

[REDACTED]

April 6, 2006

Mr. W. D. Nash, General Manager  
BWX Technologies, Inc.  
P.O. Box 785  
Lynchburg, VA 24505-0785

SUBJECT: INSPECTION REPORT 70-27/2006-202 AND NOTICE OF VIOLATION

Dear Mr. Nash:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine announced nuclear criticality safety (NCS) inspection at your facility in Lynchburg, Virginia, from March 6 through 9, 2006. The purpose of the inspection was to determine whether activities involving special nuclear material were conducted safely and in accordance with NRC regulatory requirements. An exit meeting was held at the conclusion of the inspection on March 9, 2006. Throughout the inspection, observations were discussed with your managers and staff.

The inspection, which is described in the enclosure, focused on the most hazardous activities and plant conditions; the most important controls relied on for safety and their analytical basis; and the principal management measures for ensuring controls are capable, available, and reliable to perform their function relied on for safety. The inspection consisted of analytical basis review, selective review of related procedures and records, examinations of relevant NCS-related equipment, interviews with NCS engineers and plant personnel, and facility walkdowns to observe plant conditions and activities related to safety basis assumptions and related NCS controls.

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 by the NRC during the inspection. The violation being cited as a Severity Level IV violation is the failure to provide, in a posting or approved procedure, administrative controls [REDACTED] being used as a storage location for [REDACTED] material.

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.

[REDACTED]

[REDACTED]

W. D. Nash

-2-

[REDACTED]

If you have any questions concerning this report, please contact Natreon Jordan, of my staff, at (301) 415-7648.

Sincerely,

**/RA/**

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

Docket No. 70-27  
License No. SNM-42

Enclosure: Inspection Report 70-27/2006-202

cc: L. Morrell  
Licensing Officer  
BWX Technologies

[REDACTED]

[REDACTED]

W. D. Nash

-2-

[REDACTED]

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Licensing Officer  
BWX Technologies

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<b>NAME</b>	NJordan	DMorey	RWrey	MGalloway
<b>DATE</b>	03/29/06	03/29/06	03/30/06	04/06/06

[REDACTED]

[REDACTED]

## NOTICE OF VIOLATION

BWX Technologies, Inc.  
Lynchburg, VA

Docket No. 70-27  
License No. SNM-42

During a U.S. Nuclear Regulatory Commission (NRC) inspection from March 6 through 9, 2006, 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:

Safety Condition No. S-1 of Special Nuclear Material License No. 42 requires that material be used in accordance with the statements, representations, and conditions in the license application dated July 14, 1995, and supplements thereto.

Chapter 4.1.2 of the License Application states, in part, that administrative limits and controls are provided to the operating areas on nuclear criticality safety postings or in operating procedures or both.

The Licensee's Nuclear Products Division Criticality Safety Manual (NCS-01, Revision 7) requires that fuel only be handled on equipment or in operations that are properly posted with criticality safety postings or that are controlled by approved operating documents.

Contrary to the above, on and before March 9, 2006, the licensee failed to clearly define administrative limits [REDACTED] by applying either a nuclear criticality safety posting or an approved procedure containing those limits [REDACTED] being used as a storage location for [REDACTED] material.

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

Pursuant to the provisions of 10 CFR 2.201, BWX Technologies, Inc. (BWXT), 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, NMSS, Regional Administrator, Region II, and the NRC resident inspector at BWXT, 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 or severity level, (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

Enclosure 1

[REDACTED]

[REDACTED]

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, with the basis for your denial, to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

[REDACTED]

Dated this 6 th day of April 2006

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

Docket No.: 70-27

License No.: SNM-42

Report No.: 70-27/2006-202

Licensee: BWX Technologies, Inc.

Location: Lynchburg, VA

Inspection Dates: March 6 - 9, 2006

Inspectors: Dennis C. Morey, Senior Criticality Safety Inspector, NRC Headquarters  
Natreon J. Jordan, Criticality Safety Inspector, NRC Headquarters

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

**Enclosure 2**

[REDACTED]

## EXECUTIVE SUMMARY

### **BWX Technologies, Inc. NRC Inspection Report 70-27/2006-202**

#### **Introduction**

Staff of the U.S. Nuclear Regulatory Commission (NRC) performed a routine and announced nuclear criticality safety (NCS) inspection of the BWX Technologies (BWXT), Lynchburg, Virginia, facility from March 6 through 9, 2006. The inspection included an on-site review of the licensee programs dealing with the NCS program, inspections, audits, and investigations, and plant operations. The licensee programs were acceptably directed toward the protection of public health and safety and in compliance with NRC requirements. The inspection focused on risk-significant [REDACTED] material processing activities including fuel fabrication and machining, [REDACTED] areas, the uranium recovery area, [REDACTED] areas, and machining operations.

#### **Results**

- A severity level IV violation was identified for the failure to clearly define administrative limits [REDACTED] by applying either a nuclear criticality safety posting or an approved procedure containing those limits [REDACTED] being used as a storage location for [REDACTED] material.
  - The NCS program as observed was adequate for maintaining acceptable levels of safety.
  - The inspectors observed minor administrative deficiencies in the facility integrated safety analysis (ISA) that were planned for correction in the next revision.
  - NCS audits and corrective actions were adequate for maintaining acceptable levels of safety.
  - The licensee criticality warning system horns were adequate to cause facility evacuation in the event of inadvertent criticality.
  - With the exception of the noted violation, plant operations involving [REDACTED] materials were conducted safely and in accordance with written procedures.
- [REDACTED]

**REPORT DETAILS**

**1.0 Summary of Plant Status**

BWX Technologies (BWXT) manufactures high-enriched uranium fuel, [REDACTED] facility near Lynchburg, VA. During the inspection, the licensee conducted routine fuel manufacturing operations and maintenance activities in the fuel fabrication areas. Uranium recovery, downblending, and other routine operations and maintenance activities were conducted in the [REDACTED] area.

**2.0 NCS Program (88015)**

a. Inspection Scope

The inspectors reviewed NCS analyses to determine that criticality safety of risk-significant operations was assured through engineered and human controls with adequate safety margin and preparation and review by qualified staff. The inspectors reviewed selected aspects of the following documents:

- NCS-2005-272, "[REDACTED]"; dated December 9, 2005
  - NCS-2005-299, "Level 1 NCS Evaluation for Safety Evaluation Report (SER)-05-084, Phase 1, [REDACTED]"; dated November 22, 2005
  - NCS-2005-236, "Level 3 Evaluation [REDACTED] (SER-05-077, Phase 1)"; dated January 19, 2006
  - NCS-2005-303, "Analysis [REDACTED]"; dated November 21, 2005
  - NCS-2006-027, "Evaluation [REDACTED]"; dated February 16, 2006
  - NCS-2006-010, "[REDACTED]"; dated February 28, 2006
  - NCS-2006-025, "Criticality Howler Test"; dated February 6, 2005
  - NCS-2000-175, "Drain Lines in the HEU [REDACTED]"; dated May 25, 2000
  - NCS-2003-290, "Enclosure Drain Calculations"; dated October 7, 2003
  - NCS-2005-264, "NCS Evaluation [REDACTED]"; dated October 26, 2005
  - NCS-2006-005, "NCS Evaluation [REDACTED]"; dated January 24, 2006
  - NCS-2005-276, "NCS Evaluation [REDACTED]"; dated October 26, 2005
  - NCS-01, "Nuclear Products Division Criticality Safety Manual: Limits and Controls," Revision 7
  - [REDACTED] 02-0253, "[REDACTED]"; dated November 18, 2002
- [REDACTED]

b. Observations and Findings

Within the selected aspects reviewed, the inspectors determined that NCS analyses were performed by qualified NCS engineers, that independent reviews of the evaluations were completed by 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 inspectors determined that NCS analyses and supporting calculations demonstrated adequate identification and control of NCS hazards to assure operations within subcritical limits and that NCS controls for equipment and processes assured the safety of the operations.

c. Conclusions

The NCS program as observed was adequate for maintaining acceptable levels of safety.

**3.0 Review of Integrated Safety Analysis and Items Relied On For Safety**

a. Inspection Scope

The inspectors reviewed selected NCS-related items relied on for safety (IROFS) to determine that performance requirements have been met for selected accident sequences. During walkdowns, the inspectors evaluated the effectiveness of the IROFS to assure adequate subcritical margin for normal and credible abnormal conditions. The inspectors reviewed the facility Integrated Safety Analysis (ISA) to determine that appropriate criticality safety accident sequences were identified and controlled consistent with approved criticality safety analysis. The inspectors reviewed selected aspects of the following documents:

- Safety Analysis Report (SAR) 15.15, "[REDACTED]," Revision 87, dated December 21, 2005
- Safety Analysis Report 15.37, "[REDACTED]," Revision 56, dated October 31, 2005
- NCS-2005-329, "Evaluation [REDACTED]," dated January 16, 2006

b. Observations and Findings

The inspectors reviewed selected ISA accident sequences related to NCS and established that the accident sequences and controls corresponded with approved facility criticality safety analyses. The inspectors noted that in SAR Table 15.37.4.1.1, an NCS IROFS was listed as:

[REDACTED]

The inspectors noted that the accident sequence of concern was the [REDACTED].

[REDACTED]

[REDACTED]

The inspectors were concerned that this IROFS was not well-defined. Licensee staff agreed and changed the IROFS to:

[REDACTED]

The inspectors noted that NCS evaluation NCS-2005-329 concerned the removal of equipment from the uranium recovery area which affected references in the facility ISA. The nuclear criticality safety evaluation (NCSE) contained an operational requirement to relocate SAR 15.11 Appendix [REDACTED] to other SAR Appendices or delete if similar scenarios exist. The inspectors were concerned that this appeared to leave the assignment of accident sequence applicability to clerical staff without further review by technical or safety staff. The licensee noted that this ISA revision was pending and assured the inspectors that no changes to accident sequences were foreseen. The inspectors plan to review how these NCSE operational requirements are implemented. Relocation or deletion of accident sequences directed by NCSE-2005-329 will be tracked as **Inspection Follow-up Item (IFI) 70-27/2006-202-01**.

c. Conclusions

The inspectors observed minor administrative deficiencies in the facility ISA that were planned for correction at the next revision.

#### 4.0 **Inspections, Audits, and Investigations (88015)**

a. Inspection Scope

The inspectors reviewed results of the most recent NCS quarterly audits to assure that appropriate issues were identified and resolved. The inspectors reviewed selected aspects of the following documents:

- NCS-2005-268, "NCS Violation & Observation Summary - 3<sup>rd</sup> Quarter 2005," dated November 8, 2005
- NCS-2006-004, "NCS Violation & Observation Summary - 4<sup>th</sup> Quarter 2005," dated January 31, 2006
- Corrective Action Form CA-2005-00884, "[REDACTED]," dated September 20, 2005
- Corrective Action Form CA-2005-00864, "[REDACTED]," dated September 12, 2005

b. Observations and Findings

The inspectors observed that the licensee NCS audits were conducted in accordance with written procedures. The inspectors noted that the audits were performed by NCS

[REDACTED]

engineers who reviewed open NCS issues from previous audits; reviewed the adequacy of control implementation; reviewed plant operations for compliance with license requirements, procedures, and postings; and examined equipment and operations to determine that past evaluations remained adequate. The inspectors had no concerns regarding the identification, assignment and tracking of corrective actions. No safety concerns were noted.

c. Conclusions

NCS audits and corrective actions were adequate for maintaining acceptable levels of safety.

## 5.0 Criticality Monitoring System (88015)

a. Inspection Scope

The inspectors verified that the licensee's maintenance of criticality accident alarm annunciators was adequate to assure that the system will provide an audible warning when required. The inspectors reviewed selected aspects of the following documents:

- NCS-2006-025, "Criticality Howler Test for Operability of Annunciator Horns and Lights," dated February 6, 2002

b. Observations and Findings

NRC Information Notice 2005-28 described the failure of a fuel cycle licensee to detect inoperable criticality alarm system horns during routine maintenance and testing. The inspectors noted that the licensee had performed a systematic review of operability throughout its facility and had identified no areas where inoperable horns resulted in inaudible alarms. The licensee identified that overlapping audibility coverage could result in inoperable horns going undetected, and a comprehensive annual review of horn operability was added to the governing procedure to address the concern.

c. Conclusions

The licensee criticality warning system horns were adequate to cause facility evacuation in the event of inadvertent criticality.

## 6.0 Plant Operations (88015)

a. Inspection Scope

The inspectors performed plant walkdowns to review activities in progress and to determine whether risk-significant [REDACTED] material operations were being conducted safely and in accordance with regulatory requirements. The inspectors 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 inspectors performed walkdowns of fuel fabrication and machining, [REDACTED] areas, uranium recovery area, and [REDACTED] areas. The inspectors reviewed selected aspects of the following documents prior to performing the walkdowns:

- NCS-2005-272, "[REDACTED]", dated December 9, 2005
- NCS-2005-299, "Level 1 NCS [REDACTED], Phase 1, [REDACTED]", dated November 22, 2005
- NCS-2005-236, "[REDACTED]" (SER-05-077, Phase 1), dated January 19, 2006

b. Observations and Findings

The inspectors verified that controls identified in NCS analyses were installed or implemented and were adequate to ensure safety. The cognizant NCS engineers were knowledgeable and had good interfaces with operators on the process floors. With the exception of the violation discussed below, no safety issues were identified during the walkdowns.

During a walkdown of fuel fabrication areas, the inspectors identified [REDACTED] being used to store [REDACTED] material. Upon further investigation, the inspectors noted that the [REDACTED] did not have a criticality posting or procedure in place providing limitations on usage [REDACTED] was designed to allow its top portion, when filled with [REDACTED] material to be placed [REDACTED]. Inspectors identified a criticality safety posting with limits involving use [REDACTED] on the [REDACTED]. However, there were no physical postings or procedures containing administrative limits [REDACTED] on the [REDACTED]. The licensee considered [REDACTED] to be part of, or a fixture [REDACTED]. However, there were no approved controls (posting or procedures) in place to prohibit the [REDACTED] from being moved from that area. The [REDACTED] was being used to store [REDACTED] material in the same manner as other [REDACTED] in the facility without being properly designated, by posting or procedure, as a storage location.

Chapter 4.1.2 of the License Application states, in part, that administrative limits and controls are provided to the operating areas on nuclear criticality safety postings or in operating procedures or both.

The Licensee's Nuclear Products Division Criticality Safety Manual (NCS-01, Revision 7) requires that fuel only be handled on equipment or in operations that are properly posted with criticality safety postings or that are controlled by approved operating documents.

Contrary to the above, on and before March 9, 2006, the licensee, failed to clearly define administrative limits [REDACTED] by applying either a nuclear criticality safety posting or an approved procedure containing those limits [REDACTED] being used as a storage location for [REDACTED] material.

[REDACTED]

[REDACTED]

Failure to clearly define administrative limits by applying a nuclear criticality safety posting or approved procedure [REDACTED] being used as a storage location for [REDACTED] material is **Violation (VIO) 70-27/2006-202-02.**

c. Conclusions

A severity level IV violation was identified for the failure to clearly define administrative limits [REDACTED] by applying either a nuclear criticality safety posting or an approved procedure containing those limits [REDACTED] being used as a storage location for [REDACTED] material.

With the exception of the noted violation, plant operations involving [REDACTED] materials were conducted safely and in accordance with written procedures.

**7.0 Open Item Review**

**VIO 70-27/2005-203-01**

This item concerned the licensee's failure to document in nuclear criticality safety analyses that risk of criticality was identified and minimized in process ventilation systems other than in the Uranium Recovery Area. During a previous inspection, the inspectors determined that the licensee could not demonstrate with existing documentation that it had analyzed the dry process ventilation systems and minimized the risk of [REDACTED] material accumulation. During this inspection, the inspectors reviewed the licensee's criticality safety evaluation and new controls covering ventilation in the balance of plant areas. The inspectors determined that the licensee had addressed NCS in ventilation systems appropriately. This item is closed.

**8.0 Exit Meeting**

The inspectors presented the inspection scope and results to members of the licensee's management and staff during an exit meeting on March 9, 2006. The licensee acknowledged and understood the findings as presented.

[REDACTED]

[REDACTED]

**SUPPLEMENTARY INFORMATION**

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

**Opened**

**IFI 70-27/2006-202-01** Tracks the relocation or deletion of accident sequences directed by NCSE-2005-239.

**VIO 70-27/2006-202-02** Failure to clearly define administrative limits [REDACTED] by applying either a nuclear criticality safety posting or an approved procedure containing those limits [REDACTED] being used as a storage location for [REDACTED] material.

**Closed**

**VIO 70-27/2005-203-01** Failure to document the identification and minimization of criticality risk in the criticality safety analyses for ventilation systems other than in the uranium recovery area.

**Discussed**

None

**2.0 Inspection Procedures Used**

IP 88015 Headquarters Nuclear Criticality Safety Program

**3.0 Partial List of Persons Contacted**

**BWXT**

L. Duncan	Manager, Nuclear Criticality Safety
L. Morrell	Manager, Licensing
S. Schilthelm	Manager, Safety and Licensing
D. Ward	Manager, Environment, Safety, Health, and Safeguards

**NRC**

D. Morey	Senior Criticality Safety Inspector
N. Jordan	Criticality Safety Inspector
O. Lopez	Fuel Facility Inspector, NRC Region II
G. Wertz	Senior Resident Inspector

All participated in the exit meeting on March 9, 2006.

**Attachment**

[REDACTED]



#### 4.0 List of Acronyms

BWXT	BWX Technologies, Inc.
HEU	high-enriched uranium
IFI	inspector follow-up item
IP	inspection procedure
IROFS	items relied on for safety
ISA	integrated safety analysis
LEU	low-enriched uranium
NCS	nuclear criticality safety
NCSE	nuclear criticality safety evaluation
NPD	Nuclear Products Division
NRC	U.S. Nuclear Regulatory Commission
SAR	safety analysis report
VIO	violation
SER	Safety evaluation report

