COVER SHEET

RESPONSIBLE AGENCY: U.S. Department of Energy, National Nuclear Security Administration

TITLE: Final Complex Transformation Supplemental Programmatic Environmental Impact Statement (Complex Transformation SPEIS, DOE/EIS-0236-S4)

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ABSTRACT: The National Nuclear Security Administration (NNSA), an agency within the Department of Energy, has the responsibility to maintain the safety, security, and reliability of the United States' nuclear weapons stockpile. This Complex Transformation Supplemental Programmatic Environmental Impact Statement (SPEIS) analyzes the potential environmental impacts of reasonable alternatives to continue transformation of the nuclear weapons complex to be smaller, and more responsive, efficient, and secure in order to meet national security requirements. The current Complex consists of sites located in seven states (California, Missouri, Nevada, New Mexico, South Carolina, Tennessee, and Texas). This SPEIS evaluates alternatives that would restructure special nuclear materials manufacturing and research and development facilities; consolidate special nuclear materials throughout the Complex; consolidate, relocate, or eliminate duplicative facilities and programs and improve operating efficiencies; and identify one or more sites for conducting NNSA flight test operations.

COOPERATING AGENCIES: The Department of the Air Force and the U.S. Army Garrison White Sands are cooperating agencies in the preparation of this Complex Transformation SPEIS.

PUBLIC COMMENTS: The Draft Complex Transformation SPEIS was issued for public review and comment on January 11, 2008. Comments on the Draft SPEIS were requested during a period of 90 days following publication of the U.S. Environmental Protection Agency's (EPA's) Notice of Availability in the *Federal Register*. Twenty public hearings to solicit comments on the Draft SPEIS were held during the public comment period. Prior to the end of this comment period, NNSA extended the public comment period by 20 additional days, until April 30, 2008. All comments received during the comment period were considered during preparation of the Final SPEIS. Late comments were also considered, to the extent practicable.

The Final SPEIS contains revisions and new information based in part on comments received on the Draft SPEIS. Vertical change bars in the margins indicate the locations of these revisions and new information. Volume 3 contains the comments received during the public comment period on the Draft SPEIS and NNSA's responses to the comments. NNSA will use the analysis presented in this Final SPEIS, as well as other information, in preparing the Record(s) of Decision (RODs) regarding Complex Transformation. NNSA will issue one or more RODs no sooner than 30 days after the EPA publishes a Notice of Availability of this Final SPEIS in the *Federal Register*. This document and related information are available on the Internet at www.ComplexTransformationSPEIS.com.

DOE/EIS-0236-S4

Final Complex Transformation Supplemental Programmatic Environmental Impact Statement

Volume I

Chapters 1 - 4

October 2008

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National Nuclear Security Administration
U.S. Department of Energy

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ACRONYMS AND ABBREVIATIONS

A/D	Assembly/Disassembly
A/D/HE	Assembly/Disassembly/High Explosives
AC and MC	Analytical Chemistry and Materials Characterization
ACE	Altamont Commuter Express
ACHP	Advisory Council on Historic Preservation
ACRR	Annular Core Research Reactor
AEC	Atomic Energy Commission
AFB	Air Force Base
AF&F	Arming, Fuzing, and Firing
ALARA	as low as reasonably achievable
ALCM	Air-Launch Cruise Missile
ALOHA	Aerial Location of Hazardous Atmospheres
AQCR	Air Quality Control Region
ARF	airborne release fraction
ASER	annual site environmental report
ATEC	U.S. Army Test Evaluation Command
BA	Biological Assessment
BAAQMD	Bay Area Air Quality Management District
BACMs	Best Available Control Measures
BEA	Bureau of Economic Analysis
BEEF	Big Explosives Experimental Facility
BEIR	Biological Effects of Ionizing Radiation
Bison-m	Biota Information System of New Mexico
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMAP	Biological Monitoring and Abatement Program
BMPs	Best Management Practices
BNM	Bandelier National Monument
CA	Composite Analysis
CAA	*Clean Air Act*
CAIRS	Computerized Accident/Incident Reporting System
CAMU	corrective action management unit
CASSC	California Species of Special Concern
CAUs	Corrective Action Units
CD-0	critical decision on mission need
CEQ	Council on Environmental Quality
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act*
CFF	Contained Firing Facility
CFR	Code of Federal Regulations
CGTO	Consolidated Group of Tribes and Organizations
CHS	Center for Homeland Security
CIF	Consolidated Incineration Facility
CMR	Chemistry and Metallurgy Research

CMRR	Chemistry and Metallurgy Research Building Replacement Project
CNC	Consolidated Nuclear Center
CNPC	Consolidated Nuclear Production Center
CNPS	California Native Plant Society
Complex	nuclear weapons complex
Complex Transformation SPEIS	Complex Transformation Supplemental Programmatic Environmental Impact Statement
COPCs	contaminants of potential concern
CPC	Consolidated Plutonium Center
CRT	Cargo Restraint Transporter
CSAs	Canned Subassemblies
CUC	Consolidated Uranium Center
CWA	*Clean Water Act*
CWL	chemical waste landfill
CY	calendar year
D&D	Decontamination and Decommissioning
DA	design agency
DAF	Device Assembly Facility
DARHT	Dual Axis Radiographic Hydrodynamic Test
dB	decibel
dBA	A-weighted decibels
DAF	Device Assembly Facility
DCE	Distributed Centers of Excellence
DCGs	Derived Concentration Guidelines
DHHS	U.S. Department of Health and Human Services
DHS	U.S. Department of Homeland Security
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
DP	Defense Programs
DPE	data processing equipment
DR	damage ratio
DTC	Developmental Test Command
DTRA	Defense Threat Reduction Agency
DTSC	Department of Toxic Substances Control
DU	Depleted Uranium
DWPF	Defense Waste Processing Facility
DWTF	Decontamination and Waste Treatment Facility
DX	Dynamic Experimentation
EA	Environmental Assessment
ECF	Entry Control Facility
EDE	effective dose equivalent
EE	Energy Efficiency and Renewable Energy
EFPC	East Fork Poplar Creek
EH	Office of Environment, Safety and Health

EIS	Environmental Impact Statement
EM	Environmental Management
EMAC	Ecological Monitoring and Compliance Program
EOA	expanded operations alternative
EODU	Explosive Ordinance Disposal Unit
EOL	End-of-Life
EOS	Equation of state
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
ERPG	Emergency Response Planning Guideline
ESL	Effects Screening Level
ETB	Engineering Test Bay
ETF	Environmental Test Facility
ETTP	East Tennessee Technology Park
EU	enriched uranium
EWTF	Explosives Waste Treatment Facility
FBI	Federal Bureau of Investigation
FE	facilities engineering
FGZ	fine-grain zone
FLAME	Fire Laboratory for Accreditation of Models and Experiments
FM	Farm-to-Market Road
FMD	Fissile Materials Disposition
FONSI	Finding of No Significant Impact
FPPA	*Farmland Protection Policy Act*
FTE	Full Time Employee
FWHM	Full Width at Half Maximum
FXR	Flash X-Ray
GCD	Greater Confinement Disposal
GIF	Gamma Irradiation Facility
GPD	gallons per day
GPS	Global Positioning System
GSA	General Services Area
GTS	Gas Transfer System
GWPP	groundwater protection program
HAN	hydroxylamine nitrate
HANDSS-55	“handling and segregation system for 55-gallon drums”
HANMF	H-Area New Manufacturing Facility
HAPs	Hazardous Air Pollutant
HE	High Explosives
HEAF	High Explosives Application Facility
HEPA	high-efficiency particulate air
HETB	Hardened Engineering Test Building
HEU	Highly Enriched Uranium
HEUMF	Highly Enriched Uranium Materials Facility
HEWTF	High Explosives Wastewater Treatment Facility
HI	Hazard Index

HLW	high level radioactive waste
HPS	Hantavirus Pulmonary Syndrome
HQ	Hazard Quotient
HR	Human Resources
HSC	Hazardous Materials Spill Center
HTM	High-Tech Mobile
HVAC	heating, ventilating, and air conditioning
HWDU	Hazardous waste disposal units
HWMF	hazardous waste management facility
HWSU	Hazardous Waste Storage Unit
HWTPF	Hazardous Waste Treatment and Processing Facility
HYDEC	hydride/dehydride casting
I	Interstate Highway
ICD-9-CM	International Classification of Disease, 9th Revision, Clinical Modification
ICRP	International Commission on Radiological Protection
IFF	Identification, Friend or Foe
IH	Industrial Hygiene
INEEL	Idaho National Engineering and Environmental Laboratory
INRAD	intrinsic radiation
IOM	Institution of Medicine
IPT	Integrated Project Team
ISCORS	Interagency Steering Committee on Radiation Standards
ISCST	Industrial Source Complex Short Term
ISD	Independent School District
ISM	Integrated Safety Management
ISMS	Integrated Safety Management System
ITRD	Innovative Treatment Remediation Demonstration
IWQPs	Inland Water Quality Parameters
JTA	Joint Test Assemblies
KAFB	Kirtland Air Force Base
KCP	Kansas City Plant
KCRIMS	Kansas City Responsive Infrastructure Manufacturing and Sourcing
KTF	Kauai Test Facility
LAC	Los Alamos County
LANL	Los Alamos National Laboratory
LANL SWEIS	Site-Wide Environmental Impact Statement for the Continued Operation of the Los Alamos National Laboratory
LANSCE	Los Alamos Neutron Science Center
LB/TS	Large Blast Thermal Simulator
LCF	latent cancer fatality
LDRGIF	Low Dose Rate Gamma Irradiation Facility
LLNL	Lawrence Livermore National Laboratory
LLW	low level waste
LOS	Level of Service

LPF	leak path factor
M&O	Management and Operations
MACCS	MELCOR Accident Consequence Code System
MACCS2	MELCOR Accident Consequence Code System Version 2
MACs	maximum allowable concentrations
MAR	material at risk
MBTA	*Migratory Bird Treaty Act*
MC&A	Material Control and Accountability
MCL	maximum contaminant level
MDC	maximum detectable concentration
MDL	maximum detection limit
MEI	maximally exposed individual
MEK	methyl ethyl ketone
MLLW	mixed low level waste
MOX	Mixed Oxide
MPF	Modern Pit Facility
MPF EIS	Modern Pit Facility Environmental Impact Statement
mrem	millirem
MRTFB	Major Range and Test Facility Base
MSGP	Multi-Sector General Permit
MVAs	motor vehicle accidents
MVM	million vehicle miles
MWDU	Mixed Waste Disposal Unit
NAAQS	National Ambient Air Quality Standards
NAFB	Nellis Air Force Base
NC	numerically controlled
NCRP	National Council on Radiation Protection Measurements
NDA	nondestructive assay
NDEP	Nevada Division of Environmental Protection
NE	Office of Nuclear Energy
NECI	Northeast Center Impact Area
NEP	Nuclear Explosive Package
NEPA	*National Environmental Policy Act*
NESHAP	National Emission Standards for Hazardous Air Pollutants
NEST	Nuclear Emergency Search Team
NGPF	Neutron Generator Production
NHP	National Hydrotesting Program
NHPA	*National Historic Preservation Act*
NMAAQS	New Mexico Ambient Air Quality Standards
NMAQCR	New Mexico Air Quality Control Regulations
NMED	New Mexico Environment Department
NMWQCC	New Mexico Water Quality Control Commission
NN	Nonproliferation and National Security
NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent

NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPR	Nuclear Posture Review
NPS	National Park Service
NPT	Nuclear Nonproliferation Treaty
NPTEC	Nonproliferation Test and Evaluation Complex
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSO	Nevada Site Office
NSTec	National Security Technologies
NTS	Nevada Test Site
NTTR	Nevada Test and Training Range
NWS	National Weather Service
NWSM	Nuclear Weapons Stockpile Memorandum
NWSP	Nuclear Weapons Stockpile Plan
OB/OD	Open Burn/Open Detonation
OEPG	Office of Environmental Policy and Guidance
ORNL	Oak Ridge National Laboratory
ORPS	Occurrence Reporting and Processing System
ORR	Oak Ridge Reservation
OSHA	Occupational Safety and Health Administration
OST	Office of Secure Transportation
OUs	operable units
PA	Performance Assessment
PAAA	*Price-Anderson Amendments Act*
Pantex	Pantex Plant
PCBs	polychlorinated biphenyls
pCi/L	picocuries per liter
PDCF	Pit Disassembly and Conversion Facility
PF-4	Plutonium Facility, Building 4
PHERMEX	Pulsed High Energy Radiation Machine Emitting X-Rays
PHETS	Permanent High Explosive Test Site
PIDAS	Perimeter Intrusion Detection and Assessment System
PIXY	Pulse Intense X-Ray
PMDA	Plutonium Management and Disposition Agreement
POLs	petroleum, oils, lubricants
PPE	personal protective equipment
ppy	pits per year
PQL	practical quantitation limit
PSD	Prevention of Significant Deterioration
PSRs	Potential release sites
Pu	Plutonium
PUREX	Plutonium-Uranium Extraction Process
QASPR	Qualification Alternatives to Sandia Pulsed Reactor
R&D	Research and Development
RANT	Radioassay and Nondestructive Testing

RCRA	*Resource Conservation and Recovery Act*
rem	roentgen equivalent man
REOP	Real Estate Operating Permit
RF	respirable fraction
RFI	RCRA facility investigation
RIMSII	Regional Input-Output Modeling System
RLWTF	Radioactive Liquid Waste Treatment Facility
RMWMF	Radioactive and Mixed Waste Management Facilities
ROD	Record of Decision
ROGs/POCs	reactive organic gases/precursor organic compounds
ROI	Region of Influence
RRF	respirable release fraction
RRW	Reliable Replacement Warhead
RWMC	Radioactive Waste Management Complex
RWMS	Radioactive Waste Management Site
S.C.	South Carolina State Highway
SAAQS	State Ambient Air Quality Standards
SASN	Silver acetylide-silver nitrate
SCDHEC	South Carolina Department of Health and Environmental Control
SEAB	Secretary of Energy Advisory Board
SEIS	Supplemental Environmental Impact Statement
SFNF	Santa Fe National Forest
SGT	Safeguards Transporters
SHIST	Seismic Hardrock in Site Test
SHPO	State Historic Preservation Office
SJVUAPCD	San Joaquin Valley Unified Air Pollution Control District
SMR	standardized mortality rate
SNF	Spent nuclear fuel
SNL	Sandia National Laboratories
SNL/NM	Sandia National Laboratories/New Mexico
SNL/CA	Sandia National Laboratories/California
SNM	Special nuclear material
SPEIS	Supplemental Programmatic Environmental Impact Statement
SRARP	Savannah River Archaeological Research Program
SREL	Savannah River Ecology Laboratory
SRS	Savannah River Site
SS&C	sand, slag and crucible
SSM	Stockpile Stewardship and Management
SSM PEIS	Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management
SSO	Sandia Site Office
SSP	Stockpile Stewardship Program
SST	Safe Secure Trailers
STP	Site Treatment Plan
STS	Stock-to-Target Sequence
SVOC	Semi-volatile organic compound

SWEIS	Site-Wide Environmental Impact Statement
SWSC	Sanitary Wastewater Systems Consolidation
SWTF	Solid Waste Transfer Facility
T&E	Threatened and Endangered
TA	Technical Area
TA-55	Technical Area 55
TBF	Terminal Ballistics Facility
TBP	tributyl phosphate
TCEQ	Texas Commission on Environmental Quality
TCP	Traditional Cultural Property
TECC	Transportation and Emergency Control Center
TEDE	Total Effective Dose Equivalent
TEF	Tritium Extraction Facility
TLD	Thermoluminescent dosimeter
TNRCC	Texas Natural Resource Conservation Commission
TPCB	Transurance Pad Cover Building
TPDES	Texas Pollutant Discharge Elimination System
TRAGIS	Transportation Routing Analysis Geographic Information System
Trinity NHL	Trinity Site National Historic Landmark
TRU	transuranic
TRUPACT-II	Transuranic Package Transporter
TSCA	Toxic Substance Control Act
TSD	Transportation Safequards Division
TSP	total suspended particulates
TSPI	Time Space Positioning Information
TTR	Tonopah Test Range
TVA	Tennessee Valley Authority
UC	University of California
UPF	Uranium Processing Facility
US	United States
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USC	United States Code
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
USPHS	United States Public Health Service
UXO	unexploded ordnance
VOC	volatile organic compound
VPP	Voluntary Protection Program
WAC	Waste Acceptance Criteria
WCRRF	Waste Compaction, Reduction, and Repackaging Facility
WEF	Waste Examination Facility
WETF	Weapons Engineering Tritium Facility
WFO	Work for Others
WIPP	Waste Isolation Pilot Plant

WSMR	White Sands Missile Range
WSRC	Washington Savannah River Company
WTG	Weapons Test Group
WVDP	West Valley Demonstration Project
WWTF	Wastewater Treatment Facility
XTF	Cross-wind Fire Facility
Y-12	Y-12 National Security Complex

CHEMICALS AND UNITS OF MEASURE

Bq	Becquerel
C	Celsius
Ci	curie
cm	centimeters
CFC	chlorofluorocarbons
CO	carbon monoxide
dB	decibel
dBA	decibel A-weighted
DCE	1, 2-dichloroethylene
DNA	deoxyribonucleic acid
F	Fahrenheit
ft	feet
ft^2	square feet
ft^3	cubic feet
ft^3/s	cubic feet per second
g	grams
gal	gallons
ha	hectares
hr	hour
in	inches
kg	kilograms
km	kilometers
km^2	square kilometers
kV	kilovolts
kVA	kilovolt-ampere
kW	kilowatts
kWh	kilowatt hours
L	liters
lb	pounds
m	meters
m^2	square meters
m^3	cubic meters
m/s	meters per second
mg	milligram (one-thousandth of a gram)
mg/L	milligrams per liter
MGD	million gallons per day

MGY	million gallons per year
mi	miles
mi^2	square miles
mph	miles per hour
mrem	millirem (one-thousandth of a rem)
MVA	megavolt-ampere
MW	megawatt
MWe	megawatt electric
MWh	megawatt hour
NO_2	nitrogen dioxide
NOX	nitrogen oxides
O_3	ozone
Pb	lead
PCB	polychlorinated biphenyl
pCi	picocurie (one-trillionth of a curie)
pCi/L	picocuries per liter
PM_{10}	particulate matter (less than 10 microns in diameter)
ppb	parts per billion
ppm	parts per million
ppbv	parts per billion by volume
rem	roentgen equivalent man
s	seconds
SO_2	sulfur dioxide
T	short ton
t	metric tons
TCA	1, 1, 1-trichloroethane
TCE	trichloroethylene
yd^3	cubic yards
yr	year
µCi	microcurie (one-millionth of a curie)
µCi/g	microcuries per gram
µg	microgram (one-millionth of a gram)
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter

CONVERSION CHART

To Convert Into Metric			To Convert Into English		
If You Know	**Multiply By**	**To Get**	**If You Know**	**Multiply By**	**To Get**
Length					
inch	2.54	centimeter	centimeter	0.3937	inch
feet	30.48	centimeter	centimeter	0.0328	feet
feet	0.3048	meter	meter	3.281	feet
yard	0.9144	meter	meter	1.0936	yard
mile	1.60934	kilometer	kilometer	0.62414	mile
Area					
square inch	6.4516	square centimeter	square centimeter	0.155	square inch
square feet	0.092903	square meter	square meter	10.7639	square feet
square yard	0.8361	square meter	square meter	1.196	square yard
acre	0.40469	hectare	hectare	2.471	acre
square mile	2.58999	square kilometer	square kilometer	0.3861	square mile
Volume					
fluid ounce	29.574	milliliter	milliliter	0.0338	fluid ounce
gallon	3.7854	liter	liter	0.26417	gallon
cubic feet	0.028317	cubic meter	cubic meter	35.315	cubic feet
cubic yard	0.76455	cubic meter	cubic meter	1.308	cubic yard
Weight					
ounce	28.3495	gram	gram	0.03527	ounce
pound	0.45360	kilogram	kilogram	2.2046	pound
short ton	0.90718	metric ton	metric ton	1.1023	short ton
Force					
dyne	0.00001	newton	newton	100,000	dyne

METRIC PREFIXES

Prefix	Symbol	Multiplication Factor		
exa-	E	1 000 000 000 000 000 000	=	10^{18}
peta-	P	1 000 000 000 000 000	=	10^{15}
tera-	T	1 000 000 000 000	=	10^{12}
giga-	G	1 000 000 000	=	10^{9}
mega-	M	1 000 000	=	10^{6}
kilo-	k	1 000	=	10^{3}
hecto-	h	l00	=	10^{2}
deka-	da	l0	=	10^{1}
deci-	d	0.1	=	10^{-1}
centi-	c	0.01	=	10^{-2}
milli-	m	0.001	=	10^{-3}
micro-	µ	0.000 001	=	10^{-6}
nano-	n	0.000 000 001	=	10^{-9}
pico-	p	0.000 000 000 001	=	10^{-12}
femto-	f	0.000 000 000 000 001	=	10^{-15}
atto-	a	0.000 000 000 000 000 001	=	10^{-18}