

License Application

for the American Centrifuge Plant

in Piketon, Ohio



Revision 0

Docket No. 70-7004

August 2004

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

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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</i> of 1976
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	uranyl 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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