

[REDACTED]

November 21, 2006

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

SUBJECT: INSPECTION REPORT 70-27/2006-207

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 October 23 through 27, 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 October 27, 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 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.

[REDACTED]

R. P. Cochrane

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If you have any questions concerning this report, please contact Thomas Marenchin, of my staff, at (301) 415-5148.

Sincerely,

/RA/

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

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

Enclosure: Inspection Report 70-27/2006-207

cc: L. Morrell
Licensing Officer
BWX Technologies

R. P. Cochrane

-2-

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cc: L. Morrell
Licensing Officer
BWV Technologies

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

Docket No.: 70-27

License No.: SNM-42

Report No.: 70-27/2006-207

Licensee: BWX Technologies, Inc.

Location: Lynchburg, VA

Inspection Dates: October 23 - 27, 2006

Inspectors: Dennis Morey, Senior Criticality Safety Inspector
Natreon Jordan, Criticality Safety Inspector
Thomas Marenchin, Criticality Safety Inspector

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

Enclosure

EXECUTIVE SUMMARY

BWX Technologies, Inc. NRC Inspection Report 70-27/2006-207

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 October 23 through 27, 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, the uranium recovery area, [REDACTED] areas, the [REDACTED] areas, and machining operations.

Results

- The NCS program as observed was adequate for maintaining acceptable levels of safety.
- The inspectors identified a minor administrative deficiency in the facility ISA that the licensee corrected in a timely manner.
- Licensee NCS audits and corrective actions were adequate for maintaining acceptable levels of safety.
- Licensee identified NCS-related events and corrective actions were adequately tracked by the licensee.
- Plant operations involving [REDACTED] materials were conducted safely and in accordance with written procedures.

REPORT DETAILS

1.0 Summary of Plant Status

BWX Technologies (BWXT) manufactures high-enriched uranium (HEU) [REDACTED] [REDACTED] at its facility near Lynchburg, VA. During the inspection, the licensee conducted routine [REDACTED] manufacturing operations and maintenance activities [REDACTED]. [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-2002-210, "NCS Analysis Supporting Phase 1 of SER [Safety Evaluation Report] 02-080, [REDACTED]," dated August 22, 2002
- NCS-2006-154, "Nuclear Safety [REDACTED] [REDACTED]," dated July 7, 2006
- NCS-2006-158, "Safety [REDACTED] Analysis [REDACTED] [REDACTED]," dated July 12, 2006
- NCS-2006-161, "Nuclear Safety Release for SER 06-036, [REDACTED] [REDACTED]" dated July 13, 2006
- NCS-2006-178, "Nuclear Safety [REDACTED] [REDACTED]" dated July 31, 2006
- NCS-2006-179, "[REDACTED]," dated August 1, 2006
- NCS-2006-220, "Occurrence During [REDACTED] Verification," dated September 20, 2006
- NCS-2006-194, "Nuclear Criticality Safety [REDACTED] Analysis of [REDACTED] [REDACTED]," dated August 22, 2006
- NCS-2006-197, "Level Three Criticality Safety Analysis to Determine the Safety of [REDACTED] [REDACTED] [REDACTED]," dated October 23, 2006
- NCS-2006-199, "Level 3 NCS Evaluation - Revised Requirements to SER 06-046, 'Phase 1 to Establish a [REDACTED] [REDACTED]'," dated September 6, 2006

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, 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 controls for equipment and processes assured the safety of the operations. Nuclear criticality safety analyses and supporting calculations demonstrated adequate identification and control of NCS hazards to assure operations within subcritical limits.

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 (IP 88015)

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:

- NCS-2001-325, "NCS Analysis Supporting SER 01-058, [REDACTED], [REDACTED]," dated November 1, 2001
- NCS-2002-241, "NCS Analysis Supporting Phase 1 of SER 02-094, [REDACTED], [REDACTED]," dated September 20, 2002
- Operating Procedure OP-0061121, "[REDACTED]," Revision 18, undated
- Operating Procedure OP-0000501, "[REDACTED], [REDACTED]," Revision 29, undated
- Safety Analysis Report [SAR] Table 15.41.4.1.1, "[REDACTED], [REDACTED]," dated September 25, 2006
- Safety Analysis Report Table 15.14.4.1.1, "[REDACTED], [REDACTED]," dated September 25, 2006
- Safety Analysis Report Table 15.15.4.1.1, "[REDACTED], [REDACTED]" dated September 26, 2006
- Safety Analysis Report Table 15.9.4.2.1, "[REDACTED], [REDACTED]" dated September 26, 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 an IROFS in SAR Table 15.9.4.2.1 that relied on a check [REDACTED] based on an operating procedure. The operating procedure had a step which directed the operator [REDACTED], but the step did not clearly instruct the operator to check [REDACTED]. The licensee does not label IROFS in operating procedures based on the view that this will create an impression that some work steps are more significant than others. The inspectors were concerned that the intent of the IROFS would not be known to the operator [REDACTED]. The licensee revised the operating procedure to identify the work step as a check [REDACTED]. The procedure revision resolved the inspectors' concern.

c. Conclusions

The inspectors identified a minor administrative deficiency in the facility ISA that the licensee corrected in a timely manner.

4.0 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 reviewed selected aspects of the following documents:

- NCSE [Nuclear Criticality Safety Evaluation]-02, Revision 30, "Nuclear Criticality Safety Analyses & Quality Assurance Reviews," dated October 26, 2005
- NCS-03, Revision 21, "Nuclear Criticality Safety Audits and Inspections," dated November 7, 2005
- NCS-2006-160, "NCS Violation & Observation Summary - 2nd Quarter 2006," dated August 24, 2006

b. Observations and Findings

The inspectors reviewed licensee quarterly audits and interviewed NCS staff following an NCS weekly audit that was performed for [REDACTED] and other process development areas. The inspectors reviewed procedures and discussed the audit findings with licensee NCS staff. 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 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 identified.

[REDACTED]

c. Conclusions

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

5.0 Nuclear Criticality Safety Event Review and Follow-Up (IP 88015)

a. Inspection Scope

The inspectors reviewed the licensee response to internally-reported events. The inspectors reviewed the progress of investigations and interviewed licensee staff regarding immediate and long-term corrective actions. The inspectors reviewed selected aspects of the following documents:

- Unusual Incident Report Database for July - October 2006
- NCS-2006-160, "NCS Violation & Observation Summary - 2nd Quarter 2006," dated August 24, 2006
- NCS-2006-194, "Nuclear Criticality Safety Concern Analysis of Incorrectly Located Equipment in Recovery," dated August 22, 2006
- NCS-2006-199, "Level 3 NCS Evaluation - Revised Requirements to SER 06-046, 'Phase 1 to [REDACTED] [REDACTED]' dated September 6, 2006

b. Observations and Findings

The inspectors noted that the licensee: (1) maintained a database of all corrective actions for events related to NCS; (2) was assigning corrective actions for all events identified; and (3) was performing trending analysis to identify recurrence of similar events. The inspectors determined that the licensee was taking appropriate actions to identify and track event-related corrective actions.

c. Conclusions

Licensee-identified, NCS-related events and corrective actions were adequately tracked by the licensee.

6.0 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] areas, uranium recovery area, [REDACTED]

[REDACTED]

VIO 70-27/2006-202-02

This item tracks the licensee's failure to clearly define administrative limits by either applying a nuclear criticality safety posting to or procedurally controlling [REDACTED] being used as a storage location for [REDACTED] material. During a previous inspection, the inspectors determined that [REDACTED] in the fuel fabrication area was being used to store [REDACTED] material that did not have a criticality posting or procedure in place providing limitations on usage [REDACTED]. During this inspection, the inspectors walked down the fuel fabrication area where [REDACTED] was located and found that [REDACTED] had a nuclear criticality safety posting attached [REDACTED]. This item is closed.

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 pre-filter of a process glovebox 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 licensee had completed the analysis but was expanding it to include operations in [REDACTED]. This item remains open.

VIO 70-27/2006-204-02

This item tracks the licensee's failure to conduct operations according to administrative limits [REDACTED] outlined in the nuclear criticality safety posting. During a previous inspection, the inspectors determined that [REDACTED] material, of a form not authorized for storage within that area per the nuclear criticality safety posting, was being stored on a shelf with other approved [REDACTED] material. During this inspection, the inspectors walked down the [REDACTED] areas where the [REDACTED] material was being stored and found that it was removed from that area and was in an area that was posted properly. 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 inspection, the inspectors observed that the [REDACTED] connected to the ventilation ductwork of [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, while conducting a walk down of the [REDACTED] area, the inspectors noted that the [REDACTED] drain [REDACTED] was still discolored. The licensee stated that it had not completed all of its corrective actions for the [REDACTED] drain at this time. This item remains open.

[REDACTED]

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 October 27, 2006. The licensee acknowledged and understood the findings as presented.

[REDACTED]

SUPPLEMENTARY INFORMATION

1.0 List of Items Opened, Closed, and Discussed

Items Opened

None

Items Closed

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

VIO 70-27/2006-202-02 Tracks failure to clearly define administrative limits by either applying a nuclear criticality safety posting to or procedurally controlling [REDACTED] being used as a storage location for [REDACTED] material.

VIO 70-27/2006-204-02 Tracks failure to conduct operations according to administrative limits [REDACTED] outlined in the nuclear criticality safety posting.

Items Discussed

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

IFI 70-27/2006-204-03 Tracks the licensee's commitment to revise [REDACTED] drain 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

Attachment

[REDACTED]

3.0 Partial List of Persons Contacted

BWXT

D. Faidley	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
N. Jordan	Criticality Safety Inspector, NRC HQ
T. Marenchin	Criticality Safety Inspector, NRC HQ
G. Wertz	Senior Resident Inspector, NRC Region II

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
NCS	nuclear criticality safety
NCSE	nuclear criticality safety evaluation
█	█
SAR	Safety Analysis Report
SER	Safety Evaluation Report
█	█
TTC	Transformational Technology Core
█	█
VIO	Violation