



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

REGION II  
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ATLANTA, GEORGIA 30303-8931

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September 10, 2007

OI Case No. 2-2006-018

Mr. R. P. Cochrane, General Manager  
BWX Technologies, Inc.  
Nuclear Products Division  
P. O. Box 785  
Lynchburg, VA 24505-0785

SUBJECT: NRC INSPECTION REPORT NO. 70-27/2007-005

Dear Mr. Cochrane:

This refers to the inspection conducted from July 1 through August 11, 2007, 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 included: Plant Operations, Management Organization and Controls, Radiation Protection, and Fire Protection. 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 a violation of NRC requirements occurred. The violation is being treated as a non-cited violation (NCV), consistent with Section VI.A.8 of the Enforcement Policy. If you contest this violation or its significance, 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 20555-001, and the NRC Senior Resident Inspector at your facility.

In addition, enclosed for your information is the synopsis of the NRC's Office of Investigation's (OI) report that contains security-related information. OI determined that there was insufficient evidence to substantiate the allegations. The NRC plans no further action with regard to this matter.

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R. Cochrane

2

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In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and Enclosure 1, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/readingrm/adams.html>. Enclosure 2 contains security-related information and will not be available for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) Components of NRC's document system ADAMS.

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

Sincerely,

*/RA/*

Alphonsa Gooden, Acting Chief  
Fuel Facility Inspection Branch 1  
Division of Fuel Facility Inspection

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

Enclosures: 1. NRC Inspection Report  
2. (OUO - SRI) Office of Investigations Synopsis (Case No. 2-2006-018)

cc w/encls:  
Leah R. Morrell  
Manager, Licensing and Safety Analysis  
BWX Technologies  
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Distribution w/encls: (See page 3)

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\*See previous concurrence

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## U. S. NUCLEAR REGULATORY COMMISSION

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REGION II

Docket No.: 70-27

License No.: SNM-42

Report No.: 70-27/2007-005

Licensee: BWX Technologies, Inc.

Facility: Nuclear Products Division

Location: Lynchburg, Virginia

Dates: July 1 through August 11, 2007

Inspectors: G. Wertz, Senior Resident Inspector  
R. Gibson, Senior Fuel Facility Inspector  
S. Subosits, Senior Fuel Facility Inspector

Approved by: Alphonsa Gooden, Acting Chief  
Fuel Facilities Inspection Branch 1  
Division of Fuel Facility Inspection

Enclosure 1

## **EXECUTIVE SUMMARY**

### BWX TECHNOLOGIES, INC., NUCLEAR PRODUCTS DIVISION NRC INSPECTION REPORT NO. 70-27/2007-005

This inspection included periodic observations conducted by the Senior Resident Inspector during normal and off-normal shifts in the areas of Plant Operations, Management Organization and Controls, and Fire Protection. A specialized inspection and review of documentation were conducted by a regional inspector in the area of Radiation Protection (August 6-10).

#### **Plant Operations**

- Summer shutdown maintenance work was planned and implemented in a safe manner. Emergency Management Organization was properly staffed and effectively responded to an event involving a runaway mobile crane and subsequent damage to waste water processing piping (Paragraph 2.a).
- On August 2, the Emergency Management Organization promptly and effectively responded to an event that did not involve licensed material (Paragraph 2.b).

#### **Management Organization and Controls**

- Operators identified a potential nuclear criticality safety issue involving the creation of an un-poisoned void in a Raschig ring vacuum cleaner when the lid was removed and the vacuum hose remained attached. The condition was bounded by the Integrated Safety Analysis, the safety significance was low, and the planned corrective actions to preclude recurrence were effective (Paragraph 3.a).
- Two events involving special nuclear material-bearing components, which became detached from their lifting fixtures, were properly evaluated by nuclear criticality safety engineers. The events were bounded by scenarios described in the Integrated Safety Analysis and double contingency safety controls remained effective. A re-designed lifting fixture was being fabricated and was expected to begin use within the next two months (Paragraph 3.b).

#### **Radiation Protection**

- The external and internal exposure monitoring program was implemented in a manner that maintained doses as low as reasonably achievable (ALARA) and within the limits of 10 CFR 20.1201 (Paragraph 4.a).
- Radiation protection program self-assessments and procedure changes were implemented in accordance with license requirements (Paragraph 4.b).
- The respiratory protection equipment program, radiological postings, radiation work permits, radiation contamination survey, and ALARA programs were adequately implemented to protect workers (Paragraph 4.c).

#### **Fire Protection**

- During compaction (volume reduction) of a drum containing a small amount of licensed material, there was a small fire. This resulted from a lack of procedures which was identified as a non-cited violation. The planned corrective actions included implementation of procedural controls to prevent the compaction of flammable material (Paragraph 5).

Attachment:

Partial Listing of Persons Contacted

Inspection Procedures Used

List of Items Opened, Closed and Discussed

## REPORT DETAILS

### 1. **Summary of Plant Status**

Routine fuel manufacturing operations and maintenance activities were conducted in the fuel process areas and in the Research Test Reactors and Targets (RTRT) facility. Uranium recovery was conducted in the Uranium Recovery (UR) facility.

On July 31, 2007, NRC Headquarters and Region II representatives presented BWXT Senior Management with the results of the Licensee Performance Review (LPR). Mike Weber, Director, Office of Nuclear Materials Safety and Safeguards (NMSS); Doug Collins, Director, Division of Fuel Facility Inspection (DFFI); Mike Layton, Acting Deputy Director, DFFI; David Ayres, Branch Chief, DFFI, Peter Habighorst, Branch Chief, NMMS; Steve Subosits, Fuel Facility Inspector, DFFI; and, Geoff Wertz, Senior Resident Inspector, attended the meeting.

Effective August 16, 2007, Carl Yates, Human Performance Improvement Coordinator, became the Manager of Safety and Licensing. The previous Safety and Licensing Manager, Steve Schilthelm, transferred to a technical advisor position.

### 2. **Plant Operations (Inspection Procedure (IP) 88135)**

#### a. **Plant Shutdown Operations**

#### (1) **Inspection Scope and Observations**

The inspectors reviewed the outage work plans and observed maintenance and production operations during the Summer shutdown between June 30 and July 10. Industrial Engineering coordinated electrical maintenance outages such that power to safety equipment was not required or was supplied by the Emergency Power System. Special personnel safety requirements were implemented effectively.

The inspectors responded to the July 3, Emergency Management Organization (EMO) activation following a catastrophic failure of a mobile crane's brakes. The crane operator had just completed lifting heavy equipment onto the facility roof when the crane began to roll backwards. After attempting to stop the crane, the operator recognized that the brakes had failed and jumped from the cab. He was not injured. The crane continued to roll backwards down the hillside damaging several objects in its path, including some liquid waste processing piping, before coming to rest on a parking bollard. Superficial damage was sustained to two low-level radioactive (LLR) liquid waste disposal lines. LLR liquid waste discharges were halted until the lines were tested and demonstrated to be leak-free. A pair of non-radioactive liquid waste lines were breached and repaired the following day. Radiological surveys confirmed the solution that spilled from these lines was not radioactive. The EMO was adequately staffed and properly responded to the event. Unusual Incident Report BWX 2018804 was initiated to determine the cause of the crane's brakes failure.

(2) Conclusions

Summer shutdown maintenance work was planned and implemented safely. The EMO was properly staffed and effectively responded to an event involving a runaway mobile crane and subsequent damage to waste water processing piping.

b. Event Response

(1) Inspection Scope and Observations

At approximately 10:47 a.m. on August 2, the EMO was activated for an event that did not involve licensed material. The EMO staff properly evaluated the situation, and made the appropriate NRC and other government agency notifications. NRC staff from the Region II Incident Response Center entered the Monitoring mode at 12:15 p.m. The NRC left monitoring mode after learning that licensed material was not involved. The licensee resolved the cause of the event.

(2) Conclusions

On August 2, the EMO promptly and effectively responded to an event not involving licensed material.

3. **Management Organization and Controls (IP 88135)**

a. Review of Degraded Item Relied On For Safety

(1) Inspection Scope and Observations

On July 13, UR workers identified that a Raschig ring vacuum cleaner vessel, with its top removed and hose connected, created an un-poisoned void (above the level of Raschig rings) which exceeded the nuclear criticality safety (NCS) limits for the UR Container Controlled Area. NCS was immediately notified and Event Notification (EN) 43490 promptly reported to the NRC. An investigation team was chartered by the licensee to review the event.

The inspectors reviewed the event, the Integrated Safety Analysis (ISA) and the results of the investigation team review. The safety significance was low. The ISA credited operator action to limit SNM in the container. The only other means of SNM accumulation would involve an overhead leak and no overhead SNM processing lines were located in the area. In addition, the vacuum cleaner over-flow remained effective to prevent any liquid accumulation above the Raschig ring level. Several corrective actions (CAs) were identified that would ensure that the void space remained free of SNM-bearing solutions including hose removal and operator verification that the over-flow was maintained.



(2) Conclusions

Operators identified a potential NCS concern involving the creation of an un-poisoned void in a Raschig ring vacuum cleaner when the lid was removed and the vacuum hose remained attached. The condition was bounded by the ISA, the safety significance was low, and the planned CAs to preclude recurrence were effective.

b. NCS Review of SNM Bearing Component Handling Issues

(1) Inspection Scope and Observations

Following an event on May 24, 2007, when several SNM-bearing components fell into a tank (reference NRC Inspection Report (IR) 70-27/2007-203 and EN 43339), the licensee implemented CAs to secure components in their lifting fixtures using a restraining wire. On two occasions following CA implementation, SNM-bearing components became detached. On June 29, a component fell into an empty tank while being removed from its fixture. On July 31, a fixture loaded with components struck the side of a tank and several components became dislodged but were captured on the restraining wire.

The inspectors reviewed NCS evaluations NCS-2007-152 and NCS-2007-165, and the corresponding ISA accident scenario. Both events were bounded by the ISA scenario and double contingency safety control was maintained. To preclude recurrence, a new fixture has been designed and is expected to be used within the next two months.

(2) Conclusions

Two events involving SNM-bearing components, which became detached from their lifting fixtures, were properly evaluated by NCS engineers. The events were bounded by scenarios described in the ISA and double contingency safety controls remained effective. A re-designed lifting fixture was being fabricated and was expected to begin use within the next two months.

4. **Radiation Protection (IP 88030)**

a. Exposure Control Program (R1.04 and R1.05)

(1) Inspection Scope and Observations

The inspectors reviewed personnel exposure data to verify that exposures were maintained as low as reasonably achievable (ALARA) and within the limits of 10 CFR 20.1201. Table 1 displays the maximum assigned exposure data for calendar year (CY) 2006 and 2007, year to date. A review of records indicated that the external and shallow dose exposures at the Lynchburg Technology Center (LTC) had exceeded the ALARA goals set for CY 2007 due to increased high radiation work. The offsite dose to the nearest public receptor for CY 2006, was 0.040 mrem which was well below the requirements in 10 CFR 20.1301. The inspectors reviewed the program for monitoring

exposures and determined that the exposure control program was adequately implemented.

The inspectors reviewed the licensee's bioassay program and concluded that it was effectively maintained to control internal exposure. The inspectors noted that the internal exposure to personnel at the LTC was small compared to the internal exposure at the Nuclear Products Division (NPD).

**Table 1. Maximum Annual Dose Data**

Year/Facility		Deep Dose Equivalent (DDE)-rem	Shallow Dose Extremity (SDE)-rem	Total Effective Dose Equivalent (TEDE)-rem	Collective TEDE (person-rem)	Committed Effective Dose Equivalent (CEDE) - rem
2006	NPD	0.090	0.081	0.734	32.152	0.734
	LTC	1.557	9.264	1.565	6.158	0.008
2007*	NPD	0.086	0.000	0.334	13.054	0.334
	LTC	1.213	10.213	1.245	6.408	0.041

\* Reporting period from 1/1/07 through 7/31/07, the data for 2007 was current at the time of the inspection.

(2) Conclusions

The external and internal exposure monitoring program was implemented in a manner that maintained doses ALARA and within the limits of 10 CFR 20.1201.

b. Radiation Protection Program Implementation (R1.01), Radiation Protection Program Procedures (R1.02)

(1) Inspection Scope and Observations

The inspectors reviewed the Radiation Protection (RP) program self-assessments. Findings were captured and tracked in Radiation Safety Incident Notices. Quarterly observations and management audits were provided to the ALARA Committee. The inspectors reviewed operating procedures for the health physics technicians and noted that changes to the procedures were up to date, and the changes were included in the employee training.

(2) Conclusions

RP program self-assessments and procedure changes were implemented in accordance with the license requirements

c. Respiratory Protection (R1.06), Postings, Labeling and Control (R1.07), Surveys (R1.08) and Implementation of ALARA Program (R1.10)

(1) Inspection Scope and Observations

Respiratory protection equipment issuance and training were examined and determined adequate to ensure respiratory protection equipment was only obtained by certified users. The inspectors reviewed radiation work permits (RWPs), radiological surveys, radiological precautions, and general work practices during plant walk downs. The radiological posting program was reviewed and radiation work was observed in accordance with RWPs and operating procedures. Equipment and devices used to confine and contain radioactive contamination and airborne radioactivity were in proper working condition and personnel protective equipment and dosimetry were properly worn as required by the RWPs. The inspectors reviewed survey documentation and observed technicians performing surveys in accordance with the procedures.

The ALARA program was reviewed and implemented in accordance with the license. The 2006 ALARA annual report was reviewed by management, and included detailed ALARA goals and exposure summaries to identify undesirable exposure trends.

(2) Conclusions

The respiratory protection equipment program, radiological postings, RWPs, radiation contamination survey and ALARA programs were adequately implemented to protect workers.

5. **Fire Protection (IP 88135)**

a. Inspector Followup Item 70-27/2007-03-02: Review the Results of the Licensee's Investigation of the Fire in the Waste Compactor Building

Following a fire in the Waste Compactor Building, on May 8, 2007, the EMO established a Post Incident Review Team (PIRT) to identify the cause and recommend corrective actions. The inspectors responded to the fire (See NRC IR 70-27/2007-03), observed the licensee disassemble and identify the contents of the compacted drum, reviewed the PIRT root cause report (PIRT 07-01), and discussed the CAs with the responsible manager. The event was entered into the CA program as BWX 2017074.

The PIRT report indicated that the root cause was a lack of procedural guidance. The inspectors discussed the root cause report with the Environmental Protection Manager and agreed with the PIRT report root cause assessment. The immediate CAs included halting compaction operations until implementation of procedural controls.

Failure to establish a procedure was a violation of License Application, Section 11.4, "Procedures," which required activities involving licensed material to be conducted according to written procedures. The inspectors evaluated the radiological risk of the fire and determined it was low based on the amount of SNM contained in the drum. Although the failure to establish procedure control over the NRC-licensed activity was

identified through an event, the licensee was provided identification credit due to the completion of the comprehensive root cause assessment. In addition, the immediate and planned CAs appeared effective to preclude recurrence. Therefore, this non-repetitive, licensee-identified and corrected event was treated as a non-cited violation (NCV) consistent with Section VI.A.8 of the Enforcement Policy Manual (NCV 70-27/2007-05-01, Fire Involving SNM). Furthermore, Inspector Followup Item (IFI) 70-27/2007-03-02 was closed.

b. Conclusions

An NCV was identified for failure to have an adequate procedure. The planned CAs included implementation of procedure controls.

6. **Exit Meeting**

The inspection scope and results were summarized on August 10, and 16, 2007, with R. Cochrane, General Manager, and other members of the licensee's staff. Although proprietary information and processes were reviewed during this inspection, proprietary information was not included in this report. No dissenting comments were received from the licensee.

## ATTACHMENT

### 1. LIST OF PERSONS CONTACTED

J. Burch, Manager, Operations  
R. Cochrane, General Manager  
J. Creasey, Manager, Uranium Processing  
D. Faidley, Acting Manager, Nuclear Criticality Safety  
L. Morrell, Manager, Licensing & Safety Analysis  
T. Nicks, Manager, Security  
D. Spangler, Manager, Radiation Protection  
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. INSPECTION PROCEDURES USED

IP 88135      Resident Inspection Program for Category I Fuel Cycle Facilities  
IP 88030      Radiation Protection

### 3. LIST OF ITEMS OPENED AND CLOSED

<u>Item Number</u>	<u>Status</u>	<u>Description</u>
70-27/2007-05-01	Open/Closed	NCV - Fire Involving SNM (Paragraph 5).
70-27/2007-03-02	Closed	IFI - Review the Results of the License's Investigation of the Fire in the Waste Compactor Building (Paragraph 5).