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LIST OF APPENDIX TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

μ	micro
μm	micrometer
°C	degrees Celsius
°F	degrees Fahrenheit
A	ampere
AASHTO	American Association of State Highway and Transportation Officials
ac	acre
AC	alternating current
ACI	American Concrete Institute
ACL	access control list
ADCOH	Appalachian Ultadeep Core Hole
AEGL	Acute Exposure Guideline Level
AFS	Alternate Feedstock
AHJ	Authority Having Jurisdiction
AIHA	American Industrial Hygiene Association
AISC	American Institute of Steel Construction
ALARA	as low as reasonably achievable
ALI	annual limit on intake
ALOHA	Areal Locations of Hazardous Atmospheres
A-MIMAS	advanced micronized master blend
ANS	American Nuclear Society
ANSI	American National Standards Institute
AP	aqueous polishing
API	American Petroleum Institute
APSF	Actinide Packaging and Storage Facility
ARF	airborne release fraction
ARM	area radiation monitor
ARR	airborne release rate
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
BA	Bachelor of Arts degree
BAQ	Bureau of Air Quality
BET	Bruanuer, Emmet, and Teller
BN	Belgonucleaire
BR	breathing rate
BS	Bachelor of Science degree
Btu	British thermal unit
CAAS	criticality accident alarm system
CAM	continuous air monitor
CAR	Construction Authorization Request
cc	cubic centimeter

CDE	committed dose equivalent
CEC	cation exchange capacity
CECP	Construction Emissions Control Plan
CEDE	committed effective dose equivalent
cfm	cubic feet per minute
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGA	Compressed Gas Association
CIF	Consolidated Incineration Facility
cm	centimeter
CM	configuration management
cm^3	cubic centimeter
CNSI	Chem Nuclear Systems, Incorporated
COCORP	Consortium for Continental Reflection Profiling
COE	U.S. Army Corps of Engineers
CPS	chemical process safety
CPT	cone penetrometer test
CPU	central processing unit
CRT	cathode ray tube
CS	conventional seismic
CSAS	Criticality Safety Analysis Sequence
CTF	Chemical Transfer Facility
DAC	derived air concentration
DBE	design basis earthquake
DBP	dibutyl phosphate
DC	direct current
DCF	dose conversion factor
DCP	Design Change Package
DCS	Duke Cogema Stone & Webster, LLC
DDE	deep dose equivalent
DDT	deflagration to detonation transition
DE	dose equivalent
DEAR	Department of Energy Acquisition Regulation
DER	dose equivalent rate
DETF	Dilute Effluent Treatment Facility
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOE-SR	U.S. Department of Energy Savannah River Operations Office
DOP	dioctyl phthalate
DPSG	Duke Project Services Group, Inc
DR	damage ratio
DRB	Deep Rock Borings study
DUO_2	depleted uranium oxide
DWPF	Defense Waste Processing Facility

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

EC	effluent concentration
ECR	Engineering Change Request
EDMS	Electronic Data Management System
EDST	Eastern Daylight Savings Time
EIS	Environmental Impact Statement
EMMH	external man-made hazard
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ERDA	Energy Research and Development Administration
ERPG	Emergency Response Planning Guidelines
ES&H	Environment, Safety, and Health
ETF	Effluent Treatment Facility
FA	flame acceleration
FEM	finite element model
FEMA	failure modes and effect analysis
FHA	Fire Hazard Analysis
FIC	final isotopic composition
FM	Factory Mutual
FOCI	foreign ownership, control, or influence
fpm	feet per minute
ft	foot
g	gram
g	acceleration due to gravity
gal	gallon
gpm	gallons per minute
GSA	General Separations Area
GSAR	Generic Safety Analysis Report
GSG	geological, seismological, geotechnical
ha	hectare
HAN	hydroxylamine nitrate
HAZOP	hazards and operability study
HEC-HMS	Hydrologic Engineering Center – Hydrologic Modeling System
HEPA	high-efficiency particulate air
HFE	human factors engineering
HIS	Human-system interface
HLW	high-level waste
HP	Health Physics
HPLC	high performance liquid chromatography
hr	hour
HVAC	heating, ventilation, and air conditioning
Hz	hertz
I&C	instrumentation and control
I/O	input/output

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

IAEA	International Atomic Energy Agency
ICBO	International Conference of Building Officials
ICP-MS	inductive coupled plasma – mass spectroscopy
ID	identification
IDLH	Immediately Dangerous to Life and Health
IEEE	Institute of Electrical and Electronic Engineers
in	inch
INES	International Nuclear Event Scale
IROFS	items relied on for safety
ISA	Integrated Safety Analysis
IT/SF	Interim Treatment/Storage Facility
ITP	In-Tank Precipitation Facility
ka	kilo annum or thousands of years
kg	kilogram
kip	kilopound
km	kilometer
kV	kilovolt
L	liter
lb	pound
LDE	Lens of the Eye Dose Equivalent
LETF	Liquid Effluent Treatment Facility
LFL	lower flammable limit
LLC	Limited Liability Company
LLNL	Lawrence Livermore National Laboratory
LLW	low-level waste
LOC	level of severity or concern
LPF	leak path factor
LWR	light water reactor
m	meter
M	molar
M&O	Maintenance and Operations
m^3	cubic meter
Ma	mega annum or millions of years
MACCS2	MELCOR Accident Consequence Code System for the Calculation of the Health and Economic Consequences of Accidental Atmospheric Radiological Releases
MAR	material at risk
mb	body wave magnitude
mbar	millibar
MBP	monobutyl phosphate
MC&A	Material Control and Accounting
MCC	motor control center
MCNP	Monte Carlo N-Particle
MD	duration magnitude

meq	milliequivalent
MeV	million electron volts
MFFF	Mixed Oxide Fuel Fabrication Facility
MFFP	MOX Fresh Fuel Package
mg	milligram
mgd	million gallons per day
mi	mile
MIMAS	micronized master blend
min	minute
MJ	megajoule
mm	millimeter
MMI	Modified Mercalli
MMIS	Manufacturing Management Information System
MOI	maximally exposed offsite individual
MOX	mixed oxide
MP	MOX processing
mph	miles per hour
MPQAP	MOX Project Quality Assurance Plan
MPSSZ	Middleton Place-Summerville Seismic Zone
mrem	millirem
MSA	Metropolitan Statistical Area
MSDS	Material Safety Data Sheet
msl	mean sea level
MtHM	metric tons of heavy metal
MVA	megavolt-ampere
MW	megawatt
Mw	moment magnitude
N	normal (unit of chemical concentration)
NAC/AEGL	National Advisory Committee for Acute Exposure Guidelines
nCi	nanocurie
NCSE	Nuclear Criticality Safety Evaluation
NEHRP	National Earthquake Hazards Reduction Program
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
ng	nanogram
NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_x	nitrous fumes
NPDES	National Pollutant Discharge Elimination System
NPH	natural phenomena hazard
NRC	U.S. Nuclear Regulatory Commission
O/M	oxygen-to-metal
OML	oxalic mother liquors

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

OSC	Operations Support Center
OSHA	Occupational Safety and Health Administration
Pa	Pascal
PA	Protected Area
PC	performance category
pCi	picocurie
PCM	personnel contamination monitor
PDCF	Pit Disassembly and Conversion Facility
PEL	permissible exposure level
PEP	personnel and equipment protection
PFHA	Preliminary Fire Hazard Analysis
PGA	peak ground acceleration
PHA	Probabilistic Hazards Assessment
PIDAS	perimeter intrusion detection and surveillance
PIP	Plutonium Immobilization Plant
PLC	programmable logic controller
PMF	probable maximum flood
PMI	Positive Material Identification
PMP	probable maximum precipitation
ppb	parts per billion
ppm	parts per million
psf	pounds per square foot
PSHA	Probabilistic Seismic Hazard Assessment
psi	pounds per square inch
psia	pounds per square inch, absolute
psig	pounds per square inch, gage
PSSC	principal systems, structures, and components
PSUP	Power Services Utilization Permit
PuO_2	plutonium oxide
QA	quality assurance
QL	quality level
RAB	Restricted Area boundary
rad	radiation absorbed dose
RAIC	raffinates isotopic composition
RBOF	Receiving Basin for Offsite Fuels
RCRA	Resource Conservation and Recovery Act
rem	roentgen equivalent, man
RF	respirable fraction
RIC	radiological isotopic composition
ROD	Record of Decision
RTF	Replacement Tritium Facility
RVT	Random Vibration Theory
RWP	Radiation Work Permit
S&W	Stone & Webster, Inc.

SA	Safety Assessment of the Design Basis
SAF	soil amplification function
SAR	Safety Analysis Report
SC	seismic category
SCAPA	Subcommittee on Consequence Assessment and Protective Action
SCB	Structural Consulting Board
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCE&G	South Carolina Electric and Gas Company
SCPTU	site-specific seismic piezocone penetration test soundings
SCR	South Carolina Route
SCS	Soil Conservation Service
SDE	shallow dose equivalent
sec	second
SEUS	Southeastern United States
SGS	Site Geotechnical Services
SIL	seismically induced liquefaction
SMA	strong motion accelerograph
SNM	special nuclear material
SR	Shipping and Receiving
SREL	Savannah River Ecology Laboratory
SRFS	Savannah River Forest Station
SRP	Standard Review Plan
SRS	Savannah River Site
SRSS	square root of the sum of the squares
SRTC	Savannah River Technology Center
SSCs	structures, systems, or components
SSI	soil-structure interaction
SSNM	strategic special nuclear material
SST	safe secure transport
ST	source term
STEL	short-term exposure level
Sv	sievert
SWDF	Solid Waste Disposal Facility
SWMF	Solid Waste Management Facility
SWPPP	Stormwater Pollution Prevention Plan
T	trace
TBD	to be determined
TBP	tributyl phosphate
TEDE	total effective dose equivalent
TEEL	Temporary Emergency Exposure Limit
TIC	Today's Isotopic Composition
TLV	threshold limit value
TPH	hydrogenated tetrapropylene

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

TRU	transuranic
TWA	time-weighted average
UBC	Uniform Building Code
UCNI	Unclassified Controlled Nuclear Information
UCT	Universal Coordinated Time
UFL	upper flammable limit
UGS	Gas Storage Area
UHS	Uniform Hazard Spectrum
UIC	Underground Injection Control
UL	Underwriters Laboratory
UPS	uninterruptible power supply
USDA	U.S. Department of Agriculture
USFS	United States Forest Service
USGS	U.S. Geological Survey
UST	underground storage tank
V	volt
VEGP	Vogtle Electric Generating Plant
vol %	volume percent
WAC	Waste Acceptance Criteria
WSB	Waste Solidification Building
WSI	Wackenhut Services Inc.
WSPRO	Water Surface Profile Computations
WSRC	Westinghouse Savannah River Company, LLC
wt %	weight percent
WTA	Work Task Agreement
yr	year

LIST OF MFFF BUILDING AND SYSTEM DESIGNATIONS

Buildings	
BAD	Administration Building
BAP	Aqueous Polishing Area
BEG	Emergency Generator Building
BMF	MOX Fuel Fabrication Building
BMP	MOX Fuel Fabrication Area (MOX Processing Area)
BRP	Reagents Processing Building
BSG	Standby Generator Building
BSH	Safe Haven Buildings
BSR	Shipping and Receiving Area
BSW	Secured Warehouse Building
BTS	Technical Support Building
UEF	Emergency Fuel Storage Vault
Systems	
BAS	Breathing Air System
CHH	HVAC Chilled Water System
CHP	Process Chilled Water System
DCE	PuO_2 Buffer Storage Unit
DCM	PuO_2 3013 Storage Unit
DCP	PuO_2 Receiving Unit
DCS	Decontamination System
DDP	UO_2 Drum Emptying Unit
DMW	Demineralized Water System
DRS	UO_2 Receiving and Storage Unit
EGF	Emergency Generator Fuel Oil System
GAH	Argon/Hydrogen System
GDE	Rod Decladding Unit
GHE	Helium System
GME, GMF	Rod Cladding and Decontamination Units
GMK	Rod Tray Loading Unit
GNO	Nitrogen Oxide System
GNS	Nitrogen System
GOX	Oxygen System
HDE	High Depressurization Exhaust System
HWS	Process Hot Water System
IAS	Instrument Air System
KCA	Oxalic Precipitation and Oxidation Unit
KCB	Homogenization Unit
KCC	Canning Unit
KCD	Oxalic Mother Liquor Recovery Unit
KDA	Decanning Unit
KDB	Dissolution Unit
KPA	Purification Cycle

LIST OF MFFF BUILDING AND SYSTEM DESIGNATIONS (continued)

Systems	
KPB	Solvent Recovery Cycle
KPC	Acid Recovery Unit
KPF	Silver Recovery Unit
KWD	Liquid Waste Reception Unit
KWG	Offgas Treatment Unit
MDE	Medium Depressurization Exhaust System
NBX	Primary Blend Ball Milling Unit
NBY	Scrap Milling Unit
NCR	Scrap Processing Unit
NDD	PuO_2 Container Opening and Handling Unit
NDP	Primary Dosing Unit
NDS	Final Dosing Unit
NPE, NPF	Homogenization and Pelletizing Unit
NTM	Jar Storage and Handling Unit
NXR	Powder Auxiliary Unit
PAD	Pellet Repackaging Unit
PAR	Scrap Box Loading Unit
PFE, PFF	Sintering Units
PML	Pellet Handling Unit
POE	Process Cell Exhaust System
PQE	Quality Control and Manual Sorting Units
PRE, PRF	Grinding Units
PSE	Green Pellet Storage Unit
PSF	Sintered Pellet Storage Unit
PSI	Scrap Pellet Storage Unit
PSJ	Ground and Sorted Pellet Storage Unit
PTE	Pellet Inspection and Sorting Units
PWS	Plant Water System
RDO	Diluent System
RHN	Hydroxylamine Nitrate System
RHP	Hydrogen Peroxide System
RHZ	Hydrazine System
RMN	Manganese Nitrate System
RNA	Nitric Acid System
ROA	Oxalic Acid System
RSC	Sodium Carbonate System
RSH	Sodium Hydroxide System
RSN	Silver Nitrate System
RTP	Tributyl Phosphate System
SAS	Service Air System
SCE	Rod Scanning Unit
SDK	Rod Inspection and Sorting Unit
SEK	Helium Leak Test Unit
SGF	Standby Generator Fuel Oil System

LIST OF MFFF BUILDING AND SYSTEM DESIGNATIONS (continued)

Systems	
SPS, SPC	Process Steam and Process Condensate Systems
STK	Rod Storage Unit
SXE, SXF	X-Ray Inspection Units
TAS	Assembly Handling and Storage Unit
TCK	Assembly Dry Cleaning Unit
TCL	Assembly Final Inspection Unit
TCP	Assembly Dimensional Inspection Unit
TGM	Assembly Mockup Loading Unit
TGV	Assembling Mounting Unit
TXE	Assembly Packaging Unit
VHD	Very High Depressurization Exhaust System
VRM	Radiation Monitoring Vacuum System
WVA	Vehicle Access Portal

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CAR	Construction Authorization Request
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LIST OF ACRONYMS AND ABBREVIATIONS (continued)

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CEC	cation exchange capacity
CECP	Construction Emissions Control Plan
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CFR	Code of Federal Regulations
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CIF	Consolidated Incineration Facility
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DER	dose equivalent rate
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DR	damage ratio
DRB	Deep Rock Borings study
DUO_2	depleted uranium oxide
DWPF	Defense Waste Processing Facility

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HAZOP	hazards and operability study
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HEPA	high-efficiency particulate air
HFE	human factors engineering
HIS	Human-system interface
HLW	high-level waste
HP	Health Physics
HPLC	high performance liquid chromatography
hr	hour
HVAC	heating, ventilation, and air conditioning
Hz	hertz
I&C	instrumentation and control
I/O	input/output

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mbar	millibar
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MC&A	Material Control and Accounting
MCC	motor control center
MCNP	Monte Carlo N-Particle
MD	duration magnitude

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

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MeV	million electron volts
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mgd	million gallons per day
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NFPA	National Fire Protection Association
ng	nanogram
NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_X	nitrous fumes
NPDES	National Pollutant Discharge Elimination System
NPH	natural phenomena hazard
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O/M	oxygen-to-metal
OML	oxalic mother liquors

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RBOF	Receiving Basin for Offsite Fuels
RCRA	Resource Conservation and Recovery Act
rem	roentgen equivalent, man
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RWP	Radiation Work Permit
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UHS	Uniform Hazard Spectrum
UIC	Underground Injection Control
UL	Underwriters Laboratory
UPS	uninterruptible power supply
USDA	U.S. Department of Agriculture
USFS	United States Forest Service
USGS	U.S. Geological Survey
UST	underground storage tank
V	volt
VEGP	Vogtle Electric Generating Plant
vol %	volume percent
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WSI	Wackenhut Services Inc.
WSPRO	Water Surface Profile Computations
WSRC	Westinghouse Savannah River Company, LLC
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yr	year

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BMP	MOX Fuel Fabrication Area (MOX Processing Area)
BRP	Reagents Processing Building
BSG	Standby Generator Building
BSH	Safe Haven Buildings
BSR	Shipping and Receiving Area
BSW	Secured Warehouse Building
BTS	Technical Support Building
UEF	Emergency Fuel Storage Vault
Systems	
BAS	Breathing Air System
CHH	HVAC Chilled Water System
CHP	Process Chilled Water System
DCE	PuO_2 Buffer Storage Unit
DCM	PuO_2 3013 Storage Unit
DCP	PuO_2 Receiving Unit
DCS	Decontamination System
DDP	UO_2 Drum Emptying Unit
DMW	Demineralized Water System
DRS	UO_2 Receiving and Storage Unit
EGF	Emergency Generator Fuel Oil System
GAH	Argon/Hydrogen System
GDE	Rod Decladding Unit
GHE	Helium System
GME, GMF	Rod Cladding and Decontamination Units
GMK	Rod Tray Loading Unit
GNO	Nitrogen Oxide System
GNS	Nitrogen System
GOX	Oxygen System
HDE	High Depressurization Exhaust System
HWS	Process Hot Water System
IAS	Instrument Air System
KCA	Oxalic Precipitation and Oxidation Unit
KCB	Homogenization Unit
KCC	Canning Unit
KCD	Oxalic Mother Liquor Recovery Unit
KDA	Decanning Unit
KDB	Dissolution Unit
KPA	Purification Cycle

LIST OF MFFF BUILDING AND SYSTEM DESIGNATIONS (continued)

Systems	
KPB	Solvent Recovery Cycle
KPC	Acid Recovery Unit
KPF	Silver Recovery Unit
KWD	Liquid Waste Reception Unit
KWG	Offgas Treatment Unit
MDE	Medium Depressurization Exhaust System
NBX	Primary Blend Ball Milling Unit
NBY	Scrap Milling Unit
NCR	Scrap Processing Unit
NDD	PuO_2 Container Opening and Handling Unit
NDP	Primary Dosing Unit
NDS	Final Dosing Unit
NPE, NPF	Homogenization and Pelletizing Unit
NTM	Jar Storage and Handling Unit
NXR	Powder Auxiliary Unit
PAD	Pellet Repackaging Unit
PAR	Scrap Box Loading Unit
PFE, PFF	Sintering Units
PML	Pellet Handling Unit
POE	Process Cell Exhaust System
PQE	Quality Control and Manual Sorting Units
PRE, PRF	Grinding Units
PSE	Green Pellet Storage Unit
PSF	Sintered Pellet Storage Unit
PSI	Scrap Pellet Storage Unit
PSJ	Ground and Sorted Pellet Storage Unit
PTE	Pellet Inspection and Sorting Units
PWS	Plant Water System
RDO	Diluent System
RHN	Hydroxylamine Nitrate System
RHP	Hydrogen Peroxide System
RHZ	Hydrazine System
RMN	Manganese Nitrate System
RNA	Nitric Acid System
ROA	Oxalic Acid System
RSC	Sodium Carbonate System
RSH	Sodium Hydroxide System
RSN	Silver Nitrate System
RTP	Tributyl Phosphate System
SAS	Service Air System
SCE	Rod Scanning Unit
SDK	Rod Inspection and Sorting Unit
SEK	Helium Leak Test Unit
SGF	Standby Generator Fuel Oil System

LIST OF MFFF BUILDING AND SYSTEM DESIGNATIONS (continued)

Systems	
SPS, SPC	Process Steam and Process Condensate Systems
STK	Rod Storage Unit
SXE, SXF	X-Ray Inspection Units
TAS	Assembly Handling and Storage Unit
TCK	Assembly Dry Cleaning Unit
TCL	Assembly Final Inspection Unit
TCP	Assembly Dimensional Inspection Unit
TGM	Assembly Mockup Loading Unit
TGV	Assembling Mounting Unit
TXE	Assembly Packaging Unit
VHD	Very High Depressurization Exhaust System
VRM	Radiation Monitoring Vacuum System
WVA	Vehicle Access Portal

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* Asterisk indicates a change to the original figure or the addition of a new figure.

LIST OF APPENDIX TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

μ	micro
μm	micrometer
°C	degrees Celsius
°F	degrees Fahrenheit
A	ampere
AASHTO	American Association of State Highway and Transportation Officials
ac	acre
AC	alternating current
ACI	American Concrete Institute
ACL	access control list
ADCOH	Appalachian Ultadeep Core Hole
AEGL	Acute Exposure Guideline Level
AFS	Alternate Feedstock
AHJ	Authority Having Jurisdiction
AIHA	American Industrial Hygiene Association
AISC	American Institute of Steel Construction
ALARA	as low as reasonably achievable
ALI	annual limit on intake
ALOHA	Areal Locations of Hazardous Atmospheres
A-MIMAS	advanced micronized master blend
ANS	American Nuclear Society
ANSI	American National Standards Institute
AP	aqueous polishing
API	American Petroleum Institute
APSF	Actinide Packaging and Storage Facility
ARF	airborne release fraction
ARM	area radiation monitor
ARR	airborne release rate
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
BA	Bachelor of Arts degree
BAQ	Bureau of Air Quality
BET	Bruanuer, Emmet, and Teller
BN	Belgonucleaire
BR	breathing rate
BS	Bachelor of Science degree
Btu	British thermal unit
CAAS	criticality accident alarm system
CAM	continuous air monitor
CAR	Construction Authorization Request
cc	cubic centimeter

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

CDE	committed dose equivalent
CEC	cation exchange capacity
CECP	Construction Emissions Control Plan
CEDE	committed effective dose equivalent
cfm	cubic feet per minute
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGA	Compressed Gas Association
CIF	Consolidated Incineration Facility
cm	centimeter
CM	configuration management
cm^3	cubic centimeter
CNSI	Chem Nuclear Systems, Incorporated
COCORP	Consortium for Continental Reflection Profiling
COE	U.S. Army Corps of Engineers
CPS	chemical process safety
CPT	cone penetrometer test
CPU	central processing unit
CRT	cathode ray tube
CS	conventional seismic
CSAS	Criticality Safety Analysis Sequence
CTF	Chemical Transfer Facility
DAC	derived air concentration
DBE	design basis earthquake
DBP	dibutyl phosphate
DC	direct current
DCF	dose conversion factor
DCP	Design Change Package
DCS	Duke Cogema Stone & Webster, LLC
DDE	deep dose equivalent
DDT	deflagration to detonation transition
DE	dose equivalent
DEAR	Department of Energy Acquisition Regulation
DER	dose equivalent rate
DETF	Dilute Effluent Treatment Facility
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOE-SR	U.S. Department of Energy Savannah River Operations Office
DOP	dioctyl phthalate
DPSG	Duke Project Services Group, Inc
DR	damage ratio
DRB	Deep Rock Borings study
DUO_2	depleted uranium oxide
DWPF	Defense Waste Processing Facility

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

EC	effluent concentration
ECR	Engineering Change Request
EDMS	Electronic Data Management System
EDST	Eastern Daylight Savings Time
EIS	Environmental Impact Statement
EMMH	external man-made hazard
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
ERDA	Energy Research and Development Administration
ERPG	Emergency Response Planning Guidelines
ES&H	Environment, Safety, and Health
ETF	Effluent Treatment Facility
FA	flame acceleration
FEM	finite element model
FEMA	failure modes and effect analysis
FHA	Fire Hazard Analysis
FIC	final isotopic composition
FM	Factory Mutual
FOCI	foreign ownership, control, or influence
fpm	feet per minute
ft	foot
g	gram
g	acceleration due to gravity
gal	gallon
gpm	gallons per minute
GSA	General Separations Area
GSAR	Generic Safety Analysis Report
GSG	geological, seismological, geotechnical
ha	hectare
HAN	hydroxylamine nitrate
HAZOP	hazards and operability study
HEC-HMS	Hydrologic Engineering Center – Hydrologic Modeling System
HEPA	high-efficiency particulate air
HFE	human factors engineering
HIS	Human-system interface
HLW	high-level waste
HP	Health Physics
HPLC	high performance liquid chromatography
hr	hour
HVAC	heating, ventilation, and air conditioning
Hz	hertz
I&C	instrumentation and control
I/O	input/output

IAEA	International Atomic Energy Agency
ICBO	International Conference of Building Officials
ICP-MS	inductive coupled plasma – mass spectroscopy
ID	identification
IDLH	Immediately Dangerous to Life and Health
IEEE	Institute of Electrical and Electronic Engineers
in	inch
INES	International Nuclear Event Scale
IROFS	items relied on for safety
ISA	Integrated Safety Analysis
IT/SF	Interim Treatment/Storage Facility
ITP	In-Tank Precipitation Facility
ka	kilo annum or thousands of years
kg	kilogram
kip	kilopound
km	kilometer
kV	kilovolt
L	liter
lb	pound
LDE	Lens of the Eye Dose Equivalent
LETF	Liquid Effluent Treatment Facility
LFL	lower flammable limit
LLC	Limited Liability Company
LLNL	Lawrence Livermore National Laboratory
LLW	low-level waste
LOC	level of severity or concern
LPF	leak path factor
LWR	light water reactor
m	meter
M	molar
M&O	Maintenance and Operations
m^3	cubic meter
Ma	mega annum or millions of years
MACCS2	MELCOR Accident Consequence Code System for the Calculation of the Health and Economic Consequences of Accidental Atmospheric Radiological Releases
MAR	material at risk
mb	body wave magnitude
mbar	millibar
MBP	monobutyl phosphate
MC&A	Material Control and Accounting
MCC	motor control center
MCNP	Monte Carlo N-Particle
MD	duration magnitude

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

meq	milliequivalent
MeV	million electron volts
MFFF	Mixed Oxide Fuel Fabrication Facility
MFFP	MOX Fresh Fuel Package
mg	milligram
mgd	million gallons per day
mi	mile
MIMAS	micronized master blend
min	minute
MJ	megajoule
mm	millimeter
MMI	Modified Mercalli
MMIS	Manufacturing Management Information System
MOI	maximally exposed offsite individual
MOX	mixed oxide
MP	MOX processing
mph	miles per hour
MPQAP	MOX Project Quality Assurance Plan
MPSSZ	Middleton Place-Summerville Seismic Zone
mrem	millirem
MSA	Metropolitan Statistical Area
MSDS	Material Safety Data Sheet
msl	mean sea level
MtHM	metric tons of heavy metal
MVA	megavolt-ampere
MW	megawatt
Mw	moment magnitude
N	normal (unit of chemical concentration)
NAC/AEGL	National Advisory Committee for Acute Exposure Guidelines
nCi	nanocurie
NCSE	Nuclear Criticality Safety Evaluation
NEHRP	National Earthquake Hazards Reduction Program
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
ng	nanogram
NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NO_X	nitrous fumes
NPDES	National Pollutant Discharge Elimination System
NPH	natural phenomena hazard
NRC	U.S. Nuclear Regulatory Commission
O/M	oxygen-to-metal
OML	oxalic mother liquors

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

OSC	Operations Support Center
OSHA	Occupational Safety and Health Administration
Pa	Pascal
PA	Protected Area
PC	performance category
pCi	picocurie
PCM	personnel contamination monitor
PDCF	Pit Disassembly and Conversion Facility
PEL	permissible exposure level
PEP	personnel and equipment protection
PFHA	Preliminary Fire Hazard Analysis
PGA	peak ground acceleration
PHA	Probabilistic Hazards Assessment
PIDAS	perimeter intrusion detection and surveillance
PIP	Plutonium Immobilization Plant
PLC	programmable logic controller
PMF	probable maximum flood
PMI	Positive Material Identification
PMP	probable maximum precipitation
ppb	parts per billion
ppm	parts per million
psf	pounds per square foot
PSHA	Probabilistic Seismic Hazard Assessment
psi	pounds per square inch
psia	pounds per square inch, absolute
psig	pounds per square inch, gage
PSSC	principal systems, structures, and components
PSUP	Power Services Utilization Permit
PuO_2	plutonium oxide
QA	quality assurance
QL	quality level
RAB	Restricted Area boundary
rad	radiation absorbed dose
RAIC	raffinates isotopic composition
RBOF	Receiving Basin for Offsite Fuels
RCRA	Resource Conservation and Recovery Act
rem	roentgen equivalent, man
RF	respirable fraction
RIC	radiological isotopic composition
ROD	Record of Decision
RTF	Replacement Tritium Facility
RVT	Random Vibration Theory
RWP	Radiation Work Permit
S&W	Stone & Webster, Inc.

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

SA	Safety Assessment of the Design Basis
SAF	soil amplification function
SAR	Safety Analysis Report
SC	seismic category
SCAPA	Subcommittee on Consequence Assessment and Protective Action
SCB	Structural Consulting Board
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCE&G	South Carolina Electric and Gas Company
SCPTU	site-specific seismic piezocone penetration test soundings
SCR	South Carolina Route
SCS	Soil Conservation Service
SDE	shallow dose equivalent
sec	second
SEUS	Southeastern United States
SGS	Site Geotechnical Services
SIL	seismically induced liquefaction
SMA	strong motion accelerograph
SNM	special nuclear material
SR	Shipping and Receiving
SREL	Savannah River Ecology Laboratory
SRFS	Savannah River Forest Station
SRP	Standard Review Plan
SRS	Savannah River Site
SRSS	square root of the sum of the squares
SRTC	Savannah River Technology Center
SSCs	structures, systems, or components
SSI	soil-structure interaction
SSNM	strategic special nuclear material
SST	safe secure transport
ST	source term
STEL	short-term exposure level
Sv	sievert
SWDF	Solid Waste Disposal Facility
SWMF	Solid Waste Management Facility
SWPPP	Stormwater Pollution Prevention Plan
T	trace
TBD	to be determined
TBP	tributyl phosphate
TEDE	total effective dose equivalent
TEEL	Temporary Emergency Exposure Limit
TIC	Today's Isotopic Composition
TLV	threshold limit value
TPH	hydrogenated tetrapropylene

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

TRU	transuranic
TWA	time-weighted average
UBC	Uniform Building Code
UCNI	Unclassified Controlled Nuclear Information
UCT	Universal Coordinated Time
UFL	upper flammable limit
UGS	Gas Storage Area
UHS	Uniform Hazard Spectrum
UIC	Underground Injection Control
UL	Underwriters Laboratory
UPS	uninterruptible power supply
USDA	U.S. Department of Agriculture
USFS	United States Forest Service
USGS	U.S. Geological Survey
UST	underground storage tank
V	volt
VEGP	Vogtle Electric Generating Plant
vol %	volume percent
WAC	Waste Acceptance Criteria
WSB	Waste Solidification Building
WSI	Wackenhut Services Inc.
WSPRO	Water Surface Profile Computations
WSRC	Westinghouse Savannah River Company, LLC
wt %	weight percent
WTA	Work Task Agreement
yr	year

LIST OF MFFF BUILDING AND SYSTEM DESIGNATIONS

Buildings	
BAD	Administration Building
BAP	Aqueous Polishing Area
BEG	Emergency Generator Building
BMF	MOX Fuel Fabrication Building
BMP	MOX Fuel Fabrication Area (MOX Processing Area)
BRP	Reagents Processing Building
BSG	Standby Generator Building
BSH	Safe Haven Buildings
BSR	Shipping and Receiving Area
BSW	Secured Warehouse Building
BTS	Technical Support Building
UEF	Emergency Fuel Storage Vault

Systems	
BAS	Breathing Air System
CHH	HVAC Chilled Water System
CHP	Process Chilled Water System
DCE	PuO_2 Buffer Storage Unit
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KDB	Dissolution Unit
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NBY	Scrap Milling Unit
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NDP	Primary Dosing Unit
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PSI	Scrap Pellet Storage Unit
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PTE	Pellet Inspection and Sorting Units
PWS	Plant Water System
RDO	Diluent System
RHN	Hydroxylamine Nitrate System
RHP	Hydrogen Peroxide System
RHZ	Hydrazine System
RMN	Manganese Nitrate System
RNA	Nitric Acid System
ROA	Oxalic Acid System
RSC	Sodium Carbonate System
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SAS	Service Air System
SCE	Rod Scanning Unit
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SEK	Helium Leak Test Unit
SGF	Standby Generator Fuel Oil System

LIST OF MFFF BUILDING AND SYSTEM DESIGNATIONS (continued)

Systems	
SPS, SPC	Process Steam and Process Condensate Systems
STK	Rod Storage Unit
SXE, SXF	X-Ray Inspection Units
TAS	Assembly Handling and Storage Unit
TCK	Assembly Dry Cleaning Unit
TCL	Assembly Final Inspection Unit
TCP	Assembly Dimensional Inspection Unit
TGM	Assembly Mockup Loading Unit
TGV	Assembling Mounting Unit
TXE	Assembly Packaging Unit
VHD	Very High Depressurization Exhaust System
VRM	Radiation Monitoring Vacuum System
WVA	Vehicle Access Portal

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1. GENERAL INFORMATION

1.1 FACILITY AND PROCESS OVERVIEW

1.1.1 Introduction

The consortium of Duke Project Services Group, Inc., COGEMA Inc., and Stone & Webster, Inc., has formed a Limited Liability Company (LLC) called Duke Cogema Stone & Webster (DCS). DCS seeks authorization to construct a Mixed Oxide (MOX) Fuel Fabrication Facility (MFFF) for the U.S. Department of Energy (DOE) on DOE's Savannah River Site (SRS) near Aiken, South Carolina. The MFFF is designed to convert surplus weapons-grade plutonium to MOX fuel that can be used to generate electricity at commercial nuclear power stations. The fabrication of the MOX fuel, which is a blend of uranium and plutonium oxides, is based on the proven European technology of COGEMA and BELGONUCLEAIRE.

If there are relevant changes following submittal of this request for construction authorization, the facility and process overview will be updated with the license application for possession and use of special nuclear material (SNM).

1.1.2 General Facility Description

The MFFF is located in F Area of SRS as indicated in Figure 1.1-1. The arrangement of the buildings and facilities of the MFFF is shown in Figure 1.1-2.

The MFFF site comprises an area of approximately 41 ac (16.6 ha). Approximately 17 ac (6.9 ha) of the site are developed with buildings, facilities, or paving. The remaining 24 ac (9.7 ha) are landscaped in either grass or gravel. No highways, railroads, or waterways traverse the MFFF site, and the movement of material and personnel to and from the MFFF site takes place via the SRS internal road system. Transportation right-of-ways are shown on Figure 1.1-1. The public transportation right-of-way nearest to the MFFF site and F Area is South Carolina Route (SCR) 125 to the west. Access to the MFFF site is via SRS Roads C and C-3.

1.1.2.1 Controlled Area Boundary

In accordance with 10 CFR §70.61(f), a licensee must establish a controlled area, as defined in 10 CFR §20.1003, and retain the authority to exclude or remove personnel and property from the area. A *controlled area* is an area outside of a restricted area but inside the site boundary to which access can be limited by the licensee for any reason. A *restricted area* is an area to which access is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. The MFFF restricted area is coincident with the protected area, an area encompassed by physical barriers and to which access is controlled, as shown on Figure 1-1-2. Herein, *controlled area boundary* is defined as the limit of the controlled area as given above.

The purpose of defining the controlled area boundary relates to the definition of "worker" with respect to meeting the performance requirements of 10 CFR §70.61. In the definition of controlled area boundary herein, both an SRS worker outside the MFFF but within the controlled

area boundary, as well as an MFFF worker within the controlled area boundary, are deemed to be "workers."

Figure 1.1-3 depicts the MFFF controlled area boundary, which encompasses much of SRS and is the boundary for which DOE currently controls access to SRS. The controlled area boundary access will be controlled by DCS via an agreement with DOE.

According to 10 CFR §70.61(f)(2), the controlled area boundary can be located at the DOE site boundary, thereby avoiding duplication of the access control infrastructure, if specific requirements are met. To meet these requirements, DCS intends to establish a protocol with the U.S. Department of Energy to ensure the following:

- An augmentation of the existing SRS radiation protection training program to address MFFF-specific radiation risks in accordance with the provisions for instructions to workers of 10 CFR §19.12(a)(1)-(5). This specific training will ensure the awareness of SRS workers to the risks associated with accidents involving the MFFF licensed activities as determined by the Integrated Safety Analysis (ISA).
- The posting and maintenance of notices in conspicuous locations within F Area, in accordance with the posting provisions of 10 CFR §19.11(a).

In addition, the protocol will provide for integration with the existing SRS controls established for general public access to the site.

1.1.2.2 MOX Fuel Fabrication Building

The MOX Fuel Fabrication Building (BMF) is a multifunctional complex containing all of the plutonium oxide (PuO_2) handling, fuel processing, and fuel fabrication operations of the MFFF. The building is a reinforced-concrete structure with *Text removed under 10 CFR 2.390. The overall roof height of BMF is a common elevation of 73 ft (22.3 m) above grade. The 40-ft (12.2-m) tall Vent Stack, located on top of the BMF, has a top elevation of approximately 119 ft (36.3 m) above grade.

The MOX Fuel Fabrication Building is comprised of three major functional, interrelated areas: the MOX Processing Area (BMP), the Aqueous Polishing Area (BAP), and the Shipping and Receiving Area (BSR). The MOX Processing Area includes the blending and milling area, pelletizing area, sintering area, grinding area, fuel rod fabrication area, fuel bundle assembly area, a laboratory area, and storage areas for feed material, pellets, and fuel assemblies. Space is also provided in the MOX Fuel Fabrication Building for support equipment, such as temporary waste storage; heating, ventilation, and air conditioning (HVAC) equipment; high-efficiency particulate air (HEPA) filters plenums; inverters; switchgear; and pumps.

1.1.2.3 Emergency Generator Building

The Emergency Generator Building (BEG) contains the emergency diesel generators that provide the emergency onsite electrical power supply for loads that are principal structures, systems, or components (SSCs) in the MFFF. The Emergency Generator Building is a single-story, slab-on-grade, reinforced-concrete building located adjacent to the MOX Fuel Fabrication

Building. Each of the two seismically mounted emergency diesel generators and associated equipment are enclosed within a tornado generated missile-resistant, seismically qualified walls and roof system that precludes interaction with any other SSCs. Supporting electrical equipment is located adjacent to the diesel generator rooms and separated from them by firewalls.

1.1.2.4 Emergency Fuel Storage Vault

The Emergency Fuel Storage Vault (UEF) located adjacent to the BEG, provides support and protection for the two diesel fuel oil storage tanks. Each of these storage tanks and their associated equipment is enclosed within a tornado generated missile resistant, seismically qualified walls and roof system that precludes interaction with any other SSCs. The Emergency Fuel Storage Vault is a single-story, below grade, reinforced-concrete building.

1.1.2.5 Standby Generator Building

The Standby Generator Building (BSG) contains the diesel generators that provide the onsite electrical power source for major loads in the event of loss of offsite power. The building construction is single story, slab-on-grade, steel frame building with insulated metal siding and roof. The building contains two standby diesel generators and associated equipment. Supporting electrical equipment is located adjacent to the diesel generator rooms and separated from them by firewalls.

1.1.2.6 Secured Warehouse Building

The Secured Warehouse Building (BSW) is a complex that includes the General Storage Area, the MOX Fresh Fuel Package (MFFP) Storage and Maintenance Area, the Depleted Uranium Storage Area, the Small Parts Washing Facility, Offices, the Electrical Equipment Room, and the Small Parts Storage Area. The Secured Warehouse Building is a single-story, slab-on-grade, metal building with insulated metal siding and roof.

1.1.2.7 Administration Building

The Administration Building (BAD), located outside of the Protected Area of the MFFF complex, provides administrative support to the MFFF and its operations. Space is provided in the building for facility management, facility operations, material accountability administration, finance, administration, health and safety, quality assurance, management personnel, U.S. Nuclear Regulatory Commission (NRC) personnel, and document control, and computer simulation lab. The Administration Building is a two-story, slab-on-grade, steel-framed building.

1.1.2.8 Technical Support Building

The Technical Support Building (BTS) provides the main support facilities for MOX Fuel Fabrication Building personnel and contains the access facilities for the Protected Area and the MOX Fuel Fabrication Building. The Technical Support Building, located between the Administration Building and the MOX Fuel Fabrication Building, is a two-story, slab-on-grade steel-framed building. The Technical Support Building is not directly involved in the principal processing functions of the MFFF. Supporting activities and facilities located in this building

include health physics facilities, an electronics maintenance lab, a mechanical maintenance shop, personnel locker rooms, a first aid station, and respirator and dosimetry issue.

The Access Control Area, located on the first level of the Technical Support Building, serves as the sole personnel access (except for vehicle drivers escorted in and out of the Vehicle Access Portal) into and out of the Protected Area, through the Personnel Access Portal. Security activities (e.g., badging, photo ID, search, and pass-through) take place in the Personnel Access Portal. Security monitoring at the Personnel Access Portal includes metal detectors, explosive detectors, and radiation monitors.

The Personnel Access Portal provides a secured, controlled entry for personnel and visitors into the Protected Area. All personnel seeking entry into the Protected Area are required to successfully pass through the monitors, security screening, and identity verification located at the Personnel Access Portal. Security officers staff the Personnel Access Portal during shift change as well as at all other times. Exit from the Protected Area through the Access Control Area is via a set of one-way turnstiles and SNM monitors, and then out the door on the front of the Technical Support Building.

The MOX Fuel Fabrication Building is accessed via the Entry Control Facility, located adjacent to the MOX Fuel Fabrication Building. The Entry Control Facility controls personnel access into and out of the MOX Fuel Fabrication Building. The Entry Control Facility contains a security guard station, access control equipment, and screening devices.

A dedicated diesel generator, which powers all required security systems in the event of the loss of offsite power, is also provided in the Technical Support Building.

1.1.2.9 Reagents Processing Building

The Reagents Processing Building (BRP), located adjacent to the Aqueous Polishing Area of the MOX Fuel Fabrication Building, provides storage for pure reagent-grade chemicals and facilities for preparation of chemical solutions used in the Aqueous Polishing Area. The Reagents Processing Building consists of a number of separate rooms/areas for the various chemicals. Concrete curbs around the chemical storage areas provide for spill containment. The Reagents Processing Building is a single-story, slab-on-grade, steel-framed and concrete building. One end of the Reagents Processing Building has a loading dock for transfer of chemical drums in and out of the building. Chemicals are transferred to the Aqueous Polishing Area from the Reagents Processing Building via piping located in a concrete, below-grade trench between the two buildings.

1.1.2.10 Receiving Warehouse Building

The Receiving Warehouse Building (BRW) contains areas for receipt, unpacking, inspection, and temporary storage of material, supplies, and equipment prior to transfer through the PIDAS into the protected area or to the Administration Building. The Receiving Warehouse Building is a single-story, slab-on-grade, metal building with insulated metal siding and roof.

1.1.2.11 Miscellaneous Site Structures

The miscellaneous site structures include a bulk gas storage pad, HVAC and process chiller pads, diesel fuel filling station, electrical transformers, and other minor structures.

1.1.3 Material Flow

1.1.3.1 Plutonium Oxide Feed Material

PuO_2 feed material, transported in approved shipping containers, is received in the Shipping and Receiving Area of the MOX Fuel Fabrication Building. The feed material is offloaded in the PuO_2 Truck Bay where packaging is removed and control is transferred to the responsible facility manager. Material Control and Accounting (MC&A) and radiation protection functions are performed. The feed material is then moved to the MOX Processing Area.

1.1.3.2 Depleted Uranium Oxide Feed Material

DUO_2 feed material, which is packaged in drums and shipped by truck, is received and stored in the Depleted Uranium Storage Area of the Secured Warehouse Building. MC&A and radiation protection functions are performed as part of receipt and acceptance of the drums. Onsite vehicles transfer DUO_2 to the Truck Bay in the Shipping and Receiving Area as needed for processing.

1.1.3.3 MOX Fresh Fuel Package Assemblies

The MOX Fresh Fuel Packages (MFFP) are the approved containers that are received and stored in the MFFP Storage and Maintenance Area of the BSW. Onsite vehicles transfer MFFP to the Truck Bay in the Shipping and Receiving Area as needed for processing.

1.1.3.4 Conventional Materials

Other conventional materials and supplies are received at the Receiving Warehouse Building. Packing materials are removed and the materials, supplies, or equipment are verified and inspected. The materials, supplies, or equipment are sorted and moved to storage in the Secured Warehouse Building or delivered via onsite vehicles to the BAD.

1.1.3.5 Completed Fuel Assembly Handling

Completed fresh fuel assemblies are stored in the assembly storage vault in the MOX Fuel Fabrication Building. For shipment offsite, the assemblies are loaded into a MOX Fresh Fuel Package and conveyed into the Shipping and Receiving Area of the MOX Fuel Fabrication Building for loading onto a transport vehicle.

1.1.3.6 Radioactive Effluents and Waste Disposition

1.1.3.6.1 Airborne

Exhausts from the MOX Fuel Fabrication Building are treated and airborne radioactive materials are removed in a minimum of a two-stage HEPA filter prior to discharge to the environment. The exhaust streams include those from building ventilation; gloveboxes; the process vents of tanks, vessels, and other equipment in the Aqueous Polishing Area; and the sintering furnaces in the MOX Processing Area.

The filtered exhausts are discharged through a common stack located on the roof of the MOX Fuel Fabrication Building as shown in Figure 1.1-2. Stack effluents are continuously monitored.

1.1.3.6.2 Liquids

Liquid waste streams containing radioactive materials are transferred after sampling and characterization to the SRS waste management program for final processing and disposal. No radioactive liquids are released from the MFFF to the environment. Recycling within the Aqueous Polishing Area is used extensively to reduce liquid waste volumes and impurities prior to transfer to SRS.

The liquid waste streams from the MFFF are grouped by activity for processing:

- High alpha fluids containing the americium and gallium impurities, the silver from the dissolution process, excess alkaline fluids, and excess acid fluids
- Stripped, diluted uranium fluid stream containing enriched uranium
- Low-level waste fluids (acid recovery condensate, chlorinated liquid wastes, laboratory rinsing)
- Excess solvent streams.

1.1.3.6.3 Solids

Solid radioactive wastes are placed in appropriate containers (typically 55-gallon drums), assayed, and transferred to SRS for processing and disposal under the SRS waste management program. Wherever possible, the solid wastes will be compacted by SRS to reduce volume and disposal costs.

The solid radioactive wastes generated in the MOX Fuel Fabrication Building include transuranic solid wastes and low-level waste (which includes uranium and/or plutonium contamination).

Other potentially radioactive, mixed, or nonradioactive hazardous wastes that may be generated by the MFFF will be transferred to the SRS waste management program for disposition.

1.1.3.7 Personnel Movement

The Administration Building contains offices for personnel such as management, administration, finance, health and safety, and quality assurance personnel. Personnel enter the Protected Area through the Personnel Access Portal in the Technical Support Building. The Technical Support Building contains workspaces for security and operations support personnel. Operations personnel working in the MOX Fuel Fabrication Building enter through the Entry Control Facility located in the Technical Support Building.

1.1.4 Process Overview

The MFFF is designed to convert PuO_2 and DUO_2 to MOX fuel. The MFFF has two major process operations: (1) an aqueous polishing process, which serves primarily to remove gallium from the plutonium, and (2) the MOX fuel fabrication (MOX processing) process, which processes the oxides into pellets and manufactures the MOX fuel assemblies. The technology utilized results in the recycling of almost all waste and scrap streams. The major steps in the aqueous polishing and MOX fuel fabrication processes are shown in Figures 1.1-4 and 1.1-5, respectively. Chapters 5 and 11 describe the chemical and physical forms of SNM involved in the MFFF processes.

1.1.4.1 Aqueous Polishing Process

The DOE Pit Disassembly and Conversion Facility (PDCF) located nearby will disassemble plutonium pits from weapons and convert the plutonium to plutonium oxide for use as MFFF feedstock. A smaller amount of plutonium from other DOE sources will also be utilized as MFFF feedstock (alternate feedstock). The PuO_2 received at the MFFF contains small amounts of impurities that must be removed for use of the MOX fuel in reactors. For Pit Disassembly and Conversion Facility (PDCF) feeds, these impurities are primarily gallium, americium, and highly enriched uranium. For Alternate Feedstock (AFS) feeds, the diversity of impurities and the impurity level are higher. The aqueous polishing process is used to remove these impurities. The aqueous polishing process involves the following three major steps: dissolution, purification, and conversion.

All feedstock will be received as plutonium oxide. Some of the feed material originating from sources other than PDCF may have higher than normal salts contaminants (other than chlorides), some will contain chloride contaminants, and some will contain small amounts of enriched uranium. All feed material originating from sources other than PDCF will be milled to have an homogeneous blend and smaller particle size to facilitate dissolution. The feed material originating from sources other than PDCF will also be analyzed for contaminants. If chloride contaminants are above feedstock specifications, they are removed as chlorine gas waste steam. The chlorine gas is passed through a scrubber to convert chlorine to a sodium chloride solution.

The dissolution step involves silver catalyzed dissolution and filtration of PuO_2 powder feed material. PuO_2 powder is placed into solution by electrolytic dissolution with silver (Ag^{2+}) in nitric acid, at normal temperature.

The purification step involves purification of the plutonium solution in pulsed columns by solvent extraction (30% tri-butyl phosphate in dodecane). Nitrate impurities (americium,

gallium, and silver) remain in the aqueous phase. After diluent (dodecane) washing, this raffinate stream is routed to an acid recovery unit.

The extracted plutonium and uranium stream is scrubbed with nitric acid. The plutonium is then reduced to trivalent plutonium by hydroxylamine nitrate and stripped in another pulsed column using a solution of nitric acid, hydrazine nitrate, and hydroxylamine nitrate. Based on prior sampling, if uranium is present as an impurity above a predetermined threshold (i.e., higher than the capacity of downstream columns to remove, for certain materials not originating from PDCF), the plutonium nitrate is washed with solvent to remove excess uranium. For all feed material, the unloaded organic solvent is mixed with additional stripping solution in a plutonium barrier before being routed to the uranium stripping process common to all feed material. Uranium is stripped from the organic solvent with dilute nitric acid. The uranium stream is diluted with depleted uranium before being transferred to SRS. The unloaded solvent is routed to solvent recovery mixer-settlers to be recycled.

In the purified nitrate stream, plutonium valence is adjusted back to Pu (IV) by driving nitrous fumes (NO_X) through the plutonium solution in a packed column. The offgas is routed through an offgas treatment system before being discharged to the atmosphere.

The conversion step is a continuous oxalate conversion process. The oxidized Pu (IV) is reacted with excess oxalic acid ($H_2C_2O_4$) to precipitate plutonium oxalate, which is collected on a filter, then dried in a screw calciner, to produce purified PuO_2 powder, which is blended and stored in cans.

Offgas from the screw calciner is routed through HEPA filters prior to discharge to the atmosphere through the stack. The filtered oxalic mother liquors (OML) are concentrated, reacted with manganese to destroy the oxalic acid, and recycled to the beginning of the extraction cycle, to minimize plutonium leakage.

1.1.4.2 MOX Fuel Fabrication Process

The micronized master blend (MIMAS) and advanced micronized master blend (A-MIMAS) fuels are the most recent development steps of the successive fabrication processes adopted by BELGONUCLEAIRE and COGEMA to produce pellet fuel characterized by an intimate mix of PuO_2 and DUO_2 powders. The MOX fuel fabrication process consists of four major steps: (1) powder master blend and final blend production, (2) pellet production, (3) rod production, and (4) fuel rod assembly.

The first operation is the production of the powder master blend. Polished PuO_2 is mixed with DUO_2 and recycled scraps to produce an initial mixture that is approximately 20% plutonium. This mixture is subjected to micronization in a ball mill and mixed with additional UO_2 and recycled scraps to produce a final blend with the required plutonium content (typically from 6% to 2%). This final blend is further homogenized to meet stringent plutonium distribution requirements. During the final homogenizing, lubricants and poreformers (to control density) are added.

The final homogenized powder blend is pressed to form green pellets. The green fuel pellets are sintered to obtain the required ceramic qualities. The sintering step removes organic products

dispersed in the pellets and removes the previously introduced poreformer. The sintered pellets are ground to a specified diameter in centerless grinding machines and sorted. Recovered powder from grinding and discarded pellets are recycled through a ball mill and reused in the powder processing.

Fuel rods are loaded to an adjusted pellet length column, welded, pressurized with helium, and then decontaminated in gloveboxes. The decontaminated rods are removed from the gloveboxes and placed on racks for inspection and assembly. Fuel rods are inserted into the fuel assembly skeleton, and the fuel assembly construction is completed. The fuel assembly is subjected to a final inspection prior to shipment to the reactors.

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Figures

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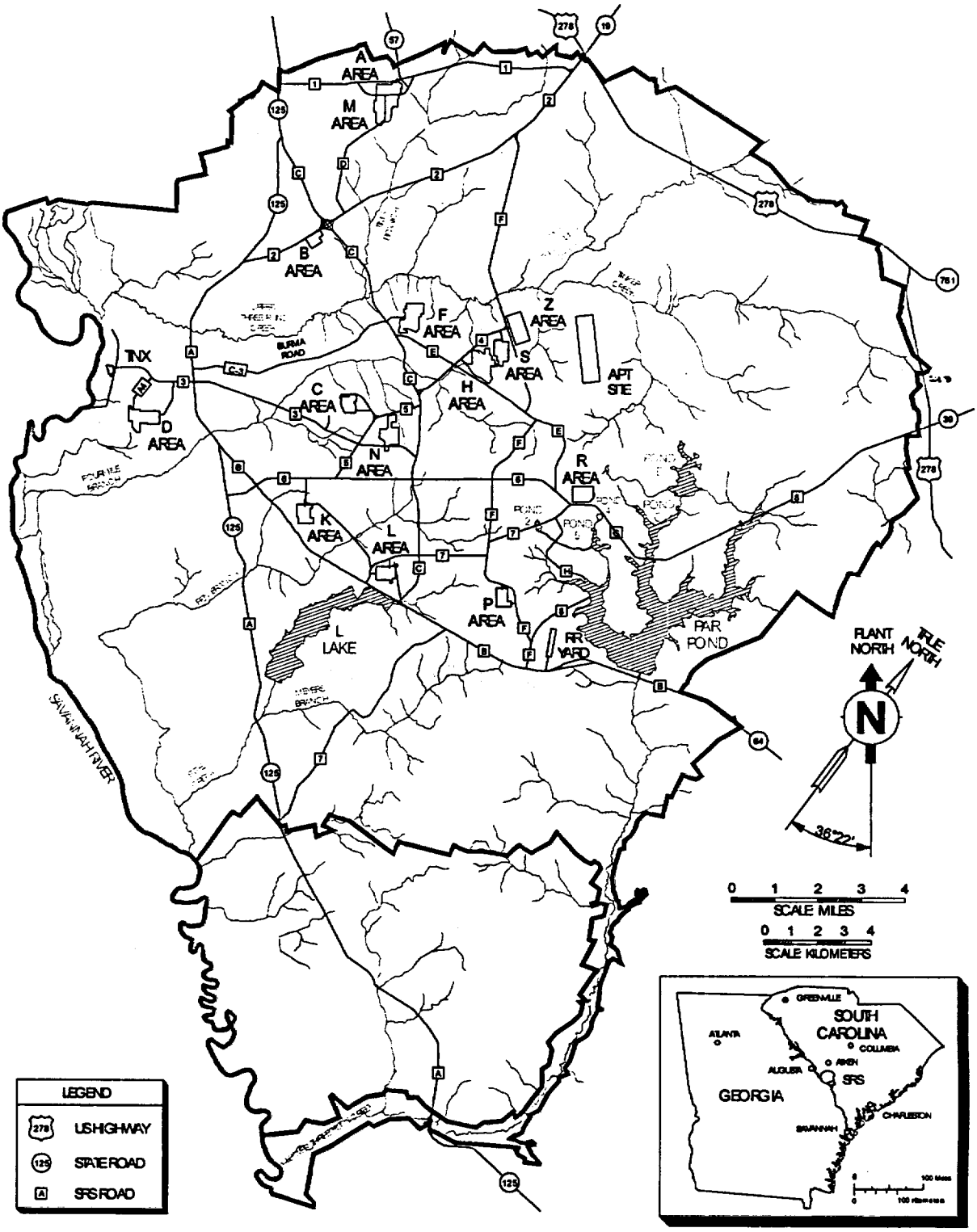

Figure 1.1-1. Location of Savannah River Site and F Area

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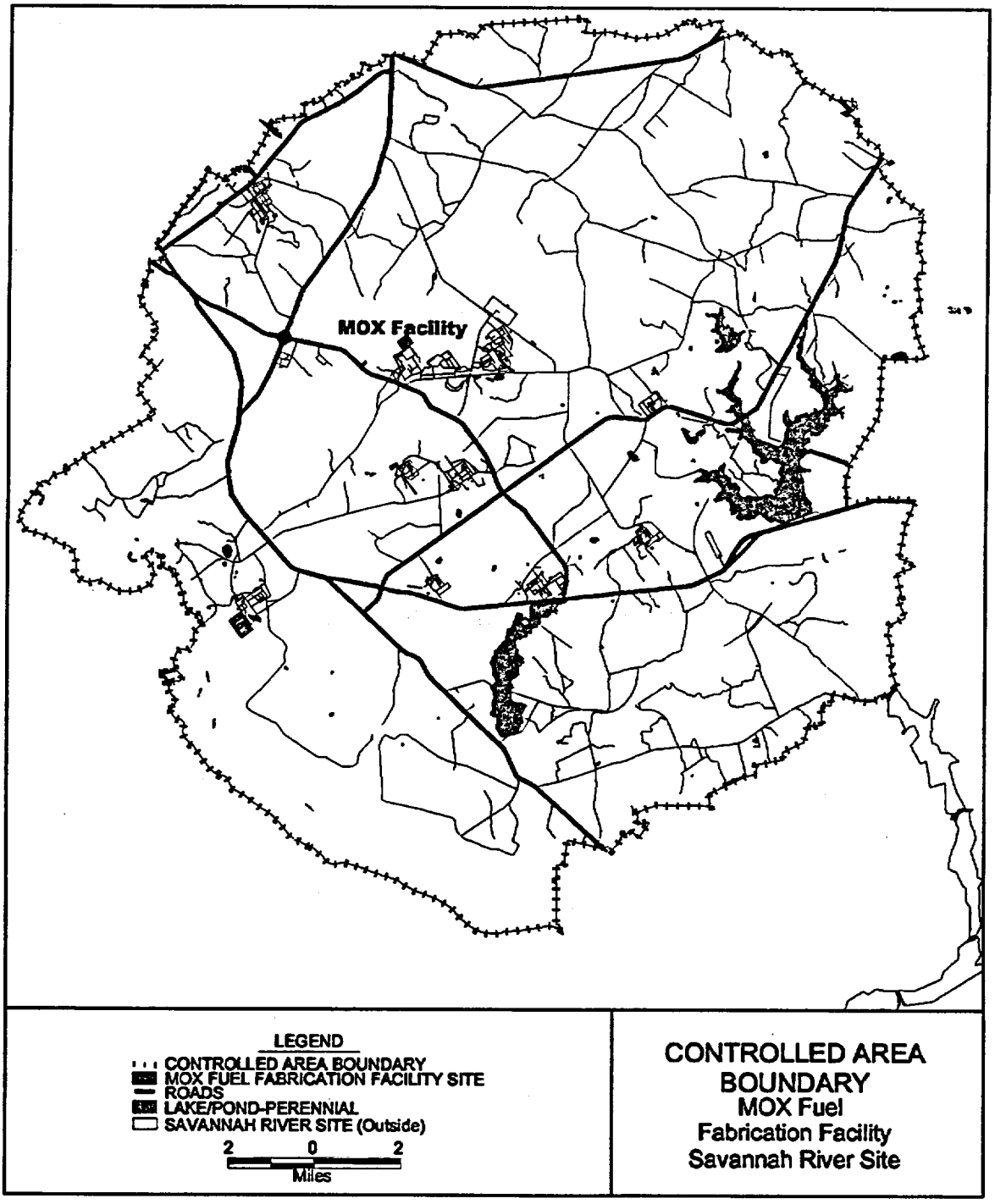

Figure 1.1-3. Controlled Area Boundary

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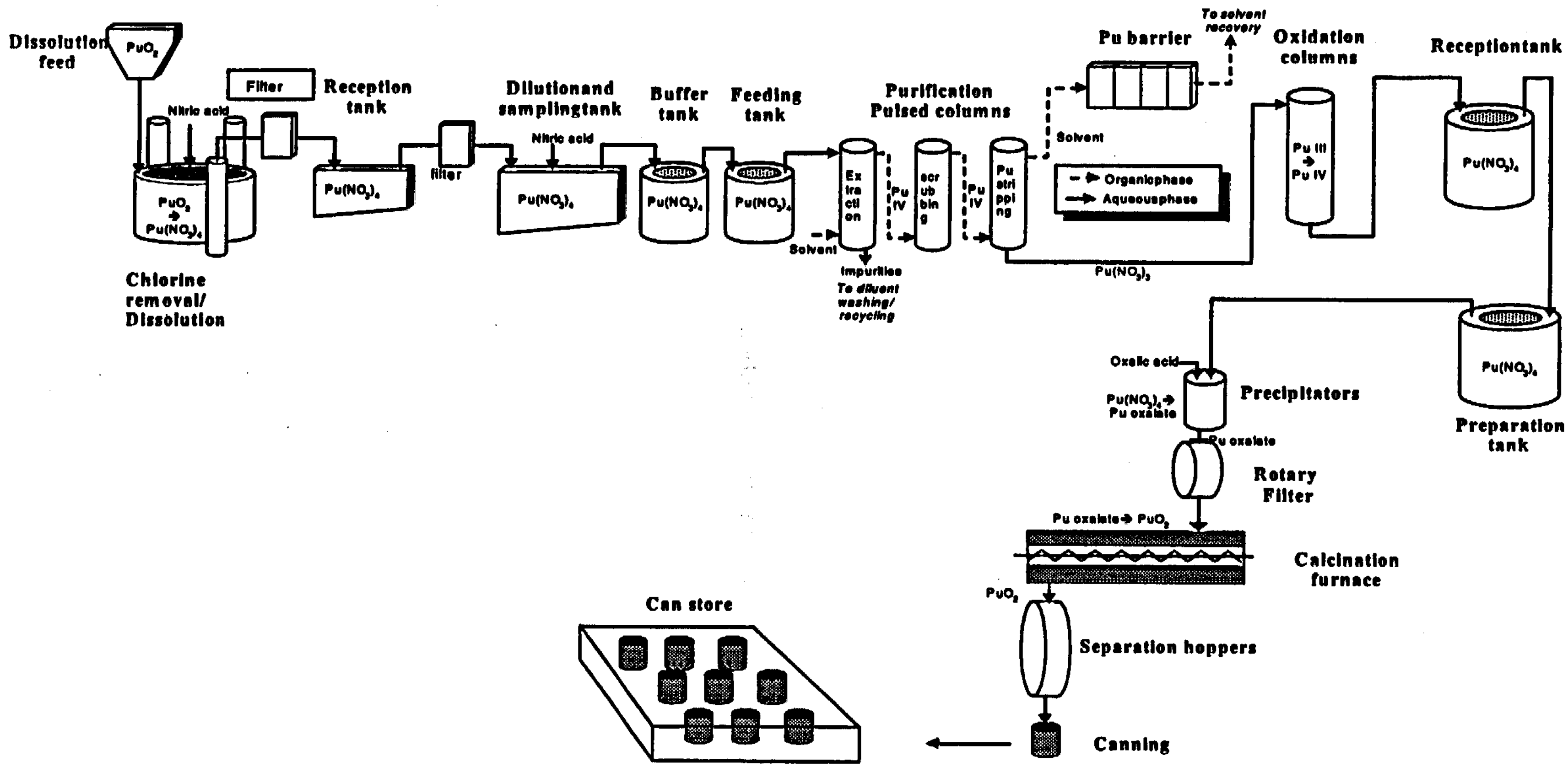

Figure 1.1-4. Aqueous Polishing Process

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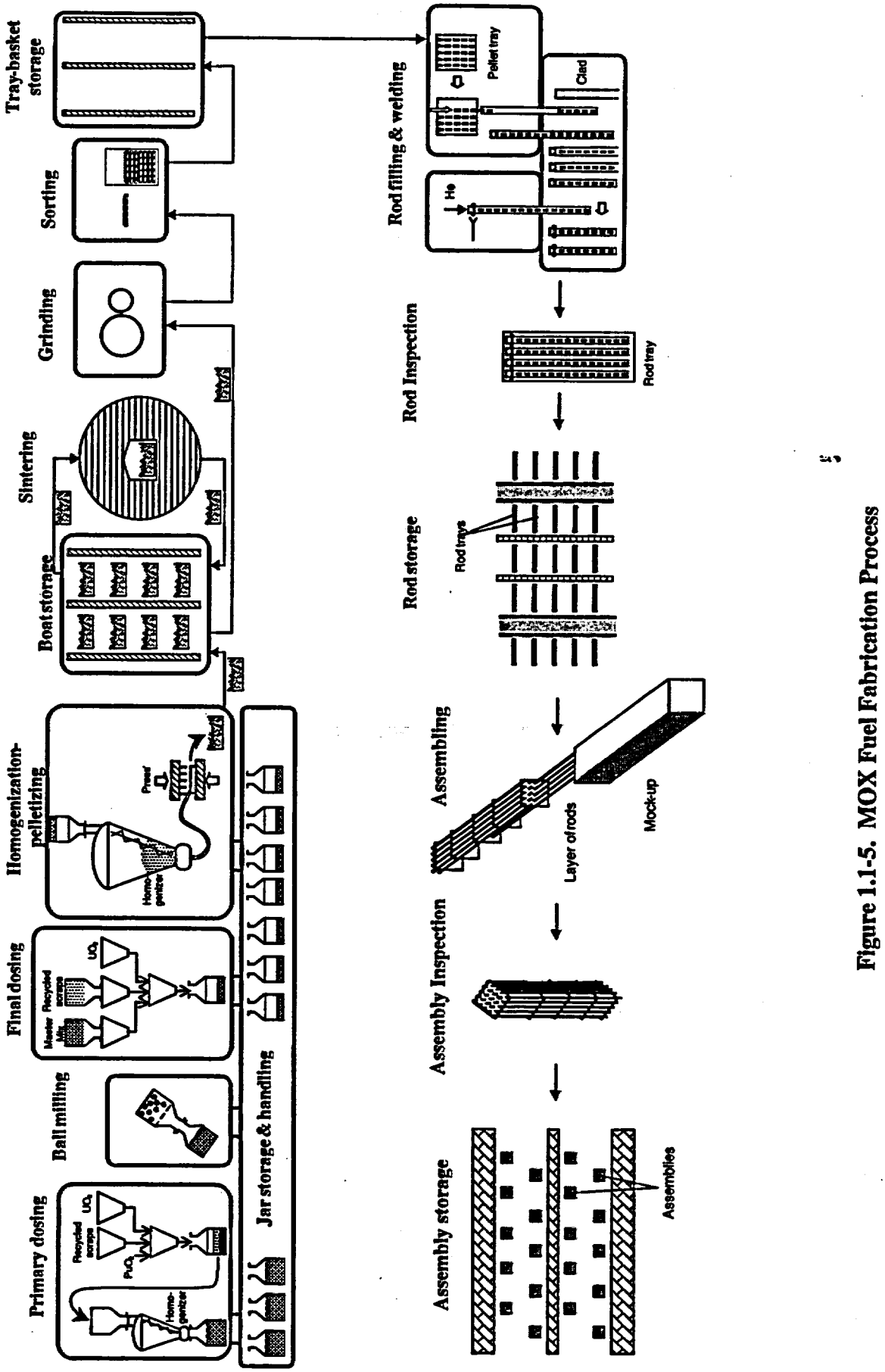

Figure 1.1-5. MOX Fuel Fabrication Process

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1.2 INSTITUTIONAL INFORMATION

The institutional information provided herein will be updated as appropriate in the license application for possession and use of SNM.

1.2.1 Corporate Identity

Duke Cogema Stone & Webster, LLC (DCS) is the applicant for the license to possess and use special nuclear material (SNM). DCS is registered in the State of South Carolina as a Limited Liability Company (LLC) owned by Duke Project Services Group, Inc. (DPSG), COGEMA, Inc., and Stone & Webster, Inc. (S&W). These three companies are the equity owners of the LLC (DPSG 40%, COGEMA 30%, and S&W 30%). DCS was formed to provide MOX fuel fabrication and other services to support the mission of DOE for the disposition of U.S.-owned surplus weapons-usable plutonium. The applicant's mailing address is as follows:

Duke Cogema Stone & Webster
P.O. Box 31847
Charlotte, NC 28231-1847

The applicant's shipping address is as follows:

Duke Cogema Stone & Webster
128 South Tryon Street, FC12A
Charlotte, NC 28202

DOE will be the owner of the MFFF, which will be located at SRS in Aiken, South Carolina. DCS is a South Carolina LLC whose direct owners are all U.S. corporations. All DCS principal officers are U.S. citizens. COGEMA, Inc., which owns a minority share of DCS (30%), is itself a wholly owned subsidiary of COGEMA, SA, a French company. DPSG and S&W together hold a 70% majority interest in DCS. As a result, there is no direct foreign ownership, no foreign control, and no significant foreign interest in DCS. Furthermore, in awarding the contract to DCS to design, construct, and operate the MFFF, DOE engaged in a careful foreign ownership, control, or influence (FOCI) review of its own in accordance with DOE Order 470.1, "Safeguards and Security Program." Based upon that review, DOE rendered a favorable FOCI determination on 9 July 1999, based on a Security Control Agreement between Duke Cogema Stone & Webster, LLC and DOE, mitigating Foreign Ownership, Control, or Influence associated with Duke Cogema Stone & Webster, LLC. Additionally, favorable FOCI determinations have been made for Duke Project Services Group (10 June 2002) and Stone & Webster, Inc (through reciprocity with the Department of Defense).

The principal DCS corporate officers (and citizenship), and their addresses, are as follows:

Robert H. Ihde (USA)
President and Chief Executive Officer
Duke Cogema Stone & Webster
128 South Tryon Street, FC12A
Charlotte, NC 28202

Tommy E. Touchstone (USA)
Executive Vice President and Chief Operating Officer
Duke Cogema Stone & Webster
128 South Tryon Street, FC12A
Charlotte, NC 28202

Edward J. Brabazon (USA)
Senior Vice President and Chief Engineer
Duke Cogema Stone & Webster
128 South Tryon Street, FC12A
Charlotte, NC 28202

Naresh C. Jain (USA)
Secretary/Treasurer
Duke Cogema Stone & Webster
128 South Tryon Street, FC12A
Charlotte, NC 28202

DCS is completely responsible for the design, construction management, and operation of the MFFF. In addition to the DPSG and S&W engineering expertise, the following companies provide technical support:

- Belgonucleaire (BN) for MOX fuel process design, facility design, and operations experience
- SGN, a wholly owned subsidiary of COGEMA, for facility design and operations experience
- Framatome ANP for operations and engineering experience
- Nuclear Fuel Services, Inc. for Safeguards and Security experience.

1.2.2 Type and Period of License and Type, Quantity, and Form of Licensed Material

DCS intends to request a license to receive, acquire, possess, use, store, and transfer byproduct material, source material, and SNM. The requested period of the license is 20 years.

Authorization is intended for the types, maximum quantities, and forms of byproduct material, source material, and SNM provided in Table 1.2-1. The possession limits in Table 1.2-1 will be updated at the time of license application for possession and use of SNM and source and byproduct materials.

1.2.3 Proposed Authorized Uses

Authorized activities at the MFFF include receipt, handling, storage, and shipment of plutonium- and uranium-bearing materials for the following uses:

Aqueous Polishing

- Mechanical powder pretreatment (feed material dependent)
- Dissolution and chloride removal (feed material dependent)
- PuO_2 dissolution by electro-generated Ag (II)
- Plutonium purification by solvent extraction
- Conversion into PuO_2 by oxalate calcination.

MOX Processing

- Blending and milling of plutonium, uranium, and mixed oxides
- Pelletizing
- Fuel rod and assembly manufacturing, inspection, and repair/rework
- Laboratory operations
- Scrap and waste processing.

1.2.4 Special Exemptions/Authorizations

This section will be updated at the time of license application for possession and use of SNM.

1.2.4.1 Decommissioning and Decommissioning Funding

DOE intends to assume responsibility for decommissioning the MFFF as discussed in SECY 99-177, "Current Status of Legislative Issues Related to NRC Licensing a Mixed Oxide Fuel Fabrication Facility," Issue 8. DCS intends to include with the license application for possession and use of SNM a request for a license condition that the facility will be turned over to DOE at the conclusion of the contract and prior to commencement of decommissioning.

1.2.4.2 Financial Protection

SECY 99-177, Issue 7, addresses the issue of Price-Anderson liability coverage. DOE has agreed to indemnify DCS in accordance with Section 170(d) of the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2210(d), and Department of Energy Acquisition Regulation (DEAR) 952.250-70 (48 CFR §952.250-70). Because the DOE indemnity will apply to the MFFF, there is no need for the application of the NRC financial protection requirements. In conjunction with the license application for possession and use of SNM, DCS intends to submit a request for an exemption pursuant to 10 CFR §140.8 from the requirements of 10 CFR Part 140, including the requirement of 10 CFR §140.13a to provide $200 million in financial protection.

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Tables

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1.3 GENERAL SITE DESCRIPTION

This section provides an overall description of the MFFF site and its environment, including regional and local geography, demography, meteorology, hydrology, geology, seismology, and stability of subsurface materials. Significant portions of the information presented in this section were derived from WSRC-TR-2000-00454, *Natural Phenomena Hazards Design Criteria and Other Characterization Information for the Mixed Oxide (MOX) Fuel Fabrication Facility at Savannah River Site (U)* (Westinghouse Savannah River Company [WSRC] 2000b).

1.3.1 Site Geography

1.3.1.1 Site Location

The MFFF site is located adjacent to the Separations Area (Existing F Area) of SRS in South Carolina (Figure 1.3.1-1). SRS, which is owned by the U.S. Government, was set aside in 1950 for the production of nuclear materials for national defense. SRS, as shown in Figure 1.3.1-1, is an approximately circular tract of land occupying 310 mi^2 (803 km^2), or 198,400 ac (80,292 ha), within Aiken, Barnwell, and Allendale Counties in southwestern South Carolina.

F Area and the MFFF site are located in Aiken County near the center of SRS, east of SRS Road C and north of SRS Road E. The existing F Area comprises approximately 364 ac (160 ha) of SRS. The nearest SRS boundary to F Area is approximately 5.8 mi (9.3 km) to the west. The center of F Area is approximately 25 mi (40 km) southeast of the city limits of Augusta, Georgia; 100 mi (161 km) from the Atlantic Coast; 6 mi (9.7 km) east of the Georgia border; and about 110 mi (177 km) south-southwest of the North Carolina border. The MFFF site is located adjacent to the north-northwest corner of F Area (Figure 1.3.1-2).

The location of SRS relative to towns, cities, and other political subdivisions within a 50-mi (80-km) radius is given in Table 1.3.1-1. The largest nearby population centers are Aiken, South Carolina, and Augusta, Georgia (see Figure 1.3.1-3). The only towns within 15 mi (24 km) of the center of SRS are New Ellenton, Jackson, Barnwell, Snelling, and Williston, South Carolina, which are shown in Figure 1.3.1-3.

1.3.1.2 Public Roads and Transportation

No highways, railroads, or waterways traverse the MFFF site. The movement of material and personnel to and from the MFFF site takes place via the SRS internal road system. There is no public transportation to SRS.

1.3.1.2.1 Public Roads

Public roads include U.S. Route 278, SCR 125, SCR 64, SCR 19, SCR 78, and SCR 57 via SRS Road 1. Of these public roads, only SCR 125 passes through the 5-mi (8-km) radius of F Area. These roads are public access corridors and are not routinely controlled. SRS is not open to the general public, but the public can traverse portions of SRS along these established transportation corridors. Figure 1.3.1-3 shows these roadways and SRS barricades.

1.3.1.2.2 Railroads

Close to SRS, the Norfolk/Southern Railway owns two tracks that traverse the 5-mi (8-km) area outside the SRS boundary (greater than 10 mi [16.1 km] from the MFFF). One track extends east from Augusta, Georgia, to Charleston, South Carolina. The other track extends south from Augusta turning eastward at the Burke County line to a point approximately 3 mi (4.8 km) from SRS and continues south to Savannah, Georgia.

SRS operates and maintains its own railroad system for providing direct rail service to various areas within SRS. The onsite rail system is interfaced with commercial railroads at the Dunbarton Station near the Railroad Classification Yard and at Ellenton near D Area. Service to D Area is provided by the CSX tracks onto a short section of DOE-owned track. The bulk of rail traffic consists of coal and cask car movements. Other cargo, such as tank cars of bulk chemicals, helium, and various other goods, is moved from the Dunbarton and Ellenton interchanges to areas on SRS.

1.3.1.2.3 Water Transportation

The major river near SRS is the Savannah River, which bounds SRS for 17 mi (27.4 km) on the southwest side of SRS. During the early operation of the Thurmond and Hartwell Lakes (1953 to 1972), there was navigational traffic on the Savannah River from Augusta to Savannah, Georgia. By the late 1970s, waterborne commerce was limited to the transportation of oil to Augusta by the Koch Oil Company until the company discontinued shipping operations in 1979. Since that time, except for limited movements of construction-related items, no commercial shippers have used the river. Maintenance dredging of the river was discontinued in 1979. SRS has no commercial docking facilities, but it has a boat ramp that has accepted large transport barge shipments. Currently, the Savannah River is used primarily for recreation. Recreational uses of the Savannah River include boating, sport fishing, and a limited amount of contact activities such as swimming and water skiing.

1.3.1.2.4 Air Transportation

Bush Field in Augusta, Georgia, and the Columbia Metropolitan Airport in Lexington County, South Carolina, are the only two airports within 60 mi (96.6 km) of SRS that provide scheduled air passenger services. Bush Field is located approximately 20 mi (32.2 km) from the MFFF site. Columbia is the nearest air traffic hub and is approximately 60 mi (96.6 km) from SRS.

Barnwell County Airport, a small general aviation facility, is nearly 16 mi (25.7 km) away from the MFFF, and is the closest airport to the SRS boundary. Private aircraft, including corporate jets, use the Barnwell County Airport.

Other small nearby airports include Aiken Municipal Airport (25 mi [40 km] away), Allendale County Airport (27 mi [43 km] away), Bamberg County Airport (30 mi [48 km] away), Burke County Airport in Waynesboro (26 mi [41.8 km] away), and Daniel Field (28 mi [45 km] away) in Augusta. Wackenhut Services Inc. (WSI) operates a heliport at SRS in B Area about 3 mi (4.8 km) from the MFFF. WSI operates two lightweight multipurpose helicopters providing support to the security services at SRS. The U.S. Forest Service (USFS) conducts regular

helicopter operations across SRS for purposes of wildfire detection/response, prescribed fire operations, and wildlife/forest health surveillance. USFS operations originate from the heliport adjacent to the USFS facility in G Area. In addition, South Carolina Electric and Gas conducts limited helicopter operations across SRS for purposes of right-of-way inspection and clearance. Operations originate offsite with site access accomplished via electrical line pathways only.

1.3.1.3 Nearby Bodies of Water

Nearby bodies of water within 50 mi (80 km) of SRS are Thurmond Lake (formerly called Clarks Hill Reservoir) and the Savannah River. Thurmond Lake, operated by the U.S. Army Corps of Engineers, is the largest nearby public recreational area. This lake is an impoundment of the Savannah River about 40 mi (64 km) northwest of the center of SRS.

The principal surface-water body associated with SRS is the Savannah River, which flows along the site's southwest border for 17 mi (27.4 km). Six principal tributaries to the Savannah River are located on SRS: Upper Three Runs, Beaver Dam Creek, Fourmile Branch, Pen Branch, Steel Creek, and Lower Three Runs. F Area is drained by several tributaries of Upper Three Runs and by Fourmile Branch. The elevation of the MFFF site is 272 ft (82.9 m) above msl. The topography of F Area and the MFFF site is shown in Figure 1.3.1-4.

1.3.1.4 Other Significant Geographic Features

Two distinct physiographic subregions are represented at SRS. They are the Pleistocene Coastal Terraces, which are below 270 ft (82.3 m) in elevation, and the Aiken Plateau, which is above 270 ft (82.3 m) in elevation.

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Table 1.3.1-1. Cities and Towns within 50 Miles of the SRS Center

Population Center	County	State	Distance (miles)	Sector	Population[a]
Augusta	Richmond	GA	25.0	WNW	43,459
Aiken	Aiken	SC	19.5	NNW	24,929
North Augusta	Aiken/Edgefield	SC	23.4	NW	17,618
Orangeburg	Orangeburg	SC	47.5	ENE	13,762
Evans	Columbia	GA	33.0	NW	13,713
Belvedere	Aiken	SC	25.9	NW	6,133
Red Bank	Lexington	SC	50.3	NE	5,950
Waynesboro	Burke	GA	25.8	WSW	6,712
Barnwell	Barnwell	SC	16.4	ESE	5,600
Clearwater	Aiken	SC	19.3	NE	4,731
Allendale	Allendale	SC	27.3	SE	4,316
Batesburg	Lexington/Saluda	SC	43.3	N	4,380
Bamberg	Bamberg	SC	35.2	E	3,596
Millen	Jenkins	GA	31.6	SW	3,977
Denmark	Bamburg	SC	28.9	E	3,640
Grovetown	Columbia	GA	34.2	WNW	4,427
Williston	Barnwell	SC	15.0	ENE	3,445
Hampton	Hampton	SC	41.3	SE	3,146
Sylvania	Screven	GA	37.0	S	3,109
Saluda	Saluda	SC	49.7	N	2,957
Gloverville	Aiken	SC	24.5	NW	2,753
Blackville	Barnwell	SC	22.2	ENE	2,640
Johnston	Edgefield	SC	38.9	NNW	2,670
New Ellenton	Aiken	SC	9.4	NNW	2,494
Edgefield	Edgefield	SC	38.8	NNW	2,644
Hephzibah	Richmond	GA	26.6	W	2,925
Louisville	Jefferson	GA	48.6	WSW	2,542
Wrens	Jefferson	GA	43.8	W	2,577
South Congaree	Lexington	SC	49.3	NE	2,736
Estill	Hampton	SC	43.6	SSE	2,513
Fairfax	Allendale	SC	32.8	SE	2,397
Harlem	Columbia	GA	40.0	WNW	2,592
Leesville	Lexington	SC	44.8	N	2,235
Varnville	Hampton	SC	44.8	SE	2,140

a – Population as of July 1, 1994

Table 1.3.1-1. Cities and Towns within 50 Miles of the SRS Center (Continued)

Population Center	County	State	Distance (miles)	Sector	Population[a]
Pineridge	Lexington	SC	49.5	NE	1,927
Jackson	Aiken	SC	9.4	WNW	1,876
McCormick	McCormick	SC	48.8	NW	1,701
Sardis	Burke	GA	22.7	SSW	1,217
Branchville	Orangeburg	SC	47.7	E	1,243
Gaston	Lexington	SC	48.4	NE	1,140
Ridge Spring	Saluda	SC	38.8	N	992
North	Orangeburg	SC	38.8	NE	827
Wagener	Aiken	SC	30.0	NNE	1,236
Midville	Burke	GA	47.2	SW	642
Brunson	Hampton	SC	36.4	SE	619
Dearing	McDuffie	GA	44.1	WNW	650
Swansea	Lexington	SC	44.5	NE	572
Springfield	Orangeburg	SC	25.8	NE	546
Burnettown	Aiken	SC	25.0	NNW	521
Salley	Aiken	SC	27.5	NE	515
Ehrhardt	Bamberg	SC	38.8	ESE	577
Neeses	Orangeburg	SC	34.5	ENE	474
Hilltonia	Screven	GA	27.7	S	414
Norway	Orangeburg	SC	31.7	ENE	411
Olar	Bamberg	SC	31.5	E	352
Hilda	Barnwell	SC	23.0	E	253
Pelion	Lexington	SC	40.3	NE	349
Stapleton	Jefferson	GA	48.3	W	330
Gilbert	Lexington	SC	46.4	NNE	356
Rowesville	Orangeburg	SC	47.2	E	350
Trenton	Edgefield	SC	33.6	NNW	315
Newington	Screven	GA	48.9	S	313
Gifford	Hampton	SC	37.8	SE	296
Blythe	Burke	GA	32.3	W	307
Monetta	Aiken/Saluda	SC	39.4	N	286
Kline	Barnwell	SC	20.6	ESE	293

a – Population as of July 1, 1994

Table 1.3.1-1. Cities and Towns within 50 Miles of the SRS Center (Continued)

Population Center	County	State	Distance (miles)	Sector	Population[a]
Furman	Hampton	SC	49.5	SSE	267
Summit	Lexington	SC	45.9	NNE	273
Perry	Aiken	SC	30.3	NE	230
Elko	Barnwell	SC	16.4	ENE	207
Sycamore	Allendale	SC	32.3	SE	203
Woodford	Orangeburg	SC	40.6	NE	215
Rocky Ford	Screven	GA	43.9	SSW	223
Girard	Burke	GA	17.5	SSW	222
Parksville	McCormick	SC	48.1	NE	199
Williams	Colleton	SC	49.5	ESE	175
Scotia	Hampton	SC	48.0	SSE	189
Livingston	Orangeburg	SC	47.7	ENE	178
Lodge	Colleton	SC	42.7	ESE	198
Smoaks	Colleton	SC	50.0	ESE	147
Cordova	Orangeburg	SC	43.1	ENE	139
Ward	Saluda	SC	25.6	N	141
Snelling	Barnwell	SC	11.3	ESE	133
Cope	Orangeburg	SC	37.3	E	130
Windsor	Aiken	SC	15.3	NNE	130
Luray	Hampton	SC	40.3	SE	71
Plum Branch	McCormick	SC	50.0	NW	104
Govan	Bamberg	SC	27.3	E	80
Ulmer	Allendale	SC	35.5	SE	67

a – Population as of July 1, 1994

Note: Data from WSRC 2000b

Table 1.3.1-2. Not Used

Figures

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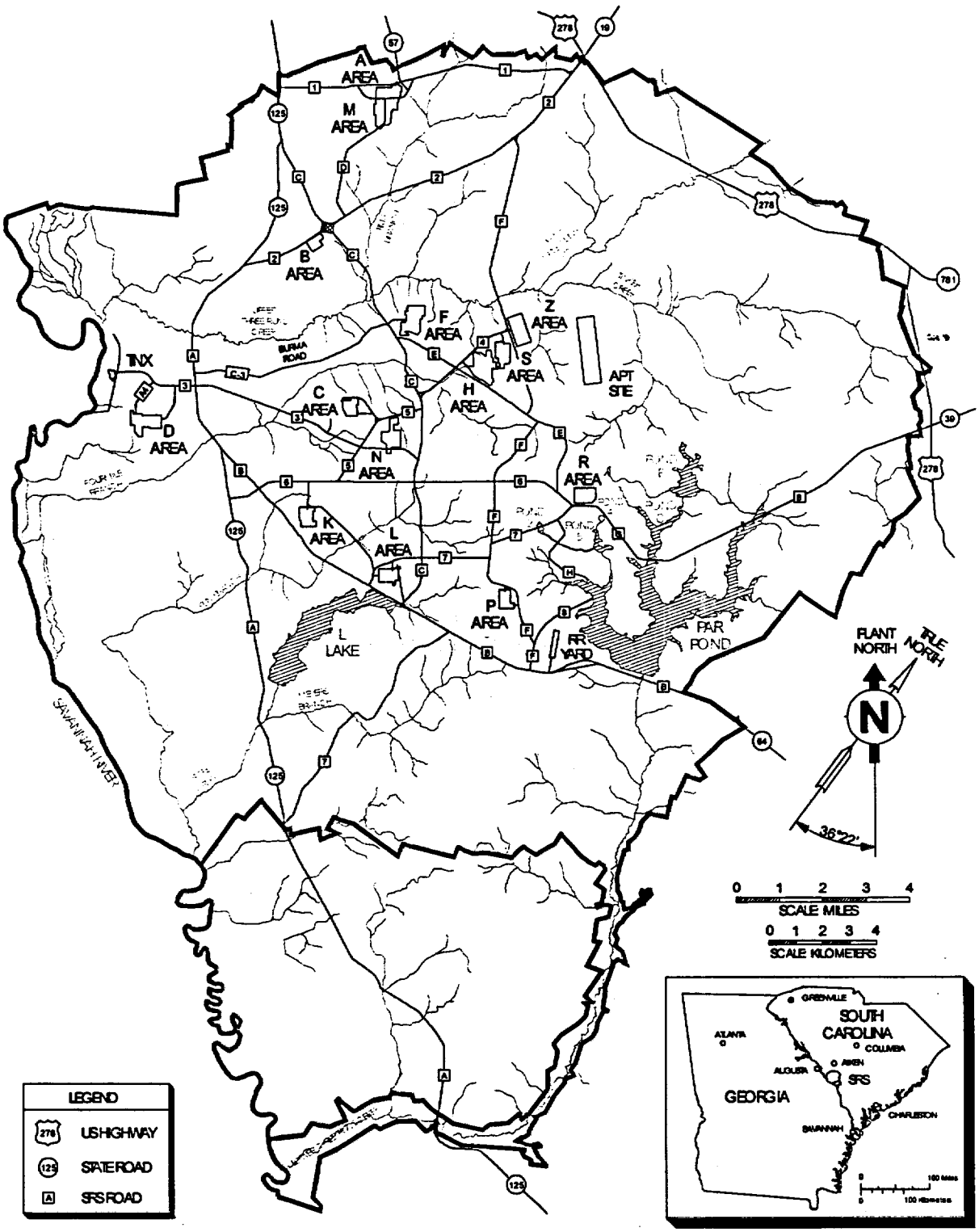

Data from WSRC 2000b

Figure 1.3.1-1. Location of the Savannah River Site

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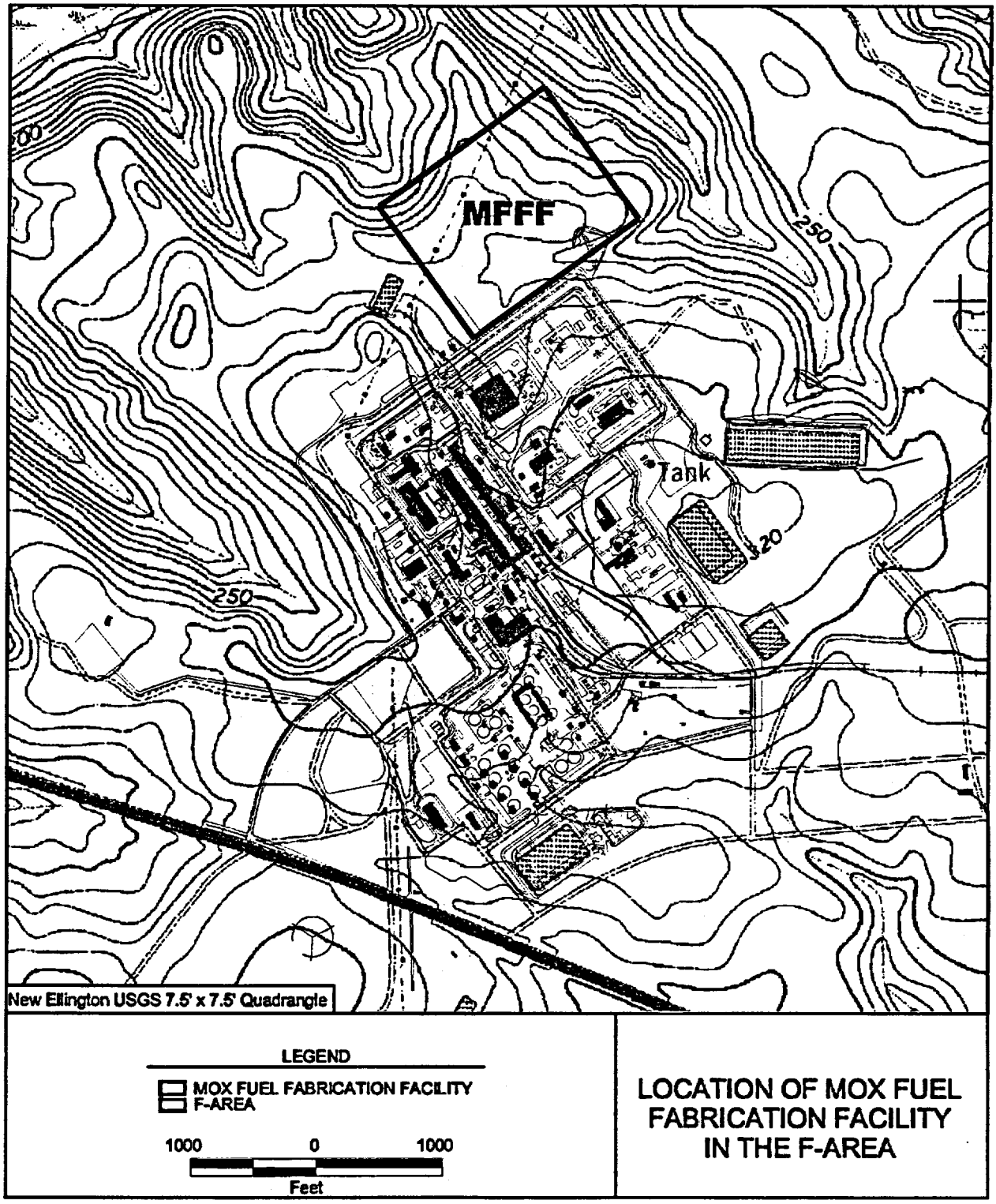

Data from WSRC 2000b

Figure 1.3.1-2. Location of MOX Fuel Fabrication Facility in the F Area

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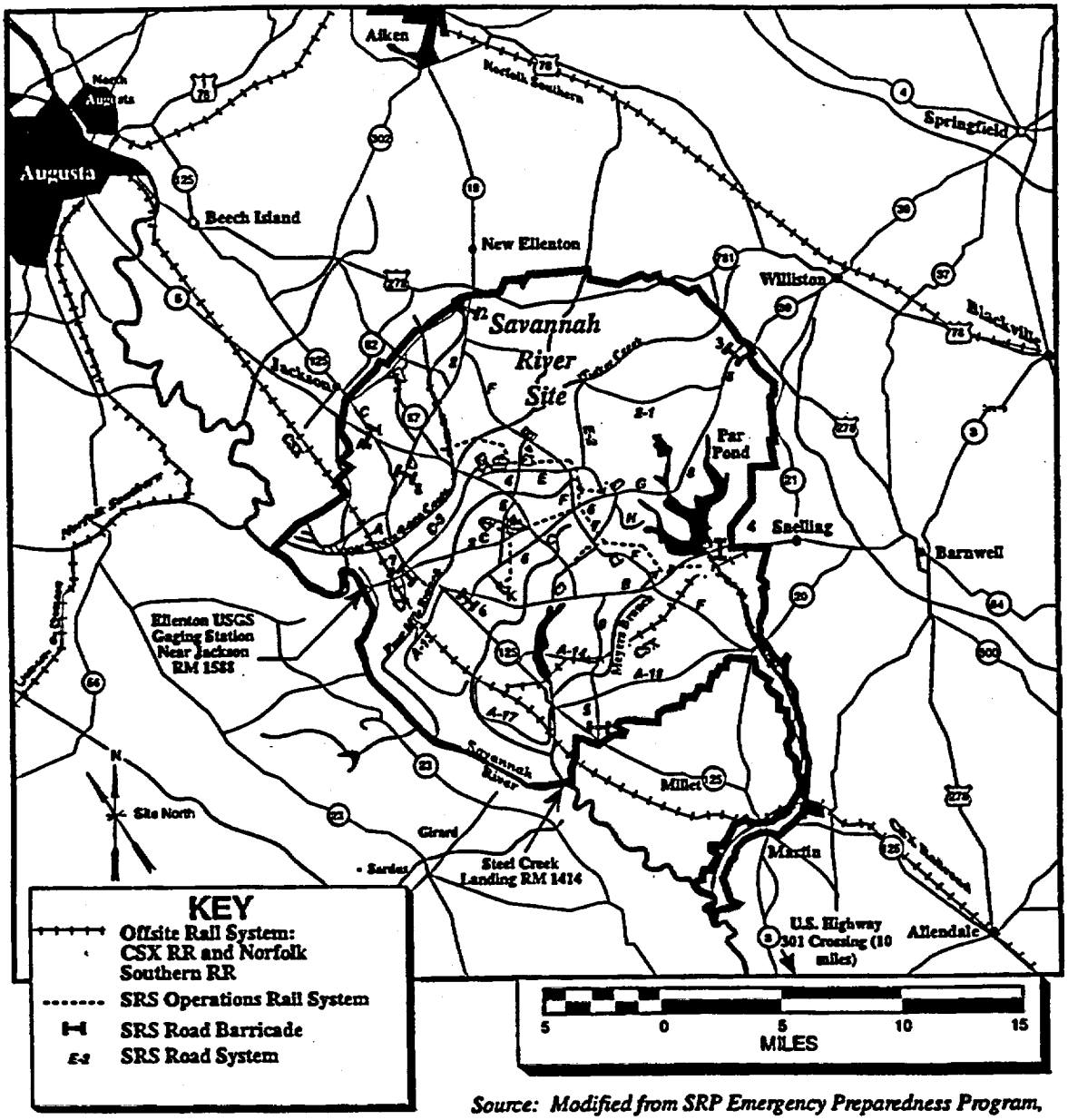

Source: Modified from SRP Emergency Preparedness Program, DOE-SR, 1988.

FG 94343119

Data from WSRC 2000b

Figure 1.3.1-3. Towns and Roads Near SRS

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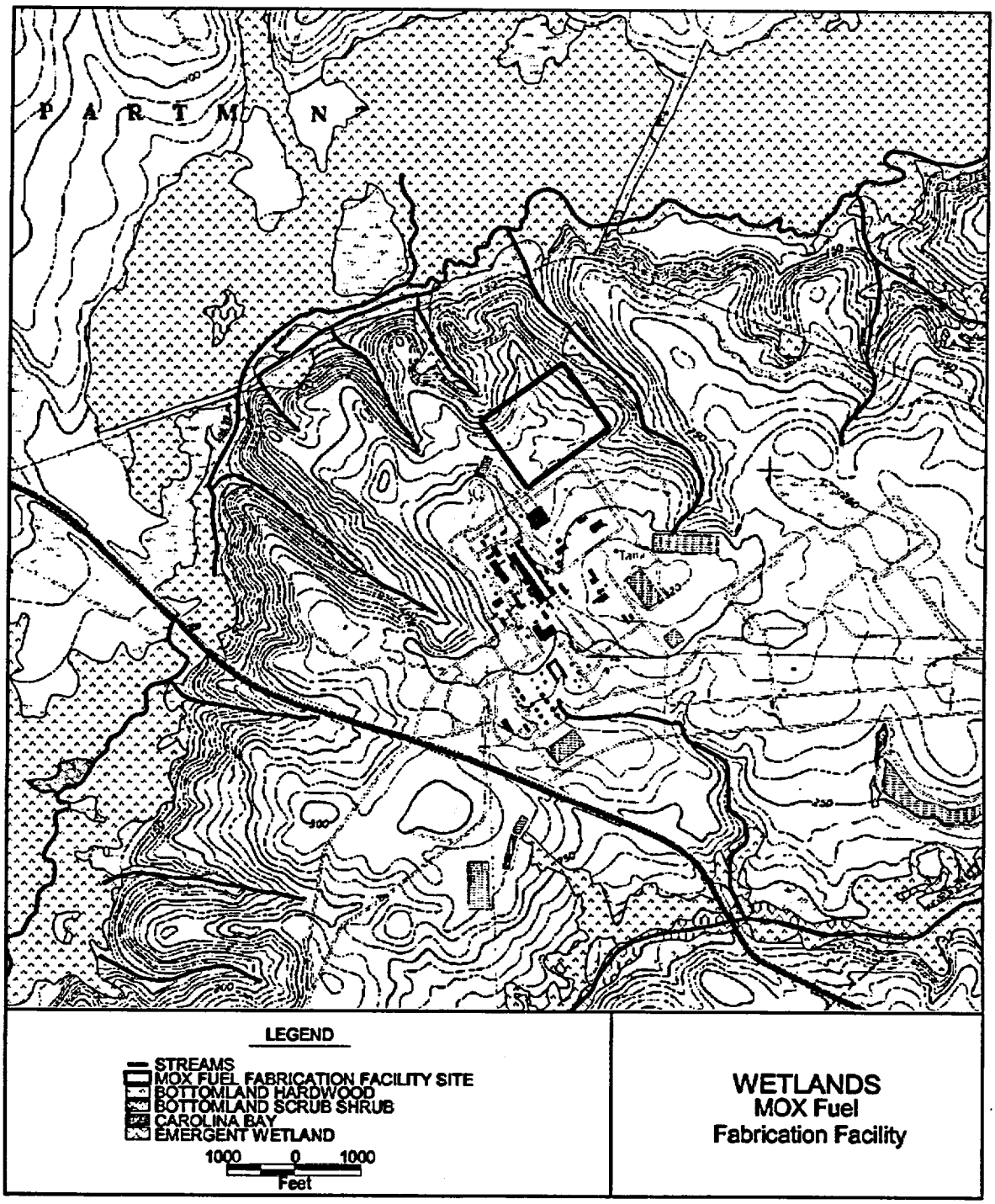

Data from WSRC 2000b

Figure 1.3.1-4. Topography in the Vicinity of the MFFF Site

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1.3.2 Demographics and Land Use

1.3.2.1 Population Information

1.3.2.1.1 Permanent Population and Distribution

A total of about 621,527 people resided within a 50-mi (80-km) radius of the MFFF site in 1990. That population is projected to grow to a total of about 1,042,483 by the year 2030. Tables 1.3.2-1 through 1.3.2-5 present the population distributions for 1990, 2000, 2010, 2020, and 2030, respectively. The 1990 numbers are based on 1990 U.S. Census counts, while years 2000 through 2030 are projections compiled for the SRS Generic Safety Analysis Report (GSAR) and are based on growth projections provided by the University of Georgia. The analysis included spatial distribution of the population based on a circular grid comprised of 22½-degree azimuth sectors centered on the 16 cardinal compass point directions and six radial distances of 0 to 5, 5 to 10, 10 to 20, 20 to 30, 30 to 40, and 40 to 50 mi (0 to 8, 8 to 16, 16 to 32.2, 32.2 to 48.3, 48.3 to 64.4, and 64.4 to 80 km). Since all land within a 5-mi (8-km) radius of the MFFF site is within SRS and contains no residential population, the usual 1 mi (1.6 km) increment analysis for the area within 5 mi (8 km) of the site is not shown.

The area within the 50-mi (80-km) radius of the MFFF site (Figure 1.3.2-1) includes all, or portions of, two major metropolitan areas where large concentrations of people may be found. The largest population centers are Aiken, South Carolina, and Augusta, Georgia. The only towns within 15 mi (24.1 km) of the center of F Area are New Ellenton, Jackson, Barnwell, Snelling, and Williston, South Carolina. The Augusta-Aiken Metropolitan Statistical Area (MSA), which includes Columbia, Richmond, and McDuffie Counties in Georgia and Edgefield and Aiken Counties in South Carolina, is anchored by the city of Augusta, which is over 20 mi (32.2 km) west-northwest of the MFFF site. The Augusta-Aiken MSA contained 415,220 people in 1990 and an estimated 458,271 people in 1998, primarily in the cities of Augusta, Aiken, and North Augusta. The closest boundary of the Columbia City MSA, which includes Lexington and Richland Counties (South Carolina), is located over 30 mi (48.3 km) northeast of the MFFF site. Columbia City, the core of this MSA, is located outside of the 50-mi (80-km) radius. The Columbia City MSA contained 453,932 people in 1990 and an estimated 512,316 people in 1998. Greater than 50% of the population in the Columbia City MSA live over 50 mi (80 km) from the MFFF site.

The local area within a 10-mi (16-km) radius around the MFFF site is comprised of portions of three counties: Aiken and Barnwell Counties in South Carolina and Burke County in Georgia. The MFFF is located on SRS in Aiken County. Only SRS facilities (no residential population) are located within 5 mi (8 km) of the MFFF site.

The area between 5 and 10 mi (8 and 16 km) from the MFFF site contained about 6,528 people in 1990. That population is projected to grow to a total of approximately 10,876 by the year 2030. A majority of this local population resides to the north and northwest of the site in the towns of New Ellenton and Jackson, which contained estimated populations of 7,197 and 2,843 people in 1998, respectively. Existing (year 1990) and projected (years 2000, 2010, 2020, and 2030) populations between 5 and 10 mi (8 and 16 km) of the MFFF site are included in Tables 1.3.2-1 through 1.3.2-5, respectively.

Table 1.3.2-6 provides the racial and ethnic mix of the local populations. Racially, the population is predominantly white, with 34% black and less than 2% Asian, Pacific Islander, American Indian, Eskimo, or Hispanic. Of the combined population of counties that are partially or entirely within the 50-mi (80-km) radius of the MFFF site, about 48% is male and 52% is female.

As shown in Table 1.3.2-7, over 20% of the population of a majority (i.e., 14 out of 21) of the counties in the 50-mi (80-km) radius had income levels below the federal poverty threshold; only Aiken and Lexington Counties in South Carolina and Columbia and Glascock Counties in Georgia had lower percentages of population below the poverty threshold than their respective state averages. Only Aiken and Lexington Counties exceeded state averages for per-capita income in 1994.

Within the three counties that make up the local 10-mi (16-km) area, Burke County, Georgia, contains the least affluent population, with a 1990 per-capita income of $11,172 and about 30.3% of its population living below the poverty level in 1989. In the same years, the per-capita income for the state of Georgia was $17,123 with approximately 14.7% of its population living below the poverty level. Within South Carolina, Aiken County had per-capita income and poverty levels superior to the state average, but Barnwell County was considerably below in income (i.e., about 20% below the state average) and contained a higher percentage of individuals below the poverty level. As shown in Table 1.3.2-8, income levels have grown slightly since 1989. However, the percentage of the population with incomes below the poverty level in each of the three local counties has remained consistent. Unemployment in the local area ranged from a high of 16% in Burke County to a low of 7% in Aiken County in 1996.

Table 1.3.1-1 shows the population and geographic locations of cities and towns within the 50-mi (80-km) radius of SRS.

1.3.2.1.2 Transient Population Variations

A 5-mi (8-km) radius for the MFFF site is considered when discussing the transient population variations for integrated safety analysis (ISA) purposes. The transient population components investigated are industrial, school, recreational, health care, and casual. The 5-mi (8-km) radius for the MFFF site, shown in Figure 1.3.2-2, falls entirely within the SRS boundary. There are no facilities or populations within 5 mi (8 km) of the MFFF site that are not part of the SRS complex. Therefore, the transient population consists only of employees, badged visitors, vendors making deliveries at SRS site locations within the area, and persons traveling on public highways on the SRS site.

There are no military reservations or correctional institutions located within the 5-mi (8-km) radius of the MFFF site boundary.

1.3.2.1.3 Industrial Population

The industrial population within a 5-mi (8-km) radius of F Area consists entirely of SRS employees at A/M, B, C, N, E, F, H, K, S, and Z Areas.

In 2002, SRS employed approximately 13,590 persons, including 12,051 employed by WSRC (Management and Operations [M&O] Contractor); 823 employed by Wackenhut Services Inc. (WSI); 459 employees under DOE-SR; and 257 other SRS contract employees. As shown in Table 1.3.2-9, approximately 90% of that workforce resides within five counties: Aiken, Barnwell, and Edgefield Counties in South Carolina and Columbia and Richmond Counties in Georgia.

1.3.2.2 Population Centers

The MFFF site within SRS is extremely rural, is entirely within the boundaries of the SRS property, and contains no communities, neighborhoods, or other areas that may be impacted by MFFF operations. The nearest population is located more than 5 mi (8 km) from the MFFF site.

A majority of the population within a 10-mi (16-km) radius of the MFFF site resides within Aiken County. Additional population information is provided in Section 1.3.2.1.

1.3.2.3 Public Facilities

1.3.2.3.1 School Population

A minimal number of facilities, mostly schools, containing transient populations are located within a 10-mi (16-km) radius surrounding the MFFF site. Five public schools are located within the area to the northwest and west, with the closest being over 6 mi (9.6 km) away from the MFFF site. Table 1.3.2-10 lists local public schools within the 10-mi (16-km) radius of the MFFF site and recent enrollments (1998 to 1999). The schools operate for 180 days each year, from late August through late May. There are no private schools or colleges located in the 10-mi (16-km) radius of the MFFF site. The students in these schools are assumed to be part of the resident population within the 50-mi (80-km) radius of the MFFF site.

1.3.2.3.2 Health Care Populations

The U.S. Census Bureau estimated that 1,765 people resided in group quarters in Aiken County, 297 in Barnwell County, and 216 in Burke County in 1997. The only residential institutions classified as "group quarters" within 10 mi (16 km) of the site are three residential care facilities located in New Ellenton: the New Ellenton Nursing Center (26 beds), Coleman's Residential Care (10 beds), and Parker's Residential Care Home (nine beds). The closest of these three facilities, Parker's Residential Care Home, is outside of the 6-mi (9.6-km) radius northwest of the MFFF site. There are no hospitals located within a 6-mi (9.6-km) radius of the MFFF site.

1.3.2.3.3 Recreational Population

The primary recreational activity within a 5-mi (8-km) radius of SRS production areas is controlled sport hunting. Hunts at SRS, supervised by DOE, are conducted annually with the benefit of controlling deer and feral hog populations.

Hunting also takes place at Crackerneck, an area of 4,780 ac (1,934 ha) west of SRS in Aiken County. The South Carolina Department of Natural Resources (SCDNR) manages hunts at

Crackerneck for deer, hogs, small game, and waterfowl, although permits are issued by DOE. Another sporting area within 5 mi (8 km) of SRS is a private commercial area of 4,000 ac (1,619 ha) about 15 mi (24 km) east of Waynesboro, Georgia. Hunting and/or fishing, as well as available lodging, are available to the public all year for a fee. No records of usage are available.

Additional recreational usage near the vicinity is available at three state parks located outside of the 5-mi (8-km) radius of SRS production areas but within the 12-mi (19-km) radius of the SRS site boundary. These areas include Redcliffe State Park, a historic site located off SCR 278 at Beech Island; Aiken State Park located off U.S. Route 78, 16 mi (25 km) east of Aiken; and Barnwell State Park located off SCR 3 near Blackville. During fiscal year 1994/1995, total park usage was approximately 116,000 visitor-days. All of the parks are available to the public year-round.

Other recreational activities within the 5-mi (8-km) radius of SRS production areas include fishing and boating. Numerous boat landings are located on the west bank of the Savannah River, which borders the southwestern portion of the site. In addition, a 95-ac (38.4-ha) man-made lake, Lake Edgar Brown, is located within the city limits of Barnwell. No records of usage at these areas are available.

1.3.2.4 Industrial Areas

1.3.2.4.1 Savannah River Site Operations Activities

SRS consists of six major operating areas: reactor areas (C, K, L, P, and R Areas); separations areas (F and H Areas); waste management areas (E, S, and Z Areas); heavy water reprocessing area (D Area); reactor materials area (M Area); and administration area (A Area).

1.3.2.4.1.1 Reactor Areas (C, K, L, P, and R Areas)

The five nuclear production reactor facilities (C, K, L, P, and R Reactors) occupy 934 ac (378 ha) of SRS. All five reactors are located within a 10-mi (16-km) radius of the MFFF site and have been placed in cold shutdown with no plans for restart. The approximate locations of the reactor areas are shown in Figure 1.3.2-2. Although the reactor areas are being used for moderator and fuel storage, no effort is being expended to maintain the production capability of these reactors.

1.3.2.4.1.2 F Area

F Area is located in Aiken County, South Carolina, near the center of SRS, east of SRS Road C and north of SRS Road E (see Figure 1.3.2-2). The existing F Area occupies 364 ac (147 ha). The F-Area center point coordinates are given in Table 1.3.1-2. The nearest SRS site boundary to F Area is less than 6 mi (9.5 km) to the west.

F-Area's main processing facility is F Canyon, which is composed of two chemical separation plants and associated waste storage facilities. In the past, F Canyon was used to chemically separate uranium, plutonium, and fission products from irradiated fuel and target assemblies. The separated uranium and plutonium were transferred to other DOE facilities for further

processing and final use. F Canyon is presently used to process the remaining transplutonium solutions and other material onsite for eventual disposal in a geologic repository. The waste is transferred to high-level waste (HLW) tanks in the area for storage. The F-Area Tank Farm stores aqueous radioactive HLW and evaporated saltcake in underground storage tanks. Currently, F Canyon is conducting operations to stabilize SRS materials. Most of the stabilization actions will be the same as the historic mission.

FB Line previously converted plutonium solution produced in F Canyon to ^{239}Pu metal to support defense programs. FB-Line's current mission is to convert plutonium-bearing solutions into a metal form suitable for storage.

The Pit Disassembly and Conversion Facility (PDCF) is part of DOE's surplus plutonium disposition program in addition to the MFFF. The PDCF will be located in F Area at SRS, near the MFFF site. The PDCF will supply plutonium feedstock to the MFFF.

Analytical laboratories in F Area (Buildings 772-F, 772-1F, and 772-4F) principally support F- and H-Area reprocessing and waste activities.

1.3.2.4.1.3 H Area

H Area is located 2 mi (3.2 km) east of F Area in Aiken and Barnwell Counties in South Carolina, near the center of SRS (see Figure 1.3.2-2). The H-Area center point coordinates are given in Table 1.3.1-2. The nearest SRS site boundary to H Area is approximately 7.2 mi (11.5 km) to the west.

H Area covers approximately 395 ac (160 ha). The H-Canyon facility in H Area is used to convert highly enriched weapons-grade uranium to a low enriched form not usable for weapons production and to stabilize ^{242}Pu solutions. In the past, H Canyon, which is a large, shielded chemical separations plant, processed irradiated fuel and target assemblies by utilizing solvent extraction and ion exchange to separate uranium, plutonium, and fission products from waste. The separated uranium and plutonium were transferred to other H-Area facilities for processing into a solid form. The waste was transferred to HLW tanks in the area for storage, and some of the nuclear materials were shipped to other DOE sites for final use.

HB Line was constructed to support the production of ^{238}Pu. HB Line is also used to stabilize ^{242}Pu solutions.

The tritium facilities in H Area consist of four main process buildings, designed for and operated to process tritium. In July 2000, work commenced on the Replacement Tritium Facility (RTF), which will extract tritium from irradiated fuel rods from the Tennessee Valley Authority Sequoyah and Watts Bar Nuclear Plants. The main mission of the tritium facilities is to purify and maintain existing inventories of tritium for defense purposes.

The Receiving Basin for Offsite Fuels (RBOF) is also located in H Area. Offsite fuels that will be processed in H Canyon are stored and packaged at the RBOF. Radioactive waste generated by the RBOF is stored in the HLW tanks in H Area.

The Effluent Treatment Facility (ETF) is located on the south side of H Area. The ETF treats low-level radioactive wastewater. The ETF removes radioactive and nonradioactive contaminants, except tritium, from process effluents and allows the water to discharge to Upper Three Runs.

The H-Area Tank Farm consists of 29 large (up to 1.3-million-gallon capacity) underground storage tanks that store aqueous radioactive HLW and evaporated saltcake. Seven of these tanks are now dedicated as In-Tank Precipitation (ITP) Facility process tanks.

The Consolidated Incineration Facility (CIF) is located on the east side of H Area. The CIF incinerates SRS hazardous, mixed, and low-level radioactive wastes.

1.3.2.4.1.4 E Area

The E-Area Solid Waste Management Facility (SWMF) is located in Aiken County, South Carolina, near the approximate center of SRS between H Area and F Area (see Figure 1.3.2-2). The SWMF occupies 195 ac (78.9 ha). The nearest SRS site boundary to E Area is approximately 6.5 mi (10.5 km) to the west.

The SWMF is used for disposal and/or storage of radioactive, hazardous, and mixed solid wastes generated at SRS, as well as occasional special shipments from offsite. It also provides interim storage for transuranic waste. Other facilities receive hazardous, low-level, and mixed wastes for incineration and nonradioactive and hazardous wastes for storage.

1.3.2.4.1.5 S Area

S Area is located in Aiken County, South Carolina, north of H Area (see Figure 1.3.2-2). The S-Area center point coordinates are given in Table 1.3.1-2. The nearest SRS site boundary to S Area is approximately 6.8 mi (10.9 km) to the north.

S Area is the site of the Defense Waste Processing Facility (DWPF) Vitrification Plant. The DWPF immobilizes radioactive HLW sludge and precipitate by "vitrifying" it into a solid glass waste form.

1.3.2.4.1.6 Z Area

Facilities in Z Area are located about 2.5 mi (4 km) from F Area in Aiken County, South Carolina, near the center of SRS (see Figure 1.3.2-2). These facilities are used to process and dispose of decontaminated salt solution supernatants from waste tanks. The Z-Area center point coordinates are given in Table 1.3.1-2. The nearest SRS site boundary to Z Area is approximately 6.2 mi (10 km) to the north.

Z Area, which contains the DWPF Saltstone Facility, is located north of the intersection of SRS Road F and SRS Road 4. The Saltstone Facility treats and disposes of the filtrate created by the ITP Facility by stabilizing it in a solid, cement-based waste form.

1.3.2.4.1.7 D Area

The 400-D Area (see Figure 1.3.2-2) occupies 445 ac (180 ha) at SRS. A coal-fired power plant is located in D Area. The D-Area power house is leased and operated by South Carolina Electric and Gas Company (SCE&G). This facility is the site's largest coal-fired powerhouse; it provides approximately 70 MW of electric capacity and 420,000 lb/hr of process steam capacity.

1.3.2.4.1.8 M Area

The 300-M Area (see Figure 1.3.2-2) occupies approximately 114 ac (46.1 ha). M Area previously provided support to the reactor facilities, heavy water facilities, and fuel fabrication facilities. The operations of these facilities have been discontinued. M Area is comprised of Buildings 313-M (including the Chemical Transfer Facility [CTF]), 316-M, 320-M, 321-M, 322-M, 330-M, 331-M, 340-M, and 341-M. Most of the buildings in M Area are used to store radioactive material and waste.

The Liquid Effluent Treatment Facility (LETF) is operating and consists of the Dilute Effluent Treatment Facility (DETF) in Building 341-M and the CTF. The Interim Treatment/Storage Facility (IT/SF), Building 341-1M, remains in operation. The waste that is stored in the IT/SF tanks is being processed as feed material for the Vendor Treatment Process, a waste vitrification process.

1.3.2.4.1.9 A Area

General site administrative functions are centered in A Area, which occupies 348 ac (141 ha). The main DOE and WSRC headquarters are in A Area. Other organizations in A Area provide scientific and logistical support for SRS operations. The Savannah River Technology Center (SRTC) supports the missions of SRS through applied research and development.

1.3.2.4.2 Other Nonproduction SRS Facilities

Activities conducted within SRS that are not related to production are performed by the following organizations: General Services Administration, WSI, Savannah River Forest Station (SRFS), Savannah River Ecology Laboratory (SREL), University of South Carolina Institute of Archaeology and Anthropology, Soil Conservation Service (SCS), and U.S. Department of Agriculture (USDA).

1.3.2.4.3 Other Industrial Populations (Non-SRS)

This section identifies nuclear and industrial facilities within a 50-mi (80-km) radius of the center of SRS.

1.3.2.4.3.1 Chem Nuclear Systems, Incorporated

Chem Nuclear Systems, Incorporated (CNSI), located in Barnwell County, South Carolina, near the eastern SRS boundary, is a commercial facility for the disposal of low-level wastes and hazardous chemicals. The CNSI facility includes a burial site, transportation unit, maintenance unit, and facilities for waste solidification and decontamination.

1.3.2.4.3.2 Transnuclear, Incorporated

Transnuclear, Incorporated, located in Aiken County, South Carolina, transports high- and low-level radioactive wastes and maintains temporary onsite storage of materials to be transported. The materials are transported from various industrial and military facilities nationwide; U.S. Department of Defense (DOD) waste is sent to SRS, and low-level waste is sent to CNSI. No commercial wastes are sent to SRS. The company also manufactures transport casks and provides cask decontamination services.

1.3.2.4.3.3 Carolina Metals, Incorporated

Carolina Metals, Incorporated, located in Barnwell County, South Carolina, processes depleted uranium hexafluoride into uranium metal for DOD and commercial uses.

1.3.2.4.3.4 Vogtle Electric Generating Plant

The Vogtle Electric Generating Plant (VEGP) is a two-unit commercial nuclear power plant operated by Georgia Power. VEGP is located across the Savannah River from SRS in Burke County, Georgia, about 4.5 mi (7.2 km) south-southeast of D Area. Unit 1 was licensed for full-power operation in May 1987. Unit 2 began operation in May 1989. An emergency plan and a communications protocol are in place between VEGP and SRS. Details of protective actions, with regard to an accident at VEGP, are provided in the SRS Emergency Plan.

1.3.2.4.3.5 Urquhart Station

Urquhart Station is a three-unit, 250-MW, coal- and natural-gas-fired steam electric plant in Beech Island, South Carolina. It is owned by SCE&G and is located on the Savannah River about 20 river-mi (32.2 river-km) north of SRS.

1.3.2.4.3.6 Military Facilities

Fort Gordon is the nearest military facility, located approximately 9 mi (14.5 km) southwest of Augusta, Georgia, and more than 20 mi (32 km) from SRS. Approximately 50,000 individuals are involved in activities at Fort Gordon. North Air Base, located approximately 39 mi (63 km) northeast of SRS, is closed and no military personnel are stationed there.

1.3.2.5 Land Use

The total area investigated within the SRS boundary area is approximately 800 mi^2 (2,070 km^2). Of these 800 mi^2, 310 mi^2 (800 km^2) are used for industrial purposes associated with the operation of SRS and for commercial and noncommercial timber management. Land use at SRS can be classified into three major categories: forest/undeveloped, water/wetlands, and developed facilities. Approximately 226 mi^2 (585 km^2) of SRS (i.e., 73% of the area) is undeveloped. Wetlands, streams, and lakes account for 70 mi^2 (181 km^2) (22%) of the site, while developed facilities including production and support areas, roads, and utility corridors make up approximately 15 mi^2 (39 km^2) (5%) of SRS. DOE manages the land that forms a buffer zone around the production facilities.

Land within F Area and the MFFF site is completely within SRS and is used for industrial purposes associated with SRS. Land use at SRS is listed in Table 1.3.2-11.

Forested areas are managed by the SRFS, an administrative unit of the U.S. Forest Service (USFS). Through an interagency agreement between DOE and the USDA, the USFS maintains the SRFS to provide timber management, research support, soil and water protection, wildlife management, secondary road management, and fire management. The land in the affected area is primarily used for timbering. Small tracts of land are clear-cut on a rotating basis.

1.3.2.6 Water Use

1.3.2.6.1 General Uses of the Savannah River

The Savannah River forms the boundary between Georgia and South Carolina. Downstream from Augusta, Georgia, the Savannah River has been classified as Class B waters suitable for domestic supply after treatment, propagation of fish, and industrial and agricultural uses. The river supplies water for Augusta, Georgia; North Augusta, South Carolina; and Beaufort and Jasper Counties, South Carolina; and supplements the water supply of Savannah, Georgia. It also receives domestic and industrial wastes from Augusta, Georgia; North Augusta, South Carolina; and Horse Creek Valley (Aiken County, South Carolina).

At SRS, the coal-fired power plants are cooled with water pumped from the river. Effluents and wastewater from SRS are discharged into the Savannah River tributaries that flow across SRS.

Recreational uses of the Savannah River include boating and sport fishing, and a limited amount of contact activities such as swimming and water skiing.

1.3.2.6.2 Navigation

During the early operation of the Thurmond and Hartwell Lakes (1953 to 1972), there was navigational traffic on the river from Augusta to Savannah. By the late 1970s, waterborne commerce was limited to the transportation of oil to Augusta. In 1979, this shipping was discontinued. Since that time, except for limited movements of construction-related items, no commercial shippers have used the river. Maintenance dredging of the river was discontinued in 1979.

1.3.2.6.3 Fisheries

Three types of fisheries are found along the Savannah River. Freshwater trout are in the cold waters flowing from the mountains of North Carolina, South Carolina, and Georgia. Other freshwater fish species are found in the warmer waters in the Piedmont and Coastal Plain; saltwater species are found downstream in the brackish waters near the mouth and in the estuary.

Warm-water fishing constitutes most of the sport fishing in the Savannah River.

1.3.2.6.4 Recreation

Over 95% of South Carolina's impounded waters are contained in the large reservoirs and have multipurpose recreational uses such as swimming, water skiing, boating, and fishing. Par Pond and L Lake, both previously used for reactor cooling water, are completely within the boundary of SRS and are not accessible to the public. Thurmond Lake (Clarks Hill Reservoir), Hartwell Reservoir, and Russell Dam are located northwest of Augusta approximately 65 to 133 river-mi (104 to 213 river-km) from the center of the site. They are used for hydroelectric power generation, flood control, and water supply, as well as for recreation.

1.3.2.6.5 Agricultural Water Use

Water for agricultural use in Aiken, Barnwell, and Allendale Counties is obtained primarily from lakes and ponds. No uses of the Savannah River for crop irrigation were identified in Richmond and Burke Counties, Georgia, or for Aiken, Barnwell, and Allendale Counties, South Carolina.

1.3.2.6.6 Municipal Use of Local Surface Water

The Savannah River and its reservoirs are the sources of water for 64 domestic and industrial users. Total withdrawals amount to approximately 1 billion gallons per day. The largest water users are SRS and VEGP. At the lower end of the river, freshwater intakes and canals are maintained by the Beaufort-Jasper Water Supply Authority, the City of Savannah Municipal and Industrial Plant, and the Savannah National Wildlife Refuge.

The larger communities in Aiken, Richmond, and Burke Counties use surface water supplies as well as groundwater. None of these surface water supplies are impacted by liquid discharges from operations at SRS. These intakes are all either on the Savannah River upstream from SRS or on tributaries of the Savannah River that do not cross or drain at SRS.

1.3.2.6.7 Municipal and Industrial Use of Savannah River Water Downstream from Savannah River Site

Two water treatment plants about 100 mi (160 km) downriver from SRS supply Savannah River water to customers in Beaufort and Jasper Counties, South Carolina, and Chatham County, Georgia. The City of Savannah Industrial and Domestic Water Supply (Chatham County, Georgia) is the largest of the two water treatment plants.

The Beaufort-Jasper Water/Sewer Authority near Hardeeville, South Carolina, has been in operation since 1965. It serves a consumer population of about 50,000 people who live in Beaufort and Jasper Counties. The plant is located about 18 mi (29 km) from the Savannah River. A canal transports water from the river to the plant. The plant processes an average of 6 million gallons per day (mgd), varying from about 5 mgd in the winter to 10 to 12 mgd in the summer. Increased use in the summer is associated with watering lawns, filling swimming pools, and uses in the home.

The City of Savannah Industrial and Domestic Water Supply at Port Wentworth has been treating water during the entire period of operation of SRS. Treated water from this plant is used

primarily for industrial and manufacturing purposes in an industrial complex near Savannah, Georgia. The complex serves a non-community/non-transient population of 6,000 people, primarily adults working in industrial facilities; it also serves as a backup for the City of Savannah's domestic groundwater system. The plant processes about 40 to 50 mgd. Usage of this water for the City of Savannah does not show a strong summer demand, since the water is primarily used for industrial purposes.

1.3.2.6.8 Groundwater Use

The coastal plain sediments that underlie SRS are an important hydrologic resource, since the formations are sources for drinking water, industrial processes, cooling water, and water used for agricultural purposes. Fifty-six municipalities and industries identified near the site use this groundwater. Total pumpage by these users in 1985 was approximately 35 mgd. In addition, several small communities, mobile home parks, schools, and small commercial interests draw from this groundwater resource.

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Tables

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Table 1.3.2-1. Population Distribution from MFFF Site – 1990

Direction	5 to 10 mi (8 to 16 km)	10 to 20 mi (16 to 32 km)	20 to 30 mi (32 to 48 km)	30 to 40 mi (48 to 64 km)	40 to 50 mi (64 to 80 km)	TOTAL
N	2,072	21,439	9,195	6,687	10,462	49,855
NNE	235	1,782	2,081	4,100	17,085	25,283
NE	8	1,545	2,730	5,240	11,442	20,965
ENE	0	3,277	4,657	5,189	31,845	44,968
E	1	4,773	5,086	10,908	5,512	26,280
ESE	8	2,166	2,577	2,839	2,891	10,481
SE	0	563	4,543	6,387	10,432	21,925
SSE	0	364	683	1,046	2,507	4,600
S	0	545	1,596	6,730	3,560	12,431
SSW	99	780	2,186	4,805	2,591	10,461
SW	110	1,171	4,578	2,093	2,711	10,663
WSW	101	1,523	4,472	2,586	6,149	14,831
W	241	6,031	10,519	8,946	6,959	32,696
WNW	1,380	5,066	129,791	32,475	14,790	183,502
NW	1,102	15,212	81,259	9,385	3,296	110,254
NNW	1,171	19,728	11,205	6,884	3,344	42,332
TOTAL	6,528	85,965	277,158	116,300	135,576	621,527

Data from WSRC 2000b

Table 1.3.2-2. Projected Population Distribution from MFFF Site – 2000

Direction	5 to 10 mi (8 to 16 km)	10 to 20 mi (16 to 32 km)	20 to 30 mi (32 to 48 km)	30 to 40 mi (48 to 64 km)	40 to 50 mi (64 to 80 km)	TOTAL
N	2,362	24,440	10,482	7,623	11,927	56,834
NNE	268	2,031	2,372	4,674	19,477	28,822
NE	9	1,761	3,112	5,974	13,044	23,900
ENE	0	3,736	5,309	5,915	36,303	51,263
E	1	5,441	5,798	12,435	6,284	29,959
ESE	9	2,469	2,938	3,236	3,296	11,948
SE	0	642	5,179	7,281	11,892	24,994
SSE	0	415	779	1,192	2,858	5,244
S	0	621	1,819	7,672	4,058	14,170
SSW	10	889	2,492	5,478	2,954	11,823
SW	125	1,335	5,219	2,386	3,091	12,156
WSW	115	1,736	5,098	2,948	7,010	16,907
W	275	6,875	11,992	10,198	7,933	37,273
WNW	1,573	5,775	147,962	37,022	16,861	209,193
NW	1,256	17,342	92,635	10,699	3,757	125,689
NNW	1,335	22,490	12,774	7,848	3,812	48,259
TOTAL	7,338	97,998	315,960	132,581	154,557	708,434

Note: The figures above use WSRC 2000b for the basis for population projections. This predicts a 14% increase in population within 50 miles of the MFFF for the year 2000 compared to 1990. After reviewing the actual increases from the 2000 census data, DCS has determined that the county populations within 50 miles actually increased by 16%. Therefore, the figures above underestimate population increase by 2%. The CAR does not use these populations in any calculations. Accordingly, DCS does not believe that the difference in population data is significant enough to warrant updating to the 2000 census.

Data from WSRC 2000b

Table 1.3.2-3. Projected Population Distribution from MFFF Site – 2010

Direction	5 to 10 mi (8 to 16 km)	10 to 20 mi (16 to 32 km)	20 to 30 mi (32 to 48 km)	30 to 40 mi (48 to 64 km)	40 to 50 mi (64 to 80 km)	TOTAL
N	2,693	27,862	11,950	8,690	13,596	64,791
NNE	305	2,316	2,704	5,328	22,204	32,857
NE	10	2,008	3,548	6,810	14,870	27,246
ENE	0	4,259	6,052	6,744	41,386	58,441
E	1	6,203	6,610	14,176	7,163	34,153
ESE	10	2,815	3,349	3,690	3,757	13,621
SE	0	732	5,904	8,301	13,557	28,494
SSE	0	473	888	1,359	3,258	5,978
S	0	708	2,074	8,746	4,627	16,155
SSW	12	1,014	2,841	6,245	3,367	13,479
SW	143	1,522	5,950	2,720	3,523	13,858
WSW	131	1,979	5,812	3,361	7,991	19,274
W	313	7,838	13,670	11,626	9,044	42,491
WNW	1,793	6,584	168,676	42,205	19,221	238,479
NW	1,432	19,770	105,604	12,197	4,283	143,286
NNW	1,522	25,639	14,562	8,946	4,346	55,015
TOTAL	8,365	111,722	360,194	151,144	176,193	807,618

Data from WSRC 2000b

Table 1.3.2-4. Projected Population Distribution from MFFF Site – 2020

Direction	5 to 10 mi (8 to 16 km)	10 to 20 mi (16 to 32 km)	20 to 30 mi (32 to 48 km)	30 to 40 mi (48 to 64 km)	40 to 50 mi (64 to 80 km)	TOTAL
N	3,070	31,763	13,623	9,907	15,500	73,863
NNE	348	3,640	3,083	6,074	25,312	38,457
NE	12	2,289	4,045	7,763	16,952	31,061
ENE	0	4,855	6,900	7,688	47,180	66,623
E	1	7,071	7,535	16,161	8,166	38,934
ESE	12	3,209	3,818	4,206	4,283	15,528
SE	0	834	6,731	9,463	15,455	32,483
SSE	0	539	1,012	1,550	3,714	6,815
S	0	807	2,365	9,971	5,274	18,417
SSW	13	1,156	3,239	7,119	3,839	15,366
SW	163	1,735	6,783	3,101	4,016	15,798
WSW	150	2,256	6,625	3,831	9,110	21,972
W	357	8,935	15,584	13,254	10,310	48,440
WNW	2,045	7,506	192,291	48,113	21,912	271,867
NW	1,633	22,537	120,389	13,904	4,883	163,346
NNW	1,735	29,228	16,601	10,199	4,954	62,717
TOTAL	9,539	128,360	410,624	172,304	200,860	921,687

Data from WSRC 2000b

Table 1.3.2-5. Projected Population Distribution from MFFF Site – 2030

Direction	5 to 10 mi (8 to 16 km)	10 to 20 mi (16 to 32 km)	20 to 30 mi (32 to 48 km)	30 to 40 mi (48 to 64 km)	40 to 50 mi (64 to 80 km)	TOTAL
N	3,500	36,210	15,530	11,294	17,670	84,204
NNE	397	3,010	3,515	6,925	28,857	42,704
NE	14	2,609	4,611	8,850	19,325	35,409
ENE	0	5,535	7,865	8,764	53,785	75,949
E	2	8,061	8,590	18,423	9,310	44,386
ESE	14	3,658	4,352	5,466	488	13,978
SE	0	951	7,673	7,409	17,619	33,652
SSE	0	615	1,154	1,767	4,234	7,770
S	0	920	2,696	11,367	6,013	20,996
SSW	15	1,317	3,692	8,115	4,376	17,515
SW	186	1,978	7,732	3,535	4,579	18,010
WSW	171	2,572	7,553	4,368	10,385	25,049
W	407	10,186	17,766	15,109	11,753	55,221
WNW	2,331	8,556	219,212	54,849	24,980	309,928
NW	1,861	25,692	137,243	15,851	5,567	186,214
NNW	1,978	33,320	18,925	11,627	5,648	71,498
TOTAL	10,876	145,190	468,109	193,719	224,589	1,042,483

Data from WSRC 2000b

Table 1.3.2-6. Racial and Ethnic Mix of Local Area Population, 1997 (Estimated)

Population Group	Aiken County, SC	Barnwell County, SC	Burke County, GA	Georgia	South Carolina
Total Population	133,980	21,830	22,725	6,478,216	3,486,703
White	74.3%	56.0%	43.8%	71.0%	69.0%
Black	24.9%	43.7%	56.0%	26.9%	29.8%
American Indian, Eskimo, or Aleut	0.2%	0.2%	0.1%	0.2%	0.3%
Asian or Pacific Islander	0.6%	0.1%	0.2%	1.1%	0.6%
Hispanic (any race)	1.0%	0.8%	0.5%	0.6%	0.3%

Data from WSRC 2000b

Table 1.3.2-7. Economic and Unemployment Data for Counties Within 50 Miles of the MFFF

County	1994 Per-Capita Income	1993 Percent of Pop. Below Poverty	Unemployment Rate – 1996 (%)
South Carolina	**$17,710**	**16.6**	**6.0**
Aiken	$19,468	13.8	7.0
Allendale	$12,175	34.3	9.1
Bamberg	$13,253	27.9	9.9
Barnwell	$16,736	21.9	10.9
Colleton	$13,988	24.1	6.8
Edgefield	$15,076	17.4	7.4
Hampton	$14,595	24.4	7.3
Lexington	$20,111	9.8	3.3
McCormick	$12,500	21.1	10.2
Orangeburg	$14,932	25.6	10.4
Saluda	$15,316	17.7	6.6
Georgia	**$20,212**	**16.8**	**4.6**
Bulloch	$14,319	22.4	3.1
Burke	$14,270	29.2	16.0
Columbia	$17,810	7.7	4.1
Glascock	$16,417	16.1	9.0
Jefferson	$15,303	27.7	13.4
Jenkins	$14,098	25.2	4.7
Lincoln	$15,358	17.5	6.4
McDuffie	$16,422	20.7	9.3
Richmond	$19,251	21.9	7.3
Warren	$13,747	27.1	9.8

Data from WSRC 2000b

Table 1.3.2-8. Income and Poverty Data for the Three-County Local Area

Area	1990 Population	1990 Per-Capita Income	1989 % Population Below Poverty	1994 Per-Capita Income	1993 % Below Poverty
Aiken, SC	120,940	$17,156	14.0	$19,468	13.8
Barnwell, SC	20,293	$13,397	21.8	$16,736	21.9
Burke, GA	20,579	$11,172	30.3	$14,270	29.2
Georgia	6,478,216	$17,123	14.7	$20,212	16.8
South Carolina	3,487,714	$15,106	15.4	$17,710	16.6

Data from WSRC 2000b

Table 1.3.2-9. Year 2002 SRS Employees (Approximate) by County of Residence

County	WSRC/ M&O	DOE-SR Operations	WSI	Other Employers	Total	Percent
Aiken, SC	6,380	296	360	180	7,216	53.1
Columbia, GA	1,868	66	72	6	2,012	14.8
Richmond, GA	1,577	66	231	25	1,899	14.0
Barnwell, SC	863	11	64	9	947	7.0
Edgefield, SC	224	3	8	1	236	1.7
Other Counties	1,139	17	88	36	1,280	9.4
TOTAL	12,051	459	823	257	13,590	100

Source: Personal Communication (Bozzone 2002)

Table 1.3.2-10. Public School Population within 10 Miles of the MFFF

School	Location	Grades	1998 - 1999 Enrollment
Greendale Elementary	New Ellenton, SC	Pre-K through 5	426
Jackson Middle	Jackson, SC	6 through 8	517
New Ellenton Middle	New Ellenton, SC	6 through 8	263
Redcliff Elementary	Jackson, SC	Pre-K through 5	967
Silver Bluff High	Aiken, SC	9 through 12	914

Data from WSRC 2000b

Table 1.3.2-11. Land Use at SRS

Use	Acres
Vegetation Types	
Bottomland Hardwoods	28,492
Upland Hardwoods	6,459
Mixed Hardwood/Pine	10,425
Swamp Species	9,158
Undrained Flatwoods	551
Longleaf Pine	40,804
Loblolly Pine	63,952
Slash Pine	21,616
Other Pine	265
Permanent Grass Openings	4,419
Non-Forest	12,377
	198,518 (site GIS acres)
Water/Wetlands	
Savannah River Swamp	9,894
Par Pond	2,640
L Lake	1,184
	13,718
Production and Support Areas	
100-C	182
100-K	247
100-L	183
100-P	185
100-R	137
200-E & F	1,058
200-S & H	580
200-Z	182
300-M & 700-A	330
400-D	422
600-B	114
N-Area (Central Shops)	375
	3,995
Total	**216,231**

Data from WSRC 2000b

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Figures

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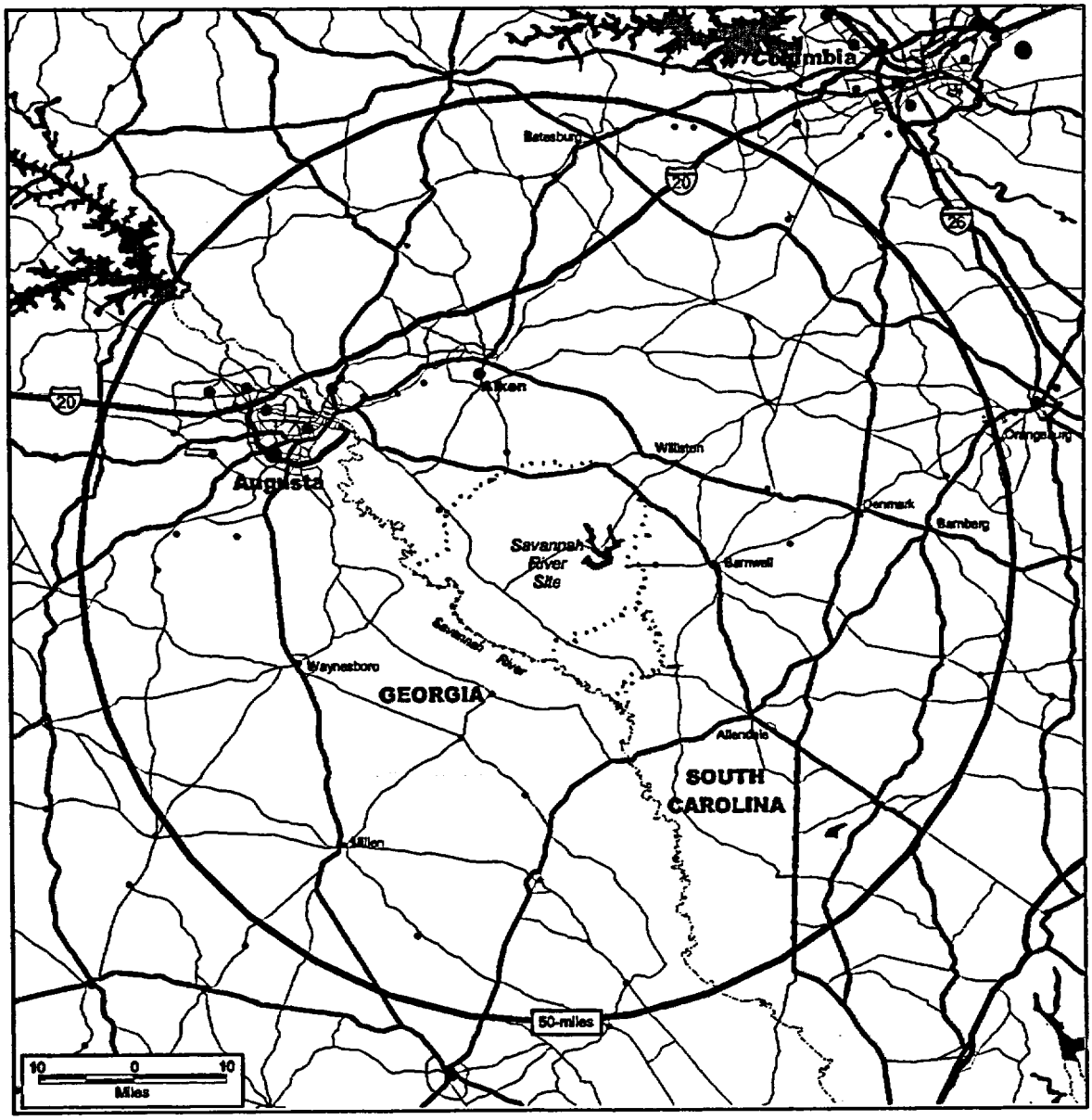

Data from WSRC 2000b

Figure 1.3.2-1. Map Showing the 50-Mile Radius from the MFFF

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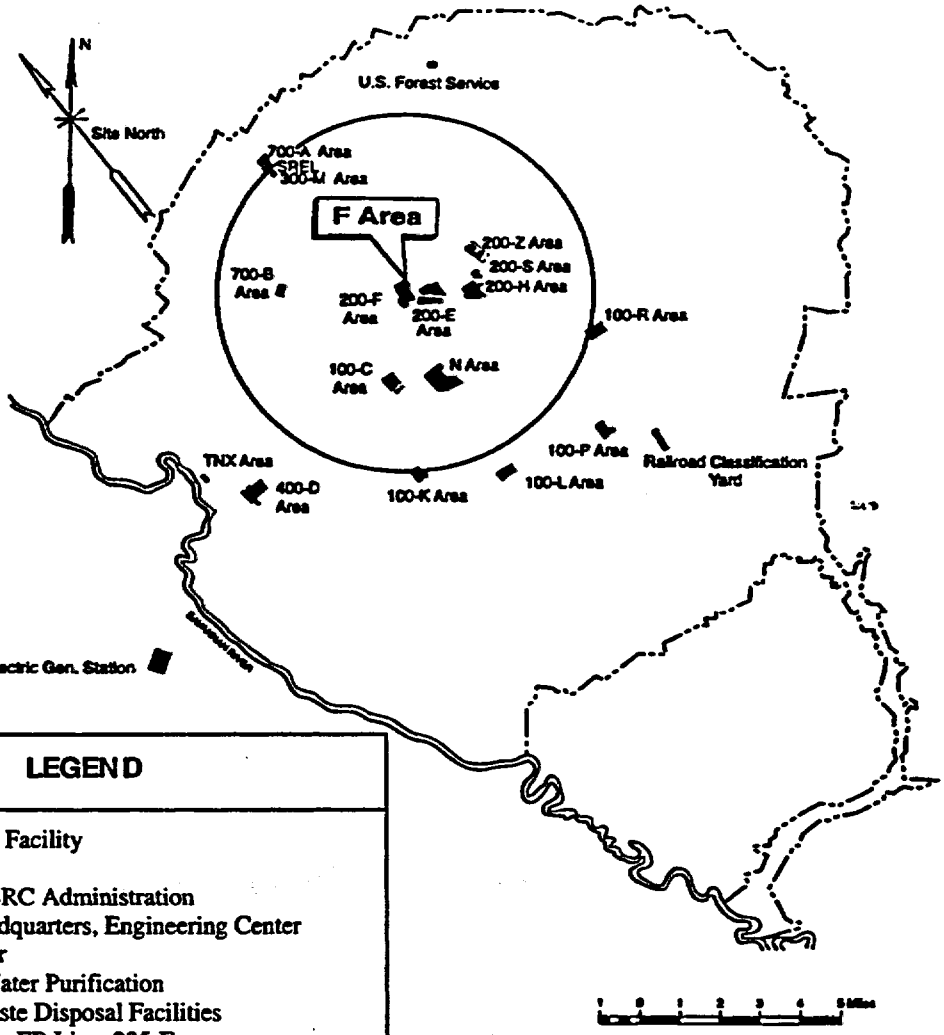

LEGEND	
Area	Facility
A Area	DOE/WSRC Administration
B Area	WSI Headquarters, Engineering Center
C Area	C Reactor
D Area	Heavy Water Purification
E Area	Solid Waste Disposal Facilities
F Area	F Canyon, FB Line, 235-F
H Area	H Canyon, HB Line, Tritium Facility
K Area	K Reactor
L Area	L Reactor
M Area	Reactor Materials Facilities
N Area	Central Shops
P Area	P Reactor
R Area	R Reactor
S Area	DWPF Ops.
Z Area	Saltstone Ops.
Offsite	Vogtle Electric Generating Station

Data from WSRC 2000b

Figure 1.3.2-2. Map Showing the 5-Mile Radius from the MFFF

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