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Safety Evaluation Report
For the Renewal of SNM-1227
Richland Fuel Fabrication Facility
Richland, Washington

Docket No. 70-1257
AREVA NP, Inc.

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Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
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ABSTRACT

The report documents the U.S. Nuclear Regulatory Commission (NRC) staff's safety and safeguards evaluation of the AREVA NP, Inc. (AREVA) application for renewal of a license to possess and use special nuclear material (SNM) at its fuel fabrication facility (FFF) located in Richland, Washington. AREVA also conducts activities at its Richland FFF involving source and byproduct material. These activities are regulated by the State of Washington and were not evaluated by the NRC staff. Therefore, they are not discussed in this Safety Evaluation Report (SER). The facility will continue to possess and process enriched uranium up to a maximum of five weight percent uranium-235 for the manufacture of nuclear fuel pellets and fuel assemblies for commercial nuclear power plants (both pressurized water reactors and boiling water reactors). The license was first issued by the Atomic Energy Commission on December 14, 1970, and most recently renewed on November 15, 1996, expiring on November 30, 2006. AREVA submitted its license renewal application on October 24, 2006, more than 30 days in advance of the expiration date. Therefore, it has continued to operate under the provisions of Title 10 of the Code of Federal Regulations (CFR), Part 70.38(a).

The objective of this review is to evaluate whether the potential adverse impacts of continued operation of the facility to the worker and public health and safety, under both normal operating and accident conditions. The NRC's review also considers physical protection of SNM, material control and accounting of SNM, and management organization, administrative programs, and financial qualifications provided to ensure the safe operation and eventual decommissioning of the facility.

The NRC staff concludes, in this SER, that AREVA's descriptions, specifications, and analyses provide an adequate basis for the safety and safeguards of facility operations, and that continued operation of the facility does not pose an undue risk to the worker or public health and safety.

A notice of opportunity to request a hearing on the renewal application was published in the Federal Register (FR) on March 15, 2007 (72 FR 12202). No requests for a hearing were received. A notice of availability of an Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) was published in the Federal Register on April 3, 2009 (74 FR 15312).

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EXECUTIVE SUMMARY

On October 24, 2006, AREVA submitted to the U.S. Nuclear Regulatory Commission (NRC) an application requesting renewal of license SNM-1227 under 10 CFR Part 70 to possess and use SNM at its FFF in Richland, Washington. AREVA supplemented its application with additional submittals dated December 13, 2006; March 28, April 18, April 29, e-mail from L.J. Maas dated August 15, August 21, August 27, September 10, October 2, October 3, October 24, October 30, November 21, and December 10, 2008; and e-mail from R.E. Link dated March 5, 2009. AREVA proposes that its FFF will continue to be authorized to possess and use a specified quantity of uranium-235 enriched up to a maximum of five weight percent. AREVA has requested a renewed license term of 40 years.

A notice of opportunity to request a hearing for the renewal application was published in the Federal Register (FR) on March 15, 2007 (72 FR 12202). No requests for a hearing were received.

The NRC staff conducted its safety and safeguards review in accordance with 10 CFR Part 20, "Standards for Protection Against Radiation," 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material," 10 CFR Part 73, "Physical Protection of Plants and Materials," 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material," and other applicable regulations. The NRC staff used guidance in NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility" (NRC, 2002) (NUREG-1520) and other applicable guidance documents to conduct its review. The NRC staff's safeguards review included reviews of AREVA's Fundamental Nuclear Material Control Plan (FNMCP) and Physical Security Plan, which includes AREVA's transportation security. The NRC staff also reviewed AREVA's Emergency Management Plan. Where AREVA's safety programs should be supplemented, the NRC staff has identified license conditions to provide assurance of safe operation.

AREVA also submitted an Environmental Report, which was used to prepare, in a separate document, an Environmental Assessment (EA) and a Finding of No Significant Impact (FONSI) for the license renewal. The EA and FONSI were both published in the Federal Register on April 3, 2009 (74 FR 15312).

A summary of the NRC's review and findings in each of the review areas is provided below:

General Information

AREVA provided an adequate description of the facility and its processes so that the staff has an overall understanding of the relationships of the facility features and the functions of each feature. Financial qualifications were properly explained and outlined in the license renewal application. The site description included pertinent information regarding regional hydrology, geology, meteorology, the nearby population, and potential effects of natural phenomena that could occur at the facility.

Organization and Administration

AREVA adequately described the responsibilities and associated resources for the operation of the facility. The plans and commitments described in the license renewal application, and supplemental information provided reasonable assurance that an acceptable organization, administrative policies, and sufficient competent resources have been established or committed for the safe operation of the facility.

Integrated Safety Analysis and Integrated Safety Analysis Summary

AREVA adequately described the process for performing Integrated Safety Analyses (ISAs) for the design and operation changes at its Richland FFF. The plans and commitments provide reasonable assurance that an acceptable process has been established and will be followed to maintain compliance with the performance requirements of 10 CFR 70.61 and the ISA regulatory requirements of 10 CFR 70.62, 70.64, and 70.65. AREVA submitted an ISA Summary for its Richland FFF on October 15, 2004. The NRC staff reviewed the ISA Summary and found it acceptable in a letter dated October 25, 2007.

Radiation Protection

AREVA provided sufficient information in its license renewal application for the NRC to evaluate its radiation protection program. The license renewal application adequately describes: (1) the qualification requirements; (2) written radiation protection procedures; (3) the radiation work permit (RWP) program; (4) the program for ensuring that worker and public doses are as low as is reasonably achievable (ALARA); and (5) the necessary training for all personnel who have access to radiologically restricted areas. The radiation survey and monitoring program is adequate to protect workers and members of the public who may potentially be exposed to radiation.

Nuclear Criticality Safety

AREVA provided adequate information for the NRC staff to evaluate its nuclear criticality safety (NCS) program. AREVA committed to having an adequate group of qualified staff to develop, implement, and maintain the NCS program in accordance with the facility organization and administration, and management measures. AREVA's NCS program meets the applicable regulatory requirements in Part 70, and is adequate to protect the workers against a criticality event.

Chemical Process Safety

AREVA adequately described and assessed accident consequences that could result from the handling, storing, or processing of licensed materials, and that could potentially have significant chemical consequences and effects. AREVA performed hazard analyses that identified and evaluated those chemical process hazards and potential accidents, and established safety controls that meet the regulatory requirements in 10 CFR 70.62 and 70.65.

Fire Safety

AREVA committed to reasonable engineered and administrative controls to minimize the risk of fires and explosions. The items relied on for safety (IROFS) and defense-in-depth protection discussed in AREVA's ISA Summary, along with the assumptions used for AREVA's safety basis, and the planned programmatic commitments in the license renewal application, meet safety requirements and provide reasonable assurance that the facility is protected against fire hazards.

Emergency Management

AREVA submitted its Emergency Management Plan (EP) on September 20, 2006. AREVA commits to maintaining and executing its EP to respond to the radiological and chemical hazards that would result from a potential release of radioactive or chemically hazardous

materials. The requirements of the EP are implemented through approved written procedures, and meet the requirements in 10 CFR 70.22(i)(3). AREVA's EP was approved via NRC letter on May 14, 2007.

Environmental Protection

AREVA committed to adequate environmental protection measures, including, environmental and effluent monitoring, and effluent controls to ensure that public doses are ALARA, as part of the radiation protection program. AREVA's proposed controls are adequate to protect the environment and the health and safety of the public, and meet the NRC's regulatory requirements.

Decommissioning

AREVA provided a Decommissioning Funding Plan (DFP) demonstrating that adequate funding will be available for the eventual decommissioning and decontamination of its Richland FFF. AREVA submitted its DFP on December 19, 2005 and was approved by the NRC on June 1, 2006. AREVA requested changes to its financial instruments in the DFP by letters dated March 28, April 29, August 21, and November 21, 2008. The new financial instruments were reviewed by the NRC staff and found acceptable and in compliance with the requirements in 10 CFR 70.25. AREVA will update the site-specific cost estimate in its DFP at least every three years to reflect inflation and changes in site inventories, and conditions that could affect the cost of decommissioning.

Management Measures

AREVA provided information in its license renewal application about management measures that will be applied to safety significant controls and IROFS. The information described: (1) the configuration management program; (2) the maintenance program; (3) the quality assurance program; (4) procedures, training, and qualification; (5) human factors; (6) audits and assessments; (7) incident investigations; (8) the corrective action process; and (9) recordkeeping and reporting. The proposed management measures are acceptable and meet the regulatory requirements in 10 CFR 70.62(d).

Material Control and Accountability

AREVA submitted its Fundamental Nuclear Material Control Plan (FNMCP) on June 27, 2006, describing the programs to be used to control and account for the SNM at the facility. The NRC staff reviewed AREVA's FNMCP and approved it via letter dated October 13, 2006. The NRC staff finds that AREVA's program for material control and accountability meets the applicable regulatory requirements in 10 CFR 70.32(c)(1)(iii) and 10 CFR Part 74.

Physical Security and Physical Protection

AREVA submitted a Physical Protection Plan (PPP) on January 22, 1998, which was later revised on October 20, 2006. The NRC staff reviewed the revised PPP and approved it by letter dated November 2, 2006. AREVA's PPP provides adequate information regarding the policies, methods, and procedures to be implemented to protect SNM of low strategic significance, used and possessed at the facility. The NRC staff found the PPP to be in compliance with the requirements in 10 CFR Part 73, and therefore acceptable.

Exemptions and Special Authorizations

AREVA referenced six special authorizations, one exemption to the requirements in 10 CFR 20.1904(a), and one exemption to the requirements in 10 CFR 20.2202(a)(2) and (b)(2). AREVA subsequently withdrew one authorization in its December 10, 2008, submittal on the basis that it was no longer needed. The NRC reviewed the remaining five authorizations and the two exemptions and found them acceptable.

LIST OF ACRONYMS AND ABBREVIATIONS

ADAMS	Agency-wide Document Access and Management System
ADU	Ammonium Diuranate
AICHE	American Institute of Chemical Engineers
ALARA	As Low As is Reasonably Achievable
ALOHA	Areal Locations of Hazardous Atmospheres
ANS	American Nuclear Society
ANSI	American National Standards Institute
BLEU	Blended Low-Enriched Uranium
CAAS	Criticality Accident Alarm System
CAB	Controlled Area Boundary
CCP	Configuration Control Program
CFR	Code of Federal Regulations
CM	Configuration Management
DFP	Decommissioning Funding Plan
EA	Environmental Assessment
EAL	Emergency Action Level
EOC	Emergency Operations Center
EP	Emergency Management Plan
EPA	Environmental Protection Agency
EPI	Emergency Prediction Information
FFF	Fuel Fabrication Facility
FHA	Fire Hazard Analysis
FNMCP	Fundamental Nuclear Material Control Plan
FONSI	Finding of No Significant Impact
FR	Federal Register
HAZOP	Hazards and Operability Analysis
HEPA	High Efficiency Particulate Air
HVAC	Heating Ventilation and Air Conditioning
IRM	Instrument Repetitive Maintenance
IROFS	Item Relied on for Safety
ISA	Integrated Safety Analysis
kg/s	kilograms per second
LLRW	Low-Level Radioactive Waste
NCS	Nuclear Criticality Safety
NFPA	National Fire Protection Association
NRC	Nuclear Regulatory Commission
OSHA	Occupational Health and Safety Administration
pCi/g	Picocuries per gram
PERT	Plant Emergency Response Team
PHA	Process Hazard Analysis
PM	Preventive Maintenance
PSP	Physical Security Plan
RASCAL	Radiological Assessment System for Consequence Analysis
RJP	Radiation Job Permit
RP	Radiation Protection
RWP	Radiation Work Permit
SSC	Safety Significant Controls
SNM	Special Nuclear Material
% wt.	Percent by weight
QA	Quality Assurance

1.0 GENERAL INFORMATION

1.1 FACILITY AND PROCESS DESCRIPTION

The purpose of the U.S. Nuclear Regulatory Commission's (NRC's) review of AREVA's facility and process description is to determine whether an application for the license renewal includes an overview of the facility layout and a summary description of its manufacturing processes.

1.1.1 REGULATORY REQUIREMENTS

The regulatory basis for the review of AREVA's facility and process description is contained in 10 CFR 70.22, "Contents of Applications," 10 CFR 70.65(b)(1), (2), and (3), "Additional Content of Applications," and 10 CFR 70.33, "Renewal of Licenses."

1.1.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria applicable to the NRC's review of the facility and process description contained in the license renewal application are contained in NUREG-1520 (NRC, 2002), Section 1.1.4.3.

1.1.3 STAFF REVIEW AND ANALYSIS

In its license renewal application, AREVA discussed information related to its Richland, WA facility. The FFF is located in Benton County, WA and consists of approximately 320 acres of land currently owned by AREVA. This facility produces fuel assemblies, finished fuel rods, and uranium oxide powder and fuel pellets, which are then delivered to reactor facilities for electric power production. The Richland, WA facility consists of approximately 27 buildings and structures that support daily operations of the facility and are adequately described in the license renewal application. These operations range from uranium and ammonia recovery that is necessary for nuclear fuel production to security and emergency operations. In its September 10, 2008, letter, AREVA provided acceptable scaled drawings illustrating the facility's layout and the facility structural features.

Section 1.1.3 and 1.1.4 of the license renewal application included a general discussion of the process used by AREVA to manufacture nuclear fuel and the raw materials, products, by-products, and wastes involved in the manufacturing process. The main feed material for the fuel production process is uranium hexafluoride (UF_6). The UF_6 undergoes numerous physical and chemical processes, and is eventually loaded into fuel rods or used to manufacture other finished products through processes which have been adequately described in the license renewal application. In addition, the manufacturing process results in the generation of liquid, airborne, and solid wastes. AREVA included a general discussion about these types of waste and how they are managed to ensure protection of public health and safety, and the environment. The NRC staff reviewed the information and concluded that the information is adequate to understand the major processes at the Richland FFF, the raw materials and by-products involved in the process, and the different types of waste streams generated at the facility.

1.1.4 EVALUATION FINDINGS

The NRC staff has reviewed the general facility and process descriptions for AREVA in accordance with guidance from Section 1.1 of the Standard Review Plan. AREVA adequately described the facility and processes so that the staff has an overall understanding of the relationships of the facility features and the function of each feature. AREVA has cross-referenced its general description with the more detailed descriptions elsewhere in its license renewal application. The NRC staff concludes that AREVA has complied with the general requirements of 10 CFR 70.22, 10 CFR 70.65(b)(1), (2), and (3), and 10 CFR 70.33, as applicable to this section.

1.2 INSTITUTIONAL INFORMATION

The purpose of the NRC's review of institutional information is to establish whether the license renewal application includes adequate information identifying the applicant, its characteristics, and the proposed activities to be conducted at the facility.

1.2.1 REGULATORY REQUIREMENTS

The regulatory basis for the review of AREVA's facility and process description is contained in 10 CFR 70.22, "Contents of Applications," 10 CFR 70.65(b)(1), (2), and (3), "Additional Content of Applications," and 10 CFR 70.33, "Renewal of Licenses."

1.2.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria applicable to the NRC's review of the institutional information section of the license renewal application are contained in NUREG-1520 (NRC, 2002), Section 1.2.4.3.

1.2.3 STAFF REVIEW AND ANALYSIS

In its license renewal application, AREVA provided information regarding its corporate identity. AREVA is owned by AREVA NP USA, a Delaware corporation with headquarters in Bethesda, Maryland, which in turn is wholly-owned by AREVA NP, SAS, a corporate organization located in Paris, France. AREVA has operated its Richland FFF for more than 35 years. AREVA has the financial means and resources to engage in the proposed activities, including the eventual decommissioning of the Richland FFF (for an additional discussion on decommissioning, please refer to Chapter 10 of this SER). The license renewal application contains adequate information regarding the location of the facility and the corporate offices, as well as the ownership of the corporation. Further, the license renewal application states that AREVA is seeking renewal for its Richland FFF for a period of 40 years.

The license renewal application contains information regarding the types, quantities, and form of licensed material to be used in the proposed activities. Uranium (primarily in the form of U-235) and plutonium will be the main radionuclides used in the production of nuclear fuel for eventual delivery to nuclear power plants. There will be other activities that support, or are the result of, nuclear fuel production at the Richland FFF. These activities are adequately described in the license renewal application.

In the license renewal application, AREVA discussed several special exemptions and authorizations for which they were seeking approval. In its September 10, 2008, letter, AREVA justified the request for each exemption and authorization. AREVA requested one exemption to the requirements in 10 CFR 20.1904(a), and one exemption to the requirements in 10 CFR 20.2202(a)(2) and (b)(2). These exemptions and authorizations were approved through previous NRC licensing actions. The NRC staff has reviewed this information and concludes that, for those authorizations to be approved in the renewed license, granting them would not compromise public health and safety, or the environment (for an additional discussion on the review of these special exemptions and authorizations, refer to Chapter 14 of this SER).

1.2.4 EVALUATION FINDINGS

The NRC staff has reviewed the institutional information for AREVA using guidance in Section 1.2. of the Standard Review Plan. On the basis of the review, the NRC staff has determined that AREVA has adequately described and documented the corporate structure and financial information, and is in compliance with those parts of 10 CFR 70.22, 70.65(b)(1), (2), and (3), and 10 CFR 70.33, related to other institutional information. In addition, in accordance with 10 CFR 70.22(a)(2) and (4), the applicant has adequately described the types, forms, quantities, and proposed authorized uses of licensed materials to be permitted at this facility as follows:

MATERIAL	FORM	QUANTITY	AUTHORIZED USE(S)
Uranium enriched in U-235	Any chemical or physical form	**XXXX**	Production of uranium fuel products and supporting activities, as described in the license renewal application
Uranium enriched up to 5.0 % weight in the U-235 isotope	Any chemical or physical form of uranium compounds	**XXXX**	Production of uranium fuel products and supporting activities, as described in the license renewal application

AREVA's proposed activities are consistent with the Atomic Energy Act of 1954, as amended. AREVA has provided all institutional information necessary to understand the ownership, financial qualifications, location, planned activities, and nuclear materials to be handled in connection with the license renewal request.

1.3 SITE DESCRIPTION

The purpose of the site description review is to determine whether the information provided by the applicant adequately describes the geographic, demographic, meteorological, hydrologic, geologic, and seismologic characteristics of the site and surrounding areas.

1.3.1 REGULATORY REQUIREMENTS

The regulatory basis for the review of AREVA's facility and process description is contained in 10 CFR 70.22, "Contents of Applications," 10 CFR 70.65(b)(1) and (2), "Additional Content of Applications," and 10 CFR 70.33, "Renewal of Licenses."

1.3.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of the applicant's site description section of the application are contained in Section 1.3.4 of NUREG-1520 (NRC, 2002).

1.3.3 STAFF REVIEW AND ANALYSIS

1.3.3.1 Site Geography

In its license renewal application, AREVA discussed general information relating to its Richland FFF and the surrounding area. The FFF is located in the City of Richland in Benton County, Washington and is situated within the Horn Rapids Industrial Park. The facility is bounded on the north by Horn Rapids Road, on the south by Battelle Boulevard, on the east by Kelly Avenue and on the west by Kingsgate Boulevard. There are no major highways in the immediate vicinity of the FFF. The FFF consists of 320 acres of land owned by AREVA, including an exclusion area of 50 acres. There are no surface water bodies within a one-mile radius of the Richland FFF. The closest surface water bodies are the Columbia River and the Yakima River which are located 1.5 and 2 miles from the site, respectively.

1.3.3.2 Demographics

In its license renewal application, AREVA provided information regarding the population in the surrounding area. The population in the City of Richland, Washington is approximately 43,520 people. AREVA stated in its September 10, 2008, letter that this demographical data was current as of 2005. The letter also specified the sources that AREVA used to obtain this data. AREVA also discussed other population centers in the Tri-Cities metropolitan area, such as Kennewick, Pasco, and West Richland. Since the facility is located in an industrial area, there are no residential areas or public facilities within a one-mile radius of the site. The closest residential area to the AREVA site is approximately 1.5 miles southwest from the site. The area located within one mile from AREVA is primarily agricultural and industrial. The license renewal application included adequate information relating to the use of nearby water bodies and land surrounding the Richland FFF.

1.3.3.3 Meteorology

The license renewal application discussed information relating to meteorology. The prevailing winds at the site come from the southwest along the Yakima River corridor. The average wind speed in the area fluctuates between 1 and 12 miles per hour, based on historical data from the Department of Energy's Hanford Site, which is adjacent and north of the Richland FFF. The license renewal application also provided adequate information regarding annual precipitation and snowfall, tornado and lightning events. In its ISA Summary, AREVA described design-basis events such as high winds, tornadoes, and other natural phenomena. AREVA assessed the likelihood of such events and their consequences to the workers and the public.

1.3.3.4 Hydrology

With regard to hydrology, AREVA included adequate information regarding nearby surface water bodies and groundwater aquifers. Groundwater at the site is recharged through three main pathways: 1) the Yakima River; 2) infiltration of precipitation runoffs from ridges surrounding the Columbia Basin; and 3) infiltration of water coming from agricultural activities upgradient from the AREVA site. The water table underneath the AREVA site fluctuates between 10 and 50 feet. In the license renewal application, AREVA discussed the depth of the water table at specific locations throughout the facility, and the subsurface gradient that

supported groundwater flow. This discussion was supplemented with a potentiometric surface map for the groundwater underneath the site. The NRC staff reviewed this information and concluded that it is adequate to give a general understanding of the hydrological characteristics of the AREVA site. In its ISA Summary, AREVA described design-basis events pertaining to river flooding. AREVA assessed the likelihood of such event and their consequences to the workers and the public.

1.3.3.5 Geology

The license renewal application discussed the geology of the site. The facility is located close to the Pasco Basin; a structural basin consisting of multiple layers of unconsolidated sands and gravels, tens to hundreds of feet thick over the basaltic bedrock. In terms of seismic activity, the site buildings are capable of withstanding a peak ground acceleration of 0.20 g without sustaining significant damage to the integrity of the buildings, which is consistent with the Uniform Building Code. The license renewal application also provided historic information regarding local peak ground accelerations for return periods from 100 years to up to 100,000 years, as well as information about volcanic activity. In its ISA Summary, AREVA described design-basis events such as earthquakes and volcanic activities. AREVA assessed the likelihood of such events and their consequences to the workers and the public.

The NRC staff reviewed AREVA's description of its Richland facility against the information provided in the ISA Summary, including natural phenomena and external man-made events. The NRC staff concluded that the information is consistent in both documents. The NRC staff concluded that discussion in the license renewal application and the ISA Summary provides enough information to understand the geographical, climatological, demographical, and geological characteristics of the facility.

1.3.4 EVALUATION FINDINGS

The staff has reviewed the site description for AREVA using guidance in Section 1.3 of the Standard Review Plan. AREVA has adequately described and summarized general information pertaining to:

(1) the site geography, including its location relative to prominent natural and man-made features such as mountains, rivers, airports, population centers, schools, and commercial and manufacturing facilities;

(2) population information using the most current available census data to show population distribution as a function of distance from the facility;

(3) meteorology, hydrology, and geology for the site; and

(4) applicable design basis events.

The reviewer verified that the site description is consistent with the information used as a basis for the environmental report, emergency management plan, and ISA Summary. Therefore, the NRC staff concluded that the site description information meets the requirements in 10 CFR 70.22, 10 CFR 70.65(b)(1) and (2), and 10 CFR 70.33, as applicable to this section

1.4 REFERENCES

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

(AREVA, 2006a) "License Renewal Application for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257," October 24, 2006 (ADAMS Accession Number ML063110089).

(AREVA, 2006b) "Additional Information in Support of License Renewal Application for AREVA NP, Inc. Richland Fuel Fabrication Facility, License No. SNM-1227, Docket No. 70-1257," December 13, 2006 (ADAMS Accession Number ML063530128).

(AREVA, 2006c) "Supplement to Applicant's Environmental Report." Richland, Washington: AREVA NP, Inc., October 24, 2006 (ADAMS Accession Number ML063110087).

(AREVA, 2008a) September 10, 2008, letter from R.E. Link to the U.S. NRC, "Request for Additional Information (RAI) Responses Pertaining to General Information and Organization and Administration (Chapters 1 and 2, respectively, of License No. SNM-1227 Renewal Application)," (ADAMS Accession Number ML082610307).

(AREVA, 2008b) "Revised License Renewal Application Chapters for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257," December 10, 2008 (ADAMS Accession Number ML090400202).

2.0 ORGANIZATION AND ADMINISTRATION

The purpose of the review of AREVA's organization and administration is to ensure that the proposed management policies will provide reasonable assurance that AREVA plans, implements, and controls site activities in a manner that ensures the safety of the workers, the public, and the environment. The review also ensures that AREVA has identified and provided adequate qualification descriptions for key management positions.

2.1 REGULATORY REQUIREMENTS

The regulatory basis for the review of AREVA's organization and administration are contained in 10 CFR 70.22, "Content of Applications," 10 CFR 70.23, "Requirements for the Approval of Applications," 10 CFR 70.33, "Renewal of Licenses," and 10 CFR 70.62(d), "Safety Program and Integrated Safety Analysis."

2.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of the organization and administration section of the application are contained in Section 2.4.3 of NUREG-1520 (NRC, 2002).

2.3 STAFF REVIEW AND ANALYSIS

In its license renewal application, AREVA describes its organizational structure and functional responsibilities. AREVA's management at the Richland FFF includes a site manager who has the overall responsibility for the safe operation of the facility. The following four individuals report directly to the site manager: 1) Operations Manager; 2) Plant Projects Manager; 3) Training Manager; and 4) Environmental, Health, Safety, and Licensing (EHS&L) Manager. The license renewal application and the September 10, 2008, letter from AREVA discussed the qualifications, and the roles and responsibilities of these management positions. The information is also supported by an organizational chart in the license renewal application, which clearly illustrates the reporting relationships of these managers. The organizational chart shows that the EHS&L organization is independent of the Operations organization. This independence allows the EHS&L organization to provide objective health, safety, and environmental audits, reviews, or control activities. In addition, the EHS&L Manager has the authority to shut down operations that appear to be unsafe, and is the approving organization for the restart of shutdown operations.

In its license renewal application, AREVA also discussed the different functions necessary for the safe operations of the Richland FFF.

The license renewal application and the September 10, 2008, letter address the qualifications, the roles and responsibilities of these functions, and their reporting relationships in the management organization of the facility. This information is further supported by an organizational chart. The NRC staff reviewed all the information and the organizational chart, and concluded that the information is adequate to understand the management organization and their roles and responsibilities to ensure the safe operations of the Richland FFF.

In its license renewal application, AREVA describes its Management Measures Program, the reporting of unsafe conditions or activities, and its offsite emergency response. The NRC staff reviewed this information and determined that:

a) AREVA has a mechanism, available for use by any person in the plant, for reporting potentially unsafe conditions or activities to the EHS&L organization. Any reported concerns are properly investigated, assessed, and resolved.

b) AREVA has established a formal Management Measures Program that ensures that IROFS are available and reliable when needed. The NRC's review of AREVA's Management Measures Program is documented in Chapter 11 of this SER.

c) AREVA has written agreements with offsite emergency organizations to provide adequate response if an emergency event occurs. The NRC's review of AREVA's Emergency Management Plan is documented in Chapter 8 of this SER.

2.4 EVALUATION FINDINGS

AREVA has described its organization and management policies for providing adequate safety management and management measures for the safe operation of the facility. The NRC staff reviewed the information in the license renewal application, including: 1) management organization, roles and responsibilities; 2) qualifications (i.e., education and experience) required for each function necessary to ensure the safe operation of the AREVA FFF; 3) emergency management plan; and 4) Management Measures Program. Based upon this review, the NRC staff concluded that AREVA has an acceptable organization, administrative policies, and sufficient competent resources to provide for the safe operation of the facility under both normal and abnormal conditions.

2.5 REFERENCES

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

(AREVA, 2006a) "License Renewal Application for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257," October 24, 2006 (ADAMS Accession Number ML063110089).

(AREVA, 2006b) "Additional Information in Support of License Renewal Application for AREVA NP, Inc. Richland Fuel Fabrication Facility, License No. SNM-1227, Docket No. 70-1257," December 13, 2006 (ADAMS Accession Number ML063530128).

(AREVA, 2008a) September 10, 2008, letter from R.E. Link to the U.S. NRC, "Request for Additional Information (RAI) Responses Pertaining to General Information and Organization and Administration (Chapters 1 and 2, respectively, of License No. SNM-1227 Renewal Application)," (ADAMS Accession Number ML082610307).

(AREVA, 2008b) "Revised License Renewal Application Chapters for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257," December 10, 2008 (ADAMS Accession Number ML090400202).

3.0 INTEGRATED SAFETY ANALYSIS AND ISA SUMMARY

The purpose of this review is to ensure that the content of AREVA's ISA Summary meets the regulatory requirements specified in 10 CFR 70.65; that suitable IROFS and management measures have been designated for higher-risk accident sequences, and that programmatic commitments to maintain the ISA and ISA Summary are acceptable.

3.1 REGULATORY REQUIREMENTS

The following regulatory requirements are applicable to the ISA and ISA Summary content:

1. 10 CFR 70.62 specifies the requirement to establish and maintain a safety program, including the performance of an ISA that demonstrates compliance with the performance requirements of 10 CFR 70.61;

2. 10 CFR 70.62(c) specifies requirements for conducting an ISA, including a demonstration that credible high-consequence and intermediate-consequence events meet the safety performance requirements of 10 CFR 70.61;

3. 10 CFR 70.64 specifies requirements for the baseline design criteria, and facility and system design, and facility layout; and

4. 10 CFR 70.65(b) specifies requirements for the contents of an ISA Summary.

The regulations in 10 CFR 70.62(a) require a licensee to establish and maintain a safety program that demonstrates compliance with the performance requirements of 10 CFR 70.61. The safety program is required to contain three elements; they are: (1) process safety information; (2) an ISA; and (3) management measures. The ISA must be conducted and maintained by AREVA, and must identify the following:

1. Radiological hazards related to possessing, or processing licensed material;

2. Chemical hazards of licensed material and hazardous chemicals produced from licensed material;

3. Facility hazards that could affect the safety of licensed materials and thus present an increased radiological risk;

4. Potential accident sequences caused by process deviations or other events internal to the facility and credible external events, including natural phenomena;

5. The consequence and likelihood of occurrence of each potential accident sequence identified and the methods used to determine the consequences and likelihood; and

6. Each IROFS identified pursuant to 10 CFR 70.61, the characteristics of its preventive, mitigative, or other safety function(s), and the assumptions and conditions under which the item is relied upon to support compliance with 10 CFR 70.61.

The regulations in 10 CFR 70.61 require that the ISA evaluate compliance with performance requirements. Those requirements specify that the risk of each credible high-consequence

event must be limited such that the likelihood of occurrence is highly unlikely, and the risk of each credible intermediate-consequence event must be limited such that the likelihood of occurrence is unlikely.

The application must include a description of the safety program required by 10 CFR 70.65(a). In addition, AREVA is required to submit, to the NRC, an ISA Summary. The ISA Summary is required to contain:

1. A general description of the site, with emphasis on those factors that could affect safety;

2. A general description of the facility, with emphasis on those areas that could affect safety;

3. A description of each process analyzed in the ISA, in sufficient detail to understand the theory of operation and, for each process, the hazards identified in the ISA and a general description of the types of accident sequences;

4. Information that demonstrates compliance with the performance requirements of 10 CFR 70.61, including a description of the Management Measures, requirements for criticality monitoring and alarms, and the information regarding the baseline design criteria and defense-in-depth practices set forth in 10 CFR 70.64;

5. A description of the team, qualifications, and the methods used to perform the ISA;

6. A list briefly describing each IROFS in sufficient detail to understand their functions in relation to the performance requirements of 10 CFR 70.61;

7. A description of the proposed quantitative standards used to assess consequences to an individual from acute chemical exposure to licensed material or chemicals produced from licensed material;

8. A descriptive list that identifies all IROFS that are the sole item preventing or mitigating an accident sequence that exceeds the performance requirements of 10 CFR 70.61; and

9. A description of the definitions of unlikely, highly unlikely, and credible, as used in the evaluations in the ISA.

3.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of the applicant's ISA and ISA Summary are outlined in Sections 3.4.3.1 and 3.4.3.2 of NUREG-1520 (NRC, 2002).

3.3 STAFF REVIEW AND ANALYSIS

3.3.1 DESCRIPTION OF ISA SUMMARY

3.3.1.1 Site Description

In Chapter 2 of the ISA Summary, AREVA described and summarized general information pertaining to: (1) the site location and geography, including its location relative to prominent natural and man-made features such as mountains, rivers, airports, highways, and population centers; (2) land use, demographic and population data; (3) climate; (4) motor vehicle and air traffic; and (5) geology and topography. In Chapter 7 of the ISA Summary, AREVA included a

discussion of external hazards, including both natural phenomena such as earthquakes, landslides, volcanoes, flooding, and intense precipitation, as well as man-made phenomena such as aircraft crashes. The NRC reviewers verified that the site description was consistent with the information used as a basis for the ISA Summary.

The staff finds the information provided in Chapters 2 and 7 of the ISA Summary to be adequate for meeting the requirements of 10 CFR 70.65(b)(1).

3.3.1.2 Facility Description

Chapters 2 and 3 of the ISA Summary describe the controlled area boundary (CAB) and restricted area for the AREVA facility. The site lies in a 320-acre plot located in Benton County in the north section of the City of Richland. The nearest residential areas are located approximately 1.5 miles to the southwest of the City of Richland. AREVA defined the CAB as the area between the restricted area and the site boundary. The site boundary is located 300 feet north, 1100 feet east, 500 feet south, and 2800 feet west of the nearest fence line that defines the restricted area. The CAB is shown in Figure 3-2 in Chapter 3 of the ISA Summary. During the ISA process, AREVA assessed worker doses within the restricted area. The consequences to the public and the environment were assessed at the outer perimeter of the restricted area.

The facility consists of 40 operations and administrative buildings plus the North Tank Farm and the Waste Storage Facility. These buildings and facilities are located within a 47-acre fenced area. This fenced area constitutes the restricted area and is located near the northern boundary of the site near Horn Rapids Road (i.e., the primary access route to the site). The center of the site is designated as **XXXX** and is located approximately **XXXX**.

The staff finds the descriptions of the facility, controlled area boundary, and the restricted area adequate for meeting the requirements of 10 CFR 70.65(b)(2).

3.3.1.3 Process Descriptions

AREVA's ISA Summary contains detailed information on process-dependent controls and their safety function. The ISA Summary also contains both criticality and chemical safety sections for each process or facility analyzed, with supporting discussions. The NRC staff reviewed the information in the ISA Summary regarding AREVA's description of process information, hazards, and accident sequences. Based on its review, the NRC staff determined, with reasonable assurance, that the descriptions meet the requirements of 10 CFR 70.65(b)(3).

3.3.1.4 Management Measures and Alarms

AREVA has identified, in its license renewal application, that it will maintain a nuclear criticality alarm system in each area that exceeds the limits specified in 10 CFR 70.24. Therefore, the facility is required to have a criticality accident alarm system (CAAS), with two detectors in each area, to detect an inadvertent criticality and to alert facility personnel that it has occurred. Placement of the detectors is determined by applying the detection criteria in 10 CFR 70.24(a)(1). The NRC staff reviewed the information in Chapters 1 and 11 of the license renewal application, as well as Chapter 3 of the ISA Summary, regarding the AREVA's commitment to the CAAS. Based on its review, the NRC staff determined, with reasonable assurance, that the facility will have a CAAS that meets the requirements of 10 CFR 70.24, as specified in 10 CFR 70.65(b)(4).

3.3.1.5 ISA Team Qualification and Methodology

3.3.1.5.1 ISA Team Qualification

In Section 4.1, Part 1 of the ISA Summary, AREVA stated that because there are a number of process systems to be analyzed, various ISA Core Teams applied the ISA methodology in parallel, under the direction of a manager from the EHS&L organization. Team members were chosen from plant personnel and have extensive experience in safety and hazard analysis along with knowledge of the process being evaluated. Each team included members with experience in:

1. Nuclear criticality,
2. Radiological safety,
3. Fire protection,
4. Chemical safety, and
5. Process/operations.

At least one member of each team served as the team leader and was responsible for ensuring that each team member was instructed in the ISA methodology prior to starting the ISA. The team leader was formally trained in ISA methodology. Appendix D to Part 1, of the ISA Summary provided a list of all ISA team members along with their experience and qualifications. Team members assigned to a specific system/process analysis were identified at the end of each major process analysis in the ISA Summary.

Based on the above information, the staff finds that the ISA team and their qualifications are acceptable for meeting the requirements of 10 CFR 70.62(c)(2) and 10 CFR 70.65(b)(5).

3.3.1.5.2 ISA Methods

In Section 4.2, Part 1 of the ISA Summary, AREVA stated that each facility process is divided down to a level that the ISA team could efficiently and accurately analyze using an appropriate hazard identification methodology, such as those described in the American Institute of Chemical Engineers (AIChE), “Guidelines for Hazard Evaluation Procedures” (AIChE 1992) including a “What-if” checklist, failure mode and effects analysis, hazards and operability analysis (HAZOP), or fault tree analyses. The identification of hazards, construction of accident scenarios, consequence assessment, and selection of IROFS considered all modes of operations, including startup, normal operation, shutdown and maintenance in addition to common cause incidents, common mode failures, system interactions, and process conditions (e.g., temperature upsets). To ensure completeness, standard checklists for facility siting and human factors were employed along with a general checklist.

AREVA used Process Hazards Analyses (PHAs), Fire Hazards Analyses, or similar analyses to identify process facility and hazards, and incorporated the results into the ISA. AREVA included a binary interaction matrix in each system PHA and listed the hazardous materials that are maintained in significant quantities that might come in contact with each other. AREVA fully considered process conditions via the hazards analysis techniques in the development of event summary tables.

Based on the above information, the NRC staff found that the methods used to perform the ISA are acceptable.

3.3.1.5.3 Performance Requirements

NUREG-1520 (NRC, 2002), Section 3.4.3.2 suggests that the performance requirements of 10 CFR 70.61 have three elements: (1) completeness; (2) consequences; and (3) likelihood. Completeness refers to the fact that the ISA must address each credible event. Consequences refer to the magnitude of the chemical and radiological doses of the accident and are the basis upon which an accident is classified in 10 CFR 70.61 to be a high or intermediate consequence event. Likelihood refers to the fact that 10 CFR 70.61 requires that intermediate consequence events be unlikely, and high consequence events be highly unlikely. AREVA's approach to each of these elements is discussed below.

Completeness

The NRC staff reviewed the accident sequences and determined that the ISA addressed each credible event and thus has reasonable assurance that the ISA is complete.

Consequences

In Table 4-1, Part 1 of the ISA Summary, AREVA listed five different consequence categories based on the severity of the effects resulting from exposure to chemical, fire, criticality, or radiological hazards. Two of these categories (Consequence Categories C and D), correspond to those listed in 10 CFR 70.61 for intermediate and high consequence events, respectively.

For each credible accident sequence, a consequence category was assigned by the ISA team based on the results of hazards analyses results, past experience, industry standards, engineering judgment, analytical data, or other applicable information.

The NRC staff reviewed AREVA's criteria (as discussed above) for determining whether an accident can be classified as a high or intermediate consequence event and has determined that the criteria are in conformance with 10 CFR 70.61(b)(1)-(4) and (c)(1)-(4), and are found to be acceptable.

Likelihood

The likelihood for each accident sequence is expressed in terms of an index number called the Controlled Event Index (CEI) which is determined by the equation:

$$\text{CEI} = \text{INITIATING EVENT FREQUENCY} + \sum \text{PROTECTION EFFECTIVENESS INDEX NUMBERS}$$

The likelihood for each accident sequence, expressed in terms of an index number (CEI), is calculated by combining the Initiating Event Frequency and the Protection Effectiveness Indices using the equation listed above. This approach is consistent with the guidance in Appendix A of NUREG-1520 (NRC, 2002).

The NRC staff reviewed AREVA's methodology for assuring that intermediate consequence events are unlikely, and high consequence events are highly unlikely, and has determined that it is acceptable.

3.3.1.6 Identification of IROFS

Accident scenarios were listed in the ISA Summary for each facility and process analyzed. Each scenario included the IROFS credited for mitigation or prevention, the description(s) of the IROFS, and the Protection Effectiveness Index(es) for the IROFS. A summary table of IROFS

was included in the ISA Summary, following the accident sequences for each facility process analyzed. Each table listed the IROFS credited in the sequences with their descriptions, type, failure index or probability of failure on demand (PFOD), failure description, and management measure designator(s), to indicate which management measures are applied to the IROFS.

The protection effectiveness index for a mitigative IROFS is based on a qualitative assessment of the control's effectiveness to mitigate the consequences of the accident sequence if an initiating event (or set of conditions) were to occur. Conditions that could affect the effectiveness and safety function of a mitigative IROFS, with respect to the progression and magnitude of the accident consequences were considered when assigning a PFOD index number to the mitigative IROFS. Thus, mitigative IROFS are capable of reliably mitigating the accident consequences below the performance requirements in 10 CFR 70.61. This performance is considered adequate.

3.3.1.7 Chemical Consequence Standards

AREVA analyzed several accident sequences in its ISA and discussed those that would result in intermediate- and high-consequence in its ISA Summary. Section 3.3, “Hazard Identification”, in Chapter 3 of the ISA Summary provided a list of hazards and anticipated quantities throughout the facility. Further, Section 7.2.2, “Chemical Hazards”, in Chapter 7, of the ISA Summary discussed the chemical hazards that could result in accident sequences that exceed the performance requirements of 10 CFR 70.61. Table 7-2 in Chapter 7, of the ISA Summary identified the bounding chemical scenarios and corresponding unmitigated consequences to the worker and the public.

AREVA used a matrix with five categories to assess consequences to the worker and the public. Environmental consequences were assessed using just one category as the criteria described in 10 CFR 70.61(b)(3). The proposed chemical consequences for high-, intermediate-, and low-consequence categories were mainly based on limits mentioned in NUREG-1520 (NRC, 2002) such as Emergency Response Planning Guideline levels, Acute Emergency Guideline Limits, and Occupational Safety and Health Administration (OSHA) exposure limits. AREVA also used, as needed, Temporary Emergency Exposure Limits and Immediately Dangerous to Life and Health limits. If more than one exposure limit was applied to a specific chemical consequence category, AREVA selected the limit with the lowest numerical limit and/or shortest exposure time.

3.3.1.8 List of Sole Items Relied on for Safety

10 CFR 70.65(b)(8) requires that the ISA Summary include a descriptive list that identifies all IROFS, that are the sole item preventing or mitigating an accident sequence that exceeds the performance requirements of 10 CFR 70.61.

In the ISA Summary, at the end of each chapter covering the analysis of a specific building, AREVA stated that there are no sole IROFS used. The NRC staff has determined that this meets the requirement of 10 CFR 70.65(b)(8) and is acceptable.

3.3.1.9 Definitions of “Credible,” “Unlikely,” and “Highly Unlikely”

10 CFR 70.65(b)(9) requires that the ISA Summary contain a description of the definitions of “credible,” “unlikely,” and “highly unlikely” as used in the evaluations in the ISA.

Credible

In Section 6.1 of Part 1, of the facility's ISA Summary, AREVA stated that an event or accident sequence is considered "credible" unless it is determined to be "not credible." In Section 6.2 an event or accident sequence is considered "not credible" if the consensus of the ISA Core Team is that:

1. It is an external event with a frequency of occurrence estimated to be 10^{-5} or less; or

2. Based on physical laws or engineering principles, the event is not possible or the accident sequence is extremely unlikely, with no dependency on a system of IROFS or management measures; or

3. The accident sequence consists of many unintentional, unlikely human actions or errors, and has never occurred in any fuel cycle facility.

Unlikely

In Section 6.4 of Part 1 of the ISA Summary, AREVA stated that an event or accident is considered unlikely if the consensus of the ISA team is that it is not expected to occur during the process system life cycle. Also, an accident sequence is considered to be unlikely based on the graded combination of IROFS, that mitigate or prevent the accident from occurring with a Controlled Event Index of -3 or less (calculated as discussed above), or based on a quantifiable probably of less than an index of -2.

Highly Unlikely

In Section 6.3 of Part 1 of the ISA Summary, AREVA stated that an event or accident sequence is considered highly unlikely if the ISA Core Team reaches a consensus that it is physically possible or credible, but not expected to occur because:

1. A combination of applied IROFS mitigate or prevent the accident from occurring with a Controlled Event Index of -4 or less; or

2. The team determined that external initiating events are highly unlikely; or

3. The team determined that unusual internal initiating events are highly unlikely based on available performance data.

The NRC staff reviewed AREVA's proposed definitions of credible, unlikely, and highly unlikely and determined that they are reasonably clear and can reasonably be expected to consistently distinguish accidents that are highly unlikely from those that are merely unlikely, based on the methodology discussed above. This methodology is consistent with the guidance in Appendix A of NUREG-1520 (NRC, 2002). Further, the NRC staff reviewed AREVA's proposed definitions for highly unlikely and unlikely and determined that they are acceptable to show compliance with 10 CFR 70.61.

3.4 EVALUATION FINDINGS

The NRC staff concluded that AREVA's safety program, if established and maintained pursuant to 10 CFR 70.62, 70.64, and 70.65, is adequate to provide reasonable assurance that IROFS will be available and reliable to perform their intended safety function(s) when needed, and in the context of the performance requirements of 10 CFR 70.61. Many hazards and potential

accidents can result in an unintended exposure of persons to radiation, radioactive materials, or toxic chemicals incident during the processing of licensed materials. The NRC staff finds that the applicant has performed an ISA to identify and evaluate those hazards and potential accidents as required by the regulations. The NRC staff reviewed the ISA Summary and other information, and finds that it provides reasonable assurance that AREVA has identified IROFS and established engineered and administrative controls to ensure compliance with the performance requirements of 10 CFR 70.61. Specifically, the NRC staff finds that the ISA results, as documented in the ISA Summary, provided reasonable assurance that the IROFS, the management measures, and the applicant's programmatic commitments will, if properly implemented, make all credible intermediate consequence accidents unlikely, and all credible high consequence accidents highly unlikely.

3.5 REFERENCES

(AIChE, 1992) American Institute of Chemical Engineers, "Guidelines for Hazard Evaluation Procedures, Second Edition with Worked Examples," New York, September 1992.

(NRC, 2001) U.S. Nuclear Regulatory Commission, NUREG-1513, "Integrated Safety Analysis Guidance Document," May 2001.

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

(AREVA, 2004) October 15, 2004, letter from R.E. Link to the U.S. NRC, "Submittal of Integrated Safety Analysis (ISA) Summary for Framatome ANP, Inc.'s (FANP's) Richland, Washington Fuel Fabrication Facility; License No. SNM-1227; Docket No. 70-1257," (ADAMS Accession Number ML042990522).

(NRC, 2007) October 25, 2007, letter from the U.S. NRC to R.E. Link, "Approval of Integrated Safety Analysis Summary (TAC L31856)," (ADAMS Accession Number ML072290197).

4.0 RADIATION PROTECTION

The purpose of this review is to determine whether the AREVA's Radiation Protection Program is adequate to protect the radiological health and safety of workers, and complies with the associated regulatory requirements in 10 CFR Parts 19, 20, and 70.

4.1 REGULATORY REQUIREMENTS

4.1.1 RADIATION PROTECTION PROGRAM IMPLEMENTATION

Regulations applicable to the establishment of a radiation protection program are presented in 10 CFR Part 20, Subpart B, "Radiation Protection Programs."

4.1.2 AS LOW AS IS REASONABLY ACHIEVABLE PROGRAM

Regulations applicable to the ALARA program are presented in 10 CFR 20.1101, "Radiation Protection Programs."

4.1.3 ORGANIZATION AND PERSONNEL QUALIFICATIONS

The regulation applicable to the organization and qualifications of the radiological protection staff are presented in 10 CFR 70.22, "Contents of Applications."

4.1.4 WRITTEN PROCEDURES

The regulation applicable to radiation protection procedures and radiation work permits (RWPs) are presented in 10 CFR 70.22, "Contents of Applications."

4.1.5 TRAINING

The following regulations apply to the Radiation Safety Training Program:

1. 10 CFR 19.12 "Instructions to workers"

2. 10 CFR 20.2110 "Form of records"

4.1.6 VENTILATION AND RESPIRATORY PROTECTION PROGRAMS

Regulations applicable to the ventilation and Respiratory Protection Programs are presented in 10 CFR Part 20, Subpart H, "Respiratory protection and controls to restrict internal exposure in restricted areas."

4.1.7 RADIATION SURVEY AND MONITORING PROGRAMS

The following NRC regulations in 10 CFR Part 20 are applicable to radiation surveys and monitoring programs:

1. Subpart C "Occupational Dose Limits"

2. Subpart F "Surveys and Monitoring"

3. Subpart L "Records"

4. Subpart M "Reports"

4.1.8 ADDITIONAL PROGRAM REQUIREMENTS

The following regulations are applicable to the additional program requirements:

1. Section 70.61 "Performance requirements"

2. Section 70.74 "Additional reporting requirements"

4.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for NRC's review of the radiation protection (RP) program are outlined in Sections 4.4.1.3; 4.4.2.3; 4.4.3.3; 4.4.4.3; 4.4.5.3; 4.4.6.3; 4.4.7.3; and 4.4.8.3 of NUREG-1520 (NRC, 2002).

4.3 STAFF REVIEW AND ANALYSIS

As part of the AREVA license renewal application, Chapter 4 describes the radiation protection (RP) program for the facility. The chapter addresses each major section of NUREG-1520. This chapter is organized to conform to the major sections of the application and NUREG-1520.

4.3.1 RADIATION PROTECTION PROGRAM IMPLEMENTATION

The RP program, as presented in the application, is designed to demonstrate compliance with the regulatory requirements in 10 CFR Parts 19, 20, and 70. The RP program will be implemented such that doses and radiological releases are within prescribed limits. AREVA has incorporated the ALARA philosophy into the RP program. In addition, the facility's ISA is used to identify radiological areas of concern.

The RP program's organizational structure and key personnel are outlined in Section 2.2.5 of the license renewal application. The Site Manager has overall responsibility for the nuclear fuel manufacturing activities. The EHS&L Manager has direct access to the Site Manager, and overall responsibility for the health and safety programs, including radiation safety. The RP function supervisors report to the EHS&L function, and are responsible to develop and implement the RP program, with assistance from subordinate Health and Safety Technicians (HSTs). The managerial staff of the EHS&L and RP function is adequately trained and must have a degree in science or engineering and at least three years applicable experience in a related field. The RP function develops and implements the program to limit exposures, conducts day-to-day surveys, and oversees ALARA for individuals and the environment.

The EHS&L function is independent from the facility's operations with primary responsibility to confirm the safety of operations. As such, it has authority to order operations shutdown and approve restart, based on plant conditions.

As defined in Section 11.5.1 of the license renewal application, audits are conducted by personnel within the EHS&L function. Those who conduct audits must be organizationally independent of the activities being reviewed. RP audits are conducted monthly, at a minimum. The audits are conducted in accordance with written procedures. The results are reviewed by appropriate EHS&L management, and deficiencies entered into the corrective action program. AREVA reviews the content and implementation of the RP program, at least annually.

The NRC staff reviewed AREVA's RP program implementation and finds it sufficient to meet the requirements of the NRC regulations and is, therefore, acceptable.

4.3.2 ALARA PROGRAM

Goals of the ALARA program include maintaining occupational exposures, as well as environmental releases, as far below the regulatory limits as is reasonably achievable. The Site Manager is responsible to ensure that the ALARA philosophy is incorporated throughout the facility. This is accomplished by incorporating the philosophy into written procedures for manufacturing, configuration change, training, and other functions that involve working and handling licensed radioactive material.

AREVA established an ALARA Committee, chaired by a member of the RP function and staffed by managers from operations and the engineering functions. The Committee meets at least annually and tracks radiological trends. The responsibilities of the ALARA committee include: (1) determining if trends in exposures, effluent releases, and contamination levels are in accordance with the ALARA principle; (2) ensuring that the occupational and public radiological exposures are within regulatory limits during normal operations; and (3) reviewing program audits made by the RP organization and inspection staff.

The Committee serves as an advisory body to review implementation of the ALARA philosophy and to provide recommendations to managers. The Committee shall document exposure trends in an annual ALARA Report. The report identifies areas for improvement, and tracks progress of ALARA projects.

The staff has reviewed AREVA's ALARA commitment and procedures, and finds them sufficient to meet the NRC requirements and is, therefore, acceptable.

4.3.3 ORGANIZATION AND PERSONNEL QUALIFICATIONS

AREVA employs suitably trained RP personnel at the facility. Information regarding personnel qualifications for the most relevant positions, in the plant, is contained in Section 2.2 of the license renewal application. Personnel in the RP program consist of two primary groups: RP Manager and HSTs. The RP Manager has, as a minimum, a degree in science or engineering, and at least three years of experience in RP programs. The RP Manager is responsible for program implementation. The HST's perform the day-to-day radiological surveillance activities and report to the RP Manager through an intervening supervisor. This supervisor must have at least two years applicable work experience as an HST or equivalent.

The HST has, as a minimum, a high school diploma or equivalent. Specific on the job training is the basis for qualification of each technician, for their respective job assignments. HSTs perform the day-to-day radiological surveillance activities required in the plant.

The staff reviewed AREVA's personnel qualifications for the radiation safety organization and finds them sufficient to meet the NRC requirements and is, therefore, acceptable.

4.3.4 WRITTEN PROCEDURES

AREVA maintains written and approved procedures entitled Radiation Work Permits (RWPs). These procedures govern activities involving the use of radioactive materials. The procedures are subject to formal review and approval protocols as listed in Section 11.4 of the license renewal application, and shall include a mechanism for triggering necessary training and

qualification updates. Safety related procedures are subject to formal review and approval by the EHS&L Manager.

AREVA issues Radiation Job Permits (RJPs) for established activities where RP requirements are not adequately covered by RWPs. RJPs are issued by the RP Manager on an as needed basis. They specify such items as the required personal protective equipment, dosimetry requirements, special procedures, etc. The document must be signed by personnel working under the RJP to acknowledge receipt.

The NRC staff finds AREVA's commitments to use written procedures sufficient to meet the requirements of the NRC regulations and, therefore, acceptable.

4.3.5 TRAINING

The training and qualification program shall be established by the EHS&L component and have two basic categories: 1) general health and safety training not specific to a particular work activity; and 2) specialized training for a particular work activity. RP training is provided to all personnel and visitors who enter areas of the facility that contain NRC licensed material, unless accompanied by trained escorts. The level of training is based on the potential radiological health risks and includes such topics as ALARA principles, safe handling of radioactive material, access and egress control, contamination control, purposes of protective devices, affects of radiation exposure, emergency response, etc. Individuals must demonstrate there understanding of radiological protection principles through oral or written evaluations.

AREVA has incorporated the provisions of 10 CFR Part 19.12 into the radiation training program, as outlined in Section 4.5 of the license renewal application.

Each employee routinely working with licensed materials shall receive annual refresher training and exams in radiation protection and criticality safety awareness. Worker training includes procedure reviews, classroom instruction and on the job training. The pertinent line managers are responsible for ensuring effective and adequate training of personnel. In addition, the adequacy of the radiation protection training program shall be reviewed at least every three years.

The staff finds that AREVA's commitments to train employees in RP sufficient to meet the requirements of the NRC regulations and are, therefore, acceptable.

4.3.6 VENTILATION AND RESPIRATORY PROTECTION PROGRAMS

The ventilation system at AREVA limits the spread of airborne contamination by maintaining pressure gradients from lower to higher contamination areas. The air flow is circulated through High-Efficiency Particulate Air (HEPA) filters prior to release through the exhaust to the stack. Exhaust stacks are continuously sampled to determine the concentrations of radioactive materials and are periodically analyzed for particulate material, generally on a weekly basis. The differential pressure across the filters will be monitored in accordance with written procedures, but a differential pressure greater than 5.0 inches of water will prompt AREVA to replace the HEPA filter. Replacement filters are tested prior to use in operations to ensure proper performance. A preventive maintenance program ensures HEPA filters are routinely inspected for degradation. In addition, routine monitoring of stack emissions provides a backup indication of HEPA performance.

AREVA maintains a minimum average linear velocity through uranium handling hoods in accordance with established procedures reviewed and approved by the ventilation engineering

function. The performance capabilities are checked routinely using smoke tests and differential pressure readings. If the flow rate falls below an established minimum, the hoods are removed for service, pending evaluation.

To meet the respiratory protection requirements in 10 CFR Part 20, Subpart H, AREVA has prepared written procedures for the selection, fitting, issuance, maintenance, testing, training of personnel, monitoring, and record-keeping for individual respiratory protection equipment. These procedures will require employees to pass a medical exam before being permitted to wear a respirator. Employees are fit-tested annually, by a physician, prior to being allowed to wear a respirator. Employees are trained in respiratory protection prior to using a respirator and receive refresher training at least every three years. Respiratory protection equipment shall be approved by the National Institute for Occupational Safety and Health.

AREVA revises respiratory protection procedures in accordance with management control procedures. The records for the respiratory protection program are maintained in accordance with the Records Management protocols described in Section 11.7 of the license renewal application. The records include, but are not limited to, the equipment maintenance and employee training for respirator use

AREVA has established ventilation and respiratory protection programs in accordance with the acceptance criteria, and satisfies the regulatory requirements of 10 CFR Part 20, Subpart H.

4.3.7 RADIATION SURVEY AND MONITORING PROGRAMS

AREVA conducts radiation surveys to monitor airborne contamination, and external and internal occupational radiation doses. Procedures are in place to specify the survey frequencies and the location of surveys to ensure annual exposure limits are not exceeded. The program uses prepared written procedures that include the program objectives, sampling procedures, data analysis methods, types of equipment used, frequency of measurements, and record-keeping requirements. The program defines actions to be taken when measurements exceed the administrative levels established by AREVA or 10 CFR Part 20 occupational dose limits.

Personal dosimeters, sensitive to beta-gamma radiation, are required in areas of the facility posted as radiation areas. This dosimetry may be supplemented by direct reading dosimeters, neutron dosimetry and survey instruments, when appropriate. Thermoluminesecent dosimeter readings are analyzed by a processor holding accreditation from the National Voluntary Laboratory Accreditation Program. Personnel dosimeters are evaluated on a frequency not greater than quarterly or as specified by the Radiation Safety Function.

Internal dose to employees is tracked based on air sample results and stay times, and, to the extent respirators are uses, modified by respiratory protection factors. Airborne sampling is conducted in areas where airborne radioactive materials are likely to exceed 10% of the Derived Air Concentration (DAC). Air samplers used to monitor individual committed effective dose equivalents are changed out in accordance with written procedures. Other air sampling devices such as continuous air monitors and lapel samplers may be used to supplement the fixed samplers. The internal procedures contain action levels which require followup investigation and response, if exceeded.

The frequency of air samples shall be conducted based on historical sampling experience in the contaminated areas. At a minimum, air samplers will be processed at least once per day in Airborne Radioactivity Areas. For contaminated areas not designated as Airborne Radioactivity Areas where the airborne concentration could exceed 1% DAC, air samplers will be processed at least every two weeks.

Diagnostic evaluations, based on air samples, are augmented by bioassay measurements, which include urinalysis and lung counts. In-vitro bioassay samples are collected and evaluated, at least annually, to track and evaluate individuals' retention of radioactive materials. Procedures will specify action levels designed to protect against kidney damage. AREVA sums the internal and external exposure values in accordance with 10 CFR 20.1202.

In accordance with AREVA's internal procedures, DAC and annual level of intake (ALI) values, based on the dose coefficients published in International Commission on Radiological Protection (ICRP) Publication No. 68 (ICRP, 1995), may be used in lieu of the DAC and ALI values in Appendix B of 10 CFR Part 20. The NRC staff authorized this activity by amendment letter dated April 11, 2001, and has determined that the activity is being conducted in accordance with the requirements in 10 CFR 20.2301, and is acceptable.

AREVA provides routine contamination survey monitoring to all people and material leaving contaminated areas. Survey equipment and protective clothing are provided at step-off areas. If contamination is detected, individuals are decontaminated under supervision of the RP staff. Potentially contaminated materials may be free released provided they have a calculated total effective dose equivalent of less than 1 mrem/yr. Internal procedures specify the types of surveys, the frequency and applicable action levels for contamination controlled areas. Requirements such as clean exterior, proper packaging, and surveys have been established as prerequisites for allowing the safe transfer of equipment and materials from one contaminated area, through a non-contaminated area, into a second contaminated area.

Administrative limits, for both internal and external exposure, have been established in AREVA's internal procedures. AREVA investigates when these action levels are exceeded to determine the appropriate response needed to resolve the issue and prevent its recurrence. Events that result in worker dose exceeding the regulatory limits are placed into the formal corrective action program. The program seeks to identify the causes, implement appropriate changes to preclude recurrence, and is tracked to completion. The facility corrective action program is further described in Section 11.6 of the license renewal application.

AREVA clears material and equipment for release to unrestricted areas of the facility in accordance with NRC Branch Technical Position entitled "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material." In addition, contaminated materials may be free-released if they contain less than 30 pCi/g of uranium or can be shown to give a total effective dose equivalent of less than 1mrem/yr to an average member of the critical group.

AREVA has an access control program that ensures that: (1) signs, labels, and other access controls are properly posted and operative; (2) restricted areas are established to prevent the spread of contamination and are identified with appropriate signs; and (3) step-off pads, change facilities, protective clothing facilities, and personnel monitoring instruments are provided in sufficient quantities and locations. AREVA has established action levels at points of egress from Contamination Controlled Areas that require decontamination. Additional efforts, if deemed appropriate, may be implemented by a member of the radiation protection group.

The staff reviewed AREVA's contamination control program and finds it sufficient to meet the requirements of the NRC regulations and, therefore, acceptable.

4.3.8 ADDITIONAL PROGRAM REQUIREMENTS

AREVA has established a program for maintaining records of the RP program, including bioassay data, dose records, radiation training, RWPs and corrective actions related to an event.

The facility identifies, preserves, controls and destroys records in accordance with the regulation policy and practices.

AREVA reports, to the NRC, any event that results in an occupational exposure to radiation exceeding the dose limits in 10 CFR Part 20, within the timeframe specified in 10 CFR 20.2202 and 10 CFR 70.74. AREVA will prepare and submit, to the NRC, an annual report of the results of individual monitoring, as required by 10 CFR 20.2206(b).

AREVA will refer, to the facility's corrective action program, any radiation incident that results in an occupational exposure that exceeds the dose limits in 10 CFR Part 20, Appendix B, or is required to be reported pursuant to 10 CFR 70.74.

4.4 EVALUATION FINDINGS

AREVA has established and will maintain an acceptable RP program that includes:

1. An effective documented program to ensure that occupational radiological exposures are ALARA;

2. An organization with adequate qualification requirements for RP personnel;

3. Approved written RP procedures and RJPs for RP activities;

4. RP training for all personnel who have access to restricted areas;

5. A program to control airborne concentrations of radioactive material with engineering controls and respiratory protection;

6. A radiation survey and monitoring program that includes requirements for controlling radiological contamination within the facility and monitoring of external and internal radiation exposures; and

7. Other programs to maintain records, report to the NRC in accordance with 10 CFR Parts 20 and 70, and correct for upsets at the facility.

The NRC staff concluded that AREVA's RP program, as described in the license renewal application, meets the regulatory requirements of 10 CFR Parts 19, 20, and 70 and is acceptable.

4.5 REFERENCES

(NRC, 1979) U.S. Nuclear Regulatory Commission, Regulatory Guide 8.24, "Health Physics Surveys During Enriched Uranium-235 Processing and Fuel Fabrication," October 1979.

(NRC, 1992a) U.S. Nuclear Regulatory Commission, Regulatory Guide 8.25, "Air Sampling in the Workplace," June 1992.

(NRC, 1992b) U.S. Nuclear Regulatory Commission, Regulatory Guide 8.34, "Monitoring Criteria and Methods to Calculate Occupational Radiation Doses," July 1992.

(NRC, 1993a) U.S. Nuclear Regulatory Commission (NRC). Regulatory Guide 8.9, "Acceptable Concepts, Models, Equations, and Assumptions for a Bioassay Program," July 1993.

(NRC, 1993b) U.S. Nuclear Regulatory Commission, Branch Technical Position, “Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source, or Special Nuclear Material,” 1993.

(ICRP, 1995) International Commission on Radiological Protection, “Dose Coefficients for Intakes of Radionuclides by Workers,” July 1995.

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

(NRC, 2005) U.S. Nuclear Regulatory Commission, Regulatory Guide 8.7, “Instructions for Recording and Reporting Occupational Radiation Exposure Data,” November 2005.

(AREVA, 2006a) “License Renewal Application for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257,” October 24, 2006 (ADAMS Accession Number ML063110089).

(AREVA, 2006b) “Additional Information in Support of License Renewal Application for AREVA NP, Inc. Richland Fuel Fabrication Facility, License No. SNM-1227, Docket No. 70-1257,” December 13, 2006 (ADAMS Accession Number ML063530128).

(AREVA, 2008a) August 27, 2008, letter from R.E. Link to the U.S. NRC, “Request for Additional Information Responses Pertaining to Radiation Protection (Chapter 4 of License No. SNM-1227 Renewal Application),” (ADAMS Accession Number ML082470523).

(AREVA, 2008b) “Revised License Renewal Application Chapters for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257,” December 10, 2008 (ADAMS Accession Number ML090400202).

5.0 NUCLEAR CRITICALITY SAFETY

The purpose of this review is to determine whether the applicant's nuclear criticality safety (NCS) program is adequate to support safe operation of the facility, as required by 10 CFR Part 70.

The NCS programmatic review determines whether: (1) AREVA provided for the appropriate management of the NCS program; (2) AREVA identified, and committed to, the responsibilities and authorities of individuals for developing and implementing the NCS program; (3) the facility management measures described in 10 CFR 70.62 have been committed to and will support implementing and maintaining the NCS program; and (4) an adequate NCS program is described that includes identifying and committing to the NCS methods, and that NCS technical practices are used to ensure the safe operation of the facility, as required by 10 CFR Part 70.

5.1 REGULATORY REQUIREMENTS

The review of AREVA's NCS program verifies that the information in the license renewal application meets the requirements of 10 CFR 70.22 and 70.65. In addition, the NCS review verifies compliance with the regulatory requirements in 10 CFR 70.24; 70.52; 70.61; 70.62; 70.64; 70.72; and Appendix A to 10 CFR Part 70.

5.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of AREVA's NCS program are outlined in Section 5.4 of NUREG-1520. This includes the commitment, with some exceptions, to use NRC Regulatory Guide 3.71, Revision 1, which endorses the use of the American National Standards Institute/American Nuclear Society (ANSI/ANS), Series-8 NCS standards.

5.3 STAFF REVIEW AND ANALYSIS

5.3.1 ORGANIZATIONAL STRUCTURE

The NRC staff's review included verification of experience, educational requirements, responsibilities, and authorities of NCS management and staff. The information and commitments which are significant to the NRC's conclusion are described below.

The AREVA Fuel America Vice President, Manufacturing, has the ultimate responsibility for safety and regulatory compliance for the Richland facility. Within AREVA's organization, EHS&L function has overall responsibility for the development and implementation of programs addressing safety and license compliance. The EHS&L Manager's responsibility, with respect to manufacturing operations, is only to confirm the safety of those operations. The EHS&L Manager has the authority to order shutdown of operations that are deemed unsafe or not in compliance with regulatory requirements; then approve re-start when operations are again safe and in compliance with regulatory requirements.

The NCS function is part of the EHS&L function. The NCS Manager is responsible for the development and implementation of the NCS program. The NCS Manager is required to have a science or engineering degree and at least three years of experience in NCS analysis. The NCS analysts are required to have a science or engineering degree and must successfully complete formal internal training or qualification program.

AREVA met the intent of ANSI/ANS-8.1-1998, "Nuclear Criticality Safety in Operations with Fissionable Material Outside Reactors", and ANSI/ANS-8.19-2005, "Administrative Practices for

Nuclear Criticality Safety", through its license commitments. A detailed list specifying which license commitments implement each of the ANSI/ANS-8.19-2005 standard's requirements was provided in AREVA's response dated October 30, 2008.

The NRC staff has reviewed the AREVA NCS organizational structure and finds that it is acceptable as the NCS organization is independent from the production staff. NCS evaluations are performed by qualified reviewers, with independent review authority, to ensure quality assurance, and that the NCS organization is consistent with the guidance in ANSI/ANS-8.19-2005.

5.3.2 MANAGEMENT OF THE NCS PROGRAM

AREVA commits to maintaining an NCS program, at its Richland site, that applies to all SNM activities and will meet the requirements of 10 CFR Part 70.

The Manager of the EHS&L function ensures that the NCS function is adequately staffed.

AREVA's NCS program objective is to prevent nuclear criticality accidents. It will accomplish this objective by a number of means, including:

1. Performing NCS analyses;
2. Ensuring that approved margins of subcriticality are maintained;
3. Establishing and maintaining limits and controls for IROFS;
4. Ensuring that sufficient IROFS are in place to prevent a nuclear criticality accident.
5. Providing appropriate NCS postings; and
6. Ensuring that personnel only perform actions that are in accordance with approved procedures.

The NRC staff has reviewed AREVA's management of the NCS program and finds that it is acceptable because AREVA has developed and is implementing and maintaining an NCS program that meets the applicable regulatory requirements of 10 CFR Part 70. NCS safety parameters and procedures are also established to ensure the effectiveness of the program.

5.3.3 NCS MANAGEMENT MEASURES

In the license renewal application, AREVA describes its Management Measures Program that includes training, procedures development and implementation, audits and assessments, configuration management, maintenance, and incident investigation/corrective action.

AREVA provides training to its workers to ensure that job performance will protect the health and safety of all AREVA personnel. AREVA's NCS training meets the intent of ANSI/ANS-8.20-1991, "Nuclear Criticality Safety Training," with many of the standard's requirements implemented through internal procedures. Employees receive general health and safety training, which includes criticality safety, prior to starting independent operations. Employees that routinely work with licensed materials receive annual refresher training that includes criticality safety. Employees are trained to recognize and respond to the criticality accident evacuation alarm.

AREVA commits in its license renewal application to provide written and approved procedures for all operations that are NCS pertinent. Procedures include standard operating procedures, standard work instructions, management control procedures, and maintenance instructions. NCS postings are approved by the NCS function is used in conjunction with operating

procedures. The NCS function approves all operating procedures, and procedure changes involving fissile material processing and storage. The NCS program also ensures that workers are trained to follow these procedures, report all suspect NCS conditions to the NCS function, and take no other action until NCS staff has evaluated the situation and provide recovery instructions.

The NCS staff will conduct periodic walkthroughs of the various process areas to determine that activities involving SNM are being conducted in accordance with the established NCS limits and controls. The frequency of these walkthroughs is based upon plant activity levels and safety performance.

NCS audits of the facility areas where fissile materials are processed or stored are conducted on a monthly basis such that each area of the plant is audited at least every two years. The objective of the audits is to verify that operations are in compliance with regulatory and license requirements. Audit findings of non-compliance are entered into a corrective action program.

An assessment of the effectiveness of the NCS program is conducted on at least a triennial basis. The assessment utilizes personnel who are independent of the NCS function; however some NCS personnel may also be utilized.

AREVA commits in its license renewal application to have a configuration management program that ensures that NCS requirements are maintained, and that changes that may impact them are evaluated prior to implementing the change. As part of the configuration management program, NCS controls are verified to fulfill the requirements specified in the NCS analyses prior to their use in a process. Processes are examined in the as-built condition by qualified personnel, to validate the safety design and to verify proper installation.

AREVA commits in its license renewal application to have maintenance programs that will ensure the availability and proper performance of features essential to the safe operation of its facility. Corrective and preventative maintenance will be applied to IROFS and other features important to safety. IROFS also undergo functional testing, surveillance and monitoring, as appropriate, to ensure their continued availability and reliability.

The NRC staff reviewed the commitments in AREVA's license renewal application with respect to NCS management measures and finds that they are acceptable because AREVA commits to: (1) provide training to personnel; (2) conduct activities involving SNM with written and approved procedures; (3) NCS walk-downs using a graded approach based on the ISA; (4) NCS audits such that all processes and all aspects of the program are audited within three years; and (5) the double contingency principle as it relates to procedures.

5.3.4 NCS Methodologies and Technical Practices

In its letter dated October 3, 2008, AREVA stated that it will document the basis for NCS in a peer reviewed and approved nuclear criticality safety analysis (NCSA) prior to the start of any activity with SNM. The NCSA will establish the parameter limits, controls, and management measures necessary to demonstrate that the subject activity meets the double contingency principle and is adequately subcritical under normal and credible abnormal conditions.

NCS implementation requirements for each activity using SNM are described in the nuclear criticality safety specifications (NCSSs). The limits and controls listed in the NCSSs are based on the applicable reviewed and approved NCSAs. Additional safety requirements not described in an NCSA may also be included in an NCSS.

5.3.4.1 NCS Methodologies

NUREG-1520 (NRC, 2002) states that ANSI/ANS-8.1-1983 is an acceptable standard as it relates to the validation of an applicant's methodology to demonstrate that the processes will remain subcritical. NUREG-1520 (NRC, 2002) states that an applicant should maintain a validation report documenting, among other things, its validation methodology, area of applicability, and determination of bias, uncertainty in the bias, and margin of subcriticality. The NRC staff previously reviewed AREVA's validation report as part of its consideration of AREVA's License Amendment 44 and found it acceptable (by letter dated May 3, 2005). In its license renewal application, AREVA specifically references this validation report, EMF-2670, "PC-SCALE 4.4a Validation." In its letter dated October 3, 2008, AREVA stated that it would notify the NRC, by letter, whenever this document is significantly changed, and include a description of the changes made. AREVA stated that it "considers changes other than editorial and routine updates for new code releases using the same methodology and benchmark experiments, to be significant changes." The NRC staff determined that this commitment met the intent of Section 5.4.3.4.1(7) in NUREG-1520 (NRC, 2002). Given that this had been reviewed previously, and that NRC would be apprised of any more than editorial changes, the NRC staff determined that a detailed review of the validation was not needed for the license renewal.

The NRC staff determined that AREVA's commitments in the license renewal application to perform and document the validation were consistent with ANSI/ANS-8.1-1998 (a newer version that has been endorsed by the NRC staff in Regulatory Guide 3.71), and therefore is acceptable to the staff. (A detailed discussion of AREVA's validation methodology is contained in NRC's SER for License Amendment 44).

In addition to computer codes, AREVA is permitted to make use of the peer-reviewed handbooks listed as references in Chapter 5 of the license renewal application, to determine criticality limits. AREVA stated that it limited the use of handbooks to those listed, which include many that are widely used and accepted throughout the nuclear industry (such as TID-7016 and TID-7028). While other, less widely known handbooks are listed, handbook limits are generally single-parameter limits known to be very conservative. One example would be a mass limit, which traditionally assumes worst-case spherical geometry, optimum moderation, and full reflection. The conservative nature of these assumptions ensures a large margin of subcriticality. In addition, because the margin of subcriticality may vary between handbooks, AREVA committed in its license renewal application to using approved safety factors to back off of critical values in handbooks. AREVA stated that the approved safety factors are those in Tables 5-1 and 5-2 of the license renewal application. The NRC determined that the combination of the use of conservative limits from peer-reviewed handbooks, combined with the safety factors in these tables, provides reasonable assurance that criticality limits, so derived, will ensure subcriticality. NUREG-1520 (NRC, 2002) states that the applicant should also include a margin of subcriticality that provides adequate allowance for uncertainty in the methodology, data, and bias, and that the margin should be large compared to the uncertainty in the calculated value of k_{eff}. AREVA states in Section 5.4.2.1 of the license renewal application that the maximum allowable k_{eff} will not exceed 0.95 for normal conditions or 0.97 for credible abnormal conditions "if justified by a sensitivity analysis." The NRC noted that a 0.95 limit for normal conditions is consistent with standard industry practices for well-benchmarked low-enriched uranium fuel processes. However, the NRC staff questioned what constituted an acceptable technical justification for the 0.97 limit for abnormal conditions, and requested AREVA to provide example sensitivity analyses. In its letter dated October 3, 2008, AREVA provided two examples of sensitivity analysis that it said justified the use of the 0.97 limit, and one example that showed that additional margin was needed. The first example was a sensitivity study of dry UO_2 powder in the Blended Low-Enriched Uranium storage racks, in

which the moisture content in the powder was varied. The sensitivity study showed that the moisture limit of 0.5% wt. would have to be exceeded by a factor of four before the k_{eff} limit of 0.97 is exceeded. The margin to criticality between powder with 0.5% wt. and 2.0% wt. moisture content is approximately 3.5% in k_{eff}. The second example was a sensitivity study of a pellet storage array, in which the pellet diameter and pitch were varied. The sensitivity study showed that, even at the optimum pellet diameter, pitch, and interstitial moderator level, the maximum k_{eff} did not exceed 0.95.

The counter-example was a sensitivity study for a slab tank containing saturated UO_2, in which the slab thickness was varied. The sensitivity study showed that a change in slab thickness of less than 0.25 inches would cause the calculated k_{eff} to increase from 0.95 to 0.97. Due to the potential for bulging from various mechanisms and geometric tolerances, AREVA determined that this case did not have sufficient margin. In the first two examples, the sensitivity studies showed that there was substantial margin in the system parameters being varied beyond the anticipated uncertainty. In the third example, the sensitivity study demonstrated that there was not sufficient margin. AREVA codified this distinction by adding this clarification to Section 5.4.2.1 of its license renewal application: "The documented justification accompanying this sensitivity analysis shall clearly discuss the sufficiency of the margin of subcriticality in terms of the parameters being controlled." The NRC determined that the above approach is consistent with the guidance in the NUREG 1520 to the effect that margin should be large compared to the uncertainty in k_{eff}. Therefore, use of these margins for normal and credible abnormal conditions is acceptable provided the above criteria are satisfied.

5.3.4.2 NCS Technical Practices

In its letter dated October 3, 2008, AREVA stated that it will ensure that sufficient IROFS are in place to render all credible nuclear criticality accident sequences at least highly unlikely (NCS RAI 13). The ISA will contain sufficient information, typically in the NCSAs, to demonstrate that this requirement is met. The ISA Summary includes the definitions of "credible" and "highly unlikely".

AREVA commits to the double contingency principle as defined in ANSI/ANS-8.1-1998. Thus, where practicable, process designs shall incorporate sufficient factors of safety during normal and credible abnormal conditions to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible. Double contingency is established by either controlling two or more independent process parameters (AREVA's preferred method), or by using multiple independent controls on a single process parameter.

AREVA considers the relative effectiveness and reliability of controls that are selected for NCS. In order of preference, the four types of NCS controls used at AREVA are passive engineered controls, active engineered controls, enhanced administrative controls, and administrative controls.

AREVA may control one or more of the following parameters for NCS purposes: (1) uranium mass; (2) moderator mass; (3) areal density; (4) surface density; (5) geometry; (6) density; (7) enrichment; (8) reflection; (9) moderation; (10) uranium concentration; (11) interaction; (12) spacing; (13) neutron absorbers; and (14) process parameters. The limits on controlled parameters are established by assuming that under credible abnormal conditions the uncontrolled parameters are at the most reactive credible condition, unless there is documented justification for using a less reactive condition based upon historical data or sound engineering determination. This includes consideration of heterogeneity. Some of the requirements for specifically controlled parameters are discussed in detail below; all requirements on the use of controlled parameters are specified in the license renewal application.

Mass: In its letter dated October 3, 2008, AREVA committed to revise its license application to clarify that workstations controlled by only fissile mass, where engineered controls do not prevent double batching, shall be limited to no more that 45 percent of the minimum critical mass, *assuming a spherical volume*, for the material in process.

Geometry: AREVA may use critical dimensions or volumes found in NRC endorsed ANSI/ANS Series-8 standards (see NRC Regulatory Guide 3.71) or peer reviewed handbooks to establish safe geometries. When such values are used the actual equipment dimensions shall be limited to 80 percent of the minimum critical sphere volume, 90 percent of the minimum critical infinite cylinder diameter, or 85 percent of the minimum critical infinite slab thickness.

Reflection: Critical parameters for units and arrays will be based on full water reflection, unless other nearby reflectors cause higher reactivity, or controls on reflection are established.

Concentration: Control of uranium concentration may be used when geometry controls are not practical. Concentration controls may be used for uranium dissolved in a solution or dispersed as a solid in some medium where there is no credible physical method that can concentrate the uranium. When a uranium concentration limit is used, it must be shown for all credible abnormal conditions that either k_{eff} does not exceed the subcritical limit (license renewal application Section 5.4.2.1), or the concentration limit does not exceed 50 percent of the relevant minimum critical concentration listed in a handbook. The credible abnormal conditions that must be considered include precipitation and other methods of concentrating uranium.

Interaction: AREVA commits to consider neutron interaction when evaluating controlled parameters for NCS. AREVA may consider equipment separated by a slab of water 30 cm thick, a slab of concrete equivalent to a slab of water 30 cm thick, or 365 cm of air to be neutronically isolated. AREVA may also exclude single transfer pipes, two-inch or less in diameter, from neutron interaction consideration. AREVA may not exclude in-transit material and arrays of transfer pipes from neutron interaction considerations. In its letter dated October 3, 2008, AREVA committed to revise its license renewal application to remove these items from its list of exclusions.

Neutron Absorbers: AREVA commits in its license renewal application to use ANSI/ANS-8.5-1996 when borosilicate glass Raschig rings are used for NCS purposes. AREVA commits to use ANSI/ANS-8.14-2004 if soluble neutron absorbers are used for NCS purposes. AREVA may also take credit for neutron absorbers added to SNM, provided that the quantity of absorber is confirmed to meet the required amount and it is ensured that the additive is uniformly distributed and will remain present in the SNM. AREVA's commitments are sufficient to meet the intent for fixed neutron absorbers. A detailed list specifying which license commitments implement each of the ANSI/ANS-8.21-1995 requirements was provided in AREVA's letter dated October 30, 2008.

AREVA commits in its license renewal application to meet the intent of ANSI/ANS-8.7-1998 for the storage of fissile material. A detailed list specifying which license commitments implement each of the standard's requirements was provided in AREVA's response letter dated October 30, 2008.

AREVA will meet the intent of ANSI/ANS-8.17-2004, "Criticality Safety Criteria for the Handling, Storage, and Transportation of [Light Water Reactor] LWR Fuel Outside Reactors," through its commitments in the license renewal application. A detailed list specifying which license commitments implement each of the standard's requirements was provided in AREVA's response to letter dated October 30, 2008.

The NRC staff reviewed the technical practices and finds that they are acceptable based upon AREVA's commitments to the double contingency principle and definition of the acceptability of controlled parameters used to define the criticality safety basis.

5.3.5 CRITICALITY ACCIDENT ALARM SYSTEM

AREVA commits in its license renewal application to maintain a Criticality Accident Alarm System (CAAS) that meets the requirements of 10 CFR 70.24(a)(1) and ANSI/ANS-8.3-1986, "Criticality Accident Alarm System". ANSI/ANS-8.3-1986 is not the most recent version of the standard. In 1992, AREVA evaluated compliance of the CAAS with ANSI/ANS-8.3-1986 and concluded that the CAAS complied with the subject standard. Updated versions of the ANSI/ANS-8.3 would not provide an increase in safety for the CAAS. Given AREVA's evaluation and the vintage of the CAAS, the NRC staff found that AREVA's compliance with ANSI/ANS-8.3-1986 is acceptable. AREVA will maintain documentation of the CAAS capability. The CAAS meets the applicable building codes that were in place when it was installed, is uniform throughout the facility, and is connected to emergency power. The alarm initiates immediate evacuation of the facility and will be clearly audible in areas that must be evacuated, unless an alternative means of personnel notification is provided.

The compensatory measures used when part of the CAAS is out of service include the use of continuously attended portable detection instrumentation, and the capability to issue area-wide emergency communication or an equivalent level of protection. Procedures used for testing and maintaining the CAAS shall include these compensatory measures when the activity results in the system being out of service. For unplanned CAAS outages, compensatory measures will be put in place in a timely manner. If compensatory measures are not put in place within four hours, AREVA will stop movement of SNM in the areas affected by the CAAS outage.

AREVA has an EP that is reviewed in Chapter 8 of this SER. The EP includes measures that AREVA will take to respond to an accidental nuclear criticality. These measures meet the intent of ANSI/ANS-8.23-1997, "Nuclear Criticality Accident Emergency Planning and Response". Dosimeters are provided to personnel who work in radiation areas and to emergency responders. Fixed criticality dosimeters are installed throughout the plant.

The NRC staff has reviewed AREVA's commitment to the CAAS requirements in 10 CFR 70.24, and finds that it is acceptable as AREVA maintains a CAAS that is capable of energizing a clearly audible alarm signal if criticality occurs. AREVA also maintains emergency procedures for each area in which SNM is handled, used, or stored to ensure prompt personnel evacuation upon the sounding of the alarm.

5.3.6 INTEGRATED SAFETY ANALYSIS

On October 25, 2007, the NRC issued a technical evaluation report that approved AREVA's ISA methodology and ISA summary. Thus, for this license renewal application, the NCS reviewer sought to verify that the ISA methodology had not changed since it was approved, and that the license renewal application contained the appropriate commitments regarding the methodology as described in Section 3.4.3.1 of NUREG-1520 (NRC, 2002).

In its letter dated October 3, 2008, AREVA committed to maintain an ISA Program as described in the ISA Summary approved by the NRC by letter dated October 25, 2007, or as subsequently approved. AREVA's original license renewal application requested that the ISA program be limited to areas that involve, or could impact, the safe handling of SNM in quantities greater than 1400 g of U-235. In its October 3, 2008, response to questions from the NRC staff, AREVA

committed to revise its license renewal application so that the ISA program would continue to apply to all quantities of SNM.

The NRC staff reviewed AREVA's commitment for its ISA Program, and determined that AREVA has not changed its methodology since it was approved by the NRC on October 25, 2007. The NRC staff also notes that any future changes to the ISA methodology would require prior approval by the NRC.

5.3.7 AUTHORIZATION AT REACTOR SITES

AREVA also requested authorization to possess fresh fuel assemblies and rods at reactor sites for the purpose of preparing them for transport off-site. In its letter dated October 3, 2008, AREVA committed to conduct operations in accordance with the reactor licensee's requirements. For such operations, AREVA has requested that it be exempt from the CAAS requirements of 10 CFR 70.24, provided that such an exemption does not conflict with any applicable reactor license requirements.

The NRC staff reviewed AREVA's request for an exemption to 10 CFR 70.24 when it conducts operations at reactor sites and finds them acceptable since AREVA must still meet the reactor licensee's requirements. Reactor licensees are not required to have a CAAS if they meet the criticality accident requirements of 10 CFR 50.68.

5.4 EVALUATION FINDINGS

The staff reviewed AREVA's NCS program for AREVA and has reasonable assurance that:

(1) AREVA has in place a staff of managers, supervisors, engineers, process operators, and other support personnel who are qualified to develop, implement, and maintain the NCS program in accordance with the facility organization and administration, and management measures.

(2) AREVA's conduct of operations is based on NCS methodologies and technical practices, which will ensure that the fissile material will be possessed, stored, and used safely according to the requirements in 10 CFR Part 70.

(3) AREVA has developed and is implementing and maintaining a criticality accident alarm system in accordance with both the requirements in 10 CFR 70.24 and the facility emergency management program.

(4) AREVA has in place an NCS program in accordance with the subcriticality of operations and margin of subcriticality for safety requirements in 10 CFR 70.61(d) and baseline design criteria requirements in 10 CFR 70.64(a).

Based on its review, the NRC staff concludes that the AREVA NCS program meets the applicable regulatory requirements of 10 CFR Part 70, and provides reasonable assurance for the protection of public health and safety, including workers, and the environment.

5.5 REFERENCES

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

(NRC, 2005a) U.S. Nuclear Regulatory Commission, Regulatory Guide 3.71, "Nuclear Criticality Safety Standards for Fuels and Material Facilities," Rev. 1, October 2005.

(NRC, 2005b) Letter from G. Janosko to R.E. Link, “Amendment 44-Framatome ANP, Inc. Clarification of Section 4.2.1 on Calculation of Maximum Allowable Neutron Multiplication Factors (TAC No. 31839),” (ADAMS Accession Number ML051020497).

(NRC, 2005c) U.S. Nuclear Regulatory Commission, “Safety Evaluation Report: Amendment 44-Calculation of Maximum Allowable Neutron Multiplication Factors,” (ADAMS Accession Number ML051150467).

(AREVA, 2006a) “License Renewal Application for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257,” October 24, 2006 (ADAMS Accession Number ML063110089).

(AREVA, 2006b) “Additional Information in Support of License Renewal Application for AREVA NP, Inc. Richland Fuel Fabrication Facility, License No. SNM-1227, Docket No. 70-1257,” December 13, 2006 (ADAMS Accession Number ML063530128).

(AREVA, 2008a) October 3, 2008, letter from R.E. Link to the U.S. NRC, “Request for Additional Information (RAI) Responses Pertaining to Nuclear Criticality Safety and Management Measures (Chapters 5 and 11, respectively, of License No. SNM-1227 Renewal Application),” (ADAMS Accession Number ML082840382).

(AREVA, 2008b) October 24, 2008, letter from R.E. Link to the U.S. NRC, “Revised Responses to Request for Additional Information (RAI) Item Nos. 21, 35 and 36 Pertaining to Criticality Safety (Chapter 5 of License No. SNM-1227 Renewal Application),” (ADAMS Accession Number ML083250253).

(AREVA, 2008c) October 30, 2008, letter from R.E. Link to the U.S. NRC, “Response to Request for Additional Information (RAI) Item No. 4 Pertaining to Criticality Safety (Chapter 5 of License No. SNM-1227 Renewal Application),” (ADAMS Accession Number ML083250252).

(AREVA, 2008d) August 27, 2008, letter from R.E. Link to the U.S. NRC, “Responses to Request for Additional Information (RAI) Item Nos. 31 and 32 Pertaining to Criticality Safety (Chapter 5 of License No. SNM-1227 Renewal Application),” (ADAMS Accession Number ML083250255).

(AREVA, 2008e) “Revised License Renewal Application Chapters for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257,” December 10, 2008 (ADAMS Accession Number ML090400202).

6.0 CHEMICAL SAFETY

The primary purpose of the chemical process safety review is to determine that AREVA has designed a facility that will adequately protect workers, the public, and the environment against chemical hazards of licensed material and hazardous chemicals produced from licensed material. AREVA must also protect against facility conditions or operator actions that can affect the safety of licensed materials and thus present an increased radiological or chemical risk.

6.1 REGULATORY REQUIREMENTS

The regulatory bases for this review are the general and additional contents of an application that addresses chemical-process safety, as required by 10 CFR 70.22, and 70.65. In addition, the chemical process safety review is intended to provide a determination of compliance with 10 CFR 70.61, 70.62, and 70.64.

6.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of chemical process safety for the proposed facility are outlined in Section 6.4.3 of NUREG-1520 (NRC, 2002).

6.3 STAFF REVIEW AND ANALYSIS

The NRC staff reviewed AREVA's application and the ISA Summary and considered the following areas:

1. Chemical Process Description;
2. Chemical Accident Sequences;
3. Chemical Accident Consequences;
4. Items Relied on for Safety (IROFS); and
5. Process Safety Management

The staff reviewed AREVA's ISA documents during an on-site visit, and responses to RAIs, to have a better understanding of the processes and safety requirements. The evaluation is summarized in the following sections.

6.3.1 PROCESS DESCRIPTION

The primary operation of the facility is the manufacture of nuclear fuel components for commercial light water reactors. The feed material is uranium hexafluoride (UF_6), which is converted into uranium dioxide (UO_2) powder via a "dry" conversion process. The powder is then pressed into pellets, which are sintered, sized, and loaded into zirconium fuel rods. These loaded rods, in conjunction with other supporting hardware, are assembled into a variety of assembly designs which vary based on customer requirements. The assemblies are then shipped to nuclear utilities for use as fuel in their reactors. Solid uranium-bearing feed material not amenable to the dry conversion process is recycled via the "wet" ammonium diuranate (ADU) conversion process. The liquid waste stream from the dry conversion process is condensed to produce a marketable hydrofluoric acid (HF) product.

The primary manufacturing activities are supported by a large number of production support activities including, but not limited to, materials storage, waste processing, analytical/physical testing, and facilities/equipment maintenance. Detailed information was provided in the chapters on the individual buildings, the Dry Conversion Facility, the UO_2 Building, and the Ventilation System.

Dry Conversion Facility

UF_6 is converted to UO_2 in the Dry Conversion Facility. Based on the review of ISA documentation, on-site visits, and follow-up inspections, the NRC staff finds that the features of the vaporization and powder production systems of the dry conversion facility provide reasonable assurance of adequate safety from hazardous chemicals.

UO_2 Building

The main processes conducted in the UO_2 building are: (1) conversion using the ADU process; (2) storage of uranium powder; (3) manufacturing of fuel pellets; (4) fuel assembly operations; (5) analysis of fuel components for quality and packaging purposes prior to shipment; (6) UO_2 powder and pellets recovery; and (7) wash of UF_6 cylinders in preparation for re-certification and shipment. In the ADU process, ammonium hydroxide is added to a uranium nitrate solution to form ADU. The ADU solids are concentrated using a centrifuge process. Then the ADU solids are calcined to form UO_2 powder. The washing of cylinders containing UF_6 heels is performed in order to recertify them and/or ship them outside the facility.

The NRC staff reviewed three accident sequences simulated for the UO_2 building, as described in the ISA Summary that resulted in personnel exposure to HF during cylinder wash operations. The NRC staff concluded that the accidents were caused by the: (1) improper connection of equipment; (2) loss of containment of cylinder wash solution; and (3) incorrect weight of heel. The NRC staff reviewed this information and concluded that the safety controls assigned to reduce the likelihood and consequences of the events in the UO_2 building provide reasonable assurance of adequate safety for protection against hazardous chemicals.

Ventilation Systems

Specific information regarding the Heating Ventilation and Air Conditioning (HVAC) system for each building was included in each process' ISA Summary. Chapter 18 of the ISA Summary contains information regarding the plant-wide ventilation system. The ventilation system includes primary high efficiency particulate air (HEPA) filters, ducting for the HEPA filters (upstream and downstream), pre-filters, and the final HEPA banks. The NRC staff has found that the ventilation system is adequate to provide reasonable assurance of adequate safety for protection against hazardous chemicals.

Process Description Conclusion

The NRC staff finds that AREVA has provided process descriptions that are sufficiently detailed to allow an understanding of the chemical process hazards.

6.3.1.1 Chemical Screening and Classification

AREVA identified the chemicals of concern based on one or more characteristics of the chemical, or the quantity in storage/use at the facility. For licensed materials or hazardous chemicals produced from licensed materials, the chemicals of concern are those that, in case of release, have the potential of exceeding any of the concentrations defined in 10 CFR 70.61(b) and 70.61(c).

AREVA provided a table of chemicals, regardless of jurisdiction (NRC or OSHA), including quantities and location, in Chapter 3 of the ISA Summary. In Chapter 7 of the ISA Summary, AREVA further identified hazardous chemicals (including those with low accident consequences) derived from licensed material.

AREVA provided a comprehensive list of concentrations and consequence categories in Appendix A in Chapter 8 of the ISA Summary.

6.3.1.2 Hazardous Chemicals and Chemical Interactions

UF_6 represents the primary chemical hazard in this facility. Any UF_6 that is released to the environment will react exothermically with water vapor present in air, producing uranyl fluoride (UO_2F_2) and HF. The chemical form and rate of reaction of the products of this reaction will depend on the temperature and the relative humidity of the air at the time of the release. UO_2F_2 is a solid whereas HF is a gas (see Eq. 1).

Eq. 1 $UF_{6(gas)} + 2H_2O_{(vapor)} \rightarrow UO_2F_{2(solid)} + 4HF_{(gas)} + Heat$

At room temperature, hydrated forms of UO_2F_2 and HF can be produced depending on the relative humidity in the air (see Eq. 2).

Eq. 2 $UF_{6(gas)} + (2+4x)H_2O_{(vapor)} \rightarrow UO_2F_2 \bullet H_2O_{(solid)} + 4HF_{(gas)} + Heat$

In both cases, UO_2F_2 compounds are deposited or precipitated close to the point of the release.

The NRC staff has determined that AREVA has adequately described chemical hazards and potentially hazardous chemical interactions.

6.3.2 CHEMICAL ACCIDENT SEQUENCES

The ISA Summary accident sequences addressed both intermediate- and high-consequence events. The NRC staff's review of the process and hazards involved did not identify any chemical accident sequences overlooked by AREVA. The staff concluded that AREVA has identified appropriate chemical accident sequences based on the use of an approved process hazards analysis method to identify those sequences and the results of the above staff review.

6.3.3 CHEMICAL ACCIDENT CONSEQUENCES

In Section 6.3.2 of the license renewal application, AREVA committed to the methods used in the ISA to estimate chemical quantitative consequences. Estimated chemical consequences for the bounding accident scenarios were based on maximum foreseeable inventories. These estimated chemical exposures were then compared to the chemical quantitative standards that AREVA identified in accordance with 10 CFR 70.65(b)(7). Chemical exposure calculations considered variables such as quantity, location, physical properties of the hazardous chemical, atmospheric conditions, and time of exposure. In addition, different assessment models were used to estimate the exposure of a hazardous chemical after a release. Industry experience, considered relevant to the facility, was integrated into the PHAs. AREVA stated that the Environmental Protection Agency's Emergency Prediction Information (EPI) software application was used to determine the chemical consequences of a UF_6 release. EPI estimates the downwind dispersion concentration of hazardous chemicals utilizing a Gaussian dispersion model and follows the guidelines in the EPA document, "Technical Guidance for Hazards Analysis-Emergency Planning for Extremely Hazardous Substances." The Areal Locations of Hazardous Atmospheres (ALOHA) code was also used. ALOHA was used to estimate the downwind concentration of ammonium hydroxide from the ADU process effluent tanks. EPA's Industrial Source Complex-Short Term (ISCST3) model was used to determine the chemical consequences from a release of nitrogen oxides from the dissolver offgas stacks. Both ALOHA

and ISCST3 use a Gaussian plume model to assess the downwind concentration of hazardous chemicals.

The models were applied using different meteorological conditions (i.e., Pasquill Categories A-F) and distances. AREVA stated that the assumed wind speed for Pasquill A and B was 4.5 meters per second (m/s), for Pasquill C and D was 3.15 m/s, and for Pasquill E and F was 1.5 m/s. The modeling results compared to the quantitative chemical standards assumed the maximized downwind consequence for different receptors.

Further, AREVA described the application of the Radiological Assessment System for Consequence Analysis (RASCAL) code to estimate the intake of uranium at various distances. The default parameters and meteorological conditions in RASCAL were used. For a release of liquid UF_6, a release fraction of 0.65 and a release rate of 32 kg/s were assumed. For UF_6 cylinders in a fire, a release fraction of one and a release rate of 8 kg/s were assumed.

AREVA developed in-house equations to determine the exposure to workers from a release inside a room. Material balances and dilution ventilation were used to develop these equations and determine exposures. The factors that determine the concentration in the room include the generation rate of the chemical of concern, the concentration in the air leaving the room, the concentration in the supply air, the volumetric ventilation rate, and time.

The NRC staff, based on the information available at the time of the ISA review and NUREG-1391 (NRC, 1991), "Chemical Toxicity of Uranium Hexafluoride Compared to Acute Effects of Radiation," determined that 40 mg of soluble uranium was in agreement with the definition of a high-consequence event as defined in 10 CFR 70.61(b)(4)(i), which states: "an acute chemical exposure to an individual from licensed material or hazardous chemicals produced from licensed material that: (i) could endanger the life of the worker..."

The 40 mg threshold for permanent kidney damage is the derived limit based on a systemic burden of 0.3 mg/kg body weight, which totals 21 mg for a 70 kg standard man, as referenced in Table 2 of page 3 in NUREG-1391 (NRC, 1991). Amendments 28 and 43 to license SNM-1227 authorize AREVA to calculate dose limits based on coefficients adopted by the ICRP and published in ICRP Publication Numbers 66 and 68. In developing the later models, it was recognized that the original model made overly conservative assumptions regarding uranium transportability from lung and gastrointestinal deposition to other areas within the body. Using the improved model in ICRP-66, the same systemic burden of 21 mg would require an intake of 75 mg of soluble uranium. AREVA stated in a letter dated July 10, 2007, that they will use 75 mg of soluble uranium as a quantitative standard to evaluate high consequences to the worker. This topic is under consideration by a working group of representatives from both the NRC and Industry.

The NRC staff finds that AREVA has identified and used appropriate methods and valid assumptions in estimating the consequences from identified chemical accident sequences, and that the consequences have been conservatively estimated.

6.3.4 ITEMS RELIED ON FOR SAFETY

6.3.4.1 Chemical Process Items Relied On For Safety

The ISA Summary described the accident sequences and the specific IROFS that are applied to prevent or mitigate the consequences of those accident sequences. The ISA Summary includes a separate chapter on each building analyzed, which describes the safety functions of all identified IROFS and the specific accident sequences for which each IROFS is applied. The

identified IROFS provide protection to prevent a loss of confinement of licensed material during operation at the facility. Based on this system level review and the NRC staff's on-site visit, the staff concluded that AREVA has identified chemical-process IROFS to prevent the consequences of accident sequences involving the chemical hazards of licensed material and the hazardous chemicals produced from licensed material.

AREVA provided information regarding chemical-process-safety IROFS identified for the facility. For chemical protection, 10 CFR 70.64(a)(5) states: "The design must provide for adequate protection against chemical risks produced from licensed material, facility conditions which affect the safety of licensed material, and hazardous chemicals produced from licensed materials." AREVA's design for the chemical process systems includes numerous controls, in addition to the IROFS, for maintaining safe conditions during operation. AREVA accomplishes this through several means, including selection and use of materials compatible with process chemicals; providing inherently safer operating conditions (e.g., vacuum systems); and providing process interlocks, controls, and alarms.

6.3.4.2 Management Measures

AREVA identified management measures that ensure the availability and reliability of chemical safety IROFS in both Chapter 11 of the license renewal application and Chapter 8 of the ISA Summary.

6.3.5 PROCESS SAFETY MANAGEMENT

6.3.5.1 Process Hazard Analysis

AREVA has performed a Process Hazards Analysis, which will be reviewed and updated every 5 years. The NRC staff reviewed the results of AREVA's HAZOP analysis as discussed in the ISA Summary. This method is widely used in the chemical industry, during the design phase, to identify operability and safety issues, and is identified as an acceptable method in NUREG-1513 (NRC, 2001). The HAZOP considered a variety of internal process, facility and external hazards that could breach the process and release licensed material and hazardous chemicals produced from licensed materials. The results of AREVA's ISA are presented in the ISA Summary, which contains information concerning the accident sequences identified as a result of the HAZOP, the unmitigated risk of each applicant identified accident sequence, and the IROFS applied to prevent or mitigate the accident sequence. The staff also reviewed selected high-consequence and intermediate consequence accident scenarios to confirm that chemical events that could exceed the performance requirements of 10 CFR 70.61 were addressed.

6.3.5.2 Contractors

In response to an inquiry by the NRC staff, AREVA confirmed that contractor personnel are required to complete both general site training and job-specific training prior to beginning work at the Horn Rapids Road facility.

6.3.5.3 Pre-startup Safety Review

In response to an inquiry by the NRC staff, AREVA confirmed that pre-startup safety reviews are performed in accordance with internal procedures, including reviews specified by the Engineering Change Notice procedure for new processes.

6.3.5.4 Mechanical Integrity

AREVA has identified a small number of mechanical components containing materials of construction that are important attributes for their capability to perform their safety function. Management measures are applied, as applicable, to ensure that they are replaced with like-kind components.

6.3.5.5 Maintenance

AREVA has a mature maintenance program in place and functioning that includes preventive and recurring (calibration) maintenance on safety-related mechanical components and instruments. Maintenance functions, including scheduling and documentation, are performed in accordance with approved procedures.

6.3.5.6 Training

In Chapter 11 of the license renewal application, AREVA committed to both general health and safety training and training relating to all IROFSs. The NRC's review of AREVA's Training Program is documented in Chapter 11 of this SER.

6.3.5.7 Procedures

In Chapter 11 of the license renewal application, AREVA committed to the use written procedures to ensure the safety of the licensed activities at the Richland FFF. These procedures include, but are not limited to: 1) chemical safety; 2) fire safety; and 3) emergency response. The NRC's review of AREVA's procedures is documented in Chapter 11 of this SER.

6.3.5.8 Audits and Assessments

In Chapter 11 of the license renewal application, AREVA committed to maintaining an audit and investigation program to assess activities important to safety and environmental protection. The NRC's review of AREVA's Audits and Assessment Program is documented in Chapter 11 of this SER.

6.3.5.9 Management of Change

In Chapter 11 of the license renewal application, AREVA committed to controlling the facility safety basis with a management of change program. The NRC's review of AREVA's Management of Change Program is documented in Chapter 11 of this SER.

6.3.5.10 Emergency Planning

In Chapter 8 of the license renewal application, AREVA committed to maintaining a current EP. The NRC's review of AREVA's EP is documented in Chapter 8 of this SER.

6.3.5.11 Incident Investigation and Corrective Actions

In Chapter 11 of the license renewal application, AREVA committed to implementing and maintaining an incident and corrective action program. The NRC's review of AREVA's Incident Investigation and Corrective Actions Program is documented in Chapter 11 of this SER.

6.4 EVALUATION FINDINGS

The staff evaluated the license renewal application using the criteria previously listed. Based on the review of the renewal application, the NRC staff has concluded that AREVA has described and assessed accident consequences that can result from the handling, storage, or processing of licensed materials, and that can potentially have significant chemical consequences and effects. AREVA has prepared a hazard analysis that identifies and evaluates those chemical process hazards and potential accidents, and established safety controls providing reasonable assurance of safe facility operation. To ensure that the performance requirements in 10 CFR 70.61 are met, AREVA has stated that controls are maintained, available, and reliable to perform their safety-related functions when needed. The NRC staff has reviewed these safety controls and AREVA's plan for managing chemical process safety and finds them acceptable. The staff concludes that AREVA's plan for managing chemical-process safety and chemical-process-safety controls meets the applicable requirements of 10 CFR Part 70, and provides reasonable assurance that public health and safety, and the environment will be protected.

Based on the above review, the NRC staff concluded that AREVA's chemical process safety program provides reasonable assurance of adequate protection against chemical risks produced from licensed material, facility conditions which affect the safety of licensed material, and hazardous chemicals produced from licensed material, and meets the requirements of 10 CFR 70.64(a)(5).

6.5 REFERENCES

(NRC, 1991) U.S. Nuclear Regulatory Commission, Draft NUREG-1391, "Chemical Toxicity of Uranium Hexafluoride Compared to Acute Effects of Radiation."

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

7.0 FIRE SAFETY

The purpose of this review is to determine, with reasonable assurance, that AREVA has: (1) designed a facility that provides adequate protection against fires and explosions that could affect the safety of licensed materials and thus present an increased radiological risk to workers and the public; (2) considered the radiological consequences of fires; and (3) instituted suitable safety controls to protect workers, the public, and the environment.

7.1 REGULATORY REQUIREMENTS

The regulatory basis for the fire safety review includes the general and additional contents of the application, as required by 10 CFR 70.22, and 10 CFR 70.65. In addition, the fire safety must provide reasonable assurance of compliance with 10 CFR 70.61, 70.62, and 70.64.

7.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of AREVA's fire safety program are outlined in Sections 7.4.3.1 through 7.4.3.5 of NUREG-1520 (NRC, 2002).

7.3 STAFF REVIEW AND ANALYSIS

7.3.1 FIRE SAFETY MANAGEMENT MEASURES

Fire safety management measures are described by AREVA in the license renewal application. These measures include a description of the fire safety organization; fire prevention program; inspection, testing, and maintenance of fire protection systems; emergency response organization, and pre-fire plan.

7.3.1.1 Fire Safety Organization

The EHS&L manager is the senior-level manager vested with the authority and staff to ensure the safe operations of the Richland FFF. The EHS&L manager reports to the Richland Site Manager and is independent of the Operations function.

The Operations manager is responsible for the day-to-day maintenance of fire safety in the plant production areas, including the provision of trained operators cognizant of fire safety and applicable fire safety-related IROFS. Through the maintenance function, the operations manager is also responsible for the periodic testing and maintenance of installed fire detection and suppression systems.

The manager of the Plant Projects Function is responsible for the engineering and installation of new/modified facilities and equipment and ensuring that these additions and modifications comply with codes, standards and regulations pertinent to fire safety. The manager of the Plant Projects Function manages the plant configuration management program, which ensures that plant changes are properly evaluated with respect to fire safety impact and then properly documented as part of the plant safety basis.

7.3.1.2 Fire Prevention

AREVA's fire prevention program consists of employee training, storage and handling of combustible liquids, control of hot work, fire safety inspections and a non-smoking policy. The facility also utilizes the following National Fire Protection Association (NFPA) codes as guidance in its fire prevention program:

1. NFPA 241 “Standard for Safeguarding Construction, Alteration, and Demolition Operations,” (NFPA, 2004*); and

2. NFPA 51B “Standard for Fire Prevention during Welding, Cutting, and Other Hot Work,” (NFPA, 2003*).

7.3.1.3 Inspection, Testing, and Maintenance of Fire Protection Systems

Preventive maintenance procedures are established for the inspection, testing, and maintenance of fire protection systems in accordance with applicable state and local fire codes. These procedures are applied to fire detection and warning systems, fixed fire suppression systems, portable fire extinguishers, and emergency power sources. Records of these activities are maintained on-site. NFPA 25, “Standard for Water Spray Fixed Systems for Fire Protections,” (NFPA, 2002*), is used as guidance for the inspection, testing, and maintenance of water-based fire suppression systems. NFPA 10, “Standard for Portable Fire Extinguishers,” (NFPA, 2002*), provides guidance for inspection and maintenance of portable fire extinguishers. NFPA 72, “National Fire Alarm Code,” (NFPA, 2002*), provides guidance for inspection and maintenance of fire detection and alarm systems.

7.3.1.4 Emergency Response Organization

AREVA maintains an emergency response organization/system that is appropriate for the potential emergencies at the Richland FFF, and their potential for adverse impacts to workers, the public and the surrounding environment. The EP, maintained in accordance with 10 CFR 70.22, outlines the facility’s overall emergency response program including, but not limited to, staffing, training, drills and exercises, response measures, and off-site agency coordination.

The facility maintains a Plant Emergency Response Team (PERT) who are trained in incipient fire fighting techniques. This training consists of:

1. Hands-on training regarding the use of fire extinguishers;
2. Self-contained breathing apparatus (SCBA) usage;
3. Incident command system;
4. Advanced first aid/employee decontamination;
5. Radiological and chemical field team procedures;
6. Spill response and decontamination related to hazardous materials; and
7. Facility re-entry/termination procedures

Typical PERT staffing for a normal dayshift is 15-20 members.

7.3.1.5 Pre-Fire Plan

AREVA maintains a pre-fire plan which is provided to, and meets the requirements of, the City of Richland, WA. Pre-fire plans are submitted to the City of Richland Fire Department and are evaluated in accordance with the guidance provided in NFPA 801, “Standard for Fire Protection for Facilities Handling Radioactive Materials,” (NFPA, 2003*).

Based on Sections 7.3.1.1 – 7.3.1.5 above, the NRC staff concludes that the license renewal application is consistent with the guidance in NUREG-1520, and that the facility meets the requirements of 10 CFR 70.22, 70.61, 70.62, 70.64, and 70.65 as they pertain to fire safety management measures.

7.3.2 FIRE HAZARDS ANALYSIS

A fire hazards analysis (FHA) is performed for the AREVA facility in order to assess the appropriate level of fire protection to ensure the safety of workers, the public and the environment from fire-induced radiological hazards. The facility contains SNM in sufficient quantities and in a form that, if released in a fire, could result in at least an intermediate consequence event as defined in 10 CFR 70.61. The FHA focuses on bounding fire scenarios for discrete fire areas within buildings and addresses fire loading, consequences of an unmitigated fire, and mitigative controls. FHAs are prepared in accordance with the guidance provided in NFPA 801, Annex B.

Fire hazards at the operational/process level are analyzed with respect to potential accident sequences, likelihoods, consequences, and the resultant risk. Potential accident sequences that could lead to an explosion or fire are controlled by the application of IROFS, if such sequences have the potential to create high or intermediate consequences, as defined in 10 CFR 70.61.

The NRC staff recognizes NFPA 801 (NFPA, 2003*) as one acceptable standard that provides guidance for conducting FHAs. Based on this, the NRC staff concludes that the license renewal application is consistent with the guidance in NUREG-1520 and that the facility meets the requirements of 10 CFR 70.22, 70.61, 70.62, 70.64, and 70.65 as they pertain to fire hazards analysis.

7.3.3 FACILITY DESIGN

The buildings and facilities at the AREVA site have been designed and built to the applicable national, state, and local building, electrical, and fire codes as required by the City of Richland Fire Marshall and Building Department at the time of their construction. In the building design, emphasis has been placed on minimizing combustible materials in the construction of facilities, provision and maintenance of effective intra-building fire barriers; and segregating non-radiological and radiological operations to the extent feasible. AREVA does not commit to the guidance provided in NFPA 801 (NFPA, 2003*) for the design of its facility. However, in addition to the codes cited previously, AREVA utilizes the guidance provided in the following NFPA codes to meet the intent of NFPA 801 (NFPA, 2003*):

1. NFPA 13 “Standard for the Installation of Sprinkler Systems,” (NFPA, 2002*);

2. NFPA 14 “Standard for the Installation of Standpipe and Hose Systems,”(NFPA, 2003*);

3. NFPA 15 “Standard for Water Spray Fixed Systems for Fire Protection,” (NFPA, 2001*);

4. NFPA 24 “Standard for the Installation of Private Fire Service Mains and Their Appurtenances,” (NFPA, 2002*); and

5. NFPA 80 “Standard for Fire Doors and Fire Windows,” (NFPA, 1999*).

In addition, the facility buildings that contain radioactive material are Type II non-combustible construction as specified by the Uniform Building Code, which meets the intent of NFPA 801, regarding building construction. The outdoor storage of combustible solids and flammable and/or combustible liquids is administratively limited by a plant safety requirement. Exterior building walls are not considered IROFS by AREVA.

The facility has provisions for collecting most of the contaminated wastewater that may result from fire fighting operations. This wastewater can be held up and monitored before discharge. Although the capacity for collection is relatively small, large amounts of water, as a result of fire fighting, are not expected. In the event that some contaminated water is not captured and flows outside the facility buildings, AREVA will take appropriate actions to protect the public and the environment.

Facility ventilation system HEPA filters meet ASME AG-1, "Code for Nuclear Air and Gas Treatment" (ASME, 2003), requirements for resistance to heated air and spot flames. Sections FC-5150 of ASME AG-1 (Resistance to heated air) requires the filter to survive exposure to air heated to 700 +/- 50 ºF for not less than 5 minutes and FC-5160 of ASME AG-1 (Spot flame resistance) requires the frame, filter media, filter pack, and sealing materials to survive a 2½" blue flame (1750 +/- 50 ºF) for 5 minutes.

Based on the above information, the NRC staff concludes that the license renewal application is consistent with the guidance in NUREG-1520, (NRC, 2002), and that the facility meets the requirements of 10 CFR 70.22, 70.61, 70.62, 70.64, and 70.65 as they pertain to facility design in regard to fire protection.

7.3.4 PROCESS FIRE SAFETY

AREVA's ISA Summary evaluates the special fire risks associated with:

1. Combustibles and flammable process chemicals;
2. Exothermic reactions of uranium oxides;
3. High temperature and/or high pressure equipment; and
4. Laboratory operations, including specialty laboratory equipment, hoods and chemicals.

AREVA identified dodecane, with a flash point of 165 ºF, as the only combustible liquid used in the Gadolinia Scrap Uranium Recovery Facility within the AREVA facility. A fire involving dodecane was determined to be a low consequence event and portable fire extinguishers, including wheeled units, are available for manual fire suppression. There are carbon dioxide, dry chemical and Metal X (class D) extinguishers on-site, along with capability for transportable aqueous film forming foam. In regard to potential fires in the HVAC system, HEPA filters (IROFS) are designed to withstand a temperature of 700ºF for at least 5 minutes.

To prevent chemical and/or radiological consequences that could exceed the 10 CFR 70.61 performance requirements, as a result of fires, the following automatic sprinkler systems were identified as IROFS:

1. Warehouse 2;
2. Area housing the Solid Waste Uranium Recovery (SWUR) incinerator within the SF Building; and
3. North end of Warehouse 6.

Specific IROFS also include fire doors/fire walls in the UO_2 Building, Specialty Fuels Building, Dry Conversion Facility, Engineering/Laboratory Operations Building, Warehouses 2/3 and Warehouses 6/6A.

Other elements of the site fire protection program which may be considered defense-in-depth features include:

1. Fire service provided by the City of Richland;

2. Redundant 10- and 12-inch water mains to plant;
3. Building construction in accordance with applicable codes;
4. Minimized utilization of combustible materials in building construction and modifications;
5. Controls for accumulation and storage of combustible and flammable materials;
6. Control of ignition sources;
7. Plant wide fire detection/alarm system;
8. Provision of appropriate portable fire extinguishers throughout the plant;
9. Trained 65 member plant emergency response team;
10. Strategic location of fire hydrants; and
11. Periodic fire safety inspections

Based on the above information, the staff concludes that the license renewal application is consistent with the guidance in NUREG-1520 (NRC, 2002) and that the facility meets the requirements of 10 CFR 70.22, 70.61, 70.62, 70.64, and 70.65 as they pertain to process fire safety.

7.3.5 FIRE PROTECTION AND EMERGENCY RESPONSE

Fire suppression needs, beyond incipient fire fighting, are supplied by the Richland Fire Department. The City of Richland Fire Department will supply truck and hose coverage. Water supply for suppression activities is supplied by two mains, which enter at opposite sides of the plant site and are fed from separate portions of the City of Richland water grid. Fire hydrants are located throughout the plant site in accordance with local fire code requirements. Although incident command responsibilities will be assumed by the Richland Fire Department during a major fire, there will be consultation with AREVA facility staff before moderators, such as water, are used for fire suppression.

The Richland FFF is covered by an electronically-supervised fire alarm system that alarms locally, and at the continuously manned central guard station, and at a remote facility that provides notification to the City of Richland. The alarm system contains smoke detectors, heat detectors, manual pull stations, water flow switches within fire sprinkler lines, and monitor switches from hydrogen detection systems. The fire alarm system may be powered from onsite emergency generators.

Based on the above information, the NRC staff concludes that the license renewal application is consistent with the guidance in NUREG-1520 (NRC, 2002) and that the facility meets the requirements of 10 CFR 70.22, 70.61, 70.62, 70.64, and 70.65 as they pertain to fire protection and emergency response.

7.4 EVALUATION FINDINGS

The NRC staff verified that the AREVA facility, as designed and operated, is consistent with the criteria in Chapter 7 of NUREG 1520. Therefore, the NRC staff concluded, with reasonable

assurance, that the facility meets the requirements of 10 CFR 70.22, 70.61, 70.62, 70.64, and 70.65 as they pertain to the fire safety aspects of the facility.

*The citations of the NFPA standards listed in this chapter are the latest versions in effect at the time the license renewal application was originally submitted by AREVA (October 24, 2006). The facilities at the Richland FFF were built, equipped, and modified over a period of 40 years. Therefore, citing a particular revision of the NFPA standard would not be practicable. AREVA complies with the NFPA standards pertaining to design, construction, and installation of fire protection systems and equipment, as specified by the City of Richland Municipal Code, which were in effect at the time a specific fire protection system or equipment was designed, built, or installed. The Richland Fire Marshall inspects and certifies the installation of fire protection systems and equipment. In the area of continuing programmatic activities, such as analysis, inspection, maintenance, testing, etc., AREVA uses recommendations provided by the most current applicable NFPA standards as guidance, provided that these recommendations are technically applicable. Compliance with the requirements specified by the City of Richland and, in electrical applications, the Washington Department of Labor and Industries, assures that the buildings and facilities at the Richland FFF are designed, constructed, operated, and maintained in accordance with the basic performance requirements of applicable NFPA standards.

7.5 REFERENCES

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

(AREVA, 2006a) “License Renewal Application for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257,” October 24, 2006 (ADAMS Accession Number ML063110089).

(AREVA, 2006b) “Additional Information in Support of License Renewal Application for AREVA NP, Inc. Richland Fuel Fabrication Facility, License No. SNM-1227, Docket No. 70-1257,” December 13, 2006 (ADAMS Accession Number ML063530128).

(AREVA, 2008a) October 2, 2008, letter from R.E. Link to the U.S. NRC, “Request for Additional Information (RAI) Responses Pertaining to Fire Safety and Environmental Protection (Chapters 7 and 9, respectively, of License No. SNM-1227 Renewal Application),” (ADAMS Accession Number ML082800187).

(AREVA, 2008b) “Revised License Renewal Application Chapters for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257,” December 10, 2008 (ADAMS Accession Number ML090400202).

8.0 EMERGENCY MANAGEMENT

The purpose of reviewing AREVA's Emergency Management Plan (EP) is to determine if AREVA has established adequate emergency management facilities and procedures to protect workers, the public, and the environment. AREVA's current EP document is E08-01-01, Rev. 3, and is divided into two parts. Part I is the actual EP and Part III includes the Emergency Plan Implementing Procedures.

8.1 REGULATORY REQUIREMENTS

The regulatory basis for the emergency management review is outlined in 10 CFR 70.22(i)(1)(ii) and 10 CFR 70.22(i)(3).

8.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of the emergency management plan are outlined in Section 8.4.3 of NUREG-1520 (NRC, 2002).

8.3 STAFF REVIEW AND ANALYSIS

8.3.1 FACILITY DESCRIPTION

AREVA submitted its EP on September 20, 2006. Section 1.2 of the EP contains descriptions of the licensed activity, the facility and the site, and the area near the site. The information in the EP includes:

1. A description of the processes;
2. A discussion of chemicals of concern, including form, physical state, location, and quantity;
3. A detailed description of the site location and layout;
4. A description of the major structures to be located at the site; and
5. A description of the ventilation systems, including stack heights, maximum flow rates, and filter efficiencies.

AREVA will maintain compliance with the "Emergency Planning and Community Right-to-Know Act of 1986." This is accomplished by conducting annual inventories; compiling the inventory information and providing it to the appropriate agencies, and advising or training construction and operating personnel regarding the marking, storage, and location of all hazardous chemicals, reporting accidental releases of these substances.

8.3.2 ONSITE AND OFF-SITE EMERGENCY FACILITIES

Section 6.0 of the EP contains descriptive information regarding the emergency response equipment and facilities. The primary Emergency Operations Center is adjacent to the Central Guard Station and will have current as-built drawings, procedures, and operational engineering information of the Richland FFF.

Off-site emergency support and equipment is described in Section 4.3 of the EP. This section also provides information regarding fire, emergency medical services, and local law enforcement. Support is available from a number of off-site agencies, if necessary, as discussed in Section 4.3.

Section 6.4 of the EP describes the emergency monitoring equipment that is available for personnel and area monitoring. This section also discusses: (1) personnel monitoring equipment; (2) liquid effluent monitors; (3) air monitors; and (4) a meteorological measurement system for wind speed, direction, and temperature.

Emergency equipment will be inventoried and tested on a monthly basis, as discussed in Section 7.6 of the EP. Section 6.2 of the EP describes the communication systems that will be used at the facility, which includes the facility telephone system and two-way radios that are powered by diesel-backed alternating current sources. The bandwidths of the radio systems will allow communication with the hospital, ambulance services, the fire department, and state, county, and local law enforcement agencies. The telephone system will be the primary means of off-site emergency communications.

8.3.3 TYPES OF ACCIDENTS

Section 2.0 of the EP identifies postulated events that have high and intermediate consequences. Accident sequences, as well as mitigating and preventive measures, are also described. **XXXX**. A consequence analysis has been performed for nuclear criticality scenarios and chemical release scenarios. The results of these analyses are provided in the ISA Summary.

8.3.4 CLASSIFICATION OF ACCIDENTS

Section 3.1 of the EP describes the system used to classify an emergency as either an Alert or a Site-Area Emergency, and defines both types of incidents. AREVA has established Emergency Action Levels corresponding with NRC Regulatory Guide 3.67 (NRC, 1992). The processes for making the appropriate classification are provided in the EP.

Tables 4, 5, and 6 of the EP provide examples of site-specific events and the emergency classification that will be declared for each event. An interim Plant Emergency Director is designated for off-shift periods, and is responsible for accident classification and assumes the responsibility of the Emergency Director until relieved by the Emergency Director or his designee.

8.3.5 DETECTION OF ACCIDENTS

Section 2.2 of the EP explains the methods and systems available to detect accidents at the facility, including:

1. Visual observation of fire or **XXXX**;
2. Automatic continuous air monitors;
3. Criticality event alarm systems; and
4. Automatic fire and smoke detectors

Action taken, in response to accidents, will be outlined in detailed procedures and implementation will be directed by the Plant Emergency Director.

8.3.6 MITIGATION OF CONSEQUENCES

Sections 5.3 and 5.4 of the EP describe actions and equipment that will be used to mitigate the consequences of accidents at the facility. Since the facility will operate with only natural and low-enriched uranium, there will be no radiological hazards that could likely result in significant off-site radiation doses. The major hazard would be **XXXX**. The main features used at the

facility, to mitigate the consequences of accidents, include automatic interruption or termination of specific operations, fire detection and suppression systems, operator response to abnormal conditions/alarms, and shutdown of the ventilation system, in case of **XXXX** or a criticality event.

8.3.7 ASSESSMENT OF RELEASES

Section 5.2 of the EP describes the actions that will be taken to assess the extent of an accident at the facility. In case of an Alert, dose projections of off-site radiation and hazardous material exposures will be made and provided to off-site emergency response agencies. Environmental air sampling will be performed off-site, if necessary. Projections of off-site radiation exposures will be based on the estimated amount released, the point of release, and the meteorological conditions at the time of the release, and will be performed using the RASCAL software (NRC, 2001).

8.3.8 RESPONSIBILITIES

The responsibilities of facility personnel during normal operations and during emergency situations are described in Sections 4.1 and 4.2, respectively, of the EP. In case of an emergency, the interim Plant Emergency Director assumes the duty of the Emergency Director until the Plant Emergency Director or designee arrives. Responsibilities of the Emergency Director include:

1. Coordinating the response;
2. Deciding whether to provide protective action recommendations to authorities responsible for off-site emergency measures (shall not be delegated);
3. Coordinating the staff and off-site personnel who augment the staff;
4. Approving information before release to the press;
5. Authority to request support from off-site agencies;
6. Authority to delegate responsibilities;
7. Directing prompt notification of local and state emergency organizations;
8. Directing assessment of on-site and off-site actual or potential consequences;
9. Implementing protective actions for on-site personnel; and
10. Downgrading/terminating the emergency.

Section 4.0 of the EP summarizes the responsibilities of the remaining on-site emergency staff. This includes the Liaison Officer, who will have a direct line of communication to the Plant Emergency Director, to ensure current and factual news releases. Other information concerning public and media access to information is included in Section 4.2 of the EP. Memoranda of Understanding have been established with local agencies and will be reviewed annually and renewed if necessary.

8.3.9 NOTIFICATION AND COORDINATION

As discussed in Section 8.3.4 of this SER, classification of emergencies is outlined in Section 3.1 of the EP and is the responsibility of the Plant Emergency Director. Section 3.2 of the EP provides a clear commitment to promptly notify offsite response organizations of an emergency, including notification to the NRC Operations Center. Sections 4.3 and 4.4 of the EP provide an adequate description of provisions for assistance from offsite response organizations. These sections adequately describe the agreements held between AREVA and local off-site organizations and agencies, procedures access to the site for these response organizations, and equipment/services available from these organizations.

As discussed previously, the Liaison Officer will have a direct line of communication to the Plant Emergency Director to ensure accurate current and factual news releases. Also, mutual aid agreements are in place to provide additional support if other services or equipment are not available.

As discussed previously, it is the responsibility of the Plant Emergency Director (or Interim for off shift periods) to: (1) declare an alert or site-area emergency; (2) activate the onsite emergency response organization; (3) notify off-site response authorities of an emergency and recommended initial protective actions; (4) notify the NRC Operations Center; (5) decide what onsite protective actions to initiate; (6) decide what off-site protective actions to recommend; (7) decide to request support from offsite organizations; and (8) decide to terminate the emergency or enter recovery mode.

8.3.10 Information to be Communicated

Section 3.3 of the EP provides an adequate description of the type of information to be given to off-site response organizations during an emergency. AREVA will use a standard form as a script to be used for initial notification of an emergency at the facility, to appropriate off-site facilities. In the event of a Site Area Emergency, a standard recommendation will be provided to off-site assistance organizations with more specific data, if available, as discussed in Section 3.3 of the EP.

8.3.11 Training

Section 7.2 of the EP provides a description of the training AREVA will provide to workers on how to respond to an emergency. All workers receive general employee training, which includes quality assurance; radiation protection (including the use of dosimetry and protective clothing); and safety, emergency, and administrative procedures. Training regarding criticality safety, radiation protection, and emergency procedures, specific to each type of job function is also provided under the nuclear safety training program. Emergency response personnel receive additional training to provide specific information about how the emergency organization responds during emergency conditions, including staffing, determining and estimating potential off-site releases of radiation and chemicals, and interfacing with offsite assistance organizations. This training is required before being assigned to the emergency organization and refresher training is provided at least once every year. The nuclear safety training program includes: (1) instructions to workers; (2) ALARA methods for controlling radiation exposures; (3) contamination control methods; (4) use of monitoring equipment; (5) emergency procedures and actions; (6) nature and sources of radiation; (7) safe use of chemicals; (8) biological effects of radiation; (9) use of personnel monitoring devices; (10) principles of nuclear criticality safety; (11) risk to pregnant females; (12) radiation-protection practices; (13) protective clothing; (14) respiratory protection; and (15) personnel surveys. Specific topics, performance objectives, content, training schedules, and the number of training hours required for each position are contained in the administrative procedures. The Emergency Preparedness Coordinator is responsible for emergency preparedness training. Individuals requiring unescorted access to the Controlled Access Area receive annual retraining. The Emergency Preparedness Coordinator ensures that the plan and procedures are reviewed and updated at least every two years to ensure that the programs are current and adequate. Facility tours and classroom training are also provided to offsite response organizations. The training includes: (1) information concerning facility access control; (2) potential accident scenarios; (3) emergency action levels; (4) notification procedures; (5) exposure guidelines; (6) personnel-monitoring devices; (7) communications; (8) contamination control; and (9) the role of the offsite assistance organization in responding to an emergency at the facility. Each group will meet at

least annually, with facility personnel, to complete this training and review items of mutual interest, including relevant changes to the program.

8.3.12 Safe Shutdown (recovery and facility restoration)

Section 9.0 of the EP states that, during an emergency, immediate action will be directed toward limiting the consequences of the incident to afford maximum protection to facility personnel and the general public. Once control of the facility has been reestablished, a systematic and planned approach to resume full facility operations will be taken.

8.3.13 Exercises and Drills

Section 7.3 of the EP provides adequate provisions for drills, exercises, and biennial exercises that are used to test the adequacy of procedures, emergency equipment, instrumentation, and to ensure all emergency response personnel are familiar and proficient with their duties. Post-drill and post-exercise evaluations will be conducted by those involved, and appropriate improvements will be implemented as necessary. Each exercise is evaluated according to Section 7.4 of the EP. Areas evaluated include the adequacy of the EP, procedures, equipment, facilities, personnel training, and overall response effectiveness. The Emergency Preparedness Coordinator is responsible for tracking deficiencies and ensuring that corrective actions are implemented and effective.

Off-site organizations are invited to participate in the biennial exercise and the NRC is invited to participate or observe. Exercise objectives and scenarios will be submitted to the NRC, for review and comment, at least 60 days before the exercise. Section 7.3 of the EP includes an adequate provision for quarterly communications checks, to verify the operability of initial notification points.

The NRC staff concluded that AREVA has developed and is implementing an effective EP for responding to radiological and chemical hazards associated with the accidental release of licensed material at the Richland FFF. As a result, safety condition S-2 in AREVA's license will be revised as follows:

S-2 The licensee shall maintain and execute the response measures in its Emergency Plan titled: "Emergency Preparedness - Part I - E08-01-1.0 Emergency Plan - Version 3.0 and Part III - E08-03-1.0 Emergency Plan Implementing Procedures - Version 2.0," dated September 20, 2006; or as further revised by the licensee consistent with 10 CFR 70.32(i).

8.4 EVALUATION FINDINGS

The NRC staff has evaluated AREVA's EP. In accordance with 10 CFR 70.22(i)(1)(ii), AREVA has established an EP for responding to the radiological hazards resulting from a release of radioactive material or hazardous chemicals relating to the processing of licensed material. The NRC staff reviewed AREVA's EP with respect to 10 CFR 70.22(i)(1)(ii), 70.22(i)(3), and the acceptance criteria in Section 8.4.3 of NUREG-1520 (NRC, 2002). The NRC staff concluded that AREVA's EP is adequate to demonstrate compliance with the regulatory requirements, in that: (1) the facility is properly configured to limit releases of radioactive materials in case of an accident; (2) a capability exists for measuring and assessing the significance of accidental releases of radioactive materials; (3) appropriate emergency equipment and procedures are provided on-site to protect workers against radiation and other chemical hazards that might be encountered after an accident; (4) a system has been established to notify Federal, State, and local government agencies and to recommend appropriate protective actions to protect

members of the public; and (5) necessary recovery actions are established to return the facility to a safe condition after an accident. The NRC staff approved AREVA's EP via letter dated May 14, 2007.

8.5 REFERENCES

(NRC, 1992) U.S. Nuclear Regulatory Commission, Regulatory Guide 3.67, "Standard Format and Content for Emergency Plans for Fuel Cycle and Materials Facilities," January 1992.

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

(AREVA, 2006) September 20, 2006, letter from R.E. Link to the U.S. NRC, "AREVA NP Inc. Emergency Preparedness - Part I - E08-01-1.0 Emergency Plan - Version 3.0 and Part III - E08-03-1.0 Emergency Plan Implementing Procedures - Version 2.0," (ADAMS Accession Number ML062860396).

(NRC, 2007) May 14, 2007, letter from the U.S. NRC to R.E. Link, "Approval of AREVA NP Inc.'s Submittal of the Revised Emergency Plan for the Richland Facility (TAC L32598)," (ADAMS Accession Number ML071310261).

9.0 ENVIRONMENTAL PROTECTION

The purpose of reviewing AREVA's Environmental Protection Program is to determine whether its proposed environmental protection measures are adequate to protect the environment, and the health and safety of the public, as required by 10 CFR Parts 20 and 70.

AREVA's environmental report was part of its license renewal request and was the basis for the EA and FONSI that the NRC staff previously prepared and issued in support of the proposed licensing action.

9.1 REGULATORY REQUIREMENTS

To be considered acceptable, AREVA must satisfy the following regulatory requirements regarding environmental protection:

1. 10 CFR Part 20 specifies the effluent control and treatment measures necessary to meet the dose limits and dose constraints for members of the public specified in Subparts B, D, and F, the survey requirements of Subpart F, the waste disposal requirements of Subpart K, the records requirements of Subpart L, and the reporting requirements of Subpart M.

2. 10 CFR 70.22(a)(7) states that the application shall contain a description of the equipment and facilities that will be used by AREVA to protect health and minimize danger to life or property (such as handling devices, working areas, shields, measuring and monitoring instruments, devices for the disposal of radioactive effluents and wastes, and storage facilities, etc.).

3. 10 CFR 70.22(a)(8) states that the application shall contain procedures to protect health and minimize danger to life or property (such as procedures for personnel monitoring and waste disposal, etc.).

4. 10 CFR 70.23(a) specifies, in part, that an application for the possession and use of SNM will be granted provided that, among other things, the applicant's equipment and facilities are adequate to protect health and minimize danger to life or property, and that the applicant's proposed procedures to protect health and minimize danger to life or property are adequate.

5. 10 CFR 70.59 outlines the radiological effluent monitoring reporting requirements for a Part 70 licensee.

6. 10 CFR 51.60(a) and (b)(1)(i) require that an applicant for a Part 70 renewed license submits an environmental report.

9.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of AREVA's environmental protection program are outlined in Section 9.4.3.2 of NUREG-1520 (NRC, 2002).

9.3 STAFF REVIEW AND ANALYSIS

The NRC staff reviewed AREVA's license renewal application and supplement to the Environmental Report (ER). Environmental data provided in the supplement to the ER included radioactive discharges to the city sewer from 2000 – 2005. The data included annual average concentrations for uranium and Technetium-99 and radioactive stack emissions, including environmental sampling data for soil, air and forage. The NRC staff also collected information

from local, State and other Federal government agencies regarding gaseous and liquid effluents and evaluated the impacts of AREVA operations on the affected environment. In addition, the NRC staff conducted a conference call with AREVA on September 29, 2008, to discuss the issues referenced in NRC's Request for Additional Information (RAI). In accordance with NUREG-1748 (NRC, 2003), the NRC staff evaluated direct, indirect, cumulative, short-term and long-term impacts of the proposed licensing activities on the affected environment, as well as other environmental resources; all these are adequately addressed in the EA.

AREVA described effluent control and treatment measures in their supplement to the ER. Additionally, the NRC staff reviewed the reports submitted by AREVA from 2003 through 2007 regarding plant effluents, pursuant to the requirements in 10 CFR 70.59. The NRC staff reviewed this information and determined that the reported plant emissions demonstrated compliance with the regulatory limits in 10 CFR Part 20, Appendix B. AREVA has adequate monitoring programs for gaseous, liquid and solid effluent streams from the plant, which includes sanitary sewer sludge sampling and environmental monitoring of vegetation and groundwater. Gaseous effluents, with potential concentrations of radioactive materials, are passed through at least one stage of HEPA filtration prior to their release via an exhaust stack. Most systems are provided with two banks of HEPA filters in series. Radiological contaminant monitoring at the point of emission is performed continuously during licensed material production. The ventilation system design restrains the spread of airborne contaminants, maintaining contaminated areas at negative pressures, in order to maintain radioactive airborne exposures below the regulatory limits. Gaseous effluents are monitored weekly for compliance with the concentration and public dose limits established in 10 CFR Part 20.

AREVA has established a waste management program that includes a wastewater treatment system, solid waste disposal and gaseous effluent monitoring program. Liquid process wastes are collected within the plant's wastewater treatment system. Their process wastewater management system provides the necessary treatment to assure compliance with the limits in Table 3 of 10 CFR Part 20, Appendix B. Regulated solid wastes and a small volume of liquid wastes are typically containerized for shipment to an off-site low-level radioactive waste disposal site. The NRC staff evaluated the environmental impacts associated with storage and/or transportation of AREVA's low-level radioactive and hazardous wastes. Aspects that were considered in the NRC's review are: (1) long-term disposal; (2) on-site storage, and (3) AREVA's waste reduction strategies. The NRC staff reviewed AREVA's program and procedures and concludes that AREVA has an adequate program to manage waste streams generated during fuel fabrication operations.

The NRC staff evaluated AREVA's program to keep radiological exposures and effluent levels ALARA. AREVA liquid effluents are maintained at ALARA levels by combining engineering controls, inspection/maintenance activities, and effluent monitoring. For radioactive liquid effluents, a treatment approach at the end of the processes is utilized to keep radioactivity levels below the regulatory limits and ALARA before the effluents leave the facility. AREVA's treatment process includes pH control, precipitation, filtration, and ion exchange. Certain liquid effluents, with higher uranium concentrations, as well as uranium recovered via end-of-process treatment techniques, are re-routed to uranium recovery processes for recycling into the plant's production lines. Utilization of the plant's dry conversion process for all gaseous UF_6 conversion constitutes an ALARA plan for chemical and radiological liquid effluents control. Several procedures and practices are used to minimize the generation of solid radioactive wastes, including: (1) limiting the introduction of unnecessary material into contamination-controlled areas, (2) evaluation of contaminated equipment and parts for potential re-use, (3) collection of certain contaminated metals for off-site recycling, and (4) practices to minimize the generation of contaminated HEPA filters. The NRC requested additional information on AREVA's procedures and practices to minimize waste generation over a period of 40 years. In AREVA's

RAI response, dated October 2, 2008, AREVA proposed the re-utilization of containers and drums, on-site and via transfer, to an off-site LLRW processor, and the volume reduction for contaminated wastes already generated. AREVA prevention plan includes: soil contamination through practices such as double containment of outdoor piping and tanks, minimization of underground lines carrying process effluents, and regular inspection of outdoor container storage areas. In addition to the ALARA philosophy, AREVA has a change control program in which reviewers evaluate changes to the facility's operations for potential environmental, health, and safety impacts.

AREVA minimizes the impact and possibility of an accidental release by confining hazardous radiological and non-radiological materials in closed systems within buildings, tank systems with double containments, and piping system periodic testing. The potential for future leaks or spills is diminished by implementing a chemical safety program and procedures designed to ensure the safe storage and handling of the material. Plant operating procedures and surveillance, environmental monitoring and preventive maintenance are safety programs that AREVA implements to avoid accidental releases to the environment. AREVA's environmental monitoring program includes, air, groundwater, surface water, sediment soil and vegetation sample collection and testing for radiological content. Mitigation plans are included when effluents exceed established limits.

Occupational health is maintained by a comprehensive radiation protection program that includes bioassay testing, engineering controls, personal protective equipment and respiratory protection. Vision, audiometric, physical exams and blood and urine testing and medical history tracking are some workplace evaluation and control programs implemented by AREVA to ensure safety of the employees and keep their doses ALARA.

The NRC staff concluded that AREVA's safety measures, procedures, equipment and facilities are adequate to protect health and minimize danger to life or property, and AREVA's proposed procedures to protect health and minimize danger to life; property and the environment are adequate.

9.4 EVALUATION FINDINGS

AREVA has committed to adequate environmental protection measures, including:
(1) environmental and effluent monitoring, and (2) effluent controls to maintain public doses ALARA, as part of the radiation protection program. The NRC staff has concluded, with reasonable assurance, that AREVA's conformance to the application and license conditions is adequate to protect the environment and the health and safety of the public, and complies with the applicable regulatory requirements imposed by the Commission in 10 CFR Parts 20, 51, and 70. The basis for these conclusions is as follows:

The NRC developed an EA as part of its review of this license renewal application. Based on this assessment, the NRC staff concluded that the proposed activities will not significantly increase the probability or consequences of accidents. No changes are being made in the types of effluents that may be released off-site and there is no significant increase in the amount of any effluent released off-site. In addition, there is no significant increase in occupational or public radiation exposure. Therefore, there are no significant radiological environmental impacts associated with the proposed activities. Accordingly, the NRC staff has concluded that there are no significant environmental impacts associated with the proposed action. On the basis of the EA, the NRC stated in its Federal Register Notice dated April 3, 2009 (74 FR 15312) that the preferred option was a FONSI.

9.5 REFERENCES

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

(NRC 2003) U.S. Nuclear Regulatory Commission (NRC), NUREG 1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," August 2003.

(AREVA, 2006a) "License Renewal Application for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257," October 24, 2006 (ADAMS Accession Number ML063110089).

(AREVA, 2006b) "Additional Information in Support of License Renewal Application for AREVA NP, Inc. Richland Fuel Fabrication Facility, License No. SNM-1227, Docket No. 70-1257," December 13, 2006 (ADAMS Accession Number ML063530128).

(AREVA, 2006c) "Supplement to Applicant's Environmental Report." Richland, Washington: AREVA NP, Inc., October 24, 2006 (ADAMS Accession Number ML063110087).

(AREVA, 2008b) Letter from R.E. Link to the U.S. NRC, "Request for Additional Information (RAI) Responses Pertaining to Fire Safety and Environmental Protection (Chapters 7 and 9, respectively, of License No. SNM-1227 Renewal Application)," (ADAMS Accession Number ML082800187).

(AREVA, 2008c) August 15, 2008, e-mail from L.J. Maas, "Response to Environmental Protection RAI No. 3," (ADAMS Accession Number ML090410530).

(NRC, 2008) October 28, 2008, Memorandum from R.L. Rodriguez to P. Habighorst, "Summary of Conference Call with AREVA-Richland to Discuss Request for Additional Information on Environmental Protection," (ADAMS Accession Number ML082970180).

(NRC, 2009) "Environmental Assessment for Renewal of U.S. Nuclear Regulatory Commission License No. SNM–1227 for AREVA NP, Inc. Richland Fuel Fabrication Facility" (ADAMS Accession Number ML090700258).

10.0 DECOMMISSIONING

The purpose of the review of AREVA's Decommissioning Funding Plan (DFP) is to determine that reasonable financial assurance will be available to decommission the facility safely and in accordance with the applicable NRC requirements.

10.1 REGULATORY REQUIREMENTS

The following NRC regulations require planning, financial assurance, and record-keeping for decommissioning, as well as procedures and activities to minimize waste and contamination:

10 CFR 70.22(a)(9)	"Decommissioning Funding Plan"
10 CFR 70.25	"Financial Assurance and Recordkeeping for Decommissioning"

10.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC's review of AREVA's DFP can be found in NUREG-1757, Vol. 3, "Consolidated Decommissioning Guidance," (NRC, 2003).

10.3 STAFF REVIEW AND ANALYSIS

In its license renewal application, AREVA discussed the use of a decommissioning funding plan (DFP). AREVA's DFP was submitted to the NRC on December 19, 2005. The NRC staff reviewed the document and found it acceptable on June 1, 2006. The DFP used a parent company guarantee as the financial assurance instrument to ensure that decommissioning funds would be available to support eventual remediation activities at the Richland FFF. On March 28, 2008, and April 29, 2008, AREVA submitted a Letter of Credit and a Standby Trust Agreement for NRC's review. The NRC staff had some questions regarding the language in the Standby Trust Agreement and discussed these questions with AREVA during a conference call on June 5, 2008. AREVA subsequently revised and submitted a new Standby Trust Agreement on August 21, 2008. The NRC staff reviewed this submittal and identified several inconsistencies with the format suggested in NUREG-1757, Volume 3 (NRC, 2003). The NRC staff held a conference call with AREVA on October 15, 2008, to discuss such inconsistencies. AREVA submitted a second revision to its Standby Trust Agreement on November 21, 2008. The NRC staff reviewed this second revision and found it consistent with the guidance in NUREG-1757, Volume 3 (NRC, 2003). The NRC staff concluded that AREVA's Letter of Credit and Standby Trust Agreement were acceptable via letter dated December 18, 2008, and that AREVA provided adequate financial instruments to ensure that funds will be available to support eventual remediation activities at the Richland FFF.

10.4 EVALUATION FINDINGS

The NRC staff reviewed AREVA's Letter of Credit and Standby Trust Agreement in accordance with NUREG-1757, Volume 3 (NRC, 2003). On the basis of this evaluation, the NRC staff concluded that AREVA's financial assurance for decommissioning is adequate and meets the regulatory requirements in 10 CFR 70.22(a)(9) and 70.25. Therefore, the NRC staff concluded that both submittals are acceptable.

10.5 REFERENCES

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

(NRC, 2003) U.S. Nuclear Regulatory Commission (NRC), NUREG-1757, Volume 3, “Consolidated Decommissioning Guidance-Financial Assurance, Recordkeeping, and Timeliness,” September 2003.

(NRC, 2006) June 1, 2006, letter from the U.S. NRC to R.E. Link, “Areva NP, Inc. - Amendment 46 - Application for increased U-235 Possession Limit and Name Change (TAC L31920 and L31937),” (ADAMS Accession Number ML060890456).

(AREVA, 2008a) March 28, 2008, letter from R.E. Link to the U.S. NRC, “Letter of Credit for Decommissioning Financial Assurance for the AREVA NP Inc. Richland, Washington Fuel Fabrication Facility (License No. SNM-1227, Docket No. 70-1257)” (ADAMS Accession Number ML081420593).

(AREVA, 2008b) April 29, 2008, letter from R.E. Link to the U.S. NRC, “Standby Trust Agreement in Support of Decommissioning Financial Assurance for the AREVA NP Inc. Richland, Washington Fuel Fabrication Facility (License No. SNM-1227; Docket No. 70-1257)” (ADAMS Accession Number ML081350245).

(AREVA 2008c) August 21, 2008, letter from R.E. Link to the U.S. NRC, “Revised Standby Trust Agreement in Support of Decommissioning Financial Assurance for the AREVA NP Inc. Richland, Washington Fuel Fabrication Facility (License No. SNM-1227; Docket No. 70-1257)” (ADAMS Accession Number ML082540193).

(AREVA, 2008d) November 21, 2008, letter from R.E. Link to the U.S. NRC, “Revised Standby Trust Agreement in Support of Decommissioning Financial Assurance for the AREVA NP Inc. Richland, Washington Fuel Fabrication (License No. SNM-1227; Docket No. 70-1257)” (ADAMS Accession Number ML083310709).

(NRC, 2008) December 18, 2008, letter from the U.S. NRC to R.E. Link, “Approval of AREVA NP Inc.’s Letter of Credit and Standby Trust Agreement in Support of Decommissioning Financial Assurance (TAC L32682),” (ADAMS Accession Number ML083510827).

11.0 MANAGEMENT MEASURES

Management measures are functions that AREVA performs, generally on a continuing basis, that are applied to IROFS to provide reasonable assurance that the IROFS are available and able to perform their functions when needed. Management measures will be implemented to ensure compliance with the performance requirements in 10 CFR 70.61, and the degree to which they will be applied will be a function of the item's importance in terms of meeting performance requirements, as evaluated in the ISA Summary. This chapter addresses each of the management measures included in the 10 CFR Part 70 definition of management measures, including: (1) configuration management (CM); (2) maintenance; (3) training and qualifications; (4) procedures; (5) audits and assessments; (6) incident investigations; (7) records management; and (8) other quality assurance (QA) elements.

The purpose of this review is to verify whether AREVA provided conclusive information to demonstrate that the management measures applied to IROFS, as documented in the ISA Summary, provide adequate assurance that the IROFS will be available and reliable, and consistent with the performance requirements of 10 CFR 70.61. If a graded approach is used, this review will also determine whether the measures are applied to the IROFS commensurate with the IROFS' importance to safety.

11.1 REGULATORY REQUIREMENTS

The requirements for fuel cycle facility management measures are specified in 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material."

1. 10 CFR 70.4 states that management measures include: (1) CM; (2) maintenance; (3) training and qualifications; (4) procedures; (5) audits and assessments; (6) incident investigations; (7) records management; and (8) other QA elements.

2. 10 CFR 70.62(a)(3) states that records must be kept for all IROFS failures; describes required data to be reported; and sets time requirements for updating the records.

3. 10 CFR 70.62(d) requires a licensee to establish management measures, for application to engineered and administrative controls and control systems that are identified as IROFS, pursuant to 10 CFR 70.61(e), to ensure they are available and reliable.

4. 10 CFR 70.72 requires a licensee to establish a CM program to evaluate, implement, and track changes to the facility, structures, systems and components, processes, and of personnel activities.

11.2 REGULATORY ACCEPTANCE CRITERIA

The acceptance criteria for the NRC staff's review of AREVA's management measures program are contained in Section 11.4.3 of NUREG-1520 (NRC, 2002).

11.3 STAFF REVIEW AND ANALYSIS

11.3.1 CONFIGURATION MANAGEMENT

In Section 11.1 of the license renewal application, AREVA describes CM as a formal review process that ensures that configuration changes do not adversely impact current implemented IROFS, or add new processes, components or systems that could pose an unacceptable risk. CM provides the commitment to capture the supporting documentation governing the design

and continued modification of the site structures, processes, systems, equipment, components, computer programs, personnel activities, and supporting management measures. AREVA commits to applying CM to IROFS regardless of safety significance. CM ensures consistency among facility design, operational requirements, physical configuration and documentation. Changes to facilities and processes are managed, controlled and evaluated in accordance to written procedures, and consistent with the requirements of 10 CFR 70.72.

The Richland Site Manager has the overall responsibility for CM. AREVA's program delegates the structure and key responsibilities between the following three functions: (1) the Plant Project function has the overall ownership of the plant's CM for facilities, equipment and software; (2) the EHS&L function will evaluate safety and licensing impacts of any modification or addition; and (3) the Fuel Operations function ensures that operational procedures and training are in accordance to the equipment, process and safety bases of the plant, and that they are maintained.

AREVA committed to maintaining a Configuration Control Program (CCP) to ensure that changes to the facilities, equipment, and software are evaluated prior to and after the changes have been made. The evaluation prior to the change implementation will determine if an NRC license amendment request is required, pursuant to 10 CFR 70.72. The CCP is implemented in accordance with approved written procedures that define the overall process for change control.

AREVA committed to perform periodic assessments to evaluate the program's effectiveness and to correct any deficiencies.

AREVA did not conduct a formal design reconstitution process prior to submitting its license renewal application. In its October 3, 2008, letter, AREVA stated that they confirmed that the facility design and construction were consistent with the ISA Summary. During a conference call between NRC and the AREVA staff on October 21, 2008, AREVA clarified that changes made to the facility did not affect the design requirements or safety basis of the facility. Any changes made to the facility were conducted by the responsible engineer and independently verified by an expert not directly involved with implementing the changes.

11.3.2 MAINTENANCE

AREVA states in Section 11.2 of the license renewal application that they established and are maintaining maintenance programs that ensure the availability and performance of the safety features essential to the Richland facility operation. The maintenance function is comprised of four components; they are: (1) corrective maintenance; (2) preventive maintenance; (3) functional testing; and (4) surveillance and monitoring.

Corrective Maintenance

In Section 11.2.1 of the license renewal application AREVA describes the corrective maintenance program. The corrective maintenance program provides a formal documented approach that ensures that the IROFS are properly repaired and restored as needed, in order to maintain the safety of the facility and the safety function of the system. The procedure requires that corrective maintenance be authorized, initiated and documented by trained personnel and appropriate coordination between the affected organizations is invoked. Moreover, the procedure includes an evaluation step for post-maintenance functional testing to determine if there are any IROFS that have been affected due to equipment failure or malfunction.

Preventive Maintenance

AREVA's preventive maintenance program is described in Section 11.2.2 of the license renewal application. It consists of two (2) components; they are: (1) preventive maintenance on equipment, and (2) instrument repetitive maintenance. Preventive maintenance on equipment and instrument repetitive maintenance are managed by formal approved programs for scheduling, initiation, tracking and documentation. The preventive maintenance program includes functional testing of IROFS specified within the applicable instructions.

The Preventive Maintenance/Instrument Repetitive Maintenance activities are performed by qualified personnel.

In its October 3, 2008, letter, AREVA discussed the frequencies for safety related preventive maintenance or instrument repetitive maintenance. The frequencies will be determined by the manufacturer's recommendation and past plant history of similar equipment. AREVA committed to evaluating equipment failure experience and new information to modify the equipment frequency needs accordingly. Frequencies are established by the EHS&L function. Any changes or modifications to preventive maintenance/instrument repetitive maintenance, including their frequencies, will require concurrence from the EHS&L function.

If a preventive maintenance or instrument repetitive maintenance is found to be non-functional or out of tolerance, the safety organization will be required to be notified in a timely manner.

Functional Testing

In Section 11.2.3 of the license renewal application, AREVA committed to conduct functional testing of maintenance activities. Functional Tests are performed in accordance with approved procedures and may be provided in conjunction with corrective maintenance, preventive maintenance or equipment installation/modification.

Surveillance/Monitoring

AREVA states, in Section 11.2.4 of the license renewal application, that any surveillance activity, such as PM, calibration, functional testing, and follow up to corrective maintenance, are established to monitor performance of the IROFS. Data obtained from IROFS failures will be entered into the Corrective Action Program for evaluation along with cause identification and assignment of any corrective actions required. Records showing current IROFS surveillance, performance, failures and corrective actions will be maintained.

11.3.3 Training and Qualifications

In Section 11.3 of the license renewal application, "Training and Qualifications," AREVA committed to providing training to personnel, commensurate with the assigned activities, in a manner that is protective of the health and safety of the employees, the public, and the surrounding environment. Trainings and qualifications will be conducted in a manner that complies with plant policies and procedures, regulatory requirements, and will ensure that only trained and qualified personnel will be assigned to perform work activities associated with specific process operations involving licensed materials. Trainings are grouped into a "general health and safety," and a "positions or activities affecting IROFS" training group. General Health and Safety training consists of radiation protection, criticality safety, emergency procedures, fire safety and chemical safety related to the licensed materials. The training requirements are established by the EHS&L function and are commensurate with the staff duties. Initial training is required to allow employees to access the areas containing licensed material and, in some

cases, to start on the job training. Employees receive initial and on the job training related to their position assignments (e.g., radiation protection, criticality safety, emergency procedures, fire safety and chemical safety related to the licensed materials). Periodic refresher trainings are required for employees that routinely work with licensed materials. Positions or activities impacting IROFS are evaluated for retraining/requalification and are included as part of the formal training program for the individuals. In its October 3, 2008, letter, AREVA committed to inform and instruct all employees affected by any changes made to the facilities, with regard to safety or emergency response requirements. Personnel working on positions/activities involving IROFS that prevent or mitigate accident sequences are also required to take training and be periodically re-qualified. The required process consists of either classroom or on-the-job activities including a combination of education/experience requirements, general employee training, initial qualification, continuing training and re-qualification.

The Richland Site Manager and pertinent line management are responsible for the content and effective conduct of the trainings. The training function is responsible for the development, implementation, and administration of plant training programs, including the maintenance of the plant training database. The implementation of the overall training and qualification program is governed by formal procedures to provide reasonable assurance that all phases are reliable and consistent. Programmatic and individual training records are created and maintained to allow verification of the training and qualification status of individuals. Training and qualification requirements, for positions impacting the availability and reliability of IROFS, will be assessed on a graded approach, considering hazards and the requirements associated with the position. The developmental basis for training, as stated in the license renewal application, is based on: (1) learning objectives, consisting of the knowledge, skills, and abilities that the trainee should demonstrate; (2) the conditions under which required actions will take place; and (3) the standards of performance achieved upon completion of the training activity. Formalized, reviewed and approved training materials such as instructor guides, lesson plans, or similar training tools ensure training consistency. Trainee accomplishments will be evaluated through a combination of observation/skills demonstration, written tests or oral interviews. On the job training is specified on the applicable position training requirements for activities that are relied on for safety and listed in the ISA Summary. The completion of the on-the-job training may be demonstrated by the actual task performance or task simulation. The effectiveness of the training program will be assessed periodically.

11.3.4 Procedures, Development and Implementation

In Section 11.4 of the license renewal application, AREVA committed to conducting its licensed activities, involving SNM, in accordance with approved procedures. Procedures are presented in several forms; they are: (1) standard operating procedures (SOPs); (2) standard work instruction (SWIs); (3) management control procedures (MCPs); and (4) maintenance instructions (preventive maintenance/instrument repetitive maintenance). AREVA has procedures in place for the different activities necessary to carry out the daily operations of facility, as well as abnormal events. These activities include, but are not limited to: (1) radiation protection; (2) chemical safety; (3) nuclear criticality safety; (4) fire protection; (5) inspection; (6) maintenance; (7) incident investigation; and (8) emergency preparedness and response.

New or revised safety-related procedures involving IROFS require formal review and approval of the EHS&L function. Formal administrative control procedures evaluate safety-related procedures development and implementation to ensure that the current revision is available to personnel in their corresponding working areas. The creation or revision of any safety-related procedure will require training to the affected personnel on the subject procedure. Changes or revisions covering licensed material operation will be evaluated in accordance with 10 CFR 70.72 as it relates to their potential impact to IROFS and the ISA. Temporary changes have a

formal process that describes the conditions for implementation and its review and approval requirements. Safety-related procedures will be periodically reviewed, with define review frequencies, grade based on importance to safety as part of a formal program.

11.3.5 Audits and Assessments

In Section 11.5 of the license renewal application, AREVA committed to implementing and maintaining a program of audits and assessments of activities that will affect the safety of the facility. The EHS&L Manager has the overall responsibility of the audits and assessments program, which include: (1) determining the appropriate personnel; (2) ensuring that the personnel have enough background, expertise and objectivity for a successful audit or assessment; and (3) ensuring that the findings are addressed in the corrective action plan.

AREVA states that audits are compliance-based activities to verify the compliance of operations with regulatory requirements and license commitments. AREVA commits to audit the areas of radiation protection, nuclear criticality safety, fire protection, environmental protection, hazardous chemical safety, emergency management, quality assurance, configuration management, maintenance, training and qualifications, procedures, incident investigations and records management. Audits are typically conducted by organizationally independent personnel, normally from the EHS&L function. In cases where full independence is not viable, the audit must be performed by personnel not directly involved with the activity being audited. Audits are conducted in accordance to written procedures, and the results are documented and maintained. Non-compliance audit results will be evaluated in the corrective action program.

AREVA states that assessments are conducted to verify the effectiveness of health, safety, and environmental compliance functions in achieving their design purposes. Assessments will be performed to activities under radiation protection, nuclear criticality safety, fire protection, environmental protection and hazardous chemical safety related to licensed material. Assessments are conducted by personnel independent of the area under review. The EHS&L function will determine the need for assessments in the areas of quality assurance, maintenance, procedures, incident investigations, and records management, in accordance with audits results in these areas. Any modifications to the assessment program, such as requirements for interim assessments, more frequent assessment, or the addition of safety areas to the program, will be at the discretion of the EHS&L manager.

11.3.6 Incident Investigation and Corrective Action

AREVA has implemented and maintains an integrated incident investigation and corrective action program for the identification, evaluation and reporting of safety-adverse incidents. The corrective action program ensures that abnormal events are properly evaluated, documented, reported, and that corrective actions applied are appropriate and tracked to completion. The corrective action program includes a prompt, risk-based evaluation, assigning a level of incident investigation or cause analysis, based on safety significance. Low safety significant events may be limited to application of the corrective action program. However, more significant events require formal investigation and analysis in accordance with the approved investigation or causal analysis procedure. Identification of cause, generic implications, corrective and preventive actions, documentation and approval requirements are defined within the procedure.

11.3.7 RECORDS MANAGEMENT

In Section 11.7 of the license renewal application, AREVA committed to establishing controls for managing records associated with its health, safety, and environmental activities. The records management program will ensure that records regarding safety bases/controls of AREVA's

facilities and processes are appropriately prepared, distributed, stored, protected, and, if necessary, restored. Current records are readily retrievable and historic records can be obtained within a reasonable time frame. Reconstructed records shall be identified.

AREVA committed to maintaining, for a minimum of two years, or as required by regulations or license commitments, the records documenting plant alterations or additions, abnormal occurrences involving licensed materials, events associated with radioactive releases, criticality safety analyses, audits, assessments, safety-related instrument calibrations and preventive maintenance, ALARA program results, worker training and retraining, personnel exposures, routine radiation surveys, environmental surveys, decommissioning plans and activities, emergency preparedness events/drills, and IROFS and/or management measures degradations or failures resulting from non-compliance with the performance requirements of 10 CFR 70.61.

11.3.8 OTHER QA ELEMENTS

In Section 11.8 of the license renewal application, AREVA committed to applying other quality assurance (QA) elements to IROFS. In its October 3, 2008 letter, AREVA committed to revising Section 11.8 of the license renewal application to describe and define other QA elements that will be applied to the safety program or to individual IROFS, as needed, on an individual needs basis.

11.4 EVALUATION FINDINGS

11.4.1 CONFIGURATION MANAGEMENT

The NRC staff has reviewed the Configuration Management (CM) function for the AREVA-Richland facility according to Section 11 of NUREG 1520 (NRC, 2002). The NRC staff reviewed the organizational structure, procedures, responsibilities to implement configuration management, the design requirements and bases, document and change control responsibilities and procedures, and assessments. AREVA has suitably and acceptably described its commitment to a proposed CM system, including the method for managing changes in procedures, facilities, activities, and equipment for IROFS. Management-level policies and procedures, including an analysis and independent safety review of any proposed activity involving IROFS, are adequately described in the license renewal application and provide reasonable assurance that consistency among design requirements, physical configuration, and facility documentation is maintained as part of a new activity or change in an existing activity involving licensed material. The management measures include the following elements of CM:

<u>CM Management</u>

The organizational structure, procedures, and responsibilities necessary to implement CM is in place or committed to.

<u>Design Requirements</u>

The design requirements and bases are documented and supported by analyses, and the documentation is maintained current.

Document Control

Documents, including drawings, are appropriately stored and accessible. Drawings and related Documents, captured by the system, are those necessary and sufficient to adequately describe IROFS.

Change Control

Responsibilities and procedures adequately describe how AREVA will achieve and maintain strict consistency among the design requirements, the physical configuration, and the facility documentation. Methods are in place for suitable analysis, review, approval, and implementation of identified changes to IROFS. This includes appropriate CM controls to assure configuration verification, functional tests, and accurate documentation for equipment or procedures that have been modified.

Assessments

AREVA has committed to an adequate function that includes both initial and periodic assessments as described in the acceptance criteria in NUREG 1520. The assessments are expected to verify and ensure the adequacy of the CM function.

Design Reconstitution (Existing Facilities Only)

No design reconstitution was conducted by the AREVA staff. Current design bases are available and verified for all IROFS, such that the configuration is consistent with the as-built facility documentation.

Based upon the staff's review of these areas, the NRC staff has concluded that the description, commitments and planned actions associated with these programs are acceptable and in compliance with the regulatory requirements in 10 CFR Part 70.

11.4.2 MAINTENANCE

AREVA has committed to an adequate maintenance of IROFS. AREVA's maintenance commitments contain the basic elements to maintain availability and reliability; they are: (1) corrective maintenance; (2) preventive maintenance; (3) functional testing; and (4) surveillance and monitoring. AREVA's maintenance function is proactive, using maintenance records, PM records, and surveillance tests to analyze equipment performance, and to seek the root causes of repetitive failures.

The surveillance or monitoring, PM, and functional testing activities described in the license renewal application provide reasonable assurance that the IROFS identified in the ISA Summary will be available and reliable to prevent or mitigate accident consequences.

The maintenance function: (1) is based on approved procedure; (2) employs work control methods that properly consider personnel safety, awareness of facility operating groups, QA, and the rules of CM; (3) uses the ISA Summary to identify IROFS that require maintenance and at what level; (4) justifies the preventive maintenance intervals in the terms of equipment reliability goals; and (5) creates documentation that includes records of all surveillance, inspections, equipment failures, repairs, and replacements of IROFS.

Based on this review, the NRC staff concluded that AREVA's maintenance function descriptions meet the requirements of 10 CFR Part 70, and provides reasonable assurance that AREVA will

implement an adequate maintenance program that ensures that IROFS will be available and reliable to perform their intended function when needed.

11.4.3 TRAINING AND QUALIFICATION

The staff's evaluation finds that AREVA's description of its training program appropriately covered: (1) training organization and management; (2) analysis and identification of activities/positions requiring training and its requirements; (3) training basis and objectives; (4) organization of instruction and training materials; (5) evaluation of trainee accomplishment; (6) conduct on-the-job training; (7) evaluation of training effectiveness; (8) personnel qualifications; and (9) personnel evaluations. Based on this evaluation, the NRC staff finds that AREVA's training program is acceptable.

Based on its review of AREVA's application, the NRC staff has concluded that AREVA has adequately described and assessed its personnel training and qualifications in a manner that: (1) satisfies regulatory requirements; (2) is consistent with the guidance in NUREG-1520 (NRC, 2002); and (3) is acceptable. There is also reasonable assurance that implementation of the training and qualification program described in the license renewal application will result in personnel who are qualified and competent to design, construct, startup, operate, maintain, modify, and decommission the facility safely. The NRC staff concludes that AREVA's plan for personnel training and qualification meets the applicable requirements of 10 CFR Part 70.

11.4.4 PROCEDURES

AREVA has described a suitably, detailed process for the development, approval, and implementation of procedures. The IROFS have been addressed, as well as items important to the health of facility workers and to the public, and to the protection of the environment. The staff's review concluded that the applicant's plan for procedures meets the requirements of 10 CFR Part 70.

11.4.5 AUDITS AND ASSESSMENTS

The NRC staff has reviewed AREVA's implementation process used to describe the internal audit and independent assessment program requirements. The audits and assessments program description considers structure, facility procedures, personnel qualifications, plan and documentation of corrective actions. The audits will verify compliance with regulatory requirements and license commitments.

Based on its review of the license renewal application, the NRC staff has concluded that AREVA has adequately described its audits and assessments program. The NRC staff also reviewed AREVA's plan for audits and assessments and finds the plan to be acceptable, as it provides reasonable assurance of protection of the health and safety of the public, workers, and the environment.

11.4.6 INCIDENT INVESTIGATIONS

AREVA has committed in its license renewal application to and established an organization responsible for: (1) performing incident investigations of abnormal events that may occur during operation of the facility; (2) determining the root cause(s) and generic implications of an event; and (3) recommending corrective actions for ensuring a safe facility and safe facility operations, in accordance with the acceptance criteria of Subsection 11.4 of NUREG-1520 (NRC, 2002).

AREVA has committed in its license renewal application to monitoring and documenting corrective actions through to completion, and to the maintenance of documentation related to incident investigations.

Accordingly, the NRC staff concluded that AREVA's description of the incident investigation process complies with applicable NRC regulations, and is acceptable.

11.4.7 RECORDS MANAGEMENT

The NRC staff has reviewed AREVA's records management system against the NUREG-1520 (NRC, 2002) acceptance criteria. Based on the staff's review, the NRC staff has concluded that the system: (1) will be effective in collecting, verifying, protecting, and storing information regarding the facility and its design, operations, and maintenance, and will be able to retrieve the information in readable form for the designated lifetimes of the records; (2) will provide a records storage area(s) with the capability to protect and preserve health and safety records that are stored there during the mandated periods, including protection of the stored records against loss, theft, tampering, or damage during and after emergencies; and (3) will provide reasonable assurance that any deficiencies in the records management system or its implementation will be detected and corrected in a timely manner.

11.4.8 OTHER QA ELEMENTS

Based on the NRC staff's review of the license renewal application, AREVA demonstrated an adequate application of other QA elements, as applied to IROFS, for design, construction, and operations. The NRC staff's review of these areas has concluded that AREVA has adequately defined and described the application of other QA elements (and the applicable QA elements of its principal contractors).

The NRC staff concludes further that:

1. AREVA has established an organization responsible for developing, implementing, and assessing the management measures to provide reasonable assurance of safe facility operations in accordance with the criteria in Section 11.4 of NUREG 1520.

2. AREVA has established and documented a commitment in the license renewal application to QA elements, and the administrative measures for staffing, performance, assessing findings, and implementing corrective action.

3. AREVA has developed a process for the preparation and control of written administrative plant procedures, including procedures for evaluating changes to procedures, IROFS, and tests. A process for review, approval, and documentation of procedures will be implemented and maintained.

4. AREVA has established and documented surveillances, tests, and inspections to provide reasonable assurance of satisfactory, in-service performance of IROFS. Specified standards or criteria, and testing steps have been provided.

5. Periodic independent audits are conducted to determine the effectiveness of the management measures. Management measures will provide for documentation of audit findings and implementation of corrective actions.

6. Training requirements have been established and documented to provide employees with the skills to perform their jobs safely and properly. Management measures have been

provided for the evaluation of the effectiveness of training against pre-determined objectives and criteria.

7. The organizations and persons performing QA element functions have the required independence and authority to effectively carry out their QA element functions without undue influence from those directly responsible for process operations.

8. QA elements cover the IROFS, as identified in the ISA Summary, and measures are established to prevent hazards from becoming pathways to higher risks and accidents.

Accordingly, the NRC staff concludes that AREVA's application of other QA elements (and the applicable QA elements of its principal contractors) meets the requirements of 10 CFR Part 70, and provides reasonable assurance of adequate protection to the public health and safety, and the environment.

11.5 REFERENCES

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

(AREVA, 2006a) "License Renewal Application for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257," October 24, 2006 (ADAMS Accession Number ML063110089).

(AREVA, 2006b) "Additional Information in Support of License Renewal Application for AREVA NP, Inc. Richland Fuel Fabrication Facility, License No. SNM-1227, Docket No. 70-1257," December 13, 2006 (ADAMS Accession Number ML063530128).

(NRC, 2008) October 22, 2008, Memorandum from R.L. Rodriguez to P. Habighorst, "Summary of Conference Call with AREVA-Richland to Discuss Request for Additional Information on Management Measures," (ADAMS Accession Number ML082950594).

(AREVA, 2008a) October 3, 2008, letter from R.E. Link to U.S. NRC, "Request for Additional Information (RAI) Responses Pertaining to Nuclear Criticality Safety and Management Measures (Chapters 5 and 11, respectively, of License No. SNM-1227 Renewal Application)," (ADAMS Accession Number ML082840382).

(AREVA, 2008b) "Revised License Renewal Application Chapters for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257," December 10, 2008 (ADAMS Accession Number ML090400202).

12.0 MATERIAL CONTROL AND ACCOUNTING

The purpose of the review of AREVA's Fundamental Nuclear Materials Control (FNMC) Plan is to determine whether AREVA has an adequate program in place for general reporting, recordkeeping, and material control and accounting (MC&A) of SNM for the AREVA FFF.

12.1 REGULATORY REQUIREMENTS

To be considered acceptable, AREVA must satisfy the regulatory requirements regarding MC&A, pursuant to 10 CFR 70.32(c)(1)(iii), and 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material."

12.2 REGULATORY ACCEPTANCE CRITERIA

The FNMC Plan is acceptable if it describes methods for achieving the performance objectives of paragraphs (1) through (3) of 10 CFR 74.31(a), and the system capabilities in 10 CFR 74.31(c). In addition, NUREG-1065, Revision 2, (NRC, 1995), "Acceptable Standard Format and Content for the Fundamental Nuclear Material Control (FNMC) Plan Required for Low-Enriched Uranium Facilities," provides guidelines for implementing an effective MC&A program at fuel cycle facilities.

12.3 STAFF REVIEW AND ANALYSIS

In accordance with 10 CFR 70.32(c)(1)(iii) and 70.34, AREVA submitted a revised version of its FNMC Plan for its Richland FFF on June 27, 2006. This document is now known as document E07-01-001, and it supersedes a previous version of the FNMC Plan known as EMF-12(P), which was dated December 18, 2003 and approved by the NRC staff on May 25, 2004. Upon adoption, by AREVA, of a new document control application software system, known as *Documentum*, EMF-12(P) became Version 1.0 of the FNMCP while document E07-01-001 became Version 2.0.

Version 2.0 of the FNMC Plan included revisions to Chapter 1.0 in the following areas:

1. Functional Description (Section 1.1.1) - This section now indicates that the Vice President of Manufacturing has the ultimate responsibility for safeguarding SNM at the Richland site.

2. Staffing (Section 1.1.2) - The Manager of EHS&L reports to the Richland Site Manager independently of the operations organization, which ensures independence of action and objectivity of decisions.

3. Position Descriptions (Section 1.1.4) - Changes to this section clarified the responsibilities and minimum qualifications for the Manager of EHS&L (which includes developing and monitoring the Richland site safeguards program), the Manager of Licensing and Compliance, the staff Specialist - Safeguards, the Manager of Analytical Services, and the Statistics/Safeguards Consultant.

4. Special Nuclear Material Custodians (Section 1.2.1.1) - **XXXX**

5. Training Program (Section 1.3) - This section now states that training for custodians is largely accomplished **XXXX**.

6. Listing of Critical Procedures (Table 1-1) - This table now includes the *Documentum* identification number for each procedure and the associated responsible organization.

AREVA also revised every page of the previous revision to reflect the new document name (E07-01-001), the new version (Version 2.0), and the new name of the facility's parent company (AREVA NP, Inc.). Finally, numerous pages had changes reflecting new procedure numbers that resulted from the migration to the *Documentum* system.

AREVA's current license references a total of five Safeguards Conditions for the MC&A program, and consists of the following:

SG-1.1: This license condition requires AREVA to follow the chapters for the current revision of the facility's FNMC Plan. This condition should remain in the license.

SG-1.2: This condition allows AREVA to have a limited exception in measurement practices with regard to receipt of returned encapsulated fuel rods and/or fuel assemblies. This condition should remain in the license for those special material receipts.

SG-1.3: This condition discusses specific actions associated with a special shutdown and cleanout physical inventory. This condition should remain in the license.

SG-1.4: This condition affirms the necessary licensing approval for any safeguards plan and/or operations which are not described in the FNMC Plan identified in Condition SG-1.1. This condition should remain in the license.

SG-1.5: This condition granted a temporary exemption from the requirements in 10 CFR 74.31 (c)(5) for completing the annual SNM physical inventory. This condition expired on August 22, 2003, and should be removed from the license.

The NRC staff has determined that Version 2.0 of AREVA's FNMC Plan meets the regulatory requirements in 10 CFR 70.32(c)(1)(iii), and AREVA continues to provide an effective MC&A program at the Richland FFF.

12.4 EVALUATION FINDINGS

The NRC staff has concluded that AREVA has provided an acceptable FNMC Plan for its Richland FFF, which meets the applicable 10 CFR Part 74 requirements. Version 2.0 of AREVA's FNMC Plan describes acceptable methods for achieving the performance objectives in 10 CFR 74.31(a), and the system capabilities in 10 CFR 74.31(c). As a result, the NRC staff concludes that AREVA meets the requirements to operate its Richland FFF, under 10 CFR Part 74. The NRC staff approved Version 2.0 of AREVA's FNMC Plan via letter dated October 13, 2006.

12.5 REFERENCES

(NRC, 1995) U.S. Nuclear Regulatory Commission, NUREG-1065, Revision 2, "Acceptable Standard Format and Content for the Fundamental Nuclear Material Control Plan Required for Low-Enriched Uranium Facilities," December 1995.

(NRC, 2006) October 13, 2006, letter from the U.S. NRC to R.E. Link, “AREVA NP Inc., Amendment 47 - Updated Fundamental Nuclear Material Control Plan (TAC L31965)” (ADAMS Accession Number ML062760131).

13.0 PHYSICAL PROTECTION AND PHYSICAL SECURITY

13.1 REGULATORY REQUIREMENTS

Each licensee who possesses or uses 10 kg or more of SNM of low strategic significance must submit a physical security plan describing how the licensee will comply with all the requirements of 10 CFR 73.67(c) - (g).

13.2 REGULATORY ACCEPTANCE CRITERIA

AREVA used Regulatory Guide 5.59 as guidance to write its Physical Protection Plan (PPP). The NRC reviewers used 10 CFR 73.67(f) "Fixed Site Requirements for SNM of Low Strategic Significance" and NUREG-1615 (NRC, 1999), "Physical Protection Requirements for Categories I, II and III Material at Fuel Cycle Facilities" to review AREVA's PPP. NUREG-1615 (NRC, 1999) describes the requirements in 10 CFR 73.67.

13.3 STAFF REVIEW AND ANALYSIS

On April 13, 2006, AREVA submitted Version 2.0 of AREVA's PPP for its Richland FFF to the NRC staff. The submittal represents a complete re-write of AREVA's January 22, 1998, PPP and reflects the additional security measures added to the facility after the issuance of the CAT III Order on October 3, 2002. The changes included procedural, administrative, and physical security additions. The NRC staff conducted a review of Version 2.0 of AREVA's PPP and requested additional information from AREVA by letter dated August 5, 2006. AREVA provided responses to the request in a letter dated September 22, 2006. The NRC staff reviewed the responses and found them to be adequate to address the issues raised in the subject letter. On October 20, 2006, AREVA submitted Version 3.0 of its PPP, which incorporated the responses provided in AREVA's September 22, 2006, letter. The revised PPP also reflected AREVA's name change from Framatome to AREVA NP, Inc, which became effective on June 1, 2006.

The revised PPP states that AREVA will meet the criteria in 10 CFR 73.67(f) for the physical protection of activities for which the facility is licensed. Numerous changes were made to comply with the CAT III Order issued to AREVA. This PPP was submitted under the provisions of 10 CFR 70.32(e), which does not require NRC approval prior to implementation, in that the changes would result in no decrease in the effectiveness of AREVA's PPP.

AREVA's current license references two Safeguards Conditions for the physical protection program, and consists of the following:

SG-2.1: This license condition requires AREVA to follow the chapters for the current revision of the facility's PPP. This condition should remain in the license.

SG-2.2: This condition requires AREVA to ensure that the UO_2 building is locked if the building is not occupied. This condition should remain in the license.

13.4 EVALUATION FINDINGS

The NRC staff concluded that the changes incorporated into Version 3.0 of AREVA's PPP, will not decrease its security effectiveness as required in 10 CFR 70.32(e). Furthermore, the NRC staff has determined that the requested actions should have no adverse affect on the public health and safety, the common defense and security, or the environment. Therefore, the NRC staff concluded that Version 3.0 of AREVA's PPP, submitted by letter dated October 20, 2006,

contains the necessary information to meet the regulatory requirements in 10 CFR 73.67(c)-(g), and is found acceptable. The NRC reviewed AREVA's PPP and found it acceptable via letter dated November 2, 2006.

13.5 REFERENCES

(NRC, 1983) U.S. Nuclear Regulatory Commission, Regulatory Guide 5.59, "Standard Format and Content for a Licensee Physical Security Plan for the Protection of Special Nuclear Material of Moderate or Low Strategic Significance," February 1983.

(NRC, 1999) U.S. Nuclear Regulatory Commission, NUREG-1615, "Physical Protection Requirements for Categories I, II and III Material at Fuel Cycle Facilities," March, 1999 (ADAMS Accession Number ML023160218).

(NRC, 2006) June 1, 2006, letter from the U.S. NRC to R.E. Link, "Areva NP, Inc. - Amendment 46 - Application for increased U-235 Possession Limit and Name Change (TAC L31920 and L31937)," (ADAMS Accession Number ML060890456).

(AREVA, 2006a) April 13, 2006, letter from R.E. Link to the U.S. NRC, "Submittal of Physical Protection Plan for SNM for Low Strategic Significance for AREVA NP Inc.'s Richland, Washington Fuel Fabrication Facility; License No. SNM-1227; Docket No. 70-1257" (ADAMS Accession Number ML061290168).

(AREVA, 2006b) August 5, 2006, letter from R.E. Link to the U.S. NRC, "Request for Additional Information for AREVA NP, Inc., Richland, Physical Protection Plan for Special Nuclear Material for Low Strategic Significance (TAC L31951)" (ADAMS Accession Number ML062220673).

(AREVA, 2006c) October 20, 2006, letter from R.E. Link to the U.S. NRC, "Submittal of Physical Protection Plan for SNM for Low Strategic Significance, Version 3.0, for AREVA NP Inc.'s Richland, Washington Fuel Fabrication Facility; License No. SNM-1227; Docket No. 70-1257" (ADAMS Accession Number ML063070484).

14.0 EXEMPTIONS AND SPECIAL AUTHORIZATIONS

14.1 SPECIAL AUTHORIZATIONS

In its license renewal application, AREVA requested a number of special authorizations. The NRC staff's review of these authorizations is documented below:

14.1.1 PLUTONIUM AND OTHER TRANSURANIC CONTAMINATION IN FEEDSTOCK

In the license renewal application, AREVA referenced an authorization request, including specific concentration limits, to receive, process, store, and ship reprocessed uranium containing plutonium and other transuranic isotopes. AREVA originally requested this authorization on April 26, 2000. The NRC staff reviewed this authorization request and conducted an SER to evaluate if granting such authorization would be protective to public health and safety, and the environment. The NRC staff approved the authorization in a letter dated July 11, 2000, and it has been incorporated into AREVA's current license.

14.1.2 PLUTONIUM CONTAMINATED WASTE STORAGE (WITHDRAWN)

This authorization was originally granted because AREVA was in possession of plutonium-contaminated waste, which was a result of operations of an on-site mixed oxide facility. Since the subject waste was shipped to the Hanford's Waste Receiving and Reprocessing facility on June 29, 2008, AREVA has withdrawn this authorization.

14.1.3 WASTE DISPOSAL

In the license renewal application, AREVA referenced an authorization request to dispose of solid waste material containing up to 30 pCi/g to other than a licensed waste disposal facility. This authorization was reviewed by the NRC staff and evaluated as part of the SER issued in support of the 1996 renewal of AREVA's license (ADAMS Legacy Library; Accession Number 9611220152). The NRC staff approved the authorization and it has been incorporated into AREVA's current license.

14.1.4 AUTHORIZATION AT REACTOR SITES

AREVA is currently authorized to possess nuclear fuel assemblies and fuel rods at reactor sites, for the purpose of loading them into shipping containers and delivering them to a carrier for transport. In its license renewal application, AREVA included specific exemptions to its original authorization request. These exemptions apply to the requirements in 10 CFR 70.24, "Criticality Accident Requirements," and are described in the license renewal application. AREVA also clarified that the authorized activities will be conducted within the license requirements of the reactor site. The NRC staff reviewed the proposed exemptions in the license renewal application and concluded that they are acceptable and do not pose an adverse impact to public health and safety, or the environment.

14.1.5 AUTHORIZED RELEASE GUIDELINES FOR HYDROFLUORIC ACID

In the license renewal application, AREVA referenced an authorization request to release hydrofluoric acid, manufactured by using the dry conversion process for unrestricted commercial use, provided that certain conditions are met. AREVA originally requested this authorization on June 28, 1994 and revised it on July 7, 1994. This authorization was reviewed by the NRC staff

and approved via letter dated October 27, 1994 (ADAMS Legacy Library; Accession Number 9411010320). This authorization was incorporated into AREVA's current license renewal application.

14.1.6 AUTHORIZED RELEASE GUIDELINES FOR AMMONIUM HYDROXIDE

In the license renewal application, AREVA referenced an authorization request to release ammonium hydroxide produced at the Ammonia Recovery Facility for unrestricted commercial use, provided that certain conditions are met. This authorization was reviewed by the NRC staff and evaluated as part of the SER issued in support of the 1996 renewal of AREVA's license (ADAMS Legacy Library; Accession Number 9611220152). This authorization is part of AREVA's current license and was not modified as part of the prior license renewal application.

14.2 EXEMPTIONS

14.2.1 LABELING

In the license renewal application, AREVA referenced an exemption from the labeling requirements for containers in 10 CFR 20.1904(a). This exemption was previously evaluated by the NRC staff, and documented in the Safety Evaluation Report, issued in support of the 1996 renewal of AREVA's license (ADAMS Legacy Library; Accession Number 9611220152). This exemption was found acceptable and is part of AREVA's current license. It was not modified as part of the prior license renewal application.

14.2.2 NOTIFICATION

In the license renewal application, AREVA referenced an exemption from the reporting requirements in 10 CFR 20.2202(a)(2) and (b)(2), which are applicable to restricted areas. This authorization is part of AREVA's current license and was not modified as part of the prior license renewal application.

14.2.3 RELEASE FROM PRIOR COMMITMENTS

Following approval of this license renewal application, all commitments made by AREVA, to the NRC shall no longer be binding, unless they are re-imposed as conditions in its new license.

14.3 REFERENCES

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

(AREVA, 2006a) "License Renewal Application for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257," October 24, 2006 (ADAMS Accession Number ML063110089).

(AREVA, 2006b) "Additional Information in Support of License Renewal Application for AREVA NP, Inc. Richland Fuel Fabrication Facility, License No. SNM-1227, Docket No. 70-1257," December 13, 2006 (ADAMS Accession Number ML063530128).

(AREVA, 2008a) September 10, 2008, letter from R.E. Link to the U.S. NRC, "Request for Additional Information (RAI) Responses Pertaining to General Information and Organization and Administration (Chapters 1 and 2, respectively, of License No. SNM-1227 Renewal Application)," (ADAMS Accession Number ML082610307).

(AREVA, 2008b) “Revised License Renewal Application Chapters for AREVA NP Inc. Richland Fuel Fabrication Facility; License No. SNM-1227, Docket No. 70-1257,” December 10, 2008 (ADAMS Accession Number ML090400202).

15.0 LIST OF CONTRIBUTORS

1. Jeannette Arce
2. Damaris Arroyo
3. Merritt N. Baker
4. Matthew Bartlett
5. Thomas N. Pham
6. Blake Purnell
7. Rafael L. Rodriguez
8. Christopher Tripp
9. Rex Westcott