THE LOS ALAMOS NATIONAL LABORATORY SITE-WIDE ENVIRONMENTAL IMPACT STATEMENT PROCESS

The United States Department of Energy (DOE) has a policy (10 Code of Federal Regulations [CFR] 1021.330) of preparing a Site-Wide Environmental Impact Statement (SWEIS) for certain large, multiple-facility sites, such as the Los Alamos National Laboratory (LANL). The purpose of a SWEIS is to provide DOE and its stakeholders with an analysis of the environmental impacts resulting from ongoing and reasonably foreseeable new operations and facilities and reasonable alternatives at the DOE site. The SWEIS analyzes four alternatives for the continued operation of LANL to identify the potential effects that each alternative could have on the human environment.

The SWEIS Advance Notice of Intent, published in the *Federal Register* (FR) on August 10, 1994 (59 FR 40889), identified possible issues and alternatives to be analyzed. Based on public input received during prescoping, DOE published the Notice of Intent to prepare the SWEIS in the *Federal Register* on May 12, 1995 (60 FR 25697). DOE held a series of public meetings during prescoping and scoping to provide opportunities for stakeholders to identify the issues, environmental concerns, and alternatives that should be analyzed in the SWEIS. An Implementation Plan[1] was published in November 1995 to summarize the results of scoping, describe the scope of the SWEIS based on the scoping process, and present an outline for the draft SWEIS. The Implementation Plan also included a discussion of the issues reflected in public comments during scoping.

In addition to the required meetings and documents described above, the SWEIS process has included a number of other activities intended to enhance public participation in this effort. These activities have included:

- Workshops to develop the Greener Alternative described and analyzed in the SWEIS.
- Meetings with and briefings to representatives of federal, state, tribal, and local governments during prescoping, scoping, and preparation of the draft SWEIS.
- Preparation and submission to the Los Alamos Community Outreach Center of information requested by members of the public related to LANL operations and proposed projects.
- Numerous Open Forum public meetings in the communities around LANL to discuss LANL activities, the status of the SWEIS, and other issues raised by the public.

The draft SWEIS was distributed to interested stakeholders for comment. The comment period extended from May 15, 1998, to July 15, 1998. Public hearings on the draft SWEIS were announced in the *Federal Register*, as well as community newspapers and radio broadcasts. Public hearings were held in Los Alamos, Santa Fe, and Española, New Mexico, on June 9, 1998, June 10, 1998, and June 24, 1998, respectively.

Oral and written comments were accepted during the 60-day comment period for the draft SWEIS. All comments received, whether orally or in writing, were considered in preparation of the final SWEIS. The final SWEIS includes a new volume IV with responses to individual comments and a discussion of general major issues. DOE will prepare a Record of Decision no sooner than 30 days after the final SWEIS Notice of Availability is published in the *Federal Register*. The Record of Decision will describe the rationale used for DOE's selection of an alternative or portions of the alternatives. Following the issuance of the Record of Decision, a Mitigation Action Plan may also be issued to describe any mitigation measures that DOE commits to in concert with its decision.

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1. DOE *National Environmental Policy Act* regulations (10 CFR 1021) previously required that an implementation plan be prepared; a regulation change (61 FR 64604) deleted this requirement. An implementation plan was prepared for this SWEIS.

COVER SHEET

Responsible Agency: U.S. Department of Energy (DOE)

Cooperating Agency: Incorporated County of Los Alamos

Title: Site-Wide Environmental Impact Statement for the Continued Operation of the Los Alamos National Laboratory, Los Alamos, New Mexico (DOE/EIS-0238)

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Abstract: DOE proposes to continue operating the Los Alamos National Laboratory (LANL) located in Los Alamos County, in north-central New Mexico. DOE has identified and assessed four alternatives for the operation of LANL: (1) No Action, (2) Expanded Operations, (3) Reduced Operations, and (4) Greener. Expanded Operations is DOE's Preferred Alternative, with the exception that DOE would only implement pit manufacturing at a level of 20 pits per year. In the No Action Alternative, DOE would continue the historical mission support activities LANL has conducted at planned operational levels. In the Expanded Operations Alternative, DOE would operate LANL at the highest levels of activity currently foreseeable, including full implementation of the mission assignments from recent programmatic documents. Under the Reduced Operations Alternative, DOE would operate LANL at the minimum levels of activity necessary to maintain the capabilities to support the DOE mission in the near term. Under the Greener Alternative, DOE would operate LANL to maximize operations in support of nonproliferation, basic science, materials science, and other nonweapons areas, while minimizing weapons activities. Under all of the alternatives, the affected environment is primarily within 50 miles (80 kilometers) of LANL. Analyses indicate little difference in the environmental impacts among alternatives. The primary discriminators are: collective worker risk due to radiation exposure, socioeconomic effects due to LANL employment changes, and electrical power demand.

Public Comment and DOE Decision: The draft SWEIS was released to the public for review and comment on May 15, 1998. The comment period extended until July 15, 1998, although late comments were accepted to the extent practicable. All comments received were considered in preparation of the final SWEIS[1]. DOE will utilize the analysis in this final SWEIS and prepare a Record of Decision on the level of continued operation of LANL. This decision will be no sooner than 30 days after the Notice of Availability of the final SWEIS is published in the *Federal Register*.

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1. Changes made to this SWEIS since publication of the draft SWEIS are marked with a vertical bar to the right or left of the text.

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MAIN REPORT

VOLUME II
PROJECT-SPECIFIC SITING AND CONSTRUCTION ANALYSES

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VOLUME III
ABBREVIATIONS AND ACRONYMS

AAQS	Ambient Air Quality Control Standards
ACHP	Advisory Council on Historic Preservation
ACGIH	American Conference of Governmental Industrial Hygienists
ACIS	Automated Chemical Inventory System
ACL	administrative control level
AEC	U.S. Atomic Energy Commission
AIHA	American Industrial Hygiene Association
AIRFA	*American Indian Religious Freedom Act*
ALARA	as low as reasonably achievable
ALOHA™	Areal Locations of Hazardous Atmospheres (code)
ANSI	American National Standards Institute
ARF	airborne release fraction
ARMS	Archaeological Records Management System
ARPA	*Archaeological Resource Protection Act*
ARR	airborne release rate
ARTCC	Air Route Traffic Control Center
BIO	Basis for Interim Operation
BLEVE	boiling liquid expanding vapor explosion
BNL	Brookhaven National Laboratory
BNM	Bandelier National Monument
°C	degrees Celsius
CAA	*Clean Air Act*
CAM	continuous air monitor

CAP–88	Clean Air Act Assessment Package for 1988
CBD	chronic beryllium disease
CDC	Centers for Disease Control
CDP	Census Designated Place
CDR	Conceptual Design Report
CEDE	committed effective dose equivalent
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH	contact-handled (waste)
CH TRU	contact-handled transuranic (waste)
cm	centimeter
CMIP	Capability Maintenance and Improvement Project
CMR	Chemistry and Metallurgy Research
CRMT	Cultural Resources Management Team
CSA	Container Storage Area
DARHT	Dual Axis Radiographic Hydrodynamic Test (Facility)
DCG	derived concentration guide
DDE	deep dose equivalent
DNA	deoxyribonucleic acid
DNFSB	Defense Nuclear Facilities Safety Board
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of Interior
DOT	U.S. Department of Transportation
DR	damage ratio

DU	depleted uranium
EA	environmental assessment
ECDR	Enhanced Conceptual Design Report
EIS	environmental impact statement
EM	DOE Office of Environmental Management
EM&R	emergency management and response
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERPG	Emergency Response Planning Guideline
ES	emission stack
EU	enriched uranium
°F	degrees Fahrenheit
FAA	Federal Aviation Administration
FE	fan exhaust
FEMA	Federal Emergency Management Agency
FIMAD	Facility for Information Management, Analysis and Display
FONSI	Finding of No Significant Impact
FR	*Federal Register*
FRP	fiberglass-reinforced plastic (or plywood)
FSAR	Final Safety Analysis Report
FS MEI	facility-specific maximally exposed individual
ft	feet
FWS	U.S. Fish and Wildlife Service
FY	fiscal year
g	gram

g	acceleration of gravity (980 cm/sec2)
GEP	good engineering practice
GIS	geographic information system
GV	guideline value
ha	hectares
HA	hazard analysis
HAP	hazardous air pollutant
HAZMAT	hazardous material
HCLPF	high confidence in low probability of failure
HE	high explosives
HEFS	High Explosives Firing Site
HEPF	High Explosives Processing Facility
HEP	(mean) human error probability
HEPA	high efficiency particulate air (filter)
HEU	highly enriched uranium
HHS	U.S. Department of Health and Human Services
HI	hazard index
HRL	Health Research Laboratory
HVAC	heating, ventilation, and air conditioning
ICBM	intercontinental ballistic missile
ICRP	International Commission on Radiological Protection
IDLH	immediately dangerous to life or health
in.	inch
IP	industrial packaging
IPF	Isotope Production Facility

IRIS	Integrated Risk Information System
ISC–3	Industrial Source Complex (Model) Version 3
km	kilometer
LACEF	Los Alamos Critical Experiments Facility
LAM	Los Alamos Municipal Airport
LAMPF	Los Alamos Meson Physics Facility (former name for LANSCE)
LANL	Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LASL	Los Alamos Scientific Laboratory
lb	pound
LCF	latent cancer fatality
LEDA	Low-Energy Demonstration Accelerator
LEL	lower explosive limit
LEU	low enriched uranium
LLMW	low-level mixed waste
LLNL	Lawrence Livermore National Laboratory
LLW	low-level radioactive waste
LPF	leak path factor
LSA	low specific activity
m	meter
MAPs	mixed activation products
MAR	material-at-risk
MC&A	materials control and accountability
MCL	maximum contaminant level
MEI	maximally exposed individual

MFPs	mixed fusion products
MGY	million gallons per year
mi	mile
ML	Richter Magnitude
MLNSC	Manuel Lujan Neutron Scattering Center
MOA	memorandum of agreement
MOI	maximum off-site individual
MOX	mixed oxide (fuel)
MSL	Materials Science Laboratory
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NAGPRA	*Native American Graves and Repatriation Act*
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NCI	National Cancer Institute
NCRP	National Council on Radiation Protection
NDA	nondestructive analysis
NDE	nondestructive examination
NDT	Nondestructive Testing (Facility)
NEPA	*National Environmental Policy Act of 1969*, as amended
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	*National Historic Preservation Act*
NIF	National Ignition Facility
NIH	National Institute of Health
NIOSH	National Institute for Occupational Safety and Health

NM	New Mexico
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated
NMSF	Nuclear Materials Storage Facility
NMTR	New Mexico Tumor Registry
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPH	natural phenomena hazard
NPS	National Park Service
NRC	U.S. Nuclear Regulatory Commission
NRDC	National Resources Defense Council
NRHP	National Register of Historic Places
NSC	National Safety Council
NTS	Nevada Test Site
NTU	nephelometric turbidity units
OEL	occupational exposure limit
OLM	Ozone Limiting Method
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PE-Ci	plutonium equivalent curie
PEIS	programmatic environmental impact statement

PF	Plutonium Facility
PGA	peak ground acceleration (horizontal)
pH	a measure of acidity and alkalinity
PHERMEX	Pulsed High-Energy Radiation Machine Emitting X-Ray (facility)
PL	public law
PM	particulate matter
PM 10	particulate matter equal to or less than 10 micrometers aerodynamic diameter
POC	point-of-contact
PPE	personal protective equipment
ppb	parts per billion
ppm	parts per million
PRA	probabilistic risk assessment
PrHA	process hazard analysis
PSHA	Probabilistic Seismic Hazard Analysis
psi	pounds per square inch
R&D	research and development
RAM	radioactive material
RAMROD	Radioactive Materials Research, Operations, and Demonstration (facility)
RANT	Radioactive Assay and Nondestructive Test (facility)
RAP	regulated air pollutant
RCRA	*Resource Conservation and Recovery Act*
rem	roentgen equivalent man
RF	radio frequency
RfCs	inhalation reference concentrations
RfD	reference dose

RFETS	Rocky Flats Environmental Technology Site
RFP	Rocky Flats Plant (former name of the Rocky Flats Environmental Technology Site)
RH	remote-handled (waste)
RH TRU	remote-handled transuranic (waste)
RLW	radioactive liquid waste
RLWTF	Radioactive Liquid Waste Treatment Facility
RMP	Risk Management Program (EPA)
ROD	Record of Decision
SA	safety assessment
SAR	Safety Analysis Report
SCAPA	Subcommittee of Consequence Analysis and Protective Actions (DOE)
SCO	surface-contaminated object
SEER	Surveillance, Epidemiology, and End Results
SHEBA	Solution High-Energy Burst Assembly
SHPO	State Historic Preservation Office(r)
SLEV	screening level emission value
SMAC	shipment mobility/accountability collection
SNL	Sandia National Laboratories
SNM	special nuclear material
SPCC	Spill Prevention, Control, and Countermeasures
SRS	Savannah River Site
SSM	Stockpile Stewardship and Management
SST	safe secure transport
START	Strategic Arms Reduction Talks (or Treaty)
STC	standard transportation container

SWB	standard waste box
SWSC	sanitary waste system consolidation
TA	Technical Area
TCP	traditional cultural property
TEDE	total effective dose equivalent
TEEL	temporary emergency exposure limit
TFF	Target Fabrication Facility
TI	transport index
TLV	threshold limit value
TRU	transuranic (waste)
TRUPACT	Transuranic Packaging Transporter
TSFF	Tritium Science and Fabrication Facility
TSP	total suspended particulates
TSTA	Tritium System Test Assembly (facility)
TWA	time-weighted average
TWISP	Transuranic Waste Inspectable Storage Project
UBC	Uniform Building Code
UC	University of California
UCL	upper confidence limit
UCNI	unclassified controlled nuclear information
UCRL	University of California Research Laboratory
UN	University of Nevada
UNM	University of New Mexico
URF	unit risk factor
U.S.	United States

U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USSR	Union of Soviet Socialist Republics
VOC	volatile organic compound
WAC	waste acceptance criteria
WCRR	Waste Characterization, Reduction, and Repackaging (facility)
WETF	Weapons Engineering Tritium Facility
WIPP	Waste Isolation Pilot Plant
WNR	Weapons Neutron Research
WWTF	Waste Water Treatment Facility

VOLUME III
MEASUREMENTS AND CONVERSIONS

The following information is provided to assist the reader in understanding certain concepts in this SWEIS. Definitions of technical terms can be found in volume I, chapter 10, Glossary.

SCIENTIFIC NOTATION

Scientific notation is used in this report to express very large or very small numbers. For example, the number 1 billion could be written as 1,000,000,000 or, using scientific notation, as 1×10^9. Translating from scientific notation to a more traditional number requires moving the decimal point either right (for a positive power of 10) or left (for a negative power of 10). If the value given is 2.0×10^3, move the decimal point three places (insert zeros if no numbers are given) to the right of its current location. The result would be 2,000. If the value given is 2.0×10^{-5}, move the decimal point five places to the left of its present location. The result would be 0.00002. An alternative way of expressing numbers, used primarily in the appendixes of this SWEIS, is exponential notation, which is very similar in use to scientific notation. For example, using the scientific notation for 1×10^9, in exponential notation the 10^9 (10 to the power of 9) would be replaced by E+09. (For positive powers, sometimes the "+" sign is omitted, and so the example here could be expressed as E09.) If the value is given as 2.0×10^{-5} in scientific notation, then the equivalent exponential notation is 2.0E-05.

UNITS OF MEASUREMENT

The primary units of measurement used in this report are English units with metric equivalents enclosed in parentheses.

Many metric measurements presented include prefixes that denote a multiplication factor that is applied to the base standard (e.g., 1 kilometer = 1,000 meters). The following list presents these metric prefixes:

giga	1,000,000,000 (10^9; E+09; one billion)
mega	1,000,000 (10^6; E+06; one million)
kilo	1,000 (10^3; E+03; one thousand)
hecto	100 (10^2; E+02; one hundred)
deka	10 (10^1; E+01; ten)
unit	1 (10^0; E+00; one)
deci	0.1 (10^{-1}; E-01; one tenth)
centi	0.01 (10^{-2}; E-02; one hundredth)
milli	0.001 (10^{-3}; E-03; one thousandth)

micro	0.000001 (10^{-6}; E-06; one millionth)
nano	0.000000001 (10^{-9}; E-09; one billionth)
pico	0.000000000001 (10^{-12}; E-12; one trillionth)

DOE Order 5900.2A, *Use of the Metric System of Measurement*, prescribes the use of this system in DOE documents. Table MC–1 lists the mathematical values or formulas needed for conversion between English and metric units. Table MC–2 summarizes and defines the terms for units of measure and corresponding symbols found throughout this report.

RADIOACTIVITY UNIT

Part of this report deals with levels of radioactivity that might be found in various environmental media. Radioactivity is a property; the amount of a radioactive material is usually expressed as "activity" in curies (Ci) (Table MC–3). The curie is the basic unit used to describe the amount of substance present, and concentrations are generally expressed in terms of curies per unit of mass or volume. One curie is equivalent to 37 billion disintegrations per second or is a quantity of any radionuclide that decays at the rate of 37 billion disintegrations per second. Disintegrations generally include emissions of alpha or beta particles, gamma radiation, or combinations of these.

RADIATION DOSE UNITS

The amount of ionizing radiation energy received by a living organism is expressed in terms of radiation dose. Radiation dose in this report is usually expressed in terms of effective dose equivalent and reported numerically in units of rem (Table MC–4). Rem is a term that relates ionizing radiation and biological effect or risk. A dose of 1 millirem (0.001 rem) has a biological effect similar to the dose received from about a 1-day exposure to natural background radiation. A list of the radionuclides discussed in this document and their half-lives is included in Table MC–5.

CHEMICAL ELEMENTS

A list of selected chemical elements, chemical constituents, and their nomenclature is presented in Table MC–6.

TABLE MC–1.—*Conversion Table*

MULTIPLY	BY	TO OBTAIN	MULTIPLY	BY	TO OBTAIN
ac	0.405	ha	ha	2.47	ac
°F	(°F -32) x 5/9	°C	°C	(°C x 9/5) + 32	°F
ft	0.305	m	m	3.28	ft
ft^2	0.0929	m^2	m^2	10.76	ft^2
ft^3	0.0283	m^3	m^3	35.3	ft^3
gal.	3.785	l	l	0.264	gal.
in.	2.54	cm	cm	0.394	in.
lb	0.454	kg	kg	2.205	lb
mCi/km^2	1.0	nCi/m^2	nCi/m^2	1.0	mCi/km^2
mi	1.61	km	km	0.621	mi
mi^2	2.59	km^2	km^2	0.386	mi^2
mi/h	0.447	m/s	m/s	2.237	mi/h
nCi	0.001	pCi	pCi	1,000	nCi
oz	28.35	g	g	0.0353	oz
pCi/l	10^{-9}	µCi/ml	µCi/ml	10^{9}	pCi/l
pCi/m^3	10^{-12}	Ci/m^3	Ci/m^3	10^{12}	pCi/m^3
pCi/m^3	10^{-15}	mCi/cm^3	mCi/cm^3	10^{15}	pCi/m^3
ppb	0.001	ppm	ppm	1,000	ppb
ton	0.907	metric ton	metric ton	1.102	ton

TABLE MC–2.—*Names and Symbols for Units of Measure*

LENGTH	
SYMBOL	**NAME**
cm	centimeter (1 x 10^{-2} m)
ft	foot
in.	inch
km	kilometer (1 x 10^{3} m)
m	meter
mi	mile
mm	millimeter (1 x 10^{-3} m)
µm	micrometer (1 x 10^{-6} m)
VOLUME	
SYMBOL	**NAME**
cm^3	cubic centimeter
ft^3	cubic foot
gal.	gallon
$in.^3$	cubic inch
l	liter
m^3	cubic meter
ml	milliliter (1 x 10^{-3} l)
ppb	parts per billion
ppm	parts per million
yd^3	cubic yard
RATE	
SYMBOL	**NAME**
Ci/yr	curies per year
cm^3/s	cubic meters per second
ft^3/s	cubic feet per second
ft^3/min	cubic feet per minute
gpm	gallons per minute
kg/yr	kilograms per year
km/h	kilometers per hour
mg/l	milligrams per liter
MGY	million gallons per year
MLY	million liters per year
m^3/yr	cubic meters per year
mi/h or mph	miles per hour
µCi/l	microcuries per liter
pCi/l	picocuries per liter

TABLE MC–2.—*Names and Symbols for Units of Measure*-Continued

NUMERICAL RELATIONSHIPS	
SYMBOL	**MEANING**
<	less than
≤	less than or equal to
>	greater than
≥	greater than or equal to
2σ	two standard deviations
TIME	
SYMBOL	**NAME**
d	day
h	hour
min	minute
nsec	nanosecond
s	second
yr	year
AREA	
SYMBOL	**NAME**
ac	acre (640 per mi^2)
cm^2	square centimeter
ft^2	square foot
ha	hectare (1 x 10^4 m^2)
$in.^2$	square inch
km^2	square kilometer
mi^2	square mile
MASS	
SYMBOL	**NAME**
g	gram
kg	kilogram (1 x 10^3 g)
mg	milligram (1 x 10^{-3} g)
µg	microgram (1 x 10^{-6} g)
ng	nanogram (1 x 10^{-9} g)
lb	pound
ton	metric ton (1 x 10^6 g)
oz	ounce

TABLE MC–2.—*Names and Symbols for Units of Measure*-Continued

TEMPERATURE	
SYMBOL	**NAME**
°C	degrees Celsius
°F	degrees Fahrenheit
°K	degrees Kelvin
SOUND/NOISE	
SYMBOL	**NAME**
dB	decibel
dBA	A-weighted decibel

TABLE MC–3.—*Names and Symbols for Units of Radioactivity*

RADIOACTIVITY	
SYMBOL	**NAME**
Ci	curie
cpm	counts per minute
mCi	millicurie (1 x 10^{-3} Ci)
µCi	microcurie (1 x 10^{-6} Ci)
nCi	nanocurie (1 x 10^{-9} Ci)
pCi	picocurie (1 x 10^{-12} Ci)

TABLE MC–4.—*Names and Symbols for Units of Radiation Dose*

RADIATION DOSE	
SYMBOL	**NAME**
mrad	millirad (1 x 10^{-3} rad)
mrem	millirem (1 x 10^{-3} rem)
R	roentgen
mR	milliroentgen (1 x 10^{-3} R)
µR	microroentgen (1 x 10^{-6} R)

TABLE MC–5.—*Radionuclide Nomenclature*

SYMBOL	RADIONUCLIDE	HALF-LIFE	SYMBOL	RADIONUCLIDE	HALF-LIFE
Am-241	americium-241	432 yr	Pu-241	plutonium-241	14.4 yr
H-3	tritium	12.26 yr	Pu-242	plutonium-242	3.8×10^5 yr
Mo-99	molybdenum-99	66 hr	Pu-244	plutonium-244	8.2×10^7 yr
Pa-234	protactinium-234	6.7 hr	Th-231	thorium-231	25.5 hr
Pa-234m	protactinium-234m	1.17 min	Th-234	thorium-234	24.1 d
Pu-236	plutonium-236	2.9yr	U-234	uranium-234	2.4×10^5 yr
Pu-238	plutonium-238	87.7 yr	U-235	uranium-234	7×10^8 yr
Pu-239	plutonium-239	2.4×10^4 yr	U-238	uranium-238	4.5×10^9 yr
Pu-240	plutonium-240	6.5×10^3 yr			

TABLE MC–6.—*Elemental and Chemical Constituent Nomenclature*

SYMBOL	CONSTITUENT	SYMBOL	CONSTITUENT
Ag	silver	Pa	protactinium
Al	aluminum	Pb	lead
Ar	argon	Pu	plutonium
B	boron	SF_6	sulfur hexafluoride
Be	beryllium	Si	silicon
CO	carbon monoxide	SO_2	sulfur dioxide
CO_2	carbon dioxide	Ta	tantalum
Cu	copper	Th	thorium
F	fluorine	Ti	titanium
Fe	iron	U	uranium
Kr	krypton	V	vanadium
N	nitrogen	W	tungsten
Ni	nickel	Xe	xenon
NO_2^-	nitrite ion	Zn	zinc
NO_3^-	nitrate ion		

VOLUME III

A

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committed effective dose equivalent (CEDE)
B–1, B–4 to B–5, B–17, D–3, D–6, D–33, G–115, G–119

criteria pollutant
B–38, B–40 to B–41, B–49 to B–50, B–53 to B–54, B–203 to B–205, B–207 to B–209, B–212 to B–213, B–215 to B–219, B–222 to B–223, B–228

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E–1 to E–4, E–13, E–21 to E–22, E–24 to E–30, E–39 to E–40, E–48 to E–53, G–121 to G–122

D

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B–3, E–2, E–52, F–5, G–27, G–115, G–139

Defense Nuclear Facilities Safety Board (DNFSB)
G–205 to G–206, G–263, G–269

depleted uranium (DU)
B–7, B–46 to B–47, B–229, B–231 to B–235, B–237, D–7, D–42 to D–44, F–5, F–37 to F–38, F–42 to F–43, F–55, G–26 to G–28, G–31, G–40 to G–41, G–107, G–109 to G–110, G–115, G–124

derived concentration guide (DCG)
D–46

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G–197, G–216

Diamond Drive
F–22, F–25,G–77, G–161, G–244, G–253

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F–35, G–222, G–251, G–271

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A–14, D–46 to D–47, D–141

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F–53 to F–54, F–62, F–75, G–14, G–25 to G–27, G–29, G–40, G–45, G–61, G–63, G–65 to G–67, G–74, G–78 to G–79, G–81, G–84 to G–85, G–89, G–124, G–167, G–169 to G–174, G–209, G–211 to G–212, G–270

E

earthquake
G–1, G–4, G–9, G–16 to G–18, G–22 to G–23, G–40, G–44, G–46, G–49 to G–50, G–69, G–76, G–82, G–87 to G–91, G–94 to G–96, G–98 to G–100, G–117 to G–118, G–212 to G–213

electric power
G–272

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G–202, G–230, G–277

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B–55, B–57, B–60 to B–61, C–1, C–104, C–130 to C–131, C–163 to C–164, D–143, E–27, E–52, G–123, G–278
EPA D–43 to D–44

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D–12, D–141

Española
A–1, A–10 to A–11, A–14 to A–15, A–17, B–73, D–116, D–145, E–29, G–39, G–171 to G–172, G–268

Executive Order(s)
E–24, E–30, E–38

Expanded Operations
A–2, A–12 to A–13, B–6 to B–15, B–21, B–23, B–26, B–27, B–28, B–31, B–35, B–41 to B–42, B–54, B–144, B–183, B–232 to B–233, B–234, B–239, D–35, D–39 to D–44, F–44, G–5, G–47, G–74, G–81, G–89, G–126 to G–127, G–132, G–134, G–137 to G–138, G–141, G–145, G–147, G–152, G–155, G–157, G–161, G–165, G–168, G–170, G–174, G–176, G–181, G–183, G–186, G–189, G–195, G–198 to G–199, G–203, G–210 to G–213, G–215, G–217, G–221, G–226, G–233, G–236, G–238 to G–246, G–250, G–252, G–254, G–256 to G–258, G–261 to G–263, G–266 to G–267

F

firing site
A–2 to A–3, B–2, B–4, B–12, B–18 to B–20, B–22 to B–28, B–40, B–46, B–229, G–27, G–103, G–107 to G–111, G–124, G–170, G–272, G–275

fission
B–6, B–10, B–16, D–3, D–7, G–9, G–74, G–86, G–163, G–166, G–168, G–214, G–216, G–219, G–258 to G–259, G–261 to G–262

fusion
F–38, G–14

G

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A–2, A–12 to A–13, A–15, B–6 to B–15, B–25 to B–28, B–33, B–37, D–35, D–39 to D–43, F–1, F–35, F–40, F–44 to F–48, F–50 to F–51, F–57, F–59, F–61 to F–65, F–67, F–69, F–72, G–5, G–47, G–81, G–126 to G–127, G–134, G–138, G–141, G–145, G–147, G–152, G–155, G–157, G–161, G–165, G–168, G–170, G–174, G–176, G–181, G–183, G–186, G–189, G–195, G–199, G–203, G–210 to G–213, G–215, G–217, G–221, G–226, G–233, G–236, G–243 to G–245, G–250, G–252, G–255 to G–258, G–261 to G–263, G–266 to G–267

H

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B–26, B–215 to B–216, B–224, B–260

hazardous waste
E–13, F–63, G–34, G–139

health effect
B–41, B–143, D–1, D–4 to D–5, D–7, D–9, D–170, F–16, F–18 to F–20, F–55, F–58, F–70, F–73, G–1, G–8, G–10 to G–12, G–39, G–74, G–100, G–130, G–139, G–142, G–146, G–148

high explosives (HE)
A–2 to A–3, A–5, A–11, B–4, B–8, B–18 to B–20, B–22 to B–26, B–40 to B–41, B–45 to B–46, B–203 to B–204, B–206 to B–213, B–215 to B–229, B–231, B–235 to B–238, D–39, D–41 to D–44, D–141 to D–142, E–10, G–14 to G–15, G–17 to G–18, G–24 to G–25, G–27, G–42 to G–43, G–64, G–80, G–85, G–167, G–212 to G–213, G–251, G–254 to G–255

highly enriched uranium (HEU)
D–7, F–36 to F–37, F–39 to F–42, G–27, G–31, G–40, G–45, G–72 to G–74, G–78, G–84, G–91, G–162, G–166 to G–169, G–216

historic resource
E–2, E–26, E–29 to E–30, E–32, E–39, G–122

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F–43, G–28

human health
D–40, D–42

Hydrogeologic Workplan
A–1, A–17

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index
A–1 to A–2, A–5, B–230, D–29, D–33, F–26, G–108

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E–10, E–27, E–40, G–5

L

latent cancer fatality(ies) (LCF)
B–1, D–28 to D–29, D–34 to D–35, D–40, F–30 to F–31, F–45 to F–47, F–49 to F–51, F–53, F–55 to F–57, F–62, F–64 to F–65, F–68 to F–69, G–8, G–215

Los Alamos Canyon
C–111 to C–116, C–139 to C–145, D–30, D–45 to D–46, D–132 to D–133, D–171, G–101, G–107 to G–108, G–110 to G–111

Los Alamos County
A–11, A–13, B–39, D–11 to D–12, D–14, D–16, D–18 to D–27, D–50 to D–51, D–58 to D–59, D–101 to D–103,

D–105 to D–106, D–108 to D–109, D–111, D–114, D–116, D–118, D–120, D–123, D–125, D–136, D–141 to D–142, D–152 to D–153, D–155 to D–156, D–159 to D–162, D–169 to D–170, E–2, E–10 to E–11, E–53, E–56, G–36, G–118, G–120, G–125, G–256

Los Alamos Neutron Science Center (LANSCE)
A–2 to A–3, A–5, B–2 to B–4, B–13 to B–16, B–18 to B–20, B–22 to B–28, B–243, D–29, D–33 to D–34, D–41, D–45, F–60, G–25, G–28

low-level radioactive mixed waste (LLMW)
F–63, F–72, G–183

low-level radioactive waste (LLW)
D–45, F–44, F–63, F–72, G–198 to G–199, G–274

M

main aquifer
C–73 to C–75

maximally exposed individual (MEI)
B–1 to B–3, B–16 to B–29, D–29, D–32, D–40 to D–43, D–44, D–143, F–20, F–47, F–56, F–62, G–14, G–31, G–76 to G–81, G–96, G–98, G–100, G–111, G–116 to G–119, G–125, G–154 to G–155, G–160 to G–161, G–167 to G–168, G–170 to G–171, G–175 to G–176, G–180, G–185 to G–186, G–194 to G–195, G–202, G–204, G–206, G–209 to G–212, G–214 to G–215, G–220 to G–222, G–232 to G–233, G–243 to G–245, G–251, G–253

medical isotope
F–20, F–38

Melcor Accident Consequence Code System (MACCS)
G–12 to G–13, G–37, G–111, G–120, G–124, G–171, G–214, G–232 to G–233, G–243, G–251, G–279

Mesita del Buey
E–52, E–56

Mexican spotted owl
G–122

minority population
G–171, G–173

mitigation(s)
E–28 to E–29, E–38, G–5, G–7, G–16, G–31, G–75, G–123

mixed oxide (MOX)
F–35, F–39, F–41

Mortandad Canyon
C–116 to C–118, C–122 to C–124, C–145 to C–147, C–154 to C–156, D–46 to D–47, D–144, G–101, G–107 to G–108, G–110 to G–111

N

National Ambient Air Quality Standards (NAAQS)
B–38, B–49, B–52, B–204 to B–205, B–208, B–213, B–217, B–228, B–255, B–257

National Emission Standards for Hazardous Air Pollutants (NESHAP)
B–1, B–4, B–21, B–26

National Pollutant Discharge Elimination System (NPDES)
A–1 to A–2, A–5, A–17, C–1, C–3, C–164, D–30, D–46, D–69 to D–70, D–72 to D–73, D–138, D–150

National Register of Historic Places (NRHP)
E–2 to E–3, E–21 to E–24, E–25, E–27, E–38 to E–41

natural gas
B–49 to B–51, B–55, B–57, B–62, G–18, G–40, G–45, G–77, G–83, G–89, G–154, G–156 to G–158

New Mexico Environment Department (NMED)
B–39

nitrate(s)
C–9, C–12, C–14, C–17, C–19, C–22, C–24, C–26, C–31, C–33, C–35, C–37, C–65, C–69, C–71, C–74, C–76, C–79, C–81, C–83, C–86, C–89, C–92, C–96, C–98, C–100, C–102, D–46, D–147, D–149, G–220, G–226 to G–232

No Action
A–2, A–12 to A–13, A–15, B–6 to B–15, B–22, B–26 to B–28, B–30, B–34, B–232 to B–234, D–39, D–41 to D–43, D–45, F–1, F–33, F–35, F–40 to F–41, F–44 to F–49, F–51, F–56, F–59, F–61 to F–66, F–68, F–71, G–5, G–31, G–47, G–81, G–126 to G–127, G–131 to G–132, G–134, G–136, G–138, G–140 to G–143, G–147, G–151, G–155, G–157, G–161, G–163 to G–165, G–168 to G–169, G–174, G–176, G–179, G–181, G–183, G–186, G–188, G–193, G–195, G–197 to G–199, G–203, G–206, G–210 to G–216, G–219, G–221, G–223, G–226, G–233 to G–234, G–236 to G–238, G–243 to G–245, G–247, G–249, G–252, G–254 to G–258, G–261 to G–264, G–266 to G–267

nonproliferation
G–5

Nuclear Materials Storage Facility (NMSF)
F–33, G–28

O

Occupational Safety and Health Administration (OSHA)
D–1 to D–2, D–9 to D–11, D–36 to D–38, D–173, G–42, G–107, G–135

Otowi
A–4, A–15 to A–16, B–73, D–31, D–147, E–6 to E–7, E–54

P

Pajarito Canyon
B–74, C–118 to C–119, C–122, C–124 to C–126, C–147 to C–149, C–153 to C–154, C–156 to C–160, G–101

Pajarito Mesa
D–147

Pajarito Road
B–251, G–77 to G–79, G–101, G–103, G–117, G–119 to G–120, G–123, G–155, G–168, G–186, G–195, G–204, G–210, G–120, G–221, G–233

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G–122

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B–215 to B–228, E–6 to E–7, F–35, G–26, G–51, G–222, G–271

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F–43, G–50, H–1

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G–14, G–51, G–55, G–261

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B–4, B–50 to B–51, B–75, B–183, B–185, B–189, B–230, B–239, B–243, B–245, B–247, B–251, B–255, E–19, F–58, F–60, G–7 to G–8, G–11 to G–13, G–35, G–69, G–75, G–83 to G–85, G–101, G–105 to G–106, G–108, G–111, G–115 to G–116, G–118 to G–119, G–123 to G–124, G–128, G–130, G–135, G–157, G–171, G–212, G–214, G–279

plutonium
A–2, B–4 to B–6, B–10 to B–11, B–13, B–18 to B–20, B–22 to B–26, B–247, C–9, C–12, C–14, C–17, C–19 to C–20, C–22, C–24, C–27, C–29, C–31, C–33, C–35, C–37, C–40 to C–41, C–43, C–45 to C–47, C–49 to C–51, C–53 to C–54, C–56 to C–57, C–59 to C–60, C–62, C–66, C–70, C–72, C–74, C–76, C–79, C–81, C–84, C–86, C–89, C–93, C–96, C–98, C–101, C–103, C–131, C–133, C–137 to C–138, C–140, C–143 to C–144,

C–146, C–148, C–150, C–152, C–155, C–157, C–159, C–161 to C–162, D–3, D–7, D–33, D–35, D–45, D–50, D–54, D–58, D–61, D–65, D–75, D–79, D–83, D–87, D–91, D–96, D–102 to D–105, D–108, D–111, D–120, D–122, D–125, D–127, D–130, D–132, D–136, D–138 to D–140, F–5, F–12 to F–13, F–28 to F–30, F–33, F–35 to F–36, F–38 to F–41, F–43, F–53 to F–54, F–62 to F–63, F–76, G–1, G–5, G–9, G–15, G–24, G–27 to G–29, G–31, G–40, G–45 to G–46, G–50 to G–51, G–53 to G–55, G–59, G–67 to G–69, G–74 to G–75, G–161 to G–162, G–171 to G–172, G–186 to G–187, G–196 to G–197, G–199, G–205 to G–214, G–216 to G–222, G–224, G–226 to G–232, G–234 to G–237, G–239 to G–243, G–245 to G–253, G–258 to G–261, G–263 to G–264, G–266 to G–267, G–271 to G–272, G–279

plutonium-238
C–9, C–12, C–14, C–17, C–19 to C–20, C–22, C–24, C–27, C–29, C–31, C–33, C–35, C–37, C–40 to C–41, C–43, C–45 to C–47, C–49 to C–51, C–53 to C–54, C–56 to C–57, C–59 to C–60, C–62, C–66, C–70, C–72, C–74, C–76, C–79, C–81, C–83, C–86, C–89, C–93, C–96, C–101 to C–102, C–131, C–133, C–137 to C–138, C–140, C–144, C–146, C–148, C–150, C–152, C–155, C–157, C–159, C–161 to C–162, D–46, D–50, D–54, D–58, D–61, D–65, D–75, D–79, D–83, D–87, D–91, D–96, D–102 to D–106, D–108, D–111, D–113, D–120, D–122, D–125, D–127, D–130 to D–132, D–136, D–146, D–148, D–151 to D–153, D–155 to D–160, D–165 to D–167, D–169, F–35, F–38 to F–40, F–42, F–53 to F–54, F–56 to F–57, F–60, F–62 to F–63, F–68 to F–70, G–197, G–205, G–264

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B–69, B–97, B–128, G–24, G–29

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G–34

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F–43

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D–1, D–10 to D–12, D–28 to D–30, D–32, D–42, D–170, G–269

Pueblo Canyon
B–74, C–120, C–149 to C–150, E–45 to E–46, G–107 to G–108, G–110 to G–111

Pueblo(s)
A–4, A–15 to A–16, B–19 to B–20, B–72 to B–74, C–32 to C–34, C–58 to C–59, C–97 to C–99, C–101 to C–104, C–120, C–131 to C–132, C–142 to C–143, C–149 to C–150, C–160 to C–161, D–16, D–46, E–3 to E–4, E–6 to E–9, E–12 to E–21, E–25, E–28 to E–29, E–31, E–38 to E–46, E–48 to E–52, E–54, E–56, G–14, G–155, G–161, G–168, G–171 to G–172, G–176, G–186, G–195, G–204, G–210, G–221, G–233, G–244, G–253

R

Radioactive Liquid Waste Treatment Facility (RLWTF)
A–2, A–5, D–46, G–24, G–29, G–90, G–93, G–95 to G–96, G–108, G–274

Radioactive Materials Research, Operations, and Demonstration (facility) (RAMROD)
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F–31, G–39, G–106, G–111, G–124

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G–171

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B–3 to B–5, B–8 to B–9, B–11 to B–17, B–28, C–1 to C–2, C–130, C–163, D–2, D–6, D–11, D–28 to D–29, D–31, D–35, D–40, D–45, D–47 to D–48, D–138 to D–139, D–171, D–173, G–12 to G–13, G–23, G–60, G–101, G–109, G–124, G–166, G–184, G–196 to G–197, G–219, G–274

RADTRAN
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A–2, A–12 to A–13, D–35, D–39 to D–43, F–1, F–44 to F–48, F–50 to F–51, F–57, F–59, F–61 to F–66, F–69, F–71, G–5, G–81, G–116, G–119, G–124, G–126 to G–127, G–134, G–138, G–141, G–145, G–147, G–152, G–155, G–157, G–161, G–165, G–168, G–170, G–174 to G–176, G–181, G–183, G–186, G–195, G–199, G–203, G–210 to G–213, G–215, G–217, G–221, G–226, G–233, G–236, G–243 to G–245, G–250, G–252, G–255 to G–258, G–261 to G–263, G–266 to G–267

Rendija Canyon
C–150 to C–151, G–87

reservoir
B–73, D–32, D–45, E–4, E–19, E–47 to E–48, E–55

Resource Conservation and Recovery Act (RCRA)
F–43, F–72, G–110, G–151 to G–152, G–179 to G–181, G–272

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F–21, F–23, F–40 to F–42, G–167

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B–73, G–96, G–98, G–100, G–117, G–119, G–147, G–155, G–161, G–186, G–206, G–210, G–233, G–244, G–253, G–261

S

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F–15, F–21, F–23, F–25, F–33 to F–37, F–39, F–45, F–53 to F–54

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F–75, G–6, G–30, G–34, G–38, G–71, G–89 to G–91, G–111, G–116, G–118, G–128, G–143, G–147 to G–148, G–154, G–156 to G–158, G–160 to G–161, G–163, G–165 to G–168, G–176 to G–177, G–181 to G–182, G–184, G–188 to G–189, G–194 to G–198, G–200, G–204, G–206, G–208, G–216, G–218 to G–219, G–221, G–227, G–244, G–253, G–258, G–261, G–269 to G–270, G–274 to G–276, G–278

San Ildefonso
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Sandia Canyon
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B–38, D–16, E–2, E–9, F–12, F–36, G–175, G–180, G–188, G–193

seismic
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Stockpile Stewardship and Management Programmatic Environmental Impact Statement (SSM PEIS)
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Technical Area (TA)–55
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D–54 to D–55

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transportation corridor
E–3

transuranic (TRU) waste
F–5, F–8, F–12, F–41, F–63, F–78, G–25, G–29, G–40 to G–41, G–45, G–64, G–67 to G–68, G–77 to G–79, G–83 to G–85, G–90 to G–91, G–93, G–99, G–107, G–109 to G–110, G–124, G–131, G–145, G–151 to G–153, G–177 to G–180, G–182 to G–185, G–187 to G–191, G–193 to G–194, G–196 to G–201, G–271, G–274 to G–275, G–278 to G–279

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Tritium System Test Assembly (TSTA)
A–2, A–5, B–4, B–20, D–41, G–15, G–29, G–47, G–61, G–63, G–67 to G–68, G–84, G–90, G–93, G–95, G–116, G–119, G–123, G–124, G–158, G–174 to G–176

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U.S. Department of Defense (DoD)
E–2, E–11, E–49, F–15, G–106, G–251

U.S. Department of Energy (DOE)
F–75 to F–76

U.S. Department of Transportation (DOT)
F–1 to F–3, F–5 to F–6, F–8, F–15, F–21, F–23, F–26, F–75 to F–76, G–37, G–130, G–133, G–139, G–141, G–147, G–151, G–177, G–180, G–196 to G–197, G–272

U.S. Environmental Protection Agency (EPA)
A–2, B–4, B–38 to B–40, B–42, B–47, B–75, B–143, B–145, B–158, B–160, B–182 to B–183, B–185, B–189, B–191, B–203 to B–207, B–210 to B–212, B–215, B–220, B–230, B–236, B–238 to B–239, B–243, B–245, B–247, B–251, B–255, B–259 to B–260, C–130, C–163, D–1, D–8, D–10 to D–11, D–28 to D–29, D–31 to D–32, D–40, D–42 to D–46, D–53, D–57, D–64, D–68, D–71, D–74, D–78, D–86, D–90, D–95, D–102 to D–106, D–108, D–110 to D–111, D–115, D–117, D–119 to D–120, D–124 to D–125, D–127, D–129, D–131 to D–135, D–138, D–141 to D–142, D–171, G–11, G–33, G–37, G–75, G–97, G–128, G–138, G–143, G–148, G–214, G–272, G–277

U.S. Fish and Wildlife Service (FWS)
E–4

U.S. Nuclear Regulatory Commission (NRC)
D–8, F–1, F–3, F–8, F–12, F–26, F–28 to F–29, F–77, G–44, G–55, G–109, G–223, G–269, G–273, G–277 to G–279

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V

vault
F–15, G–24, G–27, G–45, G–61, G–67, G–89, G–95, G–100, G–116, G–158, G–175, G–205 to G–206, G–213, G–263, G–274, G–278

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Waste Isolation Pilot Plant (WIPP)
F–8, F–75, F–79, G–152 to G–153, G–184, G–187, G–193 to G–194, G–196 to G–197, G–199, G–271

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B–13, B–27, B–38, G–34, G–120, G–183, G–185, G–194, G–197 to G–199, G–275 to G–276

waste minimization
G–5

wastewater
A–11, F–8, G–24 to G–26

Weapons Engineering Tritium Facility (WETF)
B–4, B–20, D–41, G–15, G–24, G–29, G–61, G–67, G–89, G–98 to G–99, G–116, G–119, G–123 to G–125, G–158, G–274

wetland
G–122

White Rock
A–15, B–19 to B–20, B–22 to B–26, B–74, D–27, D–101, D–111, D–114, D–123, D–144, E–2, E–7, E–43 to E–44, E–46, G–78, G–96, G–117, G–119 to G–120, G–124, G–171 to G–172, G–195, G–204, G–212

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G–18, G–39, G–44, G–46, G–50, G–76, G–82, G–87, G–100, G–103, G–107 to G–108, G–111 to G–113, G–115 to G–118, G–120 to G–125, G–151, G–181, G–277, G–280

worker dose
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