

License Application

for the American Centrifuge Plant

in Piketon, Ohio



Revision 0

Docket No. 70-7004

August 2004

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Export Controlled Information

Reviewer: Original signed by RL Coriell
Date: 07/30/04

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LA-3605-0001

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Revision 0 – 10 CFR 1045 review completed by L. Sparks on 07/29/04 and the Export Controlled Information review completed by R. Coriell on 07/30/04.

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TABLE OF CONTENTS

Acronyms and Abbreviations xv

Chemicals and Units of Measure xxi

Executive Summary 1

1.0 GENERAL INFORMATION 1-1

 1.1 Plant and Process Description 1-2

 1.1.1 Site Boundary..... 1-2

 1.1.2 Plant Layout 1-3

 1.1.3 Primary Facilities Description 1-3

 1.1.4 Secondary Facilities Description..... 1-10

 1.1.5 Process Description 1-13

 1.1.6 Hazardous Material Storage..... 1-26

 1.1.7 Roadways 1-26

 1.1.8 Phased Deployment 1-27

 1.2 Institutional Information 1-47

 1.2.1 Corporate Identity..... 1-47

 1.2.2 Financial Qualifications..... 1-49

 1.2.3 Type, Quantity, and Form of Licensed Material..... 1-51

 1.2.4 Authorized Users 1-51

 1.2.5 Special Exemptions or Special Authorizations..... 1-51

 1.2.6 Security of Classified Information 1-56

 1.3 Site Description 1-64

 1.3.1 Geography..... 1-64

1.3.2	Demographics	1-64
1.3.3	Meteorology	1-66
1.3.4	Surface Hydrology	1-68
1.3.5	Subsurface Hydrology	1-76
1.3.6	Geology and Seismology	1-81
1.4	Applicable Codes, Standards, and Regulatory Guidance.....	1-102
1.4.1	American National Standards Institute/American National Society..	1-102
1.4.2	American National Standards Institute.....	1-104
1.4.3	American National Standards Institute/American Society of Mechanical Engineers.....	1-105
1.4.4	American Society of Mechanical Engineers.....	1-106
1.4.5	National Fire Protection Association.....	1-107
1.4.6	Nuclear Regulatory Commission Guidance.....	1-110
1.4.7	Other Codes, Standards, and Guidance	1-114
1.5	References	1-115
2.0	ORGANIZATION AND ADMINISTRATION	2-1
2.1	Organizational Commitments, Relationships, Responsibilities, and Authorities	2-2
2.1.1	Senior Vice President	2-3
2.1.2	Director, Regulatory and Quality Assurance	2-3
2.1.3	Director, American Centrifuge Plant.....	2-5
2.1.4	Vice President, Chief Information & Security Officer.....	2-12
2.2	Management Controls	2-15
2.2.1	Plant Safety Review Committee	2-16

2.3	Pre-operational Testing and Initial Start-up	2-16
2.3.1	Pre-operational Testing Objectives	2-17
2.3.2	Turnover, Functional, and Initial Start-up Test Program	2-17
2.4	References	2-18
3.0	INTEGRATED SAFETY ANALYSIS AND INTEGRATED SAFETY ANALYSIS SUMMARY	3-1
3.1	Safety Program and Integrated Safety Analysis Commitments	3-1
3.1.1	Process Safety Information	3-1
3.1.2	Integrated Safety Analysis	3-2
3.1.3	Management Measures	3-3
3.2	Integrated Safety Analysis Summary	3-4
3.3	References	3-4
4.0	RADIATION PROTECTION	4-1
4.1	Radiation Protection Program Implementation	4-1
4.2	As Low As Reasonably Achievable Program	4-1
4.2.1	As Low As Reasonably Achievable Committee	4-1
4.3	Organization and Personnel Qualifications	4-3
4.4	Written Procedures	4-4
4.4.1	Procedures	4-4
4.4.2	Radiation Work Permits	4-4
4.5	Training	4-5
4.5.1	Visitor Site Access Orientation	4-5
4.5.2	General Employee Radiological Training	4-5

4.5.3	Radiation Worker Training	4-5
4.5.4	Health Physics Technician	4-5
4.6	Ventilation and Respiratory Protection Programs	4-6
4.6.1	Ventilation	4-6
4.6.2	Respiratory Protection	4-7
4.7	Radiation Surveys and Monitoring Program	4-9
4.7.1	Surveys	4-9
4.7.2	Personnel Monitoring	4-10
4.7.3	External	4-10
4.7.4	Internal	4-11
4.7.5	Airborne Radioactivity	4-12
4.8	Additional Program Elements	4-16
4.8.1	Posting and Labeling	4-16
4.8.2	Contamination Control	4-16
4.8.3	Radioactive Source Control	4-18
4.8.4	Radiation Protection Instrumentation	4-18
4.8.5	Records and Reports	4-19
4.9	References	4-23
5.0	NUCLEAR CRITICALITY SAFETY	5-1
5.1	Management of the Nuclear Criticality Safety Program	5-1
5.1.1	Program Elements	5-1
5.1.2	Program Objectives	5-2
5.2	Organization and Administration	5-2

5.2.1	Nuclear Criticality Safety Responsibilities.....	5-2
5.2.2	Nuclear Criticality Safety Staff Qualifications	5-4
5.3	Management Measures	5-5
5.3.1	Procedure Requirements.....	5-5
5.3.2	Posting and Labeling Requirements.....	5-5
5.3.3	Change Control	5-6
5.3.4	Operation Surveillance and Assessment.....	5-7
5.4	Methodologies and Technical Practices.....	5-8
5.4.1	Adherence to American National Standards Institute/American Nuclear Society Standards	5-8
5.4.2	Process Evaluation and Approval	5-8
5.4.3	Design Philosophy and Review	5-11
5.4.4	Criticality Accident Alarm System Coverage.....	5-11
5.4.5	Technical Practices	5-13
5.5	References	5-19
6.0	CHEMICAL PROCESS SAFETY	6-1
6.1	Process Chemical Risk and Accident Sequences	6-1
6.2	Items Relied on for Safety and Management Measures.....	6-2
6.2.1	Items Relied on for Safety	6-2
6.2.2	Management Measures	6-3
6.3	Requirements for New Buildings/Facilities or New Processes at Existing Facilities	6-9
6.4	References	6-10
7.0	FIRE SAFETY	7-1

7.1	Fire Safety Management Measures.....	7-2
7.1.1	Fire Prevention	7-3
7.1.2	Inspection, Testing, and Maintenance	7-5
7.1.3	Emergency Response Organization Qualifications, Drills, and Training.....	7-6
7.1.4	Pre-Fire Planning.....	7-6
7.2	Fire Hazards Analysis	7-8
7.2.1	Fire Hazards Analysis Approach.....	7-9
7.2.2	Integrated Safety Analysis	7-10
7.2.3	Building Surveys.....	7-11
7.3	Building/Facility Design	7-11
7.3.1	Fire Suppression Systems	7-12
7.3.2	Fire Alarms	7-13
7.4	Process Fire Safety.....	7-13
7.5	Fire Protection and Emergency Response	7-14
7.5.1	Fire Protection Engineering	7-14
7.5.2	Alarm and Fixed Fire Suppression Systems	7-15
7.5.3	Firewater Distribution System	7-16
7.5.4	Mobile and Portable Equipment.....	7-16
7.5.5	Emergency Response.....	7-16
7.5.6	Control of Combustible Materials.....	7-16
7.5.7	Use of Noncombustible Materials.....	7-17
7.5.8	Control of Combustible Mixtures	7-17
7.5.9	Placement of Equipment and Operations	7-17

7.6	References	7-18
8.0	EMERGENCY MANAGEMENT	8-1
8.1	Emergency Plan	8-1
9.0	ENVIRONMENTAL PROTECTION.....	9-1
9.1	Environmental Report	9-1
9.2	Environmental Protection Measures	9-1
9.2.1	Radiation Protection Program.....	9-1
9.2.2	Effluent and Environmental Monitoring	9-9
9.2.3	Integrated Safety Analysis Summary	9-24
9.3	Reports to the Nuclear Regulatory Commission	9-24
9.3.1	10 Code of Federal Regulations 70.59 Reports	9-24
9.3.2	National Emission Standards for Hazardous Air Pollutants Reports...9-24	
9.3.3	Baseline Effluent Quantity Reports.....	9-24
9.4	References	9-25
10.0	DECOMMISSIONING	10-1
10.1	Decommissioning Program.....	10-2
10.1.1	Decommissioning Design Features	10-3
10.2	Decommissioning Steps.....	10-5
10.2.1	Overview.....	10-5
10.2.2	Purging	10-6
10.2.3	Dismantling and Removal	10-6
10.2.4	Decontamination	10-6
10.2.5	Salvage and Sale.....	10-7

10.2.6 Disposal	10-7
10.2.7 Final Radiation Survey	10-7
10.3 Management/Organization	10-10
10.4 Health and Safety	10-10
10.5 Waste Management	10-10
10.6 Security and Nuclear Material Control	10-10
10.7 Record Keeping	10-11
10.8 Decontamination	10-11
10.8.1 Decontamination Service Area	10-12
10.8.2 Procedure	10-12
10.8.3 Results	10-13
10.9 Agreements with Outside Organizations	10-13
10.10 Arrangements for Funding	10-13
10.10.1 Plant Decommissioning Costs	10-13
10.10.2 Tails Disposition Costs	10-15
10.10.3 Funding Arrangements	10-16
10.11 References	10-17
11.0 MANAGEMENT MEASURES	11-1
11.1 Configuration Management	11-1
11.1.1 Configuration Management Policy	11-1
11.1.2 Design Requirements	11-6
11.1.3 Document Control	11-7
11.1.4 Change Control	11-8

11.1.5	Assessments	11-10
11.1.6	Design Verification	11-11
11.2	Maintenance.....	11-11
11.2.1	Maintenance Organization and Administration	11-12
11.2.2	Personnel Qualification and Training.....	11-13
11.2.3	Design/Work Control	11-13
11.2.4	Corrective Maintenance.....	11-15
11.2.5	Preventive Maintenance.....	11-16
11.2.6	Surveillance/Monitoring	11-16
11.2.7	Functional Testing.....	11-16
11.2.8	Control of Measuring and Test Equipment.....	11-17
11.2.9	Equipment/Work History.....	11-17
11.3	Training and Qualification	11-18
11.3.1	Organization and Management of the Training Function.....	11-18
11.3.2	Analysis and Identification of Functional Areas Requiring Training.....	11-28
11.3.3	Position Training Requirements	11-29
11.3.4	Development of the Basis for Training, Including Objectives.....	11-30
11.3.5	Organization of Instruction, Using Lesson Plans and Other Training Guides	11-30
11.3.6	Evaluation of Trainee Learning.....	11-31
11.3.7	Conduct On-The-Job Training	11-31
11.3.8	Evaluation of Training Effectiveness	11-31
11.3.9	Personnel Qualification.....	11-31

11.3.10	Provisions for Continuing Assurance	11-32
11.3.11	References	11-33
11.4	Procedures	11-33
11.4.1	Types of Procedures	11-33
11.4.2	Procedure Process.....	11-36
11.4.3	Procedure Hierarchy	11-40
11.4.4	Temporary Changes.....	11-40
11.4.5	Temporary Procedures.....	11-40
11.4.6	Periodic Review	11-41
11.4.7	Use and Control of Procedures	11-41
11.4.8	Records	11-42
11.4.9	Topics to be Covered in Procedures.....	11-42
11.4.10	References.....	11-45
11.5	Audits and Assessments.....	11-45
11.5.1	Audits.....	11-46
11.5.2	Assessments	11-46
11.6	Incident Investigations	11-47
11.6.1	Incident Identification, Categorization, and Notification	11-47
11.6.2	Conduct of Incident Investigations.....	11-48
11.6.3	Follow-up Written Report.....	11-48
11.6.4	Corrective Actions.....	11-49
11.7	Records Management and Document Control.....	11-49
11.7.1	Records Management Program.....	11-49

11.7.2 Document Control Program.....	11-53
11.7.3 Organization and Administration.....	11-56
11.7.4 Employee Training.....	11-56
11.7.5 Examples of Records.....	11-57
11.8 Other Quality Assurance Elements.....	11-61

APPENDICIES

APPENDIX A.....	A-1
APPENDIX B.....	B-1
APPENDIX C.....	C-1
APPENDIX D.....	D-1

LIST OF TABLES

Table 1.1-1 American Centrifuge Plant Major Facilities.....	1-44
Table 1.2-1 Possession Limits for NRC Regulated Materials and Substances.....	1-57
Table 1.2-2 Authorized Uses of NRC-Regulated Materials.....	1-61
Table 1.3-1 Historic and Projected Population in the Vicinity of the DOE Reservation.....	1-87
Table 1.3-2 Precipitation as a Function of Recurrence Interval and Storm Duration for the DOE Reservation.....	1-87
Table 1.3-3 Comparison of Flood Elevations of the Scioto River near the DOE Reservation with the Nominal Grade Elevation.....	1-88
Table 1.3-4 Regional Stratigraphic and Hydrogeologic Subdivisions.....	1-88

Table 2.1-1	Responsibilities for Functional Support Provided by Portsmouth Gaseous Diffusion Plant.....	2-11
Table 4.6-1	Contamination Levels	4-8
Table 4.7-1	Routine Contamination Survey Frequencies	4-13
Table 4.7-2	Bioassay Program	4-14
Table 4.7-3	Internal Dosimetry Program Action Levels	4-15
Table 4.7-4	DAC and Airborne Radioactivity Posting Levels.....	4-15
Table 4.8-1	Posting Criteria	4-20
Table 4.8-2	Radiological Protection Instrumentation and Capabilities.....	4-22
Table 7.1-1	Applicable National Fire Protection Agency Codes and Standards	7-8
Table 9.2-1	American Centrifuge Plant Action Levels for Radionuclide Effluents	9-26
Table 9.2-2	Baseline Effluent Quantities for American Centrifuge Plant Discharges.....	9-27
Table 9.2-3	Anticipated Gaseous Effluents	9-28
Table 9.2-4	Anticipated Liquid Effluents	9-29
Table 9.2-5	Environmental Baseline Activities/Concentrations, 1998-2002	9-30
Table 9.2-6	Environmental Baseline Activities/Concentrations, 1998-2002	9-32
Table 9.2-7	Environmental Baseline Activities/Concentrations, 1998-2002	9-34
Table 9.2-8	Environmental Baseline Radiation Levels, 1998-2002.....	9-36
Table 9.2-9	Potentially Applicable Consents for the Construction and Operation of the American Centrifuge Plant.....	9-37
Table 10.2-1	Components for Potential Decontamination at Decommissioning.....	10-9

LIST OF FIGURES

Figure 1.1-1	Department of Energy Reservation in Piketon, Ohio	1-28
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Figure 1.1-2	American Centrifuge Plant Layout	1-29
Figure 1.1-3	X-3001 (X-3002) Typical General Equipment and Process Flow Layout	1-30
Figure 1.1-4	Feed, Withdrawal, and Product Operations.....	1-31
Figure 1.1-5	X-3346 Typical General Equipment and Process Flow Layout	1-32
Figure 1.1-6	X-3346A Typical General Equipment and Process Flow Layout	1-33
Figure 1.1-7	X-3356 Typical General Equipment and Process Flow Layout	1-34
Figure 1.1-8	X-7725 Typical General Equipment and Process Flow Layout	1-35
Figure 1.1-9	X-7727H Typical General Equipment and Process Flow Layout	1-36
Figure 1.1-10	X-2232C Typical General Equipment and Process Flow Layout.....	1-37
Figure 1.1-11	Separation Element	1-38
Figure 1.1-12	Centrifuge Schematic	1-39
Figure 1.1-13	Example Cascade and Stage Flow Schematic	1-40
Figure 1.1-14	Systems Interface	1-41
Figure 1.1-15	Purge and Evacuation Vacuum System Schematic	1-42
Figure 1.1-16	Machine Cooling Water System Flow Schematic	1-43
Figure 1.3-1	Topographic Map of the Department of Energy Site	1-89
Figure 1.3-2	Population Within Five-Mile Radius of the U.S. Department of Energy Reservation	1-90
Figure 1.3-3	Special Population Centers Within Five Miles of the U.S. Department of Energy Reservation.....	1-91
Figure 1.3-4	Comparison of Wind Roses at 10-m Level at the U.S Department of Energy Reservation from 1998 - 2002.....	1-92
Figure 1.3-5	Comparison of Wind Roses at 30-m Level at the U.S. Department of Energy Reservation from 1998 - 2002	1-93
Figure 1.3-6	Comparison of Wind Roses at 60-m Level at the U.S. Department of Energy Reservation from 1998 - 2002.....	1-94

Figure 1.3-7	Location of Rivers and Creeks in the Vicinity of the U.S. Department of Energy Reservation.....	1-95
Figure 1.3-8	Ponds and Lagoons on the U.S. Department of Energy Reservation	1-96
Figure 1.3-9	Elevations of Roadways and of the Surrounding Areas of Main Process Buildings.....	1-97
Figure 1.3-10	The 10,000-year Intensity Versus Duration Graph for U.S. Department of Energy Reservation.....	1-98
Figure 1.3-11	Location of the Ancient Newark (Modern Scioto) and Teays Valleys in the U.S. Department of Energy Reservation Vicinity.....	1-99
Figure 1.3-12	Geologic Cross Section in the U.S. Department of Energy Reservation Vicinity.....	1-100
Figure 1.3-13	Geologic Column at U.S. Department of Energy Reservation	1-101
Figure 2.1-1	American Centrifuge Plant Organization Chart	2-14
Figure 9.2-1	Locations of American Centrifuge Plant Monitored Vents.....	9-55
Figure 9.2-2	Locations of American Centrifuge Plant Outfalls Discharging to Waters of the United States.....	9-56
Figure 9.2-3	Locations of Soil and Vegetation Sampling Points	9-57
Figure 9.2-4	Locations of Surface Water Sampling Points.....	9-58
Figure 9.2-5	Locations of Stream Sediment Sampling Points	9-59
Figure 9.2-6	Locations of Environmental Thermoluminescence Dosimeters on the U.S. Department of Energy Reservation.....	9-60
Figure 9.2-7	Locations of Environmental Thermoluminescence Dosimeters Outside the U.S. Department of Energy Reservation Boundary	9-61
Figure 10.1-1	Contamination Control Zone	10-4

ACRONYMS AND ABBREVIATIONS

ACL	Administrative Control Level
ACP	American Centrifuge Plant
ACR	Area Control Room
AHJ	Authority Having Jurisdiction
ALARA	as low as reasonably achievable
amsl	above mean sea level
ANS	American Nuclear Society
ANSI	American National Standards Institute
ARA	Airborne Radioactivity Area
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BCS	Boundary Control Station
BDC	Baseline Design Criteria
BEQ	Baseline Effluent Quantity
CA	Contamination Area
CAA	Controlled Access Area
CAAS	Criticality Accident Alarm System
CCZ	Contamination Control Zone
CEDE	Committed Effective Dose Equivalent
CER	Compliance Evaluation Reports
CFR	<i>Code of Federal Regulations</i>
CM	Configuration Management
CVP	Cylinder Valve Protectors
DA	Design Authority
DAC	Derived Air Concentration
DBE	design basis earthquake
DFP	Decommissioning Funding Plan
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DP	Decommissioning Plan
DSA	Decontamination Service Area
EOC	Emergency Operations Center
EPA	Environmental Protection Agency
EV	evacuation vacuum
FCA	Fixed Contamination Area
FPPA	<i>Farm Protection Policy Act</i>
FHA	Fire Hazards Analysis
FNAD	Fixed Nuclear Accident Dosimeters
FNMCP	Fundamental Nuclear Materials Control Plan
GCEP	Gas Centrifuge Enrichment Plant
GDP	gaseous diffusion plant
GET	General Employee Training
HAZCOM	hazardous communication
HCA	High Contamination Area

HEPA	high efficiency particulate air
HP	Health Physics
HRA	High Radiation Area
HVAC	Heating, Ventilation, and Air Conditioning
ICP/MS	Inductively Coupled Plasma/Mass Spectrometry
IHS	Industrial Hygiene and Safety
IPP	Interconnecting Process Piping
IROFS	items relied on for safety
ISA	Integrated Safety Analysis
ISTP	Integrated Systems and Test Plan
LCC	local control center
LEC	Liquid Effluent Collector
LLMW	low level mixed waste
LLRW	low level radioactive waste
LSDA	Lower Suspension and Drive Assembly
MCW	machine cooling water
MDA	Minimum Detectable Activity
MEI	Maximally Exposed Individual
MM	Modified Mercalli
MSDS	Material Safety Data Sheet
M&TE	measuring and test equipment
NCS	Nuclear Criticality Safety
NCSE	Nuclear Criticality Safety Evaluation
NEPA	National Environmental Protection Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NHPA	<i>National Historic Preservation Act</i>
NIOSH	National Institute for Occupational Health and Safety
NIST	National Institute of Standards and Technology
NMC&A	Nuclear Materials Control and Accountability
NMMSS	Nuclear Materials Management and Safeguards System
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NVLAP	National Voluntary Laboratory Accreditation Program
OEPA	Ohio Environmental Protection Agency
OJT	on-the-job training
OSHA	Occupational Safety and Health Administration
PA	Public Address
PGA	peak ground acceleration
PGDP	Paducah Gaseous Diffusion Plant
PBT	Performance Based Training
PM	preventive maintenance
PMF	Probably Maximum Flood
PMT	post-maintenance testing
PORTS	Portsmouth Gaseous Diffusion Plant
PPE	personal protective equipment

PSM	Process Safety Management
PSP	Protective Shipping Packages
PSRC	Plant Safety Review Committee
PSS	Plant Shift Superintendent
PTI	permits-to-install
PV	purge vacuum
QA	Quality Assurance
QAPD	Quality Assurance Program Description
QC	Quantity Control
QL	Quality Level
R/A	Recycle/Assembly
RA	Radiation Areas
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RCW	recirculating cooling water
REIRS	Radiation Exposure Information Reporting System
RG	Regulatory Guide
RGA	Regional Gravel Aquifer
RHW	recirculating heating water
RM	river mile
RMA	Radioactive Material Area
RMDC	Records Management and Document Control
RMP	Risk Management Program
RP	Radiation Protection
RPM	Radiation Protection Manager
RQ	Reportable Quantity
RWP	Radiation Work Permit
SAR	Safety Analysis Report
SARA	<i>Superfund Amendments and Reauthorization Act</i>
SCBA	self-contained breathing apparatus
SME	Subject Matter Expert
SNM	special nuclear material
SPCC	Spill Protection Control and Countermeasures
SRD	System Requirements Document
SRP	Standard Review Plan
SSCs	structures, systems, and components
STP	Sewage Treatment Plant
TDAG	Training Development and Administrative Guide
TEDE	Total Effective Dose Equivalent
TLDs	Thermoluminescence Dosimeters
TLV	Threshold Limiting Value
TQs	Threshold Quantities
TRM	Training Requirement Matrices
TSD	Treatment, Storage, or Disposal
TWC	Tower Water Cooling
TWCR	Tower Water Cooling Return
TWCS	Tower Water Cooling Supply

UCNI	Unclassified Controlled Nuclear Information
UCRS	upper continental recharge system
UPS	uninterruptible power supply
USA	Upper Suspension Assembly
USEC	USEC Inc.
USGS	U.S. Geological Survey
UST	underground storage tank
VHRA	Very High Radiation Area

DEFINITIONS

Heeling – The process for removing the residual quantity of uranium material that remains in a cylinder after routine evacuation procedures.

Natural Uranium – Any uranium-bearing material whose uranium isotopic distribution has not been altered from its natural occurring state. Natural uranium is nominally 99.283 percent ^{238}U , 0.711 percent ^{235}U , and 0.006 percent ^{234}U (by weight relative to total uranium element).

Normal Uranium – Any uranium-bearing material having a uranium isotopic weight distribution that can be described as being (1) 0.700 to 0.724 percent in combined ^{233}U plus ^{235}U ; and (2) at least 99.200 percent in ^{238}U .

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CHEMICALS AND UNITS OF MEASURE

CaF ₂	calcium fluoride
cfs	cubic feet per second
Ci	curie
cm	centimeters
cm ²	square centimeter
dpm	disintegration per minute
DUF ₆	depleted uranium hexafluoride
F	Fahrenheit
ft	feet
ft/d	feet per day
ft ²	square feet
g	grams
Gal	gallons
Gal/d	gallons per day
HF	hydrogen fluoride
in.	inches
k _{eff}	k _{effective}
km	kilometers
km ²	square kilometers
kV	kilovolts
L	liters
lb	pounds
L/d	liters per day
lfpm	linear feet per minute
m	meters
m ²	square meters
mCi	millicuries (one-thousandth of a curie)
mCi/mL	millicuries per milliliter
mg	milligram (one-thousandth of a gram)
mg/L	milligrams per liter
mph	miles per hour
mrem	millirem (one-thousandth of a rem)
MTU	metric tons uranium
pCi	picocurie (one-trillionth of a curie)
pCi/L	picocuries per liter
ppm	parts per million
psf	pounds per square foot
psi	pounds per square inch
rem	roentgen equivalent man
SWU	separative work units
U ₃ O ₈	depleted uranium oxide
UO ₂ F ₂	uranium fluoride
UF ₆	uranium hexafluoride
V	volt

wt.	weight
YA	Instrument Air
μCi	microcurie (one-millionth of a curie)
$\mu\text{Ci/g}$	microcuries per gram
μg	microgram (one-millionth of a gram)
$\mu\text{g/kg}$	micrograms per kilogram
$\mu\text{g/L}$	micrograms per liter
$\mu\text{g/mL}$	micrograms per milliliter
$\mu\text{g/m}^3$	micrograms per cubic meter
μ	micron or micrometer (one-millionth of a meter)
^{235}U	uranium-235
^{99}Tc	technetium

EXECUTIVE SUMMARY

This license application was prepared by USEC Inc. (USEC), the applicant for a license to possess and use special nuclear, source and by-product material in the American Centrifuge Plant located in Piketon, Ohio, under the *Atomic Energy Act* of 1954, as amended, 10 *Code of Federal Regulations* (CFR) Parts 70, 40 and 30, and other applicable laws and regulations. A primary mission of the American Centrifuge technology is to provide the United States with a reliable and economical source of enriched uranium. USEC is the parent company of the United States Enrichment Corporation, which is the current holder of a U.S. Nuclear Regulatory Commission Certificate of Compliance for PORTS issued under 10 CFR Part 76. USEC is a global energy company and the world's leading supplier of enriched uranium fuel for commercial nuclear power plants.

Deployment of the American Centrifuge Plant supports the national energy security goal of maintaining a reliable and secure domestic source of enriched uranium. Through amendments to the *Atomic Energy Act*, Congress created and privatized the Corporation with the intention that USEC would, among other things, conduct research and development as required, evaluate alternative technologies for uranium enrichment and help maintain a reliable and economical domestic source of enriched uranium.

USEC is responsible for the design, fabrication, installation, operation, maintenance, modification and testing of the American Centrifuge Plant. The American Centrifuge Plant is a uranium enrichment facility designed to enrich, safely contain and handle uranium hexafluoride up to 10-weight percent uranium-235. USEC is requesting a license for a term of 30 years from the start of operations. The initial modular design produces approximately 3.5 million separative work units annually. The design of the American Centrifuge Plant complies with the Baseline Design Criteria specified in 10 CFR 70.64(a) and the defense-in-depth requirements contained in 10 CFR 70.64(b).

The American Centrifuge Plant is located on U.S. Department of Energy (DOE) owned land in rural Pike County, a sparsely populated area in south central Ohio. Some of these facilities are leased to USEC. The DOE reservation has been studied and characterized extensively by both DOE and USEC. The facilities to be utilized for the American Centrifuge Plant, which are part of the former DOE Gas Centrifuge Enrichment Plant program, were built in the early 1980s. The existing facilities will be refurbished to accommodate the American Centrifuge Plant. New facilities will be constructed to house withdrawal and product operations. The American Centrifuge Plant will also use other existing site-wide services such as laboratory analysis, fire protection, security, medical, waste management and environmental monitoring.

This license application follows the format and guidelines provided in NUREG-1520, *Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility*. The Application is written prospectively in the present tense, representing the licensed condition. The information provided reflects the design in sufficient detail to enable a reviewer to make a definitive evaluation that the American Centrifuge Plant can be constructed and operated without undue risk to the health and safety of the public, and with no significant impact to the environment.

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