nuclear Weapon Illustrations", Classification Bulletin No. 9. August.

Serber et al. 1992. "The Los Alamos Primer– The First Lectures on How to Build An Atomic Bomb." Contains an annotated version of report LA-1, "The Los Alamos Primer" (1943). University of California Press, Berkeley.

USDOE 1997. "Linking Legacies– Connecting the Cold War Nuclear Weapons Production Processes To Their Environmental Consequences." DOE/EM-0319. U.S. Department of Energy, Washington, DC. January.

Table 2-1: Los Alamos Technical Areas Past and Present

TA	Name and Description	Radioactive Materials Involved ^a
TA-0	Los Alamos Townsite: leased space in Los Alamos and White Rock for training, support, unclassified research and development, community outreach, museum	None
TA-1	Original Main Technical Area (inactive): 1943-65 active; turned over to Los Alamos County or private interest in 1966; all contamination removed by 1975	EU, DU, ^{238,239} Pu, ²⁴¹ Am, ²¹⁰ Po, ¹⁴⁰ Ba, ¹⁴⁰ La
TA-2	a.k.a. ^c Omega Site: Early critical assembly experiments. Water Boilers (1944-1974); Pu Fast Reactor, a.k.a. Clementine (1946-1950); and Omega West Reactor (1956-1992); reactors used for critical experiments up until 1946 when experiments were moved to TA-18. Omega Site reactors operations were then centered around neutron experiments and isotope production	²³⁵ U; ²³⁹ Pu; ¹³¹ I; ⁸⁸ Rb; ¹³⁷ Cs; ¹³¹ Xe; ¹²⁵ I; ⁴¹ Ar, ³ H
TA-3	Core Area (a.k.a. South Mesa Site; active 1949 to present): detonator manufacturing, metallurgy burn pit, firing sites from 1943-49, Listed below are brief descriptions of key TA-3 operations.	^{238,239} Pu, ^{235,238} U, DU, NU, ²¹⁰ Po
TA-3-29	Chemistry and Metallurgy Research: actinide chemistry and metallurgy research since 1952 to present	²³⁹ Pu; ²³⁸ Pu; ²³⁵ U; ²³⁸ U, DU
TA-3-66	Sigma: materials fabrication since 1958; also -141 Rolling Mill, -35 Press Bldg, -159 thorium storage	²³⁵ U; DU
TA-3-1698	Materials Science Laboratory: processing, mechanical research	DU
TA-3-39,102	Machine shops: since 1953; Be in Bldg 39, DU in Bldg 102	DU
TA-4	Alpha Site: firing site until 1956; Material Disposal Area C	DU
TA-5	Beta Site: former firing site used extensively in 1945	DU
TA-6	Two-Mile Mesa Site: mostly undeveloped; detonator manufacturing and testing 1944-50	DU
TA-7	Gomez Ranch Site: former firing site used from 1944-47 for small explosive experiments with short-lived radionuclides	DU; unknown
TA-8	GT Site (a.k.a. Anchor Site West): gun firing sites 1943-45; explosives processing 1945-50; nondestructive X-ray testing 1950-present	²³⁹ Pu; ²³⁸ Pu; ²³⁵ U; DU; ⁶⁰ Co; ¹⁹² Ir; ¹³⁷ Cs; X-rays
TA-9	Anchor Site East (a.k.a. Anchor Ranch): firing areas; explosives research (active)	DU; ³ H
TA-10	Bayo Canyon: Radioactive lanthanum test shots 1944-61; Radioactive lanthanum radiochemistry 1944-50; site removed in 1963	⁹⁰ Sr; DU; NU; ¹⁴⁰ La
TA-11	K Site (active): implosion studies; later drop and vibration tests, dates unknown at this time	DU; ²²⁶ Ra, betatron
TA-12	L Site: explosives testing (1945-46); abandoned in mid-1950s	DU
TA-13	P Site: X-ray studies of explosives; later incorporated with TA-16, status unknown	X-rays, DU, ²¹⁰ Po
TA-14	Q Site (active): explosives testing 1944-present	DU
TA-15	R Site: explosives testing; eight inactive firing sites (A-H, R44, R45); Pulsed High-Energy Radiation Machine Emitting X-Rays (PHERMEX) 1962-present; Dual-Axis Radiographic Hydrodynamics Test (DARHT) Facility	²³⁹ Pu; DU; ³ H; X-rays
TA-16	S Site (active): former explosives casting/machining operations; burning ground; Weapons Engineering Tritium Facility. Began in the 1950s	²³⁹ Pu; DU; ³ H; X-rays
TA-17	X Site (canceled)	None
TA-18	Pajarito Laboratory: criticality testing 1946-present; Rover 1955-73; Hydro assembly 1957	²³⁵ U; ²³⁹ Pu; ²⁴⁰ Pu; ²³³ U; MFP; ¹³¹ I; polonium; neutron
TA-19	East Gate Laboratory: released to U.S. Atomic Energy Commission in 1962	None

Table 2-1: Los Alamos Technical Areas Past and Present (Continued)

TA	Name and Description	Radioactive Materials Involved ^a
TA-20	Sandia Canyon Site: former firing site abandoned in 1957	DU
TA-21	DP Site: a.k.a. DP Mesa: former plutonium operations (DP West); uranium/polonium operations (DP East); Material Disposal Areas A,B,T,U,V; Tritium Systems Test Assembly, Tritium Science and Fabrication Facility (1945 to 1978)	²³⁹ Pu; ²³⁸ Pu; ²⁴⁰ Pu; ²⁴¹ Pu; ²⁴¹ Am; ²³⁵ U; ²³⁸ U; ²¹⁰ Po; ²²⁷ Ac; ³ H
TA-22	TD (Trap Door) Site: detonator development; shops; disposal pits	DU
TA-23	NU Site: reduced firing load at TA-9 1945-50	Unknown
TA-24	T Site: X-ray studies of explosives; later incorporated with TA-16	X-rays, DU
TA-25	V Site: explosives assembly; later incorporated with TA-16	DU
TA-26	D Site: storage vault and guard building 1946-48; removed in 1966	³ H, ²³⁵ U; ²³³ U
TA-27	Gamma Site: plutonium gun assembly 1945-47	²³⁹ Pu, DU, thorium
TA-28	Magazine Area A (active): firing site 1979; explosives storage area	DU
TA-29	Magazine Area B: explosives storage area; abandoned in 1957	DU
TA-30	Electronics Test Area: electronics testing 1945-48	Unknown
TA-31	East Receiving Yard: 1948-54 warehouses W of airport; removed 1954	Unknown
TA-32	Medical Research Laboratory: bio-research facility; 1943-54; removed in 1954; incinerator use included	Unknown
TA-33	HP (Hot Point) Site: 1948-56 shaft experiments; High Pressure Tritium Laboratory 1970s; Material Disposal Areas D, E, K	³ H
TA-34	New Laboratory Warehouse Area (canceled)	None
TA-35	Ten Site: Radioactive lanthanum 1951-63; Los Alamos Power Reactor Experiment (LAPRE) I/II 1950s; Los Alamos Molten Plutonium Reactor Experiment (LAMPRE) I 1960s; laser fusion research 1974	³ H; ⁹⁰ Sr; ¹⁴⁰ Ba; ¹⁴⁰ La; ²³⁵ U; DU; ²³⁷ Np; Pu; Po; Co; VFP
TA-36	Kappa Site: replaced TAs-9, 23, 12 in 1950; four active firing sites; nonnuclear ordnance and armor	DU
TA-37	Magazine Area C (active): explosives storage area	DU
TA-38	Monterey Site (canceled)	None
TA-39	Ancho Canyon Site: five firing points; incinerator 1955-60; photographic study of the behavior of nonnuclear weapons	NU; DU; thorium
TA-40	DF (Detonator Firing) Site: six firing points; detonator development	³ H
TA-41	W (Weapons Group WX) Site: engineering of nuclear components; fabrication of test materials	³ H; plutonium; uranium; americium
TA-42	Incinerator Site: for low-level Pu contaminated waste; abandoned 1970	All
TA-43	Health Research Laboratory: biological research 1953-70; replaced TA-32	All
TA-44	Los Angeles Shop: experimental machine shop in Los Angeles, CA 1949-58; abandoned in 1958	Unknown
TA-45	Radioactive Liquid Waste Treatment Plant (inactive): removed majority of plutonium before discharge to Acid Canyon	^{238/239} Pu, ^{235/238} U
TA-46	WA Site: Rover batteries 1950-74; U isotope separation 1976-early 1980s; photochemistry research; lasers	²³⁵ U, ²³⁸ U thorium
TA-47	BR Site (Bruns Railhead): shipped materials via a railhead near Bruns Hospital in Santa Fe, 1943-58; abandoned in 1958	DU; unknown
TA-48	Radiochemistry Site: actinide chemistry and hot cell isotope production, area used for analyzing samples from weapon test shots, 1950s to present	U; TRU; MAP; MFP
TA-49	Frijoles Mesa Site: underground hydronuclear experiments 1960-61; now Hazardous Devices Team Training	³ H; plutonium; uranium
TA-50	Waste Management Site: treated liquid wastes before discharge to Mortandad Canyon; replaced TA-45, -35; controlled air incinerator 1976	All
TA-51	Environmental Research Site: animal exposure facility 1962; now studies of impact of waste and waste storage on the environment	⁶⁰ Co, strontium
TA-52	Reactor Development Site: Ultra-High Temperature Reactor Experiment (UHTREX)	²³⁵ U; ²³⁸ Pu; ³ H; VFP; Kr; Xe

Table 2-1: Los Alamos Technical Areas Past and Present (Continued)

TA	Name and Description	Radioactive Materials Involved ^a
TA-53	Los Alamos Neutron Science Center (LANSCE)	³ H; ⁴¹ Ar; ⁷ Be; ¹¹ C; ¹³ N; ¹⁵ O; U
TA-54	Waste Disposal Site: solid wastes; Materials Disposal Areas G, H, J, L	All
TA-55	Plutonium Facility Site (active): replaced TA-21; SNM storage, 1978 to present	²³⁹ Pu; ³ H
TA-56	Subterrene Basalt Site: melting basalt with electrically heated penetrator; abandoned in 1976	Unknown
TA-57	Fenton Hill Site: Hot Dry Rock geothermal project (inactive)	Unknown
TA-58	Two-Mile North Site: experimental sciences for TA-3 programs	Unknown
TA-59	Occupational Health Site: Office of Environment, Safety, and Health offices, emergency management	None
TA-60	Sigma Mesa: Test Fabrication Facility and Rack Assembly; Alignment Complex	Unknown
TA-61	East Jemez Road: physical support and sanitary landfill	Unknown
TA-62	Northwest Site: reserved for experiments, research, buffer zones	Unknown
TA-63	Pajarito Service Area: environmental and waste management functions	Unknown
TA-64	Central Guard Facility, Hazardous Materials Response Team	None
TA-65	Not currently active or never assigned	None
TA-66	Central Technical Support Site: industrial partnership activities	Unknown
TA-67	Pajarito Mesa: former TA-12; dynamic testing area; archeological sites	DU
TA-68	Water Canyon Site: dynamic testing area with study areas	DU
TA-69	Anchor North Site: undeveloped; buffer for the dynamic testing area	Unknown
TA-70	Rio Grande Site: undeveloped; buffer for the high-explosives test area	Unknown
TA-71	Southeast Site: undeveloped; buffer for the high-explosives test area	Unknown
TA-72	East Entry Site: Protective Forces Training Facility	Unknown
TA-73	Los Alamos Airport: on-site disposal area; incinerator 1950s	All
TA-74	Otowi Tract: water wells, archeological sites, endangered breeding area	None
Miscellaneous Locations of Activities that Involved Los Alamos Personnel		
Pacific	Nuclear tests: Marshall Islands (1945-51)	All
AK	Nuclear tests: Amchitka (Long Shot, Milrow, Cannikin) 1965, 1969, 1971	All
NV	Nevada Test Site: nuclear tests, Rover nuclear rocket engine program Nuclear tests, non-NTS: Fallon (Shoal); Tonopah (Faultless) 1968	All
CO	Nuclear tests: Grand Valley (Rulison) 1970; Rifle (Rio Blanco) 1973	All esp. ³ H; ⁸⁵ Kr
NM	Nuclear tests: White Sands (Trinity) 1945; Carlsbad (Gnome) 1961; Farmington (Gasbuggy) 1967	All esp. ¹³¹ I; ¹³³ I; ¹³⁵ I; ¹³⁷ Cs; ¹⁴⁰ Ba/ ¹⁴⁰ La
MS	Nuclear tests: Hattiesburg (Salmon and Sterling)	Unknown

^a Key for table entries:

All = ²³⁹Pu; ²⁴⁰Pu; ²³⁸Pu; ²⁴¹Am; ²³⁵U; DU; ³H; ²¹⁰Po; ²²⁷Ac; ²²⁶Ra;

DU = depleted uranium-²³⁸U;

MAP = mixed activation products (e.g., ⁴¹Ar; ⁷Be; ¹¹C; ¹³N; ¹⁵O);

MFP = mixed fission products;

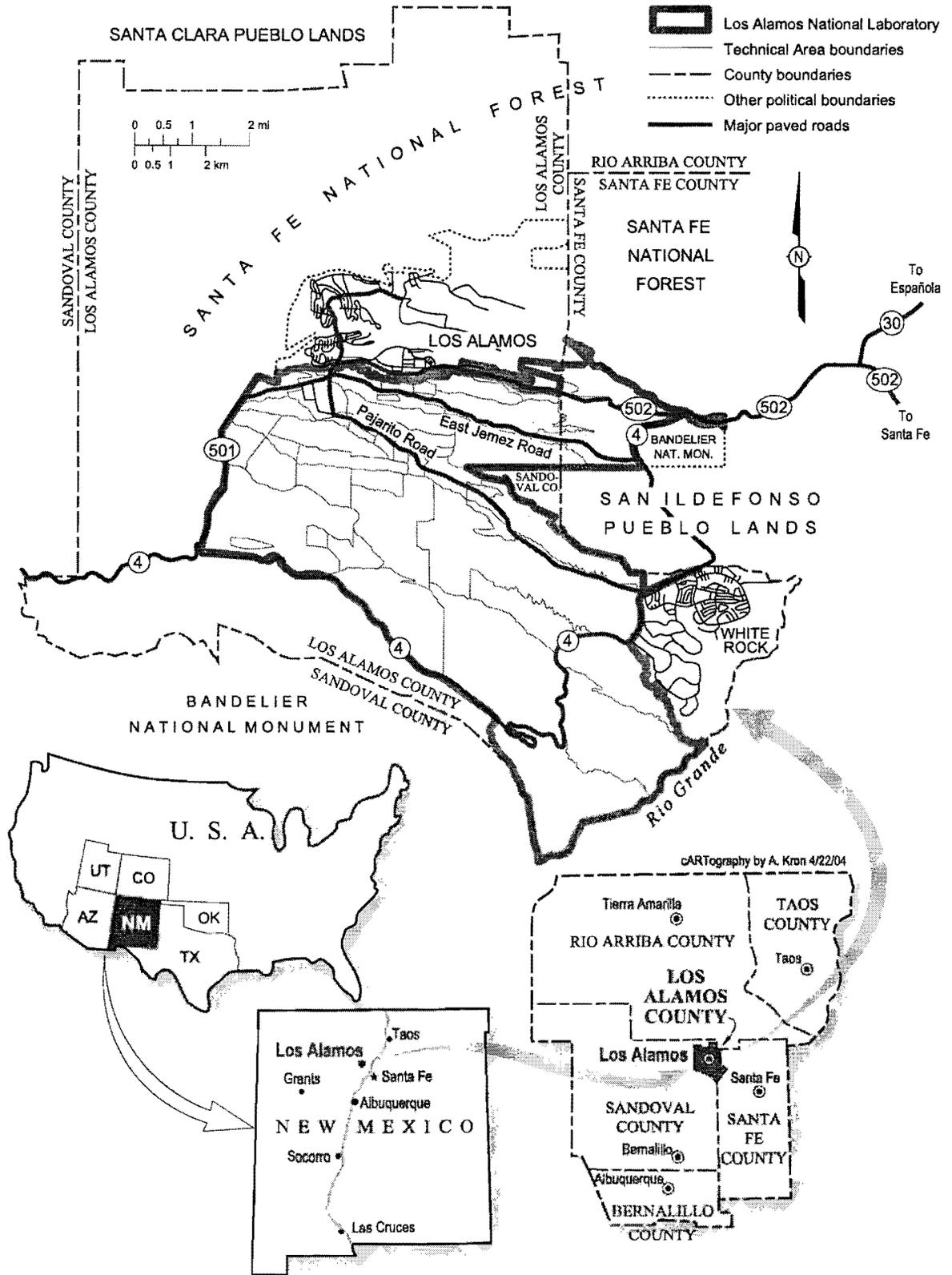
NU = natural uranium;

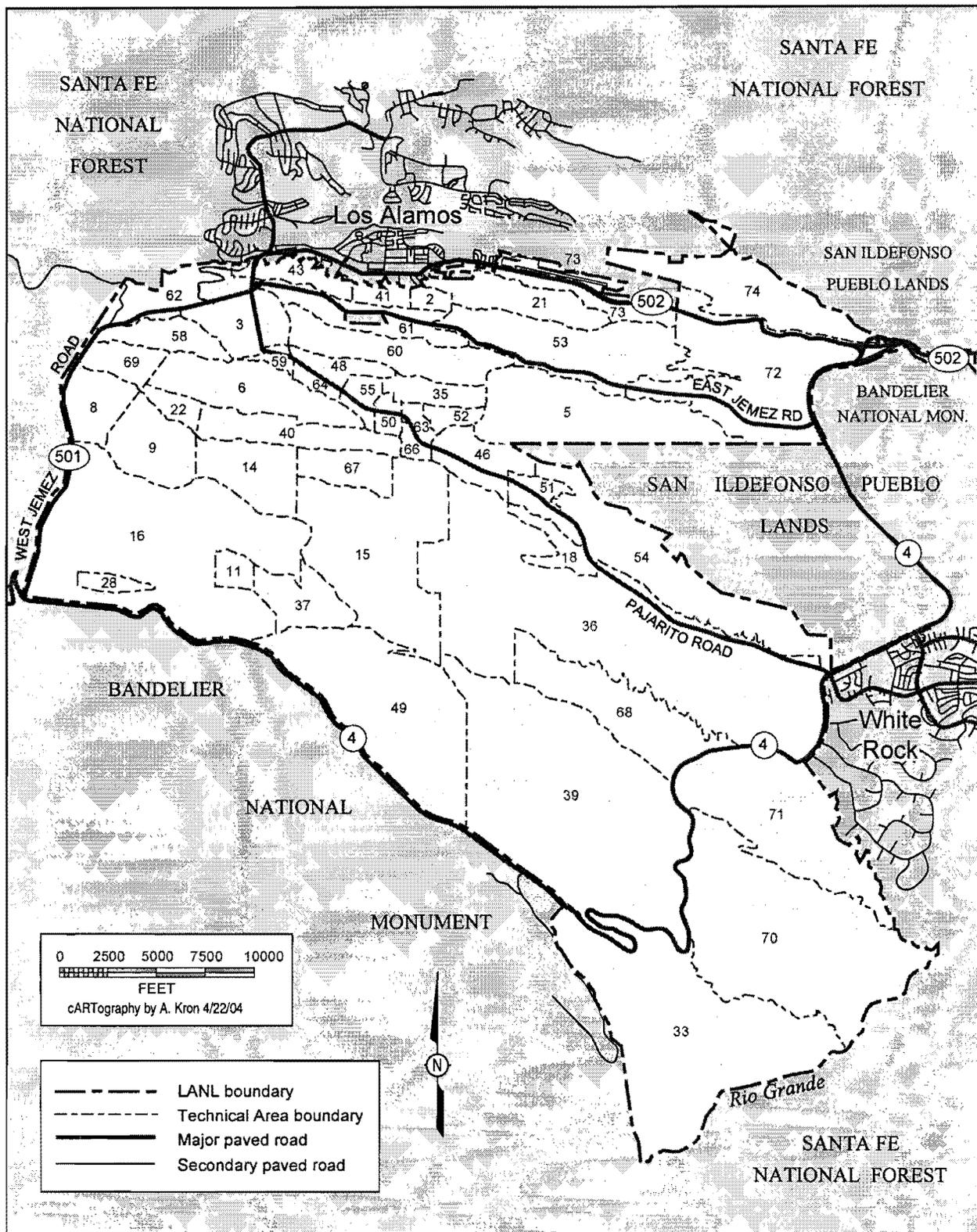
VFP = volatile fission products.

Element names without number (e.g., plutonium, uranium) indicate isotope not specified.

a.k.a. = also known as.

SNM = Special Nuclear Material.

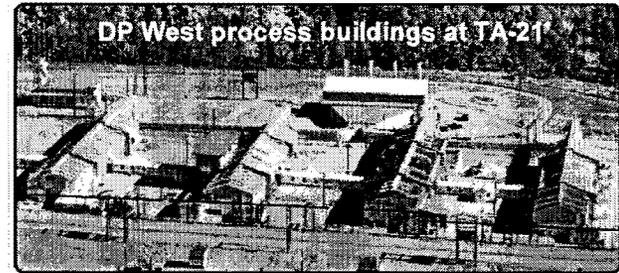
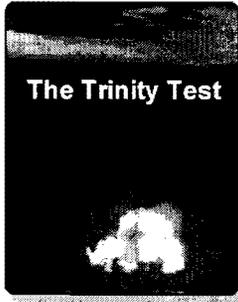
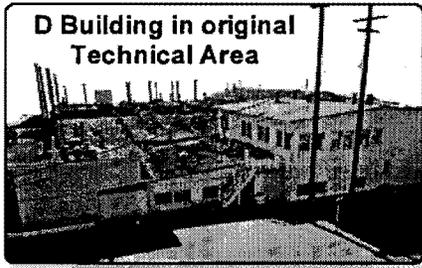




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ing (mg quantities at first)

g of Pu



ed

D Building remained in use for metallurgical R & D, analytical work, etc.

TA-55 authorized

Pu processed at TA-55

Pu production conducted at DP Site (TA-21)

CMR Building operational at TA-3, including Pu metallurgy work

Omega Site

HYPO mode

Water Boiler operated in SUPO mode

LAPRE I operated

LAMPRE I reactor operated

Omega West reactor operated

LAPRE II reactor operated

periments



Omega S

S Site operational (high explosives casting and machining; burning ground)

PHERMEX operational (explosives testing at TA-15)

ion tests in Bayo Canyon

nthanum source preparation at TA-10 Bayo Canyon site

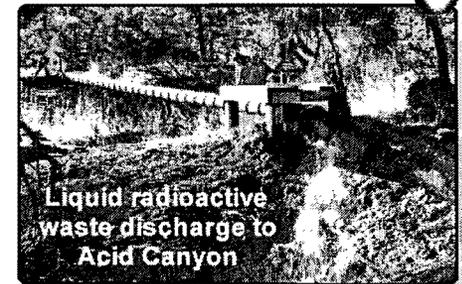
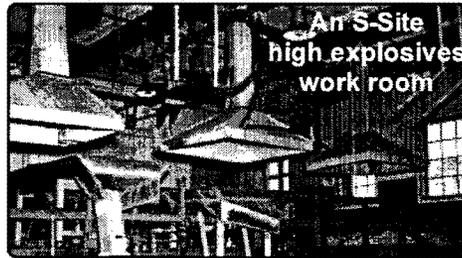
a Source prep at TA-35, "Ten Site"

uid radioactive waste discharged to Acid Canyon

ntaminated liquid wastes to Area U beds

ia T adsorption beds used

id waste plant operated, released to Acid Canyon



TA-21-35 treatment plant into operation

Area G disposal ground used

TA-50 liquid waste treatment plant operated

TA-21-257 treatment plant into operation

TA-33 tritium handling facility operational

Chapter 3: Methods Used to Gather Information at Los Alamos

Information gathering performed in the course of the LAHDRA project took the form of systematic document searching and interviewing of past and current workers and area residents.

Systematic Document Review

Systematic document review (or searching) has been conducted to date on the LAHDRA project. Systematic searching involves identifying the document collections at a facility, both classified and unclassified, then progressing through those documents in an appropriate and orderly fashion until all potentially relevant documents have been reviewed by a person qualified to recognize information that a competent scientist would use to evaluate historical releases and/or the potential for off-site health hazards. This approach best supports the "leave no stone unturned" goal that best fosters public credibility in public dose reconstruction studies. Systematic document searching can be contrasted with "directed" document searching, in which researchers have identified needs for specific types of information, and they go directly to the document locations or particular types of documents that are believed to be most likely to contain that information. Systematic searching, directed searching, and combinations of the two approaches have been applied in dose reconstruction studies in the U.S. over the past 15 years.

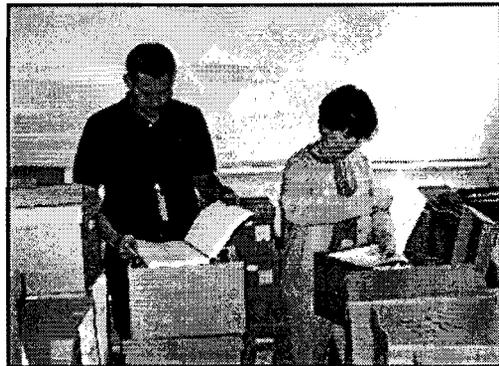


Figure 3-1: Two LAHDRA analysts review records at Los Alamos

Interviews

Interviews of current and retired workers and area residents have been conducted by the LAHDRA team to assist in the identification and description of operations possibly associated with off-site releases, identification of relevant collections of records, and development of an understanding of historical operations. Workers sometimes help the document analysts assemble the "big picture" with regard to site operations. Interviewees can also identify interview candidates with knowledge about specific subject areas, assist in the interpretation of information from documents or other interviews, and describe record-keeping practices of years gone by.

Interview candidates are often identified from author or distribution lists from key documents, from division rosters or progress reports, or from other interviews. While interviews are typically conducted with individuals, group interviews allow interviewees to jog each others memories, yielding more information that would otherwise been offered. All interviews are voluntary, and interviewees have the option to remain anonymous. In these cases, names are excluded from our records. In some cases, people who have held security clearances in the past can receive special authorization to speak freely during an interview, provided it is conducted in an appropriate facility and in accordance with all regulations and guidelines concerning handling of potentially sensitive content.

Members of the project team prepare a summary of each interview. Summaries are reviewed for classified information, and the interviewees are offered the opportunity to review the summaries for factual accuracy. Interview summaries are normally included in the project information database.

As the LAHDRA project progressed, CDC also supported and benefited from a series of interviews conducted by Peter Malmgren as part of his "Los Alamos Revisited" oral history project. Trained and experienced in anthropology and related fields, Mr. Malmgren has been involved in several oral history projects in New Mexico over the last 12 years. In his "Los Alamos Revisited" project, the 30-year Chimayo, NM resident hopes to offer a special perspective on the lives and concerns of retired Los Alamos workers. During the December 2000 to March 2003 period that CDC supported his project, Mr. Malmgren conducted over 100 interviews. Interviews numbered 1 thru 116 (the number 76 was skipped) are summarized briefly, with full names not identified, in Repos. No. 4081. The interviews cover a very wide spectrum of jobs and life experiences of people who worked at Los Alamos and/or lived in the general area. Detailed transcripts were produced by Mr. Malmgren, and the interviews were audio taped.

LAHDRA team members worked with LANL personnel to set up a roundtable meeting with current and former Los Alamos workers who were reported to have knowledge of D Building in the original Technical Area. The meeting was held on July 25, 2006 at LANL to coincide with key project team members being in Los Alamos for a public meeting the following day. The meeting was limited to individuals with the required clearance level so that classified information could be discussed freely. The meeting was videotaped, however, and an unclassified version has been made available to the public.

Meeting attendees included:

- Carl W. Buckland, Leader, General Monitoring Section, H-1, retired
- Charles D. Blackwell, General Monitoring Section, H-1, retired
- W. Clarence Courtwright, explosives safety engineer 1955-1991, retired
- Raymond Garde, LANL, retired
- Donald R. Gibbons, LANL, retired
- Joe Vigil, LANL, retired
- Tom Widner, ChemRisk
- Joe Shonka, SRA
- Bob Burns, SRA
- Jack Buddenbaum, ENSR

Plutonium release estimates have not been located for D Building so the project team is studying hundreds of documents, drawings, and photos to learn as much as possible about the plutonium processing that was performed there. The goal is to determine methods for estimating how much plutonium could have been released. At the roundtable meeting, LAHDRA team members described what they have learned about D Building and what was done there. Attendees were asked if they could address specific questions that remain, such as details of key steps in early plutonium processing, generation of airborne contamination, design of ventilation systems and some filters that were added, and indicators of environmental contamination. The workers knew very few details about D Building, but the project team did learn some useful information about LASL operations.

How Documents Were Categorized, Summarized, and Catalogued

When a document relevant to off-site releases or health effects from Los Alamos operations is found by LAHDRA analysts, a Document Summary Form (DSF) is completed. After receipt from Los Alamos, each document is assigned a Repository Number, and the information from the DSF is entered into a project information database. Copies are requested of the most relevant documents. These copies go through several review processes before being released to the public. A classification review is required, personal information that is protected under the Privacy Act is identified and removed, and a legal review is performed to identify information which is attorney-client privileged.

The Document Summary Form (DSF)

A DSF is used by the LAHDRA analysts to enter bibliographic and project specific information about relevant material found during the search of records at LANL. This form has been revised several times during the course of the project. A copy of the latest version, Rev. 7, is presented in Figure 3-2.

For purposes of completing this form, the word "document" is used as a generic term to represent the collection of information being described on the form. In most cases this is an individual document or a collection of related documents. However, the collection may have also be a notebook, a roll of microfilm, a box of records, or some other grouping of material.

LAHDRA analysts place each document or group of documents selected into one of three categories. These categories, which were defined by CDC, are as follows:

Category 1. These are documents that a competent scientist would use in estimating off-site releases or their health effects from operations at LANL or other LANL-sponsored operations within the State of New Mexico (e.g., Trinity). Examples of Category 1 documents include effluent monitoring data, accident reports with estimates of releases, release point information, or results of environmental monitoring performed near locations where people lived or recreated. All Category 1 documents are copied for the project document repository and for release to the public via reading rooms or other means.

Category 2. These are documents that contain supporting information that could be useful in *confirming* estimated release quantities or health effects from operations at LANL or other LANL-sponsored operations within the State of New Mexico. Examples of Category 2 documents include historical documents on site activities, notebooks of relevant operations, or process flow sheets. They could also include analyses of sediment cores (which could be used to confirm the identity and timing of past contaminant releases to surface water bodies); measurements of ^{129}I in local soils (which could be used to establish patterns and levels of past ^{131}I releases); or measurements of mercury in the tree rings (which could be used to estimate the magnitude of past mercury releases). The decision to copy Category 2 documents is left to the document analysts. Cases when Category 2 documents are copied include documents derived from microform sources, cases when complete copies are readily available (e.g., surplus copies of LANL reports or PDF versions available); or when a document contains information about historical operations at LANL.

Item Number/Other Identifier	OFFICE USE ONLY					
	S7 Initials	S7 Review Date	Page Count	Entry Date	Initials	Rep. No.
DOCUMENT TITLE						
AUTHOR(S)						
DOCUMENT NO.				PROJECT		
PUBLICATION DATE: _____		DATA TIME PERIOD: START _____		END _____		
Estimated? <input type="checkbox"/>		Estimated? <input type="checkbox"/>		Estimated? <input type="checkbox"/>		
ORGANIZATION(S)		TECHNICAL AREA(S)				
DOCUMENT TYPE: <input type="checkbox"/> Box <input type="checkbox"/> Document <input type="checkbox"/> Electronic <input type="checkbox"/> File Cabinet <input type="checkbox"/> Microform <input type="checkbox"/> Notebook <input type="checkbox"/> Photo/Dwg.						
CDC DOCUMENT CATEGORY: 1 2 3 DOCUMENT REQUESTED? <input type="checkbox"/> Complete <input type="checkbox"/> Partial <input type="checkbox"/> None						
ORIGINAL LOCATION OF DOCUMENT: <input type="checkbox"/> Litigation Support Database _____						
<input type="checkbox"/> LANL Records Center _____		<input type="checkbox"/> LANL Archives _____				
<input type="checkbox"/> LANL Reports Library _____		<input type="checkbox"/> Other _____				
POINTS OF CONTACT FOR DOCUMENT						
1.			2.			
KEYWORDS:						
Atmosphere	Biological	Chemical	Chronic Release			
Design	Effluent	Environmental	Episodic Release			
Ground Water	Operational	Radiation	Radionuclide			
Surface Water	Terrestrial	Uncertainty	Waste Disposal			
Other:						
DOCUMENT ABSTRACT: Original? <input type="checkbox"/>						
ANALYST COMMENTS						
ANALYST:				DATE REVIEWED:		

Figure 3-2: The LAHDRA Document Summary Form (DSF)

Category 3. These are documents that could be used to estimate or confirm off-site releases or health effects from nuclear weapons complex sites outside of New Mexico (for example, nuclear device testing in Alaska, Nevada, or on any Pacific islands or atolls), or from operations sponsored by groups other than LANL at non-LANL sites within New Mexico (for example, sponsored by Sandia National Laboratory at Kirtland Air Force Base in NM). In contrast, documents about activities by LANL personnel that occurred off site but within New Mexico (such as at Trinity site) would be Category 1 or 2, depending on the type of information they contain. Documents concerning operations at foreign nuclear weapon sites or nuclear power plants (foreign or domestic) are not defined as Category 3 material since they are not within the responsibility of the U.S. Department of Energy. Category 3 documents generally are not copied for the project document collection. However, there are some cases where copies of Category 3 material have been obtained.

Table 3-1 provides a summary of how documents were categorized based on the location and sponsorship of the activity they described.

Table 3-1: Assignment of Document Category Based on Activity Sponsor and Location

Activity's Sponsor	Location of Activity		
	At LANL	Within New Mexico but not at LANL	Weapons Complex Site Outside of New Mexico
LANL	Category 1 or 2	Category 1 or 2	Category 3
Others	Category 1 or 2	Category 3	Category 3

A document can only be assigned one category number. Previously, documents not deemed to be Category 1, 2, or 3 were called Category 4. Category 4 documents were not relevant to estimation or confirmation of releases or health effects from any sites of interest. Therefore, Category 4 documents were not summarized for inclusion in the project database or copied for the document repository. Once work on the project resumed, one important change made to the way systematic document searching was carried out was to eliminate formal documentation of the review of Category 4 material. This resulted in a substantial increase in throughput for the systematic search process.

The following is a description of the other fields on the DSF the analysts complete:

Item Number/Other Identifier: Here analysts enter the item number from the LANL document request log or other identification number as appropriate. Currently the document request logs differentiate between material which came from classified and unclassified sources, so these distinctions are included as necessary.

Office Use Only fields: These fields are used by the database and records management staff to record administrative information such as the repository number assigned, the number of pages, etc. These fields are not used by the document analysts.

Document Title: This is the complete title of the document where possible, e.g., "Environmental Surveillance at Los Alamos during 1997". If the collection of information had no official title, the analysts are instructed to enter a concise description of the material, e.g., "Flow charts and source terms for radioactive waste projections". If a memo is being described, the subject of the memo is entered as the document title. Titles for all notebooks/logs begin with "Notebook:" and for all interviews with "Interview with:".

Authors: The names of all individual authors are entered here. If an organization such as a company, group, or division is given as the author, this is included in the organization field.

Document Number: This is the official publication number if one exists, e.g. "LA-13487-ENV". If the document has no document number, the field is left blank.

Project: This is the name assigned to a specific program or activity. Thus far about 60 projects have been identified. Some examples include Project 56, Trinity, RaLa, ROVER and UHTREX.

Publication Date: This is the date the material was published or presented.

In order to facilitate searching of dates, CDC requires that values be assigned to each date field for each record (publication date, start date and end date). In cases where the publication, data start, or data end dates were unclear, a set of rules was developed for estimating these dates. These rules are described in Appendix K. The analysts indicate that dates are estimated in this manner by marking the box below the appropriate date field on the DSF. An example of a rule for date assignment is if only a publication date is available then start date would be the first day of January of the year of the publication and stop date would be the publication date. Note application of these rules introduces imprecision in the affected date fields, somewhat limiting their usefulness.

Data Time Period - Start and Stop Dates: This is the time period that the data in the document cover or the time period covered by logbooks or other logs. If available, the beginning dates and ending dates are indicated.

Organization(s): In general, this is the organization (e.g. group, division, company, or government agency) that authored or sponsored the document. Currently over 300 organizations have been identified.

Technical Area(s): The technical area(s) addressed by each document are entered here, as appropriate. A detailed description of each LANL technical area and their associated programs (similar to Table 2-1) was developed for use by the analysts in assigning TA numbers.

Document Type: The material being documented in the DSF is categorized as one of the following:

Box	Document	Electronic	File cabinet
Microform	Notebook	Photo or Drawing	

Document Requested: Analysts are instructed to indicate whether a copy was requested of the complete document (complete), a portion of the document (partial), or no part of the document (none). This field was added just prior to when work on the project was interrupted. Originally it was used to indicate how much of a document had been received from LANL. However, once work resumed, the usage was changed. Now this field is used by analysts to indicate how much of a document they requested. Because of this change there are several documents in the database for which this field needs to be updated. The original use of the "Document Requested" field stemmed from the problems experienced in reconciling the enormous backlog of material which accumulated at LANL during the initial work period. There were numerous instances of only portions of requested material being received along with volumes of material which was never requested. These problems were largely mitigated once work resumed, though the backlog problem remained due to a lack of persons authorized to declassify material.

Original Location of Document: This is the physical location of the documents identified by analysts. Locations include:

Litigation Support Database
LANL Records Center
LANL Archives
LANL Reports Library

Points of Contact for Document: CDC requires the project team to include names for individuals whom they would contact to make arrangements to review the original copy of any particular document.

Keywords: The following is the set of general keywords listed on the DSF:

atmosphere	design	ground water	surface water
biological	effluent	operational	terrestrial
chemical	environmental	radiation	uncertainty
chronic release	episodic release	radionuclide	waste disposal

Analysts selected the relevant keywords for each document, and in some cases added others. Since the start of the project, over 400 additional keywords have been used by the analysts. The assignment of keywords has not been rigorous, though analysts were instructed to stick to the general list as much as possible. Keywords are still useful even though full-text search of the documents is available. However, they are not as important as they once were. CDC requires that every document have at least one keyword assigned.

Document Abstract: This is meant to be a clear, complete and concise summary of the document or description of the collection of material. In some cases the abstract is taken directly from the document's abstract or executive summary. If so, a check or "X" is placed in the check box labeled "Original" to indicate that the text reflects the words of the document author(s), not the LAHDRA analyst.

Analyst Comments: This is an optional field an analyst can use to indicate why a document was selected or other information about its content.

Analyst: This is the name of the analyst who selected the document.

Date Reviewed: This is the date the document was reviewed and the DSF was created.

The LANL Document Request Log

One of the changes implemented once work resumed was the use of a log sheet to record information about each DSF generated by analysts in the various LANL records facilities. Use of these log sheets was coordinated through LANL's LAHDRA Project Office. Previously the project team generated its own logs of requested material, but because we were not allowed to copy material as it was identified and there were substantial time delays between identification of the material and it being reviewed for classification, there were often problems in getting the material reviewed and released. Often it was not clear what had been requested, or the material would not be in the same location. These matters made reconciling the substantial backlog of documents which had built up even more challenging.

Once work resumed the project team was allowed to copy material as it was identified. That, plus use of the new log sheets, significantly improved the document release process, as it provided a degree of rigor and formality which did not exist before. Both LANL and the project team had a formal record of the material which had been requested, and the material was ready for the declassifiers once they became available. In addition, for material which was released, the log sheets provided a convenient means to verify everything the project team had requested had been received and acted as a vehicle for resolving discrepancies.

Individual document request logs were established for the various records collections within a records center, such as classified and unclassified microfilm in the Records Center (two separate logs), classified and unclassified reports in the Reports Library (again, two separate logs) and so on. Each entry on a given log was assigned a unique item number, which is used as a reference when tracking the progress of material through the public release process. These item numbers, which are assigned sequentially, are akin to the repository numbers which are assigned once the material is released by LANL and received by the project team. The fields on the log sheets varied somewhat depending on the records facility where they were used, but they all included fields for the document title, page count, location, accession numbers or other identifiers, etc. A log entry was made for each DSF regardless of whether the document was copied so there was a complete record of everything the analysts identified as relevant in a given document collection. The log sheets also included fields for use by the classification reviewers to indicate they had reviewed each document, whether it had been declassified, redacted, etc.

Summary Statistics of the Document Collection

Currently there are 6,106 files in the LAHDRA database. There is some duplication of material, as occasionally different analysts create DSFs for the same document. This generally occurred earlier in the project due to delays in the review process. Sometimes it was many months to years before DSFs or associated documents were released by LANL and available for entry into the database. Presently there is a process in place to identify duplicate material as it is received to prevent it from being entered, but this effort was less formal earlier in the project. In the cases where known duplication exists, the two records are cross-referenced in the "analyst comment" field.

The breakdown of LAHDRA documents by category number is as shown in Table 3-2.

Table 3-2: Breakdown of LAHDRA Documents by Category Number

Category	Number	Percentage
Category 1	2670	44%
<i>Useful for reconstruction of off-site releases or health effects</i>		
Category 2	2651	43%
<i>Information to confirm off-site releases or health effects</i>		
Category 3	785	13%
<i>Information about other DOE sites</i>		

Earlier in the project, there was a significant lag time between when material was selected by an analyst for copying and when it was actually released by LANL. At the closeout of active document review under the initial contract, there was an extensive backlog of material which had not been released by LANL. Prior to the resumption of systematic document search activities, LANL and the project team made a substantial effort to get all of the backlog material reviewed and released. All of this material was processed by the project team and added to the project document repository and scanned image collection by May, 2005.

Table 3-3 shows the breakdown by locations from where LAHDRA documents have been retrieved:

Table 3-3: Breakdown of LAHDRA Documents by Location of Origin

Location	Number	Percentage
LANL Records Center	2901	48%
LANL Research Library	409	7%
LANL Archives	935	15%
LANL Reports Collection	1387	23%
Litigation Support Database	69	1%
ESH Records Center	249	4%
ESH-17 Air Quality	30	0%
ESH Dosimetry Records	54	1%
ALDNW Vault	2	0%
LANSCE/TA-53	43	1%
Project Files	14	0%
DOE EML	1	0%
Other	5	0%
Unknown	7	0%

Please note that, as of this writing, there is a backlog of material which has been selected and copied by the project team which is awaiting review and release by LANL. This backlog of material, which is from systematic searching in the LANL Archives and Report Library, is not reflected in the above data. This backlog exists because of procurement issues between LANL and the subcontractor organization it uses to perform classification reviews. The lack of a contract vehicle has prevented the subcontractor from reviewing material selected by the project team for several months.

The breakdown of LAHDRA documents by publication date is shown in Table 3-4:

Table 3-4: Breakdown of LAHDRA Documents by Decade of Publication

Location	Number	Percentage
1940s	940	15%
1950s	942	15%
1960s	936	15%
1970s	1322	22%
1980s	881	14%
1990s	1001	16%
2000s	42	1%
Unknown Dates	42	1%

Document Review at the LANL Records Center

As originally specified, the LAHDRA project was divided into six phases to be completed sequentially. Each phase was meant to target a specific group of records, as outlined below:

- Phase 1: The LANL Records Management Center
- Phase 2: The LANL Archives
- Phase 3: The Technical Report Library
- Phase 4: Records at the Technical Areas
- Phase 5: Records pertaining to "Work for Others"
- Phase 6: Documents located at other sites

Because of restrictions that were placed on the number of analysts that could work in a given repository at any time, a decision was made to abandon the sequential approach and work in multiple repositories concurrently. This approach was found to be more effective for systematic searching and was continued once document search and retrieval activities resumed.

The initial and principal focus of the LAHDRA systematic search effort was the LANL Records Management Center, Building 1001 in Technical Area 21 (TA-21-1001). This section describes and summarizes the document search and retrieval activities conducted there. This section does not address the LANL Archives, which is also housed at the TA-21-1001 facility.

Records Center Description

The LANL Records Center is a 15,000 square foot building located at 180 6th Street in Los Alamos, New Mexico. The function of the Records Center is to receive and catalog records from the various LANL groups and divisions, to place and maintain these records in retrievable storage, and disposition them in accordance with DOE retention and disposition guidelines and other associated requirements (such as the moratorium on destruction of records deemed pertinent to epidemiological studies). The LANL Archives is also housed in Building TA-21-1001, however, this collection is stored, maintained, and managed separately from the Records Center's holdings. The systematic review effort for the Archives is discussed in a subsequent section of this report.

Building TA-21-1001 is sub-divided into six "bays" denoted A through F. The Records Center includes a seventh bay, denoted G-bay, located in a separate building (TA-21-1002) behind the primary facility. The primary facility, Building TA-21-1001, is a designated Vault-Type Room, and includes classified holdings. The records stored in G-bay are considered unclassified for access control purposes. The Records Center holdings are stored in bays B, C, E, F, and G. Each bay contains a number of rows consisting of either tall (10-drawer) filing cabinets or shelving. Records Center shelving and file drawers are shown in Figures 3-3 through 3-6. The file drawers are used primarily to store paper records. The shelving is used to hold records contained in standard, one cubic foot storage boxes. There are also a number of mobile storage units used in the Records Center to house media such as microfiche and microfilm. Storage and review of microfilm are depicted in Figures 3-7 and 3-8. Each bay typically contains a mix of different types (formats) of records and records storage media/containers. For example, the tops of the rows of file cabinets are utilized for storing boxes and large-sized media such as drawings and blueprints.



Figure 3-3: Boxes of documents on shelves in the LANL Records Center

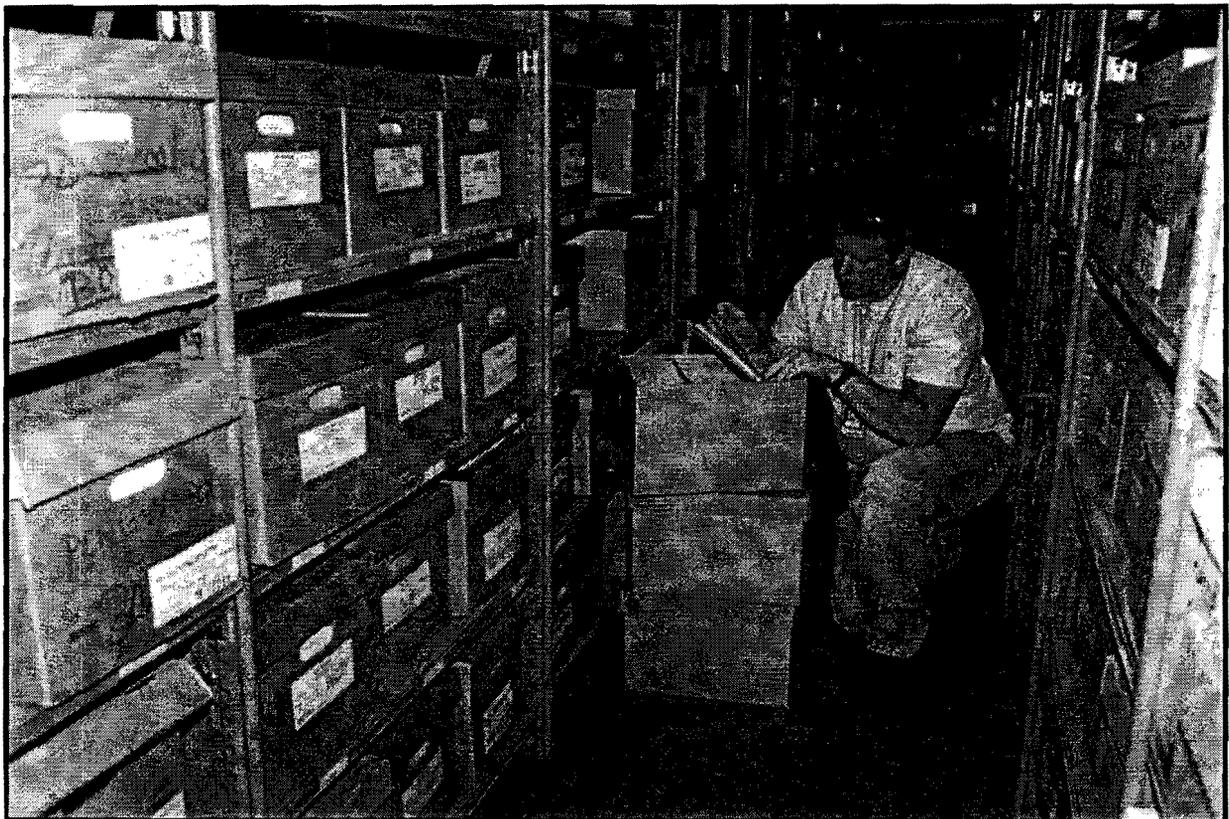


Figure 3-4: Document review in the LANL Records Center



Figure 3-5: File drawers used for document storage in the LANL Records Center

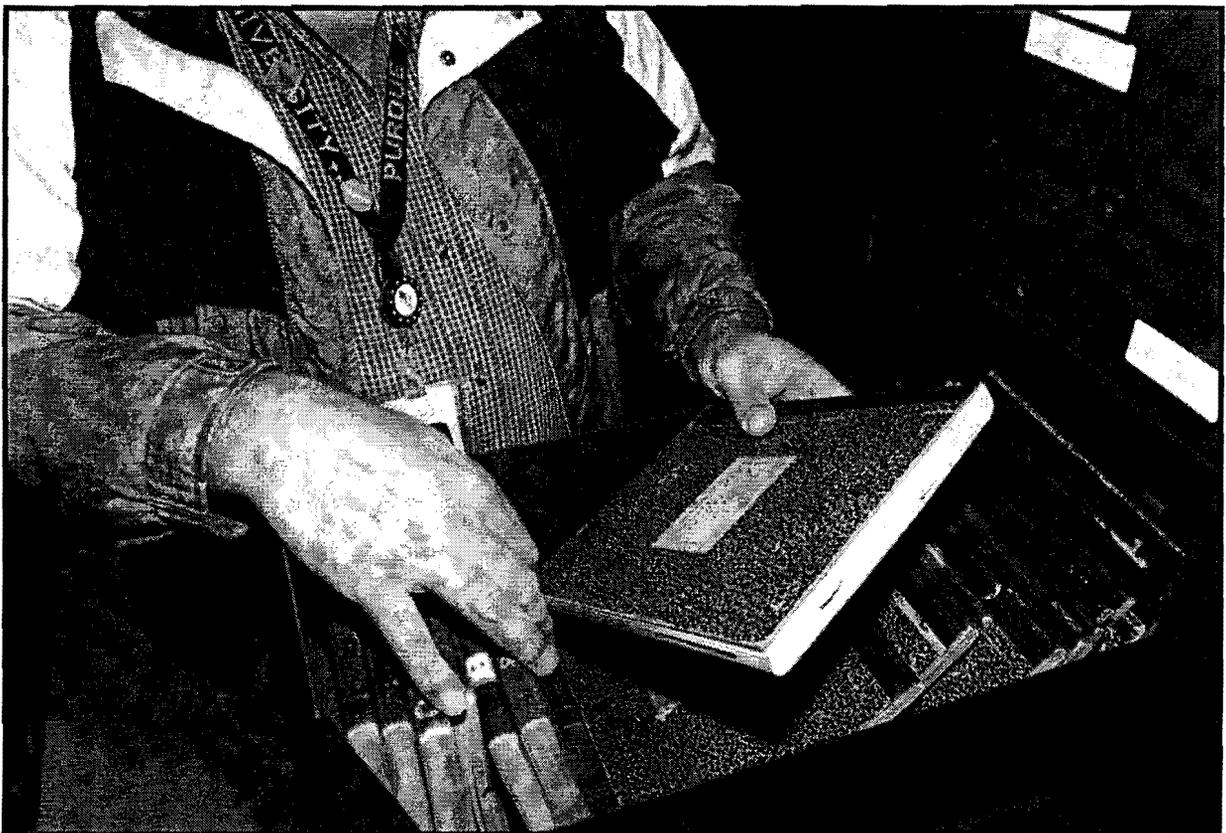


Figure 3-6: Review of notebooks in a LANL Records Center drawer

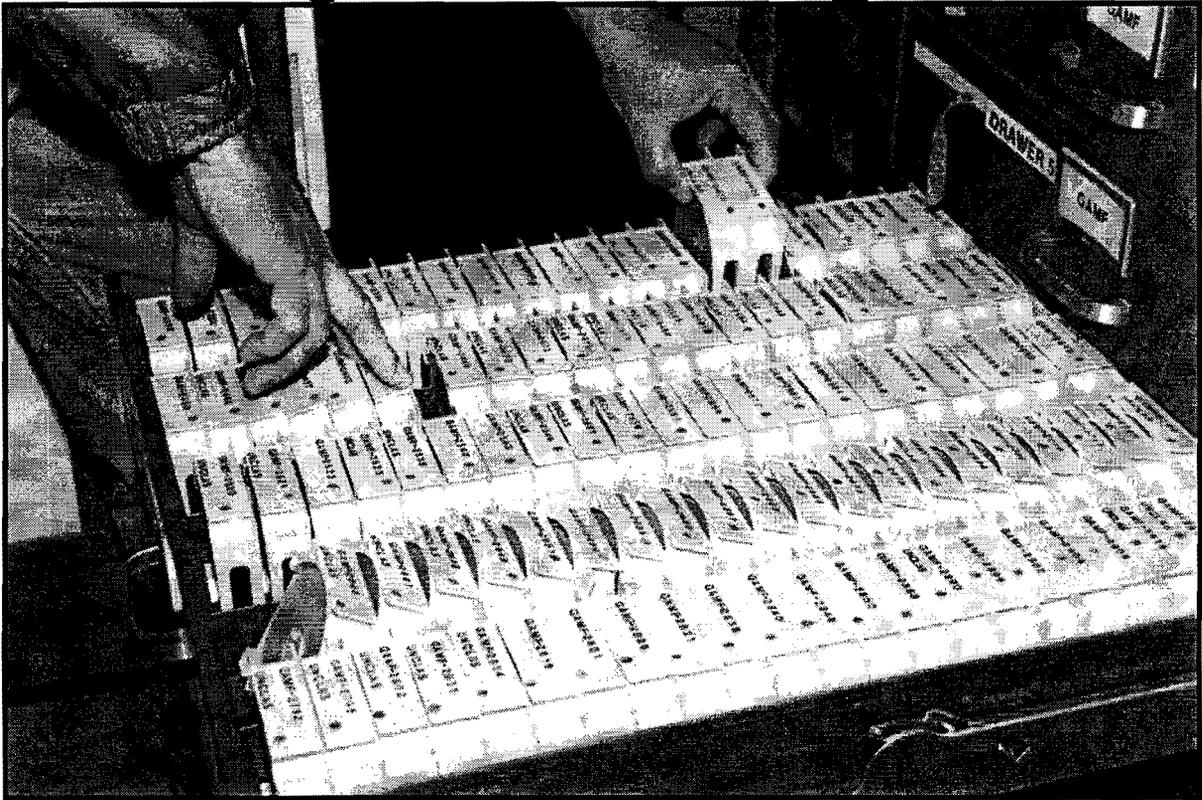


Figure 3-7: One of numerous drawers of microfilm in the LANL Records Center

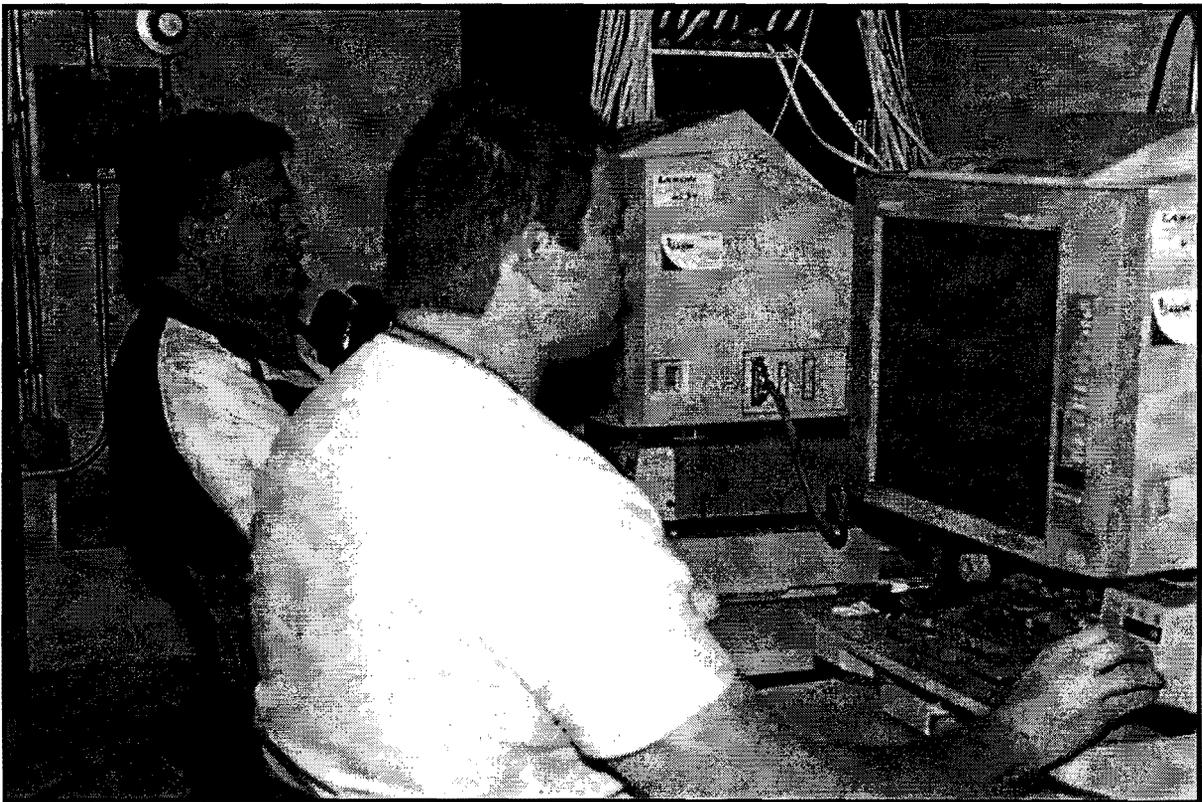


Figure 3-8: Review of microfilm in the LANL Records Center

All material accessioned by the Records Center is assigned a Transfer Record (TR) Number prior to delivery to the center. TR Numbers are assigned sequentially and are the principal means of identifying, locating, and tracking material in the LANL Records Center. Locations of records in the Records Center are referenced using a "bay-row-shelf" nomenclature, where "shelf" may be any number of storage locations, such as a file drawer or a specific box in a vertical stack of boxes. Thus, the location "B-1-2" would refer to material location in B-bay, Row 1, Location 2.

The LANL Records Center has been operating near its storage capacity for some time, and new storage locations are created frequently as the need arises. As a result, the number of records storage locations in the center at a given time is variable quantity. As of February, 2001, the number of storage locations in the Records Center was 17,615. Note this total does not include the large volume of records the center holds on microfilm or microfiche media.

The space shortage faced by the LANL Records Center results in records frequently being relocated, reconsolidated, transferred to Federal Records Centers, or otherwise dispositioned to free up storage locations for newly-accessioned material. This frequent turnover of material presented challenges to the document search and retrieval effort that rendered elements of the original search plan ineffective and required additional measures to track the progress of the effort.

Recently the Records Center completed a relocation to the Los Alamos National Security Sciences Building (NSSB) in TA-3. Many of the records were packaged and palletized for relocation to the NSSB. Many others were transferred to Federal Records Centers. The project team's first priority upon the resumption of document search activities at Los Alamos was therefore to complete the outstanding systematic review of Records Center holdings accessioned prior to December 31, 1999 before the material was unavailable for review because of the relocation process.

Summary of Document Review Activities at the Records Center

At present, the systematic search effort for the Records Center (and for the project as a whole) may be described as having occurred over three distinct periods: the initial search effort (up to the work stoppage), the interim period, and that following the resumption of systematic search activities. By learning from problems encountered earlier on, both LANL and the project team have made important changes to the systematic document review and retrieval process. These changes have resulted in significant improvements in both the throughput of the systematic review effort and the review and release process. There is still the problem of backlog material (i.e., long delays between the selection of relevant material by the project team and it being released by LANL), but many of the other problems associated with the document review and release process (discussed below) have been largely mitigated.

The three periods of systematic document search and retrieval for the LANL Records Center are discussed below.

Initial Systematic Search of the Records Center: February 1999 – October, 2003

The initial systematic search for relevant material in the LANL Records Center began in February of 1999 and continued until October of 2003. Depending on their physical location, records were either reviewed in place or pulled and brought to a more convenient location. Following review, the storage location for a set of records was marked using one of two rubber stamps. One stamp was used to identify records deemed by the analyst not to contain information pertinent to off-site releases or health effects:

✓ CDC/NCEH (in green ink)
REVIEWED

The other stamp was used to identify boxes or drawers that contained some relevant information, in other words at least one contained document was judged to be Category 1, 2, or 3.

★ CDC/NCEH ★ (in red ink)
DO NOT DESTROY

For records stored in boxes, the outside of the box was stamped. For records stored in drawers, an adhesive label was stamped and affixed to the drawer. Originally a log entry was made identifying everything which was reviewed. These logs, referred to as "box logs", included the document category assigned to the material (i.e., Category 1, 2, 3, or 4), its TR Number, location, the analyst that performed the review, and the review date. This information was recorded for all material, regardless of whether it was found to contain relevant information. In addition, a DSF was completed for all material deemed Category 1, 2, or 3. For material selected for copying, an additional entry was made in a separate log identifying the material by its TR Number and location. The purpose of this "review log" (as it was known) was to provide the classification reviewers a current listing of what they needed to review and to aide them in locating it. Material to be copied was also flagged using self-stick notes or equivalent to make it easier for the classification reviewers or others to find later. Once material was either confirmed to be unclassified or properly redacted, it was copied and forwarded for an additional series of reviews to confirm it could be released to the public. This purpose of this second review was to screen for information that was protected under the Privacy Act, proprietary, attorney-client privileged, etc. The review log served as a tool to both identify material in need of classification review and that which had been forwarded for the second part of the review process or still needed to be copied.

Early in the initial review effort it became apparent the tools and methods originally specified for tracking progress and identifying material that had and had not been reviewed were untenable. The volume of the material in the Records Center coupled with its dynamic nature (i.e., high turnover) meant handwritten logs were of little use. Likewise, the fact that boxes and drawers that had been stamped as reviewed were often re-used to store material that had not been reviewed meant the presence or lack of one of the stamps was essentially meaningless. Further, the ever-changing number of storage locations and constant in-flux of new material made asserting a completion percentage problematic, and presented a task that was open-ended. It became clear the only reliable way to keep track of the review effort for the LANL Records Center was to create and maintain an electronic database of the center's holdings and to track what had and had not been reviewed by TR Numbers. In addition, a cut-off accession date had to be established to define the point where the center's holdings would be considered frozen for the purpose of asserting when the task of reviewing all of the material was completed.

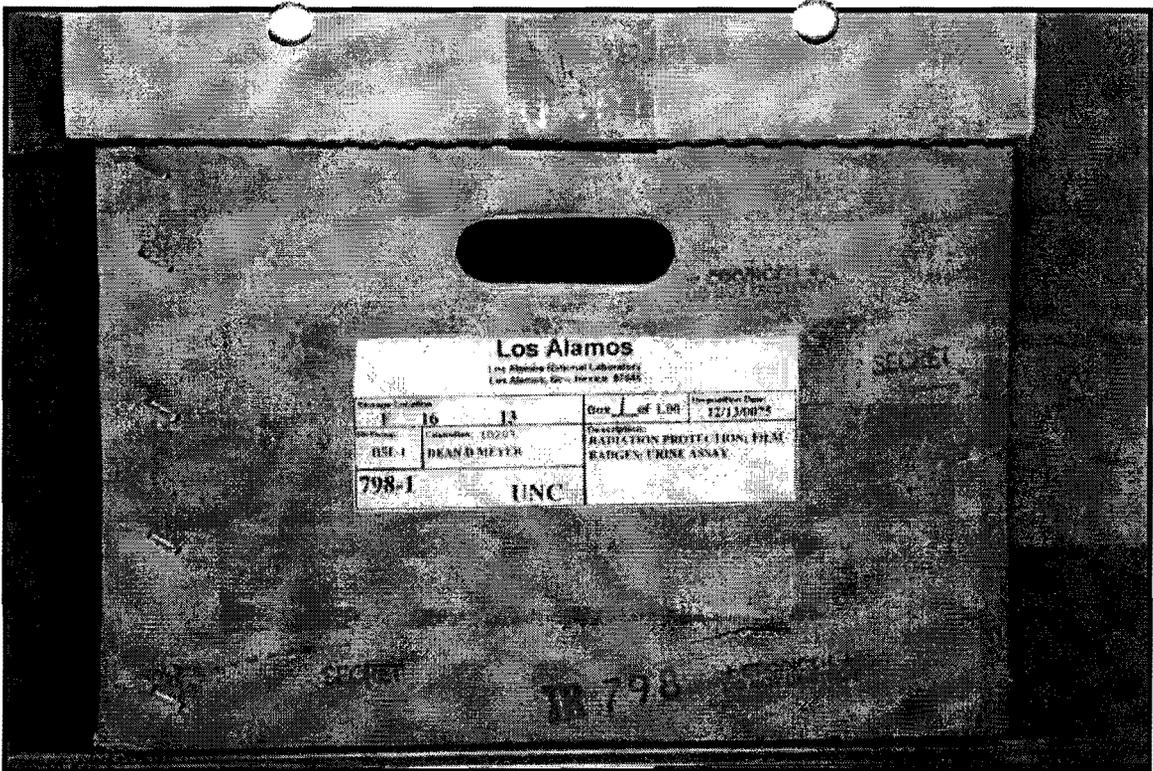


Figure 3-9: A Records Center box marked with the red "Do Not Destroy" stamp

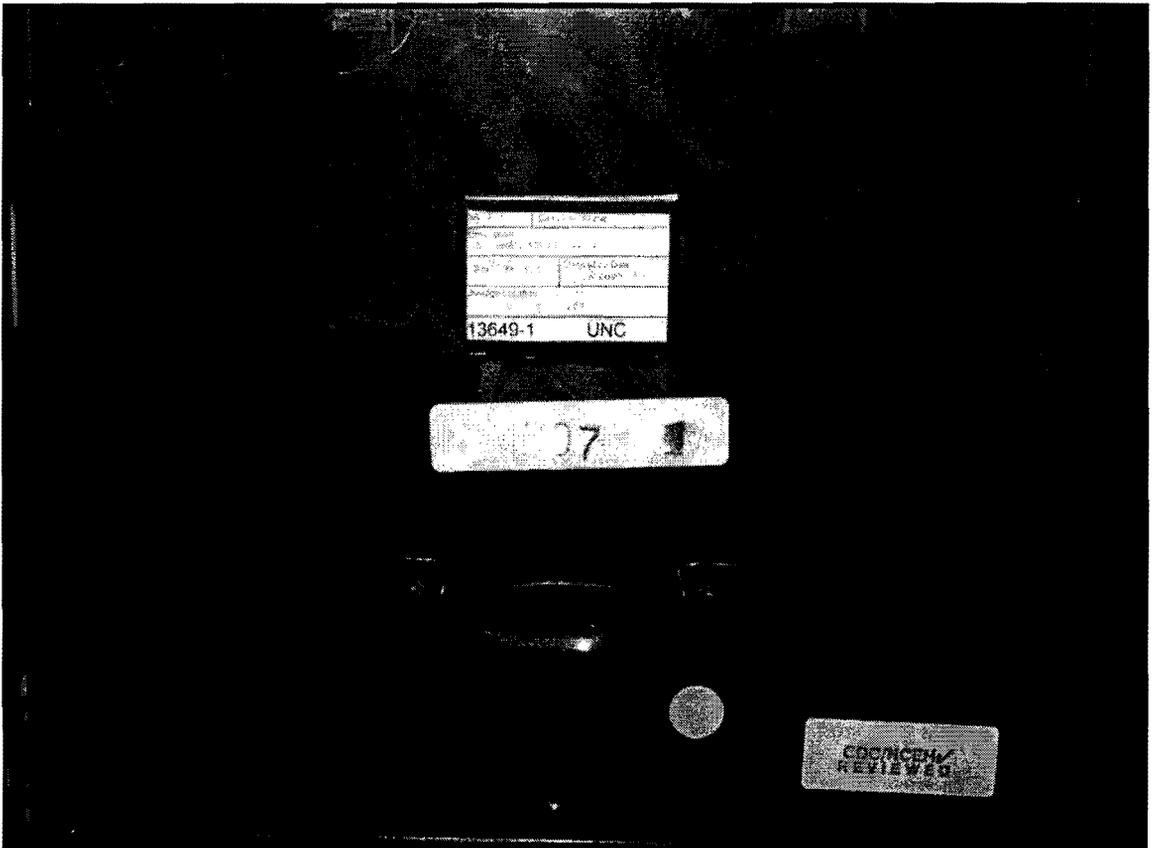


Figure 3-10: A Records Center drawer labeled with the green "CDC Reviewed" stamp

The records database used and maintained by the Records Center staff was used as the starting point for the database developed to track the review effort for the LANL Records Center for the LAHDRA project. Additional tables, fields, and search criteria specific to the LAHDRA effort were then added as needed. The most visible of the additional tables was an electronic version of the box log completed by the analysts as they reviewed material. The box logs, along with accession information provided by the Records Center staff, provided the two sources of data used to maintain the database. As long as the database was kept current in terms of records locations and TR Numbers, any discrepancies between it and the handwritten box logs gave an immediate indication of either an error in the log or material that had been moved or otherwise dispositioned. In this way, the difficult task of tracking material that had and had not been reviewed was simplified greatly, even for cases where the same locations required review a number of times due to material being rotated through. This was because all records were tracked by TR Number and not location.

The database developed and used to manage and track the review effort for the LANL Records Center was not used for microform records (i.e., microfilm or microfiche). These materials were not subject to the same turnover problems that hindered the review effort for the paper records, so the review of microform records could be managed and tracked in a manner more consistent with what was originally conceived for the paper records. Small red and green colored, adhesive dots were applied to microfilm cassettes in lieu of the rubber stamps to indicate material that had been reviewed. For microfiche records, the rubber stamps were applied to either the sleeve the media was stored in (for individual microfiche records) or to the storage container (such as the front of a drawer) if it was a large volume of records.

The cutoff accession date selected to define when the contents of the Records Center were considered frozen for the purpose of asserting when the review task was completed was December 31, 1999. The last Transfer Record assigned prior to this date was TR Number 13779. Thus, all material in the Records Center having a TR Number 13779 or less was targeted for review under the initial LAHDRA project contract. Subsequent activities will focus on assessment of material accessioned from January 1, 2000 forward by reviewing the summary information included in Transfer Records. A decision on whether to physically review the material will then be made based on the description given.

Interim Search and Retrieval Activities: September, 2004 – March, 2005

A work stoppage resulted in cessation of systematic search activities at Los Alamos in October of 2003. As of that time, a large backlog of material selected by the project team for copying and release to the public had accumulated. An interim effort to get this material copied, reviewed, and released began in September of 2004. At that time the process required was as follows: identify and locate the backlog material, make an initial copy, review and redact it as required for classification purposes, send the unclassified copy for legal review and redaction (of private or privileged information), and then make the project team's copy of the final, publicly-releasable version. Unfortunately this process had to be carried out by LANL without input from the project team. This led to a number of problems once the documents were received by the project's records management personnel. These included duplicate material being re-reviewed and material which was never requested being sent through the review process.

From the outset of the project LANL had made copies of the material selected by the project team for its own records. With the work stoppage and subsequent turnover in personnel, many of LANL's copies of the project's documents got sent back through the review and release process. In addition, there were numerous cases where misunderstandings of what document(s) the project team had selected resulted in large volumes of material which had never been requested also being sent through the review and release process. For

example, entire file drawers were released when only a few pages had been requested, and a large volume of Category 2 material was released although copies had not been requested. For the project team, all this superfluous material was a challenge to process, as much of it had little in the way of identifying information which could be used to easily tie it back to an original request (i.e., a DSF). As a result, there was a substantial effort required on the part of the project's records management personnel to reconcile the enormous volume (approximately 100,000 pages) of material and figure out what was duplicate, what was backlog, and what was extraneous; and for the backlog material, figure out which DSF it belonged with, and what was still missing.

The systematic review of records at LANL resumed in February of 2005. A listing of material from the initial review effort which was still outstanding was compiled so the project team could locate it and get it into the review process. All of this material was located and submitted to LANL for review by the end of March, 2005. It was received by the project team approximately one month later and by the middle of May, 2005 all outstanding material from the initial review effort (February, 1999 – October, 2003) was in the project repository.

In parallel with the effort to close out the backlog material prior to the resumption of systematic search activities at LANL by the project team, a CDC staff member made several trips to the LANL Records Center and the Reports Library to close out some other outstanding items from the initial search effort. Specifically, the review of hard-copy records at the Records Center and a subset of classified reports in the Reports Library were completed. All of the material selected by the CDC from the LANL Records Center has been received by the project team. The material selected from the Reports Library will be included with that selected by the project team following the resumption of search activities.

Resumption of Systematic Search Activities: February, 2005

Systematic search activities at the LANL Records Center (and for the project as a whole) were resumed in February, 2005. The first priority for this search effort was to complete the search for relevant material in the Records Center in a timely manner so there would be no adverse impact on preparations to relocate the center to the new National Security Sciences Building. This meant completing the systematic review of outstanding microform media (microfiche and microfilm).

When work resumed on the project, there were approximately 4,100 cards of microfiche and 2,700 rolls of microfilm in the Records Center remaining to be reviewed. Systematic review of the microfiche was completed by mid-March of 2005. All of the relevant material identified by the analysts in this effort had been received from LANL by mid-April. Systematic review of the microfilm (and thus the LANL Records Center itself for the time being) was completed in early June, 2005 with all of that material received from LANL by the end of that month.

These significant improvements in throughput over the initial review effort were due to a number of important changes made to the document review and release process once work resumed. These included analysts being allowed to disposition non-relevant material by title alone and copy relevant documentation as it was identified. Having the material copied as it was identified and attached to the DSF eliminated the problems suffered in the past with material not being located or the wrong material sent through the review process. Another important, but unfortunately, short-lived change was the near-full-time availability of a contractor to perform the requisite classification reviews that was also authorized to declassify material when appropriate. These changes led to not only improved throughput of the systematic review effort, but also to short turnaround times between the identification of relevant material and it being received by the project team. In addition, the use of a common log for documents captured by the project team made it easy to confirm

everything which had been requested was received and to resolve any discrepancies. The overall result was there was no backlog of documents and no difficulty in correlating the material received to the corresponding DSF.

Unfortunately there was an interruption in the availability of a contractor agency to perform classification review and declassification of material selected by the project team. This interruption occurred shortly after systematic review activities for the LANL Records Center were completed. This resulted in a large backlog of material selected from other records locations. A new contractor was eventually installed and this large backlog was cleared out. Subsequently however, this new contractor organization also became unavailable due to procurement issues, resulting in another, albeit it smaller, backlog of material. This current backlog includes outstanding material from the systematic review of the Archives (which was completed as of May, 2006) and the unclassified reports collection in the Reports Library.

Document Review at the LANL Report Collection

The LANL Reports Collection is housed in a vault facility located beneath the LANL Research Library. The Reports Collection contains both classified and unclassified reports published by LANL and numerous other entities, in paper copy and on microfiche. The Reports Collection maintains documents in three principal collections: classified reports, unclassified reports, and unclassified microfiche. The LAHDRA project's systematic search of the Reports Collection, therefore, approached each of these three collections individually. Stationary shelving, movable shelving units, and Lektriever units in use at the LANL Reports Collection are shown in Figures 3-11 through 3-14.

As with the systematic document search for other LANL records facilities, logs were kept of everything that was reviewed in the Reports Library when the project began, regardless of whether it contained relevant information. This practice of formally documenting everything which was reviewed was found to be overly cumbersome and was discontinued once document search activities resumed in February of 2005. This change, plus that of dispositioning material by title, greatly improved the efficiency of the systematic review of the Reports Library with no loss of effectiveness.

The general approach to the review of hard-copy records in the Reports Library has not changed from the outset of the LAHDRA project. Since there are no complete or reliable finding aides for the reports it holds, the systematic review of the Reports Library has always proceeded with an analyst reviewing each report, going shelf by shelf.

"LA" Series Reports

From 1942 to 1992, the LANL Reports Collection was a filing point for reports issued by LANL and by other Department of Energy sites. A 1973 publication concerning report series codes (Godfrey and Redman 1973) describes how reports were initially issued by LANL:

Formal reports issued by the Los Alamos Scientific Laboratory are given serial numbers in the LA-series. Less formal reports were once prefixed by LAMS-. Until late 1949 the two series were separately numbered, but after LA-756 and LAMS-953 they were combined. Beginning with -954 only one numerical series was maintained, but the prefix was either LA- or LAMS- as appropriate. In 1964 this pattern was changed, with the MS relegated to the position of suffix. Subsequently other suffixes were adopted, BIB for bibliographies, PR for progress reports, SOP for standing operating procedures, and TR for translations. Only important translations that have been carefully edited are included in this series. Two other series are also maintained. LA-TR-(YEAR) is used for informal translations. The LA-DC-series (formerly LADC- and currently LA-DC-(YEAR)- is used for material released for publication as journal articles, conference papers, books, etc. AM- and BM- series were assigned by the LASL to miscellaneous reports received from 1946 through 1949, and occasionally thereafter. The choice of designator was determined by the country of origin of the report, e.g., AM-American and BM-British (including Canadian). Within each series, numbers were assigned in order of accession.

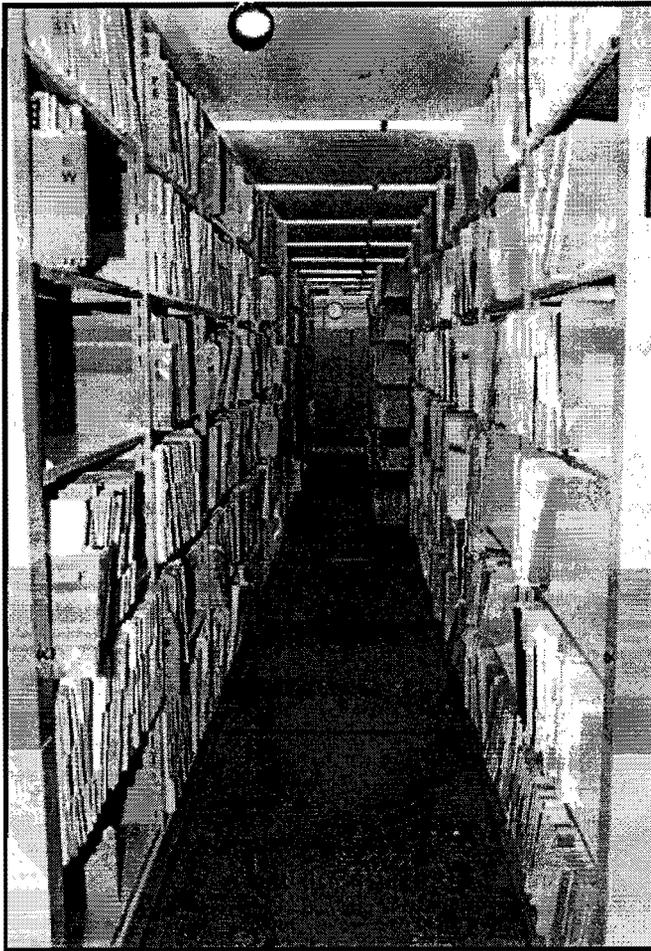


Figure 3-11: Reports on stationary shelving in the LANL Report Collection vault

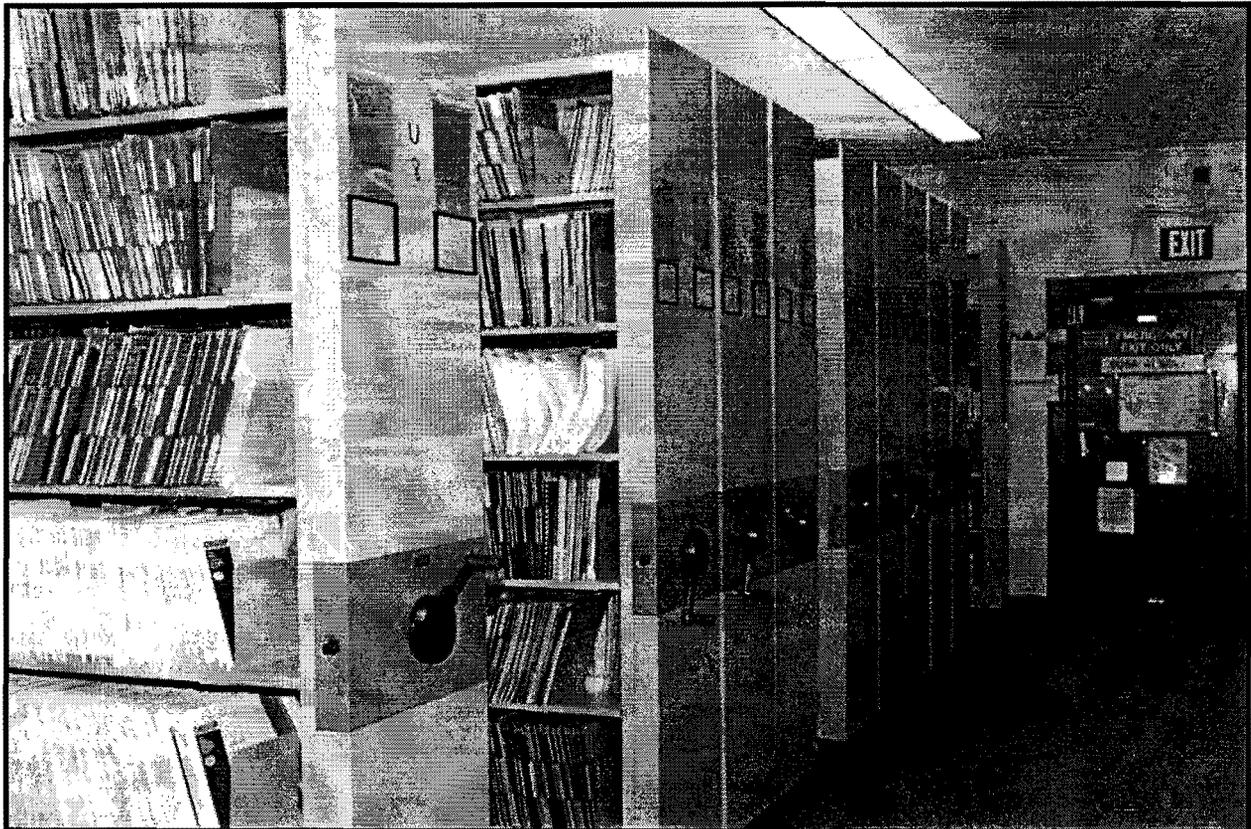


Figure 3-12: Reports on movable shelving in the LANL Report Collection vault, with a vault door in the background

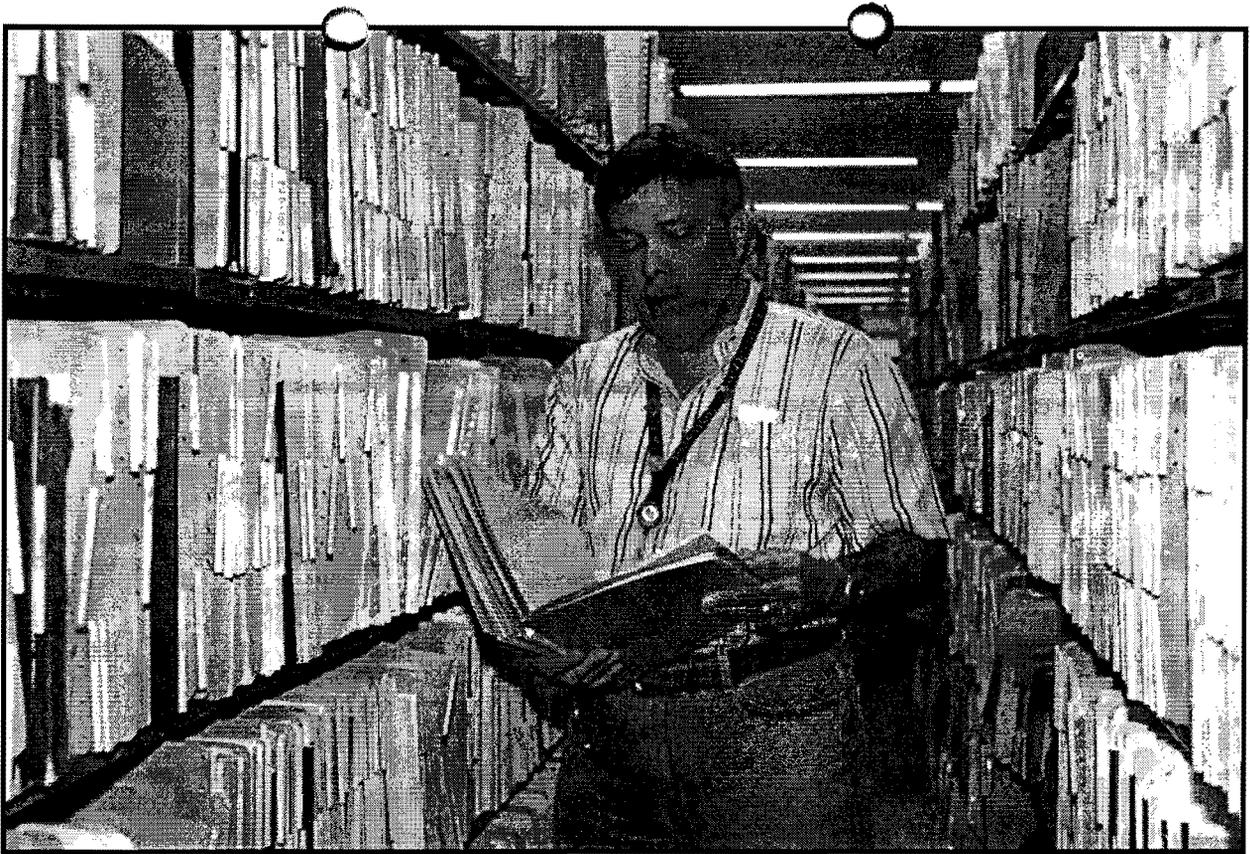


Figure 3-13: Review of technical reports in the LANL Report Collection



Figure 3-14: Microfiche copies of reports are stored in "Lektriever" units such as this in the LANL Report Collection vault

A listing of the classified and unclassified LANL technical reports (mostly LA- and LAMS-reports) is available, and was shared with the project team. That listing is the basis of the Table 3-5 summary of "LA-" and "LAMS"-series reports that are in the Report Collection's holdings.

Table 3-5: "LA"- and "LAMS"-Series Technical Reports in the LANL Reports Collection

"LA" Report Number Range			Number of Titles	Number Unclassified	Range of Years of Issuance	Percent Unclassified
1	to	500	1,139	638	1943 to 1963	56%
501	to	1,000	775	424	1944 to 1950	55%
1,001	to	2,000	1,071	735	1945 to 1967	69%
2,001	to	3,000	1,057	818	1947 to 1967	77%
3,001	to	4,000	1,023	826	1963 to 1978	81%
4,001	to	5,000	1,028	802	1967 to 1982	78%
5,001	to	6,000	1,040	868	1972 to 1982	83%
6,001	to	7,000	1,014	897	1974 to 1981	88%
7,001	to	8,000	1,021	939	1971 to 1986	92%
8,001	to	9,000	1,013	934	1979 to 1984	92%
9,001	to	10,000	1,056	934	1981 to 1988	88%
10,001	to	11,000	1,039	839	1984 to 1995	81%
11,001	to	12,000	1,027	799	1987 to 1993	78%
12,001	to	13,000	1,027	880	1990 to 1995	86%
13,001	to	50,000	701	613	1995 to 2000	87%
Totals			15,031	11,946		79%

Review of the Classified Reports Collection

The classified reports collection consists of reports which were classified at the time of publication. The reports were published by LANL and numerous other entities, including other weapons complex sites, military organizations, and contractors. The majority of the reports pertain to weapons program activities (testing in particular) and other large defense programs, such as Rover. The reports published by LANL include those in the LA-series and reports generated by various groups such as SS (material accountability), W-division, X-division, etc. The reports are stored on collapsible shelving in alphabetical order.

The classified reports collection includes approximately 3,000 classified report titles issued by LANL as LA- or LAMS- reports. Since there are two to four copies of many of these reports, quantities are reported as titles rather than as individual documents. The classified reports collection contains an additional approximately 32,000 reports from weapons complex sites other than LANL, other defense-related agencies, academic institutions, and private corporations that conducted research on behalf of DOE or its predecessor agencies.

Later in the initial systematic document search under the LAHDRA project, following some highly-publicized information security issues at LANL, the Laboratory enacted new security practices that encumbered the project team's access to the classified reports collection. These new security practices included denying the project team access to specific types of information and requiring analysts to have permission from document owners before being allowed to review any classified information. The latter constraint was a particular problem given that most of the reports in the classified reports collection were published by organizations other than LANL, many of which no longer existed. With the resumption of search activities in February of 2005, the requirement to get permission from individual document owners before reviewing classified material was relaxed, leaving the excluded

categories of information in place as the mechanism for addressing concerns over “need to know” issues raised during internal and external reviews of LANL’s security practices. To address the issue of excluded material, classified reports were reviewed by a LAHDRA analyst and a reviewer authorized by LANL to pre-screen material for excluded information working in tandem. This arrangement worked well, and the systematic review of the classified reports collection was completed in June of 2005.

The excluded categories of information are summarized in the table below. Note these exclusions apply to all LAHDRA document search activities at LANL and not just the classified reports collection.

Review of the Unclassified Reports Collection

The unclassified reports collection is similar to the classified collection, but contains only unclassified documents. As such, the subject areas covered are more broad than those seen in the classified reports and tend to yield more material of interest to the LAHDRA project. The hard-copy unclassified reports are stored on fixed and collapsible shelving in alphabetical order.

The Reports Library’s unclassified reports collection contains approximately 10,000 unclassified report titles issued by LANL as LA- or LAMS- reports. In addition, images of approximately 25,000 unclassified LA-, LA-MS-, LA-UR, and LA-PR reports are available as PDF files in the LANL electronic library catalog. Unclassified reports with limited distribution categories, such as OUO (Official Use Only), are not available electronically and have to be reviewed in the vault.

Prior to the heightening of security measures that followed the terrorist attacks of September 11, 2001, the unclassified “LA” reports were publicly available on LANL’s web site. Currently, these files can only be accessed from a computer with a LANL IP address or by certain other government computer users. The project team reviewed 100% of the unclassified “LA” reports that were formerly available without restriction on the Internet. Most of these reports were reviewed using LANL computers at an office made available to the LAHDRA team at TA-35.

In addition to those issued by LANL, there are approximately 90,000 unclassified reports in the Report Library vault that were issued by non-LANL entities, including:

- DOE sites other than LANL,
- academic institutions,
- private corporations that conducted research on behalf of DOE, and
- other defense-related agencies.

Systematic review of the hard copy holdings of the unclassified reports collection was completed in November of 2006. There are approximately 1,000 electronic “LA” series reports remaining to be reviewed in the electronic library catalog.

Information Being Withheld from the LAHDRA Team

Nuclear Weapons Design Information– includes documents relating to nuclear weapon design, such as weapon component blue prints, drawings, or other schematic or graphical design information.

Sigma 14 Information– concerns the vulnerability of nuclear weapons to deliberate, unauthorized nuclear detonation.

Sigma 15 Information– concerns the design and function of nuclear weapons use control systems, features, and their components. This includes use control information for passive and active systems.

Sensitive Compartmented Information (SCI)– includes information that has been determined pursuant to Executive Order 12958 or any predecessor order to require protection against unauthorized disclosure and that is so designated. Includes conventional weapons, security systems, foreign relations, and information regarding intelligence sources and methods.

Special Access Program (SAP) Information– deals with programs that are judged to require access limitation beyond that of the three-tiered classification system (Confidential, Secret, and Top Secret). These include programs within the Departments of Energy, Defense, and State. For example, the Congressional Emergency Relocation Site located under the Greenbriar Hotel in West Virginia, built to house Congress and key staff in the event of a national emergency, was designed, constructed, and maintained as a SAP for over 30 years until declassified in 1994.

Foreign Government Information (FGI)– includes information provided to the U. S. Government by a foreign government or governments, an international organization of government, or any element thereof, with the expectation that the information, the source of the information, or both, are to be held in confidence.

Unclassified Sensitive Vendor Proprietary Information– includes information that is deemed sensitive unclassified and touches on areas such as trade secrets and privileged or confidential commercial or financial information.

Review of the Unclassified Microfiche Collection

LANL historically subscribed to multiple UC (University of California) distribution codes for DOE-related reports. When the Office of Scientific and Technical Information (OSTI) took over the distribution of DOE-related reports, they began distributing the reports on microfiche instead of paper. There are approximately 1.5 million documents on microfiche at the LANL Reports Collection. In 1999, the LANL Research Library changed their subscription to electronic, so the microfiche collection is no longer being added to. Instead, library staff now access the reports via online databases (not hosted by LANL) upon request by LANL staff members.

All reports on microfiche are unclassified, but some are marked for limited distribution. Journals are not included in the microfiche collection due to copyright laws. Many reports in the microfiche collection are conference proceedings. The fiche cards are organized in Lektriever™ power filing units in alphabetical order (by document number). The documents in this collection include approximately 22,225 LA reports, according to the Library Catalog. Duplicates of these reports exist between the paper and microfiche collections, so the reports on microfiche did not need to be reviewed again if a paper copy of the same report had already been reviewed. Of the non-LANL agencies represented in the microfiche collection, the three largest (in terms of number of reports) are DOE Energy (~500,000

reports from 1969 to the present), Nuclear Science Abstracts (NSA; ~100,000 reports from 1949 through 1976) and NASA (~20,000 reports).

Like the other collections in the LANL Reports Library, there is no complete finding aide available to used to search the contents of the microfiche collection. The Research Library does have current subscriptions to two electronic databases, DOE Energy and NSA, and until recently also had a subscription to the NASA electronic database. A search of the DOE Energy and NSA databases showed that Los Alamos is the authoring institution for approximately 11,000 NSA reports and 53,000 DOE Energy reports, or about 10% of each database's contents.

Since there was no complete finding aide available, the project team, in conjunction with staff from the LANL LAHDRA project office, completed a cataloging (mapping) of the numerous entities represented in the millions of pages of reports contained in the microfiche collection. That effort produced an estimate of approximately 600,000 cards of microfiche in the six Lektrievers. The submitting organizations represented in these cards were differentiated into three broad categories to facilitate a search plan for this material. For each category of material, a fraction was reviewed for information relevant to the LAHDRA project. The categories of information and their associated review fractions are given in Table 3-6 below.

Table 3-6: Review fractions for categories of unclassified microfiche in the LANL Report Collection

Category	Description	Review Fraction
A	Reports from DOE or DOE sites, LANL-originated reports, and New Mexico-related documents.	100%
B	Reports from DOD, NASA, other U.S. Govt. organizations, U.S. businesses, or U.S. universities.	1%
C	Reports from foreign (non-U.S.) organizations.	None beyond that performed in the mapping process

The decision to not further review the material from non-U.S. entities was based on the sampling of the documents in the microfiche collection that was performed as an element of the mapping process.

Formal review of the microfiche collection was completed in March of 2006. All relevant material identified from the Lektriever collection has been received from LANL and entered into the LAHDRA database. The majority of this material was Category 3 information, i.e., that pertinent to sites other than LANL.

Reference

Godfrey, L.E. and H.F. Redman, editors. *Dictionary of Report Series Codes*, 2nd Edition. Special Libraries Association. New York. 1973.

Document Review at the ESH Records Center

Systematic review of the Environment, Safety, and Health (ES&H or ESH) Records Center, which is located in Building 46 at TA-35, was completed during the initial systematic document search activities conducted under the LAHDRA project. The summary below reflects group and organization names which were in use at the time the review was performed. LANL has gone through numerous organizational changes since that time, rendering the group and organization designations below largely obsolete. However, the previous organizational designations have been retained to preserve the summary of the review in sufficient detail.

The ES&H Records Center

The ES&H Records Center has been in operation since 1998. Its purpose is to receive records from the various ES&H Groups, catalogue and consolidate those records, and to eventually forward them on to the LANL Records Center. Many of the records stored at the ES&H Records Center are recent, i.e., from the 1990s.

Records in the ES&H Records Center are stored in a combination of 25 rows of shelving and 9 file cabinets. In addition, there are often a number of boxes staged in various areas of the center that are awaiting accessioning. Many (270) locations contained records that had not been accessioned yet. Rows are used to store standard one cubic foot boxes. The file cabinets are used to store a combination of boxes and other items or containers. Note that each file cabinet has a number of "shelves" that are also referred to as rows (not to be confused with the other rows).

Contents of records stored at the ES&H Records Center are described on CIC Form 170, the Records Transfer Request Form. This form defines a unique transfer record (TR) number for each set of records submitted to the center by various groups within the ES&H Division. The format of the TR numbers used for materials accessioned by the ES&H Records Center is TR-120-xxxx, where "xxxx" is a sequential number. The TR number is used to track the records in a database maintained for this purpose. Hard-copies of the TR forms are kept in binders, with a different binder used for each group. The hard-copy TR's are stored in the binders in numerical order.

Satellite ES&H Records Centers

Some ES&H groups have storage areas for the records they have not sent to the ES&H Records Center or the RMC (IM-5). For example, ESH-17 (Air Quality) has file drawers that are organized by year. They keep records for the last three years and send the data for the previous years to the ES&H Records Center. ESH-20 (Ecology) stores their records in file drawers, which are organized by topics such as Biology, Contaminate Monitoring, and Cultural Resources. In general, these types of record collections are considered to be "active records". That is, they are not part of a formal report collection and are difficult to catalogue and track.

Table 3-7 below identifies the various groups within the ES&H division and whether or not they maintain satellite records collections.

Table 3-7: Satellite Records Collections within ES&H Groups

ES&H Group	Satellite Collection?
ESH-1: Health Physics Operations	No
ESH-2: Occupational Medicine	No
ESH-3: Integrated Risk Analysis, Management and Communication	No
ESH-4: Health Physics Measurements	No
ESH-5: Industrial Hygiene and Safety	Yes
ESH-6: Nuclear Criticality Safety	Yes
ESH-7: Occurrence Investigation	Yes
ESH-10: Hazardous Materials Response	No
ESH-12: Radiation Protection Services	Yes
ESH-13: ES&H Training	Yes
ESH-14: Quality Management	No
ESH-17: Air Quality	Yes
ESH-18: Water Quality and Hydrology	Yes
ESH-19: Hazardous and Solid Waste	No
ESH-20: Ecology	Yes

When the original HSE-8 group was broken up, it was decided that their historical records would go to storage. However, ESH-20 kept their records to maintain continuity within their environmental monitoring activities. ESH-17 has since begun an ongoing effort to find historical records pertaining to releases to the environment. These records currently go back to 1958.

Summary of Document Review Activities

The bulk of records review for the ES&H Records Center took place between January and October of 2000. Records were reviewed at their storage location. Following review, records were marked using one of the two rubber stamps described earlier based on whether they contained any Category 1, 2, or 3 documents. Upon review, a log entry was made identifying the material reviewed by its location and its TR number. The log entry included the document category assigned to the material (i.e., Category 1, 2, or 3), the analyst that performed the review, and the review date. In addition, a DSF was completed for any document identified as Category 1, 2, or 3. Category 1 material was flagged for review for public release, which included reviews for classified or sensitive matter, information protected under the Privacy Act, and information that is attorney-client privileged.

On several occasions during the review period, records that had been reviewed were subsequently replaced with other newly accessioned records. In general, these new records were also reviewed, meaning that several locations were reviewed two and even three times as new material displaced older material in the center. Since the ES&H Records Center is an active staging area for records, a cutoff date of October 31, 2000 was established as a stopping point for the formal review. The rationale for this date was the fact that all of the accessioned material in the Center had been reviewed by this time and the rate at which new material was being accessioned was too slow to justify a continuing effort. However, plans were made for TR's for material accessioned after the cutoff date to be reviewed periodically to look for records of interest to the project. As of the cutoff date, there were an estimated 200 boxes in the Center pending accessioning. This is in addition to the other 270 un-accessioned boxes already on the shelves.

A total of 1,187 boxes were reviewed in the ES&H Records Center. Of these, 227 were deemed to contain material relevant to the project and thus had DSFs completed for them. The majority of the relevant material was designated as Category 2, as it was records from the 1990s that have been summarized in official reports that are readily available. An

example of such information would be AIRNET (NESHAPS) data that are used in reports on exposures to the public from LANL operations required by the EPA. Stack release data from this period is another example. This information is also reported in the annual environmental surveillance reports.

The only material found in the ES&H Records Center that was designated as Category 1 were two notebooks of working notes and document extracts that contained data on site-wide radionuclide releases. The first notebook (Volume 1 – Repos. No. 1733) contained data from 1948 to 1972. The second (Volume 2 – Repos. No. 1734) contained data from 1972 to 1996. These compilations were assembled by ES&H as part of an effort by LANL to assess historical radionuclide releases.

In July, 2003, the ES&H Records Center was revisited. The purpose was to review the materials that had been accessioned into the Center since the initial LAHDRA review. As indicated above, that review effort had established October 31, 2000, as the stopping point for that initial effort. All Transfer Request Numbers since that time [TR-120-186 (11/14/00) through TR-120-358 (6/20/2003)] were printed out. The content descriptions were examined to identify any potentially relevant documents. It was determined that 10 boxes described on three TR's needed further review. The contents of these boxes were reviewed. They contained materials on the Rover nuclear rocket engine program and soil sampling files from the 1980s and 1990s. However, no new document summary forms were generated.

Satellite ES&H Records Centers

Since the records stored in the satellite records centers are considered to be "active", a detailed review of these materials was not performed as part of the records review for the ES&H Records Center. Instead, the materials contained in each satellite center were described and those thought to be good candidates for future reviews were identified. Satellite centers that contain material that the project may want to revisit in the future include:

- ESH-5 (Industrial Hygiene and Safety): this group has several databases available (some active, some inactive) for areas such as chemical inventory, sampling and monitoring, materials information (metals, carcinogens, VOCs), etc.
- ESH-7 (Occurrence Investigation): this group is in the process of developing a database, with the most recent occurrences first.
- ESH-12 (Radiation Protection): this group has a vault that contains worker radiation exposure records.
- ESH-17 (Air Quality): this group retains the most recent three years' worth of AIRNET data (summarized in NESHAPS reports), with the oldest data being sent to the ES&H Records Center once the most recent year's data are added. This group also has a file cabinet of information being compiled to examine the accuracy of historical release data. This effort is proceeding very slowly, but currently dates back to 1958. A DISF (Category 1) was completed for a printout of the ODIS database that was found at the ESH-17 document center. The information in this database include stack ID/location, total activity discharged, total volume of air discharged, and the radionuclides or type of activity discharged.
- ESH-18 (Water Quality): this group maintains databases on LANL environmental surveillance data for surface water, ground water, soils, and sediment going back to 1970 and main aquifer radiological data dating back to 1945 (in spreadsheet form). Another database contains the results of environmental testing performed by the U.S. Geological Survey from 1945 to 1969.

- ESH-20 (Ecology): this group maintains records of biological assessments performed for various Operable Units and foodstuffs (produce). These records are stored in Building TA-21-210, Room 133.

The AIRNET data held by ESH-17 for 1997, 1998 and 1999 were reviewed by a CDC analyst at the satellite storage location. A sheet of paper stating that the records had been reviewed and were relevant to the project was placed with them so the boxes can be appropriately marked once the records are transferred to the ES&H Records Center. The ES&H Records Center staff know to look for the notification when records are submitted by ESH-17.

The ESH-6 group (nuclear criticality safety) maintains records at their facilities at TA-18. These records have not yet been evaluated by the project due to classification and need-to-know issues.

Document Review at the LANL Archives

Until recently, the LANL Archives was housed primarily in A-bay of Building TA-21-1001. Some material (motion picture reels, for instance) was housed in B-bay, and additional material (some of which has yet to be formally accessioned) was stored in G-bay in Building TA-21-1002. These are where the Archives records were maintained when the project team completed its review (with the exception of film (motion picture) and video records) in early May, 2006. Subsequently, the Archives has been relocated to the new National Security Sciences Building in TA-3. Review of the Archives' film and video records, which is being treated as an independent effort, is on hold pending LANL addressing its procurement issues with its subcontractor for classification reviews. LANL wants the backlog of outstanding hard copy material from the Archives cleared out before the project team begins its review of the film and video records. This backlog is reported to be modest in volume (less than one box of material). All other material selected by the project team from its systematic review of the Archives has been released by LANL and added to the project's document repository and library of electronic documents.

In general, the Archives records are organized into individual folders, which are stored in boxes (see Figures 3-15 through 3-18). The boxes and folders are constructed of acid-free paper, making them suitable for archival storage. Most of the boxes are of a clamshell design which allows easy access to the folders inside. Other types and sizes of boxes are used for some large or odd-sized media, microform records, etc. Some non-paper records are stored in cases or cans on Archives shelves (see Figures 3-19 and 3-20).

Archives records are organized into collections, with a collection consisting of records covering a common subject area (e.g., someone's memoirs, the records of a particular facility or group, etc.). A collection may be one box or span hundreds of boxes. Each collection is assigned a unique collection number, which consists of the year the material was accessioned and a sequential number starting with 001 for each year. Boxes are numbered sequentially within each collection, and folders are numbered sequentially within each box. For each collection there exists an inventory listing which gives a brief description of the contents of each folder.

The LANL Archives is a largely static, well-organized collection of records. The inventory listings provide the framework for an efficient and effective approach to systematic document searching which could not be used for an active records center (such as the LANL Records Center) or one with incomplete finding aides (such as the LANL Reports Collection).

The project team began the systematic review of records at the LANL Archives in June of 2005. The first step in the review process was to obtain the inventory listings for each collection. The Archives staff provided these listings to the LANL LAHDRA project office, which broke them up into "Pages." The complete listings were broken up into 52 Pages, with a given Page consisting, generally, of hundreds of pages of inventory. (LANL's choice of "Page" as its nomenclature for the inventory listings tended to be a source of confusion until one become familiar with it. A "Page" of inventory listings covers many different collections and is by no means a single page of information.)

The inventory listings were placed in three ring binders and provided to the project team by the LANL LAHDRA project office. Project analysts then went through the listings and selected material to be reviewed in detail based on the descriptions provided. The inventory listings allowed this selection process to be performed at the folder level rather than the box level. The selection process was rather broad, as often it was not apparent from the description what the material actually was. In such cases the material was always selected for review. Once this selection process was completed, approximately 28,235 folders had been selected for review. This equates to approximately 25% of the total folders in the Archives.



Figure 3-15: Moveable shelving units in the LANL Archives

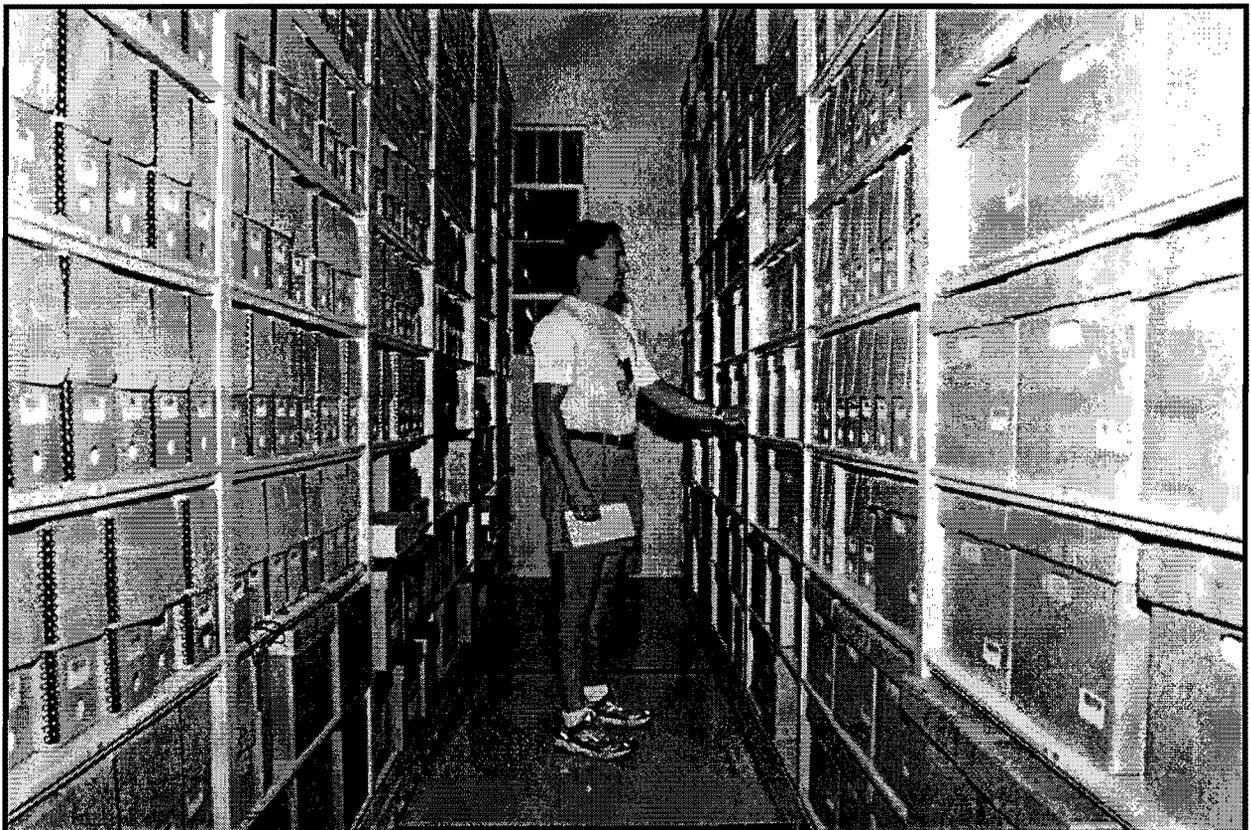


Figure 3-16: Boxes used to store LANL Archives materials



Figure 3-17: Boxes used for storage of archived material

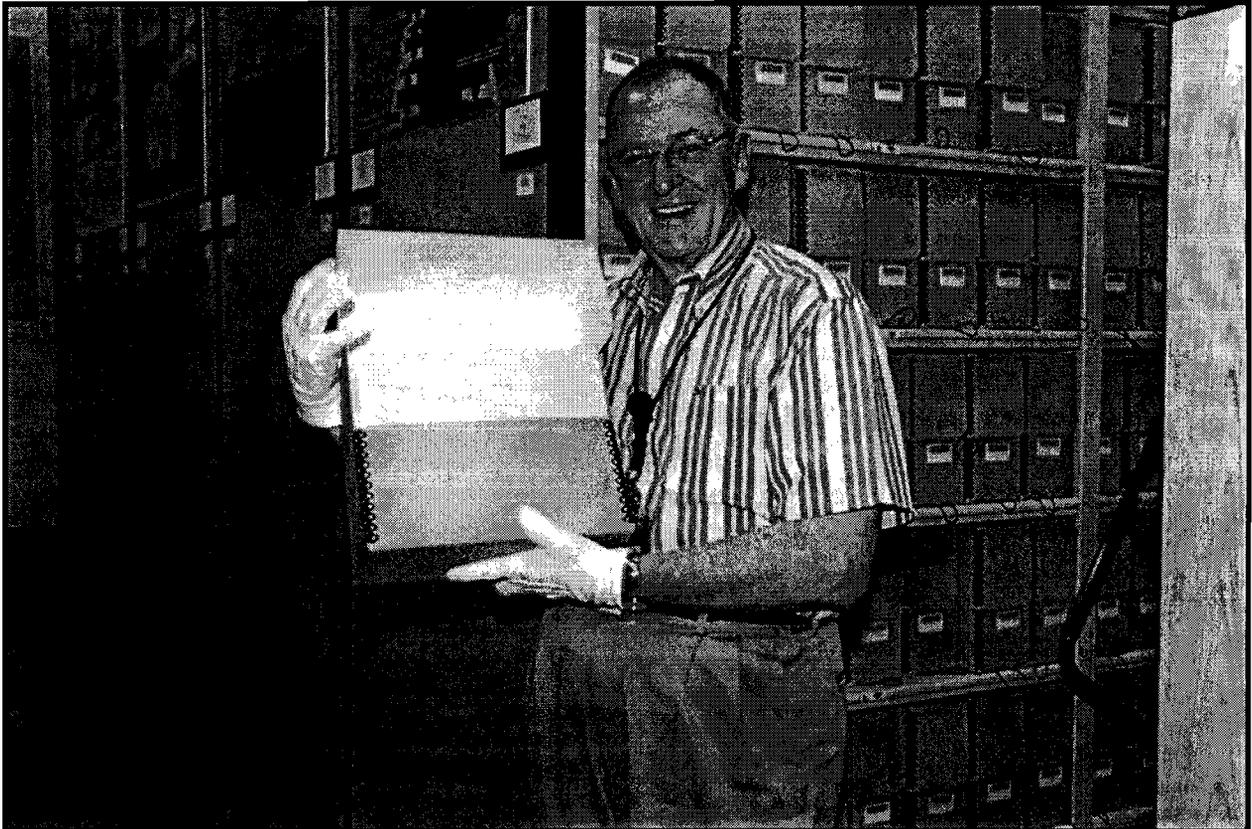


Figure 3-18: A classification officer prepared to review selected documents

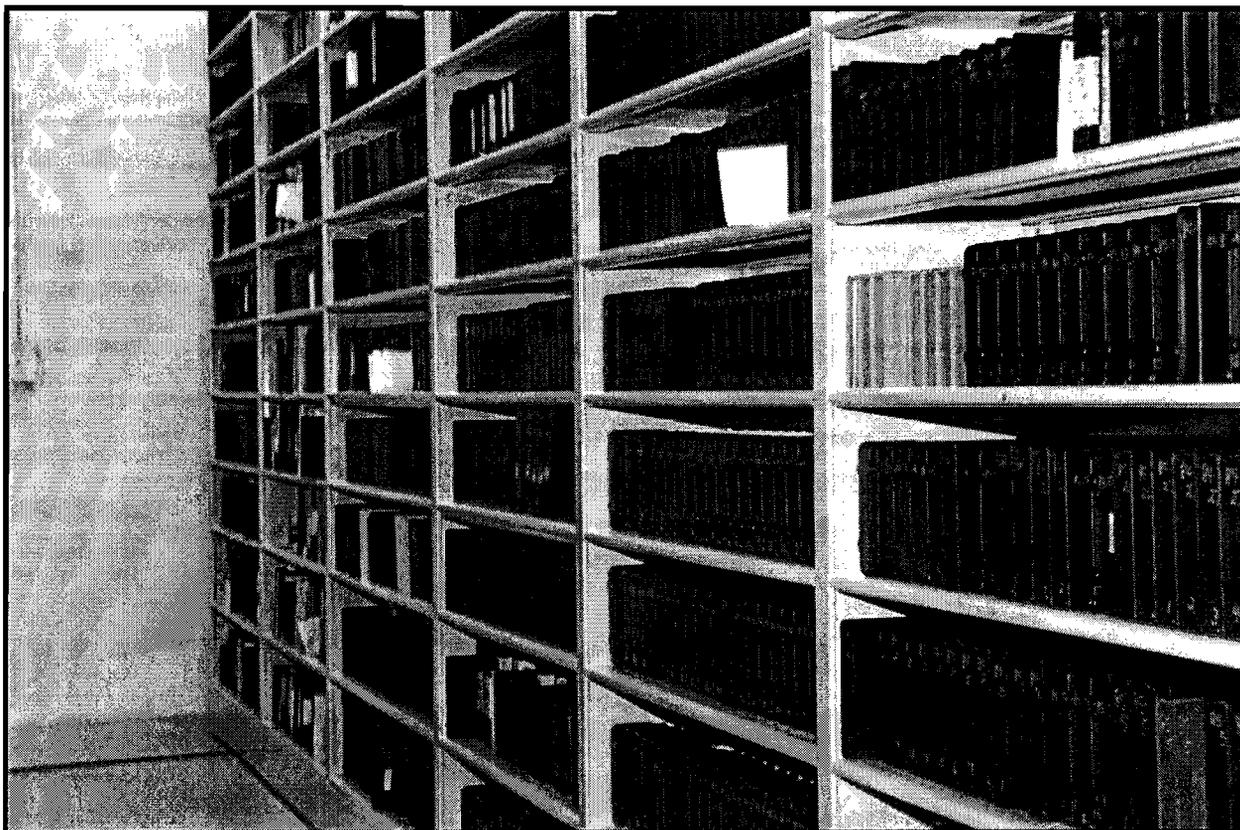


Figure 3-19: The LANL Archives contain paper documents, audio tapes, video tapes, and microfilm



Figure 3-20: The LANL Archives includes classified and unclassified motion picture films

In addition to the records selected by the project team for review, a random sampling of 1% of the folders in the Archives was performed. The purpose of this sampling was to select material to be physically reviewed by the analysts to act as a check on both the project team's document selection process and on the accuracy of the Archives inventory listings. The 1% sampling process did not indicate any problems with the material selection process or the Archives' inventories.

The review of the material selected by the project team, in general, proceeded one Page at a time. A set of boxes from a given collection was pulled and each folder selected from within those boxes (either by the analysts or via the random selection process) was reviewed. Once the review was completed, the appropriate stamp (red or green) was applied to the box and the analyst indicated the material had been reviewed by initialing and dating the inventory listing for that folder. (Use of the red and green stamps is discussed in the previous section on document review at the LANL Records Center.) This process was continued until the Page is completed. Deviations from this process were made as needed, such as the advance review of excluded material (discussed below) or completing the review for all material in G-bay (regardless of what Page it was under). In the latter case, a priority was made to complete the review of material stored in G-bay under favorable weather conditions. G-bay is a seldom-used facility with limited climate control, so both LANL and the project team wanted these reviews completed after the summer and before the winter. Review of Archives material in G-bay (including that not yet accessioned) was completed around the middle of October, 2005.

Prior to review by the project team, all of the material selected (either directly or through random sampling) had to be pre-screened for excluded categories of information by authorized individuals. The excluded categories of information are discussed in this report in the section discussing the systematic review for the LANL Reports Library. For the Archives, information determined to be excluded by LANL's reviewers was dispositioned by an interactive discussion between the reviewer and a project analyst. (Information is excluded at the folder level.) The reviewer gave the analyst a basic description of the contents of the folder and the reason he felt some of the material should be withheld from detailed review. This process gave the analysts enough information to make an informed decision on the relevance of the material vis-à-vis the goals of the LAHDRA project. Little of the material selected for review in the Archives was excluded and none of this material was thought to contain relevant information. Much of the excluded material came out of the random selection process and was not material selected by the project team. The project team went through and dispositioned most of the excluded material in advance so it did not impede the progress of the systematic review.

Review of the Litigation Support Database

In early 2000, the LAHDRA project team became aware of a number of small databases created for support of Lab Counsel's activities. These databases are known collectively as the Legal Counsel Litigation Support Database (LCLSD), though it is often referred to as simply the "Legal Database." The LCLSD effort began around 1990 with a significant level of effort directed at scanning numerous historic documents to image files. The documents selected were those potentially pertinent to the LANL Lab Counsel's activities. Many of the scanned documents were also subjected to Optical Character Recognition (OCR), creating a searchable file of the document text. All of the documents were subjected to classification review prior to being scanned.

The Legal Database is maintained by Lab Counsel as a DOS-based "DBASE" database, and is exported into an image management software program called "Personal Librarian." This software is no longer commercially available, but the images can be imported into other currently available image management systems.

The DBASE database fields include:

IMAGE
BARCODE_NO
TITLE
SYSTEM_BOX_NO
BOX_CUSTODIAN
DOC_DATE
DOC_TYPE
DOC_STATUS
AUTHOR/ORG
ADDRESSEE/ORG
THRU
COPYEE
PARENT_ID
UNREDACTED_BARCODE_NO
REDACTED_BARCODE_NO
HIST_DOC_NO
CODER_COMMENTS
PRODUCTION_INFORMATION
EXTERNAL_TRACKING
TEXT

The database permits partial records. The CODER_COMMENTS field includes statements such as "original document illegible." The TEXT field contains the text of the document if it was OCR'd. The scanned documents are stored as TIF files, one document page per file (about 50 kilobytes per page). The file naming convention is an 8-character file name which is the same as the barcode used to designate the document, and a 3-character file extension to designate the page of the material. Documents that exceeded 1000 pages were broken into two or more sections with a "parent-child" relationship established in the DBASE database under the PARENT field. There are about 500,000 document pages in the database. The scanned images require about 20 to 25 gigabytes of storage.

In early 2000 the project team examined eight of the available sub-databases which make up the LCLSD. The names of these sub-databases were CRM, H-DIV, OTHERS, RPF-0, RPF-1, RPF-2, RADLIT and RADLIT2. The first six of these were collectively called the "Brain Tumor Case Database." The RADLIT sub-databases were developed earlier in support of the Atomic Veterans cases and do not have associated scanned images of documents. Documents related to both the Brain Tumor and the Atomic Veterans cases have been identified in boxes that have been reviewed in G-Bay of the LANL Records Center. RPF-0,

RPF-1 and RPF-2 refer to the Records Processing Facility, which maintains the images on microfilm with a separate database available which provides an index. The RPF database is used in support of environmental restoration activities at LANL and to respond to FOIA requests. The H-DIV database has copies of the H-Division reports.

During the initial phase of the LAHDRA project, team members made several attempts to gain access to the documents in the LCLSD. While the database itself was not made available, in 2003 the LAHDRA team received a hardcopy listing of the scanned documents available in five of the sub-databases. This listing included document number, subject (title), author, addressee, copyee, date, status, and page count. The five sub-databases and the number of scanned documents available in each was as follows (note the documents for the Records Processing Facility were consolidated into a single sub-database):

H-Division	1,442 documents
Human Studies Project Team	4,767 documents
Central Records Management	11,198 documents
Others	10,395 documents
<u>Records Processing Facility</u>	<u>47,922 documents</u>
Total	75,724 documents

The types of information contained in each of these five sub-databases is discussed below.

The H-Division sub-database

The H-Division sub-database of the LCLSD primarily includes monthly (1943-1944 1947-1964), quarterly (1965-1975, 1978-1990) and annual (1943, 1947, 1949-1953, 1957, 1987-1990) Health Division progress reports. It also contains progress reports from several groups within the H-Division, such as H-1, Radiological Monitoring (formerly H-6 and CMR-12), and H-4, Biological and Medical Research. Both of these groups were responsible for monitoring the use of radiological and non-radiological hazardous materials at LANL. Although the H-Division sub-database contains 1,442 documents, this number is a bit inflated given it typically includes three versions of each H-Division progress report: a complete report, a version redacted for Privacy Act information, and an abstract of the complete report.

The Human Studies Project Team sub-database

The 4,767 documents listed in the Human Studies Project Team (HSPT) sub-database consist primarily of weekly status reports, fact sheets, press releases, news articles, procedures, phone logs, and other administrative documents generated during the HSPT's document review activities at LANL. The majority of these documents were generated between 1991 and 1995; however, there are some historical documents from the 1940s, 1950s, and 1960s included also. There are also a large number of documents from the 1970s related to the Karen Silkwood case and pion radiotherapy studies, and from the 1958 Cecil Kelley fatality. These documents are not relevant to the LAHDRA project.

Documents in the HSPT sub-database which are of interest to the LAHDRA project are the weekly bibliographies of documents released to the public, inventories of documents in LANL record collections, reports from the LANL autopsy tissue program, and H-Division monthly progress reports. The HSPT sub-database uses a classification system for the H-Division reports it contains. The classification categories are 001, Bayo Canyon activities; 002, DOD-related activities; 003, human tissue studies; 004, non-Bayo Canyon releases; 005, other DOE contractor (human studies); 006, tracer studies (plutonium, uranium, radioiodine, tritium, radium, other); 007, history/general; 008, atmospheric testing programs; and 009, pion radiotherapy.

The Central Records Management sub-database

The 11,198 documents in the Central Records Management sub-database cover the years 1943 to 1965. These documents include:

- Monthly hazard reports and Note Accidents for month/year (1946-1954)
- Health Tests for week ending (1950-1956)
- Neutron Exposure reports (1946-1958)
- Personnel Exposure reports (1957-1958)
- Monthly and weekly reports (1951-1958)
- Monitoring results (1945-1957)
- Minutes from weekly Section Head meetings (1945-1955)
- Air Counts, pencil and ink originals (1950-1962)
- Hand, head, shoe and nose counts (1944-1956)
- Urinalysis/urine counts (1944-1957)
- Film badge exposures (1957-1958)
- Protective Equipment- respirators, clothing (1947-1962)
- Safety meetings (1961-1962)
- Experimental shots at TA-33 (1948-1955)
- Tritium exposures at TA-33
- SL-1 accident
- DP Site explosion (1-14-1947)
- Pajarito accident (1-8-1953)

The "Others" sub-database

The 10,395 "Other" documents are primarily administrative records covering the period from 1943 to 1989. Examples of these records include:

- Contracts and contract modifications
- Reimbursement authorizations
- Personnel policies regarding overtime, moving expenses, employee benefits
- Personnel administrative panel meetings
- Organization charts (1945-1989)
- Telephone directories (1944-1989)
- The Atom (1964-1975)
- Annual reports to Congress of the AEC (1948-1973)

However, several other types of documents are also included:

- Annual environmental monitoring reports (1970-1992)
- H-Division progress reports (1943-1980)
- RFI work plans for operable units (1989-1990)
- Glenn Neely Notes
- Dept. of Labor log and summary of occupational injuries and illnesses (1989-1992)
- Occurrence reports
- Newspaper articles

The Records Processing Facility sub-database

Records Processing Facility (RPF) documents are the administrative record for the Environmental Restoration program at LANL. The 47,922 documents are also available on a searchable, internal LANL web site. The original paper copies were returned to the LANL Records Center after being microfilmed. A copy of the microfilm rolls used to be available in the RRES Group Office in the Pueblo School Complex on Diamond Drive in Los Alamos.

However this material may have been relocated to the Federal Records Center in Denver, Colorado. The RPF document collection covers the entire operational period of the Laboratory. Members of the LAHDRA team reviewed portions of the hard-copy RPF documents at the LANL Records Center and the Records Processing Facility.

Review of the LCLSD Listings and Document Images

The original plan for systematic search of the material in the LCLSD was for LAHDRA analysts to review the hardcopy listings of the document titles in each sub-database and select documents for review. These documents would then be made available to LAHDRA analysts by Legal Counsel staff. When systematic review activities resumed in 2005, the project team completed its review of the listings and selection of documents for detailed review. Ultimately, only 5% of the documents available in the five sub-databases were selected. The remainder were either clearly non-relevant or had already been captured by the project team. A breakdown of the documents selected for review is as follows.

H-Division	86 documents
Human Studies Project Team	155 documents
Central Records Management	1,706 documents
Others	764 documents
<u>Records Processing Facility</u>	<u>1,102 documents</u>
Total	3,813 documents

Initially, the LAHDRA team was denied access to the actual documents included in the LCLSD because LANL had insufficient funding to support both an on-site review of the collection and the processing of the backlog of documents at the Records Center and other locations. Once this situation was remedied (in early 2005), the document images from the five sub-databases were made available to the project team on a dedicated computer system at the LANL LAHDRA project office. Analysts accessed the documents using information retrieval and viewing software from IPRO Tech. The software allowed analysts to review the documents in a given sub-database one at a time, establish bookmarks where they left off, or access specific documents. Once identified, relevant material was printed using a dedicated printer and attached to the corresponding DSF. A search of the LAHDRA project database was conducted to determine if a potentially relevant document had previously been identified.

Systematic review of the scanned documents in the five LCLSD sub-databases began in May 2005 and was completed in September 2005. Approximately 400 documents (10% of the 3,813 selected for review) were determined to be relevant to the project and printed out and submitted for review and public release. This material has all been received by the project team.

Document Review at Other LANL Locations

This section discusses systematic document review at LANL locations other than the primary records management centers or those otherwise discussed above. It also describes remaining systematic search activities to be completed under the LAHDRA project.

Review of the ADWEM Records Vault-Type Room and Classified Safes

Systematic reviews completed to date under the LAHDRA project include holdings located in Weapons Engineering and Manufacturing (WEM) and Weapons Physics (WP) divisions. Review of documents located at the Los Alamos Neutron Science Center (LANSCE Division, formerly LAMPF) was 80 percent complete at the time of the work stoppage. These LANL divisions are organized under the Directorate's Office of the Associate Laboratory Directorate for Nuclear Weapons Engineering and Manufacturing (ADWEM). The Office of ADWEM was formerly known as Office of Associate Laboratory Directorate for Nuclear Weapons (ALDNW). There are 36 additional divisions or program offices under ADWEM that remain to be reviewed during this project.

Records reviews were conducted in accordance with a Special Security Plan for the Office of the ADWEM and its divisions issued in June 2001. Review of ADWEM-related documents by LAHDRA team analysts consisted of two review paths. Reviews included those documents that are located within vaults or vault-type rooms and those that can be found in classified safes or unclassified safes and other individual documents holdings (e.g., bookshelves) located in division staff offices. Most of the classified safes are located within individual offices within a limited number of ADWEM divisions.

The initial LAHDRA reviews of ADWEM records focused on the contents of the WEM and WP vault-type room (VTR) located in the Administration Building located at TA-3. Most of the documents produced and/or retained by these two divisions are classified as RESTRICTED DATA and contain nuclear weapon design and testing information. All classified document reviewed in the VTR were published after 1962. According to the Special Security Plan, reviews of available documents were performed on a restricted-access basis, which meant that only document titles could be examined and LAHDRA team analysts were prohibited from reviewing the contents of classified documents published after 1962. During the review, no pre-1962 classified documents were found in the above document holdings.

The WEM/WP VTR contained approximately 18,876 classified documents and 1126 classified photographs. The number of documents within this holding can vary depending on the flow of records and is limited by the capacity of the vault. At the time of our review, it was estimated that the VTR was at 95 percent capacity. One moving-shelf (approximately 6' x 10' in size) contained classified videos on various media (e.g., VHS format). The project team was denied access to these media. Two documents were identified as potentially useful to the project and were submitted through the appeal process to LANL and DOE. Full reviews by project team analysts were not possible, as the denial was upheld by DOE.

Thirty-six classified safes within the ADWEM main offices were also reviewed for potentially relevant information. The safes contained 7,056 documents marked "RESTRICTED DATA". No titles were identified as potentially relevant to the LAHDRA project.

Review of LANSCE Division Records

Reviews of available documents at LANSCE focused on office files within the Main Administration Building 1 located at TA-53 and the Radiological Air Monitoring Records Archive located in Sector R, Building 3, Room 3R-4 (TA-53-3). This archive is located adjacent to the main target Area A. Approximately 10,000 documents located in office files located in the Main Administration Building were reviewed. Of these documents, 2,500

were considered potentially relevant and underwent detailed review. Copies of 36 documents were requested and summarized for the LAHDRA project database. Highlights of these records are the Shift Supervisor Logbooks that contain daily beam current and beam-hour information dating back to 1971.

Forty-five boxes of documents (3,375 documents) located at the Radiological Air Monitoring Records Archive (Building 3R) were reviewed. Approximately 20% of the documents were identified as duplicates. Copies of 97 documents were requested and summarized for the LAHDRA project database. This archive is a very useful source of relevant information for the LAHDRA project and for any future studies of off-site releases from TA-53. The collective group of records (boxes) contain detailed information regarding radiological monitoring techniques and results from 1971 to the present. The majority of information contains information about airborne releases from TA-53.

Review of the TA-63 Engineering Drawings Facility

In February of 2006, the project team began reviewing documents maintained at the LANL Engineering Drawings Facility at TA-63. This facility houses engineering drawings and associated documents (memos, letters, specifications, etc.). The documents, which are all on microfilm, address topics including engineering studies and bases for facility modifications. Modifications were often performed to correct issues encountered after a facility began operating, such as ventilation problems. The documents in the TA-63 facility therefore include information on such problems and their impacts. They also include information such as radionuclide concentrations in soil in the vicinity of release points. The documents and drawings in the TA-63 facility date back to the 1940s.

To date, the project team's review of the TA-63 drawings facility has been more directed in nature than systematic. Initially the desire was to seek out material in support of prioritization efforts for early LANL facilities. Our initial searching, therefore, was for drawings relevant to Original Technical Area buildings (especially D Building, which was Building TA-1-6), Omega Site facilities and associated stacks, DP Site facilities and ventilation systems, and the Los Alamos town site. The number of drawings in the drawings facility and the nature of this material make systematic searching impractical. Hence, currently it is planned to only search the drawings in a directed manner.

The TA-63 facility maintains a database of their drawings inventory. The database includes fields for TA Number, keywords, titles, etc. The initial search of the drawings began by reviewing drawing titles to identify those of interest. The drawings identified were then physically reviewed, and copies were requested of those relevant to the LAHDRA project.

The database was also used to search for drawings by TA Numbers. Residential areas are designated as TA-0. Unfortunately, however, drawings which do not pertain to a specific technical area are designated "TA-0-0", which complicated the task of identifying relevant drawings of the town site. Nonetheless, the project team feels the directed search of the TA-63 drawings collection is complete for TA-0 and TA-1. The searching for TA-2 is also complete for drawings depicting the early Omega Site stack or mast.

Beyond drawings of components and systems (e.g., stacks, ventilation systems, etc.), additional types of drawings noted in the TA-63 collection thus far include area maps, maps showing drainage and topography around the original Technical Area, maps which document the scheduled abandonment of TA-1 facilities (including schedules for building closures), and aerial photographs.

In addition to directed searching of the drawings, limited systematic review of the TA-63 microfilm records has also been performed. The microfilm records were searched primarily by sampling from different drawers to get a sense of the types of information available. The

microfilm rolls are, for the most part, organized by job number and are somewhat in chronological order. These initial systematic searches did yield some relevant material, and copies were requested for release. Additional systematic searching is planned for the TA-63 microfilm records later in the project. The project team estimates there are approximately 1,000 rolls of microfilm to review.

Currently, LANL has released 370 drawings to the project team. There are a number of other drawings and documents pending review once LANL resolves its procurement issues with its subcontractor for these reviews. This additional material includes a set of aperture cards the project team has set aside for printing, as recent security issues at LANL prevented team members from printing them when they were first identified.

Review of the Records Processing Facility

The Records Processing Facility (RPF) contains the administrative record index for what was formerly the Environmental Restoration (ER) group at LANL. The distribution of RPF holdings by document date as of the year 2000 is shown in Table 3-8. A searchable version of an associated database was previously available on the internally-accessible LANL ER Web site. This was a predecessor to the system now used, which is discussed below under the section on the Environmental Stewardship Division. The boxes of original ER records and microfilm copies are stored at the LANL Records Center due to fire regulations. A duplicate set of the microfilm rolls is kept at the RPF. The RPF also holds aerial photographs, photographs of LANL catalogued by Technical Area, and engineering drawings. The project team did not review microfilm at the RPF, based on an understanding that the original documents had already been reviewed at the LANL Records Center.

Table 3-8: Distribution of ER Documents at the RPF by Date of Issuance

Document Date	No. of RPF Documents
1942 - 1949	1,871
1950 - 1959	4,340
1960 - 1969	4,684
1970 - 1979	4,755
1980 - 1989	9,864
1990 - 1992	26,326
1993	21,591
1994	37,114
1995	28,123
1996	12,330
1997	9922
1998	4,836
1999	3,387
2000	3,209

Review of Environmental Stewardship (ENV) Division Records

In May of 2006, the LANL LAHDRA Project Office provided the project team with a summary of records and databases generated by the groups and programs under the LANL Environmental Stewardship (ENV) Division. There were approximately 50 groups and programs listed, along with a number of electronic databases. Most of these groups and programs exist to collect data needed to demonstrate compliance with State and Federal regulations or that is otherwise required by the Compliance Order on Consent between LANL and the NMED. (The Consent Order is the principal regulatory document for the Laboratory's environmental remediation and surveillance programs.) Numerous databases have been created within ENV Division to store and manage the data collected by these groups and programs.

The project team has met with numerous individuals within ENV Division responsible for its groups and programs to talk to them about the types of information they collect and maintain. Most of the groups and programs have been addressed, but there are still a few for which the team has not yet been able to meet with the responsible individual(s). These meetings are forthcoming. The project team also visited a records storage area at TA-21 as part of its effort to identify the types of records available within ENV Division. This small storage area, known as the TA-21 Library, will be included under the systematic review effort for ENV Division records. The TA-21 Library primarily contains documents associated with remediation of TA-21, most of which the project team believes have already obtained from other records collections.

Systematic review of ENV Division records has already begun while efforts to meet with all of the cognizant records owners continues. The project team is currently reviewing the records within ENV Division's electronic storehouse for historical and current RPF records. This electronic collection, which operates under the Lotus Domino server application, is accessed using a web-based front end. The browser application includes provisions for searching, and is accessed by project analysts from workstations located in the LANL LAHDRA Project Office. The Domino application takes the place of the previous database of RPF records, discussed above. It includes Environmental Project Case Files, Remediation Management Records, Regulatory Compliance Records, and Decontamination and Decommissioning Records.

Records in the Domino application are indexed by a unique number known as an ERID. The system currently contains approximately 100,000 ERIDs, amounting to approximately 250,000 documents. An ERID may contain multiple documents. The documents are stored as PDF files. Systematic review is performed by sequentially going through the records by ERID number and reviewing titles which are of interest or are too ambiguous to allow judgment. Documents deemed relevant to the LAHDRA project are printed and a DSF is completed.

The LANL LAHDRA Project Office is supposed to provide the project team with a listing of the record titles in the ENV Division Domino database. Doing so will expedite the review process in that the titles can be reviewed offsite and in parallel with the onsite review effort. Titles will be reviewed to first eliminate those which are clearly non-relevant. Afterward, the remaining titles will be checked against the LAHDRA project database to screen out documents already obtained from other records collections. What will remain then will be a list of titles (ERIDs) to be formerly reviewed. This is analogous to the approach used for systematic review of the Archives, which worked rather well. The review of the Domino records is more straightforward since the material is unclassified and therefore no pre-screening is required. However, it is a large volume of material, so getting the title listing from LANL and reducing it down to just those for which formal review is needed would save a lot of time.

Reviews of Photographs and Videotape Records

Project team members have searched the photographic records of the Los Alamos Historical Society and obtained prints of photographs and maps of interest. More than 50 photographs were obtained, primarily aerial views of LANL facilities and surrounding areas from the 1940s and 1950s. The project team also obtained a title listing of photographic records held by the LANL Environmental Stewardship Division. Prints were requested of photographs from the early years of LANL operations at TA-1, TA-2, and TA-21.

The project team has obtained several videotape records from the Broadcast Media Gallery of the LANL Public Affairs Office. Review of these records is in progress.

Remaining LANL Division/Office Record Holdings to be Reviewed

Table 3-9 lists the divisions, program offices, institutional offices, and special project offices at LANL that remain to be reviewed by the LAHDRA team. Currently the project team has little information concerning the volume or nature of records that these organizations hold, so there is much uncertainty in estimating the work that remains. LANL's LAHDRA project support group is compiling information on all current LANL divisions and groups. This information will be provided to the project team as an aide in planning remaining systematic search activities. This information will be combined with historical information already obtained by the team to develop a strategy for systematic searching of the remaining divisions and groups.

Estimates of the numbers of documents within some of the organizations are given in the second column of Table 3-9. Organizations that reportedly possess the most classified records are shown in bold. Based on a review of a list of classified vaults and repositories at LANL, it is estimated that 21 vaults, 107 VTRs, 5 alarmed rooms, and 1,600 repositories (file cabinets, 2-5 drawers each, with combination locks) are present. Not all of the vaults or VTRs contain only records— some contain weapon parts and/or special nuclear material.

Table 3-9: Estimated Numbers of Documents Reported to be at Other LANL Divisions

Organization	Estimated No. of Documents
Applied Physics (X)	5,000
Audits and Assessments (AA)	
Bioscience (B)	
Business Operations (BUS)	
Computer and Computational Sciences (CCS)	10,000
Computer, Communications and Networking (CCN)	10,000
Communications and External Relations Division (CER)	
Community Relations (CR)	
Chemistry (C)	
Decision Applications Division (D)	
Diversity Office (DVO)	
Dynamic Experimentation (DX)	10,000
Earth and Environmental Sciences EES	
Engineering Sciences and Applications (ESA)	250,000
Energy and Sustainable Systems Program Office (ESS-PO)	
Facility and Waste Operations (FWO)	
Government Relations Office (GR)	
Human Resources Division (HR)	
Industrial Business Development Division (IBD)	
Integrated Safety Management Program Office (ISM)	
Laboratory Counsel (LC)	
Materials Science and Technology (MST)	
Nonproliferation and International Security (NIS)	
Nuclear Materials Technology (NMT)	15,000
Office of Equal Opportunity (OEO)	
Office of Internal Security (ISEC)	
OMBUDS Office (OMBUDS)	
Project Management Division (PM)	15,000
Performance Surety (PS) Division	
Physics (P)	5,000
Quality Improvement Office (QIO)	
Risk Reduction and Environmental Stewardship (RRES)	
Security and Safeguards (S)	
Spallation Neutron Science (SNS)	
Science and Technology Base Programs (STB)	
Theoretical (T)	

Challenges and Accomplishments in Information Gathering at Los Alamos

Access to classified documents at Los Alamos has been more difficult than LAHDRA team members have experienced at any of the other DOE sites that have been subjects of dose reconstruction investigations. This section documents the most significant circumstances under which members of the project team working for CDC at Los Alamos have been denied or restricted in their access to classified records or document repositories. The instances having the most severe impact early in the project were associated with the Cerro Grande fire and with the later security incidents that involved hard drives missing from an X-Division vault. When access was restored after those events, document review was initiated under Special Security Plans that list six categories of documents to which our access is to be denied. A chronology of the main document access challenges experienced on the LAHDRA project is presented below.

The Cerro Grande Fire

At the time the Cerro Grande fire got out of control in 2000 and Los Alamos was evacuated, five document analysts were in town. They were unable to gain access to LANL facilities on May 8, 9, or 10, and they evacuated the town when ordered to do so on the afternoon of May 10. This period without access lasted several weeks, as LANL was shut down for some time and a period of reviews to ensure readiness for reopening followed. Some of these reviews may have actually been associated with classified material security, which was the cause of the period of denial of access to classified materials that followed.

Security Stand-Downs and the Fallout of Security Incidents

After the Cerro Grande fire, members of the project team were only able to access classified material areas for several days. During the week of June 9-16, 2000, four document analysts were in town and were denied access to the Central Records Center and to the LANL Report Collection. This was in spite of the fact that, in calls near the end of the previous week, I had been told that access would again be possible during that week. As we were given indications that access would likely be quickly restored, another analyst traveled to LANL the week of June 19-23. He was also denied access, and returned home after several days of performing miscellaneous support functions. The denial of access resulted from the incident in which classified material was lost and subsequently reappeared.

Need-to-Know Letter Received

A memorandum from DOE Headquarters affirming the project team's "need to know" was signed by General John Gordon on September 17, 2000 and was distributed to appropriate personnel throughout LANL and DOE Albuquerque.

Security Plan Promised

CDC project leaders held a meeting with some key LANL division managers during the week of November 20, 2000. At that meeting, LANL officials pledged to have a special security plan prepared before the end of 2000. This plan was to outline the procedures by which access of CDC and its contractors to classified records at LANL were to be restored.

First Special Security Plan

Around January 16, 2001, final signatures were obtained on a Special Security Plan covering the LANL Records Center, Archives, and Report Collection that was prepared by LANL personnel with comments from the project team and CDC. Under this security plan, document analysts must be escorted at all times when in classified document repositories, and documents are to be pre-screened to identify those that contain information in the following five categories are to be withheld:

1. Nuclear Weapons Design Information (documents relating solely to nuclear weapons design, such as weapon component blue prints, drawings, other schematic/graphical design information).
2. Sigma 14 and 15 Information (may be expanded to include the emerging Sigma 16 category)
3. Sensitive Compartmented Information (SCI)
4. Special Access Program Information
5. Foreign Government Information (FGI)

There is a provision for appeal to DOE Albuquerque in cases when information is withheld from project team review. In mid-February 2001, members of the project team regained access to the Central Records Center and the Reports Collection.

Calls for Review by Title Alone

Requirements for prescreening of materials before review by LAHDRA analysts were found by LANL personnel to be difficult to implement. The flowchart of the "LANL Document Review Process" has a block entitled "LANL Staff Notifies Owner to Screen Records." When faced with the prospect of screening the "LA" reports in the Report Collection that were issued after 1962, LANL personnel requested that we review the reports by title alone and appeal to DOE if documents had to be reviewed beyond their titles. While this process greatly reduces the resources required for document screening by LANL personnel, the practice is problematic because document titles are often not very descriptive of a document contents.

Second Special Security Plan

Preliminary activities to gain access to records held by the Office of the Associate Laboratory Directorate for Nuclear Weapons (ALDNW) began in mid-2001. A Special Security Plan for review of the records of that group was issued in June 2001. This second security plan added a sixth category of deniable material, Unclassified Sensitive Vendor Proprietary Information, and includes a requirement that a large number of documents be reviewed by title only (i.e., all classified documents issued after 1962 by the key organizations associated with nuclear weapons, and all other documents judged by LANL personnel to contain information falling under the six categories of deniable material).

Practices Changed in the Report Collection

Up until late November 2001, project team members were allowed to review classified reports in the Report Collection that were issued by entities other than LANL. Thousands of these classified reports were reviewed, in most cases with full text access, but in some rare cases by title alone when their Report Collection escort determined that the documents contained deniable material such as foreign government information. At a meeting of LANL personnel on November 28, 2001, those in attendance decided that "LANL cannot give access based on need-to-know for non-LANL documents. Documents belonging to other DOE contractors, other government agencies, private companies or other governments will

require CDC/DOE to contact those entities and provide LANL with written need-to-know acknowledgement and permission to grant access.”

Report Collection staff indicated in early January 2002 that it would be impractical to approach the “owners” of each of the thousands of individual classified non-LANL technical reports. Report Collection staff recommended that CDC request that DOE and DOD grant blanket authorization for appropriately cleared members of the CDC project team to review the reports assembled by LANL in the course of their work for DOE and DOD.

First Appeal to DOE Issued

In late December 2001, the first appeal of denials of access to classified records at LANL was sent to DOE Albuquerque by the project team. LAHDRA team members were informed by DOEAL that the appeal letter was received, and was handed off by the addressee (Deborah Miller, who was in charge of security issues) to Larry Kirkman (who was in charge of safety issues). No response to the December 2001 appeal letter has ever been received.

UK Documents Not All Made Available for Review

While it appeared that CDC had received approval from the owners of UK records held by LANL, the volume of records that LANL made available to C.M. Wood and Bob Whitcomb in July 2002 was a fraction of what the LAHDRA team was told LANL held. Apparently over half of the UK documents were withheld from CDC review because someone at LANL judged that they contained deniable category material.

Second Appeal Letter Issued to LANL

In September 2002, at the request of LANL, the LAHDRA team resubmitted the DOE appeal letter in modified form to the LAHDRA team’s LANL point of contact to encourage those involved to put a workable appeal process into place and test it.

Contract with Classification Reviewers Expires

The contract that LANL had with PMTech for classification review of documents that LAHDRA analysts selected as relevant expired in early 2003, and there were no immediate plans to renew it despite the existence of a significant backlog of documents awaiting review. After PMTech’s period of document review in March 2003, there were no classification reviewers lined up to support the process for public release of documents. LANL’s “S-7” classification office reportedly could not support that review without contractor assistance.

CDC Requests that Work be Brought to Close under Existing Contract

On April 25, 2003, CDC notified ENSR that a decision had been made to have the project team bring information gathering at LANL to a close within remaining contract funding. The cost ceiling of the existing contract could not be substantially increased. Based on the findings of the information gathering to date, as will be summarized in an Interim Report of the project and evidenced in the project information database, and the extent to which key information access issues that remain can be resolved with DOE and LANL, CDC will evaluate whether to award another contract to continue the assessment of potential releases and/or health effects from historical activities at Los Alamos.

Prerequisites for Continued Work at Los Alamos Outlined by CDC

At a July 2003 public meeting held by the LAHDRA team, CDC outlined requirements that will have to be satisfied if CDC is to continue the LAHDRA project. First, the Department of Energy would have to provide CDC with sufficient funding to perform the work. Second, several key issues must be successfully resolved with DOE and LANL staff; 1) clear establishment of CDC's "need-to-know," 2) establishment of workable procedures for CDC to access documents held by LANL but not originated at LANL, 3) implementation of a consistent, usable appeal process for when CDC is denied access to documents, and 4) establishment of an ability for appropriately-cleared CDC staff to review documents withheld to CDC's contractors.

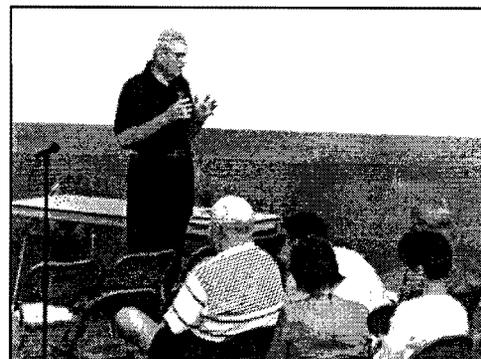


Figure 3-21: Dr. Charles Miller of CDC speaks during the July 2003 public meeting.

Tasks Authorized to Bring Work to Clean Breakpoints

In August 2003, CDC issued a contract modification that authorized the project team to perform a series of defined tasks that should significantly improve the usefulness and/or defensibility of the Interim Report and leave key project activities at cleaner breakpoints. These activities included: 1) Prepare a chronology of episodic or off-normal events described in H-Division reports, 2) Add section on site-wide tritium use to project report, 3) Process the relevant documents that have been selected but not released, 4) Finish review of paper records at the LANL Records Center, 5) Pursue getting relevant portions of LANL Legal Database, 6) Revisit ESH repository to review more recent accessions, and 7) Interview top interview candidates.

Reports Collection Resources Raised as an Issue

At an August 20, 2003 meeting with the manager in charge of the LANL Reports Collection, the ENSR project director was told that the LANL Reports Collection did not have sufficient staffing to continue to support the LAHDRA project. Several days later, after speaking with the Report Collection staff, that manager indicated that the project team could access the Report Collection vault to perform the limited close-out activities that were projected to occur under the remaining period of the existing contract.

CDC Returns to Complete Review of "UK Records"

During the week of September 15, C.M. Wood of CDC revisited LANL to complete the review of the documents of UK origin that were in LANL's possession. During that visit, there was discussion regarding whether or not CDC analysts had to make a list of every document that they reviewed. Mr. Wood voiced an opinion that such a requirement would make review of un-catalogued records of that type excessively cumbersome and impractical. Mr. Wood was able to complete review of the UK records to his satisfaction during the September visit.

Response to Appeal Letter Received

On October 28, 2003, DOE provided CDC and the project team with a response to the second appeal letter. With a few minor exceptions, officials at the DOE Los Alamos office upheld the denials of access to the documents that the LAHDRA team had appealed. This continuance of the denial of access was in part based on an exercise in which a small subset (approximately 7%) of classified LA/LAMS reports issued after 1962 were reportedly sampled and reviewed by DOE and LANL personnel.

Classification Review Backlog Quantified

On October 30, 2003, the LAHDRA team provided their LANL point of contact with listings of the documents that LAHDRA analysts selected at LANL that are awaiting classification officer action (i.e., verify unclassified/clear for public release, downgrade to unclassified, or redact for public release). Some of the documents in that backlog were requested by LAHDRA analysts as far back as 1999. LANL staff reportedly asked for this accounting of the "backlog" so that resources and a new contract could be lined up for the classification reviews. The seven-part list included documents at the LANL Records Center, Report Collection, Central Research Library, and the TA-35-58 office that has been used by the project team. Team members then provided Ms. Holmes with a prioritization of the components of the list, so that the most important documents could be reviewed first if at all possible.

Review of Documents in Backlog Begins

In early 2004, LANL reestablished a contract with PMTech to review documents in the backlog of items requiring review for public release. LANL requested that the LAHDRA team work with PMTech to facilitate the review of items in the backlog, specifically in cases where items on the master list of documents for review could not easily be matched with documents in the identified box of records. LANL estimated that it would require the balance of calendar year 2004 to complete release of documents in the review backlog.

LANL Resources Limit LAHDRA Team Activities

In January 2004, LANL staff informed CDC that there were insufficient resources to support the processing of documents in the backlog by their contractor while also allowing the LAHDRA team to complete review of paper documents at the Records Center or review records in the Litigation Support files held by Lab Counsel. CDC instructed the LAHDRA project team to support PMTech in the release of documents from the backlog, and discontinue work on completing review of paper documents at the Records Center or review of documents in the Litigation Support files.

Funding under First LAHDRA Contract is Expended

Contractor funding under the first LAHDRA contract was fully expended near the end of April 2004, just after a Draft Interim Report of the LAHDRA project was issued in March. The period of performance of the contract expired on June 30, 2004.

Progress during Early 2004

During the first six months of 2004, there was significant progress made in dealing with the backlog of documents awaiting classification officer action and with several of the open issues regarding access to classified documents at LANL. All but four of the documents in the classification reviewer backlog as documented in October 2003 had been released by LANL to the project team by the end of July 2004. Approximately 35 boxes of document copies (roughly 97,000 pages) were transmitted by LANL personnel to the LAHDRA project team during early 2004. CDC plans to have those documents processed and added to the project information database, scanned image collection, and reading room collection this year.

C. M. Wood of CDC conducted a walk down of the LANL Records Center in early June 2004 and identified 163 boxes that had not been reviewed. Approximately 160 documents were selected from these boxes as relevant to the study and were added to the list for processing for public release.

In mid-2004, LANL personnel completed a pre-screening of the remaining microfiche images at the Records Center and began begun pre-screening the remaining rolls of microfilm at the Records Center. LANL has indicated that both of these pre-screening efforts are being accomplished by review of the titles associated with the units of microform images.

During meetings and conference calls in the first half of 2004, LANL indicated a willingness to let a CDC employee, in the presence of a DOE classification officer and/or a designated DOE official, view documents that have been withheld from the LAHDRA document analysts and for which the denial of access has been upheld after appeal to DOE. There also appeared to be progress in gaining access to classified technical reports in the LA- and LAMS- series issued by LANL after 1962. LANL agreed to send an unclassified listing of approximately 1,600 titles of documents in this category to CDC for review.

LANL Shutdown Begins in Response to Security Incident

After a July 7 inventory showed that two items of Classified Removable Electronic Media (CREM) were missing from the Weapons Physics Directorate, LANL was shut down for an extended period for investigation and implementation of corrective actions by LANL personnel. No significant activities by the LAHDRA project team were underway at the Lab because of the expiration of the contract.

CDC Public Meeting, LAHDRA Interim Report Issued

On July 27, 2004, a public meeting was held by CDC to discuss the end of the first LAHDRA contract. CDC leaders indicated that the first phase of the project was complete, the period of performance of the associated contract had ended, but the Project was not complete. The Interim Report of the LAHDRA Project (Version 3B) was made available to the public in paper and electronic formats. CDC indicated that a request for proposals had been advertised on July 10, and proposals were due by August 6.

New Contract Awarded, but Site Access Not Immediately Possible

A second LAHDRA contract was awarded by CDC on September 30, 2004, to a team led by ChemRisk, Inc. and including Shonka Research Associates (SRA), ENSR Corporation, and Advanced Technologies and Laboratories International, Inc. (ATL). Some project plans were prepared, but no document review at LANL was possible through the end of the year because of the Lab shutdown.

Meeting Kicks Off Resumption of Information Gathering at LANL

After months of no site access, a "Pre-Inspection Conference" was held at LANL on February 3, 2005, in preparation for resumption of LAHDRA activities at the Lab. The meeting was attended by CDC team leaders, LAHDRA contractor personnel, LANL project support personnel, representatives of LANL document centers, a Lab Counsel representative, as well as LANL and contracted classification officers. Agenda items included a project overview; a status update; and review of procedures for escorting, document prescreening, document review, and public release of documents that are selected as relevant. Document review by LAHDRA analysts began the following Monday, with the initial emphasis being on remaining paper and microfilm records at the LANL Records Center.

Release of Documents in Backlog Completed

All of the backlog documents which had accumulated at LANL under the previous contract awaiting classification review were released and received by the project team by mid-2005.

Review of Records Center Holdings is Closed Out

Systematic review of the contents of the LANL Records Center that were accessioned prior to December 31, 1999 was completed in early June 2005, with all of the selected material received from LANL by the end of that month.

Contents of Litigation Support Database Reviewed

During the first calendar quarter of 2005, LAHDRA document analysts completed review of printed indices of the contents of the LANL Litigation Support Database. The documents selected for review by the project team were identified, and the marked indices were provided to LANL. LANL agreed to make the selected documents available for review. Review of these documents began in May 2005 and was completed in early September.

Review of LANL Archives Contents Completed

During the first calendar quarter of 2005, LAHDRA analysts began reviewing printouts of LANL Archives collections and the folders that exist within each collection, identifying (based on review of folder titles) folders to be reviewed by the project team. The project team began the review of records at the LANL Archives in early June of 2005, and this review was completed in early May of 2006, with the exception of film and video records. Review of the Archives' film and video records, which is being treated as an independent effort, is on hold pending LANL addressing its procurement issues with its subcontractor for classification reviews.

Review of Documents in the Report Collection Resumes

Remaining classified reports that were issued by entities other than LANL were reviewed during June 2005. A LAHDRA analyst and a reviewer authorized by LANL to pre-screen material for excluded information worked in tandem, and approximately 600 pages of material was selected as relevant to the project. Review of unclassified reports on microfiche contained in the Report Collection vault was completed in November of 2006. Review of the Report Collection's extensive microfiche records has also been completed.

Review of Records in the TA-63 Engineering Drawings Facility Begins

The project team performed a directed search of drawings to support ongoing prioritization efforts for early LANL facilities. The focus was on drawings relevant to Original Technical Area buildings (especially D Building, which was Building TA-1-6), Omega Site facilities and associated stacks, DP Site facilities and ventilation systems, and the Los Alamos town site. Systematic searching is also planned for the TA-63 microfilm records later in the project.

Systematic Review of Environmental Stewardship (ENV) Division Records Begins

The project team has met with numerous individuals responsible for groups and programs within ENV Division to discuss the types of information they collect and maintain. Systematic review of the ENV Division's electronic collection of RPF documents (the Domino system) began in November, 2006. This collection consists of approximately 250,000 documents.