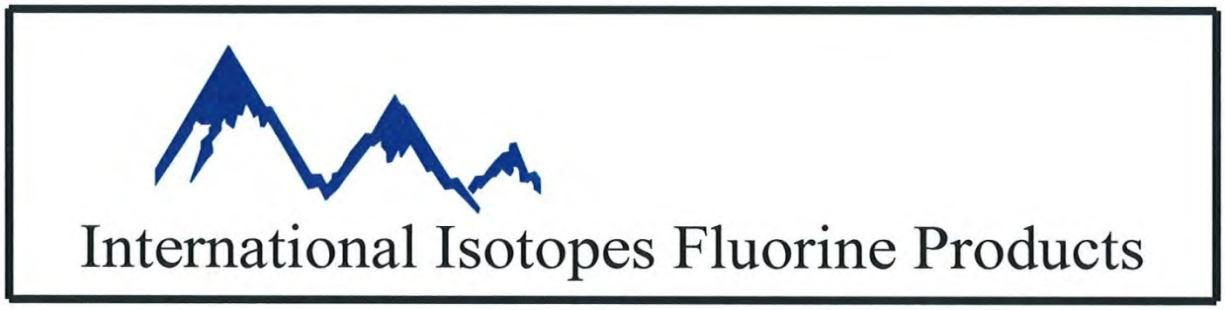

International Isotopes Fluorine Products, Inc. (IIFP)
A Wholly Owned Subsidiary of
International Isotopes, Inc. (INIS)

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

License Application

Chapter 9
Environmental Protection

Revision B
November 4, 2011

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

No List of Table Entries

9 ENVIRONMENTAL PROTECTION

International Isotopes Fluorine Products, Inc. (IIFP), a wholly owned subsidiary of International Isotopes, Inc. (INIS), will build and operate a depleted uranium processing facility near Hobbs in Lea County, New Mexico. The IIFP Facility (also referred to as the FEP/DUP Plant) is being licensed under Title 10 Code of Federal Regulations (CFR) Part 40. A summary description of the planned facility is provided in the IIFP License Application (LA), Revision B Chapter 1 "General Information."

Chapter 9 addresses the two (2) major components that provide the basis for adequate environmental protection assurance during both normal and credible abnormal operations for the IIFP Facility that is to be built near Hobbs, New Mexico. These two (2) distinct components are: 1) the Environmental Report (ER) and 2) the Environmental Protection Measures. The ER evaluates the environmental impacts of the facility whereas the Environmental Protection Measures define the programs and sampling and analysis measures necessary to maintain adequate environmental assurance during the operating lifetime of the facility.

In addition to the environmental effects for the facility requested in the current licensing activity and LA, the ER evaluates the environmental effects of a future add-on depleted uranium hexafluoride (DUF_6) process for direct de-conversion to depleted uranium oxide that would result in an expanded IIFP Facility referred to as Phase 2. The DUF_6-to-oxide de-conversion future expansion is not part of the current License Application or requested activities. The future Phase 2 facility was evaluated in the current ER submittal owing to the plans to begin adding this process to the original facility within approximately 3-4 years of the first facility operation. The Phase 2 expansion would require a separate and future licensing activity at the appropriate time prior to its construction.

The ER considers and evaluates impacts of the IIFP Facility during construction and operation. IIFP may request an exemption for some pre-license construction that could start as early as 4th Quarter of 2012. In the ER, pre-license construction is also considered in evaluating the environmental impacts. It is anticipated that pre-license approval will be obtained and some selective construction activities will be accomplished prior to issuance of a license by the U.S. Nuclear Regulatory Commission (NRC). These pre-license construction activities will be preparatory in nature and will not involve any process or safety-related equipment or systems.

The selected pre-license construction activities only affect the timing of work and do not increase the scope of the environmental impact of overall facility construction. Some of these activities that are proposed and considered in the ER include the following:

- Clear land
- Grade site and control erosion
- Install main entrance roadbed and drainage to highway
- Install construction trailer
- Prepare preliminary site roadways and gravel parking area
- Drill water wells, if needed
- Construct power substation
- Stub in gas line to meter
- Begin administration building construction
- Install geothermal heating/cooling loops
- Begin general warehouse (no contents) construction
- Install firewater tanks

In summary, the pre-license construction was evaluated in each impact area of the ER. The impacts of pre-license construction were found to be no greater than if included during the time of full construction itself and are expected to be "SMALL". The full construction impacts are determined in the ER to be SMALL except that the transportation and ecological impacts along some travel corridors are both determined to be MODERATE. A National Pollution Discharge Elimination System (NPDES) General Permit for Storm Water and a Spill Prevention, Control and Countermeasures (SPCC) Plan will likely be required and implemented earlier for the pre-license construction as it otherwise would have been done later for full construction.

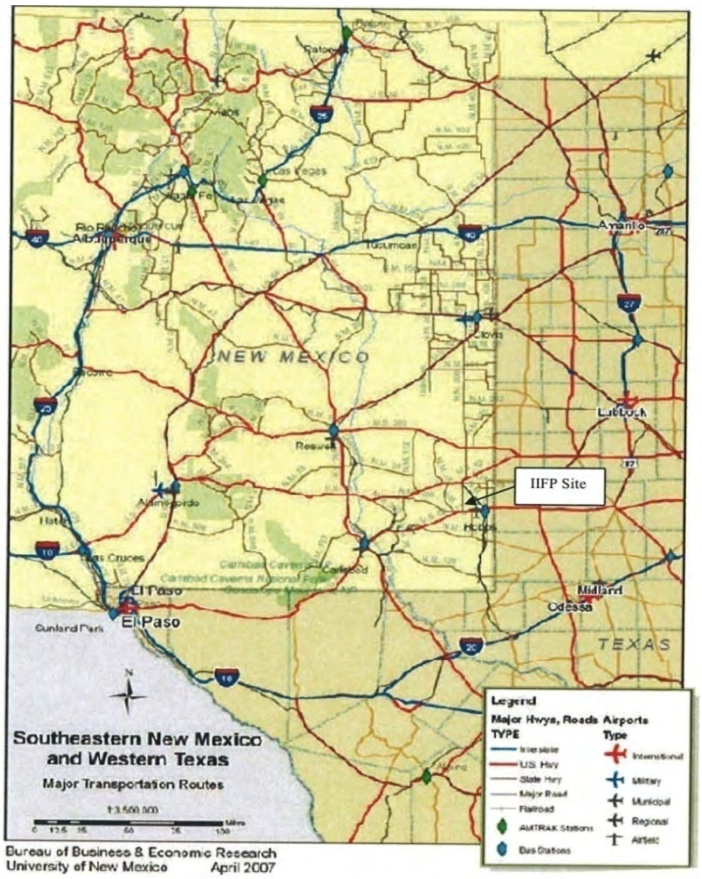

Figure 9-1 Location of the IIFP Site

9.1 ENVIRONMENTAL REPORT

The ER, Revision B constitutes one portion of an application to be submitted by IIFP to construct and operate a facility that offers de-conversion services of DUF_6 and extracts the fluoride from the DUF_6 to produce high-purity fluoride gas products and anhydrous hydrofluoric acid (AHF). During this initial (Phase 1) IIFP Facility operation the DUF_6 uranium will be de-converted into depleted uranium tetrafluoride (DUF_4) and then into depleted uranium (DU) oxide. In the future, an expansion will be made to the original (Phase 1) IIFP Facility that will result in a Phase 2 Facility. The expansion that will be licensed and constructed as a future separate activity will utilize an additional and different process for direct de-conversion of DUF_6 to AHF and DU oxide. In both processes, the extracted and recovered

fluorine products and AHF are sold and the depleted uranium oxide is sent for off-site disposal to a licensed low-level radioactive waste disposal facility.

The IIFP Facility will be located near Hobbs, New Mexico (Figure 9-1). The ER, Revision B for the facility serves two primary purposes. First, it provides information that is specifically required by the NRC to assist in meeting its obligations under the National Environmental Policy Act (NEPA) of 1969 (NEPA,1969) and the U.S. Environmental Protection Agency's (EPA) NEPA-implementing regulations. Second, it demonstrates that the environmental protection measures proposed by IIFP are adequate to protect both the environment and the health and safety of the public.

IIFP has prepared the ER to meet the requirements specified in 10 CFR 51, Subpart A, particularly those requirements set forth in 10 CFR 51.45(b)-(e), "Environmental Report" (CFR, 2009a). The organization of the ER is generally consistent with NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs, Final Report," (NRC, 2003).

The full ER evaluates the environmental impacts of the IIFP facility near Hobbs, New Mexico. Accordingly, the ER discusses the Proposed License Action (hereafter referred to as Proposed Action), the need for and purposes of the Proposed Action and applicable regulatory requirements, permits and required consultations. The ER is presented to the NRC in separate documentation comprised of the following list:

- Chapter 1, "Introduction of the Environmental Report" identifies briefly the general Proposed Action, the affected region and site area, the Proposed Action schedule for implementation and the applicable regulations with the current status.

- Chapter 2, "Alternatives" describes in more detail the Proposed Action, process descriptions and considers the No-Action and Reasonable Alternatives, if any, to the Proposed Action.

- Chapter 3, "Description of the Affected Environment" describes the IIFP Facility and the environment potentially affecting the Proposed Action.

- Chapter 4, **"**Environmental Impacts" presents and compares the potential impacts resulting from the Proposed Action and its alternatives.

- Chapter 5, "Mitigation Measures" identifies mitigation measures that could eliminate or lessen the potential environmental impacts of the Proposed Action.

- Chapter 6, "Environmental Measurements and Monitoring Programs" describes environmental measurements and monitoring programs.

- Chapter 7, "Cost-Benefit Analysis" provides a cost benefit analysis.

- Chapter 8, "Summary of Environmental Consequences" summarizes those environmental consequences.

- Listings of references and preparers are provided in Chapter 9, "References" and in Chapter 10, "List of Preparers."

9.1.1 Date of Application

As required by 10 CFR 40.31(f), "Application for Specific Licenses," (CFR, 2009b), the submittal date of December, 2009 is at least nine (9) months prior to facility construction, which is scheduled to begin in late 2012. The proposed startup date for the facility is scheduled for late 2013 or early 2014 timeframe.

9.1.2 Environmental Considerations

The IIFP ER addresses the requirements of 10 CFR 51.45(b) (CFR, 2009a) as discussed below.

9.1.2.1 Description of Proposed License Action

The current IIFP License Application is for the Phase 1 Facility only as discussed above in Section 9.1. This proposed action for Phase 1 is described in the IIFP ER, Revision B Section 2.1. The "Proposed License Action" discussed in the ER is the issuance of an NRC license under 10 CFR 40 (CFR, 2009b) for the possession of up to 750,000 kilograms of uranium (kgU) and for construction and operation of a facility for de-conversion of DUF_6 and the production of fluoride products and anhydrous hydrofluoric acid.

A description of the IIFP Site is contained in the ER, Revision B Section 1.3.3 "The IIFP Site." A detailed description of the facility and specific process descriptions are included in ER, Revision B Section 2.1. A discussion of the method utilized to extract fluorine products from the source material (DUF_6) is also described in this section. Additional information regarding the facility design, the site and the facility operating features is contained in the IIFP Revision B Integrated Safety Analysis (ISA) Summary.

9.1.2.2 Purpose and Need for Proposed License Action

The IIFP ER, Revision B Section 1.2 "Purpose and Need for the Proposed License Action" demonstrates the need for DUF_6 de-conversion facilities to support additional uranium enrichment capacity in the United States. The proposed action is intended to de-convert DUF_6 (tails) into chemically stable depleted uranium oxide while extracting the valuable fluorine to produce fluoride products for commercial use. It is estimated that new commercial uranium enrichment facilities will eventually be producing more than 85 million pounds of DUF_6 tails each year in the U.S. The U.S. Department of Energy (DOE) is building its own facilities for de-conversion of the DOE stockpile of depleted tails but those facilities will not be able to provide de-conversion of these new commercial tails for an estimated twenty (20) to twenty-five (25) years. Without the IIFP commercial de-conversion facility, it is likely that over a billion pounds of commercial tails will be accumulated in the U.S. over that time and most of the valuable fluorine trapped in this inventory will be wasted. The IIFP Facility offers a solution beginning in the near-term to depleted uranium storage, conducts recycling and recovery of important fluorine and produces products using just a fraction of the energy required to produce those fluoride products using conventional methods.

9.1.2.3 Description of Affected Environment

IIFP ER, Revision B Chapter 3 "Description of the Affected Environment" contains a description of the affected environment. The chapter provides a baseline characterization of the New Mexico site and its environment prior to any activities associated with construction, operation or decommissioning of the facility.

IIFP ER, Revision B Chapter 3 addresses the following topics:

- Land Use
- Transportation
- Geology and Soils
- Water Resources
- Ecological Resources
- Meteorology, Climatology and Air Quality
- Noise
- Historic and Cultural Resources
- Visual/Scenic Resources
- Socioeconomics
- Public and Occupational Health
- Waste Management

Each subsection discusses the regional, local and site conditions as they currently exist in order to establish a baseline. IIFP ER, Revision B Chapter 4 "Environmental Impacts" describes how the baseline environment is potentially impacted as a result of the construction, operation and decommissioning of the IIFP Facility. Basic supporting information was gathered from federal, state and county sources and site-specific data. The information represents both seasonal and long-term environmental trends.

9.1.2.4 Discussion of Considerations

The following discussion summarizes the information in the IIFP ER, Revision B with respect to the environmental impacts from, and the alternatives to, both the IIFP Facility processes and the Hobbs, New Mexico site.

Impact of the Proposed Action on the Environment

In accordance with 10 CFR 51.45(b) (1) (CFR, 2009a), the IIFP ER, Revision B Chapter 4 discusses the impact of the Proposed Action on the environment. Each subsection in IIFP ER, Revision B Chapter 3 has a corresponding subsection in ER, Revision B Chapter 4 which ensures that each environmental aspect is addressed with respect to its impact from the IIFP Facility.

Adverse Environmental Effects

The adverse environmental effects are discussed in each subsection of IIFP ER, Revision B Chapter 4 as well as in ER, Revision B Section 8.3 "Short-Term and Long-term Impacts" and Section 8.4 "Relationship between Short-Term Use of the Environment and the Maintenance and Enhancement of Long-Term Productivity." These sections satisfy the requirements in 10 CFR 51.45(b) (2) (CFR, 2009a). Overall, adverse impacts for the Proposed Action (Phase 1) and the expansion to the Phase 2 Facility are determined to be SMALL. However, in some resource areas during construction and operation of the Phase 1 Facility and later Phase 2, SMALL to MODERATE or MODERATE environmental impacts were identified; for example, in the resource areas of transportation and ecological. A complete listing of the environmental impacts in each stage of the project, including cumulative impacts, is provided in Table 2-7 of the ER, Revision B Chapter 2. Radiation and chemical releases from operations, in general, may cause adverse impacts. However, the releases and corresponding exposures from the IIFP Facility would be well below regulatory limits and proportionally very small.

IIFP ER, Revision B Chapter 4 has an additional section that discusses Environmental Justice, a federal policy under which each agency identifies and addresses disproportionately high and adverse human health or environmental effects of agency policies and activities on minority and low-income populations. For the nearby centrifuge uranium enrichment facility near Eunice, New Mexico and essentially the same populous, the NRC staff concluded that no disproportionately high and adverse impacts would occur to minority and low-income populations living near the enrichment facility or along likely transportation routes into and out of the enrichment facility as a result of the proposed action.

Alternatives to the Proposed Action

Alternatives to the Proposed Action are discussed in the IIFP ER, Revision B Chapter 2, "Alternatives," pursuant to Section 102(2)(E) of the National Environmental Policy Act of 1969 (NEPA) (NEPA, 1969) and 10 CFR 51.45(b)(3) (CFR, 2009a). Environmental impacts of the Proposed Action, including the no-action alternatives, are presented in comparative form. A discussion of site selection and design alternatives is also included.

Relationship of Short-Term Uses and Long-Term Productivity

In accordance with 10 CFR 51.45(b)(4) (CFR, 2009a), Revision B Chapter 8 of the IIFP ER, "Summary of Environmental Consequences," discusses the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity from the IIFP New Mexico operation.

During construction, the potential short-term impacts are soil erosion and fugitive emissions from dust and construction equipment, minor disruption to ecological habitats and cultural resources, noise from equipment and traffic from worker transportation and supply deliveries. These impacts are temporary and limited in scope during the construction process to the greatest extent possible. During operation, the no-action alternative would avoid increased traffic due to feed/product deliveries and shipments and worker transportation, increased demand on utility and waste services and public and occupational exposure from effluent releases. However, those impacts are SMALL to MODERATE because the local roadway (U.S. Highways 62/180) already has significant traffic of similar nature, there is sufficient capacity of utility and waste services in the region and effluent releases are strictly controlled, monitored and maintained below regulatory limits. No adverse impact on the long-term productivity of the environment after the decommissioning of the facility has been identified.

While the no-action alternative would have no significant impact on the socioeconomic structure of the Lea County, New Mexico area, the Proposed Action would have moderate to significant beneficial effects (see the "Cost Benefit Analysis" in Revision B Chapter 7 of the IIFP ER). The results of the economic analysis show that substantial positive fiscal impacts are derived from the 14-18 month construction period associated with the facility. There is a large beneficial impact on local business revenues as a result of local construction expenditures. Significant impacts on household earnings and jobs are associated with construction payroll and employment projected during the construction period. Operation of the facility also has a significant net positive impact on Lea County and surrounding counties and will help diversify the regional economy and provide additional insulation from the volatility of the oil and gas dependent economy of the region.

Irreversible and Irretrievable Commitments of Resources

In accordance with 10 CFR 51.45(b) (5) (CFR, 2009a), Revision B Chapter 8 of the IIFP ER also discusses the irreversible and irretrievable commitments of resources necessary to construct, operate and decommission the facility. No commitments of environmental resources at, or in proximity to the Hobbs, New Mexico site, were identified for the construction, operation and decommissioning of the IIFP Facility that ultimately could not be restored (that is, become irretrievable) after facility closure and decommissioning of the site for unrestricted use. Soils found at the site are applicable for range, wildlife and recreation areas and not for any standard agricultural activities. Therefore, construction and operation of the IIFP Plant are not anticipated to displace any potential agrarian use.

9.1.3 Analysis of Effects of Proposed Actions and Alternatives

The analysis of the effects in regards to the Proposed Action compared to alternatives in accordance with 10 CFR 51.45(c) (CFR, 2009a) is discussed in ER, Revision B Chapter 2. The comparison of effects considers information about the environmental, economic, social and other benefits and costs associated with the IIFP Proposed Action. ER, Revision B Chapter 4 contains a description of impacts. IIFP ER, Revision B Chapter 7 discusses the economic and environmental cost and benefits of the IIFP Proposed Action.

The analysis presented in ER, Revision B Chapter 2 considered and balanced the environmental effects of the Proposed Action, the environmental impacts of alternatives to the Proposed Action and alternatives available for reducing or avoiding adverse environmental effects. The analysis also considered technology alternatives to the IIFP Facility process technology, design alternatives and alternative site locations.

9.1.4 Status of Compliance

In addition to the NRC licensing and regulatory requirements, a variety of environmental regulations apply to the IIFP Facility during the construction and operation phases. These regulations require permits from, consultations with, or approvals by other governing or regulatory agencies. IIFP ER, Revision B Chapter 1 summarizes the applicable environmental regulatory requirements, permits, licenses or approvals, as well as the current status of each, as of the effective date of the ER. Permits include the following:

- NPDES “General Permit for Industrial Stormwater”
- Air Quality Permit for joint construction and operation
- National Environmental Standards for Hazardous Air Pollutants (NESHAP) Permit (if required)
- Groundwater Discharge Permit
- EPA Hazardous Waste ID Number
- Drinking Water System Permit
- Above-ground Storage Tank Registration
- NPDES Storm Water Pollution Prevention Plan (SWPPP)/Notice of Intent (NOI)
- State Access (Highway Right of Way) Permit
- Rare, Threatened and Endangered Species Survey Permit

IIFP will also develop a Storm Water Pollution Prevention Plan and file a Notice of Intent with the EPA at least seven (7) days prior to the commencement construction activities. An agreement has been obtained with the New Mexico Environment Department (NMED) on the type and maximum quantities

of depleted uranium and container possession limits. The NMED Agreement limits are provided LA, Revision B Chapter 1 "General Information" Table 1-1.

Miscellaneous regulations include the following:

- New Mexico Statutes Annotated (NMSA) Chapter 74, Article 12, "Night Sky Protection," establishes requirements to preserve and enhance the state's dark sky while promoting safety, conserving energy and preserving the environment for astronomy. These requirements will be addressed during detailed design of the facility.

- New Mexico Statutes Annotated (NMSA) Chapter 50, Sections 1-25, and implementing regulations at New Mexico Administrative Code (NMAC) Title 11, "Labor Workers Compensation," Chapter 5, "Occupational Safety and Health" establishes state requirements for assuring safe and healthful working conditions for every employee. These state regulations are being followed to ensure any additional requirements beyond the federal U.S. Occupational Safety and Health Administration (OSHA) regulations are adequately addressed.

- Groundwater monitoring wells are permitted through Office of the State Engineer (OSE) and well locations along with the boring logs are submitted to the OSE. Site-wide groundwater levels will be monitored routinely, and the groundwater monitoring well and pumping well networks will be analyzed to confirm that the changes in groundwater levels associated with the operation of the IIFP are minimal. Future detailed engineering and hydrological studies will identify the appropriate systems and locations. Monitoring wells are discussed in the IIFP ER, Revision B Chapter 6 "Environmental Measurements and Monitoring Program."

9.1.5 Adverse Information

In accordance with 10 CFR 51.45(b) (2) and (e) (CFR, 2009a), several sections in the IIFP Environmental Report, Revision B discuss adverse environmental effects. ER, Revision B Chapter 2 considers the potential impacts of the IIFP Facility to the alternatives. ER, Revision B Chapter 4 details environmental and socioeconomic impacts due to site preparation/construction, operation and decommissioning of the IIFP Facility New Mexico site. ER, Revision B Chapter 5 "Mitigation Measures" describes mitigation measures to minimize potential adverse impacts. Lastly, IIFP ER Chapter 8 provides a summary of the environmental consequences.

The overall environmental impacts resulting from the IIFP Facility construction, operation and decommissioning have been determined to be a SMALL value (where SMALL is defined as environmental impacts that are non-detectable or so minor that those impacts will neither destabilize nor noticeably alter any important attribute of an applicable environmental resource). Furthermore, minor impacts are controlled to the greatest extent possible through the use of mitigation measures and best management practices described in Revision B Chapter 5 of the IIFP ER.

9.2 ENVIRONMENTAL PROTECTION MEASURES

Environmental protection measures will be maintained at the IIFP Facility as part of the IIFP Environmental Protection Program. The primary purpose of this Program is to maintain radiological and chemical effluent control such that exposure of the workers, public and environment to radioactive materials or chemicals from facility operations is kept as low as reasonably achievable (ALARA). This is

accomplished through facility design, effluent engineering controls, administrative controls and staff training and qualification. Effluent and environmental monitoring is an additional best management practice to document and verify that effluent emissions and performance of the Environmental Protection Program are consistent with the guidance contained in Regulatory Guide 8.37, "As Low As Reasonably Achievable (ALARA) Levels for Effluents from Materials Facilities" (NRC, 1993). In addition, IIFP will comply with the air quality permitting requirements specified in New Mexico Administrative Code Title 20 Chapter 2.

9.2.1 Radiation Protection

The following sections address the four acceptance criteria that describe the facility Radiation Protection Program (RPP) as it applies to environmental protection. The RPP is discussed further in Revision B Chapter 4 "Radiation Protection" of the LA. Specific references to supplemental information are provided in each section, as appropriate.

9.2.1.1 Radiological (ALARA) Goals for Effluent Control

Monitoring of facility effluents, analysis of monitoring samples and evaluation of sampling data allow for the determination of the quantity of radioactive material released from the facility during normal operating conditions thereby demonstrating attainment of ALARA goals and effluent limit compliance. Identification of the quantity of material released from the facility permits the evaluation of the success of control and containment of contamination. In addition, the determined quantity of radioactive material released from the facility will allow for the estimation of potential off-site dose to the public. Finally, identification of an unexpected increase in material quantities released from the facility allows for the detection of any unexpected release pathways previously unidentified.

ALARA goals are set to demonstrate compliance with 10 CFR 20, "Standards for Protection Against Radiation," (CFR, 2009c) with respect to doses to the public, doses to the worker and environmental effluents and will initially be set at 20% of the 10 CFR 20 Appendix B values (CFR, 2007). Goals are set by the IIFP ALARA Committee and reviewed annually to assess the need to adjust specific values based on what may be ALARA for the particular measure. Compliance with the ALARA goals is demonstrated through monitoring, analysis and evaluation of air emissions, liquid effluents and disposition of solid waste.

Trends are assessed using the monitoring results to evaluate the following: 1) facility operations control and containment of contamination, 2) projections of potential dose to off-site populations and 3) detection of any unanticipated pathways for transport of radionuclide(s) within the environment. In accordance with the ALARA Program, these monitoring results are summarized and presented to the ALARA Committee on an annual basis. The ALARA Program and associated goals are further described in LA, Revision B Section 4.2.2 "ALARA Goals."

9.2.1.2 Effluent Controls to Maintain Public Doses ALARA

Effluent controls are used to maintain public doses ALARA. Gaseous effluents, that may contain depleted uranium, pass through pre-filters, porous metal filters and carbon-bed filters prior to entering the Plant Potassium Hydroxide (KOH) Scrubbing System (three-stages, in series). After scrubbing, the effluents are discharged to the atmosphere via the scrubbing system stack. Certain storage vessels, powder transfer systems and packaging stations, where depleted uranium particles are involved, are connected to dust removal systems comprised of two or three stages to ensure capture and recovery of depleted uranium

particles prior to venting the systems to the atmosphere. The stacks are continuously sampled and are routinely analyzed to measure radioactivity of the exhaust gases.

Effluent controls are described in the IIFP ER Revision B as part of the facility process descriptions in subsections 2.1.3.6, 2.1.3.7, and 2.1.3.9. In addition, ER Table 2-2 provides a list of design efficiencies for process vent off-gas treatment equipment, and ER Table 2-3 provides a list of major process vent stacks. ER, Revision B Section 6.1 identifies the proposed sampling and monitoring locations for gaseous effluents, liquid effluents and groundwater and provides an overview of the IIFP Facility Effluent Monitoring Program to achieve ALARA. IIFP ER Figure 6-1 illustrates the planned monitoring locations at the site. IIFP ER, Revision B subsections 6.1.1 and 6.1.2 provide additional details about effluent and radiological monitoring. Effluent control and conservation features are described in subsections of ER, Revision B Section 4.13.4. Section 3.1.10 of the IIFP Revision B ISA Summary describes the process vent stacks at the IIFP Facility. Table 3-4 in Revision B ISA provides the listing of design efficiencies for the off-gas treatment equipment as does Table 2-2 of the ER. Table 3-5 of the ISA provides the stack heights and estimated flow rates of the major process vent stacks.

Plant process water discharges are treated and are contained on-site either by recycling and reusing in the process or by evaporating. Cooling water is recycled. The facility liquid effluent collection and recycle systems provide a means to control liquid waste and maintain a process-water practical mass balance using flow-surge tanks, scrubber solution regeneration/recycle and evaporation equipment. There is no discharge to a Publicly Owned Treatment Works (POTW). Sanitary water usage is minimized through efficient designs and the sanitary water discharge is tertiary treated to render it suitable for watering of the facility shrubs and trees. Storm water runoff from process building roofs and pads is collected and transported to an approved design retention basin via the plant storm water sewer system. The storm water is temporarily stored in the Storm Water Retention/Evaporation Basin until it is evaporated or sampled and discharged in accordance with the State of New Mexico Groundwater Discharge Permit.

9.2.1.3 ALARA Reviews and Reports to Management

In accordance with the ALARA Program, the environmental protection aspects of the Radiation Protection Program are reviewed as part of the annual ALARA review. Review of the ALARA Program is addressed in LA, Revision B Chapter 4 Section 4.2.3. The ALARA review includes analysis of trends in release concentrations, environmental monitoring data and radionuclide distribution. The review then determines the need for operational changes to achieve the ALARA effluent goals and evaluates designs for system installations or modifications. The results of the ALARA review are reported to senior management along with recommendations for changes in facilities or procedures that are necessary to achieve ALARA goals. The members on the ALARA Committee include the Chief Operations Officer, Radiation Protection Manager, selected department managers, the Environmental Safety and Health Manager and selected supervisors and hourly workforce personnel.

9.2.1.4 Waste Minimization

The facility is designed and operated in accordance with 10 CFR 20.1406, “Minimization of Contamination” (CFR, 2009d) to minimize contamination, facilitate eventual decommissioning and minimize to the extent practicable the generation of radioactive waste. The waste minimization practices during design, construction and operation of the facility are consistent with the guidance in Regulatory Guide 4.21, “Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning,” (NRC, 2008).

The IIFP Facility incorporates several waste minimization systems in its operational procedures and design that aim at a high priority of conserving materials and preventing the spread of contamination. The major of those systems and procedures are discussed below.

Recycling on-site is an important strategy of the IIFP Facility Waste Minimization Program; for example: 1) regenerating and recycling of KOH scrubbing solution for use in the Plant KOH Scrubbing System. This design and operation eliminates the need to otherwise discharge the flow as treated wastewater and also conserves the use of the treating agent and saves cost, 2) collection and recycling of steam condensate back to the facility steam boilers, where applicable, for saving energy and minimizing disposal and 3) conserving valuable water resources by using air coolers and recirculation of process cooling water thereby avoiding once-through flow of water.

Another important aspect of the Waste Minimization Program is the employment of waste segregation methods and procedures to facilitate recycling and to minimize contamination. Various receptacles are provided to allow for segregation of clean and contaminated materials. To prevent cross contamination, training is provided with emphasis on minimizing waste and controlling disposal costs. The outer packaging associated with consumables is removed prior to use in a contaminated area to minimize potential for contamination and to facilitate recycling and disposal of the clean segregated materials.

Collected waste such as trash, compressible dry waste, scrap metals and other candidate wastes will be volume reduced, where feasible, at a centralized on-site and/or off-site waste processing facility. An off-site facility will be used for the segregated "clean waste," such as cardboard, office paper waste, aluminum cans and scrap metal, where recycling is practical and can be best operated by a commercial vendor. ALARA controls will be maintained during facility operation to account for standard waste minimization practices as directed in 10 CFR 20.1406 (CFR, 2009d).

Lubrication oils and other oils are segregated to prevent cross contamination. The oils are collected and stored in containers that are temporarily staged in a sealed-concrete pad area utilizing curbs and dikes for secondary containment in accordance with Resource Conservation and Recovery Act (RCRA) requirements. Non-contaminated waste oil is sent to an off-site recycle facility, where applicable. Oil that cannot be recycled is disposed at an off-site licensed disposal facility.

Facility ventilation systems are designed to confine airborne radioactive materials within the process area and as close to the point of origin as practicable. Construction materials for ventilation systems are selected as to have a smooth internal surface finish and IIFP minimizes the number of changes in direction to the extent practicable.

Mechanical integrity and preventative maintenance procedures are utilized in accordance with the facility Chemical Process Safety Program (CSP) that is also in compliance with the OSHA Process Safety Management Program. In part, the inspections, surveillance, scheduled and planned maintenance and audits provide a means by which the potential for leaks on piping and equipment are prevented or minimized. Design and operational procedures provide early detection if leaks do occur thus allowing prompt assessment to support timely and appropriate response. Monitoring and surveillance programs are extremely important in minimizing contamination. IIFP uses fluoride detector instrumentation, radiation detectors and personnel surveillance techniques to minimize contamination. If leaks are suspected, area samplers are utilized to investigate and identify the area for correction. Where leaks of hazardous materials are suspected, area postings and warning lights are utilized to protect employee health and communicate potential contamination problems. Suspected or known leakage problems are investigated,

the equipment operation is curtailed if needed and the leakage is resolved, including any cleanup where applicable.

The IIFP Facility is designed to minimize the usage of natural resources. Closed-loop cooling systems have been incorporated in the designs to reduce water usage. Power usage is minimized by efficient design of lighting systems, selection of high-efficiency motors and use of proper insulation materials. Solar panels and geothermal heating systems are utilized to reduce carbon based fuel requirements where practical.

The Plant KOH Scrubbing System and Environmental Protection Process are designed to recycle KOH thus conserving the treating agent. Secondary containment for tanks and tank systems is provided with a holding capacity margin of safety to ensure containment in the event of a leak or spill of the largest tank capacity per EPA requirements. Tank sampling stations are designed to minimize the possibility of sample fluid leaking to the ground. Areas involving diesel refueling are also provided with secondary containment.

Radioactive, hazardous and mixed wastes are generated at the IIFP Facility. Such wastes are collected in labeled containers in each Restricted Area (RA) and transferred to a waste storage area for inspection. Suitable waste is volume reduced, if feasible, then disposed of at a licensed waste disposal site.

Sanitary sewage effluent is discharged into a package unit where it receives primary, secondary and tertiary treatment. The effluent from sanitary treatment is used in the facility for process water makeup or for landscape and watering of the IIFP Site tree farm.

An area (Decontamination Building) is provided in the operating facility for decontaminating equipment that may need to be cleaned before repair or for cleaning of materials, where feasible, prior to disposal. This process helps minimize the spread of contamination. Some of the equipment and systems provided in this area include:

- High pressure water/steam/air equipment with a sloped sealed-type floor runoff and collection double contained sump pit
- Totally enclosed grit blast unit with dust collection system
- Ion-exchange units suitable to collect soluble uranium from solution
- High efficiency filters suitable to remove small particulates of uranium from solution
- Tanks to provide hold capability and precipitation capacity for soluble uranium

The operating facility Decontamination Building includes an area to perform a series of steps following equipment disassembly including degreasing, decontamination, drying and inspection. Items from uranium processing systems, waste handling systems and miscellaneous other items can be decontaminated in this area. Air suits and portable ventilation units are available and may be used in minimizing worker exposure and preventing airborne radiological contamination that may result from equipment dismantlement in the area. Piping and vessels in the Decontamination Building are designed to protect against spillage or leakage. Hazardous wastes and materials are contained in tanks and other appropriate containers and are strictly controlled by procedures.

Practices Consistent with Regulatory Guide 4.21 include:

A. Minimizing Facility Contamination

- Worker access to contaminated areas is controlled to assure that workers wear proper protective equipment and limit their time in the areas. Protective equipment is cleaned, stored or disposed of in proper locations and receptacles.

- Waste volume reduction is considered and implemented at every opportunity, including training of employees.

- Leak and spill collection areas are provided.

- Floor liners and catch basins are included in areas of higher leak potential.

- Personnel surveillance techniques are part of leak identification and correction.

- Monitoring is conducted for leaks or spills in area Control Rooms; for example, fluoride detectors and radiation detectors.

- Radiological boundary control and monitoring stations are used in strategic locations to prevent spreading of potential contamination.

- Controlled purge and evacuation (P&E) systems are used to prevent area contamination and potential out-leakage during maintenance and inspection.

- Decontamination Building and equipment are provided to clean equipment that has been removed for repair and re-installation.

- Floors are appropriately sloped for spills.

- Drains from locker rooms and cleanup showers in potential contamination areas are routed selectively to the Decontamination Building.

- Proper ventilation systems maintain positive pressure in Control Room areas.

- Secondary containment is provided in outside areas and includes excess capacity to capture leaks or spills from the largest vessel in the area in accordance with EPA requirements.

- Monitoring wells are provided and sampled both up gradient and down gradient with established baselines.

- Storm Water Retention/Evaporation Basins have two impermeable barriers if required.

- Exterior tanks are located on or above concrete pads above grade and with curbs and dikes.

- Areas used to support radioactive material handling are controlled and contained.

- Facility ventilation system designs confine airborne radioactive materials within the process area and as close to the point of origin as practicable. Construction materials for ventilation systems are selected as to have a smooth internal surface finish and minimize the number of changes in direction to the extent practicable.

B. Minimizing Contamination of the Environment

- Building areas where uranium is processed and handled are separated physically from other building rooms and areas where there is no need to have uranium present. These areas have separate ventilation and filtration systems to preclude the spread of contamination. Boundary control stations and hand/foot and portable monitors are used at applicable locations to verify that personnel and items exiting uranium process areas are not spreading radiological materials into non-uranium areas. The DUF_4 Process Building, FEP Oxide Staging Building, Decontamination Building, DUF_4 Container Storage Building, DUF_4 Container Staging Building and the FEP Process Building (in areas where licensed material is processed) meet these specific design features.

- All areas of the facility are sectioned into Unrestricted, Controlled or Restricted Areas. Restricted Areas limit access for the purpose of protecting individuals against undue risks from exposure to radiation and radioactive materials. All procedures for these areas fall under the Radiation Protection Program and serve to minimize the spread of contamination and simplify the eventual decommissioning.

- Routine radiological surveys will be conducted throughout the life of the facility operation and will minimize the likelihood that radioactive contamination goes undetected and will provide a historical record which will simplify the Site characterization process.

- Non-radioactive process equipment and systems are minimized in locations subject to potential contamination. This limits the size of the Restricted Areas and limits the activities occurring inside these areas.

- Containment equipment with hoods that exhaust through dust collectors that are designed with high removal efficiencies are used where uranium materials are being packaged or withdrawn from process systems.

- The hazardous material processes include designs for P&E systems and dust-collection equipment as a means to provide effective clean out of residual chemicals or dust from equipment or piping prior to opening systems for maintenance. The P&E and dust collector systems have multiple collection equipment that is configured in series (defense-in-depth) to ensure removal and treatment efficiency, redundancy, effectiveness and reliability.

- Storm water runoff via the storm sewer system flows to a “double lined” retention basin for either evaporation or for landscape (tree farm) watering. It is not likely that collected storm water would exceed acceptable or regulated levels, but routine sampling for reuse or for discharge is conducted for further assurance. Domestic sanitary wastewater is tertiary treated to meet all discharge standards and is either evaporated or used as harvested water for facility trees, grass and shrubs. The facility is designed for no liquid process water discharges. Engineered systems

are used to provide for regeneration of scrubbing solutions and recycle within the process systems.

C. Facilitating Decommissioning

- During construction a washable coating is applied to designated floors and walls in the Restricted Areas that have the higher potential to become radioactively contaminated during operation. The coating serves to lower waste volumes during decontamination and simplify the decontamination process.

- Sealed, nonporous pipe insulation is used in areas with higher potential to become contaminated. This facilitates cleaning in event of a spill and will reduce waste volume during decommissioning.

- Ample access is provided for efficient equipment dismantling and removal of equipment that may be contaminated. This minimizes the time of worker exposure.

- Tanks have access for entry and decontamination. Design provisions are also made to allow for removal of the wastes or materials contained in the tanks.

- Connections in the process systems, provided for required operation and maintenance, allow for thorough purging at facility shutdown. This system and procedure remove a significant portion of radioactive contamination prior to disassembly and prevent leakage to the general environment upon opening of equipment or piping.

- Design drawings, produced for all areas of the facility, will simplify the planning and implementing of decontamination procedures. This in turn will shorten the durations that workers are exposed to radiation.

- Worker access to contaminated areas is controlled to assure that workers wear proper protective equipment and limit their time in the areas.

- Radioactive and hazardous wastes produced during decommissioning will be collected, handled and disposed of, in accordance with all regulations applicable to the facility at the time of decommissioning. Generally, procedures will be similar to those described for wastes produced during normal operation. These wastes will ultimately be disposed of in licensed radioactive or hazardous waste disposal facilities located elsewhere. Non-hazardous and non-radioactive wastes will be disposed of in a manner consistent with good industrial practice and in accordance with applicable regulations.

- To facilitate decommissioning, the information relating to the facility design, facility construction, design, modifications, site conditions before and after construction, on-site contamination and results of monitoring and radiological surveys will be readily recoverable through the IIFP document control and management process.

9.2.2 Effluent and Environmental Controls and Monitoring

Effluent and environmental controls and monitors are maintained at and around the facility to ensure that doses to the workers, the public and the environment remain ALARA. In order to monitor and

characterize meteorological phenomena (e.g., wind speed, direction and temperature) during plant operation conditions will be monitored using a meteorological tower located on site. In addition, monitors provide indication of potential off-normal occurrences requiring further investigation. Guidance provided in Regulatory Guide 4.16, "Monitoring and Reporting Radioactivity in Releases of Radioactive Material in Liquid and Gaseous Effluents from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants," (NRC, 1985) has been utilized in the preparation of the environmental protection aspects of the IIFP RPP where applicable.

Administrative and engineered controls for environmental effluents are described in the IIFP ISA Summary, Revision B Sections 2.4.10, 2.4.11 and 3.1. These controls are also described in the LA, Revision B Chapter 1 Section 1.1.3. These controls are also described in the IIFP ER Revision B (subsections 2.1.3, 4.6.4, 6.1, 6.2, and 6.3. The IIFP Radiation Protection Plan that addresses environmental protection is described in ER, Revision B Sections 6.1, 6.2 and 6.3 and is also described in LA, Revision B Section 4.1-4.7. As described in LA, Revision B Section 4.2, the ALARA Program is a subset of the RPP. With regard to effluent and environmental controls, the ALARA principle demands that radioactive effluents are monitored and that environmental releases stay significantly below the regulatory limits. An additional aspect of the ALARA Program includes the preparation and review of an annual report to evaluate effluent release trends as a means to ensure the ALARA programs are effectively implemented.

9.2.2.1 Effluent Monitoring

The following sections address the acceptance criteria related to effluent monitoring.

Expected Concentrations

The expected concentrations of radioactive materials based on calculations and modeling in effluents were estimated using conservative assumptions. Calculated estimates airborne effluents are shown in Table 4-38, "Estimated and Bounding Radiological Releases from the Stacks during Phase 1 Operations" of the IIFP ER Revision B.

The concentrations are controlled to be ALARA and below the limits specified in 10 CFR 20. As stated above, the liquid effluent streams that have potential for containing uranium are recycled, reused and maintained on the IIFP Site. Additional discussion of gaseous and liquid effluents is provided in the following subsections. Section 6, Revision B of the IIFP ER discusses in detail the IIFP Environmental Measures and Monitoring Program. Also, Section 6.1.1.1 and Section 6.1.1.2 of the Revision B IIFP ER more specifically describe the IIFP Facility Gaseous Effluent Monitoring and the Liquid Effluent Monitoring Program, respectively. Types of solid wastes and estimated amounts are given in the IIFP ER, Revision B Section 3.12.2 "Solid Waste Management."

Calculation of Total Effective Dose Equivalent

Dose projections to members of the public are performed routinely in accordance with approved written procedures to ensure the annual dose to members of the public are kept ALARA and within the regulatory limit. Compliance as described in 10 CFR 20.1302, "Compliance with Dose Limits for Individual Members of the Public," (CFR, 2009e) is demonstrated through either the calculation of the total effective dose to the individual likely to receive the highest dose or through the calculation of annual average concentrations of radioactive material released in gaseous and liquid effluents. To demonstrate compliance with 10 CFR 20.1301 (via calculation of the Total Effective Dose Equivalent (TEDE) to the

individual likely to receive the highest dose), IIFP will apply the EPA Radiation Risk Assessment software, CAP-88 or COMPLY. There are four primary exposure pathways associated with plant effluent: 1) inhalation, 2) immersion in an effluent plume, 3) direct radiation due to deposited radioactivity on the ground surface (ground plane exposure) and 4) ingestion of contaminated food products. Of these four exposure pathways, inhalation exposures are expected to be the predominant pathways at site boundary locations and also at off-site locations that are relatively close to the site boundary. Input assumptions for the EPA codes will reflect the configuration and location of the release points, site-specific meteorology, the potential location of the maximally exposed individual and the regional land use. Input assumptions similar to those applied in the ER dose calculations (documented in ER, Revision B Section 4.12.6 "Public and Occupational Exposure Impacts") will be used as necessary. Table 4-41of the ER provides the annual and committed dose equivalents for exposures to the maximally exposed individual (MEI) from gaseous effluents. Table 4-42 from the ER provides annual and committed dose equivalents for exposures to the nearest resident from gaseous effluents. The estimated dose rate for sit boundary locations, the MEI and the nearest resident is provided in Table 4-45. The guidance in Regulatory Guide 4.20, "Constraint on Releases of Airborne Radioactive Materials to the Environment for Licensees Other than Power Reactors" (NRC, 1996), is followed to determine compliance with dose limits to members of the public. Compliance with the dose limits to the members of the public is reported to the NRC in the semi-annual effluent report as required by 10 CFR 40.65 "Effluent Monitoring Reporting Requirements" (CFR, 2009).

Effluent Discharge Locations

Two types of airborne effluent discharges are involved for the IIFP Site; stack effluent discharges and roof exhaust fan discharges. The locations of stack effluent discharges are illustrated in the IIFP Site Plot Plan, "Modified Site Features with Sampling Stations and Monitoring Locations" of the IIFP ER, Revision B. Roof exhaust fans are located on buildings which house areas where uranium is processed or handled. Both discharge types will be monitored as described in Section 6.1.1 of the ER, Revision B Chapter 6.

Thirteen (13) stacks are contributing sources in the airborne effluent discharge locations of the Proposed Action (Phase 1 Facility). The FEP Dust Collector Stack (number 03) is a common system for the SiF_4 and BF_3 processes. The process off-gases from the DUF_4, SiF_4 and BF_3 processes are all scrubbed in the three-stage (in series) equipment of the Plant KOH Scrubbing System. The treated gas from the last stage of the scrubbers exits the Plant KOH Scrubbing System Stack (number 01).

Liquid plant process effluents are maintained on the IIFP Site for reuse or recycle and there is no discharge of chemical process wastewater. Discharge of sanitary waste is from the package sanitary treatment plant and after monitoring to ensure discharge limits are met, the treated water is used for silvaculture (IIFP tree farm watering). The treated sanitary discharge is sampled and analyzed routinely in accordance with the State of New Mexico Groundwater Permit requirements. Storm water that accumulates in two collection basins will either be evaporated or used for watering the tree farm. In cases where the basin water is sent to the tree farm, the discharges are sampled and analyzed to ensure New Mexico Groundwater Permit limits are not exceeded.

Continuous Sampling Airborne Effluents

The IIFP ER, Revision B Chapter 6 addresses the Radiological Environmental Monitoring Program (REMP). The purpose of the REMP is to ensure that surveys are performed as necessary to demonstrate compliance with regulations and to demonstrate that the amount of radioactive material present in the

facility effluent remains ALARA. Effluent monitoring is discussed in Section 6.1.1 of the IIFP ER, Revision B.

The effluent stacks, where licensed materials are involved, are sampled continuously and routinely analyzed to measure radioactivity of the exhaust air. The collection filters in the sample systems are removed periodically and analyzed for gross alpha and beta activity. The filters are composited periodically and an isotopic analysis is performed. Radiological analyses are performed on ventilation air filters if there is a 25% increase in gross radioactivity or when a process change or other circumstances cause significant changes in radioactivity concentrations.

Sample Collection and Analysis

The REMP establishes sample collection and analysis methods and frequencies for the effluent medium and the radionuclide(s) analyzed. Sample collection and analysis methods and frequencies for the effluent medium will be performed in accordance with Regulatory Guide 4.15 "Quality Assurance for Radiological Monitoring Programs (Normal Operations) – Effluent Streams and the Environment" and Regulatory Guide 4.16, "Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluent from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants." Sampling methods ensure that representative samples are obtained using appropriate sampling equipment and sample collection and storage procedures. Monitoring instruments are calibrated at least annually or more frequently if recommended by the manufacturer. IIFP ensures that sampling equipment (pumps, pressure gages and air flow calibrators) are calibrated by qualified individuals. Sampling equipment and lines are inspected for defects, obstructions and cleanliness as part of the plant preventive maintenance procedures.

Section 6.1of the ER, Revision B describes the proposed sampling and monitoring locations for gases effluents and liquid effluents. Figure 6-1 "Modified Site Features with Sampling Stations and Monitoring Locations" indicates the locations of the environmental sampling stations and monitoring locations. Further, Section 6.1.1 describes the sampling media, frequency and analysis types to be performed.

Radionuclide-Specific Analysis

Radionuclide-specific analyses are performed on selected composited samples as indicated in the ER Section 6.1.1. Because uranium in gaseous effluent may exist in a variety of compounds (e.g., depleted uranium hexafluoride, uranium oxide, depleted uranium tetrafluoride, and depleted uranyl fluoride, effluent data is maintained, reviewed and assessed by the facility's Radiation Protection Manager to assure that gaseous effluent discharges comply with regulatory release criteria for uranium. The REMP falls under the oversight of the IIFP Radiation Protection Program. As a matter of compliance with regulatory requirements, potentially radioactive effluent from the facility is discharged only through monitored pathways. Effluent sampling for the IIFP Facility is designed to determine the quantities and concentrations of radionuclides discharged to the environment. Uranium isotopes and daughter products are expected to be the prominent radionuclides in the gaseous effluent. Process stacks and air vents are sampled continuously through the use of air filters and analyzed in accordance with the State of New Mexico Air Quality Permit. Samples for gross alpha/beta and isotopic analysis are composited and analyzed quarterly.

Facility preventive maintenance procedures will be specified to be maintained on-site and implemented. These preventive maintenance procedures and the associated configuration management for these procedures are described in LA, Revision B Chapter 11 "Management Measures" Section 11.2.2.

Monitoring reports show the quantities of individual radionuclide(s) estimated on the basis of methods other than direct measurement and include an explanation and justification of how the results were obtained. Monitoring reports are discussed below in "Reporting Procedures."

Radionuclide analysis may be performed more frequently at the beginning of the monitoring program until a predictable and consistent composition is established. Likewise, the analysis frequency may be increased when there is a 50% increase in gross radioactivity in effluents or a process change or other circumstance that might cause a significant variation in the radionuclide composition.

Minimum Detectable Concentrations

ER, Revision B Chapter 6 Section 6.1.1 describes the gaseous effluent monitoring requirements for the facility. A minimum detectable concentration (MDC) of at least 3.7×10^{-11} Bq/ml (1.0×10^{-15} µCi/ml) will be required for all gross alpha analyses performed on gaseous effluent samples.

Laboratory Quality Control

Monitoring and sampling activities, laboratory analyses and reporting of facility-related radioactivity in the environment are conducted in accordance with industry-accepted and regulatory-approved methodologies. The Quality Control (QC) procedures used by the laboratories performing the environmental monitoring are adequate to validate the analytical results and to conform to the guidance in Regulatory Guide 4.15 "Quality Assurance for Radiological Monitoring Programs" (NRC, 2006). These QC procedures include the use of established standards such as those provided by the National Institute of Standards and Technology (NIST) as well as standard analytical procedures such as those established by the National Environmental Laboratory Accreditation Conference (NELAC).

Action Levels

Administrative action levels are established for effluent samples and monitoring instrumentation as an additional step in the effluent control process. All action levels are sufficiently low so as to permit implementation of corrective actions before regulatory limits are exceeded. Action levels will be set at 50% of the 10 CFR 20 Appendix B Table 2 values. Effluent samples that exceed the action level are cause for an investigation into the source of elevated radioactivity. Processes are designed to include, when practical, provision for automatic shutdown in the event action levels are exceeded.

Federal and State Standards for Discharges

New Mexico Statutes Annotated (NMSA), Chapter 74, "Environmental Improvement," Article 2, "Air Pollution," (NMSA, 2009a) and implementing regulations in the New Mexico Administrative Code (NMAC) Title 20, "Environmental Protection," Chapter 2, "Air Quality," (NMAC, 2009a) establish air-quality standards and permit requirements prior to construction or modification of an air-contaminant source. IIFP defines an air-contaminant source as any building, structure or facility, or combination thereof, which emits or is capable of emitting air contaminants to the atmosphere that are regulated by federal, state and local requirements. These regulations also define requirements for an operating permit for major producers of air pollutants and impose emission standards for hazardous air pollutants. Accordingly, IIFP will file applications and obtain appropriate air construction and operating permits, where applicable. The IIFP Environmental Report Revision B Chapter 1 Table 1-9 addresses applicable regulatory requirements and status.

40 CFR 122, "National Pollutant Discharge Elimination System," (NPDES) "General Permit for Industrial Stormwater" (EPA, 2009) is required for point source discharge of storm water runoff from industrial or commercial facilities to the waters of the state. All new and existing point source industrial storm water discharges associated with industrial activity require a NPDES Stormwater Permit from the EPA Region 6 and an oversight review by the New Mexico Water Quality Bureau. Most common is a general permit which is available to almost any industry, but there is also an option to obtain an individual NPDES permit. IIFP will file and obtain a Storm Water Permit prior to pre-license construction or full construction in accordance with the EPA and state requirements.

NMSA, Chapter 74, Article 6 "Water Quality" (NMSA, 2009b) and implementing regulations found in NMAC Title 20, Chapter 6 "Ground and Surface Water Protection" (NMAC, 2009b) establishes water-quality standards and applies to permitting prior to construction, during operation, closure, post-closure and abatement, if necessary. Generally, a permit is required for discharges that could impact surface or groundwater. Any impoundments for sewage treatment facilities, cooling water or other discharges that exceed the standards listed in 20.6.2.3103 NMAC or contain toxic constituents require a permit. IIFP is working with the State of New Mexico to obtain a Groundwater Discharge Permit and to determine if any other related permitting requirements prior to construction or operation, as applicable.

Leakage Detection Systems

The design status of leak detection (and mitigation procedures) for basins and tanks has not yet progressed to final design. The facility conceptual design does include appropriate spill and leak control pads and containment dikes. The IIFP Facility will conform to leak detection recommendations in NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," (NRC, 2002). Permits, if any, will be obtained through the State of New Mexico for requirements on design, leak detection, monitoring and maintenance of the Storm Water Retention/Evaporation Basins.

Releases to Sewer Systems

All liquid process effluents are to be maintained on the IIFP New Mexico Site. In lieu of connecting to the local sewer system, sanitary waste is routed to the sanitary treatment system for primary and secondary treatment. After removal of the biomass, the liquids are sand-filtered, treated by ultraviolet radiation as tertiary treatment and rendered suitable for on-site silvaculture purposes. The biomass is shipped off-site to an approved disposal facility.

Reporting Procedures

Effluent recording procedures implement the guidance specified in Regulatory Guide 4.16 (NRC, 1985). The semi-annual effluent record contains the concentrations of principle radionuclide(s) released to unrestricted areas in liquid and gaseous effluents and includes the MDC for the analysis and the error for each data point.

Waste Management Procedures

The design of the IIFP Facility includes treatment of fluoride-bearing waste liquors to regenerate solutions for reuse and recycle in the Plant KOH Scrubbing System. Relatively small volumes of miscellaneous waste liquors that have potential to contain uranium are concentrated, filtered and the uranium is removed from the liquid steams. The removed uranium is collected and sent to a licensed low-

level waste (LLW) disposal site along with the waste uranium oxides produced by the de-conversion processes. The IIFP ER, Revision B Chapter 4 Subsection 4.13.4.3 and Section 4.13.5 provides an overview of the liquid waste treatment systems.

Solid waste management facilities with sufficient capability to enable preparation, packaging, storage and transfers to licensed disposal sites in accordance with the regulations are incorporated into the IIFP Facility design and are maintained in proper operating condition as required to support the operation of the facility. Waste management procedures and processes are performed in various buildings and areas of the IIFP Facility depending on the locations and characteristics of the waste stream. The main buildings involved are the FEP Process Building, FEP Oxide Staging Building, Decontamination Building, Environmental Protection Process Building and the Material Warehouse. These major buildings and areas are either described below or in detail in Sections of the IIFP LA, Revision B Chapter 1 "General Information" and the ISA Summary Section 2.

The locations of the buildings and areas discussed below are shown in the IIFP License Application, Revision B Chapter 1 Figure 1-5. A larger and more legible site drawing showing the subject buildings and locations is provided as Drawing 100-C-0001, Revision F and is part of the engineering drawing package provided to the NRC as separate document files of the IIFP License Application. The subject building sizes are provided in Table 1-2, Revision B Chapter 1 of the LA.

Table 1-3, Revision B Chapter 1 of the LA shows the estimated annual quantity of waste generated at the IIFP Facility. The largest amount of solid waste generated is the depleted uranium oxide that is a by-product of the FEP process. This uranium oxide waste is managed using the equipment and facilities of the FEP Process Building and the FEP Oxide Staging Building. The depleted uranium oxide from the FEP process is collected in the oxide storage hopper for temporary storage until it is packaged for shipment. The depleted uranium oxide by-product is filled into Department of Transportation (DOT) approved drums (or other approved transport containers). The depleted oxide is filled into the packaging container using an enclosed filling (drum off) station located in the FEP Process Building. The oxide hoppers and the drum-off stations are located on the first level of the building. The filling station enclosure is connected to the FEP oxide dust collection system to provide negative pressure in the enclosed filling station to contain and capture dust during the filling process. After filling, the uranium oxide shipping containers are then checked, labeled and staged temporarily in the FEP Oxide Staging Building for scheduled loading and shipment by trailer truck to a licensed disposal site. 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. The FEP Oxide Staging 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 weighing equipment, electrical and instrumentation monitoring and alarm panels and controls, exhaust hood systems, piping and ductwork connections to the primary dust collector system.

The Decontamination Building serves as a facility with equipment to manage LLW other than the depleted uranium oxide waste. The Decontamination 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 is used for decontamination of equipment for maintenance and for handling and preparing LLW for shipments. The Decontamination Building contains an equipment cleaning booth and hood system, equipment for sorting and packaging LLW and mixed dry solid waste, loading station, weighing scales, drying equipment, primary and secondary dust collector system in series, contaminated-water holding tanks, primary and polishing filters, associated pumps,

piping, field equipment instrumentation panels, ion exchange columns and associated controls and backwash systems.

Radioactive waste, including dust collector bags, ion exchange resin, crushed-contaminated drums, contaminated trash and contaminated carbon-bed trap material is collected in labeled containers in each radiological controlled area and transferred to a temporary radioactive waste storage area located in the Decontamination Building. In this area, LLW is sorted, if needed, prepared, packaged and surveyed. Suitable waste is volume-reduced using compaction equipment, if feasible. The LLW is loaded and transported for disposal at an off-site licensed disposal facility.

Also in the Decontamination Building, relatively small volumes of miscellaneous waste liquors that have potential to contain depleted uranium are concentrated, filtered and treated to remove the depleted uranium from liquid steams. Depleted uranium removed from liquid streams is collected and dried for volume reduction to meet acceptance criteria. This dried solid waste is sent to an off-site licensed LLW disposal site along with the waste depleted uranium oxides produced by the de-conversion processes.

The Environmental Protection Process (EPP) Building and adjacent area is used to treat and manage fluoride-bearing waste liquors. The design of the IIFP Facility includes equipment to regenerate spent KOH solutions that can be reused and recycled in the Plant KOH Scrubbing System. This design and operation eliminates the need to otherwise discharge the flow as treated wastewater and also conserves the use of the treating agent and saves cost. Also, aqueous waste solutions that are not licensed material, but contain fluoride or trace metals, are treated in the EPP.

The treatment of fluoride-bearing liquors results in a solid particulate calcium fluoride (CaF_2) which may be sold as a raw material for use in the fluorine chemical industry. Converting the fluoride in the subject liquors to a solid is the means by which fluoride wastes are managed with potential use as a resource in other industrial markets. The treatment process, preparation and packaging procedures for the CaF_2 are conducted in the EPP Building and adjacent area. In this area, the CaF_2 is filtered from the process and dried for shipment to customers, where there is a demand, or shipped to an approved off-site disposal site if there is no feasible market demand. The EPP Building and equipment is described in the IIFP LA, Revision B Chapter 1 Section 1.1.2.1 and in the ISA Summary, Revision B Section 3.1.8.

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 may be stored in the warehouse. No licensed materials are stored in this building.

Part of the Material Warehouse is used for managing non-radioactive waste. Designated areas inside the Material Warehouse and some collection containers on the adjacent outside curbed concrete pads are used to collect, sort, package, if necessary, and load non-radioactive waste. This waste has been segregated and surveyed to be determined as non-radioactive prior to moving to the Material Warehouse area. Waste sent to this area must be approved for release to licensed commercial disposal or recycling. This waste includes industrial non-radioactive wastes, such as cardboard, paper, wood, scrap metal, etc. Some of these wastes, such as cardboard, paper and metal may be shipped to off-site facilities for recycle or minimization, and, then sent, if required, to an off-site licensed waste disposal facility.

One area in the warehouse is designated for these types of wastes. Another area in the warehouse is set aside to manage small quantities of RCRA waste that is not otherwise handled at the EPP. The RCRA

waste is packaged, labeled, manifested and loaded for shipment. A permitted transport contractor is used to transport the waste to a permitted RCRA facility for disposal.

9.2.2.2 Environmental Monitoring

The following sections address the acceptance criteria related to environmental monitoring.

Background and Baseline Measurements

The Radiological Environmental Monitoring Program at the IIFP Facility establishes a process for collecting data for assessing radiological impacts on the environs. The REMP includes the collection of data prior to operating the facility in order to establish baseline radiological information that will be used in determining and evaluating impacts from operations at the plant on the local environment. The REMP will be initiated at least twelve (12) months prior to facility operations in order to develop a sufficient database. Samples will be collected from the site and analyzed to determine a baseline to be used in evaluating changes in potential environmental conditions caused by facility operations. Vegetation and soil samples, both from on and off-site locations will be collected on a quarterly basis in each sector during the pre-operational REMP. Air and water samples will be collected from remote locations in order to provide background data during operations.

Monitoring

The following sections describe the types of monitoring to be performed.

Direct Radiation

Direct radiation monitoring of the stored DUF_6 cylinders will be accomplished by use of environmental thermoluminescent dosimeters (TLDs) placed at the facility perimeter fence line and other location(s) close to the DUF_6 cylinders and sources.

Air

Air samples will be collected at locations that are close to the facility that would provide the best opportunity to detect and identify facility-related radioactivity in the ambient air. Air monitoring stations will be located along the fence perimeter, next to the Storm Water Retention Basins, at the nearest resident and at a “control comparative” location. The control sample location will be established beyond 5 km (3.1 mi) in an upwind sector. Air samplers will operate on a continuous basis.

Vegetation and Soil

Vegetation and soil samples both from on and off-site locations will be collected in five different sectors. Vegetation samples may include vegetables and grass, depending on availability. Soil samples will be collected in the same vicinity as the vegetation samples.

Groundwater

Groundwater samples from monitoring wells will be collected. Two or three wells are expected to be located down gradient to the facility of which one well may be located on the southeast side of the Full

DUF_6 Cylinder Storage Pad. As many as four up-gradient wells may be needed along the east and northeast side of the IIFP Facility. The final number of wells and locations will be consistent with the New Mexico Groundwater Discharge Permit that will be approved and issued to the IIFP Facility.

Sediment

Sediment samples will be collected from the storm water runoff retention basis on site in accordance with the New Mexico Groundwater Discharge Permit to monitor for any buildup of uranic material being deposited.

Storm Water

Storm water samples will be collected from the site Storm Water Retention Basin (s) and the DUF_6 Cylinder Storage Pads Basin in accordance with the New Mexico Groundwater Discharge Permit. Storm water monitoring is discussed in the IIFP ER, Revision B Section 6.2.4.

Sampling Locations and Frequencies

Table 6-2 of the IIFP ER, Revision B Chapter 6 summarizes the radiological site area sampling locations, frequencies and type of analysis to be performed for each sample type described. The exact locations will be finalized with the completion of final site design. Section 6.1 of the Chapter 6 discusses the site area radiological monitoring.

Monitoring Procedures

Monitoring procedures will employ well-known acceptable analytical methods and instrumentation. The Instrument Maintenance and Calibration Program will be appropriate to the given instrumentation in accordance with manufacturers' recommendations.

IIFP will ensure that the on-site laboratory and any contractor laboratory used to analyze IIFP samples participates in third-party laboratory inter-comparison programs appropriate to the media and analytes being measured. IIFP will require that all radiological and non-radiological laboratory vendors are certified by the National Environmental Laboratory Accreditation Program (NELAP) or an equivalent state laboratory accreditation agency for the analytes being tested.

Action Levels

Action levels will be established to identify concentrations at which an investigation will be performed, as well as levels at which process operations would be shut down. Action Levels for vegetation, soil, groundwater, sediment and storm water samples will initially be set at twice background. Action levels for direct radiation monitoring samples will initially be set at 10% of the 10 CFR 20 dose limits to the public. Action levels for air monitoring will initially be set at 1% of the 10 CFR 20 Appendix B values. Action levels will be reviewed and adjusted annually as necessary.

Minimum Detectable Concentration

Minimum Detectable Concentrations (MDCs) will be specified for sample analysis on the basis of the

action levels. The environmental MDCs will at least be as low as those selected for effluent monitoring in air, $3.7x10^{-11}$ Bq/ml ($1.0x10^{-15}$ µCi/ml).

Data Analysis

As specified in approved written procedures, data analysis methods and criteria used in evaluating and reporting the environmental sampling results will be appropriate and indicate when an action level is being approached in time to take corrective actions.

Status of Licenses, Permits and Approvals

The federal, state and local requirements for environmental monitoring are followed in accordance with the licenses and permits described above in Section 9.2.2.1 "Federal and State Standards for Discharges."

Monitoring for "High" and "Intermediate" Consequence Accidents

Based on the consequence analysis discussed in Section 9.2.3 below, the ISA did not identify any accidents that resulted in "High" or "Intermediate" consequences with respect to environmental impact. The REMP will be utilized for assessing impacts to the environment from potential radioactive and non-radioactive releases.

9.2.3 Integrated Safety Analysis

IIFP has prepared an Integrated Safety Analysis Summary in accordance with 10 CFR 70.62, "Safety Program and Integrated Safety Analysis" (CFR, 2009f), which includes the evaluation of high and intermediate consequence events involving releases of radioactive material to the environment. Accident sequences that could result in radiological or non-radiological releases to the environment are described in the ISA Summary, Revision B Section 3 "Processes, Hazards and Accident Sequences." Demonstration of compliance provided in Section 4 of the ISA Summary Revision B. Section 5 of the ISA Summary Revision B details the Process Hazard Analysis methodology.

Table 5-10, "Risk Matrix and Risk Index Values" in the ISA Summary, Revision B depicts the matrix for the Severity of Consequences and Likelihood of Occurrences. Items Relied on for Safety (IROFS) are established for any accident for which the Risk Index is greater than 4. Consequence categories are determined for environmental exposure by comparison of the 24-hour averaged release of radioactive materials outside the restricted area to 5000 times the values in Table 2 of Appendix B to CFR Part 20. If an accidental release results in concentrations exceeding this metric, the accident is assigned a consequence category of intermediate. If the likelihood category of the accident is greater than 2 (not unlikely), then IROFS would be assigned to lower the Risk Index to 4 or less. There were no accident sequences identified which resulted in concentrations exceeding the environmental performance metric therefore, no IROFS were designated for accidental releases on the environment outside the IIFP Site boundary.

REFERENCES

CFR, 2009 Title 10, Code of Federal Regulations, Section 51.45, "Environmental Report," U.S. Nuclear Regulatory Commission, 2009.

CFR, 2009b Title 10, Code of Federal Regulations, Section 40.31, "Application for Specific Licenses," U.S. Nuclear Regulatory Commission, 2009.

CFR, 2009c Title 10, Code of Federal Regulations, Section 20, "Standards for Protection Against Radiation," U.S. Nuclear Regulatory Commission, 2009.

CFR, 2009d Title 10, Code of Federal Regulations, Section 20.1406, "Minimization of Contamination," U.S. Nuclear Regulatory Commission, 2009.

CFR, 2009e Title 10, Code of Federal Regulations, Section 20.1302, "Compliance with Dose Limits for Individual Members of the Public," U.S. Nuclear Regulatory Commission, 2009.

CFR, 2009f Title 10, Code of Federal Regulations, Section 70.62, "Safety Program and Integrated Safety Analysis," U.S. Nuclear Regulatory Commission, 2009.

EPA, 2009 Title 40, Code of Federal Regulations Section 122, "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System," U.S. Environmental Protection Agency, 2009.

NEPA, 1969 National Environmental Policy Act, "National Environmental Policy Act of 1969," as amended, 1969.

NMAC, 2009a New Mexico Administrative Code, Title 20, "Environmental Protection," Chapter 2, "Air Quality," New Mexico Administrative Code, 2009.

NMAC, 2009b New Mexico Administrative Code, Title 20, Chapter 6, "Ground and Surface Water Protection," 2009.

NMSA, 2009a New Mexico Statutes Annotated, Chapter 74, "Environmental Improvement, Article 2, Air Pollution," State of New Mexico, 2009.

NMSA, 2009b New Mexico Statutes Annotated, Chapter 74, Article 6, "Water Quality, State of New Mexico," 2009.

NRC, 1985 Regulatory Guide 4.16, "Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluents from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants," U.S. Nuclear Regulatory Commission, 1985.

NRC, 1993 Regulatory Guide 8.37, "ALARA Levels for Effluents from Materials Facilities," U.S. Nuclear Regulatory Commission, 1993.

NRC, 1996 Regulatory Guide 4.20, "Constraint on Releases of Airborne Radioactive Materials to the Environment for Licensees Other than Power Reactors," U.S. Nuclear Regulatory Commission, 1996.

NRC, 2002 NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," U.S. Nuclear Regulatory Commission.

NRC, 2003 NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs, Final Report," U.S. Nuclear Regulatory Commission, 2003.

NRC, 2006 Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs," U.S. Nuclear Regulatory Commission, 2006.

NRC, 2008 Regulatory Guide 4.21, "Minimization of Contamination and Radioactive Waste Generation: Life-Cycle Planning," U.S. Nuclear Regulatory Commission, 2008.