[redacted]

August 2, 2005
Corrected Letter

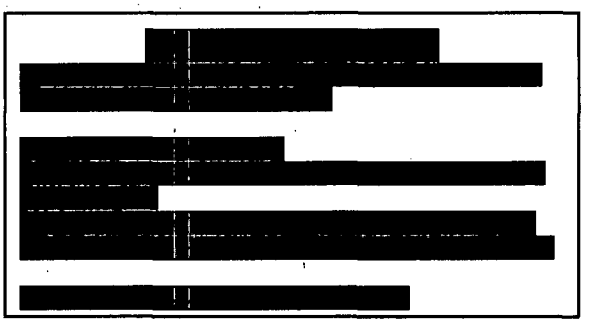
Mr. W. D. Nash, General Manager
BWX Technologies, Inc.
P.O. Box 785
Lynchburg, VA 24505-0785

SUBJECT: INSPECTION REPORT 70-27/2005-203 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 July 11 through 15, 2005. 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 July 15, 2005. The inspection observations and findings were discussed with you and members of your staff.

The inspection, which is described in the enclosure, focused on: (1) the most hazardous activities and plant conditions; (2) the most important controls relied on for safety and their analytical basis; and (3) 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. Throughout this inspection, observations were discussed with your managers and staff.



[redacted]

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 a failure to document that nuclear criticality risk was identified and minimized for process ventilation equipment in areas of the facility not involved in solution processing.

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.

If you have any questions concerning this report, please contact Lawrence Berg, of my staff, at (301) 415-6215.

Sincerely,

/RA/

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

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

Enclosures: (1) Notice of Violation
(2) Inspection Report 70-27/2005-203

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[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 July 11 through 15, 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:

> 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.
>
> The Appendix to Chapter 4 of the License Application requires that the identification and minimization of criticality risk will be documented in the nuclear criticality safety analyses of the systems.
>
> Contrary to the above, on and before July 11, 2005, the licensee failed 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.

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 Regional Administrator, Region II, the NRC resident inspector at BWXT, and the Chief, Technical Support Group, Division of Fuel Cycle Safety and Safeguards, NMSS, 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 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, with the basis for your denial, to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

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 2.790(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 this 2nd day of August 2005

[redacted]

[redacted]

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

Docket No.:	70-27
License No.:	SNM-42
Report No.:	70-27/2005-203
Licensee:	BWX Technologies, Inc.
Location:	Lynchburg, VA
Inspection Dates:	July 11 - 15, 2005
Inspectors:	Lawrence Berg, Criticality Safety Inspector, NRC Headquarters Dennis Morey, Senior 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 70-0027/2005-203

Introduction

Staff of the U.S. Nuclear Regulatory Commission (NRC) performed a routine and announced nuclear criticality safety (NCS) inspection of the BWX Technologies, Lynchburg, Virginia, facility from July 11 through 15, 2005. The inspection included an on-site review of the licensee programs dealing with plant operations, criticality accident alarm systems, and the NCS program. 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] and process ventilation systems.

Results

- A violation was identified for the failure to document that nuclear criticality risk was identified and minimized for process ventilation equipment in areas of the facility not involved in solution processing.
- NCS quarterly audits were adequate for maintaining acceptable levels of safety.
- Plant operations involving [redacted] materials were conducted safely and in accordance with written procedures.

REPORT DETAILS

1.0 Summary of Plant Status

Routine fuel manufacturing operations and maintenance activities were conducted in the fuel fabrication areas. Uranium recovery, downblending, and other routine operations and maintenance activities were conducted in the [redacted].

2.0 NCS Function (88015)

a. Inspection Scope

The inspectors 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, preparation, and review by capable staff. The inspectors reviewed selected aspects of the following documents:

- NCS-1992-054, "Nuclear Safety Release for Ventilation Modifications [redacted]," dated May 13, 1992
- NCS-1992-050, "NCS Evaluation for Ventilation Modifications [redacted]," dated May 7, 1992
- NCS-2002-278, "NCS Evaluation [redacted]," dated October 18, 2002
- NCS-2003-113, "NCS Analysis Supporting Phases 4 and 5 [redacted]," dated July 15, 2003
- NCS-2005-032, "NCS Analysis [redacted] Phase 1 and 2," dated February 9, 2005
- SER 98-016, "NCS Analysis [redacted]," dated March 25, 1998
- Section 15.35.4, "Manufacturing," Integrated Safety Analysis, dated July 13, 2005
- NCS-2001-325, "[redacted]," dated November 1, 2001
- NCS-1999-049, "NCS Evaluation of HEPA [high-efficiency particulate-air] Filter Bank [redacted]," dated March 13, 1999

b. Observations and Findings

The inspectors determined that analyses were performed by capable NCS engineers, and independent reviews were completed for the evaluations by other qualified NCS engineers. With the exception of the violation discussed below, the inspectors determined that NCS controls for equipment and processes assured the safety of the operations.

The inspectors reviewed licensee evaluation and control of criticality risk in process ventilation systems. The inspectors noted that, in response to previous material accumulation events in the uranium recovery area, the licensee had performed separate criticality analysis of process ventilation systems in that area. The inspectors also noted

that the licensee integrated safety analysis summary contained a section on ventilation for the uranium recovery area. The inspectors noted that other areas of the plant did not include substantive discussion of ventilation in their respective criticality analyses and the licensee had not performed any broad analysis covering these ventilation systems.

The licensee stated that annual surveys of ductwork and HEPA housings along with surveys of discarded HEPA filters led it to conclude that an accumulation of [redacted] material in the dry ventilation systems sufficient to support criticality was not credible. The inspectors determined that the ventilation surveys showed routine accumulation of [redacted] material with [redacted] accumulations in some areas. Occasional accumulations [redacted] had been observed. HEPA filter surveys gave similar results. The inspectors concluded that ventilation equipment in dry areas was exposed to more than contamination levels of [redacted] material, and risk significant upsets were credible. The inspectors determined that licensee survey data indicated that there was no immediate safety concern. The inspectors noted that the licensee relied on upstream NCS controls to prevent accumulation of a critical mass of [redacted] material in the dry ventilation systems. 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.

The Appendix to Chapter 4 of the License Application requires that the identification and minimization of criticality risk will be documented in the nuclear criticality safety analyses of the systems. Contrary to the above, on and before July 11, 2005, the licensee failed 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. The 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 is **Violation (VIO) 70-27/2005-203-01**.

c. Conclusions

A violation was identified for the failure to document that nuclear criticality risk was identified and minimized for process ventilation equipment in areas of the facility not involved in solution processing.

3.0 Inspections, Audits, and Investigations (88015)

a. Inspection Scope

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

- NCS-2005-082, "NCS Finding & Observation Summary - 1st Quarter 2005," dated May 3, 2005

- NCS-2005-034, "Nuclear Criticality Safety Concern [redacted]," dated February 10, 2005
- NCS-2005-104, "Triennial NCS External Assessment," dated May 2, 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 engineers who: (1) reviewed open NCS issues from previous audits; (2) reviewed the adequacy of control implementation; (3) reviewed plant operations for compliance with license requirements, procedures, and postings; and (4) examined equipment and operations to determine that past evaluations remained adequate. No safety concerns were noted.

The inspectors observed that the licensee's triennial external assessment of the NCS program had recently been completed and that the auditor had been excluded from one area of the plant where criticality safety controls were used to mitigate risk of inadvertent criticality. The inspectors noted that the previous external auditor had been excluded from the same area. The inspectors were concerned that routinely excluding the external auditors from the same plant area every time would reduce the value of the audit. The inspectors had no immediate safety concerns regarding the excluded area or the overall external audit. The licensee indicated that it understood the concern and would consider the issue when evaluating the access of future external auditors. The reevaluation [redacted] on the external NCS auditor will be tracked as **Inspection Follow-up Item (IFI) 70-27/2005-203-02.**

c. Conclusions

NCS quarterly audits were adequate for maintaining acceptable levels of safety.

4.0 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] fabrication areas, uranium recovery area, [redacted] process areas, and plant-wide process ventilation systems.

The inspectors reviewed selected aspects of the following documents prior to performing the walkdowns:

- NCS-1992-054, "Nuclear Safety Release for Ventilation Modifications [redacted]," dated May 13, 1992
- NCS-1992-050, "NCS Evaluation for Ventilation Modifications [redacted]" dated May 7, 1992
- NCS-2002-278, "NCS Evaluation [redacted]," dated October 18, 2002
- NCS-2003-113, "NCS Analysis Supporting Phases 4 and 5 [redacted]," Dated July 15, 2003
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- Section 15.35.4, "Manufacturing," Integrated Safety Analysis, dated July 13, 2005
- NCS-2001-325, "[redacted], " dated November 1, 2001
- NCS-1999-049, "NCS Evaluation of HEPA Filter Bank [redacted]," dated March 13, 1999

b. Observations and Findings

The inspectors verified that controls identified in NCS analyses were installed or implemented and were adequate to assure safety. The cognizant NCS engineers were knowledgeable and had good interfaces with operators on the process floors. No safety issues were identified during the walkdowns.

c. Conclusions

Plant operations involving [redacted] materials were conducted safely and in accordance with written procedures.

5.0 Open Item Review

IFI 70-27/2005-202-01

This item tracked correction of references to the [redacted] cross section libraries and subcritical margin for [redacted] in the licensee [redacted] validation report. During a previous inspection, the inspectors reviewed the [redacted] validation report, dated December 15, 2004, and noted that the minimum margins of subcriticality, Δk_{sm}, specified in the report did not include the new limits recently approved by the NRC [redacted] the same previous inspection, the inspectors noted that the [redacted] validation report referenced the [redacted] cross section libraries, but only included the k_{eff} limits for the [redacted] cross section library in Table 1 of the validation report. The licensee committed to correct these discrepancies in the [redacted] validation report. During the current inspection, the inspectors reviewed the [redacted] validation report and noted that the references had been corrected. This item is closed.

IFI 70-27/2005-202-02

This item tracked development of a validation database for demonstrating compliance with the validated range of applicability (ROA). During a previous inspection, the inspectors were concerned that the lack of description regarding the range of tabulated parameters over which different materials were considered validated could lead to the performance of nonconservative calculations that were not covered by the existing validation. During the previous inspection, the licensee indicated that a validation database was in development in which an analyst could electronically enter parameter data to identify validation cases that were applicable to a given situation being calculated. During the current inspection, the licensee showed the inspectors a completed and usable database which could be used to establish compliance with the validated ROA. This item is closed.

IFI 70-27/2005-202-03

This item tracked review of non-benchmark quality validation cases to determine and analyze experimental uncertainties. During a previous inspection, the inspectors noted an unusually large spread in the calculated k_{eff} values, ranging from [redacted] and noted that several of the cases with the highest and lowest k_{eff} values consisted of poorly described configurations for which experimental uncertainties were not readily available. In response to the inspectors' questions, the licensee stated that establishing the pedigree of validation cases, including use of poorly described configurations and the uncertainties associated with them was in progress at the time of the inspection. During the current inspection, the licensee indicated that the review would be complete by March 15, 2006. This item remains open.

IFI 70-27/2005-202-04

This item tracked examination of individual subsets of data to determine localized bias trends (including reason for low k_{eff} values). During a previous inspection, the inspectors noted an unusually large spread in the calculated k_{eff} values, ranging from [redacted] which was approximately the same magnitude as the margin of subcriticality. During the previous inspection, the inspectors examined the descriptions of both the highest and lowest k_{eff} cases and observed that many of the cases with a large negative bias involved material forms and compositions that were significantly different from analyzed process conditions. In response to the inspectors' questions, the licensee stated that examining subsets of the data to determine the reasons for the large positive and negative biases was already in progress at the time of the inspection. During the current inspection, the licensee indicated that the review would be complete by September 30, 2005. This item remains open.

6.0 Exit Meetings

The inspectors presented the inspection scope and results to members of the licensee's management and staff during an exit meeting on July 15, 2005. The licensee acknowledged and understood the findings as presented.

[redacted]

SUPPLEMENTARY INFORMATION

1.0 List of Items Opened, Closed, and Discussed

Opened

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.
IFI 70-27/2005-203-02	Tracks the reevaluation [redacted] on the external NCS auditor.

Closed

IFI 70-27/2005-202-01	Tracks correction of references to the [redacted] cross section libraries and subcritical margin [redacted] in the licensee [redacted] validation report.
IFI 70-27/2005-202-02	Development of the validation database for demonstrating compliance with the validated ROA.

Discussed

IFI 70-27/2005-202-03	Reviewing non-benchmark quality validation cases; determining and analyzing experimental uncertainties.
IFI 70-27/2005-202-04	Examining individual subsets of data to determine localized bias trends (including reason for low k_{eff} values).

2.0 Inspection Procedures Used

IP 88015	Headquarters Nuclear Criticality Safety Program

Attachment

[redacted]

[redacted]

3.0 Partial List of Persons Contacted

BWXT

* W. Nash	General Manager
* L. Duncan	Manager, Nuclear Criticality Safety
* L. Morrell	Manager, Licensing
* S. Schilthelm	Manager, Safety and Licensing
* D. Ward	Manager, Environment, Safety, Health, and Safeguards
M. Mitchell	NCS Engineer
L. Wetzel	NCS Engineer
B. Kidd	NCS Engineer

NRC

*D. Morey	Senior Criticality Safety Inspector
*L. Berg	Criticality Safety Inspector
*N. Jordan	Criticality Safety Inspector
*G. Wertz	Senior Resident Inspector

*Participated in the exit meeting on July 15, 2005.

4.0 List of Acronyms

ADAMS	Agency-wide Document Access and Management System
BWXT	BWX Technologies, Inc.
CFR	Code of Federal Regulations
HEPA	high-efficiency particulate-air
IFI	inspection follow-up item
IP	inspection procedure
LEU	low-enriched uranium
NCS	nuclear criticality safety
NMSS	Office of Nuclear Material Safety and Safeguards
NRC	U.S. Nuclear Regulatory Commission
ORNL	Oak Ridge National Laboratory
PDR	public document room
ROA	range of applicability (also referred to as area of applicability)
SCALE	standardized computer analyses for licensing evaluation
SNM	special nuclear material
VIO	violation

[redacted]