



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

[REDACTED]

January 7, 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. 70-27/2003-009

Dear Mr. Nash:

This refers to the inspection conducted from November 2 through December 13, 2003, 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 are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Based on the results of this inspection, the NRC has determined that a violation of NRC requirements occurred. This violation is being treated as a non-cited violation (NCV), consistent with Section VI.A.8 of the Enforcement Policy. The NCV is described in the subject inspection report. If you contest the violation or significance of this NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Regional Administrator, Region II, and the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001, and the NRC Resident Inspector at your facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and Enclosure 1 will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room). Enclosure 2 contains sensitive information associated with the BWXT material control and accounting program and physical protection program and, therefore, in accordance with 10 CFR 2.790(d), will not be made publicly available.

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BWXT

2

Should you have any questions concerning this letter, please contact us.

Sincerely,

/RA/

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

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

Enclosures: 1. NRC Inspection Report (Part 1)
2. NRC Inspection Report (Part 2) **2.790 Information**

cc w/encls:
Leah R. Morrell
Manager, Licensing and Safety Analysis
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BWXT

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.: 70-27

License No.: SNM-42

Report No.: 70-27/2003-009

Licensee: BWX Technologies, Inc.

Facility: Nuclear Products Division

Location: Lynchburg, Virginia

Dates: November 2 through December 13, 2003

Inspector: G. Wertz, Senior Resident Inspector

Approved by: David A. Ayres, Chief
Fuel Facilities Inspection Branch 1
Division of Fuel Facility Inspection

Enclosure

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[REDACTED]

NRC INSPECTION REPORT 70-27/2003-09 (PART 1)

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 facility operations. The results of this inspection are included in this report.

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 (Paragraph 2.b).
- The third quarter 2003 Radiation Protection Audit and the Nuclear Criticality Safety Findings and Observations Report were properly completed and reviewed by management. No significant findings were identified and the corrective actions were captured in the tracking system. The licensee's weekly nuclear criticality safety engineering inspection provided a thorough review of nuclear criticality safety limits and controls in the specified operational area (Paragraph 2.c).
- Two nuclear criticality safety issues were captured in the corrective action program and properly evaluated. Both issues involved nuclear criticality safety discrepancies of minor safety significance which were promptly and effectively corrected (Paragraph 2.d).
- An effective review was performed by a process engineer of a uranium metal dissolver system following an extended out of service period. The pre-operational review was extensive and included verification of the system configuration, operating procedure requirements, and system testing in order to identify and correct deficient components and ensure proper operation (Paragraph 2.e).

Radiation Protection

- A machinist inadvertently exposed encapsulated special nuclear material and contaminated himself and his work area. Radiation control technicians promptly isolated the area and effectively decontaminated the individual. The corrective actions appeared to effectively address the cause of the contamination event (Paragraph 3).
- [REDACTED]

Maintenance and Surveillance

- Daily checks of the uranium recovery radioactive effluent monitors by the operators were performed adequately and in accordance with procedural requirements (Paragraph 4).

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] processes, and in the Research Test Reactors and Targets (RTRT) processes. Uranium recovery, downblending and other routine operations and maintenance activities were conducted in the Uranium Recovery (UR) facility.

On December 2, the following NRC personnel toured the facility and observed safeguards activities: Dr. Nils Diaz, Chairman; Luis Reyes, Regional Administrator, Region II; Mike Weber, Deputy Director, Division of Nuclear Security, Office of Nuclear Security and Incident Response; Nancy Fragoyannis, Technical Assistant for Materials and Security, Office of the Chairman, and Keith McConnell, Senior Assistant for Materials, Office of the Chairman.

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

a. **Conduct of Operations - Routine Observations**

(1) **Inspection Scope**

The inspector toured the licensee's facilities to observe various operational and work activities. Observed activities were assessed to determine if the facility was operated safely and in accordance with license and regulatory requirements. The inspector also checked the Emergency Operations Center (EOC) and associated equipment to determine if the facility was maintained in a state of readiness.

Housekeeping associated with the storage of equipment and materials throughout the facility was also reviewed for any significant potential hazards. The inspector performed a routine fire safety tour to verify that fire hazards were minimized especially in locations containing hazardous chemicals or unencapsulated nuclear materials.

The inspector reviewed various operational procedures and records, radiation work permits (RWP), and nuclear criticality safety (NCS) postings, to determine if operations were performed safely and in accordance with approved plant procedures and postings.

(2) **Observations and Findings**

The inspector observed that specific operations were performed safely and in accordance with approved plant procedures and postings. Discussions with operations personnel confirmed an understanding of the procedural and posting requirements. The inspector verified that the EOC and associated equipment were maintained in a state of readiness.

[REDACTED]

Outside areas were toured and inspected. No conditions that could create an undesirable situation or hazard in the event of adverse weather (i.e., high winds, cold weather, or flooding), or blocked evacuation pathways were observed. During tours of the facility, the inspector noted radiological signs, postings, and procedures were properly posted or readily available. The inspector observed conditions and determined that equipment and devices used to confine and contain radioactive contamination and airborne radioactivity in fuel processing, UR, and other material access areas (MAA) were in proper working condition, and that proper personal protective clothing and dosimetry were issued and properly worn. During process area tours, the inspector noted that emergency egress routes were adequately clear of debris.

(3) 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 done in accordance with radiation work permit 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

The inspector reviewed nuclear criticality control devices and measures in effect during this inspection period in order to assess the effectiveness of the licensee's program for prevention of an inadvertent criticality.

(2) Observations and Findings

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 [REDACTED] of the facility, the inspector observed proper spacing practices and controls, use of storage locations, and proper identification of special nuclear material (SNM).

(3) Conclusions

NCS control devices and measures were properly implemented.

[REDACTED]

c. Quarterly Radiation Protection (RP) and NCS Audit Review

(1) Inspection Scope

The inspector reviewed the third quarter RP and NCS audit report and observed the management review of the audit findings, in order to assess the licensee's problem identification effectiveness. The inspector also observed a NCS weekly engineering inspection.

(2) Observations and Findings

Radiation Protection Audit

The third quarter RP Audit and Inspection Report was performed in accordance with RP-13-03, "Quarterly Health Physics Audit," as required by SNM-42 License Application Section 2.8.1.4, "Radiation Protection Audits." The audit was performed by health physicists and was comprehensive. Corrective actions were developed and assigned to the responsible managers with completion dates captured in the commitment tracking system. The inspector determined that proposed corrective actions and completion dates were appropriate. The RP audit findings were consistent with previous findings. The inspector determined that none of the findings represented a significant radiological concern for site workers, the public, nor the environment.

NCS Findings and Observations Summary

The third quarter NCS Findings and Observations Summary report documented three licensee identified findings and six observations. The audit was performed, as required by SNM-42 License Application 2.8.1.2, "NCS Audits," and the findings and observations were documented in accordance with the requirements of Nuclear Criticality Safety Engineering (NCSE) procedure NCSE-03, "Nuclear Criticality Safety Audits and Inspections." The inspector reviewed the safety significance and apparent cause determinations with NCS engineers and determined that the findings were properly characterized as low safety significance. The corrective actions appeared appropriate and were captured in the commitment tracking program with assigned responsible managers and completion dates. Open corrective action (CA) 2002-208, Automatic Dump Valve Failure, was reviewed by a Headquarters NCS specialist and the interim compensatory measures were determined to be commensurate with the potential safety significance. Final corrective actions were still being developed by the licensee.

The inspector accompanied an NCS engineer during the weekly NCS inspection and noted that the engineer performed a thorough review of the required NCS limits and controls for the specified operational area. NCS postings were reviewed and inspected for compliance. The applicable safety analysis report (SAR) and corresponding NCS assumptions were reviewed in order to validate SAR assumptions. An observation by

[REDACTED]

the inspector concerning an NCS posting was appropriately characterized by the NCS engineer, discussed with the cognizant area manager, and corrective action planned. No safety issues were identified.

(3) Conclusions

The third quarter 2003 Radiation Protection Audit and NCS Findings and Observations Reports were properly completed and reviewed by management. No significant findings were identified and the corrective actions were captured in the tracking system. The weekly NCS engineering inspection provided a thorough review of NCS limits and controls in the specified operational area.

d. Corrective Action Review

(1) Inspection Scope

The inspector reviewed two NCS issues identified in CA 2003-740 and CA 2003-743 in order to assess their safety significance and the licensee's corrective action effectiveness.

(2) Observations and Findings

Both issues represented NCS compliance discrepancies. The inspector reviewed the completed safety evaluations with the cognizant NCS engineers who demonstrated that double contingency NCS protection and limiting conditions of operation had been maintained. However, since CA 2003-740 represented a degraded engineered control, the inspector also reviewed SNM operations in accordance with Operating Procedure (OP) 1007590, "Drying and Calcining Material in the Conversion Area Furnace," in order to assess the effectiveness of the administrative controls. The inspector noted that the operators were cognizant of the NCS mass limits which were maintained in accordance with the NCS requirements and verified on the completed data sheets. The inspector concluded that the NCS safety evaluations were thorough, and the corrective actions were comprehensive and restored compliance.

(3) Conclusions

Two NCS issues were appropriately captured in the corrective action program and properly evaluated. Both issues involved NCS discrepancies of minor safety significance which were promptly and effectively corrected.

[REDACTED]

e. Safety System Review

(1) Inspection Scope

A safety system review of Uranium Metal (UM) Dissolver 2 was performed in order to assess the adequacy of the equipment for operation and the licensee's pre-operational safety review.

(2) Observations and Findings

The inspector noted that operation of UM Dissolver 2 was planned following an out of service period and reviewed the pre-operational readiness evaluation with the cognizant engineer. The UM dissolver process and instrumentation diagram (P&ID) was reviewed against the installed system and components. The inspector noted no discrepancies. The pre-operational testing included a water-only run which identified and corrected several system leaks. In addition, other operating component problems were identified and repaired during the test.

The inspector observed that the responsible engineer provided extensive oversight to the maintenance and operations personnel during the pre-operational testing and normal operations. OP-1007886, "Uranium Metal Dissolution Using Dissolver 2" was reviewed by the process engineer during the pre-operational testing and revised prior to UM dissolution in order to ensure effective procedural control. The inspector observed UM dissolution being performed in accordance with the requirements in the OP. The inspector discussed the processing operations with the operators who were cognizant of the procedural safety requirements.

(3) Conclusions

An effective review was performed by a process engineer of a uranium metal dissolver system following an extended out of service period. The pre-operational review was extensive and included verification of the system configuration, operating procedure requirements, and system testing in order to identify and correct deficient components and ensure proper operation.

3. Radiation Protection (TI 2600/006)

a. Inspection Scope

During uranium recovery work on a machine, an operator inadvertently machined into some encapsulated SNM which resulted in radiological contamination to the operator and the work area. In order to assess the licensee's adequacy of radiological protection and corrective action effectiveness, the inspector toured the contaminated area, reviewed the decontamination efforts with radiation control (RC) technicians, discussed

bioassay requirements with a health physicist, and reviewed the cause of the incident with the responsible supervisor.

b. Observations and Findings

The inspector observed RC technicians implement proper access control restrictions and decontaminate the work area and equipment. RC personnel entered the contaminated area in a manner careful to avoid additional contamination and were properly surveyed prior to their exit. Decontamination work continued until surface smears indicated that the contamination levels were within the operational RC limits and sufficient to release the access control restrictions.

The operator was surveyed and decontaminated in accordance with procedure RP-02-06, "Personnel Decontamination," and the results were documented on Form 1. The inspector reviewed RP-04-06, "Bioassay Sampling Following An Incident" and discussed the bioassay requirements with the cognizant health physicist (HP). The HP determined that a bioassay was not necessary since the low contamination levels would not result in any discernable internal dose (< 1 millirem). The inspector reviewed the dose assessment with an NRC regional HP and concluded that the bioassay was unnecessary and the contamination event was minor.

The inspector discussed the incident with the machine operator's supervisor and determined that the corrective action adequately addressed the cause of the contamination event. Relevant information was adequately captured in the corrective action program as CA 2003-723.

c. Conclusions

A machinist inadvertently exposed encapsulated SNM and contaminated himself and his work area. Radiation control technicians promptly isolated the area and effectively decontaminated the individual. The corrective actions appeared to effectively address the cause of the contamination incident.

4. Maintenance and Surveillance (TI2600/006)

a. Inspection Scope

The inspector observed operators performing calibration checks of the UR In-line Monitoring System with a focus on the adequacy of the calibration methodology and adherence to procedural guidance.

b. Observations and Findings

Operators checked the UR monitors in order to verify uranium concentration limits were adequate for the subsequent transfer of liquid effluent (waste) from the UR/Waste Collection System to the low level radioactive waste drain. A series of three monitors were continuously used to sample the effluent. The daily calibration check consisted of a comparison of the detector's output to previously known background and reference source values.

The inspector reviewed the applicable calibration procedure, OP-61242, "Inline Monitor System," and observed operators perform the background and reference source checks. The operators were cognizant of the procedural requirements. Minor anomalies identified by the operators during the performance of the procedure were appropriately corrected. The inspector reviewed the procedure with the responsible engineer. No discrepancies were noted.

c. Conclusions

Daily checks of the UR radioactive effluent monitors by the operators were performed adequately and in accordance with procedural requirements.

5. Exit Meeting

The inspection scope and results were summarized on December 19, 2003, with the licensee. Although proprietary documents and processes were occasionally reviewed during this inspection, the proprietary nature of these documents or processes was deleted from this report. No dissenting comments were received from the licensee.

[REDACTED]

ATTACHMENT

1. **LIST OF PERSONS CONTACTED**

Licensee

C. Abernathy, Supervisor, Nuclear Material Control
S. Baker, Manager, RTRT
W. Baker, Supervisor, Nuclear Materials Control
T. Brown, Manager, Operations
J. Calvert, Manager, Industrial Health and Safety
C. Carr, Manager, Administration and Security
J. Creasey, Manager, Uranium Processing Services
R. Coats, Manager, Environmental Protection
L. Duncan, Manager, Nuclear Criticality Safety
L. Morrell, Manager, Licensing and Safety Analysis
W. Nash, Vice President and General Manager
S. Niedzialek, Manager, CRF Operations and Maintenance
C. Reed, Manager, Uranium Process Services
S. Schilthelm, Manager, Safety and Licensing
D. Spangler, Manager, Radiation Protection
M. Suwala, Manager, Nuclear Materials Control
D. Ward, Manager, Environment, Safety, Health and Safeguards
D. Wilson, Supervisor, Radiation Control

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

2. **LIST OF ITEMS OPENED AND CLOSED**

None

3. **INSPECTION PROCEDURES USED**

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

4. **LIST OF ACRONYMS USED**

CA	Corrective Action
EOC	Emergency Operations Center
HP	Health Physicist
IP	Inspection Procedure
MAA	Materials Access Area
NCS	Nuclear Criticality Safety

[REDACTED]

NCSE	Nuclear Criticality Safety Engineering
NMC	Nuclear Material Control
OP	Operating Procedure
P&ID	Process and Instrumentation Diagram
RC	Radiation Control
RP	Radiation Protection
RTRT	Research Test Reactor and Targets
RWP	Radiation Work Permit
SAR	Safety Analysis Report
SNM	Special Nuclear Material
TI	Temporary Instruction
UM	Uranium Metal
UR	Uranium Recovery