UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET SW SUITE 23T85
ATLANTA, GEORGIA 30303-8931

[redacted]

December 27, 2004

BWX Technologies, Inc.
ATTN: Mr. W. D. Nash, Vice President
and General Manager
Nuclear Products Division
P. O. Box 785
Lynchburg, VA 24505-0785

SUBJECT: NRC INSPECTION REPORT NO. 70-27/2004-008

Dear Mr. Nash:

This refers to the inspection conducted from October 17 through November 27, 2004, at the Nuclear Products Division facility. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the enclosed report.

Areas examined during the inspection were Plant Operations, Management Organization and Controls, Maintenance and Surveillance, Transportation, Radiation Protection, Emergency Preparedness, Material Control and Accounting, and Physical Protection. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Within the scope of the inspection, violations or deviations were not identified.

[redacted]

[redacted]

[redacted]

[redacted]

Sincerely,

/RA/

David A. Ayres, Chief
Fuel Facility Inspection Branch 1
Division of Fuel Facility Inspection

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

Enclosure: NRC Inspection Report

cc w/encl:
Leah R. Morrell
Manager, Licensing and Safety Analysis
BWX Technologies
P. O. Box 785
Lynchburg, VA 24505-0785

Distribution w/encl:
D. Ayres, RII
A. Boland, RII
S. Caudill, RII
B. Gleaves, NMSS
J. Lubinski, NMSS
G. Wertz, RII
B. Westreich, NSIR

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-27
License No.:	SNM-42
Report No.:	70-27/2004-008
Licensee:	BWX Technologies, Inc.
Facility:	Nuclear Products Division
Location:	Lynchburg, Virginia
Dates:	October 17 through November 27, 2004
Inspector:	G. Wertz, Senior Resident Inspector
Approved by:	David A. Ayres, Chief Fuel Facilities Inspection Branch 1 Division of Fuel Facility Inspection

Enclosure

[redacted]

[redacted]

NRC INSPECTION REPORT 70-27/2004-08

EXECUTIVE SUMMARY

BWX Technologies, Inc., Nuclear Products Division

This inspection included periodic observations conducted by the senior resident inspector during normal and off-normal shifts in the area of Plant Operations, Management Organization and Controls, Maintenance and Surveillance, Transportation, Radiation Protection, Emergency Preparedness, Material Control and Accounting, and Physical Protection.

Plant Operations

- The facility was operated safely and in accordance with regulatory and license requirements. The Emergency Operations Center and associated equipment were maintained in a state of readiness. Maintenance work was performed in accordance with radiation work permit requirements. Housekeeping was adequate to ensure routes of egress were clear in case of an emergency (Paragraph 2.a).

- Nuclear criticality safety control devices and measures were properly implemented. Operation of the [redacted] was performed safely and in accordance with procedural requirements (Paragraph 2.b).

- The annual ventilation survey performed to identify special nuclear material accumulation was completed in accordance with procedural requirements. The survey identified one ventilation duct having an accumulation of special nuclear material which required corrective action. No adverse levels of special nuclear material accumulation nor other nuclear criticality safety concerns were identified (Paragraph 2.c).

Management Organization and Controls

- The Corrective Action system was being adequately used to identify and correct adverse facility issues. No risk significant safety issues were identified. An adverse trend in human performance in Downblending operations had already been recognized by the responsible manager and captured in the system for resolution (Paragraph 3).

Maintenance and Surveillance

- Modification of the criticality monitoring system to incorporate a low enriched uranium storage [redacted] was done effectively, safely and in accordance with approved change control requirements. Special nuclear material movement was prohibited and access to the facility was limited while the audible alarm system was unavailable. Radiation protection maintained continuous monitoring of the criticality monitoring system detectors and communication with plant personnel (Paragraph 4.a).

[redacted]

[redacted]

- Nuisance alarms on the [redacted], caused by operation of a welding machine, were corrected with the installation of a new welding machine (Paragraph 4.b).

Transportation

- A minor violation occurred when the licensee failed to ensure a test gauge was within tolerance prior to performance of a Certificate of Compliance required test on 5X22 shipping containers. The corrective actions were appropriate and included verification of proper test gauge indication (Paragraph 5).

Radiation Protection

- In Uranium Recovery, open sample containers of uranyl nitrate solution presented a potential contamination concern. The area manager modified the sample table, installed a sample container [redacted] and replaced the work station desk in order to minimize the potential for an inadvertent contamination event (Paragraph 6).

Emergency Preparedness

- The fourth quarter emergency preparedness drill demonstrated effective emergency response to a simulated hazardous liquid spill and personnel injuries by the emergency team and Emergency Operations Center personnel (Paragraph 7).

Material Control and Accounting

- [redacted]

- [redacted]

Physical Protection

- [redacted]

[redacted]

[redacted]

Attachment:
Partial Listing of Persons Contacted
List of Items Opened, Closed and Discussed
Inspection Procedures Used
List of Acronyms

[redacted]

REPORT DETAILS

1. **Summary of Plant Status**

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

[redacted].

By letters dated September 28 and October 29, 2004, the licensee notified the NRC that all actions necessary to comply with the requirements [redacted] had been completed.

2. **Plant Operations (Temporary Instruction (TI) 2600/006)**

a. Conduct of Operations - Routine Observations

(1) Inspection Scope and Observations

The inspector observed various operational activities to determine if the facility was operated safely and in accordance with license and regulatory requirements. The inspector verified that the Emergency Operations Center (EOC) was maintained in a state of readiness. The inspector reviewed various operational procedures and records, radiation work permits (RWP), and nuclear criticality safety (NCS) postings and observed that specific operations were performed safely and in accordance with approved plant procedures and postings. Outside areas were toured and no conditions that could create an undesirable situation or hazard in the event of adverse weather (high winds, cold weather, or flooding), or blocked evacuation pathways were observed. The inspector observed that equipment and devices used to contain radioactive contamination and airborne radioactivity in fuel processing, UR, and other material access areas (MAAs) were in proper working condition, and that personal protective clothing and dosimetry were issued and properly worn. The inspector noted that emergency egress routes were adequately clear of debris. Housekeeping was sufficient such that no significant hazards were identified. A routine fire safety tour verified that fire hazards were minimized especially in locations containing hazardous chemicals or [redacted] SNM.

[redacted]

(2) Conclusions

The facility was operated safely and in accordance with regulatory and license requirements. The EOC and associated equipment were maintained in a state of readiness. Maintenance work was performed in accordance with RWP requirements. Housekeeping was adequate to ensure routes of egress were clear in case of an emergency.

b. Implementation of Process Safety Controls

(1) Inspection Scope and Observations

The inspector reviewed nuclear criticality control devices and measures in effect during the inspection period in order to assess the effectiveness of the licensee's program for prevention of an inadvertent criticality. The inspector toured fuel processing, storage, and recovery areas and observed that personnel complied with approved, written NCS limits and controls, especially in areas where the licensee was using administrative controls rather than passive or active engineering controls. The inspector verified NCS limits were posted and available to the operators. During tours of [redacted] areas of the facility, the inspector observed proper spacing practices and controls, use of storage locations, and identification of SNM.

The inspector observed operation of the [redacted]. Operations were performed safely and in accordance with the requirements of operating procedure (OP) 0006505, "[redacted]."

(2) Conclusions

NCS control devices and measures were properly implemented. Operation of the [redacted] was performed safely and in accordance with procedural requirements.

c. Annual Ventilation SNM Survey

(1) Inspection Scope and Observations

The inspector reviewed the results of the licensee's annual ventilation survey performed to identify and quantify SNM accumulation in the facility's process ventilation ducts. Radiation surveys were performed in accordance with procedure E41-134, "Annual Ductwork Survey," and only the [redacted] exceeded the specified [redacted]. NCS was contacted and established appropriate controls following a more accurate estimate of the potential [redacted] accumulation. An RWP was generated and the ventilation ducts were removed and replaced. The final SNM survey analysis indicated that approximately [redacted]

[redacted]were removed. The inspector observed the ductwork configuration and no NCS concerns were identified.

(2) Conclusions

The annual ventilation survey performed to identify special nuclear material accumulation was completed in accordance with procedural requirements. The survey identified one ventilation duct having an accumulation of SNM which required corrective action. No adverse levels of SNM accumulation nor other NCS safety concerns were identified.

3. **Management Organization and Controls (TI 2600/006)**

a. Inspection Scope and Observations

License Application, Section 2.9, "Investigations and Reporting" requires the licensee to investigate incidents that have safety significance, develop corrective actions (CAs), and verify completion of the associated CA commitments. The inspector reviewed a list of approximately three hundred CAs issued between June 1 and September 9, 2004, and selected the following ten CAs, based on their nuclear safety or regulatory significance, for further review in order to assess the CA system effectiveness: CA's 2004-490, -505, -544, -545, -547, -559, -571, -579, -621, and -627.

The inspector reviewed the CA commitments developed to resolve each CA and, in some cases, discussed the issue with the responsible individuals. The inspector determined that the CA commitments appeared appropriate, were captured in the CA tracking system, and were either completed or properly extended. No other safety issues were identified.

The inspector observed that several of the CAs involved human performance errors in Downblending operations. The issue was discussed with the Downblending operations manager who had already recognized the adverse trend and initiated an investigation team review. The issue was documented in CA 2004-715.

b. Conclusions

The CA system was being adequately used to identify and correct adverse facility issues. No risk significant safety issues were identified. An adverse trend in human performance in Downblending operations had already been recognized by the responsible manager and captured in the CA system for resolution.

4. **Maintenance and Surveillance (TI 2600/006)**

a. Installation of Additional Criticality Monitoring System Detectors

(1) Inspection Scope and Observations

A low enriched uranium (LEU) storage [redacted] criticality monitoring system (CMS) was incorporated into the facility's primary CMS on October 31, 2004. The inspector reviewed the facility change control evaluation and observed the testing activities in order to assess the effectiveness of the modification. Evaluation of the modification was adequately documented in Safety Evaluation Report (SER) 02-109, Phase 2, "Criticality Monitoring System Upgrade." Post-installation testing requirements were effective and included successful completion of the monthly CMS functional test in accordance with Radiation Protection (RP) procedure 07-28, "Maintaining and Testing the Plant Criticality Monitoring System."

The inspector observed the installation and testing activities. During the period when the audible alarm system was unavailable, SNM movement was prohibited and access to the facility was limited to the small number of personnel who were directly involved in the modification work. In addition, RP personnel performed continuous monitoring of the CMS detectors and maintained constant communication with the modification teams in the plant. Post-installation testing was successful and no discrepancies were observed.

(2) Conclusions

Modification of the CMS to incorporate an LEU storage [redacted] was done effectively, safely and in accordance with approved change control requirements. SNM movement was prohibited and access to the facility was limited while the audible alarm system was unavailable. RP staff maintained continuous monitoring of the CMS detectors and communication with plant personnel.

b. [redacted]

(1) Inspection Scope and Observations

During routine facility tours, the inspector observed audible alarm actuation of the [redacted] system. The inspector reviewed the condition since the oxygen sensing system is designated as an Item Relied On For Safety. [redacted] operators indicated that the alarm was not due to [redacted] content in the box line but associated with the use of a nearby welding machine. The inspector

confirmed by observation that the [redacted] alarm actuated whenever the welding machine was operated. The operators indicated that the required actions of OP-1001087, "Safety Procedures for [redacted]" were performed for every alarm actuation.

The inspector was concerned that intermittent alarm actuation could desensitize the operators to an actual condition and discussed the issue with the [redacted] supervisor. Following numerous unsuccessful attempts to identify and electrically isolate the welding machine from the [redacted] system, a new welding machine was installed and the nuisance alarm problem was corrected.

(2) Conclusions

Nuisance alarms on the [redacted], caused by operation of a welding machine, were corrected with the installation of a new welding machine.

5. **Transportation (TI 2600/006)**

a. Inspection Scope and Observations

The inspector evaluated a licensee report involving use of an out of tolerance pressure gauge to verify Certificate of Compliance (CoC) Number 9250, Model 5X22 shipping container requirements. The licensee reported the issue to the NRC, as required by 10CFR71.95(a)(3), in a letter dated September 24, 2004, and documented their corrective actions in CA 2004-649. The CoC Safety Analysis Report for Packaging (SARP) required a closure integrity verification of the containment vessel using a pressure drop measurement across the annular o-rings. The test required pressurization of the annulus to 15.0 pounds per square inch gauge (psig) and allowed no more than a 1.0 psig decrease over a six minute test period. The licensee identified that one of the test gauges was indicating 1.2 psig rather than 0.0 psig (when at atmospheric pressure). As such, the test was performed at 13.8 psig rather than the SARP required 15.0 psig.

The inspector reviewed the SARP and discussed the issue with personnel from the NRC Spent Fuel Project Office. Both concluded that the discrepancy had minor risk significance. Although the starting test pressure was 1.2 psig lower than specified in the SARP, the pressure drop requirement (< 1.0 psig in six minutes) remained an effective test of package containment integrity. Therefore, the inspector determined that the failure to perform the test at the required CoC pressure constituted a violation of minor significance that was not subject to enforcement action in accordance with Section IV of the Enforcement Policy.

The licensee's CA's were appropriate and included verification and documentation of correct pressure gauge reading (0.0 psig) in Radiation Material Shipping (RMS)

procedure 24, "Manual Leak Testing of Shipping Containers." The inspector observed operators properly perform the verification during subsequent 5X22 shipping container testing. A review of completed RMS-24 records indicated no reduction in pressure during the pressure drop tests.

b. Conclusions

A minor violation occurred when the licensee failed to ensure a pressure test gauge was within specified tolerance prior to performance of a CoC required test on 5X22 shipping containers. The corrective actions were appropriate and included verification of proper test gauge indication.

6. Radiation Protection (TI 2600/006)

a. Inspection Scope and Observations

The inspector identified instances where open containers of uranyl nitrate (UN) solution were left on a sample table in UR. The sample table was located directly above a work desk. Personnel egress around the sample table had recently been increased following installation of [redacted] equipment in the vicinity. The inspector was concerned that inadvertent contact with an open UN container could contaminate personnel working at the desk. Face shields were not required around open UN containers in this area. The issue was discussed with the UR manager who modified the sample table and replaced the (sitting) desk with a standing work station [redacted] was installed on the sample table to secure the solution containers. The inspector concluded that the changes appeared to minimize the risk of personnel contamination.

b. Conclusions

Open sample containers of UN solution presented a potential contamination concern. The UR manager modified the sample table, installed a sample container [redacted] and replaced the work station desk in order to minimize the potential for an inadvertent contamination event.

7. Emergency Preparedness (TI 2600/006)

a. Inspection Scope and Observations

The fourth quarter emergency preparedness exercise drill was conducted on [redacted] The inspector observed the [redacted] drills. The scenario involved a simulated spill of a chemically hazardous, radioactive liquid, resulting in injured personnel. The emergency team responded to the scene promptly, evaluated the hazards, and provided appropriate medical and spill mitigation response. NCS and environmental safety aspects of the liquid spill were evaluated and integrated into the emergency team's response plan. The EOC was promptly staffed and provided

[redacted]

emergency management support including simulated requests for off-site assistance. EOC staff used the Initial Emergency Assessment Flow Chart and emergency procedures to accurately determine emergency classification and required notifications. Items for improvement were captured in the post-drill critique.

b. Conclusions

The fourth quarter emergency preparedness drill demonstrated effective emergency response to a simulated hazardous liquid spill and personnel injuries by the emergency team and EOC.

8. **Material Control and Accounting (TI 2600/006)**

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

9. **Physical Protection (TI 2600/006)**

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

11. **Exit Meeting**

The inspection scope and results were summarized on December 8, 2004, with W. Nash, Vice President and General Manager, and other members of the licensee's staff. Proprietary documents and processes were reviewed during this inspection and this report has been marked as such. No dissenting comments were received from the licensee.

[redacted]

[redacted]

ATTACHMENT

1. LIST OF PERSONS CONTACTED

Licensee

C. Abernathy, Supervisor, Nuclear Material Control
C. Carr, Manager, Administration and Security
T. Martin, Manager, Security Operations
L. Morrell, Licensing & Safety Analysis
W. Nash, Vice President and General Manager
H. Nicks, Manager, Security
J. Noel, Manager, NRC Security
S. Peters, Manager, Recovery Operations
S. Schilthelm, Manager, Licensing and Safety Analysis
M. Suwala, Manager, Nuclear Materials Control
D. Ward, Manager, Environment, Safety, Health and Safeguards

Other licensee employees contacted included engineers, technicians, production staff, security, and office personnel.

2. LIST OF ITEMS OPENED AND CLOSED

Item Number	Status	Description
70-27/2004-08-01	Opened	URI - [redacted]

3. INSPECTION PROCEDURES USED

TI 2600/006 Resident Inspection Program for Category I Fuel Cycle Facilities

4. LIST OF ACRONYMS USED

CA	Corrective Action
CMS	Criticality Monitoring System
CoC	Certificate of Compliance
EOC	Emergency Operations Center
FNMCP	Fundamental Nuclear Material Control Plan
LEU	Low Enriched Uranium
MAA	Material Access Area
NCS	Nuclear Criticality Safety
OP	Operating Procedure
[redacted]	[redacted]

[redacted]

[redacted]

PPP	Physical Protection Plan
RMS	Radiation Material Shipping
RP	Radiation Protection
psig	pounds per square inch gauge
[redacted]	[redacted]
RWP	Radiation Work Permit
SARP	Safety Analysis Report for Packaging
SER	Safety Evaluation Request
SNM	Special Nuclear Material
TI	Temporary Instruction
U	Uranium
UN	Uranyl Nitrate
UR	Uranium Recovery
URI	Unresolved Item

[redacted]