

December 20, 2005

Mr. Ron Land, Site Manager  
Framatome ANP, Inc.  
2101 Horn Rapids Road  
Richland, WA 99352-5102

SUBJECT: INSPECTION REPORT NO. 70-1257/2005-203 AND NOTICE OF VIOLATION

Dear Mr. Land:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine announced criticality safety inspection at your Richland, Washington, facility from November 28 through December 1, 2005. The purpose of the inspection was to determine whether activities involving licensed materials were conducted safely and in accordance with NRC requirements. Throughout the inspection, observations were discussed with your staff. An exit meeting was held on December 1, 2005, during which inspection observations and findings were discussed with your staff.

The inspection, which is described in the enclosure, focused on nuclear criticality safety (NCS) analysis, risk-significant NCS controls and items relied on for safety, and principal management measures for ensuring that NCS controls are capable, available, and reliable. The inspection consisted of reviews of new, changed and other risk-significant NCS analyses; selective examinations of relevant procedures and records; examinations of safety-related equipment; interviews with plant personnel; and facility walkdowns and observations of in-plant conditions and activities. Throughout this inspection, observations were discussed with your managers and staff.

Based on the results of the inspection, the NRC has determined that a Severity Level IV violation of NRC requirements occurred. The violation was evaluated in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600. The current Enforcement Policy is included on the NRC's web site at [www.nrc.gov](http://www.nrc.gov); select What We Do, Enforcement, then Enforcement Policy. The violation is being cited in the enclosed Notice of Violation (Notice) as a Severity Level IV violation, and the circumstances surrounding it are described in detail in the subject inspection report. The violation is being cited in the Notice because it was identified as the result of an event. The violation being cited as a Severity Level IV violation is the failure to designate appropriate items relied on for safety for the accident sequence of inadvertently introducing dry hydrogenous additives into 55-gallon drums in the BLEU warehouse storage array.

R. Land

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You are required to respond to this letter and should follow the instructions specified in the enclosed Notice of Violation when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.390 of NRC's "Rules of Practice," a copy of this letter and the enclosure will be available in the public electronic reading room of the NRC's Agency-wide Document Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

If you have any questions concerning this report, please contact Dennis Morey, of my staff, at (301) 415-6107.

Sincerely,

**/RA/**

Melanie A. Galloway, Chief  
Technical Support Group  
Division of Fuel Cycle Safety  
and Safeguards

Docket No.: 70-1257  
License No.: SNM-1227

Enclosures: 1. Notice of Violation  
2. Inspection Report 70-1257/2005-203

cc w/enclosures: L. J. Maas, Framatome  
D. L. Noss, Framatome  
R. E. Link, Framatome

cc w/o enclosures: Mr. Gary Robertson  
Washington Department of Health

R. Land

-2-

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## NOTICE OF VIOLATION

Framatome ANP  
Richland, WA

Docket No. 70-1257  
License No. SNM-1227

During an NRC inspection from November 28 through December 1, 2005, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions, NUREG-1600," the violation is listed below:

10 CFR Part 70.61(b) states, in part, that the risk of each credible high-consequence event must be limited. Engineered controls, administrative controls, or both, shall be applied to the extent needed to reduce the likelihood of occurrence of the event so that, upon implementation of such controls, the event is highly unlikely or its consequences are less severe than those in paragraphs (b)(1)-(4) of this section.

10 CFR Part 70.61(e) states, in part, that each engineered or administrative control or control system necessary to comply with paragraphs (b), (c), or (d) of this section shall be designated as an item relied on for safety.

Contrary to the above, on and before October 14, 2005, the licensee implemented a process to transfer reprocessed blended low-enriched uranium (BLEU) powder into storage and failed to designate as items relied on for safety all controls required to reduce the likelihood of criticality in BLEU powder storage, specifically by failing to control the transfer of BLEU powder containing dry hydrogenous additives.

This is a Severity Level IV violation (Supplement VI).

Pursuant to the provisions of 10 CFR 2.201, Framatome ANP is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555, with copies to the Chief, Technical Support Group, Division of Fuel Cycle Safety and Safeguards, Office of Nuclear Material Safety Safeguards, and the Regional Administrator, Region II, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previously docketed correspondence if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an Order or Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other actions as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

**Enclosure 1**

Because your response will be made available electronically for public inspection in the NRC Public Document Room (PDR), or from the NRC's document system (ADAMS), accessible from the NRC web site at <http://www.nrc.gov/reading-rm/adams.html>, to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld, and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated at Rockville, Maryland

this 20th day of December 2005

**U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS**

Docket No.: 70-1257

License No.: SNM-1227

Report No.: 70-1257/2005-203

Licensee: Framatome ANP, Inc.

Location: Richland, WA

Dates: November 28 through December 1, 2005

Inspector: Dennis Morey, Senior Criticality Safety Inspector, NRC Headquarters

Approved by: Melanie A. Galloway, Chief  
Technical Support Group  
Division of Fuel Cycle Safety  
and Safeguards

**Framatome ANP Inc.  
NRC Inspection Report No. 70-1257/2005-203**

**EXECUTIVE SUMMARY**

**Introduction**

Staff of the U.S. Nuclear Regulatory Commission Headquarters performed a routine and announced nuclear criticality safety (NCS) inspection of the Framatome ANP facility in Richland, Washington from November 28 through December 1, 2005. The inspection included an on-site review of the licensee NCS program, NCS analyses, NCS inspections, audits and investigations, criticality alarm annunciators, plant operations, and open item followup. The inspection focused on risk-significant fissile material processing activities in the UO<sub>2</sub> Building including scrap recovery processes, the blended low-enriched uranium (BLEU) facility, the dry conversion facility, and the specialty fuels facility.

**Results**

- A Severity Level IV violation was identified for failing to designate appropriate items relied on for safety (IROFS) for the accident sequence of inadvertently introducing dry hydrogenous additives into 55-gallon drums in the BLEU warehouse storage array.
- With the exception of the violation noted above, the NCS program was adequate for maintaining acceptable levels of safety.
- Licensee audibility testing of the criticality alarm system was adequate to meet regulatory requirements and assure prompt evacuation of workers upon detection of a criticality event.
- Plant operations involving fissile materials were conducted safely and in accordance with written procedures.

## REPORT DETAILS

### 1.0 NCS Program (88015)

#### a. Inspection Scope

The inspector reviewed NCS analyses to determine that criticality safety of risk-significant operations was assured through engineered and human performance controls with adequate safety margin/certainty and preparation and review by qualified staff. The inspector accompanied NCS and other technical staff on walkdowns of NCS controls in selected plant areas. The inspector reviewed selected aspects of the following documents:

- E04-NCSA-120, "UNH [uranyl nitrate hexahydrate] Reprocessing," Revision 3, dated September 1, 2005
- E04-NCSA-135, "BLEU Scrap Recovery," Revision 1, dated July 8, 2005
- E04-NCSA-370, "UO<sub>2</sub> Pellet Pressing," Revision 3, dated November 18, 2005
- E04-NCSA-375, "BLEU Pellet Pressing," Revision 4, dated November 21, 2005
- E04-NCSA-380, "Pellet Sintering Area," Revision 2.1, dated July 8, 2005
- E04-NCSA-395, "BLEU Pellet Grinding," Revision 2.1, dated November 11, 2005
- E04-NCSA-400, "UO<sub>2</sub> Pellet Storage Area," Revision 3, dated June 16, 2005
- E04-NCSA-761, "Between Building Transfer," Revision 3.1, July 28, 2005
- E04-NCSA-790, "Development, Process Support and Analytical Labs," Revision 2, dated September 1, 2005
- E04-NCSA-960, "HVAC [heating, ventilation and air conditioning] Exhaust Systems," Revision 3, dated September 21, 2005

#### b. Observations and Findings

The inspector determined that analyses were performed by qualified NCS engineers, that independent reviews were completed for the evaluations by other qualified NCS engineers, that subcriticality of the systems and operations was assured through appropriate limits on controlled parameters, and that double contingency was assured for each credible accident sequence leading to inadvertent criticality. The inspector determined that NCS controls for equipment and processes assured the safety of the operations.

#### c. Conclusions

With the exception of the violation noted below, the NCS program was adequate for maintaining acceptable levels of safety.

## 2.0 NCS Inspections, Audits and Investigations (88015)

### a. Inspection Scope

The inspector reviewed licensee investigation and corrective actions for two recent events where criticality safety controls were involved or affected. The inspector reviewed selected aspects of the following documents:

- E04-NCSA-325, "BLEU Powder Preparation," Revision 3.0, dated October 14, 2005
- E04-NCSA-325, "BLEU Powder Preparation," Revision 4.0, dated November 16, 2005
- E04-NCSA-355, "BLEU Powder Storage," Revision 4.0, dated November 16, 2005

### b. Observations and Findings

#### **Ventilation Deluge System Activation**

On September 17, 2005, licensee staff inadvertently activated a fire deluge system in a ventilation supply line during a test of the ventilation smoke detector when the test was mistakenly performed on the system heat detector. The inadvertent activation resulted in a contamination event. The deluge system is intended to prevent fire propagation by filling the ventilation supply line with water spray in the event of a temperature increase above a trip point near a high-efficiency particulate-air filter. The criticality concern relative to the deluge system is the backflow of water into other parts of the ventilation system. The inspector determined that the NCS controls in place, drains and sloping of the ventilation toward the drains, functioned appropriately during the event. The inspector did not have any safety concerns related to the event.

#### **45-Gallon to 55-Gallon Drum Transfer**

The licensee stores BLEU  $\text{UO}_2$  powder in 55-gallon drums in a warehouse in the BLEU facility. The 55-gallon drums are segregated in the BLEU warehouse by physical barriers which prevent their movement into other areas of the BLEU facility. BLEU powder is normally transferred into BLEU warehouse 55-gallon drums by vacuum transfer from shipping containers upon arrival. The licensee recently decided to store reprocessed BLEU powder in BLEU warehouse 55-gallon drums and installed a vacuum transfer system to move this powder from 45-gallon poisoned drums to 55-gallon BLEU warehouse storage drums. The licensee intended that only dry  $\text{UO}_2$  powder (less than 0.5 wt% moisture) without additives would be transferred for storage in 55-gallon drums. The inspector noted that BLEU powder is also available with dry hydrogenous additives such as pore former and die lubricant which are moderators. The licensee planned to assure criticality safety for this operation with two IROFS: IROFS #1 assured that two independent determinations of moisture content or moisture equivalent were made and IROFS #2 verified moisture content before opening the transfer valve.

On November 3, 2005, during initial testing of the powder transfer system, licensee staff transferred 115 kilograms of 3.0 wt% enriched reprocessed BLEU  $UO_2$  powder mixed with dry hydrogenous additives and containing a total of 0.53 wt% moisture equivalent from a poisoned 45-gallon drum to a 55-gallon drum in the BLEU warehouse. The transfer operation was not successfully completed because an administrative requirement to label the drum could not be accomplished. During an investigation of the labeling problem, the licensee determined that IROFS #2 for moisture content verification did not address moderators other than water. The licensee noted that only one credited IROFS (IROFS #1) protected the drum storage array. The inspector noted that the transferred powder contained 0.53 wt% moisture equivalent which exceeded the operating limit for the drum storage array of 0.5 wt% moisture equivalent. The inspector determined that the event had occurred due to the analytical failure to consider moderators other than water which could be present in BLEU powder. The licensee's failure to consider and address BLEU powder with dry hydrogenous additives resulted in the failure of one of the IROFS protecting the drum storage warehouse array from exceeding the array safety limit for moderator content.

Two NCS concerns are raised by the event: criticality in the individual drum and criticality in the drum storage array. The safety limit for individual drums is 6.25 wt% moisture equivalent moderation and 931 kilograms  $UO_2$  powder per drum. The safety limit for the drum array is 2.0 wt% moisture equivalent moderation and 830 kilograms  $UO_2$  powder per drum. The inspector determined that the licensee had a credited IROFS preventing movement of powder with greater than 1.0 wt% moisture or moisture equivalent (IROFS #1). The licensee also had an IROFS credited for the accident sequence of exceeding moderation limits when initially placing additives in  $UO_2$  powder (a different accident sequence) which consisted of limits on the additives. The licensee also had an IROFS credited for the accident sequence of exceeding seismic limits in the 55-gallon drum storage rack which was limiting individual drum mass to 454 kilograms  $UO_2$  powder (another different accident sequence). The inspector noted that IROFS #1 which was credited for the accident sequence and the two IROFS credited for different accident sequences were available during the event. The inspector determined that credit could be granted for these controls in this situation so that the criticality safety performance requirement for the accident sequence of inadvertently introducing dry hydrogenous additives into 55-gallon drums in the BLEU warehouse storage array could be considered met.

The inspector determined that on and before October 14, 2005, the licensee implemented a process to transfer reprocessed BLEU powder into storage and failed to designate appropriate IROFS for that operation as required in order to reduce the likelihood of criticality in BLEU powder storage, specifically by failing to control the transfer of BLEU powder containing dry hydrogenous additives. The failure to designate appropriate IROFS for the accident sequence of inadvertently introducing dry hydrogenous additives into 55-gallon drums in the BLEU warehouse storage array is **Violation (VIO) 70-1257/2005-203-01.**

c. Conclusions

A Severity Level IV violation was identified for failing to designate appropriate IROFS for the accident sequence of inadvertently introducing dry hydrogenous additives into 55-gallon drums in the BLEU warehouse storage array.

**3.0 Criticality Alarm System Annunciators (88015)**

a. Inspection Scope

The inspector reviewed licensee criticality alarm annunciator use and testing to confirm that the licensee had a procedure to verify horn operability. The inspector reviewed selected aspects of the following documents:

- PM003887, "Criticality Howlers," Revision 7, dated March 5, 2005
- DWG-EMF-601,685, Sheet 26, "Criticality System Howler Location," Revision 21, dated March 2005
- DWG-EMF-601,685, Sheet 27, "Criticality System Howler Location," Revision 4, dated October 1999
- DWG-EMF-601,685, "Criticality System Howler Location Preventive Maintenance Site Plan," Revision 3, dated November 1999

b. Observations and Findings

The licensee performs biennial evacuation drills during which the criticality alarm system is activated and also conducts biennial horn functionality checks wherein maintenance workers check each individual horn during an off-shift. The licensee relies on employees to report inoperable horns during evacuation drills and checks each individual horn during functional checks. The functional tests are performed off-shift on weekends in accordance with a scheduled preventive maintenance procedure, and every individual horn is checked. Licensee staff indicated that between four and eight horns are serviced each year as a result of the tests. The inspector noted that the licensee employs a single unified criticality alarm system which activates all annunciators upon detection of a criticality event so that the impact of individual annunciators becoming inoperable is minimal. The inspector determined that the licensee provided adequate assurance of the audibility of the criticality alarm system.

c. Conclusions

Licensee audibility testing of the criticality alarm system was adequate to meet regulatory requirements and assure prompt evacuation of workers upon detection of a criticality event.

#### **4.0 Plant Operations (88015)**

##### a. Inspection Scope

The inspector performed plant walkdowns to review activities in progress and to determine whether risk-significant fissile material operations were being conducted safely and in accordance with regulatory requirements. The inspector interviewed operators, NCS engineers and process engineers both before and during walkdowns.

##### b. Observations and Findings

The inspector verified the adequacy of management measures for assuring the continued availability, reliability and capability of safety-significant controls relied upon by the licensee for controlling criticality risks to acceptable levels. The inspector performed walkdowns of the UO<sub>2</sub> Building including scrap recovery processes, the BLEU facility, the dry conversion facility, and the specialty fuels facility. No safety concerns were noted during walkdowns.

##### c. Conclusions

Plant operations involving fissile materials were conducted safely and in accordance with written procedures.

#### **5.0 Open Item Follow-up**

##### **IFI 70-1257/2004-202-02**

This item tracked completion of NCS posting revisions by May 31, 2005. During this inspection, the licensee indicated that work on the revisions is complete. The inspector reviewed a selection of new postings and interviewed responsible NCS staff. The inspector determined that NCS posting revision has been completed. This item is closed.

##### **IFI 70-1257/2004-202-04**

This item tracked completion of work station qualification guide revisions by October 31, 2005. During this inspection, the inspector determined that the qualification guide revisions were complete. This item is closed.

##### **IFI 70-1257/2004-203-03**

This item tracks the licensee's evaluation of the impact of uranium-hydrocarbon benchmarks. During a previous inspection, the inspectors noted that the licensee's collection of benchmark experiments did not include uranium-hydrocarbon systems. The inspectors had determined through interviews with licensee NCS staff that uranium-hydrocarbon systems (e.g., pellet press oil) existed at the facility and were routinely modeled in NCS calculations. The licensee acknowledged the lack of applicable benchmarks in the validation report and agreed to further evaluate the impact of

uranium-hydrocarbon systems on bias. During a subsequent inspection, the inspector determined that qualitative analysis was not adequate for demonstrating the impact of hydrocarbons on the licensee benchmark set. The inspector determined that a more quantitative method such as recalculating bias for the example or licensee benchmark sets with hydrocarbon critical experiments included would be more appropriate to address the issue. During this inspection, the licensee indicated that a company-wide strategy for establishing subcritical limits was planned and the item would not be resolved until October 2006. This item remains open.

## **6.0 Exit Meeting**

The inspector communicated the inspection scope and results to members of Framatome ANP, Richland management throughout the inspection and during an exit meeting on December 1, 2005. Licensee management acknowledged and understood the findings as presented.

## SUPPLEMENTARY INFORMATION

### 1.0 List of Items Opened, Closed, and Discussed

#### Items Opened

**VIO 70-1257/2005-203-01** Failure to designate appropriate IROFS for the accident sequence of inadvertently introducing dry hydrogenous additives into 55-gallon drums in the BLEU warehouse storage array (Section 2.0)

#### Items Closed

**IFI 70-1257/2004-202-02** Tracks completion of NCS posting revisions by May 31, 2005 (Section 5.0)

**IFI 70-1257/2004-202-04** Tracks completion of work station qualification guide revisions by October 31, 2005 (Section 5.0)

#### Items Discussed

**IFI 70-1257/2004-203-03** Tracks the licensee's evaluation of the impact of uranium-hydrocarbon benchmarks (Section 5.0)

### 2.0 Inspection Procedures Used

IP 88015 Headquarters Nuclear Criticality Safety Program

### 3.0 Key Points of Contact

#### **Framatome ANP Richland**

*J. Diest	NCS Engineer
*C. Manning	Manager, NCS
*L. Maas	Manager, Licensing and Compliance
*C. Perkin	Manager, Richland Operations
R. Land	Site Manager

#### **NRC**

\*D. Morey Criticality Safety Inspector, NRC Headquarters

\*Personnel in attendance at the exit meeting on December 1, 2005.

#### **4.0 List of Acronyms and Abbreviations**

ANP	Advanced Nuclear Power (company name)
BLEU	blended low-enriched uranium
CFR	Code of Federal Regulations
IFI	inspection follow-up item
IP	inspection procedure
IROFS	item relied on for safety
NCS	nuclear criticality safety
NMSS	Office of Nuclear Material Safety and Safeguards
NRC	U.S. Nuclear Regulatory Commission
VIO	violation