International Isotopes Fluorine Products

International Isotopes Fluorine Products, Inc. (IIFP)
A Wholly Owned Subsidiary of
International Isotopes, Inc. (INIS)

Fluorine Extraction Process & Depleted Uranium De-conversion (FEP/DUP) Plant

License Application

Chapter 1
General Information

Revision B
December 29, 2011

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ACRONYMS and ABBREVIATIONS

AC	Administrative Control
ac	Acre
AEA	Atomic Energy Act
AEC	Active Engineered Control
AEGL	Acute Exposure Guideline Levels
AHF	Anhydrous Hydrogen Fluoride/Anhydrous Hydrofluoric Acid
AHJ	Authority Having Jurisdiction
ALARA	As Low As Reasonably Achievable
ALI	Annual limit intake
ANSI	American National Standards Institute
APE	Area of Potential Effect
APF	Assigned protection factor
APTS	Advanced Process Technology Systems
ARI	Average Recurrence Interval
ASCE	American Society of Civil Engineers
ARTCC	Air Route Traffic Control Center
ASL	Approved Suppliers List
ASME	American Society for Mechanical Engineers
ASTM	American Society for Testing and Materials
ATIS	Automated Radar Terminal System
BDC	Baseline design criteria
BMP	Best Management Practice
Bq	Becquerel
BTU	British Thermal Unit
CA	Controlled Area
CDE	Committed dose equivalent
CEDE	Committed effective dose equivalent
CEO	Chief Executive Officer
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
Ci	Curie(s)
cm	Centimeter
CM	Configuration Management
CMM	Configuration Management Manager
CMO	Communication Officer
COO	Chief Operations Officer
CPR	Cardiopulmonary Resuscitation
CPS	Chemical Process Safety
CY	Calendar Year

D&D	Decontamination and decommissioning
DAC	Derived air concentration
DB	Design and Build
dBA	Decibels acoustic
DBE	Design Basis Earthquake or Design Basis Event
DBF	Design Basis Fire
DEM	Design Engineering Manager
DFP	Decommissioning Funding Plan
DHSEM	U.S. Department of Homeland Security and Emergency Management
DOC	Decommissioning Operations Contractor
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DUP	Depleted Uranium De-conversion Process
E	East
EAC	Enhanced Administrative Control
EAL	Environmental Assessment Lead
EIS	Environmental Impact Statement
EMD	Emergency Director
EMP	Effluent Monitoring Program
EMP	Emergency Management Plan
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act (1986)
EPIP	Emergency Plan Implementation Procedure
EPP	Environmental Protection Process
ER	Environmental Report
ERPGs	Emergency Response Planning Guidelines
ERO	Emergency Response Organization
ERT	Emergency Response Team
ERTL	Emergency Response Team Leader
ESH	Environmental, Safety and Health
FAA	Functional Allocation Analysis
FEMA	U.S. Federal Emergency Management Agency
FEP	Fluorine Extraction Process
FEP/DUP	Fluorine Extraction Process & Depleted Uranium De-conversion Plant
FF	Failure Frequency
FHA	Fire Hazards Analysis
FIC	Field Incident Commander
FLM	Front Line Manager

FP	Failure Probability
FPE	Fire Protection Engineer
FSE	Facility Safety Engineer
FSRC	Facility Safety Review Committee
ft	Foot/feet
ft2	Square foot/feet
ft3	Cubic/feet
GET	General Employee Training
gpm	Gallons per minute
GUIs	Graphical User Interface
ha	Hectacres
HAZCOM	Hazardous Communication Program
HAZWOPER	Hazardous Operations and Emergency Response
HEPA	High Efficiency Particulate Air
HFE	Human Factors Engineering
HSI	Human System Interface
HUD	U.S. Housing and Urban Development
HVAC	Heating Ventilation Air Conditioning System
IBC	International Building Code
ICRP	International Commission on Radiological Protection
IECC	International Energy Conservation Code
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Fire Code
IFR	Instrustment Flight Rules
IIFP	International Isotopes Fluorine Products, Inc.
INIS	International Isotopes, Inc.
IP	Industrial Package
IROFS	Items-Relied-on-For-Safety
ISA	Integrated Safety Analysis
ISAL	ISA Lead
ISO	International Organization for Standardization
JHA	Job Hazards Analysis
kg	Kilograms
kgU	Kilograms of depleted uranium
KOH	Potassium Hydroxide
LA	License Application
lbs	Pounds
Ldn	Day-Night Average Sound Level
LLW	Low-Level Waste
LPG	Liquefied petroleum gas
LSC	Life Safety Code

M	Meters
M&TE	Measuring and Test Equipment
MCC	Motor Control Center
mCi	Millicuries
Md	Modified Mercalli (scale)
MDC	Minimum detectable concentration
mg	Milligram
mi	Miles
ml	Milliliters
MOAs	Military Operation Areas
MOU	Memorandum of Understanding
MPFL	Maximum Possible Fire Loss
mrem	Millirems
MSDS	Material Data Safety Sheets
msl	Mean sea level
mSv	Milli-Sieverts
mw	Megawatt
N	North
NCDC	National Climate Data Center
NCR	Nonconforming Report
NEF	obsolete use URENCO USA* (formerly National Enrichment Facility)
NELAC	National Environmental Laboratory Accreditation Conference
NEPA	National Environmental Policy Act of 1969
NESHAP	National Environmental Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NM 483	New Mexico Highway 483
NMAC	New Mexico Administrative Code
NMCBC	New Mexico Commercial Building Code
NMDGF	New Mexico Department of Game and Fish
NMDHSEM	New Mexico Department of Homeland Security and Emergency Management
NMDOT	New Mexico Department of Transportation
NMEC	New Mexico Electrical Code
NMED	New Mexico Environment Department
NMED/AQB	New Mexico Environment Department /Air Quality Bureau
NMED/HWB	New Mexico Environment Department/Hazardous Waste Bureau
NMED/RCB	New Mexico Environment Department/Radiological Control Bureau
NMED/GWQB	New Mexico Environment Department/Groundwater Water Quality Bureau
NMED/SWQB	New Mexico Environment Department/Surface Water Quality Bureau
NMPC	New Mexico Plumbing Code

NMSA	New Mexico Statutes Annotated
NMSHPO	New Mexico State Historic Preservation Office
NMSLO	New Mexico State Land Office
NMRL/CID	New Mexico Regulation and Licensing/Construction Industries Division
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPH	Natural Phenomena Hazards
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NUREG	U.S. Nuclear Regulatory Commission Regulatory Guides
OEM	Office of Emergency Management
OJT	On-the-Job Training
OER	Operating Experience Review
OSHA	U.S. Occupational Safety and Health Administration
P&E	Purge and Evacuation
P&IDs	Piping and Instrumentation Diagrams
PCS	Plant Control Systems
PEC	Passive Engineered Control
PFDs	Process Flow Diagrams
pga	Peak Horizontal Ground Acceleration
PHA	Process Hazard Analysis
PHMSA	Pipeline Hazardous Material Safety Administration
PLC	Project Logic Controller
PM	Plant Manager
PM	Preventive Maintenance
PM	Particulate Matter
ppm	Parts per million
PO	Procurement Officer
POTW	Publicly Owned Treatment Works
PMT	Post-Maintenance Testing
PPE	Personal Protective Equipment
PSA	Pressure Swing Absorption
psia	Pounds per square inch absolute
psig	Pounds-force per square inch gauge
PSM	Process Safety Management
PSP	Physical Security Plan
QL-1	QA Level 1
QL-2	QA Level 2
QA	Quality Assurance
QAPD	Quality Assurance Program Description

QC	Quality Control
QMS	Quality Management System
RA	Restricted Area
RAIs	Requests for Additional Information
RAQD	Regulatory Affairs and Quality Assurance Director
RCAs	Radiological Controlled Areas
RCRA	Resource Conservation and Recovery Act
rem	roentgen equivalent in man
REMP	Radiological Environmental Monitoring Program
RP	Radiation Protection
RPM	Radiation Protection Manager
RPP	Radiation Protection Program
RWP	Radiation Work Permits
S	South
SCBA	Self-contained breathing apparatus
scfm	Standard cubic feet per minute
SFC	Sequoyah Fuels Corporation
SFPE	Society of Fire Protection Engineers
SHPO	State Historic Preservation Office
SIH	Standard Industrial Hazards
SNM	Special Nuclear Material
SPCC	Spill Prevention Control and Countermeasure
SRC	Silicon Controlled Rectifier
SRP	Standard Review Plan
SSCs	Systems, structures and components
SSP	Shift Superintendent
SUM	Startup Manager
Sv	Sievert
SWPPP	Storm Water Pollution Prevention Plan
TAC	Tactical Teams
TA	Task Analysis
TEDE	Total effective dose equivalent
TLD	Thermo-luminescent Dosimeter
TPSL	Training /Procedures Support Lead
UL	Underwriters Laboratories
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
UPS	Uninterruptible Power Supply
U.S. 62/180	U.S. Highways 62 and 180
USGS	United States Geological Survey
USFWS	U.S. Fish and Wildlife Service

UV	Ultraviolet
V&V	Verification and Validation
VFR	Visual Flight Rules
VOC	Volatile organic compound
W	West
WIP	Work-in-progress
WIPP	Waste Isolation Pilot Plant

1 GENERAL INFORMATION

International Isotopes Fluorine Products, Inc. (IIFP), a wholly owned subsidiary of International Isotopes Inc. (INIS), intends to build and operate a new uranium processing facility (plant) in Lea County, New Mexico (referred to as the Hobbs site). IIFP will provide services to the uranium enrichment industry for converting depleted uranium hexafluoride (DUF_6) into uranium oxide for long-term stable disposal. This process is generally referred to as "de-conversion" with respect to DUF_6. The company will also include a commercial plant to produce specialty fluoride gas products for sale. High-purity silicon tetrafluoride (SiF_4) and boron trifluoride (BF_3) will be manufactured in the IIFP Facility by utilizing the fluorine derived from the de-conversion of DUF_6. The fluoride gas products are highly valuable for applications in the electronic, solar, and semi-conductor markets. In addition, anhydrous hydrogen fluoride (AHF) is a product of the de-conversion and is sold as a chemical in high demand for various industrial applications. The IIFP Facility is also referred to as the Fluorine Extraction Process and Depleted Uranium De-conversion (FEP/DUP) Plant. These titles are used synonymously and interchangeably throughout the IIFP License Application (LA), Revision B documents.

Depleted uranium hexafluoride referred to as "tails" is the by-product of uranium enrichment. Enrichment is required as a vital step in the nuclear fuel cycle to produce fuel for nuclear reactors. All of the existing and planned commercial uranium enrichment processes use uranium hexafluoride (UF_6) as the process gas to produce isotopic enriched UF_6. Upon further processing, the enriched uranium material results in the desired nuclear fuel product. The DUF_6 tails may have some residual enrichment value but ultimately require disposal. A commercial service is needed in the U.S. to convert the DUF_6 into the more stable uranium oxide for long term disposal. IIFP will design, license, construct and operate the nation's first privately-owned commercial facility for de-conversion of DUF_6.

IIFP is applying for a U.S. Nuclear Regulatory Commission (NRC) license to construct and operate a facility for commercial de-conversion services and production of high-purity products as discussed above. This LA and requested licensing activities consider only the near term facility construction and operation and is referred to as the Phase 1 Facility and licensing action.

A future expansion is planned that will result in a facility referred to as Phase 2, but it is not part of the current licensing activity or application. Any such new expansions (or facility phases) would be licensed and constructed in different time periods under separate licensed actions.

The only part of the current license application where there is a need to identify the future and separate Phase 2 licensing action and construction is in Chapter 9, Revision B "Environmental Protection." The referral to a future Phase 2 expansion is briefly discussed in LA, Revision B Chapter 9 owing to links and references to the IIFP Environmental Report (ER) Revision B. The future Phase 2 Facility evaluation is included in the current ER submittal because of plans to add a Phase 2 expansion within approximately 3-4 years of the Phase 1Facility operation. However, that Phase 2 expansion would require a separate and future licensing action.

Chapter 1 provides an overview of the IIFP Facility along with descriptions of the facility and various processes and a description of the IIFP Site. Institutional information is provided to identify the applicant, describe the applicant's financial qualifications and describe the proposed license activities. Additionally, two "exemptions" are requested and described in Section 1.5.

The IIFP Facility will be built and operated beginning at a time when new U.S. uranium enrichment facilities are coming on-line and the need for de-conversion services is increasing. The IIFP Facility will have a de-conversion nominal capacity of approximately 8 million pounds (3.4 to 3.7 million kg(kilograms) per year (lb/yr) DUF_6. The facility also will have a nominal capacity for producing approximately 2-3 million pounds (about 0.9-0.14 million kg) per year of extracted fluorine products as SiF_4 or BF_3 and up to nearly 1 million pounds (0.45 million kg) per year of AHF. The facility is scheduled to start operation in the late 2013 or early 2014 timeframe. These annual nominal design capacities are provided only for general information. The facility actual production volumes of depleted uranium and fluoride products will be the quantities necessary to support routine operations and sales demand.

The IIFP Facility will be licensed under Title 10 of the Code of Federal Regulations Part 40, "Domestic Licensing of Source Material," (CFR, 2008a). The format and content, however, of this License Application follows the criteria specified in 10 CFR 70 Subpart H, "Domestic Licensing of Special Nuclear Material ,"(CFR, 2008d) and particularly the methodology set forth in NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," Revision 1 (NRC, 2010). This was done in the IIFP LA in anticipation that the NRC will through rulemaking establish Integrated Safety Analysis (ISA) requirements for conversion and de-conversion facilities that will be similar to those in 10 CFR 70 Subpart H.

IIFP believes the request for a 40-year license term is reasonable and appropriate notwithstanding the IIFP Facility will be licensed as a Part 40 facility. This longer license term request is consistent with Part 70 Subpart H "Fuel Cycle Facility" and, in addition to meeting the Part 40 licensing requirements, the IIFP license application and review is being done in accordance with the 10 CFR Part 70 Subpart H and NUREG-1520 requirements.

After the license is issued, IIFP will maintain the ISA in accordance with requirements of 10 CFR 70 Subpart H including the facility change process described in 10 CFR 70.62 (CFR, 2009c) and the change documentation submittals required by 10 CFR 70.72 (CFR, 2009d) paragraphs d(1), d(2) and d(3). The IIFP management measure commitments in the IIFP License Application, Revision B Chapter 11 "Management Measures" will further ensure configuration management and structured maintenance measures for safety related structures, systems and components (SSCs). The management measures, planned capital replacements and change processes will systematically manage the aging phenomena such as not to pose technical issues that preclude longer license terms of forty (40) years. Through this change process and updates, the NRC will be kept informed of changes due to facility and equipment aging throughout the lifetime of the IIFP Facility. Thus, facility aging does not significantly affect the duration of the license term. The Subpart H requirements permit the NRC to continue to support safe operations of licensed facilities on an ongoing basis, regardless of the duration of the license.

IIFP will update the financial assurance cost estimates in accordance with the IIFP commitments in LA, Revision B Chapter 10 "Decommissioning" Section 10.32. These updates provide sufficiently frequent reviews such that NRC does not have to rely on the license renewal review to perform a timely evaluation of the adequacy of financial assurance. Thus, decommissioning funding requirements would be satisfied regardless of the duration of the license term.

The IIFP ER, Revision B addresses cumulative effects from the combination of individual actions for the current license action (a Phase 1 Facility) and for a future expansion action that would result in a Phase 2 Facility. The ER is the basis on which NRC will prepare an Environmental Assessment (EA) or Environmental Impact Statement (EIS). The current License Application addresses only the Phase 1 Facility. IIFP will use a separate licensing action for the Phase 2 Facility. For any facility expansions beyond Phase 2, IIFP will issue an ER. Based on the new ER, the NRC would write an EA or EIS at that time. If the EA reveals that the licensing action could have significant environmental impacts, an EIS is prepared. NRC would continue to evaluate environmental impacts and cumulative effects occurring over a period of time. Thus, National Environmental Policy Act of 1969 (NEPA) requirements would be satisfied regardless of the duration of the license term.

Allowing the maximum license term for IIFP whose License Application meets 10 CFR Part 70, Subpart H requirements is consistent with NRC's Strategic Plan. It allows the NRC to continue to support safe operations of the IIFP Facility, to reduce regulatory burden, to enhance effectiveness and efficiency and is based on the NRC experiences with those licensees in the recent past after the addition of Subpart H requirements to 10 CFR Part 70.

IIFP is requesting a license authorizing up to 750,000 kilograms of depleted uranium (kgU) to be maintained at any one time in the facility inventory. IIFP is requesting the license authorization for up to forty (40) years and is planning to operate the facility indefinitely and continue to renew the license as needed. IIFP also has a written agreement with the State of New Mexico on the maximum inventories of depleted uranium oxides and total depleted uranium that can be maintained on site.

Table 1-1 provides the estimated typical range of inventories of major chemicals materials used at the IIFP Facility and the physical forms for each material. Also shown is the maximum limit on the depleted uranium and uranium oxide inventories as per the IIFP agreement with the State of New Mexico.

Table 1-1 IIFP Facility Inventories of Major Chemicals

Material	Maximum Limit Agreement with New Mexico[1]	Physical Form: Liquid(l), Solid or Powder(s),Vapor or Gas(g)	Typical Range of Inventory Based on Projected Production Capacity and Requirements
Total Depleted Uranium as "U"	Redacted	l, s, g	Redacted
DUF_6	Not Applicable (NA)	l, s, g	Redacted
DUF_4	NA	s	Redacted
Uranium Oxides as DUO_2	Redacted	s	Redacted
Hydrofluoric Acid (Hydrogen Fluoride)	NA	l, g	Redacted
SiF_4 (Packaged + in process)	NA	s, g	48,000-70,000 lb (21,800-31,800 kg)
BF_3 (Packaged + in process)	NA	s, g	17,000-54,800 lb (7,800-24,900 kg)
KOH	NA	l	14,000-54,000 lb (6,300-24,600 kg)
CaF_2	NA	s	2,400-80,500 lb (1,100-36,500 kg)
$Ca(OH)_2$	NA	s	25,000-100,000 lb (11,300-45,300 kg)

[1] Memorandum of Agreement of International Isotopes, Inc. and the New Mexico Environment Department, October 22, 2009.

1.1 Facility and Process Description

The facility consists mainly of two processes and the supporting infrastructure. The processes are:

- DUF_6 de-conversion to depleted uranium tetrafluoride (DUF_4), (i.e. the DUF_6 to DUF_4 plant)
- The Fluorine Extraction Process for producing SiF_4 and BF_3 by reacting the DUF_4 produced in the de-conversion step with the oxides of silicon (SiO_2) and boron (B_2O_3), respectively

The overall process nominal throughput capacity is depicted in Figure 1-1.

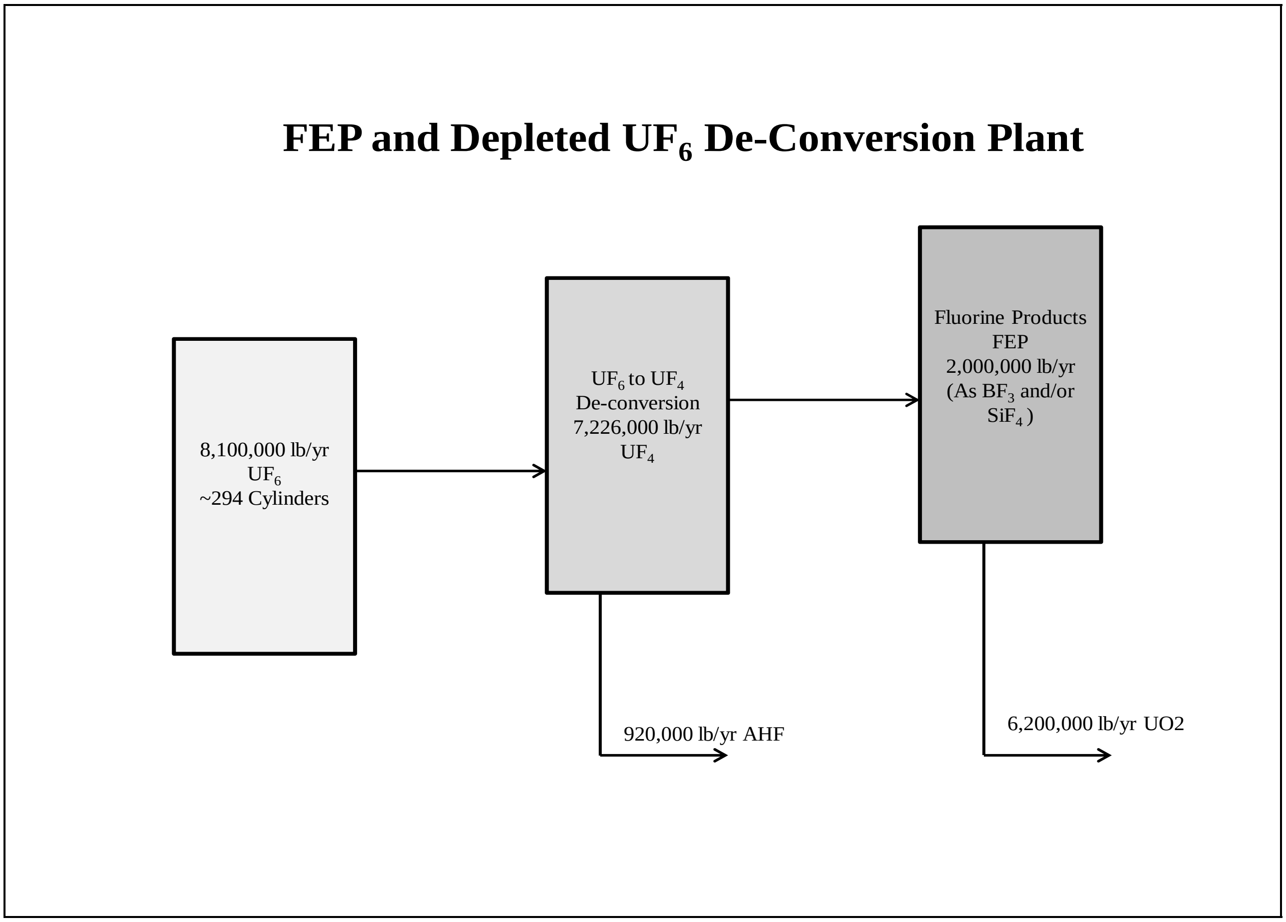


Figure 1-1 IIFP Facility Nominal Process Throughput

1.1.1 Facility Location, Site Layout and Surrounding Characteristics

The IIFP Site is located in Southeast New Mexico, approximately 19 kilometers (km) or 12 miles (mi) west of Hobbs, New Mexico (population 28,657). The Site is located in Lea County, approximately 26 km (16 mi) west of the Texas state border, 87 km (54 mi) northwest of Andrews, Texas (population 10,182) and 362 km (225 mi) southeast of Albuquerque, New Mexico (population 712,728). The nearest large population center (>100,000 population) and commercial airport is the Midland-Odessa, Texas area which is approximately 142 km (89 mi) to the southeast. The IIFP property consists of a 259 ha (640-ac) Section that lies approximately one mile north of U.S. 62/180 and along the east side of New Mexico Highway 483 (NM 483). See Figure 1-2, Location of IIFP Site.

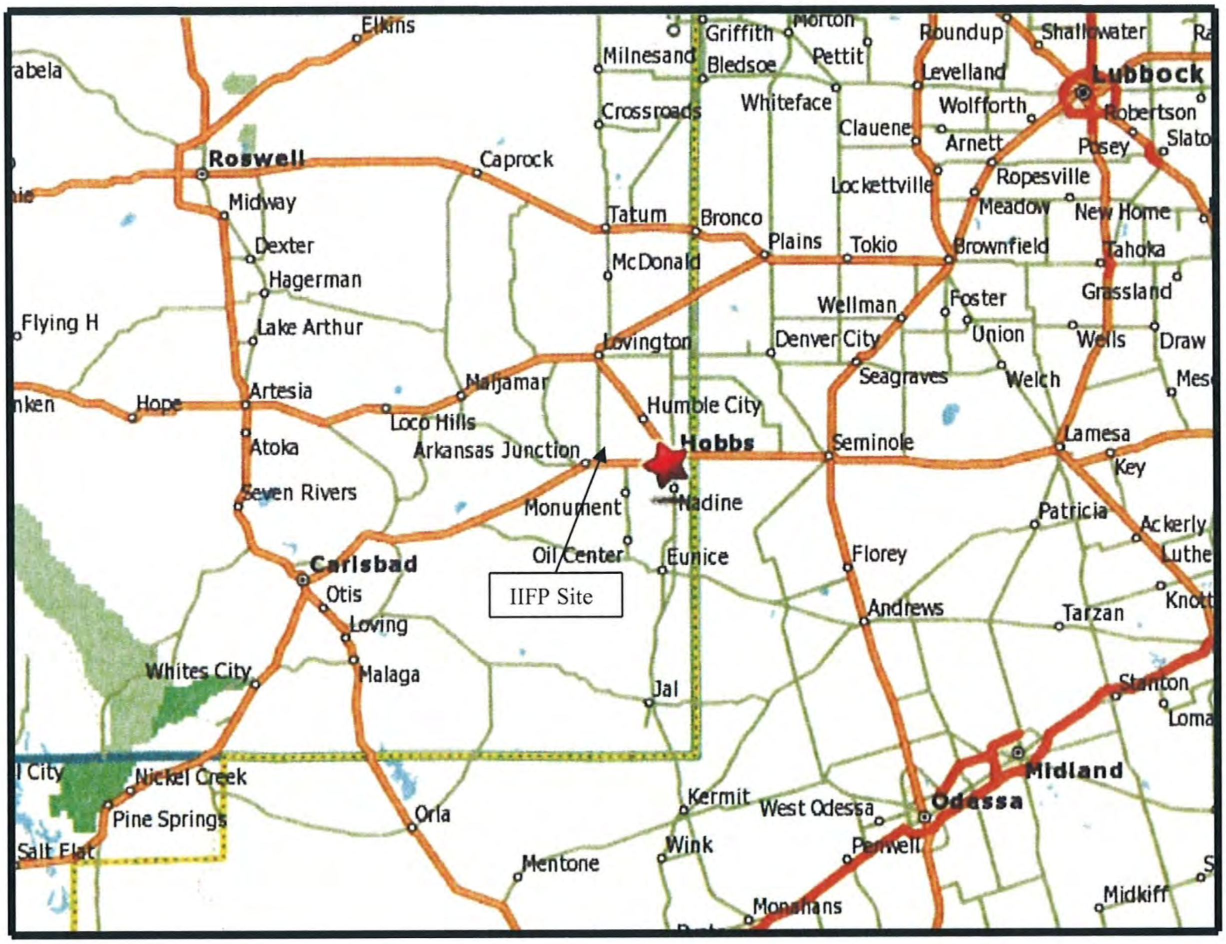


Figure 1-2 Location of IIFP Site

The area surrounding the Site consists of vacant land and industrial properties. The general area of the site location consisting of four (4) approximate 640-acre Sections is shown in Figure 1-3 in relation to New Mexico (NM) Highway 483 and U.S. Highway 62/180.

The IIFP Facility will be built on 16.2 ha (40 ac) within the 259-ha (640-ac) Section 27 as shown in Figure 1-4.

The Site is located within Township 18S, Range 36E, Section 27. The Site is relatively flat with slight undulations in elevation. Surrounding properties consist of vacant land and four industrial facilities. Three gas-fueled electric-generating plants and a gas-processing facility are located nearby including the Xcel Energy Cunningham Station, 1.6 km (1.0 mi) from the Site on the west boundary (New Mexico Highway 483); Xcel Energy Maddox Station located 3.5 km (2.2 mi) east-southeast of the Site; and the Colorado Energy Hobbs Generating Station 3.1 km (1.9 mi) east-northeast of the Site. The DCP Midstream Linam Ranch Plant, a natural gas (NG) processing facility, is located 5.8 km (3.6 mi) southeast of the IIFP Site.

Source: Natural Resources Conservation Service, U.S. Department of Agriculture

Figure 1-3 IIFP General Site Location in Relation to NM Highway 483 and U.S. Highway 62/180

Several power lines and underground power lines generally run across the site generally east to west, and several gas pipelines run north and south as well as east to west. The IIFP Site as well as land around the site has been mostly developed by the oil and gas industries.

The IIFP Environmental Report, Revision B provides a more detailed description of the Site. Also, Section 1.7 below provides additional detail about the site location and significant features. The information and data in this Chapter 1 for the site description, location, distances, climate, geography, geology, populations, and hydrology are taken from information and reference resources in the IIFP ER, Revision B.

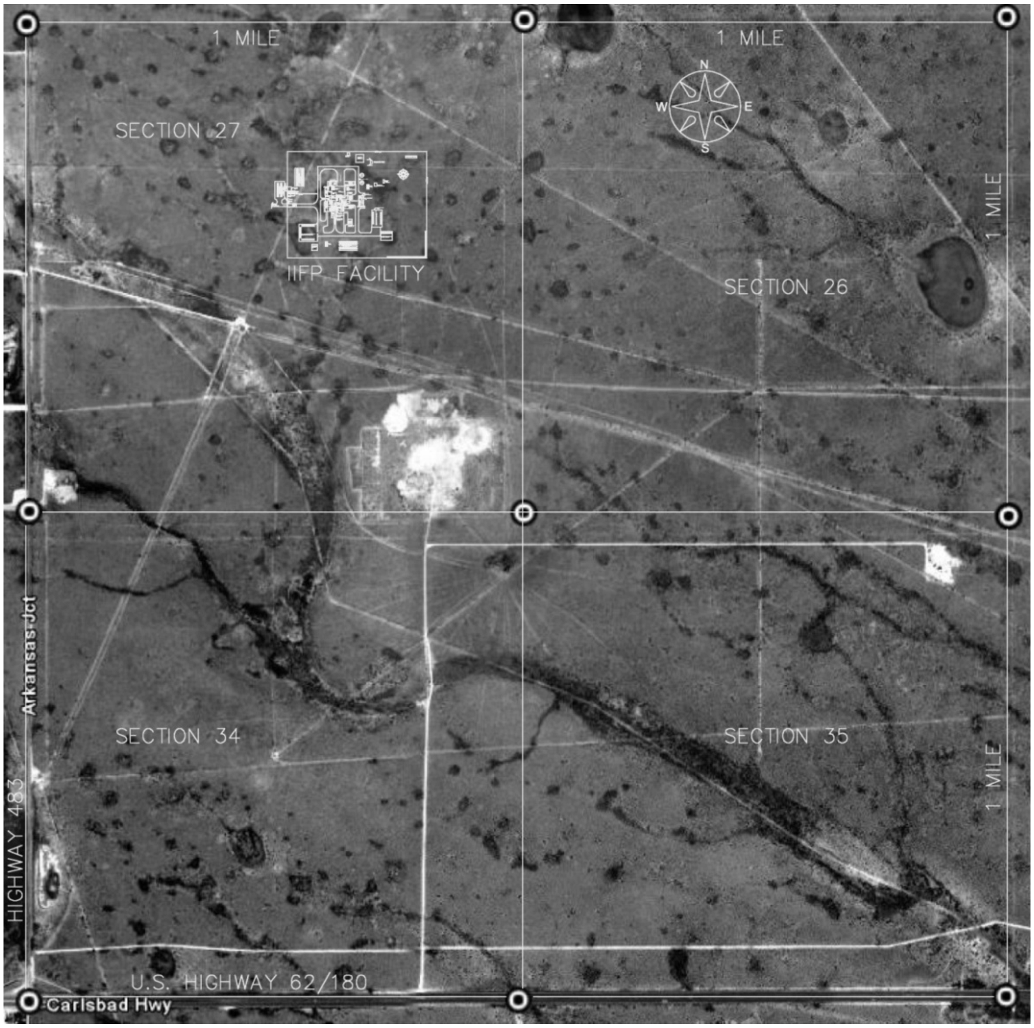


Figure 1-4 Location of the IIFP Facility within Section 27

1.1.2 Facility Description

The facility and infrastructure are typical of specialty chemical and industrial facilities. Buildings, in addition to the process buildings, are included for administration, laboratory, maintenance shop, stores inventories, security checkpoints, utilities and powerhouse and warehousing.

The Site Boundary and Unrestricted Area are defined below:

- The IIFP Lea County, New Mexico property boundary is approximately 640 acres. The IIFP Facility Site is approximately 40 acres that are fenced within the 640-acre property boundary. The remainder of the property boundary is not fenced, but is a buffer zone around the 40-acre Facility Site. The property ownership of the buffer zone prevents other industries or the public from establishing extended or permanent occupancy close to the 40-acre Facility site.

- NRC regulation 10 CFR 20.1003 (CFR, 2008e) defines an Unrestricted Area as an area access to which is neither limited nor controlled by the licensee. The area adjacent to the 40-acre Facility Site and outside the fenced area where the IIFP does not normally exercise access control is an Unrestricted Area. This area can be accessed by members of the public, indigenous wildlife or by facility personnel. The Unrestricted Area is governed by the limits in 10 CFR 20.1301(CFR, 2008f). The total effective dose equivalent to individual members of the public from the licensed operation may not exceed 1 milli-Sievert (mSv) or 100 millirem (mrem) in a year (exclusive of background radiation). The dose in any Unrestricted Area from external sources may not exceed 0.02 mSv (2 mrem) in any one hour. In addition to the NRC limit, the U.S. Environmental Protection Agency (EPA), in 40 CFR 190, (CFR, 2008g) imposes annual dose equivalent limits of 0.25 mSv (25 mrem) to the whole body, 0.75 mSv (75 mrem) to the thyroid and 0.25 mSv (25 mrem) to any other organ of any member of the public as the result of exposures to planned discharges of radioactive materials to the general environment from uranium fuel cycle operations and to radiation from these operations.

The Controlled and Restricted Areas are defined as below:

- In 10 CFR 20.1003, the NRC defines a “Controlled Area” as an area, outside of a Restricted Area but inside the site boundary, access to which can be limited by the licensee for any reason. The NRC defines a Restricted Area as an area, access to which is limited by the licensee for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials.

- The IIFP Facility Site Controlled Area is within the approximately 40-acre perimeter fence but consists of area that is not within Restricted Areas. The Controlled Area is marked at the perimeter fence and has access controls, gates and security checkpoints. The area of the plant within the perimeter fence but outside any Restricted Area is part of the Controlled Area. Facility employees and contractors have authorized access to the Controlled Area based on specific applicable pre-authorization procedures and training.

- Due to the presence of the owner Controlled Area fence, members of the public and site visitors do not have direct access to this Controlled Area of the site and must be processed by security and authorized to enter the site. Training for access to a Controlled Area is provided commensurate with the radiological hazard. Site visitors may include delivery people, tour guests and service personnel who are temporary, transient occupants of the Controlled Area. Area monitoring demonstrates compliance with public exposure limits for such visitors.

- Examples of Restricted Areas include staging/storage areas for DUF_6, DUF_4 and depleted uranium oxide and the DUF_4 Process Building. Personnel who have not been trained in radiation protection procedures are not allowed to access a Restricted Area without escort by trained personnel.

- All personnel are required to monitor themselves prior to exiting Restricted Areas that have the potential for contamination using monitoring instruments that detect contamination.

- Access control to Restricted Areas and some of the types of areas that may exist within Restricted Areas are discussed in the IIFP License Application, Revision B Chapter 4 “Radiation Protection” Section 4.7.15 “Access Control.” These areas may be temporary or permanent. The areas are posted to inform workers of the potential hazard in the area and to help prevent the spread of contamination. These areas are conspicuously posted in accordance with the requirements of 10 CFR 20.1902 (CFR, 2008h).

The 40-acre IIFP Facility Site is surrounded by security fence with a surveillance road just inside the fence. Pole mounted security lighting is installed around the perimeter of the security fence.

The entrance to the facility is from the west via a paved road (approximately 3/4 mile) that intersects with NM 483. The road connects with the plant road system at the main gate and guard station.

Figure 1-5 shows the Facility Site Plan and layout of the buildings, roads and major infrastructure. The Figure 1-5 shown in this Chapter is for illustration purposes only. A larger and more legible engineering drawing, 100-C-0001 Revision F, has been provided to NRC as part of the IIFP LA Engineering Drawing Package.

Figure 1-5 IIFP Facility 40-acre Site Plan
(Redacted)

The process equipment is located within building structures where feasible. Process buildings that function as product and waste material storage have separate areas for each purpose. Those areas have loading/unloading docks to facilitate shipping.

Process buildings have aprons, curbing and dikes and external pads have curbing and dikes where chemicals are stored or handled. Pumps are provided on pads and in building selected areas to transfer chemicals to containers or to the Environmental Protection Process (EPP) Building in the event of a spill or leak.

Auxiliary buildings generally house:

- Materials
- Maintenance shop
- Laboratory equipment
- Steam boilers and supporting utilities
- Electrical utility equipment
- Sanitary water treatment and certain equipment for process water treatment and recycle
- Accommodation for personnel work, break-rooms, change-rooms and toilets

Buildings, lighting, fire protection and building support systems are designed in accordance with latest revisions, of building and construction codes including where applicable the National Fire Protection Association (NFPA) standards, local and state codes and related codes and standards.

IIFP will contract and use a Design and Build (DB) contractor for detailed design, engineering and construction of the IIFP Facility. A list is provided in the LA, Revision B Chapter 3 Section 3.1.5 "Integrated Safety Analysis" of applicable federal, state and local codes and standards that the DB contractor will use during the detailed design, construction and startup stages of the project. The use of these codes and standards ensures adequate protection against natural phenomena, environmental conditions and dynamic effects. The DB contractor will also ensure, as part of the written contract, that design meets these applicable federal, state and local codes and standards. Buildings, lighting, fire protection and building support systems are designed in accordance with latest revisions of building and construction codes including, where applicable, the NFPA standards, local and state codes and other related codes and standards. A list of NFPA Standards is also shown in Chapter 7, "Fire Safety" of the LA, Revision B Table 7-1.

A listing of the major buildings and estimated sizes is provided in Table 1-2.

1.1.2.1 Process Buildings and Process Areas

General Description

The DUF_6 Autoclave Building, DUF_4 Process Building, DUF_4 Container Storage Building, DUF_4 Container Staging Building, Decontamination (Decon) Building, FEP Process Building (SiF_4 and BF_3), FEP Oxide Staging Building, FEP Product Storage and Packaging Building and the EPP Building are of structural steel beam and column construction with metal wall panels and with Class 1 metal roofs. The first floor of each building is constructed of reinforced concrete with curbing to function as a containment-type barrier. The AHF Staging Containment Building and the Fluoride Products Trailer Loading Building are constructed of reinforced concrete floor slabs with a containment-type barrier design around the inside perimeter. The upper sections of these buildings are of concrete or concrete block construction with Class 1 metal roofs.

Radiological boundary control hand-foot monitors are strategically located at building walkway exits of areas where determined to be needed. Fluoride and radiological detection systems, local alarms and alarm notification to Controls Rooms are also strategically located in those building areas, where applicable.

The DUF_4 Process Building and the FEP Process Building are multi-story buildings to provide elevations for permitting gravity flow of particulate solids through equipment and piping.

Table 1-2 IIFP Facility Buildings and Estimated Sizes

Building* *Areas where uranium is processed or stored are marked in "BOLD" print."	Dimensions, ft			Approximate Area, ft^2	Approximate Volume, ft^3
	Length	Width	Eave Height		
DUF_6 Autoclave Building	Redacted	Redacted	Redacted	Redacted	Redacted
DUF_4 Process Building	Redacted	Redacted	Redacted	Redacted	Redacted
DUF_4 Container Storage Building	Redacted	Redacted	Redacted	Redacted	Redacted
DUF_4 Container Staging Building	Redacted	Redacted	Redacted	Redacted	Redacted
Decontamination (Decon) Building	Redacted	Redacted	Redacted	Redacted	Redacted
FEP Process Building (SiF_4 and BF_3)	Redacted	Redacted	Redacted	Redacted	Redacted
FEP Oxide Staging Building	Redacted	Redacted	Redacted	Redacted	Redacted
FEP Product Gas Storage and Packaging Building	Redacted	Redacted	Redacted	Redacted	Redacted
AHF Staging Containment Building	Redacted	Redacted	Redacted	Redacted	Redacted
Fluoride Products Trailer Loading Building	Redacted	Redacted	Redacted	Redacted	Redacted
Maintenance and Stores Building	60	50	15	3,000	45,000
EPP Building	40	30	18	1,200	21,600
Utilities Building	50	50	18	2,500	45,000
Material Warehouse	100	50	18	5,000	90,000
Main Switchgear Building	50	40	18	2,000	36,000
Fire Pump House	20	20	15	400	6,000
Water Treatment Building	30	15	15	450	6750
Process Offices	50	30	15	1,500	22,500
Laboratory **(small uranium samples handled)**	30	30	15	900	13,500
Administrative Building	80	50	15	4,000	60,000
Guard House	Redacted	Redacted	Redacted	Redacted	Redacted

The floor areas below equipment and piping containing powdered materials are constructed of reinforced concrete with curbing and seal coatings on floor and wall surfaces. Other upper floor areas of the buildings are constructed of metal grating or metal flooring.

Process Control Rooms are provided in the major processes and include appropriate monitoring, recording, alarm notification and control instrumentation. A Control Room is located in the DUF_4 Process

Building. The DUF_6 Autoclave Building is controlled from the DUF_4 Process Building. The FEP Process Building has its own process Control Room for the SiF_4 and BF_3 processes. The AHF Staging Containment Building and Fluoride Products Trailer Loading Building share a Control Room. Likewise, one control area is located in the Utilities Building for monitoring and controlling the steam boiler system, air compressors and other utility supply equipment. Control Room areas and electrical and instrument rooms are typically of concrete block construction with concrete or metal roofs. Ceiling assemblies and fire walls separate these areas from production areas of the facilities. Process area Control Rooms, where routinely occupied by workers, have environments maintained for comfort and safety. Control Rooms located in process areas, where uranium or hazardous chemicals are processed, stored or handled, have heating, ventilation and air conditioning (HVAC) systems separate from the process area. The Control Rooms in these areas are designed to maintain a positive pressure environment with high-efficiency filtration of intake air and are provided with low pressure alarms to notify occupants should a loss of pressure inside a Control Room occur.

The process buildings are classified per NFPA 13 as Ordinary Group 2 and are protected with 100 percent coverage, wet-type fire protection sprinkler systems with Class 1 standpipes between floors in all exit stairways of multi-story buildings (NFPA, 2007). Codes followed for construction are the latest editions as adopted by the State of New Mexico. A final Record of Codes for construction will be established at the time the Design and Build contractor starts the detailed design.

Each process building/area and its relationship to respective process flows are further described below.

Full DUF_6 Cylinder Storage Pad

Cylinders containing solid DUF_6 are received by truck from customers/suppliers in accordance with approved Department of Transportation shipping requirements. After following pre-unloading procedures for material accountability, cylinder inspection, shipping document verifications and IROFS requirements related to assay and weight verification, the cylinder is unloaded for temporary storage at the Full DUF_6 Cylinder Storage Pad. This pad is used to stage full DUF_6 cylinders for processing. Cylinders are moved by a special cylinder hauler to the DUF_6 Autoclave Building as needed for feeding of contents to the DUF_6-to-DUF_4 process. Protective anchored concrete-filled pipe bollards are installed around the perimeter of the cylinder pad in locations where a potential exposure to uncontrolled vehicle traffic exists. The pad is constructed of reinforced concrete and is approximately 175 ft wide by 200 ft long and is sized to store up to 60 full cylinders. The entire storage pad is curbed for storm water collection and is provided with underground drains connecting to the Cylinder Pad Storm Water Retention Basin located south of the cylinder pad. The surface and slope of the cylinder pad is designed to prevent any significant pooling of liquids. The pad is provided with saddles to space and support the cylinders. A full cylinder is placed in a saddle for temporary storage and full cylinders are never stacked.

DUF_6 Autoclave Building

The DUF_6 Autoclave Building is one level and includes a large overhead area to accommodate a bridge crane. The building contains two containment-type autoclaves that use controlled steam to safely vaporize the solid DUF_6 for feeding to the DUF_4 process. The vaporized DUF_6 flow is from the feed cylinder located in the autoclave through a feed header and piping to the DUF_6-to-DUF_4 reaction vessel that is located in the DUF_4 Process Building. Typically, the content of one DUF_6 cylinder is being fed to the reaction vessel from one autoclave. The other autoclave is going through a cycle of removing an emptied cylinder, reloading a full solid-contents cylinder and heating the cylinder contents in preparation for feeding to the reaction vessel.

Also included in the DUF_6 Autoclave Building are two cold boxes cooled by refrigeration systems, each sized to contain the contents of one 48Y-type cylinder. One cold box is used to collect DUF_6 cylinder heels after cylinders have been fed out to the DUF_4 process. The other cold box is the receiving vessel for the purge and evacuation system that serves the DUF_4 process.

Two (2) rail mounted cylinder carts and weigh scales are provided in the autoclave area. One cart and scale are located between the two autoclaves, and the other cart and scale are located between the cold boxes. An overhead bridge crane is installed to hoist the DUF_6 cylinders into and out of the autoclaves and cold boxes. The crane path is designed to permit lateral movement without traveling above an autoclave or cold box containing a DUF_6 cylinder.

The Motor Control Center (MCC) and instrumentation equipment rooms are located in the east end of the DUF_6 Autoclave Building on the first floor.

Just west of the DUF_6 Autoclave Building, a reinforced concrete pad is installed as a staging area for DUF_6 cylinders. This pad is located at the entrance doors to the DUF_6 Autoclave Building to provide for staging of both empty and full cylinders for transportation by the cylinder hauler to and from the outdoor cylinder storage pads. Protective anchored concrete filled pipe bollards are installed around the staging area for protection of DUF_6 cylinders from vehicular traffic.

Empty DUF_6 Cylinder Storage Pad

Approximately 150 ft east of the intersection of the East and South Roads is the Empty DUF_6 Cylinder Storage Pad. This pad is used to stage empty DUF_6 cylinders in preparation for shipment from the facility. A security fence is installed around the entire perimeter of the cylinder pad and has one entrance opening with clearance for the cylinder hauler to maneuver. The pad is constructed of reinforced concrete and is approximately 105 ft wide x 185 ft long and sized to contain up to 40 empty cylinders. The pad is provided with saddles to space and support the cylinders. Empty cylinders may be double stacked if necessary.

DUF_4 Process Building

The DUF_4 Process Building is a five (5) level building adjacent to the DUF_6 Autoclave Building with a fire barrier between the two buildings. It is within this building that DUF_6 is converted to DUF_4 and AHF.

The DUF_6 from the DUF_6 Autoclave Building flows to the DUF_6 surge tank where it enters the top of the DUF_6 to DUF_4 reaction vessel. Also, hydrogen gas from the hydrogen gas generator system, that is located outside and remote of the DUF_4 Process Building, flows through control systems into the top of the reaction vessel. The DUF_6 reacts with the hydrogen gas to form DUF_4 solid particles and AHF gas. The DUF_4 powder is removed from the reaction vessel by a cooling screw where it is transported to hoppers for temporary storage. The AHF exits the bottom of the reaction vessel through the cooling screw as an off-gas. It then passes through two sets of filters in series configuration, a series of carbon-bed traps to remove any residual un-reacted DUF_6 and two in-series condensers where the AHF liquefies and drains into temporary storage tanks that are located in the AHF Staging Containment Building. The residual off-gas that passes through the second condenser flows through a hydrogen burner and the Plant KOH Scrubbing System and vent stack, all of which are located external to the DUF_4 Process Building.

The top level of the DUF_4 Process Building contains the top portion of the reaction vessel and the DUF_6 surge tank. Also on this level are the primary and secondary dust collectors and dust collector blower. The fourth level houses six carbon-bed traps (configured as two banks of three traps in series), the off-gas primary filter, and the off-gas secondary filter. The partial AHF condenser, total AHF condenser and the cooling screw conveyor are located on the third level. The second level contains the product transfer screw, vibrating screen and the top heads of the three DUF_4 storage hoppers. The bottom outlets of the three DUF_4 storage hoppers and the product vacuum transfer system are located on the first level. One bay is clear on all floors to be used to facilitate maintenance of equipment, instrumentation and piping. Just west of the DUF_4 Process Building, a reinforced concrete equipment pad is installed to provide access to equipment for removal from the DUF_4 Building if removal of such equipment is required for maintenance.

DUF_4 Container Staging Building

Located in the southeast corner of the access pad and adjacent to the DUF_4 Process Building, is the DUF_4 Container Staging Building. The purpose of this building is to provide equipment and space for unloading, staging and emptying DUF_4 containers that may have been used to temporarily store additional inventory of DUF_4. The building may also be used to handle DUF_4 that may be received from other suppliers for conversion of DUF_4 to fluoride gas products. This building is used for removing DUF_4 from storage or shipping containers and for transferring into the DUF_4 hoppers located in the DUF_4 Process Building.

Decontamination (Decon) Building

The Decontamination Building serves as a facility with equipment to manage Low-Level Waste (LLW) other than the depleted uranium oxide waste. A more detail explanation in the use of the Decontamination Building to manage LLW is provided in Section 9.2.2.1, Subsection “Waste Management Procedures" Chapter 9 of the IIFP License Application, Revision B.

The Decontamination (Decon) Building is located adjacent to, and on the north side of the DUF_4 Process Building. The construction provides for a fire barrier between the Decontamination Building and the DUF_4 Process Building. This building and its equipment is used for decontamination of process equipment for maintenance and removal of depleted uranium from decontamination wash waters or from small volumes of contaminated liquors. The Decon Building contains an equipment cleaning booth and hood system, primary and secondary dust collector system in series, holding tanks, precipitation tanks, primary and polishing filters, associated pumps, piping, field equipment instrumentation panels, ion exchange columns and associated controls and backwash systems.

FEP Process Building

The FEP Process Building is a four (4) level building located just east of the DUF_4 Process Building. The SiF_4 and BF_3 processes that involve licensed material are housed in this building. The flow of process materials for both of these processes begins with DUF_4 being transported from the DUF_4 Process Building to the respective DUF_4 feed hoppers (bins) in the FEP Process Building.

In the SiF_4 process, the DUF_4 is mixed with SiO_2 and fed to the rotary calciner where the mixture reacts to form SiF_4 gas and solid particulate uranium oxide. The depleted uranium oxide discharges the end of the rotary calciner and is temporarily stored in hoppers until packaged for shipment to an off-site licensed disposal facility. The SiF_4 product exits the rotary calciner as an off-gas, flows through a set of filters configured in series flow and through pre-condensers for removing hydrogen fluoride (HF) impurities. The product gas then flows to primary and secondary cold traps where the product is collected. The residual off-gas from the secondary cold trap flows to the Plant KOH Scrubbing System to receive three-stage treatment prior to discharging to the atmosphere through the vent stack.

In the BF_3 process, the DUF_4 is mixed with B_2O_3, fed into a pre-heater where moisture is removed by forming HF that leaves the pre-heater as a vapor and flows to the Plant KOH Scrubbing System. The mixed solids discharge the pre-heater into a rotary calciner where the BF_3 product gas and uranium oxide are produced. The depleted uranium oxide discharges the rotary calciner to temporary storage hoppers until packaged for shipment to an off-site licensed disposal facility. The BF_3 product gas flows from the rotary calciner through two in-series filters, through pre-condensers for HF impurity removal, and then is collected in primary and secondary cold traps. The off-gas that exits the secondary cold trap flows to the Plant KOH Scrubbing System for three-stage treatment prior to discharging to the atmosphere through the vent stack.

The top level of the FEP Building supports the product cold traps, the pre-condensers, secondary filters, primary and secondary dust collectors and dust collector blower. The third level houses the primary filters, the SiO_2 and B_2O_3 feed hoppers, DUF_4 feed hopper, the dust collector fines hopper, the ribbon blender, the feed conveyors and the pre-heater (for the BF_3 process only). The second level contains the rotary calciners for the SiF_4 and BF_3 processes. The cooling screws associated with the rotating calciner discharges are also on the second level. The oxide hoppers and the drum-off stations are located on the first level. Also located on the first level are the FEP Control Room, as described above, and the electrical equipment room.

The largest amount of solid waste generated at the IIFP Facility is the depleted uranium oxide that is a by-product of the FEP process. This waste is managed using the equipment and facilities of the FEP Process Building and the FEP Oxide Staging Building. The use of these buildings and associated equipment in managing this oxide waste is described in Section 9.2.2.1 Revision B Chapter 9 of the IIFP License Application.

FEP Oxide Staging Building

The FEP Oxide Staging Building is adjacent to, and on the east-side of the FEP Process Building. The wall between the FEP Oxide Staging Building and the FEP Process Building is a fire barrier. This building is a two (2) level building with a reinforced concrete floor on the first level with containment-type curbing. It is used for staging of oxide waste containers for loading into truck trailers and transporting to an off-site licensed waste disposal facility. Equipment in the building consists of enclosed container-loading stations, weighing equipment, electrical and instrumentation monitoring and alarm panels and controls, exhaust hood systems, piping and ductwork connections to the primary dust collector system.

DUF_4 Container Storage Building

Just east of, and adjacent to, the FEP Oxide Staging Building is the DUF_4 Container Storage Building. This building is used to store additional inventory of DUF_4 or shipping containers of DUF_4 that may be received from suppliers. This source of DUF_4 can be used in production of FEP products and be de-converted to depleted uranium oxide.

FEP Product Storage and Packaging Building

The FEP Product Storage and Packaging Building is separated from and is located at the south side of the FEP Process Building. In this building, the purified SiF_4 and BF_3 products, which are chemically and physically separated from licensed material, are received for temporary storage and packaging. When a product cold trap in the FEP Process Building is ready to be unloaded, the respective product compressor and evaporator in the FEP Product Storage and Packaging Building is used to transfer the product to storage tubes also located in this building. The building contains two (2) levels and has a reinforced concrete floor on the first level with containment-type curbing. The equipment in this building is used to transfer product from temporary storage tubes to truck tube-trailers located in the Fluoride Products Trailer Loading Building or to package and store SiF_4 and BF_3 product gas in cylinders for shipment to customers. This building houses the FEP compressors and associated coolers, product evaporator vessels, storage systems, containment-type enclosures containing the packaging manifolds and the exhaust hoods and ductwork that connect to an emergency scrubber. The FEP product gas storage system consists of approximately 12-in. diameter by 30 ft long, high pressure rated, American Society for Mechanical Engineers (ASME) coded and stamped storage tubes inside a common cooling area. A total of nine (9) banks of storage tubes (45 tubes total) are provided for storage of FEP products.

FEP Building Dock

An elevated dock on the southeast side of the FEP Process Building provides access for truck loading for transporting oxide containers to licensed waste disposal facilities and for truck loading for shipping SiF_4 and BF_3 cylinders to customers.

Plant Potassium Hydroxide (KOH) Scrubbing System

A KOH liquid scrubbing system is used to remove residual fluorides from each process off-gas prior to venting the off-gas flows to the atmosphere. This Plant KOH Scrubbing System vents treated gases through a single stack. The system is utilized to treat final off-gas streams from the DUF_4 production process (DUF_6 to DUF_4) and the SiF_4 and BF_3 processes. The off-gas streams flow first through a concurrent-venturi where the gas contacts aqueous KOH solution and then through a counter-current flow packed tower where further scrubbing with aqueous KOH solution occurs. Final scrubbing of the gas is achieved by flow through a bed of sized coke where the gas is again contacted with a counter-current flow of aqueous KOH solution. The treated gas is then discharged through a vent stack to the atmosphere. The Plant KOH Scrubbing System stack is monitored to measure for traces of fluorides or uranium in the vent gas.

The spent liquors resulting from scrubbing the fluorides contain mainly potassium fluoride, water and some un-reacted KOH. The spent liquors are sent to the Environmental Protection Process (EPP) Building to regenerate the KOH liquid for recycle back to the scrubbing system.

The KOH venturi-type (primary), packed tower (secondary), and coke box (tertiary) scrubbers and pumps; KOH tanks and associated equipment and dike pad that serve the DUF_4 process are located outside and adjacent to the east side of the DUF_4 Process Building. The system consists of two similar lines of three-stage in-series scrubbers.

The primary scrubbing equipment (venturi-type) for the FEP process is located outside and on the west side of the FEP Process Building, with the venturi off-gas vents connected by piping to the packed towers of the scrubber system that serves the DUF_4 process. This configuration provides secondary and tertiary treatment of the final effluents from the FEP processes prior to venting to the atmosphere.

Environmental Protection Process Building

The EPP Building is located east of the DUF_4 Container Storage Building and inside the EPP process dike area. The building equipment is used to treat fluoride bearing liquors for recycle and reuse in the plant processes. In this process, hydrated lime is reacted with spent KOH solution that is received from the Plant KOH Scrubbing System. The reaction results in regeneration of KOH and formation of calcium fluoride. The solid particulate calcium fluoride (CaF_2) is filtered and dried for shipment to customers or disposal at an off-site licensed disposal facility. The regenerated KOH is pumped back to the Plant KOH Scrubbing System for reuse.

The building houses the EPP control systems, rotary vacuum filter, dryer feed screw, dryer and discharge screw. Equipment for reacting hydrated lime with the fluoride bearing liquors includes the reaction tank, clarifier, pumps, regenerated KOH recycle tank, holding/feed tanks and associated equipment. This equipment is located outside the EPP Building and within the process dike area.

AHF Staging Containment and Fluoride Products Trailer Loading Buildings

The AHF Staging Containment Building and the Fluoride Products Trailer Loading Building are located east of the DUF_6 Autoclave Building and south of the FEP Product Storage and Packaging Building. A fire barrier is located between the AHF Staging Containment Building and the Fluoride Products Trailer Loading Building and between the FEP Product Storage and Packaging Building and the Fluoride Products Trailer Loading Building. A minimum number of sealed pipes and conduits penetrate the walls separating these buildings. Each building is constructed as a separate enclosed area. The buildings are not totally leak tight but provide a level of secondary containment to suppress or inhibit an AHF, SiF_4 or BF_3 release in the event of a spill or leak.

The AHF Staging Containment Building houses four (4) 8,000 pound AHF storage tanks, piping and controls. The Fluoride Products Trailer Loading Building is used as an enclosed area for loading AHF trailers and for loading SiF_4 and BF_3 tube trailers for shipment to customers. Vent lines and relief valve lines on the storage tanks and from the trailer during loading are connected to the Plant KOH Scrubbing System described above.

The products are loaded from the storage tanks into approved U.S. Department of Transportation (DOT) tank trailers when inventories reach a level for shipment. A minimum number of product transfer lines from each process enter the Fluoride Products Trailer Loading Building.

The Fluoride Products Trailer Loading Building contains a truck entrance door on one side that remains sealed, closed and controlled except for short periods when the trailer is moved in and out. Safety precautions are taken to prevent the trailer from contacting the fill line by the installation of physical barriers and to prevent inadvertent movement of the trailer during load-out.

Two (2) positive-air-lock doors are located in each building. One air-lock in each building is an emergency exit to the outside. The other air-lock in each building is an exit and also an entrance to a separate control room, under positive pressure, where surveillance and operational controls for the two (2) containment areas are managed.

In these buildings, the SiF_4, BF_3 and AHF products have been chemically separated from licensed materials. These products are also physically separated from licensed materials, such as not to affect licensed materials.

1.1.2.2 Other Buildings

Fire Pump House

The Fire Pump House is located on the east side of the access road loop and between the two (2) fire water storage tanks. This building houses the fire water pumps, interconnecting piping and controls for the facility fire water system. A fire wall separates the main fire water pump from the diesel powered emergency fire water pump.

Administrative Building (Offices)

The Administrative Building houses the offices of personnel not directly involved in the production and maintenance functions of the facility. This building is accessed directly through the front from the parking lot. The rear portion of this building is the Change/Locker Area with toilet facilities, showers and lockers. The main employee entrance and boundary control area are located at the side of the Change/Locker Area. A turn-style and access controls are located at the security fence permitting employee entrance into the controlled area.

Process Offices and Laboratory

The Process Office Building is located adjacent to and north of the DUF_4 equipment access pad. This building contains the offices for the engineering, technical, Environmental, Safety and Health (ESH) and plant management supervisory staff. The north side of this building contains the Laboratory that is furnished with work benches, equipment, analytical instrumentation, fume hoods, containment devices and exhaust systems with vent streams exiting to an outdoor scrubber on a containment pad just east of the Laboratory area. The Laboratory area provides areas that receive, prepare and store various samples as follows:

- Radiological Protection (Health Physics) Lab for calibration of instruments and radiological sample analysis
- Chemical Laboratory for process and product sample analysis
- Environmental Monitoring Lab for environmental sample analysis

Maintenance and Stores Building

The Maintenance and Stores Building is located southeast of the Fluoride Products Trailer Loading Building. This building contains small tools, machines, repair equipment and maintenance supplies such as pipe and fittings, hardware, electrical parts and other small items required for maintenance of the facility. No licensed materials, raw materials, in-process materials or finished products are stored in this building. An office area is provided for maintenance supervision and stores personnel.

Material Warehouse

The Material Warehouse is located just northeast of the Process Offices and Laboratory Building. This warehouse is used to receive and store such items as piping components, electrical conduit, wiring, equipment for capital construction projects and spare parts. Small quantities of chemicals such as paints, oils and cleaning agents are stored in the warehouse, but the quantities are limited to meet New Mexico Commercial Building Code (NMCBC, 2009) and NFPA requirements. No licensed materials, raw materials or in-process materials or finished products are stored in this building. Part of the Material Warehouse is used for managing non-radioactive waste. This function is described in Section 9.2.2.1, Subsection "Waste Management Procedures" Chapter 9 of the IIFP License Application, Revision B.

Water Treatment Building

The Water Treatment Building is located east of the electrical utility substation and adjacent to the facility water wells. This building contains the domestic water storage tank, pumps, treatment system and controls required to furnish potable water for use throughout the facility.

Main Switchgear Building

The Main Switchgear Building is located just east of the Utilities Building. This building houses the incoming main switchgear distribution and metering equipment for the facility. The main switchgear is fed from the electrical utility substation located just inside the north fence line.

Guard House

The Guard House is located at the entrance to the plant. It functions as a security checkpoint for all incoming and outgoing traffic. Employees, visitors and trucks that have access approval are screened at the Guard House. Vehicle traffic entering the secured area including common carriers, such as mail delivery trucks, are checked and authorized for access to the facility at this location.

1.1.3 Process Description

This section provides a description of the process chemistry, process flows, general descriptions of the unit operations and types of equipment used in the process. Section 3 of the IIFP ISA Summary, Revision B describes in more detail the process, its equipment systems and estimated ranges for the operating parameters. The flow diagrams in the following sections are for illustration purposes only. The diagrams are to aid in the understanding of the process flow descriptions. Larger and more legible process flow sheets are provided in a separate Engineering Drawing Package as part as part of the overall LA submittal to the NRC.

1.1.3.1 Process Chemistry

The IIFP commercial plant involves the following major chemical reactions:

DUF_6 to DUF_4 Process

$$UF_6 + H_2 \rightarrow UF_4 + 2HF$$

SiF_4 Process

$SiO_2 + UF_4 \rightarrow SiF_4 + UO_2$ (or U_3O_8)

BF_3 Process

$2B_2O_3 + 3UF_4 \rightarrow 4BF_3 + 3UO_2$ (or U_3O_8)

Air and Water Treatment Systems

$HF + H_2O \rightarrow HF$ (aqueous)

$HF + KOH \rightarrow KF + H_2O$

$3SiF_4 + 4KOH \rightarrow 2K_2SiF_6 + 2H_2O + SiO_2$

$SiO_2 + 2KOH \rightarrow K_2SiO_3 + H_2O$

$4BF_3 + 3KOH \rightarrow 3KBF_4 + B(OH)_3$

$2HF + Ca(OH)_2 \rightarrow CaF_2 + 2H_2O$

$2KF + Ca(OH)_2 \rightarrow CaF_2 + 2KOH$

1.1.3.2 DUF_6 to DUF_4 De-conversion Process

DUF_6 is converted to DUF_4 by a high temperature reaction with hydrogen. The basic chemical equation is:

UF_6 (gaseous) + H_2 (gas) $\rightarrow$ UF_4 (solids) + 2HF (anhydrous)

The DUF_4 is used as a feed material to produce high-purity fluoride products of SiF_4 and BF_3

The IIFP Facility receives DUF_6 material in a solid physical state typically contained in 14-ton type 48-Y (or 48-G) or in 10-ton type 48-X cylinders owned by the supplier (the IIFP de-conversion customer). These cylinders are built to American National Standards Institute (ANSI) standards (ANSI, 2001) and are transported by truck trailers that are U.S. Department of Transportation approved. The type 48-Y and type 48-X cylinders are approved for multiple shipments, provided the ANSI standards, which include a 5-year hydrostatic test, requirement is met. Empty 48-Y or 48-X type cylinders are returned to the customer following de-conversion. Radioactive material shipments will be transported in packages that meet the requirements of 10 CFR 71 (CFR, 2004) and 49 CFR 171-173 (CFR, 2011b). Transportation routes for both incoming DUF_6 feed and outgoing uranium wastes will be those routes designated by the U.S. Department of Transportation to minimize the potential impacts to the public from the transportation of radioactive materials. If any DUF_4 is received, it will be contained in approved shipping containers in accordance with DOT regulations**.**

The type 48-G cylinder is typically used by the uranium enrichment facilities for their on-site storage of DUF_6 but has been utilized for transport by the U.S. Department of Energy (DOE). Shipment of the type 48-G cylinders to the IIFP Facility may require the supplier/customer to obtain a DOT Special Permit. The type 48-G is a one-time use cylinder. Disposition of the empty cylinder would require the complete removal of DUF_6. One option under consideration would be to qualify the empty 48-G cylinder as an Industrial Package (IP) and utilize it as a depleted uranium oxide transport and disposal container.

Upon receipt, full cylinders of DUF_6 are visually inspected for damage and surveyed for radiation and removable contamination. Cylinders and cylinder valves shall be inspected for ANSI N14.1 requirements.

Documents that contain information regarding cylinder identification, weight and uranium assay that accompany the shipment are reviewed and verified for accuracy. Uranium assay is qualitatively verified by performing a non-destructive survey measurement. Once accepted for receipt, the cylinder is unloaded using the facility cylinder hauler vehicle and placed in the Full DUF_6 Cylinder Storage Pad area until it is scheduled for feed to the de-conversion process. Only designated vehicles with less than 280 liters (74 gal) of fuel shall be allowed on the cylinder storage pads.

The DUF_6 cylinder is placed in a containment-type autoclave where the contents are vaporized. The DUF_6 vapor is then fed to the DUF_6 reaction vessel, located in the DUF_4 Process Building, where it reacts to produce DUF_4 and AHF. The reaction is exothermic which sustains an efficient reaction temperature. Air cooling around the reaction vessel is employed to control the reaction at set operating temperatures. Insulation around the reaction vessel and electrical heating around part of the reaction vessel are utilized for fine control of the reaction temperature. The DUF_4 solid powder is continuously withdrawn from the reaction vessel bottom through a cooling screw mechanism and transferred to storage hoppers. A two-stage dust collector system is provided to control and recycle DUF_4 dust that is generated by gas flows internal to the solids handling equipment The DUF_4 in the storage hoppers is transferred to the FEP plant for use as raw material feed in producing SiF_4 and BF_3.

Off-gases from the reaction vessel leave the cooling screw equipment and pass through a series of filters and carbon-bed traps to remove entrained particulates and residual traces of un-reacted DUF_6, respectively. The off-gas flow exiting the carbon-bed trap system passes through heat exchangers where the by-product AHF is condensed. Residual off-gases exit the condenser equipment to a hydrogen burner system to combust any un-reacted hydrogen gas. The off-gas flows into a 3-stage scrubbing system designed for removing trace quantities of fluorides. Off-gas flow through the Plant KOH Scrubbing System is described in Section 1.1.3.5.

The AHF that liquefies in the condenser equipment is drained to storage tanks that are located in a containment-type building (AHF Staging Containment Building). The AHF product has been chemically separated from licensed material. It is physically stored in a building separate from licensed material. The AHF is temporarily stored and then loaded into tank-truck trailers inside the containment-type building for shipment to customers. The trailers are DOT approved for shipment.

Major flows for the DUF_6 to DUF_4 de-conversion process are shown in Figure 1-6.

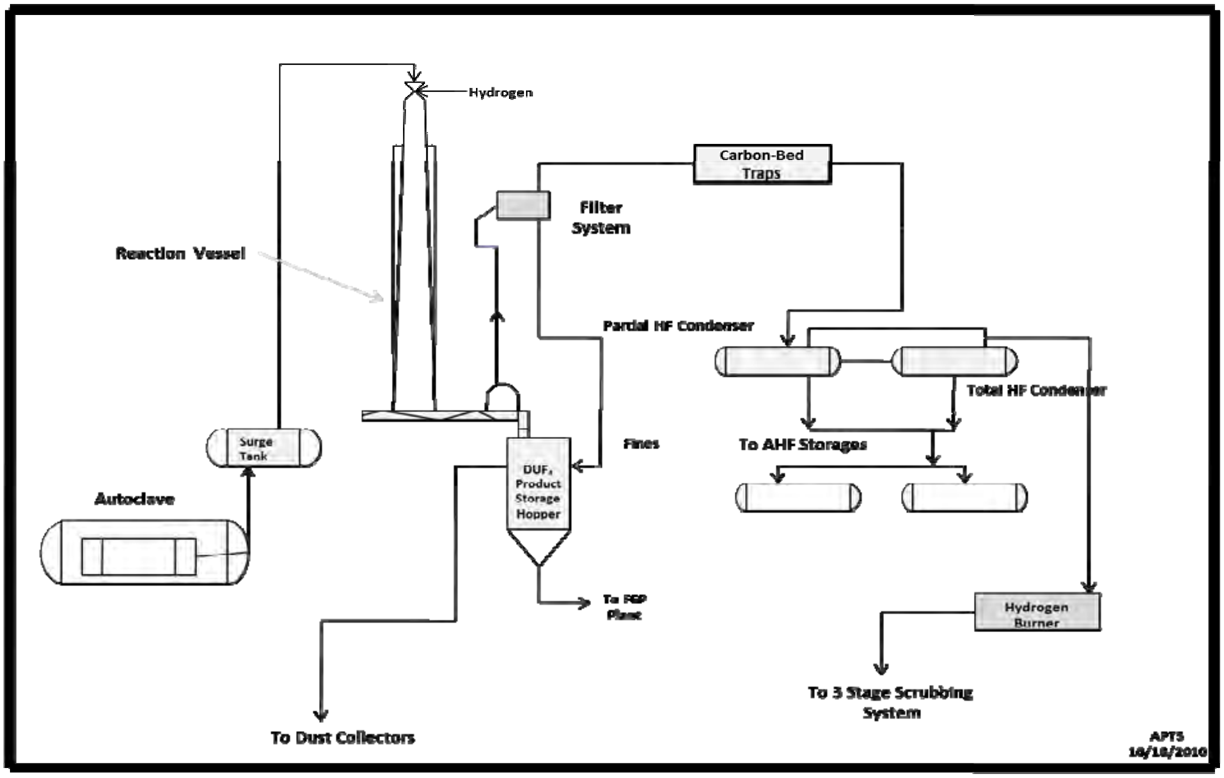


Figure 1-6 DUF_6 to DUF_4 Plant Major Flows

1.1.3.3 SiF_4 Production Process

The IIFP method of SiF_4 production involves the reaction of solid particulate uranium tetrafluoride (UF_4) with solid particulate silicon dioxide (SiO_2) as follows:

$$SiO_2 \text{ (solids)} + UF_4 \text{ (solids)} = SiF_4 \text{ (gas)} + UO_2 \text{ (solids) (or } U_3O_8 \text{ solids)}$$

Silicon dioxide powder is mixed with DUF_4 and continuously fed to a rotary calciner where the mixture is heated and reacted to form SiF_4 and uranium oxide. The mass flow of the feed mixture is controlled through the rotary calciner to ensure the desired reaction residence time. The resulting SiF_4 gas product and trace impurities exit the rotary calciner as an off-gas while the uranium oxide powder discharges at the end of the rotary calciner through a cooling screw mechanism and transfers to storage hoppers. A two-stage dust collector system is provided to control and recycle uranium oxide dusts that are internal to the solids handling equipment and generated by air or gas flows associated with the handling equipment. The uranium oxide in the storage hoppers is packaged into DOT approved shipping containers and transported to an off-site licensed disposal facility.

Off-gas leaves the rotary calciner and flows through two-stages of filters to capture entrained particulates. Particles captured by the filter system are recycled back as feed to the rotary calciner. After exiting the filter system, the off-gas flow passes through a pre-condenser system to remove hydrogen fluoride and other trace gas contaminants, followed by a two-stage cold trap system that collects the SiF_4 product.

The SiF_4 product is collected by solidifying the gas in the cold trap system. More than one cold trap is utilized for operating in a loading and unloading cycle. When a trap is loaded, the coolant temperature is set to allow the product to warm and transfer to a SiF_4 product storage tube via the evaporator.

The SiF_4 product has been chemically separated from licensed material. It is physically stored in the FEP Product Storage and Packaging Building separate from licensed material. The product is packaged as a gas from the storage tube, using a compressor, into customer cylinders or tube trailers that are a type design approved by the DOT.

The final residual off-gas, which is not collected in the cold trap and passes through the cold trap system, flows to the 3-stage Plant KOH Scrubbing System for treatment to remove trace amounts of fluorides before venting to the atmosphere.

Off-gas flow through the scrubbing system is described in Section 1.1.3.5. Figure 1-7 depicts the SiF_4 process major flows.

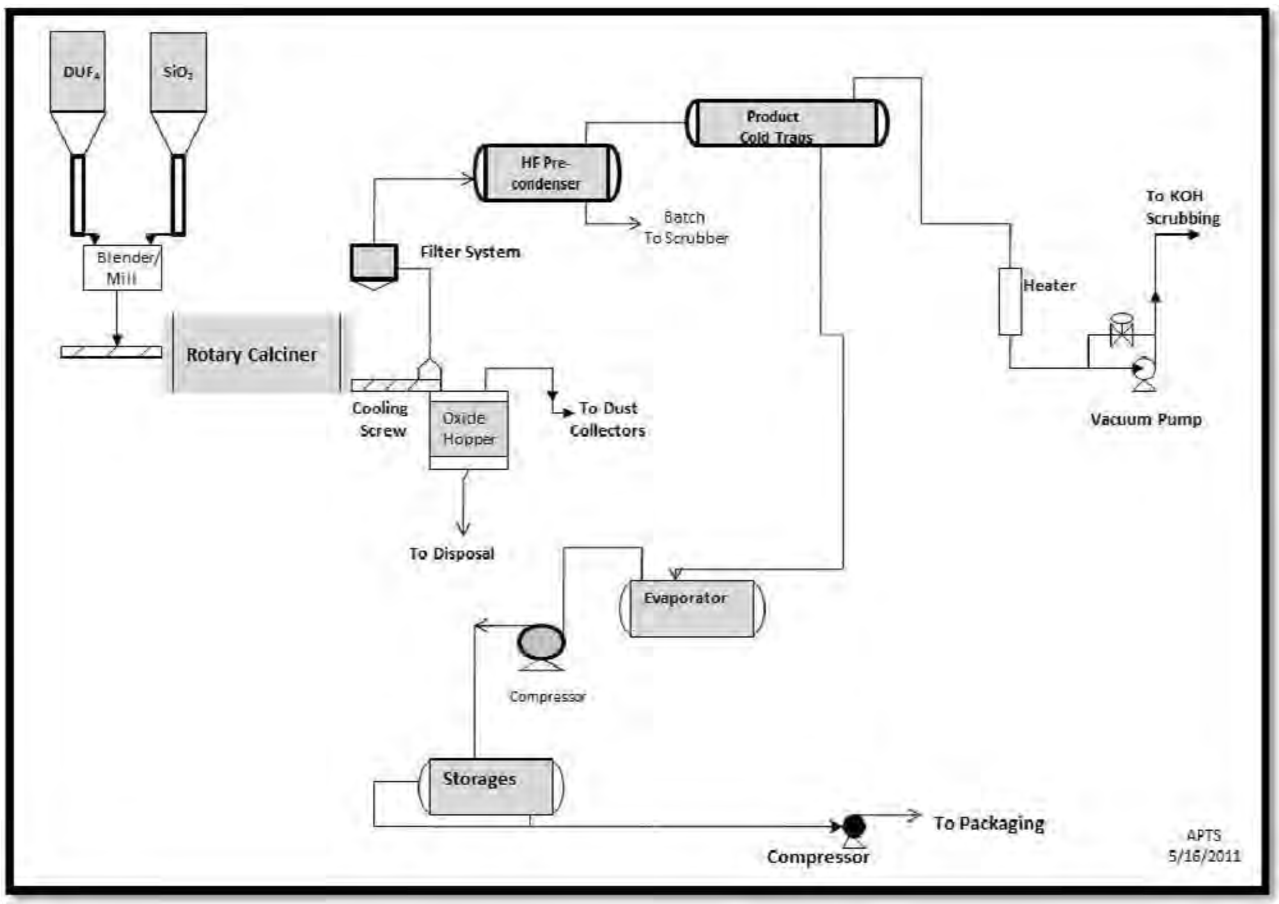


Figure 1-7 SiF_4 Plant Major Flows

1.1.3.4 BF_3 Production Process

The BF_3 production process follows essentially the same IIFP patented FEP technology as in the SiF_4 process but involves the reaction of solid particle boric oxide (B_2O_3) with the DUF_4 as follows:

$$2B_2O_3\,(\text{solids}) + 3UF_4\,(\text{solids}) \rightarrow 4BF_3\,(\text{gas}) + 3UO_2\,(\text{solids})\ (\text{or } U_3O_8 \text{ solids})$$

The BF_3 process does include preheating of the feed mixture prior to feeding it to the rotary calciner to remove moisture and minimize the amount of HF impurities in the product gas stream.

In the production of BF_3, B_2O_3 is mixed with DUF_4 powder and continuously fed to a pre-heater, where the temperature is controlled to cause reaction of small amounts of the DUF_4 with the moisture that may be contained in the mixture. The resulting HF leaves the pre-heater as a vapor and passes through filters and then on to the Plant KOH Scrubbing System for treatment and conversion to potassium fluoride.

The mixed powder leaves the discharge end of the pre-heater then enters a rotary calciner where it is heated and forms BF_3 gas and uranium oxide powder. The BF_3 product, traces of AHF and gas contaminants leave the rotary calciner as off-gases.

The uranium oxide powder exits the discharge end of the rotary calciner through a cooling screw mechanism and is transferred to storage hoppers. A two-stage dust collector system is provided to control and recycle uranium oxide dusts that are internal to the solids handling equipment and generated by air or gas flows associated with the handling equipment.

The uranium oxide in the storage hoppers is packaged into DOT approved shipping containers and transported to an off-site licensed disposal facility.

Off-gas from the rotary calciner flows through two-stages of filters to capture entrained particulates. The particles captured by the filter systems are recycled back as feed to the rotary calciner. After exiting the filter system, the off-gas flow passes through a pre-condenser system to remove AHF and other trace gas contaminants followed by a two-stage cold trap system that collects the BF_3 product.

The BF_3 product is collected by solidifying in the cold trap system. More than one cold trap is utilized for operating in a loading (collecting) and unloading cycle. When a cold trap is ready to unload, the coolant temperature is set to allow the product to warm and transfer to a BF_3 product storage tube via the evaporator.

The BF_3 product has been chemically separated from licensed material. It is physically stored in the FEP Product Storage and Packaging Building separate from the licensed material. The product is packaged as a gas from the storage tube, using a compressor, into customer cylinders or tube trailers that are a type/design approved by the DOT.

The final residual off-gas exits the cold-trap system and passes to the three-stage Plant KOH Scrubbing System for treatment to remove trace amounts of fluorides before being vented to the atmosphere. Off-gas flows through the plant scrubbing system as described in Section 1.1.3.5.

The BF_3 plant major flows are shown in Figure 1-8.

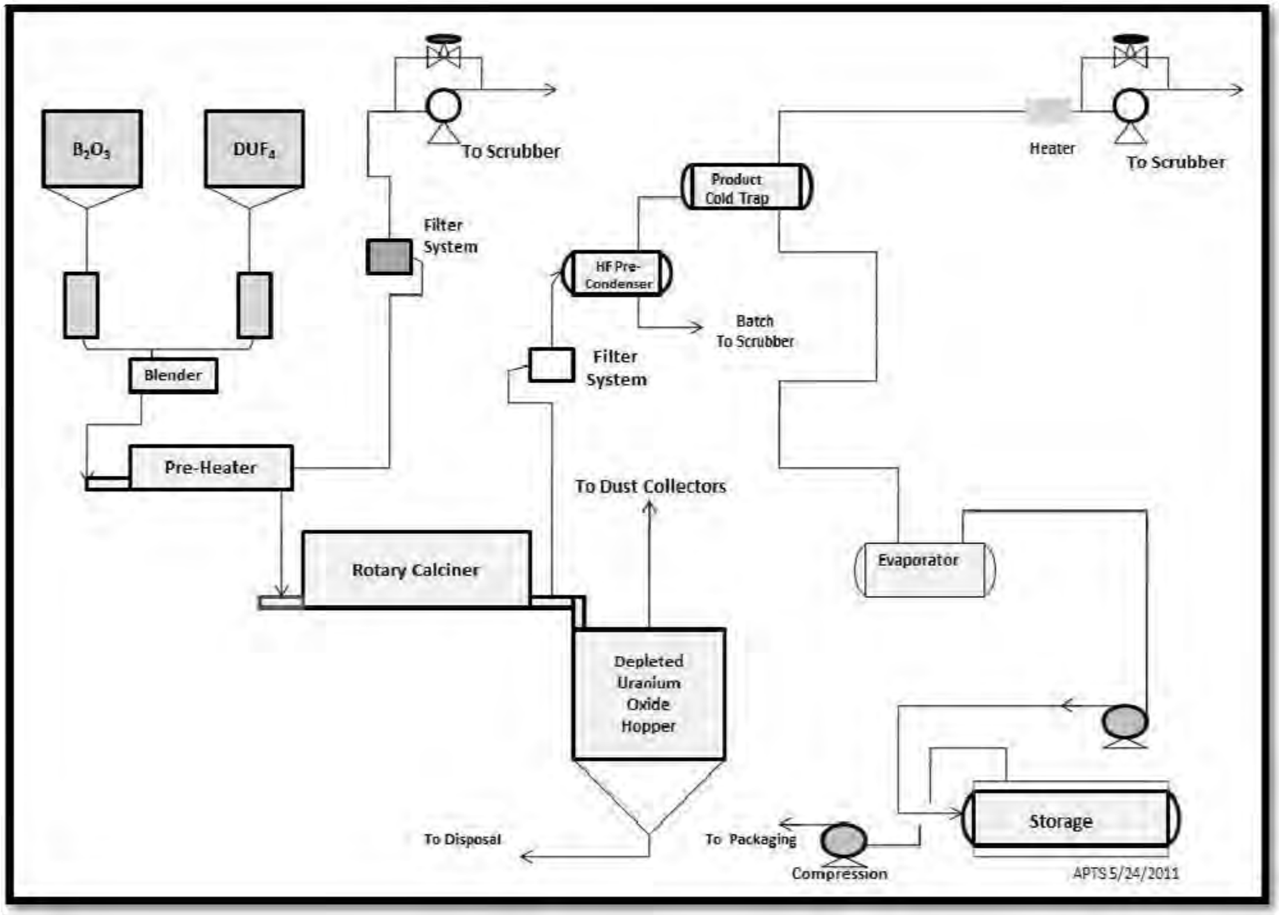


Figure 1-8 BF_3 Plant Major Flows

1.1.3.5 Process Off-gas Emissions Treatment (Plant KOH Scrubbing System)

Final off-gas streams from the DUF_6 to DUF_4, SiF_4 and BF_3 processes (comprised mostly of nitrogen, air and trace fluorides) enter the Plant KOH Scrubbing System. The off-gases flow through this three -stage scrubber system for treatment prior to being vented to the atmosphere.

Two parallel line scrubber systems that are basically alike provide operating flexibility. Each scrubber line consists of a primary wet venturi scrubber followed by a secondary countercurrent-flow gas-liquid packed tower. The third-stage tertiary scrubber is designed to treat gas flow exiting the secondary packed tower scrubber though a bed of sized coke. The coke is wetted by an aqueous KOH solution that serves as the scrubber liquor. An aqueous KOH solution is used and recycled within each of the scrubbers until the concentration of KOH (spent) needs replenishment. The KOH solution concentration in the scrubber equipment is maintained at a safe margin to ensure it effectively reacts (scrubs) with fluoride components in the gas stream.

When there is a need to replenish the KOH scrubbing liquor concentration, some of the spent scrubbing solution, containing potassium fluoride (KF), water and some excess KOH, is pumped from the scrubber recycle tanks to the Environmental Protection Process. The EPP is described in Section 1.1.3.6.

The total system equipment basically consists of a KOH storage tank, KOH pump tank, regenerated KOH tank, two or three (installed spare) venturi scrubbers, two packed towers and two coke boxes as shown in Figure 1-9. There are redundant pumps for each scrubber, pump tank and storage tank.

Hydrogen fluoride, from the discharge of the DUF_6 to DUF_4 process and from the SiF_4 and BF_3 pre-condensers, is routed to one venturi. Final off-gas streams exiting the SiF_4 and BF_3 processes, containing some of the uncollected SiF_4 and BF_3 and trace quantities of other fluorides, are routed to another venturi scrubber.

The Plant KOH Scrubbing System vents treated gases through a single stack. The three-stage KOH scrubbing system is designed for removing fluoride bearing components in the gas streams at approximate efficiencies of greater than 80%, 95%, and 99% for the first, second, and third stages, respectively. The overall system removal efficiency is designed at greater than about 99.9 %. The Plant KOH Scrubbing System stack is continuously sampled and routinely analyzed to measure for traces of fluorides or uranium in the vent gas.

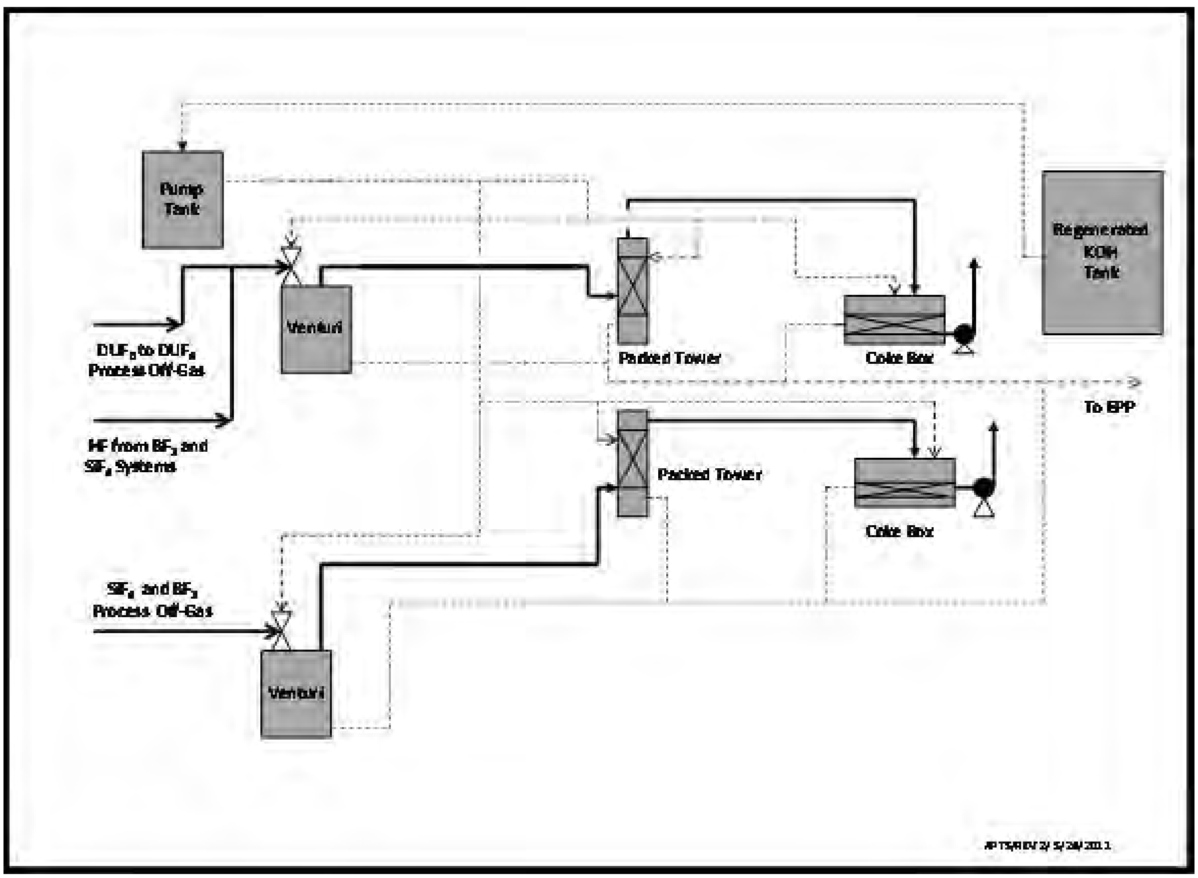


Figure 1-9 Plant KOH Scrubbing System Major Flows

1.1.3.6 Environmental Protection Process

The Environmental Protection Process is a process for treating two (2) different liquid streams. Potassium fluoride solutions are treated in the KOH regeneration process, and weak aqueous HF solutions are treated in the HF neutralization process.

In the KOH regeneration process of the EPP, the potassium fluoride, water and excess KOH spent solution from the Plant KOH Scrubbing System are reacted with a lime-slurry. Calcium fluoride and regenerated potassium hydroxide solution are produced. The regenerated KOH is recycled and reused in the plant scrubbing process. The calcium fluoride is filtered, dried and packaged for shipment to an approved commercial waste burial site, to an HF producer or other potential users.

The other stream treated in the EPP is weak aqueous HF solution, water or KOH solution that may contain a low concentration of fluorides. Also, small spills that potentially occur and require clean up from spill control containment areas may contain weak fluoride concentrations. In this case, the fluoride-bearing liquids may have too much water to send to the KOH regeneration and recycle system. The HF neutralization process uses lime slurry to react with weak HF to produce calcium fluoride and water. Figure 1-10 depicts the main flows of the EPP Neutralization and KOH Regeneration and Recycle processes. These processes are discussed below.

HF Neutralization

The HF Neutralization process is designed to operate intermittently, as needed. A lime silo is provided, including an installed dust collector. The silo holds an inventory of hydrated lime. Lime is fed to a mix tank where it is mixed with harvested water. The slurry generated is ~30% solids. Dilute HF solution is transferred from the weak HF solution tank to an agitated acid reaction vessel. The lime-slurry from the mix tank is also transferred to the acid reaction vessel. The materials in the acid reaction vessel require a retention time of about one hour or greater for reaction completion. When the reaction is complete, materials from the acid reaction vessel are transferred to a thickener tank for settling. After thickening, calcium fluoride and excess lime are transferred by a slurry-type pump from the bottom of the thickener to a rotary drum vacuum filter. Solids are discharged from the filter to a dryer capable of removing excess water. Liquors from the rotary vacuum filter are recycled to the weak HF solution tank for recycling. Calcium fluoride, after drying, is packaged suitable for sale or disposal an appropriate off-site licensed Resource and Conservation Recovery Act (RCRA) disposal facility. The primary chemical reaction is:

$$2HF + Ca(OH)_2 \rightarrow CaF_2 + 2H_2O$$

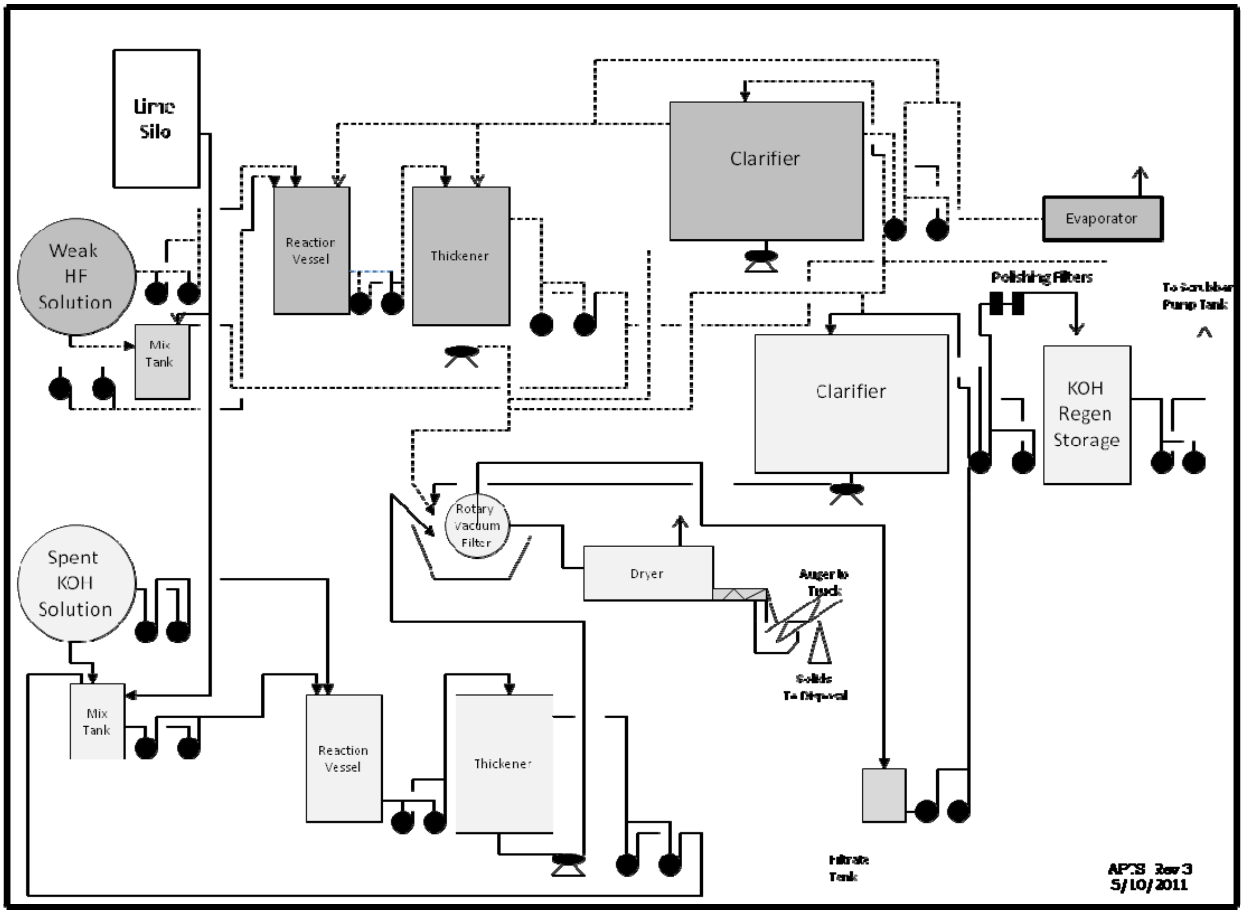


Figure 1-10 Environmental Protection Process Major Flows

KOH Regeneration

Lime is fed to an agitated mix tank where it mixes with harvested water. The slurry generated contains ~30% solids. Spent KOH solution (KF solution containing a weak concentration of KOH) is transferred from a spent KOH storage tank to an agitated reaction vessel. The lime-slurry from the mix tank is also transferred to the reaction vessel. The materials in the reaction vessel tank are given a retention time of about one hour or greater for reaction completion. When the reaction is complete, materials from the reaction vessel are transferred to a thickening tank for settling. Calcium fluoride and excess lime are transferred by a slurry pump from the bottom of the thickener to a rotary drum vacuum filter. Solids are discharged from the filter to a dryer capable of processing excess water. The dried material is packaged and stored for sale or sent to an approved off-site licensed RCRA disposal facility. Liquors are transferred to a clarifier where trace solids are settled. Regenerated KOH is removed from the top of the clarifier and passed through a set of filters to the regenerated KOH storage tank. The regenerated KOH solution is pumped to the Plant KOH Scrubbing System as needed for reuse by the scrubbers.

The primary chemical reaction is:

$$2KF + Ca(OH)_2 \rightarrow CaF_2 + 2KOH$$

1.1.3.7 AHF Staging Containment Building and Fluoride Products Trailer Loading Building

The AHF product is stored temporarily in the AHF Staging Containment Building until it is loaded into customer or transporter-owned DOT approved tank trailers (typically type DOT-412 trailer, loaded to about 30,000-40,000 lb product) and shipped to customers.

The purpose of the AHF Staging Containment Building and equipment is to provide temporary storage of AHF that is received from the DUF_6 to DUF_4 process AHF condensers. AHF transferred from the DUF_4 Process Building partial and total condensers is temporarily stored in ~8,000-lb (3,630-kg) tanks of materials of construction compatible with AHF. Dikes are provided around each storage tank. Each dike is sized to hold the contents of a single storage tank with an additional margin of safety to minimize the surface area (and evaporation rate of liquid) in the unlikely event the tank breaches and spills liquid AHF.

When AHF inventories reach a level for shipment, the AHF is loaded into an approved tank trailer staged in the Fluoride Products Trailer Loading Building. The tank trailer is the type approved by the DOT and of the design/type routinely used for shipping AHF nationwide. A transfer line from the storage tanks enters the tank trailer side of the building. The Fluoride Products Trailer Loading Building has a truck entrance door on one side that remains sealed, closed and controlled, except for short periods when the trailer is moved in and out. Safety precautions, controls and barriers are used to prevent the trailer from inadvertently being moved and from contacting the fill line.

The SiF_4 and BF_3 products awaiting shipment to customers are stored in the FEP Product Storage and Packaging Building until packaged using the respective enclosed packaging station within that building into customer DOT approved shipping cylinders (typically type 3A or 3AA). The SiF_4 or BF_3 product may be packaged into DOT approved shipping tube trailers, and in this case the product is transferred from the storage tubes to the tube trailer in the Fluoride Products Trailer Loading Building.

The Fluoride Products Trailer Loading Building is connected to the AHF Staging Containment Building and serves the purposes of: 1) loading tank trailers with AHF from storage and 2) loading gas-tube trailers with BF_3 or SiF_4 transferred from the FEP Product Storage and Packaging Building.

The AHF Staging Containment Building and the Fluorine Products Trailer Loading Building are totally enclosed, separated by a containment-type wall and provided with a leak detection and water spray system that is described below.

The SiF_4, BF_3 and AHF products in the FEP Product Storage and Packaging Building, the AHF Staging Containment Building and the Fluoride Products Trailer Loading Building have been chemically separated from licensed material through several process stages. These chemical products are physically stored, transferred and controlled such as not to affect on-site licensed material in the event of a release of these chemicals.

Products (AHF, SiF_4 and BF_3) that are shipped in the approved DOT tube or tank trailers are transferred through independent and safe-pressure designed piping and connections from their respective storage vessels to the product designated trailer in the Fluoride Products Trailer Loading Building. Process hazard analysis is conducted for the storage, handling and transfer of these chemicals. Safeguards and operational controls are designed and provided for standard industrial chemical safety, and where applicable, to meet requirements of U.S. Occupational Safety and Health Administration (OSHA) 1910.119 “Process Safety Management of Highly Hazardous Chemicals,” (CFR, 2009e) or federal and State of New Mexico environmental permit requirements.

The AHF Staging Containment Building and the Fluoride Products Trailer Loading Building are not totally leak-tight but are sufficiently enclosed and sealed to suppress or inhibit releases to the outside environment or into other adjacent buildings in the event of a leak or spill of the chemicals being stored or transfer loaded. A fluoride leak detection and water-spray deluge system provides for additional suppression and mitigation of potential AHF or fluoride product chemical releases.

The fluoride detection and water spray system is a safeguard to suppress (knock down) fluoride vapors within the building in the event of a leak or vessel breach and to minimize the potential of abnormal fluoride emissions to the environment. The system also provides the operational means to facilitate treatment and disposal of fluorides in event of a leak from a container or during transfer operations.

The AHF Staging Containment Building and the Fluoride Products Trailer Loading Building are equipped with an array of water-fog nozzles that are activated automatically if a leak of AHF or fluoride product chemicals should occur. Fluoride detectors are effectively configured throughout the two containment areas. The detection and control system is designed for automatically closing isolation valves at the storage tanks and at the tank trailer fill lines. The detection system also provides automatic and manual controls for initiating the water deluge system in event of chemical leakage in either building area. In the event one detector activates, an alarm sounds in the area Control Room and any chemical material transfer is stopped by automatic closure of the transfer isolation valves. The condition is investigated and corrected as necessary before starting or resuming transfer operations. If any two or more fluoride detectors activate in a building, the chemical material transfer valves automatically close and the water deluge system is automatically activated for that area. The detection and control system design in the storage tank area is based conservatively on the leakage of the entire contents of one full 8,000 lb (3,630 kg) storage tank of AHF. Once activated, the water flow continues until the event is investigated and determined to be a false alarm or under control. The system design in the truck loading area assumes that transfer of materials through hose connections and transfer lines is shut off by the automatic detection and control system controllers and valves before more than 8,000 lb (3,630 kg) of full-truck contents is released.

There are two (2) positive-air-lock doors in each of the two containment-type buildings. One air-lock in each building is an emergency exit to the outside. The other air-lock in each building is an exit and entrance to a separate Control Room, under positive pressure, where control and remote surveillance of the buildings and equipment are managed. Parts of the containment-type building structures, trenches and sumps have a protective coating compatible with aqueous HF to minimize corrosion in the event of a leak or spill.

If the deluge system activates, the water is gravity drained to sump pumps where it is transferred to a large lined carbon steel emergency reservoir tank (HF Recycle Tank) that is vented to the Plant KOH Scrubbing System. In the event the water deluge is activated and fluoride-bearing water from the building's spill drainage system is received into the holding tank, the aqueous fluoride solution is sent to the EPP plant for treatment..

1.1.4 Utilities Requirements

Utility resource requirements include electrical power, steam, natural gas, dry air, water and liquid and gaseous nitrogen. The Utilities Building contains a package steam boiler, a spare steam boiler for backup supply, associated boiler feed water softening and treating equipment, compressors and air driers for generating plant air as needed. A separate electrical substation and switchgear building are provided to supply and distribute electrical power requirements.

1.1.4.1 Electrical

The electrical power load demand in the facility is mostly for operating the reaction vessels (calciners) in the FEP Process Building and the refrigeration system and reaction vessel in the DUF_4 Process Building. The substation and major line-distribution system are designed for the plant at an estimated 4.9 VA. As detailed design and engineering proceeds, the electrical take-off calculations for specific equipment will better define load demands by area. The Main Switchgear Building houses the electrical gear, breakers and electrical systems for control and distribution of the main electrical power.

1.1.4.2 Steam

Steam is the primary heat source for vaporizing DUF_6 in the autoclave, heating some process and warehouse buildings, and tracing pipes to prevent solidification of temperature sensitive substances.

Steam requirement is estimated at about 2,500-3,500 lb/hr based on routine operations at design capacities. The steam is produced on-site using a packaged boiler system. The steam boiler package includes a softener system for the feed water, standard blow-down capabilities and associated steam and fuel controls. The boiler operates on natural gas and is located in the Utilities building. A spare package redundant boiler is planned for maintaining reliable heat source capabilities.

Condensate from autoclaves, line traps, heating units and process equipment is collected in local condensate tanks for temporary holding and flow control. Condensate is either treated and returned as feed to the steam boiler or used as makeup water in the process. Boiler blow-down is sent to the EPP for treatment, if needed, and evaporated at that point.

1.1.4.3 Compressed Air

Compressed air is needed for operation of some instrumentation, control valves, dust collector blow-back, hopper vibrators and some miscellaneous uses. Air is compressed and dried using vendor standard selected compressors to deliver approximately 100 psig. Air regulators and controls are specified as part of the detailed engineering and procurement package.

1.1.4.4 Nitrogen

Nitrogen is required for purge gas systems and in the process mainly for cooling of pre-condensers and product cold traps in the FEP process building. Liquid nitrogen is used for the cold traps. The cold nitrogen vapor exiting the product cold traps will be re-used for the pre-condenser cooling. Gaseous nitrogen leaving the condensers is collected and compressed to supply gaseous nitrogen in other parts of the facility where a dry inert gas is needed. The main application is for purge and seal systems, such as the rotary calciner inlet and discharge seals. A cost-benefit analysis will be conducted during detailed design to determine whether to make or buy the liquid nitrogen or to utilize another type cryogenic system, such as gaseous helium. It is assumed for the LA that liquid nitrogen is procured from a vendor.

1.1.4.5 Water Supply

The plant requires relatively low volumes of incoming water because of designs for recycling process water and re-circulating the cooling water. A preliminary estimate of water supply requirement is less than 10,000 gallons per day. Sanitary water usage for showers, lavatories, drinking, toilets and the laboratory comprise 3,000-4,500 gal/day of the total.

There is currently no municipal water line within a reasonably close distance to the plant site. Some other plants in the local area use ground wells as water supply. Ground wells are used for the IIFP Facility coupled with a packaged treatment plant to render the groundwater acceptable for sanitary and drinking water use.

1.1.4.6 Heating, Ventilation and Air Conditioning

Steam is used as the main heat source for process building environment. Process Control Room areas are served by electrical or gas supplied heat pump units for heating and air conditioning. Process equipment areas are open and of large volumes, so steam heating is practical. Cooling of the large process and storage areas of low occupancy is by fresh air ventilation either by roof-fan or side-wall vents. Smaller process areas that are routinely occupied by personnel, such as the product packaging areas, are cooled by local HVAC refrigerant type units. Final decisions on types, locations, number of units and thermal loading is pending the architecture and engineering details with respect to building design and layout.

1.1.4.7 Ground-Thermal System

Administrative areas, stores, process offices, laboratory, guard station and other personnel high occupancy areas are heated and cooled by ground-thermal systems. The current concept is to design, select and install two systems close to consumers.

A total 60-ton capacity (720,000 British Thermal Units, BTUs per hour) is estimated for the buildings identified and currently sized in the plant concept. Actual sizing, selection and engineering of the system will be decided in later detailed engineering work.

1.1.4.8 Solar Power Supplement

Plans are to use a combination of solar electric supply ground mount and roof space panel systems to supplement some building lighting and light-duty auxiliaries, such as small fan motors and battery chargers.

1.1.5 Supporting Infrastructure

The following sections address the supporting infrastructure including equipment support pads and spill containment, water treatment, storm sewers and collection basins and fire protection.

1.1.5.1 Equipment Support Pads and Spill Containment

Most of the process equipment is located inside the process buildings. There are some storage tanks, off-gas scrubbing equipment and utilities equipment located outside. Process building concrete aprons and pads are arranged to be close to the inside process equipment for each building, .

Process pads, where chemicals or hazardous materials are stored or handled, have dikes with sealed seams between the dike walls and concrete pad. The dike areas are designed to have an excess total capacity plus a design margin of safety for any one of the largest containers, vessels or tanks within the area.

Building aprons and pads that do not require dikes for spill control have curb designs to collect rainwater from building roofs and to prevent erosion. This arrangement helps prevent potential contamination of soil in the areas near process buildings in event of a leak or spill outside the normally controlled containment areas. In this design concept, runoff from building roofs and non-hazard areas is sent via the storm water sewer system to a double-lined retention basin designed to collect and evaporate storm water or to discharge in accordance with the New Mexico Groundwater Discharge Permit. It is unlikely that roof and non-hazard designated pads would contain radioactive or chemical contamination. The storm water runoff system design provides a means to collect and sample this retained water. This collection and controlled process provides reasonable assurance for operating the plant with minimal risks relative to storm water disposition.

1.1.5.2 Water Treatment

Cooling Water

Re-circulated cooling water is used in refrigeration systems, chillers and process heat exchangers. Cooling water is treated for corrosion prevention and protection relative to fungi, mold and Legionnaire disease organisms. The closed-system avoids effluent treatment in general owing to little to no waste discharge.

In the event of a spill or leak around the chillers or cooling systems, the cooling water is collected in the spill containment areas, pumped to the EPP holding tanks where it could be lime-treated, neutralized and evaporated through the EPP dryer unit. Chemical residues are likely to be very small amounts, if any, and will be disposed in an approved Resource Conservation and Recovery Act permitted disposal site. Small amounts of boiler blow-down water will also be sent to the EPP to be treated in the same manner.

Plant Water Treatment

Plant water supply is from an on-site well(s). Civil engineering and surveys have not been performed, so characterization of the well water is not fully defined. The current water supply treatment concept is to employ packaged treatment that provides well water to meet specifications for plant boiler raw water feed and for cooling water make-up needs. The boiler raw feed is further treated in the Utilities Building, for example through softeners, to meet the boiler feed specifications. Part of the raw water is pumped to separate storage and treated to meet drinking water standards for sanitary supply. About 3,000-4,500 gal/day of raw well water will need to be treated in a sanitary intake water packaged unit. The package unit treatment equipment and controls are housed in the Water Treatment Building.

1.1.5.3 Sewer Systems and Collection Basins

Storm Sewers

The IIFP Facility storm sewer systems conceptual design assumes a 100-year return period with one-hour precipitation event of 4.0 inches. The local precipitation information was obtained from the National Oceanic and Atmospheric Administration (NOAA) Precipitation Frequency Data Server for three weather stations in the Hobbs, NM area. These data show mean 100-year one-hour rainfalls of 3.33 to 3.40 inches with a maximum 90% upper confidence limit of 3.77 inches (NOAA, 2011). Preliminary engineering of the drainage system size and layout was done to estimate costs and determine requirements and information for additional detailed design later. The early design encompasses an area of the facility that includes the process buildings, auxiliary buildings, pads, roads, parking lot and the water treatment and electrical substation areas in the back acreage of the facility. All the storm sewer systems are inside the inner fenced area and collect rainwater runoff from an estimated 20-25 acres including roadways, building roofs and pads.

Storm Water Retention and Evaporation Basins

Two (2) collection basins are planned for use in handling surges of storm water drainage. One serves the Full DUF_6 Cylinder Storage Pad. The other is the main retention basin for collection of the site storm sewer drainage. Preliminary engineering calculations estimate the main basin needs to be approximately 100,000 cubic feet volume, assuming a 20% freeboard above the maximum design water level. The basin is double-lined with impervious synthetic materials typically used in these applications. Current plans are to use a sand base with a layer of geo-synthetic liner and a second layer of high density polyethylene. Detail engineering and specifications will be refined after civil engineering data are obtained from the site surveys and further discussions with the State of New Mexico regarding permits.

Considerable detailed design and engineering is required to meet state and local potential requirements relative to the retention/evaporation basins including bird netting and lining specifications and design. Given the plant basins are mainly for storm water collection and disposition, some of the issues normally encountered with holding basins are avoided.

Sanitary Sewer

Preliminary design of the currently planned sanitary system provides for capability to handle hydraulic loading of about 3,000-4,500 gal/day.

Treatment of sanitary sewer discharge uses a packaged system for primary and secondary digestion and activation. Tertiary treatment, most likely ultraviolet or other effective disinfection, follows. Biomass generated by the treatment is removed from the Facility Site by an approved and licensed haul and disposal contractor. The triple-treated water will be re-used in the plant for landscape or tree-farm watering.

Process Sewer

Water and solutions used in process equipment and KOH liquors used in air emissions scrubbing units are pumped, when contaminant concentrations dictate, to the EPP via above ground piping. The design in some cases is double-walled pipes where significantly hazardous solutions may require rigorous spill/leak prevention. This design is used where such piping could not practically be located within a contained spill control area.

Chemical process water is not transported through underground sewers or pipe and the facility is designed such as not to require process sewers.

1.1.5.4 Fire Protection

Two (2) above ground fire water storage tanks of 100,000 gallons each are provided to supply immediate demand. Water supply is from the groundwater wells with booster and jockey pumps to maintain supply to and from the reservoir. An electrical fire water pump and an emergency diesel fire water pump are provided.

The plant fire protection system is based on NFPA standard NFPA 13 and the New Mexico Commercial Building Code. Details of the IIFP Fire Safety Program including further description of the fire protection system is provided in Chapter 7 of the IIFP LA, Revision B.

1.1.6 Waste Management

The following sections address generation and handling of wastes at the plant.

1.1.6.1 Solid Wastes

Solid waste generated at the IIFP Plant will be grouped into industrial (nonhazardous), radioactive and mixed, and hazardous waste categories. In addition, solid radioactive and mixed waste will be further segregated according to the quantity of liquid that is not readily separable from the solid material. The solid waste management systems will be in designated areas, administrative procedures, and practices that provide for the collection, temporary storage, (no solid waste processing is planned), and preparing for off-site disposal of categorized solid waste in accordance with regulatory requirements. Solid radioactive wastes generated will be LLW as defined in 40 CFR 61 (CFR, 2011f). See Table 1-3, Estimated Annual Quantities of Waste Generated at the IIFP Facility.

Table 1-3 Estimated Annual Quantities of Waste Generated at the IIFP Facility

Material (Type of Waste)	Estimated Annual Amount (lb)
Depleted uranium oxide	2,800,000-6,200,000
Other process LLW	85,650-137,300
Resource Conservation Recovery Act (RCRA)	203,200-308,400*
Industrial waste including sanitary waste	60,650-91,300

*Includes Calcium Fluoride which may not be RCRA Waste if sold.

The depleted uranium oxide waste from the de-conversion process is shipped to an off-site LLW disposal facility licensed for accepting depleted uranium oxide.

Industrial waste, including sanitary waste, miscellaneous trash, vehicle air filters, empty cutting oil cans, miscellaneous scrap metal and paper will be shipped to off-site facilities for recycle or minimization. Then, if required, will be sent to a licensed waste disposal facility.

Radioactive waste, including dust collector bags or filters, ion exchange resin, crushed-contaminated drums, contaminated trash, contaminated carbon-bed trap and chemical trap material and contaminated disposal personnel protection items will be collected in labeled containers in each Restricted Area and transferred to a temporary radioactive waste storage area for inspection. Suitable waste will be volume-reduced, if appropriate, and radioactive waste will be disposed at a licensed LLW disposal facility.

Hazardous wastes and some mixed wastes will be generated at the IIFP Site. These wastes will also be collected at the point of generation, transferred to a temporary waste storage area, inspected and classified. Any mixed waste that may be processed to meet land disposal requirements may be treated in its original collection container and shipped as LLW for disposal at a licensed facility.

RCRA hazardous wastes will be collected and packaged in approved containers and shipped by a licensed RCRA transporter to a licensed RCRA disposal facility. Under New Mexico regulations, a facility that generates more than 1,000 kg (2,200 lb) per month is a large quantity generator of RCRA wastes. In New Mexico, hazardous waste generators are classified by the actual monthly generation rate, not the annual average.

There is no on-site disposal of any solid or chemical process liquid waste at the IIFP Facility. Therefore, waste management impacts for on-site disposal are not evaluated.

1.1.6.2 Liquid Wastes

The facility does not directly discharge any chemical process effluents to natural surface waters or grounds onsite, and there is no tie into a Publicly Owned-Treatment Works (POTW). No public impact is expected from routine liquid effluent discharge as no chemical process liquids are discharged off site.

Worker exposure to liquid in-plant effluents is minimal. No exposures exceeding 29 CFR 1910, (CFR, 2009b), Subpart Z is anticipated. Additionally, handling of all chemicals and wastes is conducted in accordance with the site Environment, Safety and Health Program, which conforms to 29 CFR 1910 and specifies the use of appropriate engineered controls, as well as personnel protective equipment, to minimize potential chemical exposures.

1.1.6.3 Liquid and Air Effluents

Process and Non-Process Wastewaters

Chemical process effluents are treated and recycled or reused within the processes. Relatively small amounts of aqueous and non-aqueous liquid waste generation can be expected. These miscellaneous materials are collected in approved containers. Some process solutions containing uranium will be sent to the Decontamination Building for removal of the uranium followed by evaporation of the treated water. Aqueous laboratory samples and other miscellaneous liquids from maintenance activities that may contain uranium are sampled to determine their uranium or hazardous waste content, collected in approved containers and sent to an approved licensed disposal facility appropriate for that type hazardous material, if applicable. Where potentially contaminated areas have to be cleaned with solutions, the solution, if contaminated, is sent to the De-contamination Building to remove uranium, evaporate the liquids, and packaging of any uranium residues for shipment to an off-site licensed disposal facility.

Non-process waste liquids that are determined to contain regulated or hazardous contaminants are collected and disposed at off-site licensed facility. Cooling water is recycled and steam condensate is either reused as process makeup water or treated and returned to the boiler. Where cooling water, steam condensate or boiler blow-down exceeds the amount that can be recycled, the excess water is evaporated.

A retention basin is used for the collection and monitoring of general site storm water runoff. Sanitary sewage effluent is discharged into a package treatment unit where it receives primary, secondary and tertiary treatment. The effluent from sanitary treatment is used in the plant for process make-up water or for landscape or site tree-farm watering.

Air Effluents

The primary materials used or generated at the facility are UF_6, HF, SiF_4, BF_3, UF_4 and UO_2. UF_6 is chemically reactive with water and will break down into uranyl fluoride (UO_2F_2) and hydrogen fluoride). When released to the atmosphere, gaseous UF_6 combines with humidity to form particulate UO_2F_2 and HF fumes. Inhalation of UF_6 typically results in internal exposure to UO_2F_2 and HF. In addition to a potential radiation dose, a worker would be subjected to two other primary toxic effects:

- Uranium in the uranyl complex acts as a heavy metal that can affect the kidneys.
- HF can cause severe irritation to the skin and lungs at high concentrations.

Because of low specific-activity values, the radio-toxicity of UF_6 and its products is of less concern than the chemical toxicity.

Of primary importance to IIFP is the control of UF_6. The UF_6 readily reacts with moisture and some other materials such as hydrocarbons at elevated temperatures. Other significant reaction products in the facility are HF, SiF_4 and BF_3 . Of these, HF is the most significant hazard. If any of these substances are released into the atmosphere, there is a potential are toxicity to humans. HF may also be generated as a by-product of the hydrolysis of $UF_{6,}$ BF_3 and SiF_4. Uranium material that has potential to become airborne is removed through filtration prior to the discharge of gaseous effluent to the atmosphere. See IIFP ER, Revision B for estimated emission data.

Worker exposure to in-plant gaseous effluents will not exceed chemical exposure limits defined in 29 CFR 1910, Subpart Z are anticipated. Laboratory and maintenance operations activities involving hazardous gaseous or airborne effluents are conducted with ventilation control (i.e., fume hoods, local exhaust or similar) and/or with the use of respiratory protection as required. All regulated gaseous effluents are below regulatory limits as specified by the New Mexico Air Quality Bureau.

Hazardous chemicals that are contained within licensed material or that could affect licensed material activities are evaluated as part of the ISA Summary, Revision B.

1.1.7 Raw Materials, By-Products, Wastes and Finished Products

The primary raw materials used at the IIFP Facility are DUF_6, SiO_2, and B_2O_3. The by-product of the facility is a chemically stable uranium oxide suitable for permanent offsite burial. Facility wastes include solid wastes, process waste liquids and air effluents as described above. The finished products are fluoride products, namely SiF_4, AHF and BF_3.

1.2 INSTITUTIONAL INFORMATION

This section describes the corporate identity, financial qualifications, type of license and the requested special authorizations and exemptions.

1.2.1 Corporate Identity

The applicant name and address, corporate structure and ownership control and physical location of the facility are provided below.

1.2.1.1 Applicant Name and Address

This application for a NRC source license is filed by IIFP. IIFP is a wholly owned subsidiary of International Isotopes Inc. (INIS) that is headquartered in Idaho Falls, Idaho.

The full address of the applicant is as follows:

Mailing Address:

4137 Commerce Circle
Idaho Falls, Id. 83401

Physical Address:

Same as Mailing Address

1.2.1.2 Organization and Management of Applicant

International Isotopes, Inc. was formed as a Texas corporation in 1995. Its wholly owned subsidiaries are International Isotopes Idaho Inc., International Isotopes Fluorine Products Inc. and International Isotopes Transportation Services Inc., all of which are Idaho corporations. Company headquarters and all operations are currently located within two facilities in Idaho Falls, Idaho.

Mr. Steve Laflin is President and Chief Executive Office and reports to the Board of Directors of INIS. An organization chart and description of the organizational structure for the IIFP Facility is provided in Section 2.1.4 of the IIFP LA, Revision B Chapter 2 "Organization and Administration."

1.2.1.3 Address of Facility and Site Location Description

The IIFP Site is located in Southeast New Mexico, approximately 19 km (12 mi) west of Hobbs, New Mexico (population 28,657). The site lies approximately one mile north of U.S. 62/180 and along the east side of New Mexico Highway 483. A mailing address has not yet been designated for the site. IIFP will provide the NRC a mailing address when it is determined and assigned by the U.S. Post Office. In the interim, the mailing address provided in the Applicant Name and Address section above may be used for all mail deliveries.

1.2.2 Financial Qualifications

IIFP estimates the total capital and startup (capitalized) cost of the IIFP Facility to be approximately $109 million dollars (projected in 2013 U.S. dollars) excluding the interest on debt, decommissioning and any replacement equipment required during the life of the facility.

IIFP presently intends to utilize a surety bond and Standby Trust Fund method to provide reasonable financial assurance that decommissioning funding will be available at the time of decommissioning the facility. IIFP will provide NRC the financial assurance instrument that IIFP intends to execute at least six (6) months prior to the receipt of licensed material in quantities and form requiring decommission funding. Upon finalization of the specific funding instrument to be used and at least twenty-one (21) days prior to the commencement of operations, IIFP will supplement its application to include the signed, executed documentation. IIFP is requesting an “exemption” in Section 1.5.2 relative to execution of the financial assurance instrument. The surety bond and Standby Trust Fund method will provide assurance that decommissioning costs will be paid in the unexpected event IIFP is unable to meet its decommissioning obligations at the time of decommissioning. In this case, funds drawn from the surety bond will be placed directly into a Standby Trust Fund naming the U.S. Nuclear Regulatory Commission as the beneficiary.

A Decommission Funding Plan (DFP) for the facility is developed and provided as Chapter 10 of the IIFP NRC Licensing Application, Revision B.

1.3 TYPE, QUANTITY AND FORM OF LICENSED MATERIAL

IIFP proposes to acquire, deliver, receive, possess, produce, use, transfer and/or store source material meeting the criteria of “Source Material” as described in 10 CFR 40.4, “Definitions” (CFR, 2008c). Details of the source material are provided in Table 1-4, “Type, Quantity, and Form of Licensed Source Material.” Also, it is anticipated that some license materials may be used for instrument calibrations. As those needs are identified during the detailed design phase, IIFP will prepare a license amendment as needed. A small amount of natural uranium for use in laboratory standards and methods is included in the licensed material request.

Table 1-4 Type, Quantity and Form of Licensed Source Material

Source Material	**Physical and Chemical Form**	**Licensed Material to be Possessed at any One Time**
Depleted uranium and daughters	Physical: solid, liquid, and gas Chemical: UF_6, UF_4, uranium oxides and other trace compounds	750,000 Kilograms as uranium
Natural uranium and daughters	Physical: solid, liquid, and gas Chemical: UF_6, UF_4, uranium oxides and other trace compounds	50 Kilograms as uranium
Any by-product material with atomic numbers 1 through 83 and any source material	Sealed Source	*Not to exceed 10.0 mCi per source and 1.0 Ci total

Note: ***millicuries (mCi) and curie (Ci)

The IIFP Facility will receive depleted uranium hexafluoride, process the material and ship depleted uranium oxide to an off-site licensed disposal facility. A detailed description of the IIFP processes is provided in Section 3 of the IIFP Integrated Safety Analysis Summary, Revision B. The 10 CFR 40.64 (CFR, 2011a) regulation details the requirements for reporting to the Nuclear Materials Management and Safeguards System (NMMSS) for Part 40 licensees. The primary reporting requirements of 10 CFR 40.64(a) include providing a Nuclear Material Transaction Report Form 741 (Form 741) to NMMSS in accordance with NUREG/BR-0006 (NRC, 2011a) and NMMSS Report D-24 for receipts, transfers and inventory adjustments of the licensed depleted uranium source materials (referred to as “source materials”), where applicable. Further, 10 CFR 40.64(b) requires an annual inventory of source material each year in accordance with NUREG/BR-0007(NRC, 2011b).

IIFP will meet and adhere to the above requirements through the use of a “Source Material Record and Reporting (SMRR) Plan” and implementing procedures. The SMRR Plan will be finalized and ready for implementation through its procedures at least four (4) months prior to receiving source material at the IIFP Facility. Also, IIFP will request the NMSSS Reporting Identification Symbol (RIS) and have the RIS in place prior to implementing the procedures and the receipt of source materials. The SMRR Plan describes source material recording and reporting relative to the IIFP organization, operational processes, records management and IIFP policy implementing procedures. The implementing procedures will be used in managing the source material inventory and database, training affected personnel in their respective source material recording and reporting duties and providing the reports required in the regulations. An accounting system will be used to manage the book inventory of source material.

If the Nuclear Material Transaction Report Form (Form 741) received by IIFP from shippers of source material to the IIFP Site, identifies the source material as subject to the terms of international treaties, the uranium source material will also be entered and accounted in the facility Inventory of Foreign Obligations.

For those transactions subject to NMMSS reporting requirements, the Form 741 will be prepared for transmittal in accordance with NUREG/BR-0006. A Form 741 will be transmitted to NMMSS for source material received at the IIFP Facility, for heel content of cylinders returned to the uranium enrichment (supplier/customer) facilities, and for depleted uranium oxide shipped from the IIFP Facility to an off-site licensed disposal facility.

The IIFP Facility will have one Material Balance Area (MBA) to account for incoming and outgoing depleted uranium source material. The DUF_6 received will be low in the U^{235} isotope (typically < 0.35 weight percent) and of low attractiveness, therefore the assay and uranium content of DUF_6 received as identified by the shipper measurement data will be recorded in the IIFP MBA inventory. When a cylinder of depleted DUF_6 is received from a supplier and the content weight verified, the supplier recorded assay and uranium content are used to determine the mass of uranium to be entered into the MBA inventory. Likewise, when the DUF_6 cylinder content is emptied to the process, the emptied cylinder is weighed to determine the contained “heel” material and the recorded assay and uranium content are used to determine the mass of uranium to be removed from the MBA inventory when the cylinder is shipped back to the supplier.

In the first step of the IIFP process, the DUF_6 is de-converted to DUF_4 that is then transferred to the FEP operations for use as feed material for production of fluorine products. The uranium content of the DUF_4 is accounted for in the inventory when the recorded amount of uranium in the DUF_6 received is entered into the MBA inventory. IIFP is capable of receiving pre-produced DUF_4 for use in production of the fluorine products. If DUF_4 is received from suppliers, its weight and assay and uranium content as identified by the shipper measurement data will be used to determine the uranium amount to be recorded in the MBA inventory.

In the FEP process the DUF_4 is converted to gaseous fluorine products and depleted uranium oxide. The depleted uranium oxide by-product of the FEP operation will be loaded into containers for shipment to an off-site licensed disposal facility. A statistically significant sampling method and chemical analysis of the samples will be conducted to determine the content of uranium in the depleted uranium oxide material to be shipped from the facility. The measurement methods applied to determine the concentration of uranium in the depleted uranium oxide for disposal will be governed by approved written procedures. The written procedure for uranium determination will include the sampling method and plan, acceptable quality levels, the approved analytical methods and steps, calibration standard requirements and procedures for calibration where applicable. The sampling method will be based on valid technical and statistical principles including estimating variance and establishing confidence limits associated with the sampling method. The qualified measurement methods, including the analytical accuracy, precision, variance and confidence limits will be demonstrated before being approved as an implementing procedure.

The data recorded in the MBA inventory, the net weight of the shipping containers for disposal and the uranium content in the uranium oxide will be used to determine the mass of uranium source material that will be removed from the MBA inventory. Analytical and weight data on the uranium content of the depleted uranium oxide will be incorporated into the uranium inventory database for preparation of the Form 741 shipping report and accounting of the Inventory of Foreign Obligations.

The IIFP Chief Operations Officer will appoint a key manager at the IIFP Facility to serve as the Uranium Materials Manager (UMM) who also may function in other management responsibilities at the IIFP Facility. The Uranium Materials Manager will be appointed with appropriate authority for implementation of the SMRR Plan and procedures throughout the operations, accounting, records management and security functions.

IIFP personnel who are involved with source material transactions, accounting and reporting will have their functions and assignments defined once the SMRR Plan is completed. These personnel will have other organization roles and responsibilities (e.g., a Process Operator or Area Supervisor may also function as a uranium material custodian. An Accounting Clerk may also be assigned as an inventory records and reporting clerk). Personnel who are involved with source material transactions will be formally trained and appointed to their source material job tasks. The SMRR Plan will identify the functional organization and assignments for source material transactions and records management.

For any given transfer of source material into or out of the MBA inventory, the material transfer information will be submitted to the IIFP Uranium Inventory Clerk. The Uranium Inventory Clerk will ensure that transfer information is entered into the book inventory and that a Form 741 is generated and processed if the transaction requires reporting to NMMSS. The Uranium Inventory Clerk will be trained in bookkeeping relative to MBA and NMMSS accounting and reporting and in the IIFP “Source Material Record and Reporting Plan” and implementing procedures.

An annual inventory of source material will be conducted at the end of each reporting year. The uranium material staging and storage areas will be inventoried by walk-down validating the book inventory of uranium containers in the MBA. Process measurement and calculation procedures will be used for determining the inventory contents of the process equipment.

The SMRR Plan will include policy to establish the annual reporting period, the reference procedures for conducting the annual inventory, and for reporting in accordance with NUREG/BR-0007. Facility material balance and the annual inventory data will be submitted to NMMSS on NRC Forms 742 and 742C.

The IIFP Facility Quality Assurance Manager will assure that audits are conducted for the source material records and reporting functions on an appropriate frequency as defined by respective procedures. Any findings of the self-assessments and audits will be entered into the facility tracking system for developing corrective actions. The UMM will ensure that related issues are followed through to resolution.

1.4 REQUESTED LICENSES AND AUTHORIZED USES

The Source Material license for the material described in Table 1-4 of Section 1.3 above is requested to be authorized for up to forty (40) years. IIFP plans to operate the facility indefinitely and continue to renew the license as needed.

IIFP will not store or process Special Nuclear Material (SNM) at the IIFP Facility. Therefore, no licenses and authorized uses for SNM are requested. SNM is defined in 10 CFR 40.4.

IIFP will contract with commercial enrichment plant suppliers (customers) who have requirements and licenses for their facilities to receive and process UF_6 that has resulted from natural uranium feed. Under the current IIFP License Application and commitments, it is highly unlikely that IIFP would receive DUF_6 cylinders that contain technetium (Tc) or transuranics (TRU). IIFP is not requesting a possession license to receive DUF_6 tails from facilities that enrich reprocessed uranium. Also with the current license request and the technology described in the current License Application, IIFP will not receive DUF_6 cylinders from the DOE stockpile (that may contain technetium or transuranic elements) based on the reasons discussed in the DOE "Portsmouth DUF_6 Conversion Final EIS, Appendix B" (DOE, 2004). IIFP will assure these requirements are met through contractual arrangement, technical specifications, terms and conditions of the contract and auditing of the commercial enrichment facility license. If IIFP in the future has the opportunity for receiving and processing (de-conversion) cylinders from the DOE DUF_6 stockpile and determines it to be feasible, then IIFP will prepare and submit a separate licensing amendment and action.

Studies conducted at Oak Ridge National Laboratory and results of a peer review by Lawrence Livermore National Laboratory state that "the only plausible pathway for TRU and technetium to end up in the depleted UF_6 cylinders is by way of heels from prior use of the cylinders to store reactor return feed." ("Strategy for Characterizing Transuranics and Technetium Contamination in Depleted UF_6 Cylinders," Oak Ridge National Laboratory, (Hightower, 2000) and "A Peer Review of the Strategy for Characterizing Transuranics and Technetium Contamination in Depleted Uranium Hexafluoride Tails Cylinder", Lawrence Livermore National Laboratory, (Brumbaugh, 2000)).

Therefore, IIFP will require suppliers of cylinders that are used for depleted tails and received by IIFP to preclude use of cylinders that in the past have contained reprocessed UF_6, unless those cylinders have been decontaminated and verification is made that such cylinders do not contain Tc and TRU contaminants. Suppliers of DUF_6 to IIFP will be required to provide written evidence as to the origin of the cylinders that are filled with DUF_6 and shipped to the IIFP Facility. Also, periodic audits of suppliers will be performed to provide assurance that these requirements are satisfied.

1.5 SPECIAL EXEMPTIONS AND SPECIAL AUTHORIZATIONS

1.5.1 Exemption for Use of International Committee on Radiological Protection ICRP-68 Dose Coefficients

In accordance with 10 CFR 40.14 (CFR, 2011c), "Specific Exemptions," International Isotopes Fluorine Products Inc. requests an exemption from certain provisions of 10 CFR 20.1204, Determination of internal exposure," (CFR, 2011d). Specifically; IIFP hereby requests a special exemption to authorize use of annual limits of intake (ALIs) and derived air concentrations (DACs) based upon dose coefficients published in the International Committee on Radiological Protection (ICRP) publication number 68, entitled “Dose Coefficients for Intake of Radionuclides by Workers,” (ICRP 68, Volume 24, No. 4, 1994) for determining dose to workers. Further, IIFP will make use of ICRP publication 72, entitled “Age-dependent Doses to the Members of the Public from Intake of Radionuclides Part 5, Compilation of Ingestion and Inhalation Coefficients,” (ICRP 72, Volume 26, No 1, 1996) for determining dose to the public due to effluents.

Consistent with 40.14(a);

Granting the exemption is authorized by law;

The requested exemption is consistent with provision provided by 20.1204(c)(2) which provides;

(c) When specific information on the physical and biochemical properties of the radionuclides taken into the body or the behavior or the material in an individual is known, the licensee may— (2) Upon prior approval of the Commission, adjust the DAC or ALI values to reflect the actual physical and chemical characteristics of airborne radioactive material (e.g., aerosol size distribution or density);

Granting the exemption will not endanger life or property or the common defense and security;

The exemption does not alter the design or effectiveness of the safety systems associated with the handling of radioactive materials, the containment of radioactive materials or the mitigation of radioactive material effluents.

Granting the exemptions is otherwise in the public interest;

The exemption does not; increase the potential for release or concentrations of radioactive material effluents from the site, alter the consequence category associated with accident scenarios associated with public exposure to radioactive effluents, or remove any Items Relied on for Safety (IROFS).

The requested exemption is considered administrative and procedural in nature and does not result in a significant change in the types or a significant increase in the amounts of any effluents that may be released offsite, there is no significant increase in individual or cumulative occupational radiation exposure, there is no significant construction impact and there is no significant increase in the potential for or consequences from radiological accidents. Consistent with the categorical exclusion provided by 51.22(c)(11) granting the exemption does not require a revision to the Environmental Report submitted with the License Application or a revision to the Environmental Impact Statement, Revision B or a standalone Environmental Assessment.

In lieu of the values in 10 CFR 20, Appendix B, (CFR, 2011g) IIFP will use the International Commission on Radiation Protection (ICRP)-68 derived air concentration (DAC) and annual limit intake (ALI) values in determination of dose for workers and the ICRP-72 dose coefficients (as referenced above) will be used for determination for dose for the public. An exemption to utilize the ICRP-68 and ICRP-72 dose coefficient values is herein requested by the License Application.

1.5.2 Exemption from Certain Provisions of 10 CFR 40.36, "Financial Assurance and Recordkeeping for Decommissioning, Paragraph (d)"

In accordance with 10 CFR 40.14, "Specific Exemptions," (CFR, 2011c) IIFP requests an exemption from certain provisions of 10 CFR 40.36 (NRC, 2011c), "Financial Assurance and Recordkeeping for Decommissioning," Paragraph (d). Specifically, 10 CFR 40.36(d) requires that "...the decommissioning funding plan must also contain a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning...."

As stated in Section 1.2.2 "Financial Qualification" of the License Application, "IIFP presently intends to utilize a surety bond and Standby Trust Fund method to provide reasonable financial assurance of decommissioning funding that will be available at the time of decommissioning the facility. At least six (6) months prior to the receipt of licensed material in quantities and form requiring decommissioning funding, IIFP will provide NRC the financial assurance instrument that IIFP intends to execute. Upon finalization of the specific funding instrument to be used and at least twenty-one (21) days prior to the commencement of operations, IIFP will supplement its application to include the signed, executed documentation."

The justification to provide the financial assurance instruments to the NRC six (6) months prior to operations and to fund the instruments twenty-one (21) days prior to operations is to allow issuance of the license so construction can commence without accruing costs associated with funding the financial assurance mechanism while at the same time providing the NRC with a sufficient amount of time to review the financial assurance instruments before licensed material would be brought on site.

Uranium contaminated equipment obtained from the Sequoyah Fuels Corporation facility will be decontaminated prior to transfer to the construction site. If residual uranium contamination, as uranium tetrafluoride or uranium oxides, associated with Sequoyah Fuels Corporation equipment cannot be decontaminated to unrestricted use levels, then this equipment will be received on-site and controlled in accordance with New Mexico Administrative Code, 20.3.3.304 B, "Small Quantities of Source Material." This equipment has been included in the decommissioning cost estimate and will be funded for decommissioning when the financial assurance mechanism is implemented as described above.

Therefore, IIFP specifically requests an exemption from the 10 CFR 40.36(d) requirement that the "Decommissioning Funding Plan must also contain a certification by the licensee that financial assurance for decommissioning has been provided in the amount of the cost estimate for decommissioning and a signed original of the financial instrument obtained to satisfy the requirements of paragraph (e) of this section" and alternatively that IIFP can provide the financial assurance instruments to the NRC six (6) months prior to the receipt of licensed material in quantities and form requiring decommissioning funding and to fund these instruments twenty-one (21) days prior to the receipt of licensed material in quantities and form requiring decommissioning funding.

Consistent with 40.14(a);

Granting the exemption is authorized by law;

The decommissioning liability associated with a site that does not possess licensed material, as would be the case during construction, should be considered zero. This is consistent with the "prepayment funding mechanism" described in §40.36(e) (1) which states (emphasis added); "Prepayment is the deposit prior to the start of operation into an account segregated from licensee assets and outside the licensee's administrative control…". This method of funding is also consistent with International Isotope Inc. License SUB-1587 Amendment 1 (Docket No. 40-9058) Block 17.

Granting the exemption will not endanger life or property or the common defense and security;

Delaying the funding of financial assurance until the receipt of licensed material in quantities and form requiring decommissioning funding does not endanger life or property or the common defense and security because the cost associated with decommission the facility during the construction phase is considered zero. Financial assurance for decommission will be in place prior to the receipt of licensed material in quantities and form requiring decommissioning funding when the decommission liability costs would be assured.

Granting the exemption is otherwise in the public interest; A requirement for funds to be set aside for the cost of decommissioning the facility prior to the receipt of licensed material in quantities and form requiring decommissioning funding presents an undue financial burden on IIFP. The decommissioning liability associated with the IIFP Facility during the construction phase is considered to be zero. The cost associated with maintaining financial assurance instruments during the construction phase of the project is not warranted, these costs could be allocated toward construction activities which provide employment opportunities to the local community which is in the public interest.

Granting the exemption meets the categorical exclusion criteria cited in §51.22(c)(25)(vi)(H) and (I) and therefore does not require a revision to the Environmental Report submitted with the License Application or a standalone environmental review.

1.6 SECURITY OF CLASSIFIED INFORMATION

All processes, materials and information at the IIFP Facility are unclassified. Therefore, the security of classified information is not applicable to the IIFP Facility.

1.7 SITE DESCRIPTION

This section contains description of the New Mexico site and surrounding areas. The IIFP ER, Revision B contains more detailed information regarding the Site and its environs. The information provided in the Site Description sections below was extracted mainly from the development and preparation of the site information in the IIFP ER, Revision B. The references for the specific site data and information are provided in Revision B of the ER.

1.7.1 Site Geography

This section contains information regarding the site location, including nearby highways, bodies of water and other geographical features.

1.7.1.1 Site Location Specifics

Site location specifics are described in Section 1.1.1 above. See Figure 1-2, "Location of IIFP Site" and Figure 1-3, General Site Location in Relation to NM Highway 483 and U.S. Highway 62/180. The approximate center of the IIFP Site is located at latitude 32 degrees, 43 min North and 103 degrees, 20 min West longitude.

Lea County is situated at an average elevation of 1,220 m (4,000 ft) above mean sea level (msl) and is characterized most often by its flat topography. Lea County covers 11,381 km^2 (4,393 mi^2) or approximately 1,138,114 ha (2,822,522 acres) which is three (3) times the size of Rhode Island and only slightly smaller than Connecticut. From north to south, Lea County spans 173 km (108 mi); the county spans 70 km (44 mi) from east to west at its widest point.

The IIFP property lies approximately one (1) mile north of U.S. Highway 62/180 and the along the east side of New Mexico Highway 483. U.S. Highway 62/180 intersects New Mexico Highway 209 providing access from the city of Hobbs south to Eunice and Jal. New Mexico Highway 132 runs north from Hobbs at the intersection with U.S Highways 62/180 to Knowles and Denver City. U.S. Highways 62/180 runs southwest to Carlsbad, New Mexico, approximately 50 miles from the site. U.S. Highways 62/180 runs east through Seminole, Texas, 28 miles from Hobbs to Forth Worth, Texas, 340 miles from the site.

1.7.1.2 Features of Potential Impact to Accident Analysis

The landscape of the site and vicinity is typical of a semi-arid climate and consists of sandy soils with desert-like vegetation such as mesquite bushes, shinnery oak shrubs and native grasses. The IIFP Site is open, vacant land. Except for man-made structures associated with the neighboring industrial properties and the local oil and gas industry, nearby landscapes are similar in appearance. The only agricultural activity in the site vicinity is domestic livestock ranching.

The IIFP Site is within the southern part of the Llano Estacado or Staked Plains, which is a remnant of the southern extension of the Southern High Plains. The Southern High Plains are remnants of a vast debris apron spread along the eastern front of the mountains of Central New Mexico by streams flowing eastward and southeastward during the Tertiary period. The site and surrounding area has a nearly flat surface. Natural drainage is south to southwest. Surface drainage is into numerous un-drained depressions as well as a small intermittent water tributary running from the southeastern boundary to the northwest.

The site area overlies prolific oil and gas geologic formations of the Pennsylvanian and Permian age. Other common features of the Southern High Plains are un-drained depressions called "buffalo wallows” which are believed to have formed by leaching of the caliche cap and the calcareous cement of the underlying sandstone and subsequent removal of the loosened material by wind.

There are no mountain ranges in the site vicinity. Several “produced water" lagoons are located on the property. "Produced water" is water that has been injected into oil wells to facilitate the extraction of oil. As oil wells mature, the ratio of water to oil in each well increases. This is because of the formation of “waters out” due to the water injection process. Water becomes a significant by-product of oil and gas production. There are two (2) Playa lakes on the site, but no significant bodies of water such as rivers or lakes. There are no parks, wilderness areas or other recreational areas located within or immediately adjacent to the IIFP Site. In addition, there are no architectural or aesthetic features that would attract tourists to the area.

1.7.2 Demographics

This section provides the current census results (calendar year [CY] 2010) for the area surrounding the IIFP New Mexico Site, to include specific information about populations, public facilities and industrial facilities. Land use and nearby bodies of water are also described.

1.7.2.1 Latest Census Results

According to the U. S. Census Bureau, the population of Lea County was 67,727 in 2010 with a population density of nearly 6.0 people per square kilometer. The population of Andrews County was 14,786 in 2010 with a population density of 3.8 people per square kilometer (see IIFP ER, Revision B). Its population experienced a similar growth/decline pattern as that of Lea County. The population of Gaines County in 2010 was 17,526 with a population density of 4.5 people per square kilometer. Unlike in Andrews County, the population of Gaines County was relatively stable during the 1990s. The total population of the three principal counties in the region of influence was about 100,000 in 2010. The area did not experience the population increase that occurred in other areas of New Mexico and Texas.

1.7.2.2 Description, Distance and Direction to Nearby Population Area

The IIFP Site is in Lea County, New Mexico. Figure 1-2 shows the city of Hobbs, New Mexico, the closest population center to the site, at a distance of about12 miles. Other population centers distances from the site are as follows:

- Eunice, Lea County, New Mexico: 35 km (22 mi) south-southeast
- Jal, Lea County, New Mexico: 69 km (43 mi) south-southeast
- Lovington, Lea County, New Mexico: 24 km (15 mi) north-northwest
- Seminole, Gaines County, Texas: 66 km (41 mi) east
- Denver City, Gaines County, Texas: 55 km (34 mi) northeast
- Andrews, Andrews County, Texas: 87 km (54 mi) southeast

Aside from these communities, the population density around the site region is extremely low. Other communities in Lea County include Buckeye, Caprock, Humble City, Knowles, McDonald, Maljamar, Monument, Oil Center and Tatum.

Surrounding property consists of vacant land and the industrial facilities described in Section 1.7.2.4 below. Cattle grazing on nearby sites occur throughout the year. Land around the site has been mostly developed by the oil and gas industry. The nearest residence is situated west northwest approximately 2.6 km (1.6 mi) from the northern IIFP Site boundary. There is no known public recreational area within five (5) miles of the site.

1.7.2.3 Proximity to Public Facilities

Urban development is relatively sparse in the vicinity of the IIFP Site. Within Hobbs, New Mexico several educational institutions are available for the education of personnel in the local community. There are two (2) colleges, a high school and an alternative high school, three (3) middle schools and twelve (12) elementary schools as well as two (2) private schools.

There are two (2) hospitals in Lea County, New Mexico. The Lea Regional Medical Center is located in Hobbs, New Mexico. Lea Regional Medical Center is a 221 licensed-bed hospital that can handle acute and stable chronic care patients. The Lea Regional Medical Center is 15.5 km (9.6 mi) directly east northeast from the site, or 31.4 (19.5 mi) from the site using NM 483, U.S. 62, North Grimes Street and North Lovington Highway. In Lovington, New Mexico, Covenant Medical Systems manages Nor-Lea Hospital, a full-service, 27-bed facility. The Nor-Lea Hospital is 27.0 km (16.8 mi) north of the IIFP Site.

There are thirteen (13) nursing homes or senior living facilities in Hobbs. There are twenty-one (21) daycare providers and preschool centers in Hobbs.

As mentioned above, no state or federal park is located within five (5) miles of the IIFP Site.

1.7.2.4 Nearby Industrial Facilities

Land around the IIFP Site has been mostly developed by the oil and gas industry. Nearby industrial facilities are the Xcel Energy Cunningham Station plant on the west boundary (New Mexico Highway 483), approximately 1.6 km (1.0 mi) from the IIFP Site, the Xcel Energy Maddox Station 3.5 km (2.2 mi) to the east, the Colorado Energy Hobbs Generating Station approximately 3.1 km (1.9 mi) east-northeast of the site and the DCP Midstream Plant 5.8 km (3.6 mi) southeast of the site. The average number of employees working at these facilities is shown in Table 1.5.

Table 1.5 Nearby Industrial Facilities

Company	Employees on Days	Shift Employees (per shift)
DCP Midstream Linam Ranch Plant	67	2
Colorado Energy Hobbs Generating Station	14	3
Xcel Energy Maddox Station	12	2
Xcel Energy Cunningham Station	25	3

1.7.2.5 Land Use within a Five Mile Radius

As mentioned above, the Site is undeveloped and utilized for oil and gas wells. Several power lines and underground power lines run generally east to west and several gas pipelines run north and west as well as east to west.

Surrounding property consists of vacant land, three power companies and the gas processing plant mentioned above. Cattle grazing on nearby sites occur throughout the year. Land around the IIFP Site has been mostly developed by the oil and gas industry.

1.7.2.6 Land Use within One Mile of the Facility

As described above, very little land use occurs nearby the IIFP Site. Land use within one mile of the facility is essentially the same as that within five (5) miles of the facility.

1.7.2.7 Uses of Nearby Bodies of Water

Surface water resources (bodies of water) at the site are minimal. There are two (2) local playas on the site with a small stream that runs from the northwest to southeast across the property that is predominantly dry during the year. The nearest river is fifty (50) miles or greater from the IIFP Site.

The site region has semi-arid climate, with relatively low precipitation rates and minimal surface water occurrence. Thus, the potential for negative impacts on those water resources are very low due to lack of water presence and formidable natural barriers to any surface or subsurface water occurrences.

1.7.3 Meteorology

The following sections address the site meteorologic conditions.

1.7.3.1 Primary Wind Directions and Average Wind Speeds

Spring is the windy season. Winds of 15 mph or more occur from February through May. Blowing dust and serious soil erosion of unprotected fields may be a problem during dry spells. Winds are generally stronger in the eastern plains than in other parts of the State. Winds generally predominate from the southeast in summer and from the west in winter, but local surface wind directions will vary greatly because of local topography and mountain and valley breezes. Average wind speed and direction from four regional locations are shown below in Figure 1-11, Wind Rose for Midland-Odessa, Roswell, Hobbs and Eunice for 1993.

1.7.3.2 Annual Precipitation – Amounts and Forms

As described in the IIFP ER, Revision B the normal annual total rainfall as measured in Hobbs, New Mexico is 16 inches. Precipitation amounts range from an average 0.45 inch in January to 2.63 inches in September. Maximum and minimum monthly totals are 13.8 inches and zero. Table 1-6 presents a summary of precipitation in the Hobbs area for monthly and annual means from the Hobbs weather station with monitoring data from 1914 to 2006. Total snowfall is also shown in Table 1-6. The mean snowfall is 5.1 inches with a high of 27.1 inches at this monitoring location.

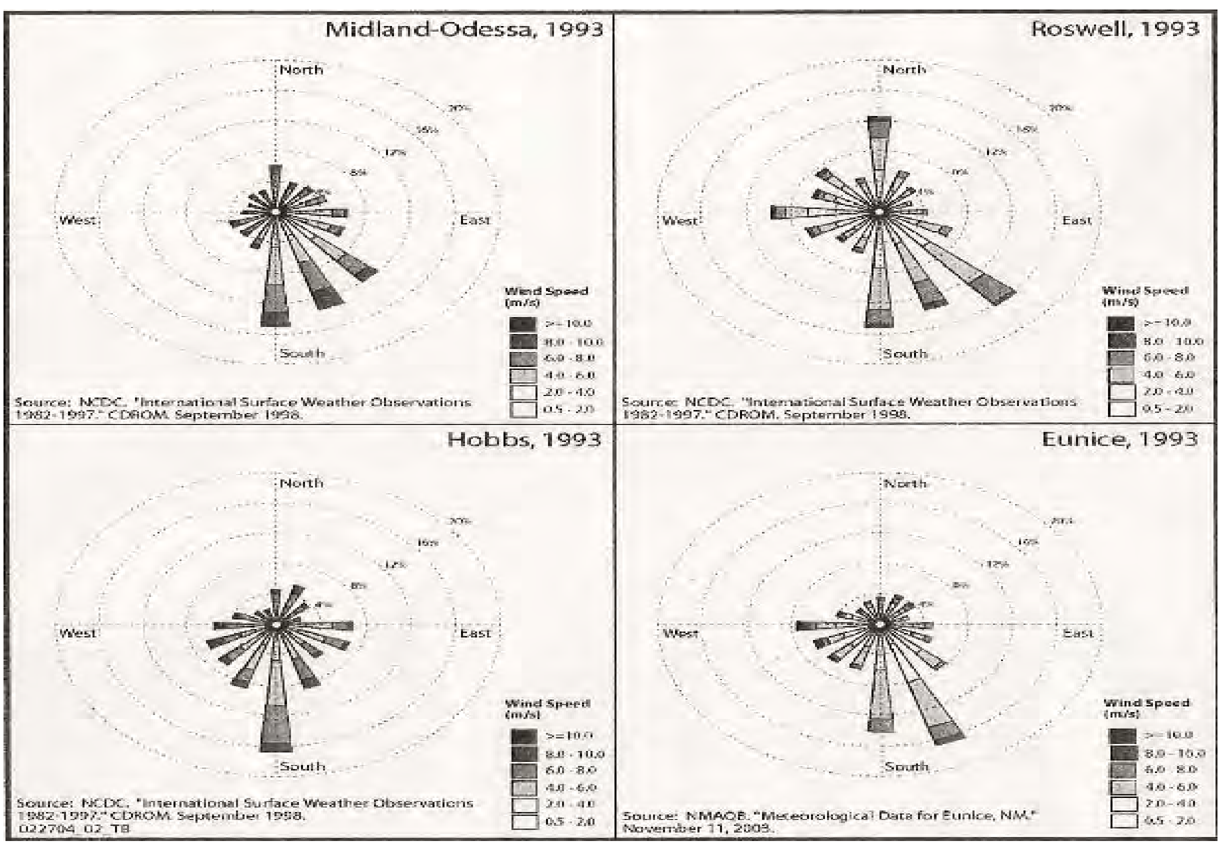


Figure 1-11 Wind Rose for Midland-Odessa, Roswell, Hobbs and Eunice for 1993

Table 1-6 Summary of Monthly Precipitation at Hobbs, New Mexico from 1914 to 2006

	Rainfall							Total Snowfall		
Month	**Mean**	**High**	**Year**	**Low**	**Year**	**1-Day Maximum**		**Mean**	**High**	**Year**
January	1.14 cm (0.45 in)	7.52 cm (2.96 in)	1949	0.00	1924	3.07 cm (1.21 in)	01/11/1949	3.30 cm (1.3 in)	31.75 cm (12.5 in)	1983
February	1.14 cm (0.45 in)	6.20 cm (2.44 in)	1923	0.00	1917	3.53 cm (1.39 in)	02/05/1988	2.79 cm (1.1 in)	36.32 cm (14.3 in)	1973
March	1.40 cm (0.55 in)	7.57 cm (2.98 in)	2000	0.00	1918	5.08 cm (2.00 in)	03/20/2002	1.27 cm (0.5 in)	25.40 cm (10.0 in)	1958
April	2.03 cm (0.80 in)	13.13 cm (5.17 in)	1922	0.00	1917	4.75 cm (1.87 in)	04/20/1926	0.51 cm (0.2 in)	22.86 cm (9.0 in)	1983
May	5.16 cm (2.03 in)	35.13 cm (13.83 in)	1992	0.00	1938	13.21 cm (5.20 in)	05/22/1992	0.0	0.0	1948
June	4.80 cm (1.87 in)	23.62 cm (9.30 in)	1921	0.00	1924	11.23 cm (4.42 in)	06/07/1918	0.0	0.0	1948
July	5.33 cm (2.10 in)	23.90 cm (9.41 in)	1988	0.00	1954	11.35 cm (4.47 in)	07/19/1988	0.0	0.0	1948
August	6.02 cm (2.37 in)	23.29 cm (9.17 in)	1920	0.10 cm (0.04 in)	1938	11.30 cm (4.45 in)	08/09/1984	0.0	0.0	1948
September	6.68 cm (2.60 in)	32.99 cm (12.99 in)	1995	0.00	1939	19.05 cm (7.50 in)	09/15/1995	0.0	0.0	1948

Table 1-6 Summary of Monthly Precipitation at Hobbs, New Mexico from 1914 to 2006

October	4.04cm (1.59 in)	20.70 cm (8.15 in)	1985	0.00	1917	14.22 cm (5.60 in)	10/09/1985	.25 cm (0.1 in)	11.43 cm (4.5 in)	1976
November	1.45 cm (0.57 in)	11.00 cm (4.33 in)	1978	0.00	1915	9.65 cm (3.80 in)	11/04/1978	1.52 cm (0.6 in)	41.91 cm (16.5 in)	1980
December	1.42 cm (0.56 in)	12.90 cm (5.08 in)	1986	0.00	1917	4.72 cm (1.86 in)	12/21/1942	2.29 cm (0.9 in)	24.13 cm (9.5 in)	1986
Annual	40.49 cm (15.94 in)	81.76 cm (32.19 in)	1941	13.41 cm (5.28 in)	1917	19.05 cm (7.50 in)	09/15/1995	11.93 cm (4.7 in)	68.83 cm (27.1 in)	1980

1.7.3.3 Severe Weather

Extreme Temperature

Table 1-7 below, Temperature Extremes at Hobbs, New Mexico, shows the highest and lowest recorded temperatures in the IIFP Site area.

Table 1-7 Temperature Extremes at Hobbs, New Mexico

Station	Temperature Extremes ^{o}C (^{o}F)			
	High	**Date**	**Low**	**Date**
Hobbs	45.6 (114)	June 27, 1998	-21.7 (-7.1)	January 11, 1962
Hobbs FAA Airport	42.2 (108)	July 14, 1958	-23.9 (-11)	February 1, 1951
Hobbs 13 W	41.7 (107)	June 25, 1998	-16.1 (3)	December 8, 2005

Extreme Precipitation

Summer rains fall almost entirely during brief, but frequently intense thunderstorms. Frequent rain showers and thunderstorms from June through September account for over half the annual precipitation. The general southeasterly circulation from the Gulf of Mexico brings moisture from the storms into the State of New Mexico, and strong surface heating combined with orographic lifting as the air moves over higher terrain causes air currents and condensation. Orographic lifting occurs when air in intercepted by a mountain and is forcefully raised up over the mountain, cooling as it rises. If the air cools to its saturation point, the water vapor condenses and a cloud forms. August and September are the rainiest months with 30 to 40 percent of the year's total rainfall during those two (2) months.

Extreme Winds

Wind speeds over the State of New Mexico are usually moderate, although relatively strong winds often accompany occasional frontal activity during late winter and spring months and sometimes occur just in advance of thunderstorms. Frontal winds may exceed 30 mile/hr for several hours and reach peak speeds of more than 50 mile/hr.

Design wind speeds for all buildings and structures that do not contain licensed material or for buildings and structures containing chemicals or processes that do not affect licensed material will be determined in accordance with the applicable model building codes (New Mexico Commercial Building Code) and American Society of Civil Engineers ASCE 7-05, (ASCE, 2006) or latest editions adopted by the State of New Mexico at time of design). Specifically, these buildings and structures will be designed for a minimum straight gust wind speed of 90 mph.

The IIFP Facility buildings and structures that contain hazardous radiological and chemical (if applicable) materials that must be controlled or mitigated to meet the performance criteria given in 10 CFR Part 70.61, (CFR, 2009a) are treated for the purposes of evaluating risk as equivalent to PC-3 structures per the Natural Phenomena Hazard Evaluation methods prescribed in DOE-STD-1020-2002 (DOE, 2002). These structures will be designed to withstand a straight gust wind speed of 135 mph at the 10^{-4} probability level of exceeding. Hence, based on the order of magnitude scale for determining event likelihood using the ISA methodology in NUREG-1520, Rev. 1, the collapse or loss of the building integrity is considered to be highly unlikely at this design basis.

Sandstorms

Blowing sand and dust may occur occasionally. Large dust storms with the potential of covering a large region are rare (DOE, 2003).

Thunderstorms

Thunderstorms occur during every month but are most common in the spring and summer months. Thunderstorms occur on an average of 36.4 days/yr in Midland-Odessa. The seasonal average are: 11 days in the spring (March through May) and 17.4 days in the summer (June through August); 6.7 days in the fall (September through November); and 1.3 days in winter (December through February). Occasionally, thunderstorms are accompanied by hail.

Lightning

Only two lightning events having sufficient intensity to cause loss of life, injury, significant property damage, and/or disruption to commerce were reported in Lea County, New Mexico, between January 1, 1950 and April 30, 2004 (see IIFP ER, Revision B). The closest lightning event occurred in Hobbs with minor property damage of $3,000 on August 12, 1997. The second occurred in Lovington on August 8, 1996, causing two deaths.

The NOAA database indicates that Lea County is in a region that has an average flash density of 4 to 5 flashes/km^2/yr. The conversion of this flash density to a 40 acre basis for the IIFP fenced area indicates that the site could expect 0.65 to 0.81 flashes per year (equivalently less than one flash per year). IIFP structures, equipment and associated power systems will be designed and built with heavy grounding and/or lightning protection to handle lightning strikes (NOAA, 2010).

Tornados

Tornadoes are occasionally reported in New Mexico, most frequently during afternoon and early evening hours from May through August. NOAA National Climate Data Center (NCDC) Storm Events includes information for 527 tornado events reported for the state of New Mexico for the period 1950-2010 for an average of 8.78 events per year. Lea County reported 92 tornadoes for the same period for an average of 1.53 tornadoes per year. Of these 92 tornado events for Lea County between 01/01/50 and 01/31/10, 63 - F0, 20 - F1, 8 - F2, and one- F3 tornadoes were reported. During this same sixty-year period, no F4 or F5 tornadoes were reported (NOAA, 2010a).

Tropical Storms and Hurricanes

Hurricanes are low pressure weather systems that develop over the tropical oceans and as they move inward they lose their intensity quickly once they make landfall. The IIFP Site is approximately 500 mile from the nearest coast, it is likely that any hurricane that moved in that direction would have downgraded to a tropical depression before it reached IIFP.

Floods

The IIFP Site has not been mapped but does not lie within areas which have been mapped and are in the 100-year floodplain in and around Hobbs, New Mexico according to information provided in the U.S. Federal Emergency management Agency (FEMA) Mapping Information Platform. Preliminary screening indicates that flooding is not a design basis event other than in consideration of storm water runoff which is included in the detailed facility design. See section 1.3.2.6 “Floods” of the IIFP ISA Summary, Revision B.

Snow

The mean annual snowfall is 5.1 inches as recorded at the Hobbs weather station with a high annual total of 27.1 inches. The historical maximum snow depth for Hobbs, NM is 12.2 inches and it occurred during the month of November. The 2-day 100-year snowfall is 12.1 inches which also occurred in November.

The design basis extreme environmental roof load for the process buildings (involving or affecting licensed material) at the IIFP Site is 81.2 lb/ft^2 or 396.8 kg/m^2. This design load is based on the sum of the 100-year return period snowpack and the load corresponding to the 48-hour all-season precipitation and an annual probability of 1.0 x 10^{-5} for the Facility site area. (Refer to the IIFP ISA Summary, Revision B Section 1.3.2.7 for an additional description of determining the design basis snow load).

1.7.3.4 Hydrology

This section describes the IIFP Site's surface water and groundwater resources. Data are provided for the IIFP Site and its general area, and the regional associations of those natural water systems are described. This information provides the basis for evaluation of any potential facility impacts on surface water, groundwater, aquifers, water use and water quality. Subsections address surface hydrology, water quality, pre-existing environmental conditions, water rights and resources, water use, contamination sources and groundwater characteristics.

Characteristics of Nearby Rivers, Streams and Other Bodies of Water

The climate in southeast New Mexico is semi-arid. Precipitation in the IIFP area averages only 33 to 38 cm/yr (13 to 15 in/yr). Evaporation and transpiration rates are high which results in minimal, if any, surface water occurrence or groundwater recharge.

Two small intermittent drainages are located on the southwest quadrant of Section 27. The drainages grade to the southeast and coalesce approximately 396 m (1,300 ft) south of the section boundary. The coalescent drainage continues to grade to the south/southeast toward Monument Draw. Monument Draw is a major surface drainage feature in southern Lea County and is clearly present in topographical maps approximately 22.5 km (14 mi) southeast of the section boundary. Although the drainage present in Section 27 grades toward Monument Draw, a review of topographic maps did not reveal a clear physical connection to Monument Draw. The drainage terminates in a playa approximately 12.9 km (8 mi) southeast of the section (GL, 2010).

Surface drainage at the site is also contained within two (2) local playa lakes that have no external drainage. The nearest river to the IIFP Facility site is 50 miles, or greater, away (the Pecos River) and runoff from the site does not drain to this river. Surface water is lost through infiltration and/or evapotranspiration resulting in high salinity conditions and the waters in soils associated with the playas. These conditions are not favorable for the development of viable aquatic or riparian habitats. The IIFP Facility has no direct outfall to a natural body of surface water. IIFP defines "direct outfall" as a discharge of facility water directly into a natural body of surface water such as a river or stream, or as a water discharge normally identified as an "outfall" in a National Pollutant Discharge Elimination (NPDES) permit. At the IIFP Facility, chemical process water is either recycled back into the process systems or evaporated. Process areas where hazardous chemicals or licensed materials are processed and handled have sealed dikes, curbs and pumps, where necessary, to collect and transport leaks or spills in those areas back into the process or to the EPP for treatment as process water. Sanitary wastewater from toilets, lavatories and showers receives primary, secondary and tertiary treatment and is used to water an on-site tree farm in accordance with New Mexico ground-water permit requirements. Disposition of sanitary water and collected rain or storm water is further described in Section 1.1.5.3 above.

Depth to the Groundwater Table

The site sits upon the Ogallala Aquifer where the overall underground reservoir system depth varies from actual surface discharge to over 150 meters (500 feet). Generally the Aquifer is found from 15 to 90 meters (50 to 300 feet) below the land surface (WE, 2011). More specifically for the IIFP Site, a drill log of an Xcel Energy, Maddox Facility water supply well (M3) located in Section 27 indicates the Ogallala Formation was encountered from 30 to 155 feet below the ground surface (bgs). Initial depth to groundwater (DTGW) in M3 was 55 feet when completed in 1965. Three (3) Xcel Energy, Cunningham Facility monitoring wells are located along a north-south axis close to the western boundary of Section 27 and have been monitored for DTGW as recently as November of 2009. DTGW within these wells ranges from 59 feet to 67 feet bgs (GL, 2010). The Site region has semi-arid climate, with relatively low precipitation rates and minimal surface water occurrence. Thus, the potential for negative impacts on those water resources are very low due to lack of water presence and formidable natural barriers to any surface or subsurface water occurrences. It is highly unlikely that groundwater at the site would be impacted by any potential releases because of the dikes, curbs, collection basins, spill controls and water discharge controls provided in the facility process areas.

Groundwater Hydrology

The IIFP Site is located west of the Llano Estacado caprock and east of the Pecos River in southeastern New Mexico. The Llano Estacado surface is underlain by the Ogallala Formation, which is composed of fluvial gravels exposed at the base with thicker eolian fine sand above. It is capped by the Caprock, a 3-m (9-ft) thick calcrete that is the resistant layer upon which the Llano Estacado if formed.

The surface geology is dominated by erosion that has exposed the upper weathered surface of the Caprock. Bioturbation of site sediments by rodents and insects may be severe. In some places, young deposits are present that include slope-wash sediments along the margins of playas and eolian sand deposits on the leeward (east) side of playas. Thin eolian deposits also occur along the northern edge of the southern lobe of the Llano, the sand derived from the Mescalero Plain. The draws across some areas of the Llano are old drainages filled with Holocene-age sediment.

Most precipitation is contained onsite due to infiltration and/or evapotranspiration. The vegetation on the site is primarily shrubs and native grasses. The surface soils are predominantly of an alluvial or eolian origin. The texture of the surface soils is generally silt or silt-like sands. Therefore, the surface soils are relatively low in permeability, and would tend to hold moisture in storage rather than allow rapid infiltration to depth. Water held in storage in the soil is subsequently subject to evapotranspiration. Evapotranspiration processes are significant enough to short-circuit any potential groundwater recharge.

A National Pollutant Discharge Elimination System Construction General Permit for storm water discharge is required because construction of the IIFP Facility will involve the grubbing, clearing, grading or excavation of one or more acres of land. This permit is required prior to certain pre-construction activities and to construction activities and will be administered by the U.S. Environmental Protection Agency with oversight review by the New Mexico Water Quality Bureau. Various land clearing activities such as off-site borrow pits for fill material are covered under this general permit. IIFP construction contractors will be clearing approximately 40 acres during the construction stage of the project. IIFP will develop a Storm Water Pollution Prevention Plan (SWPPP) and file a Notice of Intent (NOI) with the EPA, at least seven (7) days prior to the commencement of construction activities, in accordance with regulatory requirements

A Spill Prevention Control and Countermeasure (SPCC) plan will be implemented for the facility to identify potential spill substances, sources and responsibilities. In addition, storm water discharges during plant operation will be controlled by a Storm Water Pollution Prevention Plan to assure that runoff released to the environment will be of acceptable water quality.

Characteristics of the Uppermost Aquifer

The Ogallala Aquifer, also known as the High Plains Aquifer, is a huge underground reservoir created millions of years ago that supplies water to the region which includes the IIFP Site. The aquifer extends under the High Plains from west of the Mississippi River to the east of the Rocky Mountains. The aquifer system underlies 174 square miles in parts of eight States (Colorado, Kansas, Nebraska, New Mexico, Oklahoma, South Dakota, Texas and Wyoming).

Design Basis Flood Events Used for Accident Analysis

The IIFP Site has not been mapped and does not lie within areas that have been mapped and that are in the 100-year or 500-year flood-plain in and around Hobbs, New Mexico according to information provided in the FEMA Mapping Information Platform. Additionally, no river is within fifty (50) miles. However, an analysis for flooding at the site was performed in consideration of “flash” flooding in the event of extreme precipitation. The likelihood of any major flood at the Plant Site is determined to be low and the consequences are limited (due to no fissile material existing at the site). Thus, flood-type accidents are not a significant risk for facility operations. A detailed analysis and discussion of flooding at the IIFP Site are provided in the IIFP ISA Summary, Revision B Section 1.3.2.6.

1.7.4 Geology and Seismology

This section describes the geology and seismology at the New Mexico, including soil characteristics, earthquake magnitudes and return periods and other geologic hazards. Seismic analysis and design basis are discussed in the IIFP LA, Revision B Chapter 3 Section 3.2.4.3 Subsection “Natural Phenomena Hazards” and in the IIFP ISA Summary, Revision B Section 4.4.2.

1.7.4.1 Characteristics of Soil Types and Bedrock

The IIFP Site is located west of the Llano Estacado caprock and east of the Pecos River in southeastern New Mexico. The Llano Estacado surface is underlain by the Ogallala Formation, which is composed of fluvial gravels exposed at the base with thicker eolian fine sand above. It is capped by the Caprock, a 3-m (9-ft) thick calcrete that is the resistant layer upon which the Llano Estacado if formed.

The Pecos Plains section is characterized by its more irregular erosion topographic expression. The boundary between the two sections is locally referred to as Mescalero Ridge. In southern Lea County, Mescalero Ridge is an irregular erosion topographic feature with a relief of about 9.1 to 15.2 m (30 to 50 ft) compared with a nearly vertical cliff and relief of approximately 45.7 m (150 ft) in Northwestern Lea County. The lower relief of the ridge in the southeastern part of the county is due to partial cover by wind-deposited sand. The dominant geologic feature of this region is the Permian Basin. The Permian Basin is a massive subsurface bedrock structure that has a downward flexure of a large thickness of originally flat-lying, bedded, sedimentary rock. The Permian Basin extends to 4,880 m (16,000 ft) below msl. The IIFP Site is located within the Central Basin Platform area. The Central Basin Platform divides the Permian Basin into the Midland and Delaware sub-basins. The top of the Permian deposits are approximately 434 m (1425 ft) below ground surface at the IIFP Site. Overlying the Permian are the sedimentary rocks of the Triassic Age Dockum Group.

The upper formation of the Dockum Group is the Chinle Formation, a tight claystone and silty clay layer. The Chinle Formation is regionally extensive with outcrops as far away as the Grand Canyon region in Arizona. In the vicinity of the site, the Chinle Formation consists of red, purple and greenish micaceous claystone and siltstone with interbedded fine-grained sandstone. The Chinle (also known as Red Bed) Formation is overlain by Tertiary Ogallala, Gatuna or Antlers Formations (alluvial deposits). Caliche is a partly indurate zone of calcium carbonate deposits accumulation formed in the upper layer of surficial deposits. Soft caliche is interbedded with the alluvial deposits near the surface.

IIFP will conduct geotechnical and geophysical investigations and analyses to determine the site class, seismic site response, liquefaction potential, soil settlement potential and allowable bearing capacity of the soil for the IIFP Facility site. Details of the analysis plan and the codes and standards to be followed are provided in the IIFP ISA Summary, Revision B Section 1.5.4 and in the IIFP LA, Revision B Chapter 3 Section 3.1.5.3, respectively.

1.7.4.2 Earthquake Magnitudes and Return Periods

The IIFP Site is in a seismically quiet region, with earthquakes being of relatively small (< 2.0 Md) magnitude. No Quaternary faults or folds, thought to be associated with most earthquakes of moment magnitude 6 or greater over the last 1.6 million years, exist in the southeast New Mexico/west Texas region (Yarger, 2009).

The majority of earthquakes in the United States are located in the tectonically active western portion of the country. However, areas within New Mexico and the southwestern United States also experience earthquakes, although at a lower rate and at lower intensities. Earthquakes in the region around the IIFP Site include isolated and small clusters of low to moderate size events toward the Rio Grande Valley of New Mexico and in Texas, southeast of the IIFP Site.

Table 1-8 below summarizes IIFP Site peak horizontal ground acceleration (pga) for various recurrence intervals of potential interest (1,000, and 2,500 years). As noted below, *T* is the earthquake return period, "P" is the annual probability of exceedance. "EP" is the probability of exceedance in "n" years when "n" is taken to be 50 years. The pga values of 0.05g and 0.11g for 1,000 year recurrence interval earthquakes respectively, are determined from the United States Geological Survey (USGS) seismic hazard tables for the site latitude and longitude (USGS 2002). The pga of 0.03 for the 500 year recurrence interval earthquake was determined by Weber (Weber, 2008).

Probabilistic ground motion for the site is also shown in Table 1-8. Seismic activity is well documented as the result of licensing activities of an enrichment facility located near Eunice, New Mexico and the extensive network of seismometers established for a Waste Isolation Pilot Plant (WIPP) facility near Carlsbad, New Mexico. The Peak Horizontal Ground Acceleration (pga) for a 1,000 and 2,500 year return is 0.05g and 0.11g respectively (USGS, 2002).

Table 1-8 Seismic Criteria for New Mexico Site

T	500 yrs	1000 yrs	2500 yrs
P	0.002 (.2%)	0.001 (.1%)	0.0004 (.04%)
EP	0.1 (10%)	0.05 (5%)	0.02 (2%)
n	50 yrs	50 yrs	50 yrs
pga	0.03g (1)	0.05g (2)	0.11 (2)

(1) Weber, 2008
(2) USGS, 2002

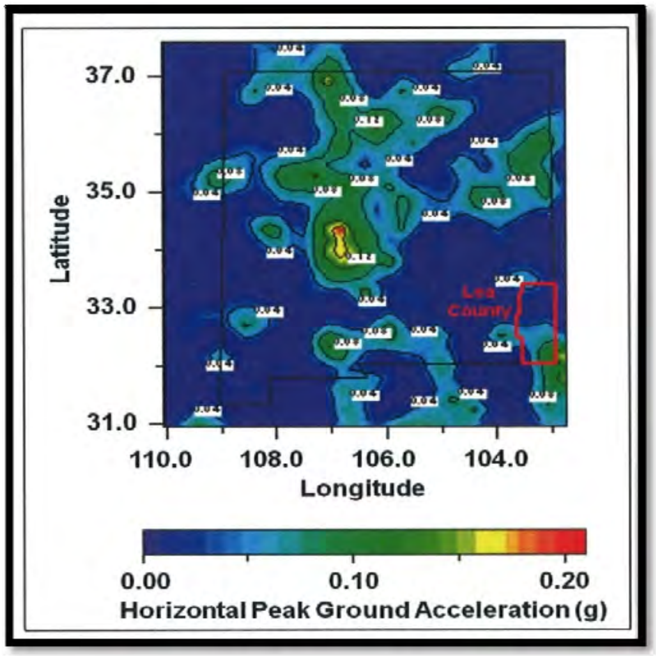
Where: $P=1/T$, $EP=1-(1-P)^n$, n=50 years and pga= horizontal peak ground acceleration

Seismic activity in southeastern New Mexico is typically of small magnitude and generally caused by oil field injection activities. However, one of the most recent major earthquakes (moment magnitude of > 4.5 on the Modified Mercalli-Revised 1931 scale) in New Mexico occurred south of Eunice in January 1992. The earthquake was 5.0 on the Modified Mercalli (Md) scale with its epicenter at 32.3 degrees North and 103.2 degrees West (Yarger, 2009).

The New Mexico Institute of Mining and Technology has generated probabilistic seismic hazard estimates for different magnitude of earthquakes. Figure 1-12 and Figure 1-13 show horizontal peak ground acceleration (g) for an earthquake (Md) of 6 in New Mexico (10% probability of exceedance in a 50-year period). For a horizontal ground acceleration of 0.2 g, the risk of structural damage is minimal for a modern well-designed building, but non-structural risk damage can be significant (Yarger, 2009).

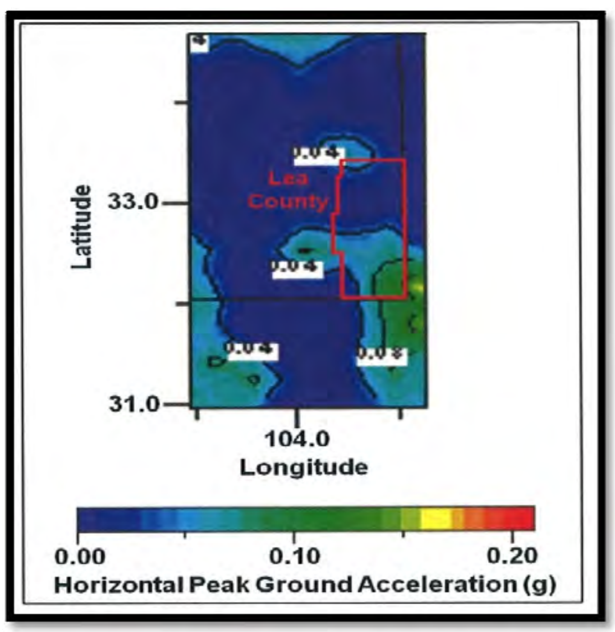
1.7.4.3 Other Geologic Hazards

No other known geological hazard exists at the IIFP New Mexico Site. During the New Mexico State permitting process IIFP will work with the State to ensure abandoned oil and gas wells, if any, are closed in accordance with the State of New Mexico requirements and regulations for abandoned wells.



Source: Yarger 2009. Adapted from Lin et.al. 1998

Figure 1-12 New Mexico Seismic Hazard for a Moment Magnitude (Md) 6 Earthquake



Source: Yarger, 2009. Adapted from Lin et.al, 1998

Figure 1-13 Lea County Seismic Hazard for a Moment Magnitude (Md) 6 Earthquake

REFERENCES

ANSI, 2001 American National Standards Institute Inc., "Uranium Hexafluoride-Packaging for Transport," ANSI N14.1-2001, 2001.

ASCE, 2006 American Society of Civil Engineers, ASCE 7-05, "Minimum Design Loads for Buildings and Other Structures: SEI/ASCE 7-05 (ASCE Standard)," 2006.

Brumbaugh, et al, 2000 "A Peer Review of the Strategy for Characterizing Transuranics and Technetium Contamination in Depleted Uranium Hexafluoride Tails Cylinder", Brumbaugh, G.P., et al, Lawrence Livermore National Laboratory, 2000.

CFR, 2004 Title10 Code of Federal Regulations, Part 71, "Packaging and Transportation of Radioactive Material," 2004.

CFR, 2008a Title 10, Code of Federal Regulations, Part 40, "Domestic Licensing of Source Material, U.S. Nuclear Regulatory Commission," 2008.

CFR, 2008c Title 10, Code of Federal Regulations, Part 40.4, "Definitions," U.S. Nuclear Regulatory Commission, 2008.

CFR, 2008d Title 10 Code of Federal Regulations, Part 70, Subpart H "Domestic Licensing of Special Nuclear Material," U.S. Nuclear Regulatory Commission, 2008.

CFR, 2008e Title 10 Code of Federal Regulations, Part 20.1003 "Standards for Protection Against Radiation and Definitions," 2008.

CFR, 2008f Title 10 Code of Federal Regulations, Part 20.1301 "Registration of Manufacturing, Distributors and Dispensors of Controlled Substances", 2008

CFR, 2008g Title 40 Code of Federal Regulations, Part 190 "Environmental Radiation Protection Standards for Nuclear Power Operations", 2008.

CFR, 2008h Title 20 Code of Federal Regulations, Part 1902, "Standards for Protection Against Radiation," 2008.

CFR, 2009a Title 10 Code of Federal Regulations Part 70.61 "Performance Requirements," 2009.

CFR, 2009b Title 29, Code of Federal Regulations, Part 1910, Subpart Z, "Toxic and Hazardous Substances," 2009.

CFR, 2009c Title 10 Code of Federal Regulations, Part 70.62, "Safety Program and Integrated Safety Analysis," US Nuclear Regulatory Commission, 2009.

CFR, 2009d Title 10 Code of Federal Regulations, Part 70.72, "Facility Changes and Change Process," U.S. Nuclear Regulatory Commission, 2009.

CFR, 2009e Title 29, Code of Federal Regulations, Section 1910.119, "Process Safety Management of Highly Hazardous Chemicals," 2009.

CFR, 2011a Title 10 Code of Federal Regulations Part 40.64 “Domestic Licensing of Source Material,” 2011

CFR, 2011b Title 49 Code of Federal Regulations Part 171-73, “Transportation,” 2011.

CFR, 2011c Title 10 Code of Federal Regulations Part 40.14, “Specific Exemptions”, 2011.

CFR, 2011d Title 10 Code of Federal Regulations Part 20.1204, “Determination of Internal Exposure,” 2011.

CFR, 2011f Title 40 Code of Federal Regulations Part 61, “Protection of Environment,” 2011.

CFR, 2011g Title 10 Code of Federal Regulations Appendix B, “Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage”, 2011.

DOE, 2002 U.S. Department of Energy, DOE STD-1020-2002, “Natural Phenomena Hazards Design and Evaluation Criteria for Department of Energy Facilities.” Washington, D.C., 2002.

DOE, 2003 DOE/WIPP-95-2065 Revision 7 “Waste Isolation Pilot Plant Contact-Handled (CH) Waste Safety Analysis Report,” 2003.

DOE, 2004 “Portsmouth DUF_6 Conversion Final EIS”, Appendix B, U.S. Department of Energy website: www.gc.doe.gov/sites/files/EIS-0360-FEIS-Appendices-2004.pdf, viewed in 2010.

GL, 2010 GL Environmental, “Existing Groundwater Conditions in Section 27, Township 18 South, Range 36 East,” 2010

Hightower, et al, 2000 “Strategy for Characterizing Transuranics and Technetium Contamination in Depleted UF_6 Cylinders”, Hightower, J.R., et. al, Oak Ridge National Laboratory, 2010.

NFPA, 2007 National Fire Protection Association, “NFPA 13, “Installation of Sprinkler Systems” Quincy, MA, 2007or latest edition.

NMCBC, 2009 New Mexico Commercial Building Code, 2009.

NOAA, 2010 National Oceanic and Atmospheric Administration, National Climate Data Center, Website (http://www.lightningsafety.noaa.gov/stats/08_Vaisala_NLDN_Poster.pdf), 2010.

NOAA, 2010a National Oceanic and Atmospheric Administration, National Climate Data Center, Website (http:// www.4.ncdc.noaa.gove/cgi-win/wwcgi.dll?event~storms), 2010.

NOAA, 2011 National Oceanic and Atmospheric Administration, National Climate Data Center, Website (http://hdsc.nws.noaa.gov/hdsc/pfds_map_cont.html?bkmrk=mn), 2011.

NRC, 2010 NUREG-1520, “Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility,” U.S. Nuclear Regulatory Commission, Revision 1, 2010.

NRC, 2011a NUREG/BR-0006, “Instructions for Completing Nuclear Transactions Reports, 2011.

NRC, 2011b NUREG/BR-0007, “Instructions for the Preparation and Distribution of Material Status Report,” 2011.

NRC, 2011c “Financial Assurance and Recordkeeping for Decommissioning,” 10 CFR 40.36, Nuclear Regulatory Commission, Website www.nrc.gov/reading-rm/doc-collections/cfr/part 040-0036.html. Viewed in 2011.

USGS, 2002 U.S. Geological Survey “National Seismic Hazard Mapping Project” U.S. Department of the Interior, Washington, D.C., 2002.

WE, 2011 Water Encyclopedia Science and Issues website, "Ogallala Aquifer, " 2011.

Weber, 2008 Neil Weber & Associates, “Regional Seismological Evaluation,” Hobbs, New Mexico, 2008.

Yarger, 2009 F. Yarger, “Seismic Probability in Lea County, NM: A Brief Analysis, New Mexico Institute of Mining and Technology,” New Mexico Center for Energy Policy, Socorro, NM, 2009.