March 15, 2007

Mr. Roger P. Cochrane, General Manager
BWX Technologies, Inc.
P.O. Box 785
Lynchburg, VA 24505-0785

SUBJECT: INSPECTION REPORT 70-27/2007-202 AND NOTICE OF VIOLATION

Dear Mr. Cochrane:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine announced nuclear criticality safety (NCS) inspection at your facility in Lynchburg, Virginia, from February 26 through March 2, 2007. 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 2, 2007. 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 functions 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; 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 implement a control that limited an NCS parameter to the value specified in the NCS evaluation.

[redacted]

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]

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

Sincerely,

/RA/

Wilkins R. Smith, Acting Chief
Technical Support Branch
Division of Fuel Cycle Safety
and Safeguards, NMSS

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

Enclosures: 1. Notice of Violation
2. Inspection Report 70-27/2007-202

cc: L. Morrell
Licensing Officer
BWX Technologies

[redacted]

[redacted]

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[redacted]

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cc: L. Morrell
Licensing Officer
BWX Technologies

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[redacted]

[redacted]

NOTICE OF VIOLATION

BWX Technologies, Inc.
Lynchburg, VA

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

During an NRC inspection from February 26 through March 2, 2007, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, 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.
>
> Part IV of the appendix to Chapter 5 of the License Application states, in part, that unless specified and acceptable controls are implemented to limit a nuclear criticality safety parameter to certain values that the most reactive condition will be assumed in the nuclear criticality safety evaluation.
>
> Contrary to the above, on and before February 28, 2007, the licensee failed to implement a specified control limiting a nuclear criticality safety parameter to the specified value in the approved nuclear criticality safety evaluation. Specifically, the licensee failed to implement a control [redacted]

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 Branch, Division of Fuel Cycle Safety and Safeguards, NMSS, and 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.

Enclosure 1

[redacted]

[redacted]

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.

[redacted]

Dated this 15th day of March 2007

[redacted]

[redacted]

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

Docket No.:	70-27
License No.:	SNM-42
Report No.:	70-27/2007-202
Licensee:	BWX Technologies, Inc.
Location:	Lynchburg, VA
Inspection Dates:	February 26 through March 2, 2007
Inspectors:	Dennis Morey, Senior Criticality Safety Inspector Blake Purnell, Criticality Safety Inspector
Approved by:	Wilkins R. Smith, Acting Chief Technical Support Branch Division of Fuel Cycle Safety and Safeguards, NMSS

Enclosure 2

[redacted]

[redacted]

EXECUTIVE SUMMARY

BWX Technologies, Inc.
NRC Inspection Report 70-27/2007-202

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 February 26 through March 2, 2007. The inspection included an on-site review of the licensee NCS program, NCS-related inspections, audits and investigations, and plant operations. The inspection focused on risk-significant [redacted] material processing activities including fuel fabrication and machining, the uranium recovery area, [redacted] areas, and the criticality warning system (CWS).

Results

- A severity level IV violation was identified for the failure to implement a specified NCS control.
- No safety concerns were identified regarding NCS controls in approved NCS analysis, approvals, or calculations.
- No safety concerns were noted regarding NCS audits.
- No concerns were noted regarding CWS coverage being affected by preparation of new or revised NCS analysis.
- With the exception of concerns regarding implementation of passive engineered (PE) items relied on for safety (IROFS), no safety concerns were noted regarding plant operations.
- No safety concerns were identified regarding licensee NCS administrative and operating procedures.

[redacted]

REPORT DETAILS

1.0 Summary of Plant Status

BWX Technologies (BWXT) manufactures high-enriched uranium (HEU) [redacted] at its facility near Lynchburg, VA. During the inspection, the licensee conducted routine fuel manufacturing operations and maintenance activities in the fuel fabrication and uranium recovery areas. The downblending area was shutdown and no fabrication operations were being conducted in the [redacted].

2.0 Nuclear Criticality Safety Program (IP 88015 & IP 88016)

a. Inspection Scope

The inspectors reviewed nuclear criticality safety (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-2006-262, "Nuclear Criticality Safety [redacted]" dated December 14, 2006
- NCS-2007-016, "[redacted] of SER [Safety Evaluation Report] 06-069, Phase 1," dated February 1, 2007
- NCS-2007-003, "[redacted]," dated January 8, 2007
- NCS-2006-197, "[redacted]," dated October 23, 2006
- NCS-2007-012, "[redacted]," dated January 25, 2007
- NCS-2007-023, "Nuclear Safety [redacted]," dated February 15, 2007
- NCS-2007-027, "Nuclear Safety [redacted]," dated February 20, 2007
- NCS-2006-229, "Level I NCS Analysis for [redacted]," dated October 10, 2006
- NCS-2007-018, "NCS Analysis for SER 07-009 [redacted]," dated February 7, 2007
- NCS-1992-067, "[redacted]," dated June 15, 1992

b. Observations and Findings

The inspectors reviewed NCS Approvals, NCS Evaluations, and supporting calculations for new, changed, and other selected operations. Within the selected aspects reviewed, the inspectors determined that the analyses were performed by qualified NCS engineers, that independent reviews of the evaluations were completed by qualified NCS engineers, and that the analyses provided for subcriticality of the systems and operations. The inspectors observed that the analyses contained appropriate limits on controlled parameters for each credible accident sequence leading to inadvertent criticality. Nuclear criticality safety analyses and supporting calculations demonstrated adequate identification and control of NCS hazards to assure operations within subcritical limits.

The inspectors did not identify any safety concerns related to NCS controls in approved NCS analysis, approvals, or calculations.

c. Conclusions

No safety concerns were identified regarding NCS controls in approved NCS analysis, approvals, or calculations.

3.0 Nuclear Criticality Safety Administrative and Operating Procedures (IP 88015)

a. Inspection Scope

The inspectors reviewed NCS administrative procedures to determine whether the procedures adequately implement the NCS program described in the license. The inspectors reviewed selected aspects of the following documents:

- Quality System Procedure (QSI) NCS-01, "Limits and Controls," Revision 7, undated
- QSI NCS-05, "Moderation Control," Revision 5, undated
- Quality Work Instruction (QWI)-5.1.26, "NCS Postings," Revision 6, undated
- Operating Procedure (OP) NCSE [Nuclear Criticality Safety Evaluation]-02, "NCS Analysis," Revision 33, dated July 15, 2006
- OP NCSE-03, "NCS Audits," Revision 22, dated December 15, 2005

b. Observations and Findings

The inspectors reviewed licensee administrative procedures, a selection of changes affecting NCS analysis, and selected NCS controls. The inspectors interviewed licensee managers, NCS engineers, system engineers, and facility operators during document reviews and facility walkdowns. The inspectors determined that the licensee NCS program was conducted in accordance with written administrative procedures that reflected the program described in the license.

c. Conclusions

No safety concerns were identified regarding licensee NCS administrative and operating procedures.

4.0 Review of Integrated Safety Analysis and Items Relied On For Safety (IP 88016)

a. Inspection Scope

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 several NCS-related passive engineered (PE) controls identified as items relied on for safety (IROFS) to determine that performance requirements were 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 selected aspects of the following documents:

- SAR [Safety Analyses Report] 15.22, "[redacted] Rev. 38, dated October 26, 2006
- SAR 15.23, "[redacted]," Rev. 48, dated October 19, 2006
- NCS-1992-067, "NCSE [redacted]" dated June 15, 1992
- NCS-1989-357, "NCS Evaluation [redacted]," dated January 4, 1989
- NCS-2007-038, "Safety Concern Analysis [redacted]," dated March 1, 2007

b. Observations and Findings

The inspectors noted that the licensee had recently identified and corrected two PE IROFS that were not implemented as described in its ISA Summary. The inspectors selected several PE IROFS in order to verify that the IROFS were implemented as described in the ISA Summary for the [redacted] process area.

The inspectors observed a cylindrical compact vacuum storage chest in the [redacted] process area that did not contain a PE control, described in SAR 15.22, that would limit the height [redacted] The inspectors noted that a posting on the storage chest stated that [redacted] are not permitted in the storage chest. The inspectors noted that the NCSE for the storage chest described this height limit as an administrative control. The licensee noted that the likelihood analysis in the ISA for the accident sequence protected by the control assumed that the control was a PE control. The licensee determined that the affected accident sequence would remain highly unlikely if the suspect PE control was changed to an administrative control. The licensee committed to revise the ISA and ISA Summary to correctly identify the IROFS for the storage chest as an administrative control. The licensee revision of the ISA will be tracked as **Inspector Follow-up Item (IFI) 70-27/2007-202-01**.

The inspectors reviewed SAR 15.23 and noted that [redacted]. This reflector control was listed as a PE IROFS in the ISA. The inspectors verified this feature for several [redacted] process area and observed that [redacted]. The inspectors noted that the NCSE assumed the [redacted]

The licensee's immediate corrective actions were to remove the [redacted], cover-up these storage locations, and then [redacted]. The inspectors determined that the licensee corrective actions resolved the immediate safety concern. Licensee analysis of the issue indicated that double contingency on the [redacted] was maintained and that the performance requirements were met without the reflector control. The licensee's failure to implement the reflection control to the limit specified in the NCSE is **Violation (VIO) 70-27/2007-202-02**.

c. Conclusions

A severity level IV violation was identified for the failure to implement a specified NCS control.

5.0 Nuclear Criticality Safety Inspections, Audits, and Investigations (IP 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 observed an NCS staff member conduct an audit [redacted]. The inspectors reviewed selected aspects of the following documents:

- Draft NCS-2007-0015, "NCS Violations & Observations Summary—4th Quarter 2006," dated January 30, 2007
- NCSE-03, "Nuclear Criticality Safety Audits and Inspections," Rev. 22, dated December 15, 2005

b. Observations and Findings

The inspectors reviewed a licensee draft quarterly audit report and observed an NCS staff member conduct an audit [redacted]. The inspectors determined that the licensee NCS audits were conducted in accordance with written procedures. The inspectors noted that the audits were performed by NCS engineers who reviewed open NCS issues from previous audits; reviewed new violations that occurred during the audit quarter; reviewed the adequacy of control implementation; reviewed plant operations for compliance with license requirements, procedures, and postings; examined equipment and operations to determine that past evaluations remained adequate; and analyzed the violations for potential trends.

The inspectors interviewed NCS staff regarding the licensee's review of PE IROFS during NCS audits. Licensee NCS staff stated that they had conducted an expanded review of PE IROFS covering the entire facility during the third and fourth quarter audits of 2006 and planned to continue this expanded review due to concerns about verification of PE IROFS implementation.

c. Conclusions

No safety concerns were noted regarding NCS audits.

6.0 Criticality Warning System (IP 88017)

a. Inspection Scope

The inspectors reviewed licensee evaluation of criticality warning system coverage during preparation of new and revised criticality analysis to determine that the licensee has a means to identify affected CWS coverage. The inspectors reviewed selected aspects of the following documents:

- NCS-2006-041, "Level Three NCS Analysis [redacted]," dated March 3, 2006
- NCS-2004-202, "Range for Criticality Detector Coverage," dated July 27, 2004

b. Observations and Findings

The inspectors noted that the licensee routinely reviews criticality warning system coverage during preparation of new and changed criticality analysis and this review is noted in a separate section of the analysis. The licensee relies on NCS-2004-202 to provide general parameters for determining the effect of new equipment and operations on CWS coverage. Other methods for determining CWS coverage are also used including calculating the effect of distance or shielding due to changes. The inspectors did not identify any safety concerns regarding NCS review of CWS coverage during preparation of NCS analysis.

c. Conclusions

No concerns were noted regarding CWS coverage being affected by preparation of new or revised NCS analysis.

7.0 Plant Operations (IP 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], uranium recovery area, [redacted] areas.

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. As discussed in Section 4.0 of this inspection report, a safety concern was identified regarding implementation of PE IROFS. No other safety issues were identified during walkdowns of the facility.

c. Conclusions

With the exception of concerns regarding implementation of PE IROFS, no safety concerns were noted regarding plant operations.

8.0 Open Item Review

IFI 70-27/2006-204-01

This item tracks the licensee's commitment to analyze [redacted] material accumulation in filter media. During a previous inspection, inspectors investigated an incident involving higher-than-normal [redacted] material accumulation in the [redacted] enclosure. The amount did not challenge the mass limit imposed on the process enclosure. The licensee committed to generate an explicit analysis addressing [redacted] material accumulation in filter media. During the current inspection, the inspectors noted that the licensee had completed the analysis including analysis of operations in [redacted] This item is closed.

IFI 70-27/2006-204-03

This item tracks the licensee's commitment to revise [redacted] drain procedures, replace the condensate [redacted], and complete corrective actions. During a previous [redacted] was so discolored that it was not possible to see the presence of liquid inside it. The inspectors determined that the condition of the [redacted] rendered observation of the level (or even presence) of the condensate impossible. The licensee stated that it would (1) replace the [redacted] with one that clearly allows operators to view the level of condensate, and (2) update the operating procedure. During this inspection, the licensee stated that the [redacted] had been replaced, but due to the nature of the process, it rapidly discolored. The licensee has updated the operating procedure such that the visibility of the [redacted] is not relied upon during its inspection. The licensee stated that it had identified an additional [redacted] that perform a similar function, and the operating procedures for these [redacted] will be updated in the same manner. This item remains open.

9.0 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 2, 2007. The licensee acknowledged and understood the findings as presented.

[redacted]

SUPPLEMENTARY INFORMATION

1.0 List of Items Opened, Closed, and Discussed

Items Opened

IFI 70-27/2007-202-01	Tracks the licensee's commitment to revise the ISA and ISA Summary to correctly identify the IROFS limiting the height of [redacted] storage chest.
VIO 70-27/2007-202-02	Failure to implement a passive engineered control on a storage [redacted] that limited a specified parameter in the NCSE.

Items Closed

IFI 70-27/2006-204-01	Tracks the licensee's commitment to analyze [redacted] material accumulation in filter media.

Items Discussed

IFI 70-27/2006-204-03	Tracks the licensee's commitment to revise [redacted] procedures, replace the condensate [redacted], and complete corrective actions.

2.0 Inspection Procedures Used

IP 88015	Nuclear Criticality Safety Program
IP 88016	Nuclear Criticality Safety Evaluations and Analyses
IP 88017	Criticality Accident Alarms

3.0 Partial List of Persons Contacted

BWXT

D. Faidley	Nuclear Criticality Safety
R. Hogg	Nuclear Criticality Safety
J. Dougherty	Licensing
S. Schilthelm	Manager, Safety and Licensing
J. Creasey	Department Manager Uranium Processing
J. Burch	Department Manager Operations

NRC

D. Morey	Senior Criticality Safety Inspector, NRC HQ
B. Purnell	Criticality Safety Inspector, NRC HQ
G. Wertz	Senior Resident Inspector, NRC Region II

Attachment

[redacted]

4.0 List of Acronyms

BWXT	BWX Technologies, Inc. (Licensee)
CWS	criticality warning system
HEU	high-enriched uranium
[redacted]	[redacted]
IFI	inspector follow-up item
IP	inspection procedure
IROFS	item relied on for safety
ISA	integrated safety analysis
K_{eff}	effective neutron multiplication factor
NCS	nuclear criticality safety
NCSE	nuclear criticality safety evaluation
PE	passive engineered
[redacted]	[redacted]
SAR	Safety Analysis Report
SER	Safety Evaluation Report
[redacted]	[redacted]
VIO	violation