



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
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ATLANTA, GEORGIA 30303-8931

October 20, 2008

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. 70-27/2008-003

Dear Mr. Cochrane:

This letter refers to the inspection conducted from June 22 through September 20, 2008, at the BWX Technologies, Inc. (BWXT) facility in Lynchburg, VA. The purpose of the inspection was to determine whether activities authorized under 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, no violations or deviations were identified.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, and its enclosure, 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>.

R. Cochrane

2

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

Sincerely,

/RA/

D. Charles Payne, 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:
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U. S. NUCLEAR REGULATORY COMMISSION
REGION II

Docket No.: 70-27

License No.: SNM-42

Report No.: 70-27/2008-003

Licensee: BWX Technologies, Inc.

Facility: Nuclear Products Division

Location: Lynchburg, Virginia

Dates: June 22 thru September 20, 2008

Inspectors: S. Subosits, Senior Resident Inspector
R. Gibson, Senior Fuel Facilities Inspector
R. Prince, Fuel Facilities Inspector
O. Lopez, Acting, Senior Resident Inspector

Approved by: D. Charles Payne, Chief
Fuel Facility Inspection Branch 1
Division of Fuel Facility Inspection

Enclosure

EXECUTIVE SUMMARY

BWX Technologies, Inc., Nuclear Products Division
NRC INSPECTION REPORT 70-27/2008-003

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, Maintenance and Surveillance, and Radiation Protection. Specialized inspections and reviews of documentation were conducted by regional inspectors in the areas of Fire Protection (R. Prince, June 23 –26), and Radiation Protection (R. Gibson, August 4 - 8).

Plant Operations

- The facility was operated safely and in accordance with nuclear criticality safety postings. On July 22, the licensee provided an adequate response and repair to the discovery of a leak location in a waste transfer line following a pressure test on the underground piping. (Paragraph 2.a.)
- The licensee initiated a formal investigation to determine the cause(s) and identify corrective actions following the discovery of spark generation in the high level trough dissolver. An inspector followup item was identified to review the results of the licensee's investigation. (Paragraph 2.b.)

Fire Protection

- Fire protection surveillance activities, maintenance and availability of fire protection equipment, and suppression systems, and conduct of Hot Work activities were properly performed and maintained (Paragraph 3.a).

Radiation Protection

- The radiation protection program self-assessments and procedure changes were implemented in accordance with license requirements (Paragraph 4.a).
- 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.b).
- The respiratory protection equipment program, radiological postings, radiation work permits, radiation contamination surveys, and ALARA programs were adequately implemented to protect workers (Paragraph 4.c).

Attachment:

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

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.

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

a. Plant Operations

(1) Inspection Scope and Observations

The inspectors performed daily tours of the fuel manufacturing, and uranium recovery areas. The inspectors verified compliance with nuclear criticality safety (NCS) postings. The inspectors verified that there was adequate staffing, operator attentiveness, compliance with procedures and verified that safety controls were implemented and controlled. No safety problems were identified.

The inspectors toured the Lynchburg Technology Center (LTC) and queried LTC Radiation Protection (RP) personnel regarding facility radiation and contamination monitoring and control features. No issues were identified and RP personnel were knowledgeable of the LTC radiation and contamination hazards.

The inspectors reviewed an incident that occurred on July 22 during the performance of a pressurized leak test with water on a waste water transfer line from LTC to the Waste Treatment Facility (WTF). During this annual test the licensee determined that a leak existed in the transfer line. Following excavation of portions of the line, the source of the leak was identified on the high point of a coupling on a threaded elbow. The line normally gravity feeds waste water from a 10,000 gallon tank to the WTF. Sample results of the excavated soil in the area of the leak did not exceed the licensee's action level of 30 picocuries/gram beta or 15 picocuries/gram alpha. The licensee initiated an unusual incident report, required notifications were made and the issue was entered into the corrective action system. Because the contamination levels the area did not exceed the action levels in the license application and the area was cleaned up in less than 24 hours, the event was not reportable to the NRC. The pipe was repaired and the leak test of the repaired line was acceptable with no leaks identified.

(2) Conclusions

The facility was operated safely and in accordance with nuclear criticality safety postings. On July 22, the licensee provided an adequate response and repair to the discovery of a leak location in a waste transfer line following a pressure test on the underground piping.

b. Discovery of Spark Generation during Routine Operations in High Level Dissolvers

(1). Inspection Scope and Observations

On August 28, a Production Operator noticed a generation of sparks in the high level dissolver metal dissolution trough. Uranium Recovery Engineering was notified and also observed the phenomena. The licensee postulated that the floating pieces of zirconium were acting as an anode in a galvanic cell with the aqueous dissolving solution acting as an electrolyte and the metal trough acting as a path to ground. Because of the potential for combustion of hydrogen gas within the dissolver glovebox, the licensee suspended dissolution of the type of fuel components with which the spark generation occurred until further investigation into the cause. The licensee also conducted an incident evaluation to determine if the occurrence of an ignition in the dissolvers constituted a reportable event under the criteria in 10 CFR 70 Appendix A. The inspectors reviewed the evaluation to verify comprehensiveness. The licensee's evaluation cited high consequence accident scenarios HLDR1 and 5N-5a from their Integrated Safety Analysis (ISA) / Safety Analysis Report (SAR) 15.5, "High Level Dissolution Process in Uranium Recovery" which bound the condition due to the assumption in the scenarios that an accumulation and ignition of hydrogen gas occurs in the dissolver process enclosures. One of the Items Relied on for Safety (IROFS) controls cited in the scenarios was control of transient and fixed sources of ignition in the dissolver process. The loss of this IROFS did not lower the protection score for the scenarios into a range where either scenario was no longer highly unlikely. Despite the loss of this IROFS, the condition did not result in a failure to meet the performance requirement because of the presence of other controls including the scrubber ventilation system, Lower Explosive Limit (LEL) monitoring for hydrogen, and an administrative control for operator response to shutdown the dissolution process upon loss of ventilation. Based on their review of the ISA scenarios, the inspectors concluded the licensee's evaluation provided adequate justification for why the incident was not reportable under 10 CFR 70 Appendix A criteria.

Following the resumption of dissolution operations, a second occurrence of spark generation was noted on September 12 by a uranium recovery operator and an engineer. The material being dissolved contained zirconium but was a different form than the material which was being dissolved on August 28. The inspectors interviewed a number of engineers and managers to ascertain the licensee's path forward for the high level trough dissolvers and to express their belief that the condition warranted a formal investigation to identify the cause of the spark generation and provide actions to prevent recurrence. As an immediate corrective action the licensee suspended dissolution operations with the high level trough dissolvers. The licensee also assigned a formal investigation team to ensure the cause of the spark generation was more thoroughly investigated and to identify and implement corrective actions for the high level trough dissolver process. The review of the findings and corrective actions for the licensee's investigation is an inspector followup item (IFI 70-27/2008-003-01).

(2) Conclusions

The licensee initiated a formal investigation to determine the cause(s) and identify corrective actions following the discovery of spark generation in the high level trough dissolver. An inspector followup item was identified to review the results of the licensee's investigation.

3. **Fire Protection (IP 88055)**

a. Fire Protection Program Implementation (O3.01), Annual Inspection (O3.02), Identification and Resolution of Problems (O3.03)

(1) Inspection Scope and Observations

The inspectors observed hot work activities in the field and interviewed personnel regarding the conduct of hot work and associated fire watch responsibilities. The inspectors found that individuals were knowledgeable of the requirements and controls regarding the performance of hot work activities. The inspectors observed the hot work job locations and noted the appropriate placement of fire retardant materials and the availability of fire extinguishing agents.

Fire Protection Technicians demonstrated the performance of fire extinguisher inspection activities and tracking of inspection results. The inspector observed the process by which inspection data is down-loaded into a computerized data base and mechanisms utilized to ensure that inspection results are acceptable. Cognizant personnel demonstrated the ability to track and trend fire extinguisher inspection results and discussed the criteria for entering inspection data results into the licensee's corrective action program. No safety concerns were identified.

The inspectors reviewed records associated with the inspection of fire extinguishers. The inspectors found the records to be adequate and current. The inspectors interviewed licensee personnel regarding the program associated with records maintained for smoke and heat detectors. The inspectors found that the program utilized a similar data base and tracking system as that for fire extinguishers. No issues or concerns were identified.

The inspectors observed the location and availability of fire extinguishers and other extinguishing agents stationed throughout the facility. The inspectors noted that extinguishers were properly charged and stored in designated locations free of obstructions, areas were clearly posted, and the fire suppression systems were free of obstructions and available to perform their intended function. The inspectors interviewed workers at various work stations with regards to the location of fire fighting equipment and the actions to take in the event of a fire. The inspectors found that individuals were knowledgeable of fire protection equipment locations and the required actions as specified in licensee procedures.

The inspectors reviewed selected fire hose locations and found hoses and associated equipment in good condition and available for use. The inspectors observed the main facility where emergency vehicles and fire fighting equipment are stored and staged for use. The inspectors observed the fire pump facility and noted that house keeping and material condition was adequate. Combustible materials were adequately controlled and hazardous and industrial waste materials properly stored in accordance with the licensee's program. The inspectors interviewed cognizant personnel regarding the availability and reliability of the fire pumps. No issues or concerns were identified.

The inspectors observed an emergency response drill conducted on June 24, 2008. The drill scenario involved fire fighting and emergency medical response actions. The inspectors observed the response of fire protection emergency response personnel. The inspectors noted that emergency response personnel were aware of their responsibilities and drill response activities were conducted in accordance with assigned responsibilities. Individuals were knowledgeable of their duties and demonstrated adequate skill in handling and staging of emergency equipment and supplies. No issues were identified.

(2) Conclusions

Fire Protection equipment was adequately maintained and available for use. Licensee personnel were knowledgeable of their fire protection responsibilities and notification requirements. Fire suppression systems, portable fire fighting equipment, and supplies were maintained in accordance with the requirements of the licensee's program. Emergency response team members demonstrated adequate knowledge and skill in response to a simulated emergency.

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

a. 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.

b. Exposure Control Program (R1.04)(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) 2007 and 2008, year to date. A review of records indicated that the external and shallow dose exposures at the (LTC) were within the ALARA goals set for CY 2008. The offsite dose to the nearest public receptor for CY 2007 was 0.13 millirem 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
2007	NPD	0.218	0.110	0.584	24.819	0.569
	LTC	1.823	12.920	1.854	8.666	0.045
2008*	NPD	0.093	0.056	0.340	9.351	0.340
	LTC	0.604	1.955	0.664	2.212	0.077

* Reporting period from 1/1/08 through 6/30/08, the data for 2008 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.

c. Respiratory Protection (R1.04), Postings, Labeling and Control (R1.05), Surveys (R1.06) and Implementation of ALARA Program (R1.08)

(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 2007 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 surveys and ALARA programs were adequately implemented to protect workers.

5. Exit Meeting

The inspection scope and results were summarized on June 26, August 8, and October 3, 2008, 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 is 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, Manager, Nuclear Criticality Safety
B. Cole, Manager, Licensing & Safety Analysis
T. Nicks, Manager, Security
C. Yates, Manager, Safety and Licensing
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. **LIST OF ITEMS OPENED AND CLOSED**

<u>Item Number</u>	<u>Status</u>	<u>Description</u>
70-27/2008-003-01	Open	IFI – Review of the Licensee’s Investigation Regarding the Discovery of Spark Generation in the High Level Trough Dissolvers (Paragraph 2.b).

3. **INSPECTION PROCEDURES USED**

IP 88135	Resident Inspection Program for Category I Fuel Cycle Facilities
IP 88030	Radiation Protection
IP 88055	Fire Protection (Annual)