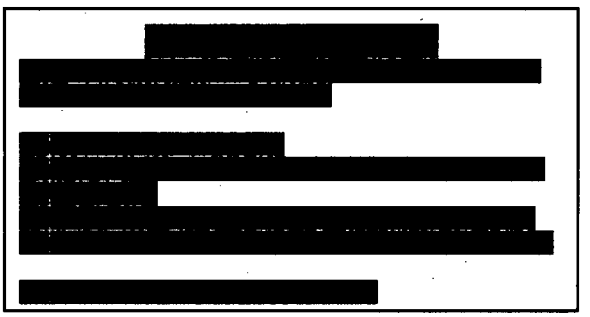
U. S. NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

Docket No:	70-27
License No:	SNM-42
Report No:	70-27/2004-207
Licensee:	BWX Technologies, Inc.
Location:	Lynchburg, VA
Inspection Dates:	October 18 - 21, 2004
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, NMSS



Attachment:
Supplementary Information

Enclosure

EXECUTIVE SUMMARY

BWX Technologies, Inc.
NRC Inspection Report 70-0027/2004-207

Introduction

Staff of the U.S. Nuclear Regulatory Commission (NRC) performed a routine and announced nuclear criticality safety (NCS) inspection of the BWX Technologies, Lynchburg, Virginia, facility from October 18 through 21, 2004. The inspection included an on-site review of the licensee's programs dealing with plant operations, criticality accident alarm systems, and the NCS function. The licensee's programs were acceptably directed toward the protection of public health and safety, and in compliance with NRC requirements. The inspection focused on risk-significant fissile material processing activities including [redacted], Research Test Reactor and Target (RTRT) fabrication areas, uranium recovery, [redacted], downblending and the Lynchburg Technology Center.

Results

- Plant operations involving fissile materials were conducted safely and in accordance with written procedures.
- The NCS function was adequate for maintaining acceptable levels of safety.
- The licensee's placement of criticality monitoring system detectors provides acceptable coverage of risk-significant operations.
- NCS quarterly audits were adequate for maintaining acceptable levels of safety.

REPORT DETAILS

1.0 Plant Operations (88015)

a. Inspection Scope

The inspectors 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 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 [redacted], Research Test Reactor and Target (RTRT) fabrication areas, uranium recovery, [redacted], downblending and the Lynchburg Technology Center.

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

- NCS-2004-047, "Nuclear Criticality Safety Concern for an Unapproved Container in the Recovery Facility," dated March 2, 2004
- NCS-2004-058, "Safety Concern Analysis for Storage of [redacted]," dated March 11, 2004
- NCS-2004-127, "NCS Analysis for Storage of [redacted]," dated May 11, 2004
- NCS-2004-165, "Nuclear Criticality Safety Concern for an Overbatched Blend in the [redacted] Downblending Facility," dated June 17, 2004
- NCS-2004-191, "Nuclear Criticality Safety Concern Analysis Addressing the Lack of a Spacing Control on Portable Raschig Ring Vessels in the Recovery Area," dated July 12, 2004
- NCS-2004-208, "Safety Concern Analysis for [redacted] Storage," dated August 5, 2004
- SAR 15.17, Revision 27, dated December 22, 2003
- SAR 15.18, Revision 36, dated December 10, 2003
- Quality Work Instruction 5.1.26, "Nuclear Criticality Safety Postings," Revision 3, not dated

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.

During tours of [redacted] areas, the inspectors noted that NCS postings associated with vertical element racks and carts limited the number of elements to one per storage location. The inspectors identified examples where more than one element appeared to be stored per storage location. The inspectors observed that elements were placed on racks and carts in a skewed fashion with only the bottom of the elements being stored in accordance with the posting. The inspectors determined that the as-found storage arrangement of elements was adequately bounded by the normal case storage conditions and was not a safety concern. During the inspection, the licensee committed to revising the postings to clarify the storage requirements. The clarification of posted storage requirements will be tracked as **IFI 70-27/2004-207-01.**

c. Conclusions

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

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-2003-307, "Level 3 Analysis to Increase the Dispersion Hood Capacity for the [redacted] Contract," dated November 17, 2003
- NCS-2004-051, "Level 2 NCS Evaluation for [redacted] Supply System for the [redacted] Program," dated October 7, 2004
- NCS-2004-142, "2004 Annual Ventilation Ductwork Survey Report," dated May 18, 2004
- NCS-2004-145, "Level 3 Analysis to Reduce the Back Spacing for the Waste and Product Columns," dated October 6, 2004
- NCS-2004-190, "Nuclear Criticality Safety Analysis Supporting SER04-037," dated July 13, 2004

b. Observations and Findings

The inspectors determined that analyses were performed by capable NCS engineers, independent reviews were completed for the evaluations by other qualified NCS engineers, subcriticality of the operations was assured through appropriate limits on controlled parameters, and 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.

c. Conclusions

The NCS function was adequate for maintaining acceptable levels of safety.

3.0 Criticality Alarm System (88015)

a. Inspection Scope

The inspectors reviewed the replacement of [redacted] detectors with [redacted] detectors in the Lynchburg Technology Center (LTC) criticality monitoring system (CMS) to determine the adequacy of assumptions and calculation results used to support the licensee's plan to replace the [redacted] detectors. The inspectors visually inspected detector placement configurations to verify that dual detector coverage of risk-significant operations would be maintained. The inspectors reviewed selected aspects of the following documents:

- GCC-2004-045, "Incident Investigation Report for Loss of [redacted] Monitoring Coverage at LTC with No Compensation," dated June 22, 2004
- NCS-2004-153, "Safety Concern Analysis for Loss of Criticality Detector Coverage for LTC [redacted]," dated May 28, 2004
- NCS-1989-406, "Evaluation of [redacted] for Compliance with 10 CFR 70.24," dated October 31, 1989

b. Observations and Findings

The licensee plans to replace [redacted] detectors in the LTC with [redacted] detectors to reduce resources required to maintain CMS capability in that facility. The inspectors noted that the licensee had installed [redacted] detectors near the LTC [redacted] in 1989 following the determination that adequate CMS coverage could not be demonstrated with the existing [redacted] detectors. The inspectors determined that previous CMS coverage analysis was based on point depletion of prompt [redacted] which would not result in a dose rate sufficient to set off the alarm for a minimum accident of concern inside the [redacted]. The licensee used MCNP (monte-carlo n-particle) calculations to support placement of new [redacted] alarms in locations where the minimum accident of concern will produce a sufficient dose rate. Existing LTC [redacted] detectors remain in place, and the inspectors determined that detector coverage of risk-significant operations was adequate.

c. Conclusions

The licensee's placement of criticality monitoring system detectors provides acceptable coverage of risk-significant operations.

4.0 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-2004-181, "2nd Quarter 2004 NCS Findings and Observation Summary," dated August 5, 2004
- NCS-2004-245, "3rd Quarter 2004 NCS Findings and Observation Summary," dated October 4, 2004

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 remain adequate.

The inspectors noted that five of the six findings for the second and third quarters involved unrelated failures to follow NCS postings and/or procedures in the Uranium Recovery area. The inspectors observed that the total number of findings for the first three quarters of 2004 was approximately equivalent to the total number of findings for calendar year 2003. The inspectors discussed this trend with the licensee and determined that the trend was not risk-significant. As mentioned in Section 1.0 of this report, the licensee committed to clarifying the requirements associated with the vertical element racks and carts that the inspectors determined required greater management attention to ensure compliance. The inspectors noted that the licensee was addressing the performance issues in the Uranium Recovery area through meetings between area management and foremen and a posting review to help clarify and simplify postings. The inspectors determined that the licensee's efforts to clarify postings were adequate for reducing the likelihood of posting non-compliance.

c. Conclusions

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

5.0 Open Item Review

Inspector Follow-up Item (IFI) 70-27/2004-204-01

This item concerned the clarification of the moderation control requirements on postings NRRack-006 and NRCart-20, and the 2.5-liter container requirements on NCS posting #110 located at the entrance to the Uranium Recovery area. The inspectors observed that the postings were modified to support procedural requirements, training was completed and the postings were in place. This item is closed.

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 October 21, 2004. The licensee acknowledged and understood the findings as presented.

SUPPLEMENTARY INFORMATION

1.0 List of Items Opened, Closed, and Discussed

Opened

IFI 70-27/2004-204-07	Tracks licensee actions to clarify the posting requirements on vertical element racks and carts.

Closed

IFI 70-27/2004-201-01	Tracks clarification of moderation control requirements on postings NRRack-006 and NRCart-20.

Discussed

None

2.0 Inspection Procedures Used

IP 88015	Headquarters Nuclear Criticality Safety Program

3.0 Partial List of Persons Contacted

BWXT

* T. Brown	Manager, Operations
* L. Duncan	Manager, Nuclear Criticality Safety
* W. Nash	General Manager, Nuclear Products Division
* C. Reed	Manager, Uranium Recovery Process Systems
* 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
A. Koudelka	NCS Engineer

* Attended the exit meeting on October 21, 2004.

ATTACHMENT