## 2.0 ORGANIZATION AND ADMINISTRATION

USEC Inc. (USEC) is committed to conducting operations at the American Centrifuge Plant (ACP) in a manner that protects the health and safety of workers and the public; protects the environment; and provides for the common defense and security. In order to meet these objectives, as well as others required for operation of the ACP, USEC maintains the following operations policy with respect to environmental, health, nuclear safety, safeguards, security, and quality to guide the day-to-day business activities of, and provide direction to, ACP personnel.

> USEC is responsible for safe operation of the ACP and is committed to conducting operations in a manner that protects the health and safety of workers and the public; protects the environment; provides for the common defense and security; and is in compliance with applicable local, state, and federal laws and regulations.

USEC has provided the management structure to ensure that this policy is effectively implemented. The Operations organization is responsible for the safe operation of the ACP. Programs and staff organizations are established for the environmental, health, safety, safeguards, security, and quality areas and are provided with sufficient resources to support safe operation of the ACP.

USEC is responsible for the design, quality assurance (QA), refurbishment/construction, testing, start-up, operation, maintenance, and decommissioning of the ACP. Preparation of some refurbishment/construction documents and portions of the refurbishment/construction activities are contracted to qualified contractors. The Engineering Manager has the responsibility for construction management and coordination with the contractor(s). USEC staffs the ACP with qualified individuals to ensure a smooth transition from refurbishment/construction activities to plant operations.

Managerial positions that have the principal responsibilities important to environmental, health, safety, safeguards, security, and quality for the ACP are described in this chapter. Their qualifications, responsibilities, and authorities are clearly defined in position descriptions that are accessible to affected personnel and the U.S. Nuclear Regulatory Commission (NRC) upon request.

Section 2.1 describes the organizational commitments, relationships, responsibilities, and authorities for the overall management system to assure the protection of the health and safety of the workers and the public; protection of the environment; and provide for the common defense and security. This section includes the qualifications, functions, responsibilities, and authorities of the positions in the organizations assigned functions related to environmental, health, safety, safeguards, security, and quality during the stages of the project, from design through refurbishment/construction, start-up, operation, and decommissioning.

Section 2.2 describes the management controls for maintaining the environmental, health, safety, safeguards, and quality programs and the administrative systems to control relationships and interfaces between the programs.

Section 2.3 describes USEC's plans and the management controls for pre-operational testing and initial start-up of the ACP.

## 2.1 Organizational Commitments, Relationships, Responsibilities, and Authorities

The ACP management structure provides for line responsibility for safe operations with sufficient staff support to develop, communicate, and implement technical programs for various environmental, health, safety, safeguards, security, and quality areas. Figure 2.1-1 depicts the ACP organization.

The Director, American Centrifuge Plant provides overall direction and management of ACP operations, and oversees activities to ensure safe and reliable operations and refurbishment/construction. The Plant Support Manager, Engineering Manager, and Manager, Enrichment Operations report to the Director, American Centrifuge Plant and manage the activities in their areas of responsibility.

Minimum qualifications, functions, and responsibilities for key staff positions are described below. The personnel responsible for managing the design, refurbishment/construction, and operation of the plant have the substantive breadth and level of experience to successfully execute their responsibilities. These key staff positions are located at the plant and are available as necessary. Alternates are designated in writing and in accordance with procedural requirements to fulfill the responsibilities and authorities of these personnel during their absence from the plant. Alternates will meet the minimum qualification for the corresponding position.

Throughout this section, equivalent technical experience means the substitution of two years of nuclear industry experience for each year of college up to a total of three years. Additionally, 30-semester hours or 45-quarter hours from an accredited college or university may be substituted for the remaining one year of baccalaureate education. Individuals who do not meet the formal educational requirements specified in this section or do not meet the equivalent technical experience defined above are not automatically eliminated where other factors provide sufficient demonstration of their abilities to fulfill the duties of a specific position. These other factors must clearly demonstrate proficiency in the technical area for which the position will be responsible (e.g., a license or certification, documented completion of relevant training, or previous experience in the same position at another plant). These factors are evaluated on a case-by-case basis, documented, and approved by the Director, American Centrifuge Plant.

### 2.1.1 Senior Vice President

The Senior Vice President, located at headquarters, reports to the Executive Vice President and Chief Operating Officer. The Senior Vice President has overall responsibility for safe operation of the ACP and has shutdown and stop work authority for the ACP. If such authority is exercised, the Senior Vice President must concur with restart of shutdown operations.

The Senior Vice President has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, six years nuclear experience, and ten years of management experience, which may be concurrent with the nuclear experience.

The USEC Board of Directors appoints the Senior Vice President.

### 2.1.2 Director, Regulatory and Quality Assurance

The Director, Regulatory and Quality Assurance, located at headquarters, reports to the Senior Vice President.

This position has responsibility for the management of regulatory and quality assurance functions and the ACP policy system. This individual is the primary day-to-day interface with the NRC and has overall responsibility for management of activities related to license requirements for the ACP. Although this individual works closely with the Director, American Centrifuge Plant and key plant personnel, he/she is independent from production, plant operating cost, and production schedule concerns, and has the authority to stop work if there is a failure to adhere to regulatory requirements. If such authority is exercised, the Director, Regulatory and Quality Assurance must concur with restart of shutdown operations.

This position has, as a minimum, a bachelor's degree in engineering or physical sciences or equivalent technical experience, and six years of nuclear experience, and six years of management experience, which may be concurrent with the nuclear experience.

The Senior Vice President appoints the Director, Regulatory and Quality Assurance.

#### 2.1.2.1 Regulatory Manager

The Regulatory Manager, located at the ACP, reports to the Director, Regulatory and Quality Assurance.

The Regulatory Manager is responsible for regulatory oversight functions, environmental compliance, and commitment management. The Regulatory Manager, as delegated by the Director, Regulatory and Quality Assurance, and Director, American Centrifuge Plant, maintains the day-to-day interface with NRC representatives on matters of regulatory compliance. The individual has responsibility for managing the plant change process and ensuring the plant change reporting requirements are met. The Regulatory Manager is also responsible for implementing the

Corrective Action Program; ensuring incident investigations are performed; and providing management with data to assure that corrective actions and commitments are properly addressed and managed to facilitate compliance with implementing policies and procedures.

The Regulatory Manager has shutdown and stop work authority in any part of the ACP where activities are not being conducted in accordance with applicable regulatory requirements. If such authority is exercised, the Regulatory Manager must concur with restart of shutdown operations.

The Regulatory Manager has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and four years of nuclear experience.

The Director, Regulatory and Quality Assurance appoints the Regulatory Manager, with concurrence from the Director, American Centrifuge Plant.

#### 2.1.2.2 Quality Assurance Manager

The QA Manager, located at the ACP, reports to the Director, Regulatory and Quality Assurance.

The QA Manager has the responsibility to exercise oversight of procurement, refurbishment, construction, start-up, and plant operations to ensure that the health and safety of the public and workers are adequately protected; to ensure compliance with safety, safeguards, and quality requirements; and to ensure implementation of the Quality Assurance Program Description (QAPD) for the ACP, policies, procedures, and management expectations.

The QA Manager has direct access to the Senior Vice President for quality assurance matters and has shutdown and stop work authority, when necessary, to ensure protection of public and worker health and safety; provide for common defense and security; and to ensure regulatory and quality compliance. If such authority is exercised, the QA Manager must concur with restart of shutdown operations. The QA Manager has access to information at the plant related to safety, safeguards, and quality. This manager interacts directly with the Director, American Centrifuge Plant, other managers, and key ACP personnel, and participates (as desired) in any evaluations or discussions related to safety, safeguards, and quality. The QA Manager informs the Director, American Centrifuge Plant and the Director, Regulatory and Quality Assurance about safety, safeguards, and quality issues and compliance.

The QA Manager provides independent oversight and assessment to ensure that the health and safety of the public and workers are adequately protected; to ensure compliance with safety, safeguards, and quality requirements; and to ensure implementation of policies, procedures and management expectations.

The QA Manager has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and four years nuclear experience, and four years of

management experience in quality assurance; nuclear safety oversight; engineering and technical support; or regulatory affairs, which may be concurrent with the nuclear experience.

The Director, Regulatory and Quality Assurance appoints the QA Manager, with concurrence from the Senior Vice President.

### 2.1.3 Director, American Centrifuge Plant

The Director, American Centrifuge Plant, located at the ACP, reports to the Senior Vice President.

The Director, American Centrifuge Plant is responsible for the day-to-day safe operation of the plant, compliance with applicable NRC regulatory requirements, and adherence to applicable policies. The Director, American Centrifuge Plant is responsible for the overall safe operation and maintenance of the ACP, including refurbishment/construction, initial start-up, testing, and operation. The Director, American Centrifuge Plant is responsible for training, procedures, engineering, and occupational, environmental, and nuclear safety. The Director, American Centrifuge Plant also has primary responsibility for the interface with NRC inspection personnel on matters of regulatory compliance, and may delegate responsibility for this day-to-day interface to the Regulatory Manager.

The Director, American Centrifuge Plant has shutdown and stop work authority for the ACP, and if such authority is exercised, must concur with restart of shutdown operations. The Director, American Centrifuge Plant must obtain concurrence of the Senior Vice President for restart of any operations that were directed to be shutdown by the Quality Assurance Manager or the Director, Regulatory and Quality Assurance.

The Director, American Centrifuge Plant has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, six years of nuclear experience, and six years of management experience, which may be concurrent with the nuclear experience.

The Senior Vice President appoints the Director, American Centrifuge Plant.

#### 2.1.3.1 Plant Support Manager

The Plant Support Manager reports to the Director, American Centrifuge Plant.

The Plant Support Manager is responsible for Fire Safety, Health Services, Emergency Management, and Nuclear Materials Control and Accountability for the ACP.

In the absence of the Director, American Centrifuge Plant, the Plant Support Manager may be delegated the responsibilities and authorities of the Director, American Centrifuge Plant. The Plant Support Manager has shutdown and stop work authority in any part of the ACP where activities are not being conducted in accordance with applicable regulatory requirements for

which the Plant Support Manager has responsibility. If such authority is exercised, the Plant Support Manager must concur with restart of shutdown operations.

The Plant Support Manager has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and four years of nuclear experience.

The Director, American Centrifuge Plant appoints the Plant Support Manager, with concurrence from the Senior Vice President.

#### 2.1.3.1.1 Fire Safety Manager

The Fire Safety Manager reports to the Plant Support Manager.

The Fire Safety Manager is responsible for fire protection services, including interpretation and application of applicable fire codes and standards and emergency management; and has shutdown and stop work authority for activities at the ACP not being conducted in accordance with applicable fire protection requirements. If such authority is exercised, the Fire Safety Manager must concur with restart of shutdown operations.

The Fire Safety Manager has, as a minimum, a bachelor's degree or equivalent technical experience, four years of fire protection experience, and six months of nuclear experience.

The Plant Support Manager appoints the Fire Safety Manager, with the concurrence of the Director, American Centrifuge Plant.

#### 2.1.3.1.2 Nuclear Materials Control and Accountability Manager

The Nuclear Materials Control and Accountability (NMC&A) Manager reports to the Plant Support Manager.

The NMC&A Manager is responsible for ensuring that an effective NMC&A program is implemented and has shutdown and stop work authority for activities at the ACP not being conducted in accordance with NMC&A requirements. If such authority is exercised, the NMC&A Manager must concur with restart of shutdown operations.

The NMC&A Manager has, as a minimum, a bachelor's degree or equivalent technical experience, and four years NMC&A experience.

The Plant Support Manager appoints the NMC&A Manager, with the concurrence of the Director, American Centrifuge Plant.

### 2.1.3.2 Engineering Manager

The Engineering Manager reports to the Director, American Centrifuge Plant.

The Engineering Manager is responsible for engineering activities in support of operations including projects (i.e., design, fabrication, and construction of plant modifications or additions), system engineering, procurement, construction management, and construction engineering; as well as providing the primary interface with the refurbishment/construction contractor(s), and records management and document control. The Engineering Manager manages the design change process for the ACP.

The Engineering Manager is responsible for the Nuclear Criticality Safety (NCS) Program and for maintaining the Integrated Safety Analysis (ISA) for the ACP.

In the absence of the Director, American Centrifuge Plant, the Engineering Manager may be delegated the responsibilities and authorities of the Director, American Centrifuge Plant. The Engineering Manager has shutdown and stop work authority for any activity that poses a nuclear safety or criticality concern; or any activity that would be or is in violation of the ACP's licensing or design basis, or the assumptions or evaluations contained in the ISA Summary. If such authority is exercised, the Engineering Manager must concur with restart of shutdown operations.

The Engineering Manager has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and four years of nuclear experience.

The Director, American Centrifuge Plant appoints the Engineering Manager with concurrence from the Senior Vice President.

#### 2.1.3.2.1 Nuclear Safety Manager

The Nuclear Safety Manager reports to the Engineering Manager.

The Nuclear Safety Manager is responsible for developing and implementing the safety analysis program for the ACP. These duties include technical oversight of safety analysis, safety analysis training, review of procedures involving fissile material operations, and assessments of program implementation. The Nuclear Safety Manager is also responsible for procurement engineering and configuration management. The Nuclear Safety Manager has direct access to the Director, American Centrifuge Plant concerning nuclear safety matters and has shutdown and stop work authority for any activity that would be or is in violation of the ACP's licensing or design basis, or the assumptions or evaluations contained in the ISA Summary. If such authority is exercised, the Nuclear Safety Manager must concur with restart of shutdown operations.

The Nuclear Safety Manager is also responsible for the management of NCS functions, including administering the NCS program. These duties include programmatic oversight of NCS and NCS training.

The Nuclear Safety Manager has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and four years nuclear experience, including six months at a uranium processing plant.

The Engineering Manager appoints the Nuclear Safety Manager, with the concurrence of the Director, American Centrifuge Plant.

#### 2.1.3.2.1.1 Nuclear Criticality Safety Manager

The NCS Manager reports to the Nuclear Safety Manager.

The position is responsible for the management of NCS functions, including administering the NCS program and conducting assessments of program implementation. These duties include programmatic oversight of NCS and NCS training. The NCS Manager has stop work authority for any activity that could cause a NCS concern. If such authority is exercised, the NCS Manager must concur with restart of shutdown operations.

The NCS Manager has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and four years nuclear experience, including six months at a uranium processing facility where NCS was practiced.

The Nuclear Safety Manager appoints the Nuclear Criticality Safety Manager, with the concurrence of the Engineering Manager.

### 2.1.3.3 Manager, Enrichment Operations

The Manager, Enrichment Operations reports to the Director, American Centrifuge Plant.

The Manager, Enrichment Operations is responsible for the day-to-day production activities at the ACP including production support, operations, and maintenance.

In the absence of the Director, American Centrifuge Plant, the Manager, Enrichment Operations may be delegated the responsibilities and authorities of the Director, American Centrifuge Plant. The Manager, Enrichment Operations has shutdown and stop work authority in any part of the ACP where activities are not being conducted in accordance with applicable regulatory requirements. If such authority is exercised, the Manager, Enrichment Operations must concur with restart of shutdown operations.

The Manager, Enrichment Operations has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and four years of nuclear experience.

The Manager, Enrichment Operations is appointed by the Director, American Centrifuge Plant, with concurrence from the Senior Vice President.

#### 2.1.3.3.1 Production Support Manager

The Production Support Manager reports to the Manager, Enrichment Operations.

The Production Support Manager is responsible for industrial safety, industrial hygiene, chemical safety, and the Radiation Protection Program; waste management; environmental survey; and training and procedures. In the absence of the Manager, Enrichment Operations, the Production Support Manager may be delegated the responsibilities and authorities of the Manager, Enrichment Operations. The Production Support Manager has shutdown and stop work authority in any part of the operation for which he/she has responsibility. If such authority is exercised, the Production Support Manager must concur with restart of shutdown operations.

The Production Support Manager has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and four years of nuclear experience.

The Manager, Enrichment Operations appoints the Production Support Manager, with concurrence from the Director, American Centrifuge Plant.

##### 2.1.3.3.1.1 Radiation Protection Manager

The Radiation Protection Manager (RPM) reports to the Production Support Manager.

The RPM is responsible for the Radiation Protection (RP) Program for the plant. The RPM is responsible for providing guidance and direction for establishment and implementation of the RP Program and has the authority to deny access to radiological areas by personnel who do not adhere to radiological protection requirements. The RPM has oversight of radiological protection procedures with the authority to oversee and to maintain the integrity of the RP Program. The RPM has direct access to the Director, American Centrifuge Plant and the Senior Vice President for radiation protection matters, and has shutdown and stop work authority for activities not being conducted in accordance with radiation protection requirements and policies. If such authority is exercised, the RPM must concur with restart of shutdown operations.

The RPM has, as a minimum, a bachelor's degree in engineering, health physics, radiation protection, or the physical sciences or equivalent technical experience, and four years experience in radiation protection, including six months at a uranium processing plant.

The Production Support Manager appoints the RPM, with the concurrence of the Manager, Enrichment Operations.

##### 2.1.3.3.1.2 Training Manager

The Training Manager reports to the Production Support Manager.

The Training Manager is responsible for preparation, presentation, and documentation of employee orientations; and for technical and qualification training program development and

implementation. The Training Manager is also responsible for the development and implementation of the procedures program. The Training Manager has shutdown and stop work authority in any part of the operation for which he/she has responsibility. If such authority is exercised, the Training Manager must concur with restart of shutdown operations.

The Training Manager has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and four years of nuclear experience.

The Production Support Manager appoints the Training Manager, with concurrence of the Manager, Enrichment Operations.

#### 2.1.3.3.2 Operations Manager

The Operations Manager reports to the Manager, Enrichment Operations.

The Operations Manager is responsible for enrichment operations; feed and withdrawal operations; utilities; production management; shift operations; packaging and transportation; and repair and assembly of centrifuge machines. This includes activities such as ensuring the correct and safe operation of the uranium hexafluoride ($UF_6$) processes; proper receipt, storage, handling, and on-site transportation of $UF_6$; and providing chemical cleaning and decontamination services. Operational analysis of cascade performance is also the responsibility of the Operations Manager.

In the absence of the Manager, Enrichment Operations, the Operations Manager may be delegated the responsibilities and authorities of the Manager, Enrichment Operations. The Operations Manager has shutdown and stop work authority in any part of the operation for which he/she has responsibility. If such authority is exercised, the Operations Manager must concur with restart of shutdown operations.

The Operations Manager has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and four years of nuclear experience, including six months at a uranium processing plant.

The Operations Manager is appointed by the Manager, Enrichment Operations, with concurrence from the Director, American Centrifuge Plant.

##### 2.1.3.3.2.1 Operations Supervisors

Operations Supervisors report to the Operations Manager.

As the senior manager on shift (one per shift), the Operations Supervisor represents the Director, American Centrifuge Plant and has the authority and responsibility to make decisions, as necessary, to ensure safe operations, including shutdown and stop work authority and placing the plant in a safe condition. The Operations Supervisors are responsible for accumulation and dissemination of information regarding plant activities to the incident commander during emergencies, and making notification of events to regulatory agencies.

The Operations Supervisors are responsible for providing operational support of centrifuge machine assembly, transport, installation, pump down, integrated system testing, start-up, operation, and repair. The Operations Supervisors also direct the operation of systems within the facilities necessary to support enrichment operation. Operations Supervisors authorize the restart of equipment that has been shutdown in a routine fashion when the prerequisites and limitations of the associated operating procedure are met.

Operations Supervisors have, as a minimum, a high school diploma or satisfactory completion of the General Educational Development test, and three years of industrial/chemical/nuclear plant operations, maintenance, or engineering experience. Operations Supervisors must have one year of supervisory experience or completion of a supervisory training course.

The Operations Manager appoints Operations Supervisors, with the concurrence of the Manager, Enrichment Operations.

#### 2.1.3.3.3 Maintenance Manager

The Maintenance Manager reports to the Manager, Enrichment Operations.

The Maintenance Manager is responsible for the safe and reliable performance of preventive and corrective maintenance and support services on facilities and equipment with the exception of centrifuge machines. This includes troubleshooting; maintenance of logs and records; work planning/control to initiate, screen, evaluate, and prioritize maintenance work; and coordinating shop maintenance. The Maintenance Manager is also responsible for integrated planning and scheduling. This includes managing daily work control activities, developing an integrated work schedule, and coordinating development of work control guidelines.

In the absence of the Manager, Enrichment Operations, the Maintenance Manager may be delegated the responsibilities and authorities of the Manager, Enrichment Operations. The Maintenance Manager has shutdown and stop work authority in any part of the operation for which he/she has responsibility. If such authority is exercised, the Maintenance Manager must concur with restart of shutdown operations.

The Maintenance Manager has, as a minimum, a bachelor's degree in engineering or the physical sciences or equivalent technical experience, and four years of nuclear experience.

The Maintenance Manager is appointed by the Manager, Enrichment Operations, with concurrence from the Director, American Centrifuge Plant.

#### 2.1.3.3.3.1 Maintenance Supervisors

Maintenance Supervisors report to the Maintenance Manager.

Maintenance Supervisors are responsible for supervising the maintenance of electrical equipment; electronic and pneumatic instrumentation and controls; and computers and programmable controllers. Maintenance Supervisors are also responsible for supervising mechanical maintenance (i.e., valve, pump, and mechanical repair and replacement). In addition, these supervisors are responsible for supervising other maintenance activities (i.e., painting, carpentry, sheet metal, and machinist activities). The Maintenance Supervisors have shutdown and stop work authority in any part of the operation for which they have responsibility.

Maintenance Supervisors have, as a minimum, a high school diploma or satisfactory completion of the General Educational Development test, and three years of industrial/chemical/nuclear plant operations, maintenance, or engineering experience. Maintenance Supervisors must have one year of supervisory experience or completion of a supervisory training course.

The Maintenance Manager appoints Maintenance Supervisors.

#### 2.1.3.3.4 Shift Crew Composition

The minimum operating shift crew consists of an Operations Supervisor, a Radiation Protection/Industrial Hygiene technician, and one operations technician per process building. Other personnel, such as NCS, will be available on an as needed basis.

### 2.1.4 Vice President, Chief Information & Security Officer

The Vice President, Chief Information & Security Officer, located at headquarters, reports to the Executive Vice President and Chief Operating Officer.

The Vice President, Chief Information & Security Officer, is responsible for the strategic direction of information technology programs as well as overall physical and data security. The Vice President, Chief Information & Security Officer has shutdown and stop work authority for activities not being conducted in accordance with applicable security requirements. If such authority is exercised, the Vice President, Chief Information & Security Officer, must concur with restart of shutdown operations.

The Vice President, Chief Information & Security Officer has, as a minimum, a bachelor's degree or equivalent technical experience, six years security experience, and ten years of management experience, which may be concurrent with the security experience.

The USEC Board of Directors appoints the Vice President, Chief Information & Security Officer.

### 2.1.4.1 Security Manager

The Security Manager, located at the ACP, reports to the office of the Vice President, Chief Information & Security Officer.

The Security Manager is responsible for the ACP safeguards and security services. The Security Manager has direct access to the Director, American Centrifuge Plant concerning security matters and has shutdown and stop work authority for activities not being conducted in accordance with applicable security requirements. If such authority is exercised, the Security Manager must concur with restart of shutdown operations.

The Security Manager has, as a minimum, a bachelor's degree or equivalent technical experience, and four years security experience.

The Vice President, Chief Information & Security Officer appoints the Security Manager, with the concurrence of the Director, American Centrifuge Plant.

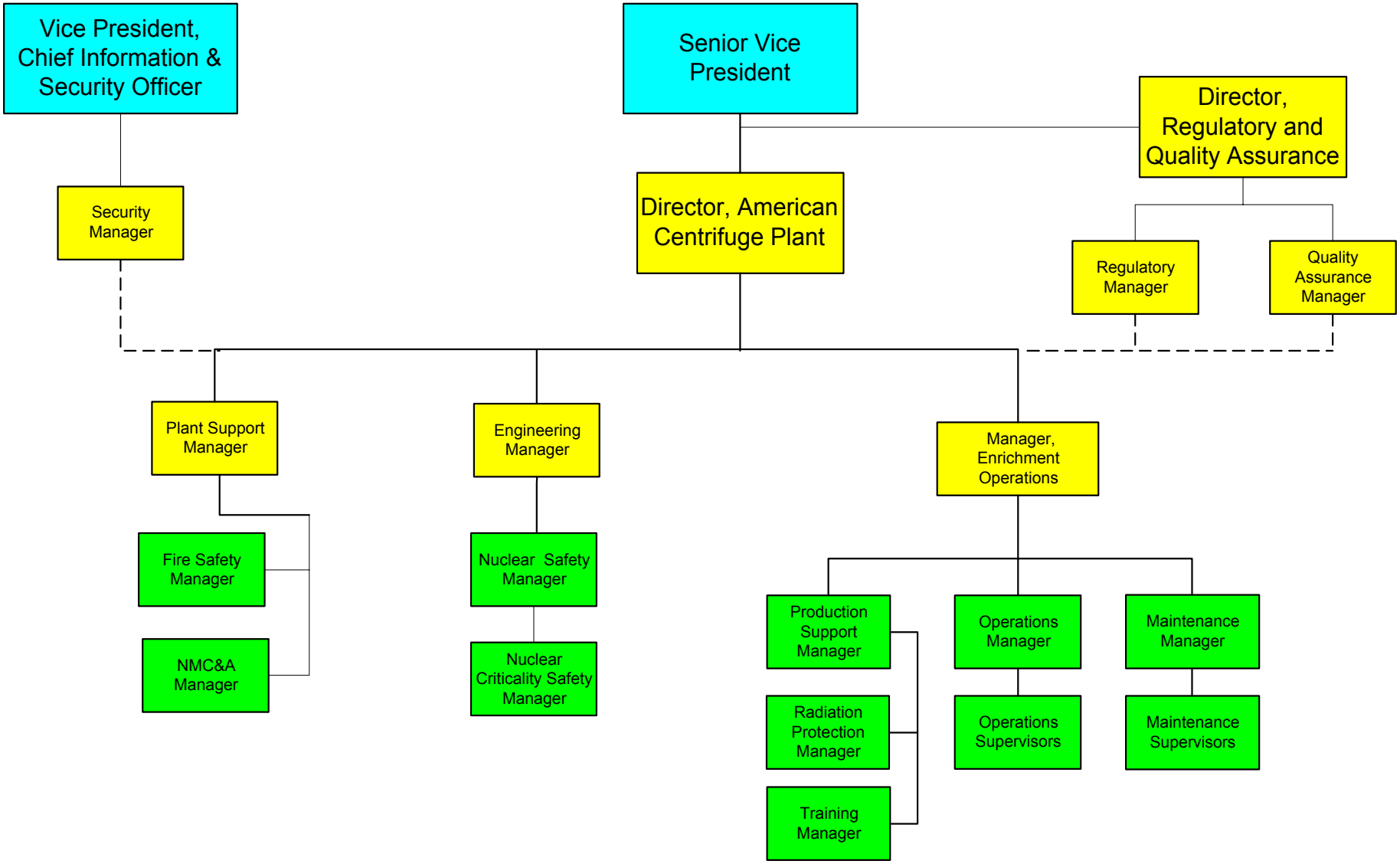


Figure 2.1-1
American Centrifuge Plant Organization Chart

## 2.2 Management Controls

USEC has established management measures with associated policies, administrative procedures, and management controls to ensure the ACP equipment, facilities and procedures; the staff (including training and qualifications); and the programs provide for the protection of the health and safety of workers and the public, protection of the environment, and for the common defense and security. Management controls have been established to maintain configuration management of the plant. These controls are described in Section 11.1 of this license application. Organizations with environmental, health, nuclear safety, safeguards, security, and quality responsibilities have been established with a reporting chain, independent from the operations organization. Effective lines of communication and authority among the organizations involved in the engineering, environmental, safety, and health, and operations functions of the plant are clearly defined.

The management controls established by USEC for the ACP include policies, management systems, and administrative procedures that are communicated to plant personnel. Policies related to the protection of health and safety of workers and the public, protection of the environment, and providing for the common defense and security are discussed in pertinent sections of this license application. Activities that are essential for effective implementation of the environmental, safety, and health functions are documented in approved, written procedures, prepared in compliance with a document control program. Procedure development and document control are described in Section 11.4 of this license application and Section 5.0 and 6.0 of the QAPD.

Management measures required to ensure the availability and reliability of items relied on for safety (IROFS) are described in Chapter 11.0 of this license application. Controls specific to plant programs are identified in the QAPD, Fundamental Nuclear Materials Control Plan, and Security Program for the American Centrifuge Plant.

The commitment tracking and Corrective Action Programs are integrated to prioritize ACP actions consistent with their safety and safeguards significance. Any person working in the plant may report potentially unsafe conditions or activities by submitting a condition notification. Reported concerns are investigated, assessed, and resolved as described in Section 11.6 of this license application.

Where safety, security or safeguards might be adversely impacted by cost or schedule considerations, it is the policy of USEC to subordinate cost and schedule considerations to ensure adequate treatment of safety and safeguards in full compliance with applicable regulatory requirements.

The integration of ACP operations and the various programs and requirements is accomplished through a variety of management practices, including:

- Staff meetings to discuss issues and policy implementation;
- Review of performance indicators;
- Review of identified events or conditions;
- Multi-discipline reviews by the Plant Safety Review Committee (PSRC); and
- Work permit systems that provide the integration in the field of various health, safety, and environmental program requirements and hazard evaluations.

Additionally, oversight of the integration of various program elements is provided by the QA organization.

Letters of agreement exist with off-site emergency resources (i.e., fire, police, ambulance/rescue units, and medical services). These interface agreements are addressed in more detail in the Emergency Plan for the American Centrifuge Plant.

### 2.2.1 Plant Safety Review Committee

The PSRC performs multi-discipline reviews of day-to-day and proposed activities to ensure that these activities are and/or will be conducted in a safe manner. The PSRC advises the Director, American Centrifuge Plant on matters related to Radiation Protection, Nuclear Safety, Chemical Safety, Fire Safety, and Environmental Protection. The specific membership, qualifications, meeting frequency, quorum, functions, responsibilities, and required records are provided in a plant procedure. Auditing and oversight of PSRC activities is the responsibility of the QA Manager.

Subcommittees may be established by the PSRC chairperson to provide assistance in conducting reviews and assessments as described in the PSRC procedure. The PSRC chairperson approves the subcommittee procedures, membership, and member qualifications. The PSRC maintains the overall responsibility for any required reviews.

## 2.3 Pre-operational Testing and Initial Start-up

Specific plans have been established to ensure the safe and efficient turnover, testing, and start-up of centrifuge machines, equipment, and support systems. These plans cover the transition from the refurbishment/construction phase to the operations phase.

The Engineering Manager is responsible for development and implementation of testing to provide for the turnover and acceptance of equipment and systems from contractors/vendors to USEC.

The Operations Manager is responsible for the development and execution of the Integrated Systems and Test Plans (ISTPs). The Engineering Manager may assist in the development of ISTPs. The ISTPs demonstrate the proper operation of completed systems to ensure the systems meet their intended design functions. The Operations Manager is also responsible for the testing, initial start-up, and operation of the centrifuge machines, equipment, and support systems. Documentation of testing is maintained in accordance with records management and document control requirements, and is available for NRC review.

### 2.3.1 Pre-operational Testing Objectives

The overall objectives of the pre-operational test program are to ensure that the facilities and systems, including the IROFS:

- Have been adequately designed and constructed;
- Meet contractual, regulatory, and licensing requirements;
- Do not adversely affect worker or public health and safety; and
- Can be operated in a dependable manner so as to perform their intended functions.

### 2.3.2 Turnover, Functional, and Initial Start-up Test Program

The refurbishment/construction contractor(s) is responsible for completion of as-built drawing verification; purging/flushing; cleaning; hydrostatic or pneumatic testing; system turnover; and initial calibration of instrumentation in accordance with procedures, design documents, and installation specifications. As systems or portions of systems are turned over to USEC, acceptance testing is performed in accordance with established schedules. The Engineering Manager is responsible for coordination of turnover and acceptance testing.

Integrated systems testing, as a minimum, includes system or component tests required by the pertinent design codes or QAPD that were not performed by the refurbishment/construction contractor(s) prior to turnover to USEC. The testing that is performed is commensurate with the system or component's quality level and is principally associated with IROFS, but may also include other tests on systems or components that USEC deems appropriate for financial, reliability, or other reasons. Integrated systems tests include the testing that is necessary to demonstrate that the facility, system, or component is capable of performing its intended function. The Operations Manager is responsible for coordinating the ISTP for the ACP. The integrated systems tests are performed following completion of construction; flushing; hydrostatic or pneumatic testing; system turnover; and initial calibration of required instrumentation. Scheduling of the testing is such that it generally occurs prior to $UF_6$ introduction. Other pre-operational

tests, not required prior to $UF_6$ introduction, may be performed following introduction of $UF_6$ to the process system.

The purpose of initial start-up testing is to ensure structures, systems, and components will perform their intended design functions in a safe and controlled manner. Examples of initial start-up tests include the leak testing, evacuation, start-up, and filling of a centrifuge machine.

## 2.4 References

None

# 3.0 INTEGRATED SAFETY ANALYSIS AND INTEGRATED SAFETY ANALYSIS SUMMARY

The requirements in 10 *Code of Federal Regulations* (CFR) 70.62(c) specify that an Integrated Safety Analysis (ISA) of the appropriate level of detail for the complexity of the process involved be conducted and maintained. An ISA Summary is required by 10 CFR 70.65(b). Accordingly, USEC Inc. (USEC) has conducted an ISA of adequate complexity to support preparation of an ISA Summary for the ACP. The ISA is a compilation of the design and analysis documentation utilized to: 1) identify the potential accident sequences that could occur, 2) designate items relied on for safety (IROFS) to either prevent such accidents or mitigate their consequences to an acceptable level, and 3) identify the management measures to provide reasonable assurance of the availability and reliability of IROFS.

The ISA Summary is a synopsis of the ISA and contains the information required by 10 CFR 70.65(b). The ISA Summary is updated continuously to reflect changes to the ISA. Neither the ISA nor the ISA Summary is incorporated as part of this license. The ISA documentation is available to the U.S. Nuclear Regulatory Commission (NRC) by request at the ACP through the Regulatory Manager. The ISA Summary is maintained as a separate document from the license application, and is submitted separate from this license application. In addition to providing a synopsis of the results of the ISA, the ISA Summary describes the methods and criteria utilized in the safety analysis and describes the qualifications of the team performing the ISA.

## 3.1 Safety Program and Integrated Safety Analysis Commitments

### 3.1.1 Process Safety Information

The Chemical Process Safety program is described in Chapter 6.0 of this license application. Consistent with this program, USEC compiles and maintains an up-to-date database of process-safety information. Written process-safety information is used in updating the ISA and in identifying and understanding the hazards associated with the processes. The compilation of written process-safety information includes information pertaining to:

- The hazards of materials used or produced in the process, which includes information on chemical and physical properties (e.g., toxicity, acute exposure limits, reactivity, and chemical and thermal stability) such as those included on Material Safety Data Sheets (meeting the requirements of 29 CFR 1910.1200(g));

- Technology of the process, which includes a block flow diagram or simplified process flow diagram, a brief outline of the process chemistry, safe upper and lower limits for controlled parameters (e.g., temperature, pressure, flow, and concentration), and evaluation of the health and safety consequences of process deviations;

- Equipment used in the process, which includes general information on topics such as the materials of construction, piping and instrumentation diagrams, ventilation;

design codes and standards employed, material and energy balances, IROFS (e.g., interlocks, detection, or suppression systems), electrical classification, and relief system design and design basis; and

- The applicability of 29 CFR 1910.119 (Process Safety Management) and 40 CFR Part 68 (Risk Management Plan) to operation of the ACP to assure that chemicals not related to the licensed material are evaluated as necessary.

The ISA considers chemical process safety through out the analysis development. Process safety is considered when identifying the credible accident scenarios, developing the IROFS, and establishing the management measures to ensure the health and safety of the workforce and public. The ISA and ISA Summary are maintained and updated by written procedures using qualified personnel to ensure that process safety information is accurately reflected in accordance with 10 CFR 70.72.

### 3.1.2 Integrated Safety Analysis

An ISA of the design and operation of the ACP was conducted in accordance with the guidance provided in NUREG-1513, *Integrated Safety Analysis Guidance Document* and the requirements of 10 CFR 70.62(c). The ISA is a collection of the design documentation and programmatic information reviewed and utilized during the course of the ISA effort. This information is available on site for NRC review.

The ISA documentation is sufficiently detailed to identify the following:

- Radiological hazards;
- Chemical hazards that could increase radiological risk;
- Facility hazards that could increase radiological risk;
- Chemical hazards from materials involved in processing licensed materials;
- Potential accident sequences;
- Consequences and likelihood of each accident sequence; and
- IROFS including the assumptions and conditions under which they support compliance with the performance requirements of 10 CFR 70.61.

Should the addition of new processes or other changes to the ACP be necessary, evaluations of appropriate complexity for each process will be performed in accordance with 10 CFR 70.72, using established ISA methods to ensure the processes can be carried out in a manner such that compliance with the performance requirements of 10 CFR 70.61 are maintained.

USEC maintains the ISA and ISA Summary so that it is accurate and up-to-date by means of a suitable configuration management system, described in Section 11.1 of this license application. ACP procedures specify the criteria for changing the ISA Summary. Changes to the ACP are evaluated against the ISA and ISA Summary using a change process that meets the requirements of 10 CFR 70.72. Changes to the ISA Summary are submitted to the NRC in accordance with 10 CFR 70.72(d)(1) and (3). The ISA accounts for any changes made to the ACP or its processes (e.g., changes to the site, operating procedures, or control systems). Any facility change, operational change, or change in the process safety information that may alter the parameters of an accident sequence is evaluated by means of the ISA methods. USEC evaluates proposed changes to the ACP or its operations by means of the ISA methods and designates new or additional IROFS, along with appropriate management measures, as necessary.

USEC also evaluates the adequacy of existing IROFS and associated management measures and makes any required changes prior to making changes to the ACP and/or its processes. If a proposed change results in a new type of accident sequence (e.g., different initiating event or significant changes in the consequences) or increases the consequences and/or likelihood of a previously analyzed accident sequence within the context of 10 CFR 70.61, USEC evaluates whether changes to existing or additional IROFS, or associated management measures are required. For any changes that require prior NRC approval under 10 CFR 70.72, USEC will submit an amendment request in accordance with 10 CFR 70.34 and 70.65.

The Engineering Manager is responsible for maintaining the ISA and ISA Summary (i.e., reviewing proposed changes, performing analyses, and ensuring implementation of required updates). The Regulatory Manager is responsible for submitting the required changes to the NRC and coordinating information requests from the NRC.

Suitably qualified personnel update and maintain the ISA and ISA Summary. The ISA team consists of at least one team leader who is formally trained and knowledgeable in the ACP's ISA methods and individuals with specific, detailed experience in the operation, hazards, and safety design criteria of the particular process being evaluated. Personnel with appropriate experience and expertise in engineering and process operations are utilized in the maintenance and updating of the ISA and ISA Summary. Written procedures are used to implement the ISA process and are maintained onsite. For any revisions to the ISA Summary, personnel having qualifications similar to those of ISA team members who conducted the original ISA are used.

### 3.1.3 Management Measures

ACP IROFS are identified in the ISA Summary. Management measures are utilized to maintain the IROFS so that they are available and reliable to perform their safety functions when needed. Management measures are the principal mechanism by which the reliability and availability of each IROFS is ensured. Management Measures are described in Chapter 11.0 of this license application. Any IROFS deficiencies are addressed in accordance with the Corrective Action Program.

## 3.2 Integrated Safety Analysis Summary

An ISA Summary for the ACP meeting the requirements of 10 CFR 70.65(b) was prepared in accordance with the guidance contained in Chapter 3.0 of NUREG-1520, *Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility* and NUREG-1513, *Integrated Safety Analysis Guidance Document*. The ISA Summary is being submitted for review (separate from this license application).

## 3.3 References

1. LA-3605-0003, Integrated Safety Analysis Summary for the American Centrifuge Plant

2. NUREG-1513, *Integrated Safety Analysis Guidance Document*

3. NUREG-1520, *Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility*

4. NUREG/CR-6410, *Nuclear Fuel Cycle Facility Accident Analysis Handbook*

# 4.0 RADIATION PROTECTION

This chapter describes the American Centrifuge Plant (ACP) Radiation Protection (RP) Program for keeping occupational radiation exposures and radioactive contamination below regulatory limits and as low as reasonably achievable (ALARA). The RP Program addresses the occupational radiation protection requirements set forth in 10 *Code of Federal Regulations* (CFR) Parts 19, 20, and 70. The Radiation Protection Manager (RPM) is responsible for the ACP RP Program. The RPM or designee carries out responsibilities of the RPM described in this chapter.

## 4.1 Radiation Protection Program Implementation

In accordance with 10 CFR 20.1101(c), the RP Program content and implementation is reviewed annually. The RPM is responsible for this annual review and preparation of a report documenting the results of the review. The ALARA Committee then reviews the report. Revisions to the RP Program, if warranted, are initiated and processed by the RPM as part of the annual review process. Any resulting changes to the Radiation Worker Training module are also implemented.

## 4.2 As Low As Reasonably Achievable Program

In accordance with 10 CFR 20.1101, the ACP RP Program is designed to protect personnel entering the ACP from unnecessary exposure to ionizing radiation and radioactive materials. This program is based upon the following principles and is implemented through written procedures.

- Personnel radiation exposures and the release of radioactive effluents shall be maintained in accordance with the ALARA principle.

- No individual shall receive a radiation dose in excess of any regulatory limit.

Responsibility for establishing and ensuring adherence to these principles rests with the Senior Vice President. The Director, American Centrifuge Plant has the overall responsibility and authority for the ALARA Program. The RPM is responsible for establishing and implementing the ALARA Program in accordance with written policies and procedures.

### 4.2.1 As Low As Reasonably Achievable Committee

The ALARA Committee is an independent advisory group to the Director, American Centrifuge Plant and the Plant Safety Review Committee on RP issues. It functions to: (1) monitor selected operational RP issues; (2) advise ACP management on RP concerns; and (3) review proposed designs, work practices, selected suggestions, and selected projects with regard to contamination control and/or ALARA.

The ALARA Committee:

- Communicates management's commitment to the ALARA Program;
- Monitors the implementation of the ALARA Program and serves as the advisor to ACP management for maintaining occupational dose and environmental dose in accordance with ALARA principles; and
- Reviews, for the purpose of occupational dose and environmental dose reduction, proposed designs, practices, selected suggestions, and selected project schedules.

The ALARA Committee also:

- Establishes the annual exposure goals;
- Provides recommendations to ACP management and/or the Plant Safety Review Committee as appropriate, regarding procedural, equipment, or design changes that could have a significant impact on personnel radiation exposure; and
- Forms subcommittees or assigns individuals to undertake special studies or conduct ALARA reviews that will be documented and presented to the ALARA Committee with any recommendations.

Membership consists of persons from various functional disciplines who have the necessary competence and experience to perform the functions of the committee. Standing committee members are the RPM who serves as the chairperson, the vice-chairperson who is appointed by the RPM, the Engineering Manager, Operations Manager, Maintenance Manager, Plant Support Manager, Regulatory Manager, and an operations technician and/or a maintenance mechanic. Participation from other functional disciplines may vary depending on the issue of concern. The committee chairperson, or designee, is responsible for requesting appropriate functional representation. Committee members may designate an alternate to attend committee meetings in their place.

The ALARA Committee meets at least annually and as directed by the chairperson. A quorum consists of five standing committee members or their alternates. Ad hoc subcommittees may be established for special studies or reviews pertinent to committee-related issues.

The chairperson ensures those functions of the committee and tasks are properly executed. Minutes are provided to the Director, American Centrifuge Plant. The committee issues special reports prepared upon request of ACP management, or as determined by the chairperson.

The committee reviews matters that have or may have an impact on contamination control and/or ALARA. The ALARA Committee reviews the ALARA Program and the review includes an evaluation of the results of audits performed by Health Physics (HP), reports of radiation levels, contamination levels, employee exposures, and effluent releases. The review

determines if there are any upward trends in personnel exposure for identified categories of workers and types of operations. The review also identifies any upward trends in effluent releases and contamination levels and determines if exposures, releases, and contamination levels are in accordance with the ALARA concept. Specific areas reviewed include, but are not limited to the following:

- Technologies for selected job tasks;
- Current work practices and completed tasks which have/had contamination control or ALARA concerns;
- Radiation protection violations;
- Lessons learned;
- Trends and resulting impacts on contamination control and/or ALARA; and
- Environmental monitoring reports.

The committee also establishes annual contamination control and exposure goals. Minutes are issued that identify committee members and/or alternates in attendance, agenda items, a summary of decisions made, and action items. Copies are made available to ACP management and the committee members. Recommendations of the ALARA Committee are documented and tracked to completion in the Corrective Action Program.

## 4.3 Organization and Personnel Qualifications

The RPM is responsible for providing guidance and direction for establishment and implementation of the RP Program and has direct access to the Director, American Centrifuge Plant and Senior Vice President for radiological control matters. The RPM reports to the Production Support Manager, which provides independence from operations. The RPM and designee are required to have the technical competence and experience to establish RP programs (RPM qualifications are stated in Section 2.1.4.3.1.1) and the management capability to direct the implementation and maintenance of RP programs.

The HP Group reports to the RPM and provides radiological protection support to the plant. HP is independent of the organizations responsible for production. The HP Group is staffed with suitably trained individuals who provide oversight and control of the technical aspects of the program elements that affect RP. There are sufficient HP resources available to support ACP activities.

HP Technicians and their managers perform the functions of assisting and guiding workers in the radiological aspects of the job. HP Technicians and their managers have the responsibility and authority to stop radiological work or mitigate the effect of an activity if they

suspect that the initiation or continued performance of a job, evolution, or test will result in the violation of approved RP requirements.

## 4.4 Written Procedures

### 4.4.1 Procedures

The RP Program is implemented using procedures. The procedures are prepared consistent with the requirements of 10 CFR Part 20 and are approved, maintained, and adhered to for operations involving personnel radiation exposure and toxicological exposure to soluble uranium. The procedures are reviewed and revised as necessary to incorporate any plant or operational changes, including these initiated by changes to the Integrated Safety Analysis (ISA). These procedures are prepared, maintained and made available to appropriate personnel at the plant as described in Section 11.4 of this license application.

### 4.4.2 Radiation Work Permits

Radiation Work Permits (RWPs) are a basic implementing tool by which radiological controls are established. RWPs provide information to the worker concerning protective clothing, job/task identification, and special instructions such as radiological hold points. Radiological surveys that supplement RWPs provide information regarding radiation and contamination levels.

RWPs are required for work activities in Contamination Areas (CAs), High Contamination Areas (HCAs), Airborne Radioactivity Areas (ARAs), Radiation Areas (RAs), High Radiation Areas (HRAs) and other areas as required by HP. Qualified HP personnel are authorized to approve, issue, update, revise, and close RWPs. The RPM may exempt the requirement for an RWP in certain RAs as specified in approved procedures.

The limits established for contamination control (surface and airborne) are based on the toxicity of soluble uranium. The contamination control program, of which RWPs are a part, is designed to ensure that the inhalation or ingestion of soluble uranium is below the limits stated in 10 CFR 20.1201(e).

An RWP may be issued for any period up to one year, based on the stability and predictability of changes in the radiological conditions of the work area. RWPs are normally closed upon job completion. HP may close an RWP at any time.

Radiological surveys are reviewed to evaluate the adequacy of RWP requirements. RWPs are updated or closed and reissued if radiological conditions change to the extent those protective requirements need to be modified.

HP management reviews the RWP closure package to ensure appropriate actions have been taken.

Continuous HP coverage may be used in lieu of RWPs when approved by the RPM. Qualified HP Technicians are authorized to provide continuous radiological coverage in lieu of an RWP for short duration (less than one shift), non-complex tasks. When continuous HP coverage is used, requirements normally specified on an RWP are communicated to the worker verbally.

## 4.5 Training

Radiological control is provided by controlling access to areas where radioactive material may be encountered and by requiring that each person who enters those areas or facilities receive the appropriate level of radiological worker training. Personnel are trained commensurate with the hazard per 10 CFR Parts 19 and 20. Details concerning Visitor Site Access Orientation and radiological training are provided in Section 11.3.1 of this license application. The Radiological Worker Training Program addresses the requirements of 10 CFR 19.11 and 19.12 and workers' responsibilities under the Radiation Protection Program. The Radiation Worker Training program is described in Section 11.3.1.3 of this license application.

### 4.5.1 Visitor Site Access Orientation

Visitors review basic information related to the site and hazards present at the ACP. Trained radiological workers escort visitors who are granted access to the Restricted Areas.

### 4.5.2 General Employee Radiological Training

General Employee Radiological Training covers the employee's responsibilities for maintaining exposures to radiation and radioactive materials in accordance with the ALARA philosophy.

### 4.5.3 Radiation Worker Training

If a person requires unescorted access to the Restricted Area, radiological worker qualification is required. Radiation Worker Training is a biennial training requirement.

### 4.5.4 Health Physics Technician

HP Technicians are trained and qualified in accordance with an approved qualification standard and training is delivered consistent with applicable training procedures (see Section 11.3). HP Technician training develops the skills necessary to perform assigned work in a competent manner. The training consists of initial, on-the-job, and continuing training.

HP Technician qualification consists of the standardized core course training material, ACP-specific information, and on-the-job training. Passing a final comprehensive written examination is required. The training program ensures personnel are proficient in radiation measurements, characterization of radiological conditions, release monitoring, and personnel monitoring. Formal remediation protocols are utilized.

Entry-level prerequisites are established to ensure that HP Technicians meet minimum standards for education. Task qualification for entry-level positions may be used until formal training is completed.

Following initial qualification, HP Technicians are requalified every two years. The requalification process requires successful completion of a comprehensive written examination. The written examination may be waived for personnel with National Registry of Radiation Protection Technologist certification. Personnel who maintain qualifications as HP Technicians satisfy the requirements of Radiation Worker Training.

HP Technician managers complete and maintain qualifications as HP Technicians.

## 4.6 Ventilation and Respiratory Protection Programs

ACP building ventilation systems are described in Chapter 1.0 of this license application and in the ISA Summary. These systems are primarily designed to maintain the building environment required for proper operation of process and associated equipment.

There are no items relied on for safety (IROFS) identified with ventilation systems in the ACP ISA. However, building ventilation systems are credited as design features that reduce the consequences of a $UF_6$ release in multiple analyzed events.

The ISA accident scenarios also identify use of portable ventilation units (commonly referred to as “gulpers”) during applications ranging from pigtail operations to small-scale maintenance tasks to reduce worker exposure. In addition, administrative guidance requires the shutdown of building ventilation systems following detection of a $UF_6$ release to minimize the consequences to personnel (on and off site) during loss of confinement events.

### 4.6.1 Ventilation

In addition to general ventilation systems, portable ventilation units may be employed for short duration jobs when the unprotected worker could potentially exceed 0.8 Derived Air Concentration (DAC)-hours of exposure. These portable ventilation units are equipped with high efficiency particulate air (HEPA) filters and are designed to discharge room air at low velocities.

The differential pressure of portable HEPA filtered ventilation units is checked per operating procedure for radiological purposes. The operating differential pressure range is based on manufacturer's recommendations or as specified in the technical design basis. HEPA filter systems, both fixed and portable, are efficiency tested in accordance with American Society of Mechanical Engineers (ASME) N510-1989, *Testing of Nuclear Air- Treatment Systems,* as it applies to radiological contaminants likely to be found at the ACP. Portable HEPA filter unit use is normally specified on the RWP.

HEPA filter systems used to implement ALARA principles and to control worker exposures are tested in accordance with ASME N510-1989. For those systems not designed in accordance with ASME N509-1989, *Nuclear Power Plant Air-Cleaning Units and Components*, ASME N510-1989 is used as testing guidance.

The average air velocity through openings in uranium sampling and handling hoods containing readily dispersible uranium is a minimum of 100 linear feet per minute (lfpm). This velocity is checked at least annually.

If radiological containments are used, when they are in use and have the potential to generate airborne radioactivity, they will be maintained at a negative differential pressure.

### 4.6.2 Respiratory Protection

The Respiratory Protection Program follows the requirements of 29 CFR 1910.134 and 10 CFR Part 20 for use, issuance, training, and qualifications for respirator users. Procedures for respirator usage follow the requirements of 10 CFR 20.1703(c)(4). RWPs specify respiratory protection required for radiological protection purposes. Respirator use is considered for activities where an individual may be exposed to soluble uranium that may exceed 0.8 DAC-hours or an intake of 1 milligram (mg) of soluble uranium during a work shift.

Engineering and administrative controls, including access restrictions and the use of specific work practices designed to minimize airborne contamination or loss of contamination control are used to minimize worker internal exposure. When engineering and administrative controls have been applied and the potential for airborne radioactivity still exists, respiratory protection is used to limit internal exposures. Use of respiratory protection is considered under any of the following conditions:

- During entry into posted ARAs;
- During breach of contaminated systems or components;
- During work in areas or on equipment with removable contamination levels greater than 100 times the levels in Table 4.6-1; and
- During work on contaminated surfaces with the potential to generate airborne radioactivity.

In specific situations approved by the RPM, respiratory protection may not be used due to physical limitations, such as heat stress, or the potential for significantly increased external exposure. In such situations, stay time controls to limit intakes are established and continuous workplace airborne monitoring is provided along with expedited analysis of results.

**Table 4.6-1 Contamination Levels**

| Nuclide[a] | Removable (dpm/100 $cm^2$)[b] | Total (Fixed + Removable) (dpm/100 $cm^2$) |
|---|---|---|
| U-natural, $^{235}U$, $^{238}U$, and associated decay products, Transuranics $\leq$ 2 percent by alpha activity, $^{99}Tc$, and beta-gamma emitters | 1,000 | 5,000 |
| Transuranic modified materials containing > 2 percent and < 8 percent transuranics by alpha activity, Th-natural, $^{232}Th$, $^{223}Ra$, $^{224}Ra$, and $^{232}U$ | 200 | 1,000 |
| $^{226}Ra$, $^{228}Ra$, $^{230}Th$, $^{228}Th$, $^{231}Pa$, $^{227}Ac$, $^{125}I$, $^{129}I$, and Transuranics $\geq$ 8 percent by alpha activity | 20 | 500 |

[a] The values in this table apply to radioactive contamination deposited on, but not incorporated into the interior of, the contaminated item. Where contamination by both alpha and beta-gamma-emitting nuclides exists, the levels established for the alpha- and beta-gamma-emitting nuclides apply independently.

[b] The amount of removable radioactive material per 100 square centimeters ($cm^2$) of surface area is determined by swiping the area with a dry filter or soft absorbent paper while applying moderate pressure and then assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. For objects with a surface area less than 100 $cm^2$, the entire surface is swiped; and the activity per unit area is based on the actual surface area. Except for transuranics $\geq$ 8 percent by alpha activity, $^{228}Ra$, $^{227}Ac$, $^{228}Th$, $^{230}Th$, $^{231}Pa$, and alpha emitters, it is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual contamination is within the levels for removable contamination.

The levels may be averaged over one square meter provided the maximum surface activity in any area of 100 $cm^2$ is less than three times the level specified. For purposes of averaging, any square meter of surface is considered to be above the level G if: (1) from measurements of a representative number of n of sections it is determined that $1/n \, \Sigma_n \, S_i \geq G$, where $S_i$ is the disintegration per minute (dpm)/100 $cm^2$ determined from measurements of section i; or (2) it is determined that the sum of the activity of all isolated spots or particles in any 100 $cm^2$ area exceeds 3G. (G is defined as the levels listed above.)

## 4.7 Radiation Surveys and Monitoring Program

The Radiation Surveys and Monitoring Programs are based on the requirements of 10 CFR Part 20, Subpart F and ALARA principles. Written procedures are prepared for the elements of the Radiation Survey and Monitoring Programs discussed in this section. Deficiencies associated with surveys and the monitoring program or results that exceed the administrative control levels are dispositioned in accordance with the Corrective Action Program, described in Section 11.6 of this license application.

### 4.7.1 Surveys

The radiological survey program consists of routine, work support, and material release surveys (refer to Section 4.8.2.4 below). Surveys are conducted to support plant activities in a manner that ensures radiological hazards associated with each activity are properly identified, and relative radiation levels and concentrations of radioactive material are determined. Radiological surveys for the purposes of establishing personnel protection equipment or for posting requirements are performed by qualified HP Technicians. Decontamination is performed as appropriate considering the gained benefit from waste minimization, ALARA principles and worker access.

The routine survey program involves surveys to determine workplace radiological conditions, effectiveness of contamination control measures, and proper identification and posting of radiological hazards. Routine survey frequencies are established based on the stability of operations as demonstrated by the consistency of survey results. Areas within the plant are categorized and scheduled for survey commensurate with their relative radiological hazard and contamination potential. Survey frequencies are based on area occupancy, potential for spread of contamination, and process knowledge. The routine survey program is reviewed annually by the RPM, documented, maintained, and modified to reflect changes in radiological conditions. Table 4.7-1 provides the contamination survey program frequencies for ACP areas.

In the event that large areas of removable contamination are identified on accessible surfaces exceeding the levels specified in Table 4.6-1, the area will be re-posted as a CA or HCA and actions will be taken to locate the source of contamination. If access is required to the area, decontamination of the area is initiated as soon as practical with consideration of ALARA principles.

Work support surveys are a fundamental element of the RWP process. In-process surveys are conducted as necessary to verify radiological conditions at various points in the work activity and to ensure exposure potentials are maintained in accordance with the ALARA principle. When required by work activities, surveys are conducted by qualified personnel to support decontamination efforts and the release of tools, equipment, and waste material from the work area.

### 4.7.2 Personnel Monitoring

Both the U.S. Nuclear Regulatory Commission (NRC) and the U.S. Department of Energy (DOE) regulated sources of radiation and radioactive materials are interspersed on the reservation. This situation makes separation of personnel exposure between NRC and DOE regulated sources impractical.

To comply with the personnel monitoring requirements of 10 CFR 20.1502(a) and (b), 10 CFR 20.1202, and the reporting requirements of 10 CFR 19.13, 20.2106, and 20.2206, the ACP tracks exposures for personnel issued National Voluntary Laboratory Accreditation Program (NVLAP)-accredited dosimeters regardless of whether the exposure is from an NRC or DOE regulated source. Whenever worker notification is required by 10 CFR 19.13, the individual's "total exposure" while on the site is reported without differentiating between exposure from NRC-regulated sources and DOE-regulated sources.

The established personnel monitoring program consists of the following:

- An Administrative Control Level (ACL) of 500 millirem (mrem) per year Total Effective Dose Equivalent per person;
- The intake limit for soluble uranium is set at 10 mg per week;
- Personnel dosimeters to measure the external exposure of personnel;
- Analysis of personnel occupational exposure and maintenance of exposure records; and
- A network of Fixed Nuclear Accident Dosimeters (FNADs) situated in the ACP areas requiring a Criticality Accident Alarm System. A NVLAP accredited dosimeter reader processes dosimeters in the FNADs. The ACP maintains onsite capability to determine neutron flux and energy. The FNADs also serve as area monitors.

Personal dosimeters are also evaluated for neutron dose. In addition, security badges contain an indium foil that can be evaluated for neutron activation. If the indium foil indicates exposure to a neutron flux exceeding 10 rads, the dosimeter is read and/or biological materials of personnel may be evaluated.

### 4.7.3 External

Persons requiring radiation exposure monitoring per 10 CFR 20.1502(a) wear beta-gamma-sensitive dosimeters which are processed and evaluated by a processor holding current NVLAP accreditation from the National Institute of Standards and Technology (NIST). Dosimeters are exchanged at least quarterly (plus or minus two weeks) unless authorized in writing by the RPM. The dosimeters may be supplemented, as appropriate, by other types of dosimeters (e.g., finger rings, direct-reading dosimeters, and neutron dosimeters) and by

radiation measurements made with radiation survey instruments. Self-reading or alarming dosimeters are used for entry into HRAs or Very High Radiation Areas.

If an individual exceeds 50 percent of the ACL during a calendar quarter or the ACL in the calendar year, an evaluation is performed by the RPM for approval by the Director, American Centrifuge Plant. The evaluation is performed to determine the types of activities that may have contributed to the worker's exposure. This may include, but is not limited to, procedural reviews, and review of work practices, work locations, and job assignments. Depending upon the conclusions of the evaluation, the individual may be allowed to continue radiological work; however, work restrictions may be imposed on individuals whose exposure exceeds the ACL.

Approval for continued work is documented in the evaluation, as described in the preceding paragraph, which requires approval by the Director, American Centrifuge Plant. Investigations to determine cause, assess the exposure, and document the results are conducted in accordance with written procedures.

HP determines any unusual trends or exposures during reviews of external dosimetry results. If the external exposure status of an individual is uncertain, the individual is removed from further exposure until HP determines the exposure status and advises management of any special controls or restrictions to be applied.

To comply with the reporting requirements of 10 CFR 20.2206, the site submits personnel monitoring information for the Radiation Exposure Information Reporting System (REIRS) report based on the personnel exposure database. Dose reports are completed as required for personnel monitored in accordance with 10 CFR 20.1502(a).

The occupational exposure received by ACP employees, subcontractors, and visitors must not exceed the 10 CFR Part 20, Subpart C limits. The ACP requires current year exposure history of an occupational worker as required by 10 CFR 20.2104.

Personnel declaring pregnancy are advised to control radiation exposure to an embryo or fetus in accordance with the ALARA principle during the entire gestation period. The ACP complies with the guidelines of Regulatory Guide 8.13, Revision 2*, Instructions Concerning Prenatal Radiation Exposure.*

### 4.7.4 Internal

The chemical characteristics and retention times of soluble uranium processed at the ACP are such that renal toxicity limitations are the limiting conditions for health effects. A bioassay program is employed to confirm the results of radioactive material contamination control and respiratory protection programs. Bioassay results are the primary means of calculating internal doses. Personnel who have the potential to receive intakes resulting in a Committed Effective Dose Equivalent (CEDE) greater than or equal to 0.1 roentgen equivalent man (rem) CEDE in a year or intakes of 1 mg of soluble uranium per week participate in the routine bioassay program.

Personnel submit bioassay samples, such as urine or fecal samples, and participate in *Invivo* monitoring as required by the bioassay program. Table 4.7-2 provides a summary of the bioassay program description and the analytical methods employed. The routine sample submission frequencies and administrative control levels are listed in Table 4.7-3.

Because chemical toxicity is limiting when personnel are exposed to soluble uranium, the uranium action levels have been selected to limit an individual's chronic intake to 10 mg of soluble uranium per week. Personnel participate in follow-up bioassay monitoring when their bioassay results exceed administrative control levels or as determined by HP. Special bioassay studies are performed as necessary and investigations performed when intakes are confirmed or suspected to exceed 1 mg of soluble uranium per week.

The ACP collects "random single void" urine samples from personnel. Isotopic analysis of fecal samples and 24-hour urine sampling are not routinely performed, however, these analyses will be considered when dose assessments exceed 0.5 rem CEDE. Bioassay results are used to assign internal dose. The sensitivities of lung counting systems are not as effective as urinalysis for Class D uranium; lung counting is considered when intake estimates exceed 0.5 rem CEDE.

The CEDE per unit of intake by inhalation from Federal Guidance Report No. 11, *Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion,* is used to calculate internal dose.

HP determines unusual trends during reviews of urinalysis results. If bioassay sample results indicate an internal exposure that exceeds action levels or appears uncertain, additional analyses and removal of the individual from further exposure are considered.

### 4.7.5 Airborne Radioactivity

Routine general area air sampling is established in areas where airborne radioactivity concentrations may exceed 10 percent of the DAC listed in Table 4.7-4, averaged over 8 hours. Table 4.7-4 also summarizes the airborne radioactivity posting levels. Investigations are performed when airborne radioactivity data indicates personnel exposures exceed 0.8 DAC-hours. Special bioassay sampling is required when air samples exceed 0.8 DAC-hours. Adjustment for respirator use is considered in determining bioassay monitoring.

A combination of low-volume, high-volume, and lapel air samplers are used for job coverage and general area air sampling. Low-volume air samplers are used for routine air sampling and are exchanged at least weekly. Due to radon and radon daughter products, routine air samples are allowed to decay for a minimum of three days.

Air sample data is not used as the primary method to determine internal dose, however the data is used to prompt bioassay monitoring. Only air samples collected in the workers' breathing zone (approximately 30 cm) are considered representative.

Air sample flow measurement devices are calibrated under standard laboratory conditions at least annually. The NIST traceable standards used have accuracy and precision of 20 percent or better. Lapel samplers are calibrated in accordance with a procedure.

**Table 4.7-1 Routine Contamination Survey Frequencies**

| Area Surveyed | Survey Frequency |
|---|---|
| Uranium Centrifuge Area | Yearly[a] |
| Contaminated Maintenance Areas | Quarterly |
| Contamination Control Zones (CCZ) | Quarterly |
| Lunchrooms/Breakrooms | Note c |
| Permanent Boundary Control Stations (BCS)[b] | Weekly |
| Change Rooms | Monthly |
| $UF_6$ Sample Handling Areas and Feed and Withdrawal Areas | Monthly[a] |

[a] Localized area surveys are taken following an indication of release and during maintenance activities.

[b] When personnel contamination is detected at the BCS, the ensuing follow-up activities include a physical survey of the BCS.

[c] Surveys are performed daily during normal working days (i.e., Monday through Friday). Weekends and plant holidays are excluded.

**Table 4.7-2 Bioassay Program**

| Urine Bioassay Capabilities | Comment |
|---|---|
| Workers Participation | Selected based on work locations |
| Frequency of Urine Monitoring | Monthly[a] |
| Routine Urine Sample Volume | Single void sample, between 60 and 100 mL |
| Primary Uranium Analysis Methods | Fluorimetry or Inductively Coupled Plasma (ICP) Mass Spectroscopy |
| ICP Mass Spectroscopy Minimum Detectable Concentration | <0.006 : g/L $^{235}U$<br><0.015 : g/L $^{238}U$ |
| Fluorimetry Minimum Detectable Concentration | 5 : g/L Total Uranium |

| Additional Analytical Capabilities | |
|---|---|
| Alpha Spectroscopy | 0.1 pCi/sample[b] |
| Uranium Alpha with Proportional Counter | 40 dpm/L Total Uranium in urine |
| Invivo Lung Counting | 0.2 nCi $^{235}U$<br>4 nCi $^{238}U$ |
| Dose Assessment Software | INDOS (Routine Analysis)<br>CINDY (Developmental and Special) |

[a] Samples scheduled for submission every four weeks.
[b] Equipment also used for loose contamination and airborne radioactivity samples for characterization efforts.

**Table 4.7-3 Internal Dosimetry Program Action Levels**

| Bioassay Technique | Frequency | Action Level | Actions to be Taken |
|---|---|---|---|
| **Urinalysis Routine** | Monthly[a] | 5 :g U/L | Resample to confirm result and determine intake[b] |
| | Monthly | 20 :g U/L | Restrict individual and resample to determine intake[b] |
| **Urinalysis Special** | 2-6 hours after intake | 5 :g U/L<br>300 :g U/L | Resample to confirm result and determine intake[b]<br>Restrict individual and resample to determine intake[b] |
| | 16-30 hours after intake | 5 :g U/L<br>50 :g U/L | Resample to confirm result and determine intake[b]<br>Restrict individual and resample to determine intake[b] |
| **Lung Counting** | As Required | >100 :g $^{235}$U or 7 nCi Total U | Recount to confirm result and perform urinalysis |

[a] In addition, personnel may be assigned a special frequency if deemed necessary by HP.
[b] When intake is confirmed to be > 1 mg uranium, an investigation is performed to identify the source of the exposure, assess the impact, and if practical, a means to prevent reoccurrence.

**Table 4.7-4 DAC and Airborne Radioactivity Posting Levels**

| NUCLIDE[a] | DAC[c, d] | POSTING LEVEL[b] |
|---|---|---|
| Gross Alpha based on Class D $^{234}$U and 2 percent Class W $^{230}$Th | $1.0 \times 10^{-10}$ | $1.0 \times 10^{-11}$ |
| Gross Alpha based on Class D $^{234}$U and 8 percent Class W $^{230}$Th | $3.0 \times 10^{-11}$ | $3.0 \times 10^{-12}$ |
| Gross Alpha based on Class W $^{230}$Th | $3.0 \times 10^{-12}$ | $3.0 \times 10^{-13}$ |
| Gross Beta-Gamma based on Class Y $^{234}$Th | $6.0 \times 10^{-8}$ | $6.0 \times 10^{-9}$ |

[a] All values are listed with units of :Ci/mL.
[b] Posting Levels are 10 percent of DAC.
[c] The values above are assumed as worst case, i.e., $^{230}$Th is present in each mixture at the highest concentration per category as described.
[d] Area may be posted based on calculated DACs from actual airborne radioactivity concentration data.

## 4.8 Additional Program Elements

### 4.8.1 Posting and Labeling

Caution signs for Radioactive Material Areas (RMAs), ARAs, RAs, and HRAs are maintained as required by 10 CFR 20.1901, 20.1902, 20.1903, 20.1904, and 20.1905. RMAs located within a posted CCZ, CA, HCA, ARA, RA, HRA or other posted radiological area are not required to be posted as an RMA since a higher level of control is already required. In addition, as noted in Section 1.2.5 of this license application, the following exceptions to the applicable 10 CFR Part 20 requirements have been taken and require an exemption:

- $UF_6$ feed, product, and depleted uranium cylinders, which are routinely transported inside the reservation boundary between plant locations and/or storage areas at the plant, are readily identifiable due to their size and unique construction, and are not routinely labeled as radioactive material. Qualified radiological workers attend $UF_6$ cylinders during movement.

- Containers located in Restricted Areas within the ACP are exempt from container labeling requirements of 10 CFR 20.1904, as it is deemed impractical to label each and every container. In such areas, one sign stating that every container may contain radioactive material will be posted. By procedure, when containers are to be removed from contaminated or potentially contaminated areas, a survey is performed to ensure that contamination is not spread around the reservation.

- In lieu of the requirements of 10 CFR 20.1601(a), each High Radiation Area with radiation reading greater than 0.1 rem/hour at 30 cm but less than 1 rem/hour at 30 cm is conspicuously posted "Caution, High Radiation Area" and entrance into the area is controlled by an RWP. Physical and administrative controls to prevent inadvertent or unauthorized access to High and Very High Radiation Area is maintained.

### 4.8.2 Contamination Control

#### 4.8.2.1 Access to Restricted Areas

Restricted Areas are areas to which access is limited to protect individuals against undue risks from exposure to radiation and radioactive materials. Unescorted access to Restricted Areas requires the successful completion of the appropriate level of radiological worker training and, if required, a personnel dosimeter. Depending upon the type and extent (or amount) of radioactive material present, Restricted Areas are further identified as RMAs, CCZs, CAs, HCAs, ARAs, RAs, or HRAs.

Radiological control is provided by controlling access to areas where radioactive material may be encountered and by requiring that each person who enters those areas receive the appropriate level of radiological worker training. Access and departure requirements are specified by procedure and/or reiterated in RWPs. Radiological posting is used to alert

personnel to the presence of radiation and radioactive materials, aid in minimizing exposures, and prevent the spread of contamination. Where contamination is present, contamination controls are implemented.

Table 4.8-1 provides definitions and criteria used for posting ACP Restricted Areas.

### 4.8.2.2 Equipment and Personnel Monitoring

Personnel exiting areas controlled for removable contamination (CCZs and CAs) are required to monitor themselves for contamination after removing their protective clothing and prior to leaving the step-off pad area. Personnel monitoring requirements are specified on RWPs. Equipment and materials are monitored and decontaminated if required prior to removal from CCZs and CAs, or are contained and controlled as radioactive material.

### 4.8.2.3 Personal Protective Equipment

Personal Protective Equipment (PPE) is provided for personnel entering contaminated areas. The type(s) of PPE required is consistent with the individual's work assignment and is dependent upon the type and level of contamination anticipated. With the exception of emergency evacuations, protective clothing is removed prior to exiting the Boundary Control Station as specified in Radiation Worker Training, RWP, area posting, or procedures. During emergency evacuations, personnel report to designated assembly points and/or monitoring stations where protective clothing is removed and contamination monitoring is performed.

Industrial safety equipment, such as face shields, goggles, and acid suits are available. In addition full-face negative pressure respirators and full-face positive pressure respirators and other National Institute for Occupational Safety and Health and Mine Safety and Health Administration approved devices may also be utilized for respiratory protection in accordance with Section 4.6.2 of this chapter.

### 4.8.2.4 Release of Materials and Equipment

Materials and equipment are not released for unrestricted use unless the surface contamination levels are less than the levels specified in Table 4.6-1. Contamination surveys are performed on materials, equipment, and facilities to be released from radiological controls.

Use histories are used to supplement surveys of materials or equipment that have inaccessible surfaces. Use histories are summaries of the operational history of the item. Use history information includes the function, location(s) where the item was used, and other relevant evidence to assess the item’s potential for internal contamination.

Total contamination in bulk, aggregate materials, or waste to be released for unrestricted use or disposal is specified in plant procedures.

### 4.8.3 Radioactive Source Control

The Radioactive Source Control Program maintains administrative and physical control of sealed radioactive sources. The Source Control Program establishes source custodians and requires leak testing, accountability, and control of sealed radioactive sources.

Each sealed source containing more than 100 microcuries (:Ci) of beta and/or gamma emitting material or more than 10 :Ci of alpha emitting material, other than $^{3}H$, with a half-life greater than 30 days and in any form other than gas, is tested for leakage and/or contamination at intervals not to exceed six months. In the absence of a certificate from a transferor indicating that a test has been made within six months prior to the transfer, the sealed source is not put into use until tested.

Sealed plutonium alpha sources containing 0.1 :Ci or more of plutonium, when not in use, are stored in a closed container designed and constructed to contain plutonium that might otherwise be released during storage. When in use, the ACP will test the sources at least every three months using radiation detection instruments capable of detecting 0.005 :Ci of alpha contamination.

Leak tests are taken from the source or from appropriate accessible surfaces of the container or from the device where the sealed source is mounted or stored where one might expect contamination to accumulate. Leak testing is conducted by HP. The test is capable of detecting the presence of 0.005 :Ci or more of removable contamination, or if a plutonium source has been damaged or broken, the source will be deemed to be loosing plutonium.

The ACP will immediately withdraw the sealed source from use and repair or dispose of the source, if determined to be leaking. Within five days after determining that any source has leaked, the ACP will file a report with the NRC Director, Nuclear Material Safety and Safeguards, describing the source, test results, extent of contamination, apparent or suspected cause of source failure, and corrective action taken. A copy of the report will be sent to the NRC Regional Administrator, Region II.

The periodic leak test does not apply to sealed sources that are stored and not being used. The sources excepted from this test will be tested for leakage prior to any use or transfer to another person unless they have been leak tested within six months, or three months for a sealed plutonium source, prior to the date of use or transfer.

### 4.8.4 Radiation Protection Instrumentation

Radiation dose rate and contamination survey instruments are selected to measure the types and energies of radiation encountered with gas centrifuge enrichment operations. The primary complement of instrumentation includes alpha/beta count rate and scaler instrumentation plus ion chambers used to evaluate shallow dose and deep dose equivalent readings. Table 4.8-2 describes typical instrumentation available to support the operation of the ACP.

The RPM is responsible for maintaining adequate quantities of calibrated radiation detection and measurement instruments.

Radiological portable instruments are calibrated based on specifications derived from applicable vendors manuals and other nationally recognized guidance as appropriate (e.g., National Council on Radiation Protection 112). The standards found in the American National Standards Institute (ANSI) N323 (1978) are followed except for Sections 4.6 and 5.1(3). The following requirements apply to all such equipment and instruments:

- Portable radiation detection and measurement instruments are inspected, maintained, and calibrated at least annually or removed from service.

- Instruments are calibrated following any maintenance, modification, or repair deemed likely to affect operation before being returned to service.

- Calibration sources and equipment used for dose rate instruments are within 5 percent (at 2 sigma) of the stated value and have documented traceability links to the NIST. Large area uranium slab sources are certified to 10 percent by NIST. Calibration sources used to calibrate contamination-monitoring equipment are within 20 percent (at 2 sigma) for activity and 10 percent (at 2 sigma) for surface emission rate.

- Portable HP instruments that are in use but do not have a built in automatic functional test feature are source checked daily, or prior to using the instrument if not used on a daily basis. Instruments with the automatic functional test feature that are in use are checked once a week.

### 4.8.5 Records and Reports

Radiological protection records demonstrate the effectiveness of the overall program and document personnel exposure. Records are maintained in the form required by 10 CFR 20.2110 and are retained as required by 10 CFR 20.2101 through 20.2106.

Reports and notifications of RP issues are made as required by 10 CFR Part 20, Subpart M and/or 10 CFR 70.74. Details of reporting and notification for ACP incidents are described in Section 11.6 of this license application.

## Table 4.8-1 Posting Criteria

| AREA | CRITERIA | POSTING |
|---|---|---|
| Radiation Area measured at 30 cm | >0.005 rem/hr<br>but ≤ 0.1 rem/hr | "CAUTION, RADIATION AREA"<br>"TLD and RWP Required for Entry" |
| High Radiation Area measured at 30 cm | >0.1 rem/hour<br>but ≤ 1.0 rem/hr | "CAUTION, HIGH RADIATION AREA"<br>"TLD, Supplemental Dosimeter and RWP Required for Entry" |
| High Radiation Area measured at 30 cm | >1.0 rem/hr | "DANGER, HIGH RADIATION AREA"<br>"TLD, Supplemental Dosimeter and RWP Required for Entry" |
| Very High Radiation Area measured at 1 m | > 500 rads/hr | "GRAVE DANGER, VERY HIGH RADIATION AREA"<br>"Special Controls Required for Entry"<br>"Contact PSS Before Entry" |
| Contamination (Removable) | Levels > 1 time but ≤ 100 times Table 4.6-1 values | "CAUTION, CONTAMINATION AREA"<br>"RWP Required for Entry" |
| High Contamination (Removable) | Levels >100<br>Times Table 4.6-1 values | "CAUTION, HIGH CONTAMINATION AREA"<br>"RWP Required for Entry" |
| Fixed Contamination[a] | Removable Contamination < Table 4.6-1 levels and total contamination levels > Table 4.6-1 column 3 values | "CAUTION, FIXED CONTAMINATION AREA" |
| Airborne Radioactivity Area | Levels 0.1 Times Table 4.7-4 DAC values | "CAUTION, AIRBORNE RADIOACTIVITY AREA"<br>or<br>"CAUTION AIRBORNE RADIOACTIVITY AREA"<br>"Respiratory Protection Required" |
| Contamination Control Zone | Levels normally less than Table 4.6-1 removable column values with potential to exceed Table 4.6-1 removable column values | "CAUTION, CONTAMINATION CONTROL ZONE" |
| Radioactive Material Area or Radioactive Material Storage Area[b] | An amount of radioactive material used or stored exceeding 10 times the quantity of such material specified in 10 CFR Part 20, Appendix C | "CAUTION"<br>"Radioactive Material Area"<br>or<br>"Radioactive Material Storage Area" |

[a] If the area has been sealed with contrasting fixatives or alternative methods and labeled in accordance with methods approved by the RPM, the area is exempt from posting as a Fixed Contamination Area.

[b] Areas posted as a Contamination Control Zone, Contamination Area, High Contamination Area, Airborne Radioactivity Area, Radiation Area, High Radiation Area, or Very High Radiation Area need not be posted as Radioactive Materials Area.

**Table 4.8-1 Posting Criteria (continued)**

**Definitions**

**Airborne Radioactivity Area (ARA)** — Any area where the measured concentration of airborne radioactivity, above natural background, may be reasonably expected to exceed either: (1) 10 percent of the DAC sampled over 8 hours, (2) a peak concentration of 1 DAC sampled over no more than 1 hour, or (3) soluble uranium concentration exceeds 50 : $g/m^3$ averaged over 8 hours.

**Contamination Area (CA)** — An area where transferable contamination levels are greater than the release limits stated in Table 4.6-1, but less than or equal to 100 times those limits.

**Contamination Control Zone (CCZ)** — An area where transferable contamination levels are less than the release limits stated in Table 4.6-1. CCZs are essentially buffer zones established where discrete areas of contamination may be occasionally encountered as a result of plant size.

**Fixed Contamination Area (FCA)** — An area containing radioactive material that cannot be readily removed from surfaces by nondestructive means, such as casual contact, wiping, brushing, or washing.

**High Contamination Area (HCA)** — An area where transferable contamination levels are greater than 100 times the limits stated in Table 4.6-1.

**High Radiation Area (HRA)** — An area, accessible to personnel, in which radiation levels could result in a person receiving a dose equivalent in excess of 0.1 rem Deep Dose Equivalent (DDE) in 1 hour at 30 cm from the radiation source or 30 cm from any surface that the radiation penetrates.

**Radiation Area (RA)** — An area, accessible to personnel, in which radiation levels could result in a person receiving a dose equivalent in excess of 0.005 rem DDE in 1 hour at 30 cm from the source or from any surface that the radiation penetrates.

**Radioactive Material Area (RMA)** — An area or structure where radioactive material is used, handled or stored.

**Restricted Area** — An area, to which access is limited for the purpose of protecting individuals against undue risk from exposure to radiation and radioactive materials.

**Very High Radiation Area (VHRA)** — An area, accessible to personnel, in which radiation levels could result in a person receiving an absorbed dose in excess of 500 rads in one hour at 1 meter from a radiation source or 1 meter from any surface that the radiation penetrates.

**Table 4.8-2 Radiological Protection Instrumentation and Capabilities**

| Instrument | Manufacturer | Use | Detection Limit |
|---|---|---|---|
| LB5100 | Tennelec | Air sample counting and Removable contamination sample counting | alpha - 4 pCi<br>beta-gamma - 8 pCi<br>alpha- 20 dpm/100 $cm^2$<br>beta-gamma - 40 dpm/100 $cm^2$ |
| LB1043AS | Berthold | Personnel contamination monitoring | 5,000 dpm/100 $cm^2$ total contamination[a] |
| PCM2 | Eberline | Personnel contamination monitoring | 5,000 dpm/100 $cm^2$ total contamination |
| Ludlum 12 with GM probe | Ludlum | Alpha personnel contamination monitoring and removable contamination surveys | 100 cpm above background[b] |
| Ludlum 12 with alpha scintillator | Ludlum | Beta-gamma personnel contamination monitoring and removable contamination surveys | 100 cpm above background[b] |
| REM 500 | Health Physics Instruments | Neutron Dose/Dose Rate | 0.001 rem (rad)/hr - 999 rem (rad)/hr |
| Teletector | Eberline | Beta-gamma Dose/Dose rate | 0 mR/hr - 1,000 R/hr |
| RO2 | Ludlum | Beta-gamma Dose/Dose rate | 0 mR/hr - 5 R/hr |

[a] The Berthold Monitors are set to alarm with 95 percent confidence upon detection of less than or equal to 5,000 dpm total contamination per detector. The actual detection limits are approximately 3-sigma above background, and depends on detector size, efficiency, background, and count time.

[b] Personnel are trained in Radiation Worker Training to notify HP when contamination is detected greater than 100 counts per minute (cpm) above background. The maximum acceptable background count rate is 300 cpm.

[c] Minimum calibration frequency is annual or manufacturer recommendations.

The instruments listed above are used for routine operations. Additional instruments are available to support emergency response.

## 4.9 References

1. ASME N509-1989, *Nuclear Power Plant Air-Cleaning Units and Components*

2. ASME N510-1989, *Testing of Nuclear Air-Treatment Systems*

3. ANSI N323-1978, *Radiation Protection Instrumentation Test and Calibration*

4. Federal Guidance Report No. 11, *Limiting Values of Radionuclide Intake and Air Concentration and Dose Conversion Factors for Inhalation, Submersion, and Ingestion*

5. NUREG-1520, *Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility*

6. Regulatory Guide 8.13, Revision 2, *Instructions Concerning Prenatal Radiation Exposure*

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