DOCKET NO: 70-1201

LICENSE NO: SNM-1168

LICENSEE: Framatome ANP, Inc.
Lynchburg, VA

SUBJECT: SAFETY EVALUATION REPORT FOR THE FRAMATOME ANP, INC. (LYNCHBURG) - CHAPTER 3 OF LICENSE APPLICATION

1.0 INTRODUCTION

The "Standard Review Plan (SRP) for the Review of a License Application for a Fuel Cycle Facility," NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," was used by the Nuclear Regulatory Commission (NRC) staff as guidance for the review and evaluation of the health, safety, and environmental aspects of the proposed changes to Chapter 3, "Integrated Safety Analysis (ISA) and ISA Summary," of Framatome ANP, Inc., Lynchburg's (FANP's) license. Chapters 3, "ISA," and 11, "Management Measures," of the SRP are the primary chapters that address the staff's review in relation to the performance and other requirements of Subpart H.

This safety evaluation report was written to address the proposed changes to Chapter 3 of the FANP license. The ISA Summary is evaluated in the associated Technical Evaluation Report (TER), separate from this evaluation.

2.0 DISCUSSION

As part of the process of submitting its ISA Summary for approval, on October 15, 2004, FANP submitted a proposed license change request (hereafter referred to as "the request") for Chapter 3 of its license application, which included its ISA Summary, an annual update to the ISA Summary dated January 28, 2005, and a supplement to the ISA Summary dated May 19, 2005. The current Chapter 3 states:

> "The ISA for MAR [the Mount Athos Road] facility will be submitted for review and approval in accordance with the plan submitted to the NRC pursuant to 10 CFR 70.62(c)(3)(i) on 18 April 2001 and as modified by subsequent correspondence. As part of that plan, the complete Chapter 3 will be submitted, along with the ISA summary, and changes to the other chapters as required."

The ISA will be completed and submitted no later than October 18, 2004."

FANP's submittal deleted the current text and replaced it with a description of its ISA and ISA Summary. The proposed revision to Chapter 3 included a description of the ISA Program, Chemical Hazards, and ISA Summary and Documentation. Section 3.1, "ISA Program," of the proposed license amendment request stated FANP maintains an ISA Program for the facility that involves handling special nuclear material (SNM) in quantities greater than 1400g ^{235}U. It also stated that the ISA Program consisted of the following elements: 1) ISA Summary, 2) ISA Program commitments described in this chapter, and 3) ISA supporting information maintained at the facility. In this section, FANP commited to maintain the supporting information, such as process descriptions with major manufacturing steps identified, criticality safety analyses, radiological hazards analyses, fire hazard analyses, and process hazards analyses. The request identified the Manager of Regulatory Affairs as the person responsible for convening and assigning members to the ISA team should it be required to review process changes.

In its request, FANP described the makeup of the ISA team. Probabilistic hazards assessments will be done, when necessary, by the ISA team made up of specialists performing the following functions: 1) a team leader, 2) criticality safety, 3) radiation protection, 4) fire protection, 5) chemical protection, 6) a process specialist, 7) a facility specialist, and 8) an individual with engineering expertise. All ISA team members were and will continue to be instructed in the methodology being used.

FANP committed to use the "What If," "Failure Mode and Effect Analysis" (FMEA)," "Hazard and Operability Analysis" (HAZOP), and "Fault Tree" methodologies. This is reflected in the recommended license condition below.

Accident consequences and likelihoods of potential accident sequences will be evaluated in a non-quantitative manner. The ISA Summary provided the definition of the qualitative likelihood determination.

The ISA team will ensure that the reliability characteristics of the system of controls will be evaluated to ensure that high consequence events are highly unlikely and intermediate consequence events are unlikely as defined in the ISA Summary. Management measures are defined in Chapter 11 of the current license application.

Section 3.2, "Chemical Hazards," states that no chemical accident sequences related to or resulting from the processing of special nuclear material have been identified that exceed the performance requirements of 10 CFR 70.61. FANP committed to evaluate fire hazards as part of its review of chemical hazards.

Section 3.3, "ISA Summary and ISA Documentation," defines the elements of the ISA Summary. In addition, the request commits to submit, by January 31 of every year, an update of changes affecting the Summary that do not require pre-approval in accordance with 10 CFR 70.72.

3.0 CONCLUSION

The NRC staff concludes that the applicant's safety program, if maintained, is adequate to provide reasonable assurance that items relied on for safety (IROFS) will be available and reliable to perform their intended safety functions when needed in the context of the performance requirements.
Many potential hazards and accidents can result in unintended exposure of persons to radiation, radioactive materials, or toxic chemicals incidental to processing licensed materials. The NRC staff finds that the applicant has performed an ISA to identify and evaluate those potential hazards and accidents as required by the regulations. The NRC staff has reviewed the ISA Summary and other information, and finds that the information provides reasonable assurance that the applicant has established engineered and administrative controls and identified IROFS to meet the performance requirements of 10 CFR 70.61 as described in the TER. Specifically, the NRC staff finds that the ISA results, as documented in the ISA Summary, provide reasonable assurance that the IROFS, management measures, and programmatic commitments will, if properly implemented, make all credible high consequence events highly unlikely and all credible intermediate consequence events unlikely.

The staff's review determined that aspects of the ISA methodology are central to its conclusion regarding the acceptability of the ISA program. As a result of this review, the staff recommends that Safety Condition S-5 be added to the license:

> S-5 The ISA methodology shall be implemented and maintained as presented in the ISA Summary submitted on May 19, 2005. Accident scenario development shall be limited to What-If, FMEA, HAZOP and Fault Tree methods. Assignment of indices for initiating events and reduction of risk provided by IROFS shall be consistent with Chapter 5 of the ISA Summary. Demonstration that the performance criteria of Subpart H have been met shall be as prescribed in the "Use of Tables" section in the ISA Summary. Determination of likelihood shall be as defined in Chapter 9 of the ISA Summary. Framatome must obtain a license amendment for proposed deviations to the methodologies for items listed in this Safety Condition.

The NRC staff has reviewed the request and concludes that FANP meets the requirements in 10 CFR70.62(a)(1)-(3) for including a description of the safety program, establish and maintain records that demonstrate compliance with the requirements, and maintain records of failures of IROFS or management measures. In addition, the staff finds that FANP meets requirements for maintaining process safety information to perform and maintain an ISA as required by 10 CFR 70.62(b). The discussion of the NRC staff's review of FANP's compliance with the requirements of 10 CFR 70.62(c) and (d) are in the TER associated with the staff's review of the ISA Summary.

4.0 ENVIRONMENTAL REVIEW

Authorization of the change to the license to reflect commitments related to the ISA and ISA Summary constitutes an administrative and organizational change. The existence or use of an ISA, ISA Summary, or supporting information will not cause a change in the types or significant increase in the amounts of any effluents that may be released offsite. The authorization of this change will not result in any significant increase in individual or cumulative occupation radiation exposure. There will be no significant construction impact since the ISA is currently being used in an existing facility. No construction activities are required. There will be no significant increase in the potential for or consequences from radiological accidents as discussed in the safety evaluation.

Accordingly, the NRC staff has determined that the criteria from 10 CFR 51.22(c)(11) for a categorical exclusion has been met. Therefore, neither an environmental assessment nor an environmental impact statement is warranted for this action.

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DOCKET NO: 70-1201

LICENSE NO: SNM-1168

LICENSEE: Framatome ANP, Inc.
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SUBJECT: TECHNICAL EVALUATION REPORT FOR THE FRAMATOME ANP, INC. (LYNCHBURG) - INTEGRATED SAFETY ANALYSIS SUMMARY AND ANNUAL UPDATE

1.0 INTRODUCTION

The "Standard Review Plan (SRP) for the Review of a License Application for a Fuel Cycle Facility," NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility," was used by the Nuclear Regulatory Commission (NRC) staff as guidance for the review and evaluation of the health, safety, and environmental aspects of the Integrated Safety Analysis (ISA) Summary. The new Subpart H of 10 CFR Part 70 identifies risk-informed performance requirements and requires licensees to conduct integrated safety analyses and submit an ISA Summary. Chapters 3, "ISA," and 11, "Management Measures," of the SRP are the primary chapters that address the staff's review in relation to the performance and other requirements of Subpart H. This SRP does not preclude licensees or applicants from suggesting alternative approaches to those specified in the SRP to demonstrate compliance with applicable regulations.

2.0 ISA SUMMARY

As stated in the ISA Summary, transmitted by letters dated October 15, 2004, January 28, and May 19, 2005, the ISA was performed for special nuclear material handling operations at the Framatome ANP, Inc., Lynchburg (FANP) facility. The FANP facility primarily receives finished uranium oxide pellets, and loads them into zirconium tubes that are then combined into fuel assemblies and shipped to commercial light water power reactors.

2.1 Description of Site

The FANP facility is located on an approximately 67-acres in Campbell County approximately four miles from the Lynchburg city limits. The nearest body of water is the James River north of the facility, and bordering part of the property line. The site is on the eastern edge of the Blue Ridge Mountains. The year 2000 census indicates that the population for Campbell County was approximately 51,000. The population for the city of Lynchburg was approximately 65,000. There are no significant clusters of population within a 2-mile radius of the facility. The closest inhabitants occupy residences, which are located about 0.5 miles to the East North East.

Due to its location near the Blue Ridge Mountains, extreme weather is rare. The probability of the site being struck by a tornado or high winds is considered highly unlikely. Since the site is not in a coastal location, the effects of a hurricane would be limited to strong winds and heavy rain. The most intense rainfall recorded to date in the region was 9.2 inches of water in a 40-minute period. During the summer, thunderstorms occur frequently in the afternoon. There have been no identified credible accident sequences that result from a lightning strike.

The FANP site is located in the Western Piedmont physiographic province where it lies in an upland characterized by scattered hills, some mountainous dimensions, lying eastward from the foot of the Blue Ridge Mountains. The site is located on a river bend and generally exhibits a rolling surface of gentle slopes. The ground is inclined from the highest hill located on the property toward the James River (at 693 feet MSL to 470 feet MSL). The central Appalachian region of Virginia is seismically characterized by a moderate amount of low-level earthquake activity. The facility is located in the western part of the central Virginia cluster region which is classified as Zone 2 on the Seismic Risk Map of the United States. This corresponds to a Modified Mercalli scale of VII, which implies building damage to the extent of fallen chimneys and cracked walls. Zone 2 has an acceleration range of 0.065 to 0.14 gravity.

The facility is bounded on three sides by the James River. The facility is approximately 75 feet above the river bank and far above the flood plain. The facility is 46 feet above the Federal Emergency Management Agency's 500-year flood plain. The risk of a flood from the James River is deemed to be not credible.

The site is surrounded by various other public facilities, such as BWX Technologies, Inc., Norfolk & Southern Railway, Archer Creek Steel plant, Central Virginia Credit Union, and local and regional airports. The likelihood of accidents from these facilities was evaluated and deemed not credible or highly unlikely to cause an accident that would require mitigation as required by 10 CFR Part 70.

The staff has reviewed the site description for FANP according to Section 1.3 of the SRP. FANP has adequately described and summarized general information pertaining to the site geography, population information, meteorology, hydrology, and geology and applicable design basis events. The NRC staff verified that the site description is consistent with the information in the environmental report and emergency plan.

2.2 Description of Facility

The FANP-Lynchburg site contains the large fuel fabrication building, a large building for by-product operations, and various other small outbuildings, and a warehouse.

The staff has reviewed the general facility description for FANP according to Section 1.1 of the SRP. The licensee has adequately described the facility and processes so that the staff has an overall understanding of the facility features and functions. The licensee has cross-referenced its general description with more detailed descriptions where necessary. The NRC staff concludes that FANP has complied with the general requirements of 10 CFR 70.22, "Contents of Applications," 10 CFR 70.60, "Applicability," and 10 CFR 70.65(b)(1), (2), and (3), "Additional Content of Applications," as applicable.

2.3 Description of Facility Processes, Hazards, and Types of Accident Sequences

The facility operations are made up of three main tasks: 1) pellet handling, 2) rod handling, and 3) fuel bundle handling. The FANP facility receives unclad uranium oxide fuel pellets with a maximum enrichment of 5.1% ^{235}U. The pellets are received in NRC-approved packages. Pellet boxes are transferred by conveyor, then unwrapped, weighed and stored for later use. Uranium scrap is shipped in similar containers. When ready for use, pellet trays are removed from the shipping boxes and weighed and prepared for use in rod loading equipment. Rod loading activities involve assembling pellets to be loaded into zirconium alloy fuel tubes. Once complete, the necessary end connections are made, welded, pressurized, washed, assayed, inspected, and stored. The rods that complete this process will be used in the production of fuel bundles. The production of fuel bundles includes taking rods from storage, assembling bundles, upending, measuring, inserting guide tubes, visual inspection, cleaning, storing, and shipping.

2.4 Description of the ISA Team Qualifications, ISA Methods, and Management Measures

2.4.1 ISA Team Qualifications

The licensee described its ISA team qualifications in its ISA Summary and assembled those teams to perform the process hazards analysis portion of the ISA. The team leaders and members were selected based on their training and experience in the field and in hazard assessments methods. Each team was led by an individual with more than 15 years of relevant experience. The teams typically had experience in maintenance, operation, health and safety, and engineering. The teams also had expertise in nuclear criticality safety, health physics. The plant manager and a consultant independently reviewed the team outputs.

The ISA process was performed by three teams with expertise in engineering and process operations. The teams consisted of persons experienced and knowledgeable in nuclear criticality safety, radiation safety, fire protection, and chemical process safety. Each team also included a cognizant engineer with experience and knowledge specific for each process being evaluated and an experienced operator. One member of each team had at least 15 years of relevant experience and was trained and knowledgeable in the ISA methodology used.

2.4.2 ISA Methods

The licensee, in employing ISA methods, used a combination of the What-If and Fault Tree techniques, and performed a process hazards analysis for generating accident sequences for three process areas of the FANP facility. These areas include handling of uranium oxide pellets, fuel rods, and fuel assemblies. The hazards evaluated included fire, chemical, radiological and criticality. The process hazards analysis for FANP showed that only criticality events could result in consequences that exceed 10 CFR 70.61 criteria. The ISA methods are as described in the approved ISA Plan.

2.4.3 Management Measures

The licensee included multiple management measures to support the reliability and availability for each IROFS and also provided a description of the safety function of each IROFS in Revision 2 of the ISA Summary. The licensee's table of IROFS in the ISA Summary also

provided cross reference to all corresponding accident sequences.

During the review of the ISA Summary, the staff identified that the licensee included management measures such as training and procedures as controls for mitigation and/or prevention of the consequences associated with facility hazards. The licensee revised the ISA Summary in Revision 2 to delete management measures from the controls listed in the hazard analysis sections of the summary. Also, the staff's review revealed that Table 6-1, List of IROFS, in the ISA Summary appeared to have inappropriate management measures applied to several IROFS and appeared to have inconsistencies in that the same type of IROFS had different management measures. Again, in response to discussions with the staff, the licensee revised the ISA Summary in Revision 2 such that these issues were satisfactorily resolved. The NRC staff concluded that the licensee's management measures are acceptable.

2.5 ISA Methodology

The ISA methodology as applied to the FANP facility processes was consistent with that described in the ISA Plan previously submitted by the licensee on April 18, 2001, and as amended on December 3, 2001, and February 21, 2002. The staff and the licensee conducted discussions on the application of the methodology during a site visit and in a number of followup telephone calls. In response to these discussions, the licensee revised the ISA Summary regarding the methodology in Revision 2 dated May 19, 2005. These revisions included clarifications and modifications regarding initiating events, acceptance criteria, and the general types of accident sequences.

The generation of accident sequences was accomplished based on the results of the process hazards analysis. General types of accident sequences for nuclear criticality scenarios were created that were both bounding and representative of possible events. The sequences were bounding because they assumed worst case configurations of mass, geometry, and moderation. The sequences were representative because they reflected multiple circumstances and events that could lead to the potential high consequence hazards.

The general types of accident sequences provided in the ISA Summary by the licensee contained three types of accident sequences. The first type is a simple accident sequence that lists the initiating event and the IROFS that are used to prevent the accident. In this sequence type, the individual IROFS are each credited in the demonstration for meeting the "highly unlikely" performance requirement. The second type of accident sequence provides a list of individual IROFS that are all preventive, but the licensee conservatively chose to not credit all the IROFS in determining the overall scoring of the sequence. An example of this type of accident sequence is one that considers accumulation of special nuclear material (SNM) in a ventilation system and the introduction of water (a moderator) to create a possible critical configuration. In this sequence, the licensee lists three passive engineered IROFS to prevent introduction of water (i.e., the concrete ceiling, a condensate deflector, and a drain on the ventilation duct work) but credits only a single passive control, in conjunction with an IROFS for preventing SNM accumulation in the duct work, for determining acceptance with the performance requirements of 10 CFR 70.61. The third type of accident sequence contains

multiple IROFS that provide conditional prevention depending on the IROFS failure assumed for the initiating event in the sequence. An example of this type of accident sequence is one that considers a moderator in multiple loaded pellet scrap boxes loaded on a shelf with sufficient uranium mass and geometry to create the potential for a criticality event. In addition to an IROFS for moderator control, the second IROFS can be either a passive engineered control with borated plates between the shelves (geometry control) or an administrative control to not allow stacking past a certain slab height on a shelf (mass control). If, for example, the initiating event considers the failure of mass control due to stacking the pellet boxes, then the IROFS for geometry control provides the preventive safety function. In this accident sequence type, either the geometry control or mass control (whichever one does not fail as part of the initiating event), in conjunction with the first IROFS for moderator control, will demonstrate that performance requirements are met.

For initiating events, the licensee chose to include multiple events because no single event could initiate a criticality accident. The licensee included justification and description of this part of the methodology in Revision 2 of the ISA Summary. The process of using multiple events for the initiating event was a conservative process in that, in most cases, the combination of the events in conjunction with the underlying assumptions on mass, geometry, and moderation could be considered to be highly unlikely. The licensee chose to conservatively assign a likelihood of “not likely” for the purpose of generating IROFS.

In determining the preventive effectiveness of the assigned IROFS, the licensee used a simple and conservative process to assign reliability indices/scores. Administrative IROFS were assigned an index of 1 for all administrative protections despite the fact that most administrative IROFS were either of a routine nature, had adequate time associated with them to allow identification and correction of a possible failure before the IROFS failure would occur, or were enhanced by active controls such as alarms. Active engineered controls were assigned an index of 2, and passive engineered controls were assigned an index of 3. For some accident sequences, in which multiple controls are listed, the licensee only takes credit for one IROFS on the list, and the minimum index is assumed for demonstrating acceptance to the performance requirements. The licensee included multiple management measures to support the reliability and availability for each IROFS and also provided a description of the safety function of each IROFS in Revision 2 of the ISA Summary. The licensee’s table of IROFS in the ISA Summary also provided cross reference to all corresponding accident sequences.

The licensee determined acceptance criteria for meeting the performance requirements of 10 CFR 70.61, as part of its methodology, by multiplying the likelihood of the initiating event by the expected consequence level (high consequence for criticality events) and subtracting the indices for all IROFS assigned to the accident sequence. The licensee’s indices for scoring of likelihood were 1= highly likely, 2 = unlikely, and 3 = unlikely. The licensee’s indices for scoring of consequence were 1 = low, 2 = intermediate, and 3 = high. The licensee provided the assignment of likelihood and consequence indices in tables in the ISA Summary along with a risk matrix for determining acceptable and unacceptable risk for meeting 10 CFR 70.61. Consistent with the licensee’s methodology for criticality-related events, the licensee assigned a likelihood index of 2 (unlikely) to all initiating events and assumed a consequence index of 3 (high) for all criticality-related accident sequences. The licensee considers an overall score of

5, or less, to be acceptable to demonstrate meeting the performance requirements of 10 CFR 70.61. Following discussions between the staff and the licensee, the licensee added an additional requirement for criticality events in Revision 2 of the ISA Summary that double contingency must be met. Therefore, for criticality events, an effective score of 4 or less must be demonstrated to meet the performance requirements.

The staff finds that the ISA methodology as described in Revision 2 of the ISA Summary and applied in the FANP ISA Summary is acceptable. The methodology is consistent with that described in the ISA Plan submitted by the licensee and has been applied in a conservative manner for the purpose of generating IROFS and for showing compliance with the performance requirements of 10 CFR 70.61.

Because FANP is an existing and not a new facility, the licensee is not required to address the requirements of 10 CFR 70.64 in its ISA Summary.

2.6 Criticality Safety

The requirements in 10 CFR 70.65(b)(3) specify that the ISA Summary must contain a description of each process analyzed in the ISA in sufficient detail to understand the theory of operation, and, for each process, the hazards that were identified in the ISA and a general description of the types of accident sequences. The NRC reviewed the information contained in the ISA Summary and determined with reasonable assurance that the licensee met this requirement, for nuclear criticality safety (NCS), in the ISA Summary by including process information that provides sufficient detail to understand the processes in Section 2.0, a complete description of the hazards in Section 4.0, and a general description of the types of accident sequences in Section 5.0.

The requirement in 10 CFR 70.65(b)(4) specifies that the ISA Summary must contain information that demonstrates the licensee's compliance with the performance requirements of 10 CFR 70.61. The licensee's ISA Summary contains a table of accident sequences and tables of indices for the likelihood of initiating events and for the preventive effectiveness for individual IROFS. A risk matrix for determining acceptance with the performance requirements of 10 CFR 70.61 based on consequences and likelihoods is also provided. Demonstration that the performance requirements are met is provided in the ISA Summary for each accident sequence and supported by application of the licensee's ISA methodology and adequate process description and hazards identification. The licensee adheres to compliance with the double contingency principle and defense in depth principles in the evaluation of criticality related events.

In the ISA Summary, the list of IROFS that is provided in Section 6.0 represents a summation, by process, of all preventive controls that were determined from the detailed ISA evaluations of individual processes and provide support that acceptable risk is assured and that the performance requirements have been met. For each IROFS, a description of the control type, safety function, and management measures are provided. The staff reviewed the list of IROFS and their safety functions, the management measures supporting the IROFS, and the general list of accident sequences presented in the ISA Summary that support the generation of the

IROFS. The staff evaluation finds that the list of IROFS for process-specific operations of the facility provided in the ISA Summary adequately reflects the controls needed to assure that the hazards described in the general types of accident sequences for criticality safety meets the criteria for demonstrating highly unlikely.

The staff has also determined that the licensee's ISA methodology and its proper application, support the demonstration that the performance requirements have been met and can be met in the future when addressing IROFS failures or degradation, replacement of IROFS, or evaluation of new processes. The staff reviewed, in detail, the method for constructing and evaluating accident scenarios and the controls to prevent each accident scenario as described in the ISA Summary. The staff reviewed implementation of the methodology by evaluating detailed accident scenarios from selected processes to determine that: (1) adequate controls were identified to assure acceptable risk; (2) the performance requirements were satisfied; and (3) the ISA process was repeatable and properly documented.

The requirements in 10 CFR 70.65(b)(4) also specify that the ISA Summary must contain information that demonstrates the licensee's compliance with the requirements for criticality monitoring and alarms in 10 CFR 70.24. The requirements in 10 CFR 70.24 specify that each licensee authorized to possess special nuclear material in a quantity exceeding 700 grams of contained ^{235}U (or other mass limits based on the nuclide and whether special moderators or special reflectors exist) must maintain in each area in which such licensed SNMis handled, used, or stored, a monitoring system that must be capable of detecting a criticality that produces an absorbed dose in soft tissue of 20 rads of combined neutron and gamma radiation at an unshielded distance of 2 meters from the reacting material within 1 minute and that coverage of all areas must be provided by two detectors. In Section 4.4 of the ISA Summary, the licensee described how it meets 10 CFR 70.65(b)(4) and 10 CFR 70.24 for the Criticality Accident Alarm System (CAAS).

The NRC staff reviewed the information in the ISA Summary, Section 4.4, regarding the licensee's CAAS. The licensee has a criticality monitoring system for all areas of the facility that handle greater than 700 grams of ^{235}U. The licensee has a criticality alarm system that is functionally tested periodically and detector calibrations are performed by the licensee at regular intervals. The licensee also requires that the system be functionally tested after replacement of an alarm or detector module. Based on the information provided, the NRC staff determined with reasonable assurance that the facility has a CAAS that meets the requirements of 10 CFR 70.24 as specified in 10 CFR 70.65(b)(4) based on following the guidance contained in NUREG-1520-2002 for Nuclear Criticality Safety.

To meet 10 CFR 70.65(b)(5), the licensee provided a description in the ISA Summary of the facility processes, identified hazards and identified the accident sequences for the facility. This information is in Section 5.0 of the ISA Summary. The ISA process for determining accident sequences used the What-If and Fault Tree process hazard analysis techniques, and the results, by process, are included in the ISA Summary.

Based on the information provided by the licensee, the NRC has determined with reasonable assurance that the licensee has performed hazards analyses for determining accident sequences that is complete and meets the requirement in 10 CFR 70.65(b)(5) for NCS in the ISA Summary and that sufficient description is provided in the ISA Summary to understand the processes.

The requirement in 10 CFR 70.65(b)(6) specifies that the ISA Summary must contain a list briefly describing the IROFS in sufficient detail to understand their function in relation to the performance requirements of 10 CFR 70.61. In the ISA Summary, the list of IROFS that is provided represents a summation, by process, for all preventive controls that were determined from the detailed ISA evaluations of individual processes and support that acceptable risk is assured and that the performance requirements have been met. For each IROFS, a description of the control type, safety function, and management measures supporting the availability and reliability is provided. The staff reviewed the list of IROFS, the management measures supporting the IROFS, and the general list of accident sequences presented in the ISA Summary that support the determination of the IROFS. The NRC confirmed, by a detailed review of all facility processes, that in conjunction with the demonstration of the performance requirements provided in the ISA Summary, the IROFS data in the ISA Summary clearly shows the role of the IROFS in terms of their preventive function, effectiveness, availability and reliability. The licensee has also provided the correspondence between individual IROFS and individual accident sequences in the ISA Summary to provide coordination of the IROFS and the sequences.

Based on the summarized list of process-dependent IROFS listed in the ISA Summary, demonstration through the ISA Summary accident sequences that the IROFS meets the necessary criteria to support meeting the performance requirements of 10 CFR 70.61, and the information provided in the ISA Summary for the correspondence between individual IROFS and accident sequences, the staff has determined that the requirement of 10 CFR 70.65(b)(6) has been met.

The requirement in 10 CFR 70.65(b)(8) specifies that the ISA Summary must contain a descriptive list that identifies each IROFS that is the sole IROFS. The licensee has not identified any sole IROFS, and thus, has demonstrated compliance with 10 CFR 70.65(b)(8).

The staff concludes that the licensee's conservative ISA methodology, as applied to the processes at the FANP facility described in the ISA Summary, is an acceptable method for showing compliance with the regulations. Based on the above NRC evaluation, the implementation of the FANP ISA methodology, as described and applied in the licensee's ISA Summary for NCS, meets the regulatory requirements of 10 CFR 70.65(b)(3) through (b)(6) and (b)(8). The staff therefore concludes that there is a reasonable assurance of safety for the protection of public health including workers and the environment.

2.7 Fire Protection

The reviewer confirmed that because the applicant has uranium dioxide only in the form of sintered pellets, there are no fire-related accident scenarios with consequences that exceed the performance requirements in 10 CFR 70.61. The reviewer examined the site Fire Hazard Analysis and performed a field examination of the licensed process areas. The reviewer verified that the risks from external or structural fires in adjacent facilities had been reduced to acceptable levels.

2.8 Descriptive list of IROFS

For the complete list of IROFS, see FANP's ISA Summary, transmitted by letters dated October 15, 2004, and January 28, and May 19, 2005.

2.9 Description of Chemical Safety

The licensee's ISA Summary stated, and the staff confirmed, that the site does not have any hazardous chemicals in quantities sufficient to cause acute chemical exposures in excess of the criteria in 10 CFR 70.61(b)(4) or 10CFR70.61(c)(4).

2.10 Descriptive list of sole IROFS

There are no IROFS used for systems or processes at the site that are the only item preventing or mitigating an accident sequence that exceeds the performance requirements of 10 CFR 70.61.

2.11 Definition of the terms "credible," "unlikely," and "highly unlikely"

The licensee provided definitions for the terms "credible," "unlikely," and "highly unlikely," in the context for which they are intended to be used.

The term "credible" in the context of an initiating event is any initiating event that is neither "highly unlikely" or "unlikely."

The definition of "unlikely" in the context of external events is an event for which the occurrence frequency is less than 10^{-4} occurrences per year, floods rising to levels above the 100-year flood plane, and earthquakes of a magnitude associated with a 500-year return frequency or greater. "Unlikely" in the context of a process deviation is one that, although theoretically possible, has never occurred within the lifetime of the facility as determined by reasonably available records and the experience of the ISA Team.

The definition of "highly unlikely" in the context of an external event is an event for which the occurrence frequency is less than 10^{-5} occurrences per year, floods rising to levels above the 500-year flood plane, and earthquakes with a magnitude associated with a 1000-year return frequency or greater.

3.0 CONCLUSION

The NRC staff concludes that the applicant's safety program, if maintained, is adequate to provide reasonable assurance that IROFS will be available and reliable to perform their intended safety functions when needed in the context of the performance requirements.

Many potential hazards and accidents can result in unintended exposure of persons to radiation, radioactive materials, or toxic chemicals incidental to processing licensed materials. The NRC staff finds that the applicant has performed an ISA to identify and evaluate those potential hazards and accidents as required by the regulations. The NRC staff has reviewed the ISA Summary and other information, and finds that it provides reasonable assurance that the applicant has established engineered and administrative controls and identified IROFS to

meet the performance requirements of 10 CFR 70.61. Specifically, the NRC staff finds that the ISA results, as documented in the ISA Summary, provide reasonable assurance that the IROFS, management measures, and programmatic commitments will, if properly implemented, make all credible high consequence events highly unlikely and all credible intermediate consequence events unlikely.

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