



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

July 31, 2008

EA-08-204

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. 70-27/2008-002 AND NOTICE OF VIOLATION

Dear Mr. Cochrane:

This letter refers to the inspection conducted from March 23 through June 21, 2008, at the BWX Technologies 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, Radiation Protection, Radioactive Waste Management, Operator Training, Operational Safety, and Environmental 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 that two violations of NRC requirements occurred. Both violations were evaluated in accordance with the NRC Enforcement Policy available on the NRC's Web site at <http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html>. The violations are cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the subject inspection report. If you contest the violations or the 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 20555-0001, and the NRC Senior Resident Inspector at your facility.

In addition, an apparent violation (APV) was identified and is being considered for escalated enforcement action in accordance with the NRC Enforcement Policy. The APV involved the failure to meet the performance requirements of 10 CFR 70.61(c)(4)(i). Specifically, an operator received an exposure of liquid hydrogen fluoride to the eye, while trying to neutralize a spill, that could have led to irreversible or other serious, long-lasting health effects.

The circumstances surrounding the APV and the significance of the issue were discussed with members of your staff during an exit meeting conducted on June 26, 2008. As a result, it may not be necessary to conduct a predecisional enforcement conference in order to enable the NRC to make an enforcement decision. However, before the NRC makes its enforcement decision, we are providing you an opportunity to either: (1) respond to the apparent violation addressed in the inspection report within 30 days of the date of this letter, or (2) request a pre-decisional enforcement conference. If a conference is held, it will be open for public observation. The NRC will also issue a press release to announce the conference. Please contact D. Charles Payne (404-562-4711) or Alphonsa Gooden (404-562-4716) within seven days of the date of this letter to notify the NRC of your intended response.

If you choose to provide a written response, it should be clearly marked as a "Response to Apparent Violation in Inspection Report No. 70-27/2008-002; EA-08-204" and should include: (1) the reason for the APV, or, if contested, the basis for disputing the APV; (2) the corrective steps that have been taken and the results achieved; (3) the corrective steps that will be taken to avoid further violations; and (4) the date when full compliance will be achieved. In presenting your corrective actions, you should be aware that the promptness and comprehensiveness of your actions will be considered in assessing any civil penalty for the APV. The guidance from NRC Information Notice 96-28, "Suggested Guidance Relating to Development and Implementation of Corrective Action," is available on the NRC's website and may be helpful. Your response may reference or include previously docketed correspondence if the correspondence adequately addresses the required response. If an adequate response is not received within the time specified or an extension of time has not been granted by the NRC, the NRC will proceed with its enforcement decision or schedule a predecisional enforcement conference.

Please be advised that the number and characterization of the apparent violation described in the enclosed inspection report may change as a result of further NRC review. You will be advised by separate correspondence of the results of our deliberations on this matter.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosures, and your response, if you choose to provide one, 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/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

R. Cochrane

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

Sincerely,

/RA/

Joseph W. Shea, Director
Division of Fuel Facility Inspection

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

- Enclosures: 1. Notice of Violation.
2. NRC Inspection Report No. 70-27/2008-002

cc w/encls:
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X PUBLICLY AVAILABLE NON-PUBLICLY AVAILABLE SENSITIVE
ADAMS: X Yes ACCESSION NUMBER: _____

X NON-SENSITIVE
X SUNSI REVIEW COMPLETE

OFFICE	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI	RII:EICS
SIGNATURE	OI 7/28/08	OL for 7/28/08	MC 7/28/08	RG 7/28/08	RP 7/30/08	AG 7/30/08	CFE7/22/08
NAME	OLopez	CCramer	MCrespop	RGibson	RPrince	AGooden	CEvans
DATE	8/ /2008	8/ /2008	8/ /2008	8/ /2008	8/ /2008	8/ /2008	8/ /2008
E-MAIL COPY?	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO	YES NO

NOTICE OF VIOLATION

BWX Technologies, Inc.
Lynchburg, Virginia

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

During NRC inspection activities conducted from March 23 through June 21, 2008, violations of NRC requirements were identified. In accordance with the NRC Enforcement Policy, the violations are listed below:

- A. 10 CFR 70.61(b) requires, in part, that the risk of each credible high-consequence event must be limited. Engineered controls, administrative controls, or both, shall be applied to the extent needed to reduce the likelihood of occurrence of the event so that, upon implementation of such controls, the event is highly unlikely.

10 CFR 70.61(e) states, in part, that each engineered or administrative control or control system necessary to comply with paragraph (b) of this section shall be designated as an item relied on for safety (IROFS). The safety program, established and maintained pursuant to §70.62 of this subpart, shall ensure that each IROFS will be available and reliable to perform its intended function when needed and in the context of the performance requirements of this section.

Contrary to the above, prior to June 2, 2008, the licensee did not apply engineered or administrative controls to the extent needed to reduce the likelihood of occurrence of accident sequence SB1-1a1 (combustible gas explosion) so that, upon implementation of such controls, the sequence was highly unlikely.

Specifically, the licensee credited the auxiliary fan powered by an emergency diesel generator as one of the controls, i.e. an IROFS, to reduce the likelihood of occurrence of accident sequence SB1-1a1. This IROFS did not have a functional test between 2004 and 2008 to ensure that it was available and reliable to perform its intended safety function when needed. Therefore, this IROFS could not be credited and the probability of accident sequence SB1-1a1 was not highly unlikely for a high consequence event.

This is a Severity Level IV violation (Supplement VI).

- B. 10 CFR 70, Appendix A, (b)(1) requires that any event or condition that results in the facility being in a state that is different from that analyzed in the Integrated Safety Analysis (ISA), and which results in failure to meet the performance requirements of §70.61 be reported to the NRC Operations Center within 24 hours of discovery.

Contrary to the above, on June 26, 2008, the licensee failed to report to the NRC Operations Center within 24 hours the discovery of the condition as described in violation A above that resulted in the facility being in a state that was different from that analyzed in the ISA, and which resulted in failure to meet the performance requirements of §70.61.

This is a Severity Level IV violation (Supplement VI).

Enclosure 1

Pursuant to the provisions of 10 CFR 2.201, BWX Technologies, Inc., is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with a copy to the Regional Administrator, Region II, and a copy to the NRC Resident Inspector at BWX Technologies, Inc., within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previously docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response, 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, the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001, and the NRC Resident Inspector at your facility.

Because your response 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/reading-rm/adams.html> to the extent possible, it should not include any personal privacy, proprietary, classified, or safeguards information so that it can be made available to the public without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g. explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.390(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated this 31st day of July 2008.

U. S. NUCLEAR REGULATORY COMMISSION
REGION II

Docket No.: 70-27

License No.: SNM-42

Report No.: 70-27/2008-002

Licensee: BWX Technologies, Inc.

Facility: Nuclear Products Division

Location: Lynchburg, Virginia

Dates: March 23 through June 21, 2008

Inspectors: O. López, Acting Senior Resident Inspector
C. Cramer, Fuel Facilities Inspector
M. Crespo, Senior Fuel Facilities Inspector
R. Gibson, Jr., Senior Fuel Facilities Inspector
R. Prince, Fuel Facilities Inspector

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

Enclosure 2

EXECUTIVE SUMMARY

BWX Technologies, Inc., Nuclear Products Division
NRC INSPECTION REPORT 70-27/2008-002

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, Radiation Protection, and Physical Protection. Specialized inspections and review of documentation were conducted by regional inspectors in the areas of Radiation Protection, Radioactive Waste Management, and Operator Training (May 19 through 23); and Operational Safety and Environmental Protection (June 2 through 6).

Plant Operations

- The facility operated in accordance with nuclear criticality safety limits and radiological work permit requirements (Paragraph 2.a).
- On Monday, June 9, the licensee halted operations in the Recovery area and performed a valve alignment stand down to emphasize the importance of proper valve configuration (Paragraph 2.a).
- The inspectors determined that reviewed items relied on for safety (IROFS) were implemented and documented in the safety analysis reports (SARs). Operators and area engineers were knowledgeable of their procedures and responsibilities (Paragraph 2.b).
- An apparent violation was identified for the failure to meet the performance requirements of 10 CFR 70.61(c)(4)(i). Specifically, an operator received an exposure of liquid hydrogen fluoride to the eyes, while attempting to neutralize a spill, that could have led to irreversible or other serious, long-lasting health effects (Paragraph 2.c).
- The inspectors identified two deficiencies related to maintenance plans in Uranium Recovery (UR). The deficiencies were related to ensuring that the intent of maintenance plans was accomplished and ensuring that functional tests are performed following maintenance to an IROFS (Paragraph 2.d).
- A violation was identified for the failure to apply engineered or administrative controls to the extent needed to reduce the likelihood of occurrence of accident sequence SB1-1a1 so that, upon implementation of such controls, the accident sequence is highly unlikely (Paragraph 2.e).
- A violation was identified for the failure to identify and report to the NRC Operations Center within 24 hours of discovery, a condition that resulted in accident sequence SB1-1a1 being in a state that was different from that analyzed in the ISA, and which resulted in failure to meet the performance requirements of §70.61(Paragraph 2.e).

Management Organization and Controls

- Modifications of the redesigned high level dissolvers (HLDs) were performed in accordance with the Change Management System (Paragraph 3.a).

Radiation Protection

- Radiation Protection surveillance activities, instrument operation and calibration, and as low as reasonably achievable (ALARA) program activities were properly maintained. Self-assessments and Quality Assurance surveillances of Radiation Protection program activities were adequately implemented. Training and qualification activities for Radiation Protection personnel were current and implemented in accordance with the licensee's program (Paragraph 4.a).

Radiological Waste Management

- The licensee adequately performed shipping and characterization activities for radioactive waste generated from the Lynchburg Technology Center and the main site. The licensee adequately implemented self-assessments to verify compliance with procedures for radiological waste activities (Paragraph 5.a).
- The licensee was adequately storing drummed waste in secure areas (Paragraph 5.b).
- The licensee completed waste manifests that accurately detailed the contents of radiological waste shipments (Paragraph 5.c).

Operator Training

- The licensee properly implemented training requirements for contractors in the settling pond remediation project and operators in the recovery area (Paragraph 6.a).
- The licensee properly performed training activities for the recovery area (Paragraph 6.b).
- The licensee testing and documentation of training adequately verified the knowledge of the operators (Paragraph 6.c).

Effluent Control and Environmental Protection

- The licensee's environmental monitoring program was implemented in accordance with the license requirements. Environmental sampling results for soil, vegetation, water, and ambient air, since the last inspection, showed uranium activities near background levels in the environment (Paragraph 7.a).
- In August 2006, groundwater monitoring well samples were found in excess of license application (LA) action levels due to Tc-99 contamination. During this inspection, it was determined by the licensee that the levels had decreased significantly; however, results still exceeded the LA action levels. In addition, the licensee determined that two other groundwater wells showed alpha readings above the LA action levels. Isotopic analysis identified the alpha readings as natural uranium settling in the wells (Paragraph 7.b).
- The licensee maintained an acceptable quality control program for analytical measurements of environmental samples (Paragraph 7.c).

- The environmental audit program was consistent with the requirements specified in the LA. The environmental program audits were thorough and corrective actions were tracked appropriately (Paragraph 7.d).
- The liquid effluent program effectively maintained effluent concentrations below the limits specified in the LA (Paragraph 7.e).
- The airborne effluent monitoring program was effective in controlling and measuring effluents, and compliant with the requirements of the LA. The effluent air sampling equipment, including the sample delivery lines, had been properly maintained. Calculated offsite doses were below regulatory limits (Paragraph 7.f).

Physical Protection

- Physical protection activities were performed in accordance with regulatory requirements and licensee's procedures (Paragraph 8.a).

Attachment:

Partial Listing of Persons Contacted

List of Items Opened, Closed and Discussed

Inspection Procedures Used

Acronyms

REPORT DETAILS

1. Summary of Plant Status

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

2. Plant Operations (Inspection Procedures (IP) 88135 and 88020)

a. Plant Operations

(1) Inspection Scope and Observations

The inspectors performed daily tours of the fuel manufacturing, storage, and UR areas. The inspectors observed that personnel complied with approved, written nuclear criticality safety (NCS) limits. The inspectors reviewed in detail the container controlled requirements for the UR process area and interviewed UR operators and NCS engineers. The inspectors verified that there was adequate staffing, operator attentiveness and compliance with procedures and verified that safety controls were implemented and controlled. No safety problems were identified.

The inspectors performed a detailed review of Radiation Work Permit (RWP) 08-0038 which involved modifications to the redesigned HLDs. The inspectors also reviewed RWP 08-0040 which involved the cleaning and packaging of several process columns no longer in service. The inspectors verified that maintenance and operations personnel complied with the prescribed controls and precautions. RWPs contained adequate requirements concerning the radiation levels, respiratory protection equipment, dosimetry, contamination levels, special tools and equipment, airborne radioactivity, and containment devices.

As a result of recent spills due to valve misalignment, on Monday, June 9th, the licensee halted operations in the UR area and performed a valve alignment stand down. The purpose of the stand down was to visually identify valves that could potentially cause solution to lose containment and to emphasize the importance of proper valve configuration. The stand down also allowed for field verification of valve locations and identification against the process diagrams.

(2) Conclusion

The facility was operated in accordance with nuclear criticality safety limits and radiological work permit requirements. On Monday, June 9th, the licensee stopped operations in the Recovery area and performed a valve alignment stand down to emphasize the importance of proper valve configuration.

b. Identification of Safety Controls and Related Programs (O1.01), Implementation of Safety Controls (O1.02), and Safety Control Support Programs (O1.03)

(1) Inspection Scope and Observations

The inspectors reviewed SARs for recovery, specialty fuels facility, fuel manufacturing, assembly, storage areas, and RTRT to determine if IROFS were properly implemented and documented in the SARs. The inspectors then walked down selected IROFS in these areas to ensure that the IROFS were in place and performing their intended safety function.

The inspectors reviewed operating procedures, maintenance records, investigative reports, change requests, and quality work instructions (QWIs). Operators and engineers were interviewed and were knowledgeable about their procedures and responsibilities. No safety issues were identified.

(2) Conclusion

The inspectors determined that reviewed IROFS were properly implemented and documented in the SARs. Operators and area engineers were knowledgeable of their procedures and responsibilities.

c. UR Hydrofluoric Acid (HF) Spill

(1) Inspection Scope and Observations

On Monday, April 28, on third shift (10:15 p.m.), an HF spill occurred while operators were in the process of adding HF to the HLDs. Operators noted liquid HF beneath the HF day tank dripping from a drain valve which should have been closed for this operation. Operator "A" closed the valve and mistakenly applied crystalline sodium hydroxide (NaOH), instead of soda ash, in an attempt to neutralize the HF liquid. Upon the addition of the NaOH, the HF liquid spill erupted and splashed Operator "A" in the face and eyes.

A Radiation Control Technician in the area stated that he felt a burning sensation on his neck. The operator and the Radiation Control Technician received first aid (calcium gluconate ointment applied to the skin and a 1% solution to the eyes) on site before going to the hospital. Operator "B", who provided assistance following the event and had trouble breathing, was also sent to the hospital where he received breathing therapy (the incident may have aggravated an asthma condition). The individuals were treated and released from the hospital in less than 24 hours. In response to the chemical reaction, the licensee evacuated the building and emergency responders entered the area, with adequate PPE and respiratory protection, to assess and control/neutralize the HF spill. The area was released to operation on the morning of April 29.

Subsequent to treatment at the hospital, Operator "A" was evaluated by his personal optometrist as well as by the BWXT site physician and a BWXT recommended medical expert on HF. Following the event, Operator "A" complained of blurred vision and eye irritation. The operator's personal optometrist diagnosed the condition as "dry eyes" with some indication of scar tissue and a small abrasion in one eye. A prescription eye solution was provided to Operator "A" to aid in relieving the dryness. No complaints or adverse health effects were reported by Operator "B" or the Radiation Control Technician (RCT).

As immediate corrective actions, the licensee sealed and tagged out of service the NaOH and soda ash drums, and made improvements to the labeling on the drums. Area engineers performed a walk down of the HF system to ensure the system was in a safe operational state and the incident was reviewed with all UR personnel. The licensee also initiated an investigation to identify causal factors and recommended corrective actions.

The inspectors reviewed the licensee's root cause investigation report. The licensee identified the following causal factors: selection and application of the wrong chemical to neutralize spill, failure to don a face shield during the attempted spill neutralization, and failure to close HF pumps maintenance valves after testing. The proposed corrective actions included the development/training of a site-wide procedure for responding to chemical spills, establishment of spill response kits, and a review of test plans to ensure they include steps to return systems to normal operations. The inspectors performed an independent investigation of the event and concurred with the causal factors identified by the licensee.

The inspectors reviewed the licensee's ISA and determined that the licensee improperly analyzed accident sequences involving unprotected and unmitigated chemical exposures, including HF spills. The licensee determined that consequences from these accidents would not result in consequences exceeding 10 CFR 70.61 requirements. The licensee could not provide to the inspectors documentation that supported their ISA. In particular, the licensee did not provide any quantitative standards that were used to assess the consequences to an individual from an acute chemical exposure to licensed material. Hydrofluoric acid is more damaging to the eye than other acids due to the ability of the fluoride ion to penetrate tissue. Eye exposure to HF could result in permanent damage as described in the licensees' Material Safety Data Sheets (MSDS). The MSDS stated that ocular exposure to HF could cause permanent eye damage and even blindness very rapidly. The inspectors determined that the licensee failed to implement engineering or administrative controls to the extent needed so that, upon implementation of such controls, the risk of each credible intermediate-consequence event was unlikely or its consequences were less than those in Paragraph (c) (1)-(4) of §70.61. Paragraph (c)(4)(1) states, in part, that an intermediate consequence is an acute chemical exposure to an individual from licensed material or hazardous chemicals produced from licensed material that could lead to irreversible or other serious, long-lasting health effects to a worker. An operator received an eye exposure of liquid HF, while trying to neutralize a spill, that could have led to irreversible or other serious, long-lasting health effects. Failure to meet the performance requirements in 10 CFR 70.61(c)(4)(i) was identified as an apparent violation (APV 70-27/2008-002).

(2) Conclusion

An APV was identified for the failure to meet the performance requirements of 10 CFR 70.61(c)(4)(i). Specifically, an operator received an exposure of liquid hydrogen fluoride to the eye, while attempting to neutralize a spill, that could have led to irreversible or other serious, long-lasting health effects.

d. Deficiencies with UR maintenance plans

(1) Inspection Scope and Observations

On May 15, the inspectors observed maintenance activities related to the testing of non-safety related high level probe interlocks in UR. The intent of the maintenance plan was to test the functions of the high level probes which included activating an audible alarm, shutting down pumps, and closing feed valves. The inspectors noted that some of the functions could not be tested because the system was shutdown and the components were not operational (i.e. pumps and solenoid valves). The operators stated that when the system is shutdown they only verify that they get the alarm upon activation of the high level probe. The inspectors noted that the system was not locked out until the test could be completed nor was operations notified to leave the work order open to ensure the other functions were tested before the system was put back in operation. The inspectors discussed the situation with the licensee and the licensee successfully re-performed the tests with the applicable equipment operating.

On June 3, 2008, a combustible gas sensor, which is an IROFS, was replaced in the HLD area. The inspectors reviewed the documentation associated with the maintenance on this IROFS and could not determine if a functional test was performed. The inspectors interviewed maintenance personnel responsible for the activity and they stated that a functional test was performed, but proper documentation of this test was not available. The inspectors discussed the situation with the licensee. The licensee changed the work order to specifically state that a functional test was to be performed following any maintenance to an IROFS.

The licensee entered both issues in its corrective action program (BWX_2027370). The licensee committed to review and update maintenance plans of safety controls, including IROFS in the UR process areas, to verify that the test instructions are specific enough to minimize ambiguity during performance of the tests and to ensure that a functional test is performed following maintenance to an IROFS.

(2) Conclusion

The inspectors identified two deficiencies related to maintenance plans in UR. The deficiencies were related to ensuring the intent of the maintenance plans are accomplished and ensuring that a functional test is performed following maintenance to an IROFS.

e. Failure to meet the performance requirements of 10 CFR 70.61

(1) Inspection Scope and Observations

While reviewing the results of functional tests on IROFS, the inspectors found an annual test that had not been performed. The purpose of the test was to determine if an auxiliary fan would function properly when powered by an emergency diesel generator during a loss of off-site power. The licensee stated that an ISA audit conducted in June of 2007 determined that a functional test was not being performed to ensure that this IROFS would function when needed. In response, the licensee wrote a change request (CR-1026495) to create an annual functional test. When the inspectors asked why the test had not yet been performed, the licensee stated that off-site power needed to be shutdown which occurs only during maintenance outages. Because the next maintenance outage was scheduled for June of 2008, the licensee thought it would be sufficient to wait to test the system at that time.

The inspectors examined the accident scenarios related to this IROFS and determined that accident scenario SB1-1a1 had a protection score of 4 and a severity level of 5 (high consequence event). The protection score is based on three IROFS summed together. Two of the IROFS had a protection score of 1, while the back-up fan on emergency power had a protection score of 2. The overall accident likelihood is determined by subtracting the protection score from the frequency score. The frequency score in this scenario was 0, resulting in an overall accident likelihood of -4. However, table 3.2.4-2 of the LA stated that a protection score of 2 is defined as, "a functionally tested hardware system." Because this IROFS had not had an annual functional test between 2004 and 2008, the IROFS did not meet the requirements for a protection score of 2. Therefore, this IROFS could not be applied in accident scenario SB1-1a1. This resulted in a reduced overall accident likelihood of -2. The inspectors determined that the auxiliary fan powered by the emergency diesel was not functionally tested at the required frequency (annually) to prove that this IROFS was available and reliable to perform its safety function when needed.

Table 3.2.4-4 of the LA considered an accident sequence with an overall accident likelihood of -2 to be unlikely. Table 3.2.4-4 of the LA also stated that an accident scenario with a severity level of 5 and an accident likelihood of -2 will not meet the performance requirements of 10 CFR 70.61. 10 CFR 70.61(b) requires, in part, that the risk of each credible high-consequence event must be limited. Engineered controls, administrative controls, or both, shall be applied to the extent needed to reduce the likelihood of occurrence of the event so that, upon implementation of such controls, the event is highly unlikely.

Failure to apply engineered or administrative controls to the extent needed to reduce the likelihood of occurrence of accident sequence SB1-1a1 so that, upon implementation of such controls, the sequence is highly unlikely is a violation of NRC requirements (VIO 70-27/2008-002-002).

In June 2007, the licensee determined that a functional test was not being performed to ensure that the auxiliary fan would function properly off the emergency diesel power. However, the licensee did not determine how the overall accident likelihood would

change without taking in consideration the auxiliary fan powered by the emergency diesel generator. The licensee did not identify that without the auxiliary fan they would not meet the performance requirements of 10 CFR 70.61 for accident sequence SB1-1a1. On June 26, 2008, the inspectors discussed this matter with the licensee and the licensee acknowledged this as an example of failing to meet the performance requirements of §70.61. 10 CFR 70, Appendix A(b)(1), requires that any event or condition that results in the facility being in a state that is different from that analyzed in the ISA, and which results in failure to meet the performance requirements of §70.61 be reported to the NRC Operations Center within 24 hours of discovery.

The licensee failed to identify and report to the NRC Operations Center within 24 hours of discovery a condition that resulted in accident sequence SB1-1a1 being in a state that was different from that analyzed in the ISA, and which resulted in failure to meet the performance requirements of §70.61. Failure to report to the NRC Operations Center is a violation of NRC requirements (VIO 70-27/2008-002-003).

(2) Conclusion

Two violations of NRC requirements were identified: (1) failure to apply engineered or administrative controls to the extent needed to reduce the likelihood of occurrence of accident sequence SB1-1a1 so that, upon implementation of such controls, the accident sequence is highly unlikely, and (2) failure to identify and report to the NRC Operations Center within 24 hours of discovery a condition that resulted in accident sequence SB1-1a1 being in a state that was different from that analyzed in the ISA, and which resulted in failure to meet the performance requirements of §70.61.

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

a. Redesigned HLD Modifications

(1) Inspection Scope and Observations

The inspectors reviewed modifications to the redesigned HLD and reviewed Change Requests 1028165 and 1077851 in order to verify that: (1) work documents reflected the proper approvals and reviews of the proposed activities, (2) personnel were properly implementing these changes as designed, and (3) management oversight was evident during the work activities. Proper controls (i.e. Work Request, Lockout/Tagout, and Ignition Permits) were in place and implemented during the work activities. No safety problems were identified.

(2) Conclusion

Modifications of the redesigned HLD system were done in accordance with the Change Management System.

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

a. Radiation Protection Procedures, Instruments and Equipment, Exposure Controls, Postings, Labeling and Control, Surveys, As Low As Is Reasonably Achievable

(1) Inspection Scope and Observations

The inspectors observed RCTs performing routine surveys in controlled areas of the facility and surveys associated with the release of material from the controlled area. These RCTs demonstrated adequate contamination survey and air sample filter change out techniques. Breathing zone air monitoring stations were positioned at appropriate locations to obtain representative air samples in work areas normally occupied by operators. The inspectors reviewed selected survey results for accuracy and completeness. No issues or concerns were identified. The inspectors observed the performance of daily source response and operational checks of radiation monitoring equipment, and functional alarm verification of contamination monitors located at exit points from controlled areas. Licensee personnel were knowledgeable of the operational check requirements and activities were performed in accordance with approved procedures.

The inspectors reviewed records associated with the calibration of portable survey instruments and hand-and-foot contamination monitors. The inspectors reviewed calibration sources for appropriate configuration and to confirm suitability of sources for their intended function. The inspectors found that personnel responsible for calibration were knowledgeable of calibration techniques and associated procedural requirements. The inspectors reviewed selected calibration records for accuracy and completeness. No issues or concerns were identified.

The inspectors interviewed personnel regarding the ALARA program and the trending and tracking of personnel exposures. The inspectors noted that ALARA committee meetings were held on a routine basis. The ALARA committee meeting agendas included a review of personnel exposures, a review of radiation safety incident notices, and mechanisms to track committee action items. The inspectors noted that the licensee had established action levels associated with daily personnel exposures. In the event that action levels are exceeded, steps would be initiated to evaluate the situation, and if necessary, corrective measures implemented. The inspectors noted that these action levels were conservative and established at values well below regulatory exposure limits.

The inspectors reviewed the most recent independent review of the Radiation Control program. The program review was conducted by an individual familiar with the licensee's program who had been employed as a contractor to the Radiation Control group. The inspectors interviewed Radiation Control managers concerning the scope and depth of the program review. The independent review included interviews, field observations, and document reviews. The scope and depth of the program review was adequate to assess the licensee's program. The inspectors interviewed individuals

responsible for scheduling and performing quality assurance (QA) surveillances of the Radiation Control program and reviewed selected QA surveillances. Surveillance findings and observations were adequately assessed and mechanisms established to track issues to closure in accordance with approved procedures.

The inspectors reviewed the licensee's program associated with the training and qualification of Radiation Control personnel. The inspectors interviewed personnel and reviewed selected individuals' training and qualification records. The inspector noted that the licensee had initiated an effort to prepare RCTs for the National Registry of Radiation Protection Technologists (NRRPT) exam. To successfully complete the NRRPT exam candidates must demonstrate adequate knowledge of those topics related to the practical aspects of Radiation Control. Several licensee technicians have received NRRPT certification. The licensee training and qualification programs adequately addressed initial, continuing, and requalification requirements for various Radiation Control positions. The inspectors found that individuals were trained and qualified in accordance with the licensee's program requirements.

(2) Conclusion

Radiation Protection surveillance activities, instrument operation and calibration, and ALARA program activities were properly maintained. Self-assessments and QA surveillances of Radiation Protection program activities were adequately implemented. Training and qualification activities for Radiation Protection personnel were current and implemented in accordance with the licensee's program.

5. **Radiological Waste Management (IP 88035)**

a. **Management Control for Waste Classification, Shipping, and Burial; Quality Assurance**

(1) Inspection Scope and Observations

The inspectors reviewed the radiological waste management activities for the main site and the Lynchburg Technology Center (LTC). The inspectors noted that the responsibilities for these activities were clearly designated to specific organizations and individuals. The inspectors noted that these individuals were familiar with the various waste streams produced by the sites and were properly characterizing the waste shipments. The inspectors interviewed the employees appointed to perform the characterization of the waste and found no issues with their process.

The inspectors also reviewed self-assessment records to verify that the licensee was performing QA activities to verify compliance with procedures and regulations. The self-assessment focused on the loading and disposition of waste. No issues were noted with the self-assessments reviewed.

(2) Conclusion

The licensee adequately performed shipping and characterization activities for radioactive waste generated from the LTC and the main site. The licensee adequately implemented self-assessments to verify compliance with procedures for radiological waste activities.

b. Adequacy of Storage Area

(1) Inspection Scope and Observations

The inspectors reviewed the radiological waste storage areas for various classes of waste to verify that the waste was properly secured and adequately sheltered from environmental hazards. The inspectors noted the storage areas involved predominately drummed waste, which met the requirements as stated in the procedures. The inspectors noted that the mixed waste storage area was adequately sheltered from adverse weather conditions. No issues were noted.

(2) Conclusion

The licensee was adequately storing drummed waste in secure areas.

c. Waste Shipment Labeling

(1) Inspection Scope and Observations

The inspectors reviewed the activities involving the settling pond sludge remediation being performed by contractors. The waste shipments were performed via railcar and were properly labeled and marked as radiological shipments. The inspectors also reviewed the waste manifests for the shipments and noted no issues.

(2) Conclusion

The licensee completed waste manifests that accurately detailed the contents of radiological waste shipments.

6. **Operator Training (IP 88010)**

a. Instruction to Workers

(1) Inspection Scope and Observations

The inspectors reviewed activities in the settling pond sludge remediation project to verify that the contractors performing the work had completed the required 10 CFR 19.12 training. The licensee was able to provide the documentation demonstrating that the contractors had attended the required training. No issues were noted.

(2) Conclusion

The licensee properly implemented training requirements for contractors in the pond sludge remediation project and operators in the recovery area.

b. Observations of Managers, Supervisors, and Operators

(1) Inspection Scope and Observations

The inspectors interviewed operators, supervisors, and managers for the recovery area and the settling pond remediation project. The inspectors found the operators to be knowledgeable of their systems/area of responsibility. Licensee operators were familiar with their process systems and safety controls. Operators interviewed were also aware that procedures should not be overridden by process variable specification sheets.

(2) Conclusion

The licensee properly performed training activities for the recovery area.

c. Changes in Examinations; Training Program Procedures

(1) Inspection Scope and Observations

The inspectors reviewed the licensee's training records and exams to verify the validity of its method in testing operators' knowledge of material. The inspectors noted the exams were adequate to test the knowledge of pertinent safety issues and required a sufficiently high passing grade. The inspectors also reviewed the training logs in the recovery area that documented the operators' reviews of revised procedures. No significant issues were noted.

(2) Conclusion

The licensee testing and documentation of training adequately verified the knowledge of the operators.

7. **Environmental Protection and Effluent Control (IP 88045)**

a. Management Controls

(1) Inspection Scope and Observations

The inspectors reviewed selected portions of the licensee's environmental program to verify that environmental monitoring was implemented in accordance with the license requirements and verify the licensee's capabilities to measure and assess environmental radiological contamination as a result of plant operations.

The inspectors reviewed selected environmental sampling results from soil, sediment, vegetation, surface water, and environmental air station samples collected since the last inspection. The licensee was required to perform weekly air station samples, and every

quarter they were required to collect soil, sediment, vegetation, and surface water samples for uranium analysis. The inspectors determined that the sample results were consistently well below the licensee's action levels and near background levels in the environment.

(2) Conclusion

The licensee's environmental monitoring program was implemented in accordance with the license requirements. Environmental sampling results for soil, vegetation, water, and ambient air since the last inspection showed uranium activities near background levels in the environment.

b. Technetium-99 and Natural Uranium in Groundwater Wells

(1) Inspection Scope and Observations

In August 2006, the licensee notified the NRC that two groundwater monitoring wells, FEP-1 and FEP-2 located adjacent to the Final Effluent Ponds (FEPs), had exceeded the action levels of their license application. The licensee has since sampled the wells every month and determined that the levels have decreased since August 2006. During this inspection, the inspectors reviewed sample records of the monitoring wells and determined that monitoring well FEP-1 had decreased from 1480 pCi/l in August 2006 to 92.45 pCi/l on May 27, 2008. Monitoring well FEP-2 had decreased from 6205 pCi/l to 118.11 pCi/l. The licensee will continue to sample the wells every month until the level of technetium-99 is below the LA limits.

The inspectors reviewed sample records of groundwater monitoring wells across the site and determined that the licensee identified alpha levels above the LA limits for monitoring well MWL-8, which is located in the parking lot of the LTC, and for monitoring well FL-2, which is located adjacent to the Landfill 1. An isotopic analysis identified that natural uranium had been detected in the wells. From discussion with the Radiation Protection Manager, the inspectors determined that the contamination was contained onsite and there was minimal potential for offsite groundwater or onsite drinking water contamination due to the dilution factor in the James River.

(2) Conclusion

In August 2006, groundwater monitoring well samples were found in excess of LA action levels due to Tc-99 contamination. During this inspection, based on licensee samples, the inspectors confirmed that the levels had decreased significantly; however, contamination levels were still not below the LA action levels. In addition, the licensee determined that two other groundwater wells showed alpha readings above the LA action levels. Isotopic analysis identified the alpha readings as natural uranium settling in the wells.

c. Quality Control of Analytical Measurements

(1) Inspection Scope and Observations

The inspectors reviewed instruments used for the environmental monitoring and analysis program, procedures used, recorded results, and discussed the program with licensee personnel. The inspectors observed the sampling of environmental air and ground water samples in the field and reviewed the operation, calibration, and maintenance records of the laboratory instruments.

(2) Conclusion

The licensee maintained an acceptable quality control program for analytical measurements of environmental samples.

d. Environmental Program Audit Review

(1) Inspection Scope and Observations

The inspectors reviewed the licensee's environmental program audit since the last inspection. The licensee's environmental audit program was reviewed and was found to be consistent with the LA. Specifically, the inspectors reviewed the annual audit for the environmental program for 2007. The inspectors noted that the audit was appropriately distributed to ensure that it received the appropriate management review. The environmental program audit was thorough and corrective actions were appropriately tracked.

(2) Conclusion

The environmental audit program was consistent with the requirements specified in the license application. The environmental program audits were thorough and corrective actions were appropriately tracked.

e. Radioactive Liquid Effluents

(1) Inspection Scope and Observations

The inspectors reviewed the liquid effluent monitoring data for the facilities to verify that releases were compliant to the limits specified in the LA requirements and 10 CFR Part 20. The inspectors toured the outfall stations (Effs 001, 002 and 003) and discussed the sampling techniques and routines with the licensee. The inspectors compared the results with historical data and determined that they were consistent. All samples were at or near background levels. The inspectors concluded that the licensee's liquid effluents monitoring programs were effective in controlling and measuring effluents, and met the requirements of the license.

(2) Conclusion

The liquid effluent program effectively maintained effluent concentrations below the limits specified in the license.

f. Radioactive Airborne Effluents

(1) Inspection Scope and Observations

The inspectors examined selected stack effluent sampling stations at the LTC and the Nuclear Product Division, to ensure that equipment was properly maintained and representative samples were being collected. The inspectors reviewed the airborne effluent monitoring results to verify that releases were within LA limits.

The inspectors observed a health physics (HP) technician collect daily air particulate filter samples from the stacks at the LTC. The stack samples were taken properly by the HP technician in accordance with the LA. The sampling delivery lines with quick connects were in good condition with no signs of damage or corrosion.

The stack sampling results and quantities of airborne radioactive materials released for the calendar year 2007 and the semiannual effluent release reports to the NRC for the second six months of 2007 were reviewed. The calculated offsite doses for airborne effluents were well below the 10 CFR Part 20 constraint level of 10 millirem per year.

(2) Conclusion

The airborne effluent monitoring program was effective in controlling and measuring effluents and was compliant with the requirements of the license. The effluent air sampling equipment, including the sample delivery lines, had been properly maintained. Calculated offsite doses were below regulatory limits.

8. **Physical Protection (IP 88135)**

a. Routine Activities

(1) Inspection Scope and Observations

The inspectors toured process and surrounding areas, and discussed with security personnel routine activities. The inspectors noted that security personnel were attentive to their posts and that security equipment was functional. No safety issues were identified.

(2) Conclusion

Physical protection activities were performed in accordance with regulatory requirements and licensee's procedures.

9. **Followup of Previously Identified Issues (IP 88135)**

URI 70-27/2007-02-05: Further review of licensee's determination that the consequences of acid solution events were below the requirements necessary for implementing IROFS

The inspectors reviewed accident scenarios related to chemical exposures from acid solution events and determined that the licensee improperly analyzed these accident sequences. The licensee determined that consequences from these accidents would not result in consequences exceeding 10 CFR 70.61 requirements. This unresolved item will be captured as part of APV 70-27/2008-02-01. This item is closed.

10. **Exit Meeting**

The inspection scope and results were summarized on May 23, June 6, and June 26, 2008, with R. Cochrane, General Manager, and other members of the licensee's staff. On July 1, a re-exit meeting was conducted to further discuss the inspection findings. Although proprietary information and processes were reviewed during this inspection, proprietary information is not included in this report. The licensee disagreed with VIO 70-27/2008-02-03 during the exit meeting held on July 1, 2008.

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
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>
URI 70-27/2007-02-05	Closed	Further review of licensee's determination that the consequences of acid solution events were below the requirements necessary for implementing IROFS. (Paragraph 9)
APV 70-27/2008-02-01	Opened	Failure to meet the performance requirements in 10 CFR 70.61(c)(4)(i). (Paragraph 2.c)
VIO 70-27/2008-02-02	Opened	Failure to apply engineered or administrative controls to the extent needed to reduce the likelihood of occurrence of accident sequence SB1-1a1. (Paragraph 2.e)
VIO 70-27/2008-02-03	Opened	Failure to report to the NRC a condition that resulted in accident sequence SB1-1a1 being in a state that was different from that analyzed in the ISA, and which resulted in a failure to meet the performance requirements of 70.61. (Paragraph 2.e)

3. **INSPECTION PROCEDURES USED**

IP 88005	Management Organization and Controls
IP 88010	Operator Training
IP 88030	Radiation Protection
IP 88035	Radiological Waste Management
IP 88045	Environmental Protection and Effluent Control
IP 88135	Resident Inspection Program for Category I Fuel Cycle Facilities

4. **ACRONYMS**

ALARA	As Low As Reasonably Achievable
APV	Apparent Violation
CFR	Code of Federal Regulations
FEP	Final Effluent Pond
HF	Hydrofluoric Acid
HLD	High Level Dissolver
HP	Health Physics
IROFS	Items Relied On For Safety
ISA	Integrated Safety Analysis
LA	License Application
LTC	Lynchburg Technology Center
MSDS	Material Safety Data Sheet
NaOH	Sodium Hydroxide
NCS	Nuclear Criticality Safety
NRC	Nuclear Regulatory Commission
NRRPT	National Registry of Radiation Protection Technologists
QA	Quality Assurance
RCT	Radiation Control Technician
RTRT	Research Test Reactors and Target
RWP	Radiation Work Permit
SAR	Safety Analysis Report
UR	Uranium Recovery
VIO	Violation