February 25, 2010

Mr. Roger P. Cochrane, General Manager Babcock and Wilcox Nuclear Operations Group, Inc. P.O. Box 785 Lynchburg, VA 24505-0785

SUBJECT: INSPECTION REPORT NO. 70-0027/2010-201 AND NOTICE OF VIOLATION

Dear Mr. Cochrane:

The U.S. Nuclear Regulatory Commission (NRC) conducted a routine announced nuclear criticality safety (NCS) inspection at your Babcock and Wilcox Nuclear Operations Group, Inc. facility in Lynchburg, VA from January 25-29, 2010. The purpose of the inspection was to determine whether activities involving special nuclear materials were conducted safely and in accordance with regulatory requirements. Observations and findings were discussed with members of your management and staff throughout the inspection and at an exit meeting held on January 29, 2010.

The inspection, which is described in the enclosure, focused on the most hazardous activities and plant conditions; the most important controls relied on for safety and their analytical basis; and the principal management measures for ensuring controls are available and reliable to perform their functions relied on for safety. The inspection consisted of analytical basis review, selective review of related procedures and records, examinations of relevant NCS-related equipment, interviews with NCS engineers and plant personnel, and facility walkdowns to observe plant conditions and activities related to safety basis assumptions and related NCS controls.

Based on the results of this inspection, NRC has determined that a Severity Level IV violation of NRC requirements occurred. The violation was evaluated in accordance with the NRC Enforcement Policy included on the NRC's web site at <u>www.nrc.gov</u>; select Public Meetings & Involvement, then Enforcement Policy. The violation is being cited in the enclosed Notice of Violation (Notice), and the circumstances surrounding it are described in detail in the subject inspection report. The violation being cited as a Severity Level IV is the failure to adequately demonstrate subcriticality under bounding moderation and spacing conditions for bowed fuel on a fuel cart.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

R. Cochrane

In accordance with 10 CFR 2.390 of NRC's "Rules of Practice," a copy of this letter and the enclosure will be made publicly available in the public electronic reading room of the NRC's Agency-Wide Document Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <u>http://www.nrc.gov/reading-rm/ADAMS.html</u>.

If you have any questions concerning this report, please contact Dennis Morey, of my staff, at (301) 492-3112.

Sincerely,

/RA/

Patricia A. Silva, Chief Technical Support Branch Division of Fuel Cycle Safety and Safeguards Office of Nuclear Material Safety and Safeguards

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

Enclosures:

- 1. Notice of Violation
- 2. Inspection Report No.: 70-0027/2010-201

cc: Barry Cole Licensing Officer Babcock and Wilcox Nuclear Operations Group, Inc. R. Cochrane

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NOTICE OF VIOLATION

B&W NOG, Inc. Lynchburg, VA Docket No.: 70-27 License No.: SNM-42

During a Nuclear Regulatory Commission (NRC) inspection conducted January 25-29, 2010, a violation of NRC requirements was identified. In accordance with the NRC Enforcement Policy, the violation is listed below:

Safety Condition No. S-1 of Special Nuclear Material License No. 42, requires that material be used in accordance with the statements, representations, and conditions in the license application dated June 29, 2007, and supplements thereto.

License Application Section 5.2.3 states, in part, that the limiting condition for operation (LCO) for all high-enriched systems (other than those involving A1B clusters) will be $k_{eff} \leq 0.92$, and that a Routine Operating Limit shall be established from the LCO to account for measurement uncertainties and normal process variability, which is not to exceed the LCO.

License Application Section 5.2.5 states, in part, that calculations are to be based on optimum moderation unless moderating materials are restricted or carefully controlled. Section 5.2.5.3 states, in part, that when calculations indicate that license conditions would be violated at a degree of interstitial moderation other than 100%, all degrees of moderation exceeding any allowed H/X limit must be controlled.

Contrary to the above, on and before December 14, 2009, using a less than optimal degree of interstitial moderation, the licensee performed a safety concern analysis for bowed fuel on a vertical fuel cart without controlling or restricting moderation. Specifically, the analysis was performed for a fuel cart in the Research, Test Reactor and Target (RTRT) area using an interstitial moderation value of 5%, when the LCO limit of $k_{eff} \leq 0.92$ would have been exceeded with optimum interstitial moderation and fuel closer than the allowed spacing of 0.1 inches.

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

Pursuant to the provisions of 10 CFR 2.201, Babcock and Wilcox Nuclear Operations Group, Inc., is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with copies to the Chief, Technical Support Branch, Division of Fuel Cycle Safety and Safeguards, Office of Nuclear Material Safety and Safeguards, and Regional Administrator, Region II, 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; (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 Demand for Information may be issued as to why the license should

not be modified, suspended, or revoked, or why such other actions as may be proper should not 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 to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001.

Because your response will be made available electronically for public inspection in the NRC Public Document Room, or from the NRC's document system, 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, 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 2.790(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 <u>25th</u> day of February 2010

U. S. NUCLEAR REGULATORY COMMISSION OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS

Docket No.:	70-27
License No.:	SNM-42
Report No.:	70-27/2010-201
Licensee:	Babcock and Wilcox Nuclear Operations Group, Inc.
Location:	Lynchburg, VA
Inspection Dates:	January 25-29, 2010
Inspectors:	Dennis Morey, Senior Criticality Safety Inspector
	Christopher Tripp, Senior Criticality Safety Inspector

EXECUTIVE SUMMARY

Babcock and Wilcox Nuclear Operations Group, Inc. NRC Inspection Report 70-27/2010-201

Introduction

Staff of the U.S. Nuclear Regulatory Commission (NRC) performed a routine and announced nuclear criticality safety (NCS) inspection of the Babcock and Wilcox Nuclear Operations Group, Inc. (B&W NOG), Lynchburg, Virginia facility from January 25-29, 2010. The inspection included an on-site review of the licensee's NCS program, NCS-related inspections, audits and investigations, plant operations and open item review. The inspection focused on risk-significant fissile material processing activities including fuel fabrication and machining; the uranium recovery area; and the Research, Test Reactor and Target (RTRT) area.

Results

- A Severity Level IV violation was identified regarding the failure to adequately demonstrate subcriticality of fuel stored on a vertical fuel cart in RTRT.
- A weakness was identified regarding use of polyvinyl chloride (PVC) piping as a neutron absorber.
- A weakness was identified regarding what training is required before an NCS engineer can perform a quality assurance (QA) computer code validation.
- No safety concerns were noted regarding licensee identified NCS-related events.
- No safety concerns were identified regarding NCS audits.
- Other than the weakness above, no safety concerns were identified with regard to training and qualification of NCS staff.
- No safety concerns were identified with regard to the testing and maintenance of the criticality alarm system, or with procedures for manual reset due to equipment failure or storm watches.
- No safety concerns were identified during walkdowns of the facility and operations.

REPORT DETAILS

1.0 Summary of Plant Status

B&W NOG, manufactures high-enriched uranium fuel, reactor core components and reactor cores at its facility near Lynchburg, VA. During the inspection, the licensee conducted routine fuel manufacturing operations, maintenance activities and waste management activities in the fuel fabrication and uranium recovery areas.

2.0 Nuclear Criticality Safety Program (IP 88015 & IP 88016)

a. Inspection Scope

The inspectors reviewed NCS analyses to determine that criticality safety of risksignificant operations was assured through engineered and human controls with adequate safety margin and preparation and review by qualified staff. The inspectors reviewed selected aspects of the following documents:

- [Nuclear Criticality Safety Evaluation] NCSE-02, "Nuclear Criticality Safety Analyses & Quality Assurance Reviews," Rev. 38, dated October 30, 2009
- NCS-1984-056, "Aluminum Shop Fuel in Lots of 24," August 17, 1984
- NCS-1984-060, "Criticality Safety Analysis for Aluminum Shop Fuel Storage in Three Tier High Lots," dated September 10, 1984
- NCS-1986-024, "ATR [Advanced Test Reactor] Vertical Fuel Cart, Baldwin MNB8707," dated March 20, 1986
- NCS-2008-047, "Validation Report for SCALE 5.0 on Dell Duo Processor E 6850 Running Windows XP," dated March 21, 2008
- NCS-2009-011, "30-Day Report to the General Manager for CA-200903670 Oil Residue Inside MFP [modified fuel process] Furnace (U)," dated January 13, 2010
- NCS-2009-181, "DoAll Saw Technical Report," dated November 3, 2009
- NCS-2009-215, "NCS Justification Analysis for Addition of Water Line to Primary Extraction Strip Feed Column (CR-1032296)," dated November 12, 2009
- NCS-2009-219, "NCSA [nuclear criticality safety analysis] for DoAll Saw Modifications," dated December 14, 2009
- NCS-2009-223, "NCS Release Phase 2 Alternate heat Treatment Furnace," dated November 30, 2009
- NCS-2009-225, "NCS Safety Analysis Supporting [safety evaluation report] SER 09-056 Phase 01 – Butterfly Drain Valves (U)," dated December 9, 2009
- NCS-2009-229, "Safety Concern Analysis for Spacing on Vertical Fuel Cart in RTRT (CA200903655)," dated December 14, 2009
- NCS-2009-231, "Safety Concern Analysis for Oil Residue Found in MFP Furnaces (CA200903670)," dated December 16, 2009
- NCS-2010-004, "30 Day Report for Cart Spacing Violation," January 7, 2010
- NCS-2010-006, "Criticality Risks," dated January8, 2010
- NCS-2010-015, "NCS Release Phase 3 Alternate Heat Treatment Furnace," January 18, 2009
- NCS-2010-019, "Nuclear Criticality Safety Analysis Supporting the Use of PVC Piping (U)," dated January 20, 2010

b. Observations and Findings

The inspectors reviewed NCS approvals, NCS evaluations, and supporting calculations for new, changed, and other selected operations. Within the selected aspects reviewed, the inspectors determined that the analyses were performed by qualified NCS engineers, that independent reviews of the evaluations were completed by qualified NCS engineers, and that the analyses provided for subcriticality of the systems and operations. The inspectors observed that criticality analyses contained appropriate limits on controlled parameters for credible accident sequences leading to criticality.

The inspectors reviewed a plant change involving the installation of two parallel butterfly valves as part of an automatic safety system. The inspectors reviewed the criticality scenarios and their scoring in the Integrated Safety Analysis Summary (although no scenarios were changed), and determined that the changes were adequate. The inspectors toured the changed operation and interviewed the responsible process engineer.

The inspectors noted that criticality analysis for PVC piping (NCS-2010-019) took credit for the thickness and density of the piping as a neutron absorber in some of the models. The inspectors questioned whether PVC was properly validated for use in these calculations. The licensee stated that there was only one critical experiment containing chlorine in the validation, which is not a sufficient basis for validation. The inspectors requested the validation report referenced in the analysis (NCS 2005-123, "Computer (Dell 650) SCALE 5 Validation"). The current revision of this validation (NCS-2008-047) lists chlorine in Table 4 as being within the area of applicability, but contains no further discussion justifying PVC or other materials used as neutron absorbers. The licensee stated that it had previously identified that the PVC piping analysis would have to be revised, and described its plan to further evaluate the sensitivity of these models to the presence of chlorine, and to enhance the validation by adding more experiments containing chlorine. The licensee will track completion of the revised analysis as part of Corrective Action (CA) CA201000198, dated January 28, 2010. (The inspectors noted that this CA stated that the error was that credit was taken for the full thickness of PVC piping, rather than half thickness as specified in procedure NCSE-02, "Nuclear Criticality Safety Analyses & Quality Assurance Reviews," Rev. 38, dated October 30, 2009.) Revision of validation and supporting calculations to justify use of PVC piping as a neutron absorber will be tracked as Inspection Follow-up Item (IFI) 70-27/2010-201-01.

The inspectors reviewed a licensee Safety Concern Analysis (SCA) for an incident involving the bowing of fuel stored on a vertical fuel cart in RTRT. Current analysis (NCS-1986-024) requires the fuel to be stored at least 0.1" apart, but bowing allowed the fuel to be closer than 0.1" at the ends. The SCA determined that the spacing restriction was not necessary, as the allowed number of elements would be subcritical with any degree of interstitial moderation, even if they were in contact (i.e., spacing reduced to zero). The inspectors determined that the licensee had extrapolated to a spacing of zero from four prior calculations performed with spacing from 0.1 to 0.4". The inspectors note that the licensee extrapolation range was approximately 1/3 of the total range covered by the data, that the equation of the linear fit was not provided, and that the uncertainty in the extrapolation or the linear correlation coefficient of the regression

fit was not discussed. The licensee stated that it had not extrapolated the data rigorously because it expected that k_{eff} will decrease as spacing is reduced to zero. While this is likely, it is also possible that k_{eff} reaches a maximum at some nonzero value less than 0.1".

With regard to interstitial moderation, the licensee stated that it had originally believed that 5% was bounding but, upon further examination, an optimum value of 7 - 10% should have been used. Based on the prior analysis, increasing interstitial moderation from 5 to 7% results in an increase in k_{eff} of ~3%. The limiting condition for operation (LCO) as specified in the license application, for this high-enriched system, is:

 k_{calc} + 2 σ + (bias) \leq 0.92 (LCO)

The licensee's extrapolation at 5% interstitial moderation, the corresponding curve at 7% interstitial moderation, and the LCO value are shown in the figure below:



kadj vs. spacing

Because there were no controls to limit the maximum amount of interstitial moderation, an optimum value should have been chosen for the extrapolation. Failure to adequately demonstrate subcriticality under bounding moderation and spacing conditions for bowed fuel on the RTRT vertical spacing cart is **Violation VIO 70-27/2010-201-02**.

Following discovery of the bowed fuel, the licensee had issued Corrective Action CA200903655, dated December 14, 2009. Immediate corrective actions included completion of an SCA to justify continued operation of the carts. Operations of the cart

have continued under the existing limits and postings. Long-term corrective actions included completion of a formal NCS analysis to verify that the spacing between elements does not need to be controlled when the effect of interstitial moderator is taken into account. The inspectors noted that the long-term corrective actions are pending.

c. Conclusions

A Severity Level IV violation was identified regarding the failure to adequately demonstrate subcriticality of fuel stored on a vertical fuel cart in RTRT.

A weakness was identified regarding use of PVC piping as a neutron absorber.

3.0 Nuclear Criticality Safety Event Review and Follow-Up (IP 88015 & IP 88016)

a. <u>Inspection Scope</u>

The inspectors reviewed the licensee's response to internally reported events. The inspectors interviewed the licensee's staff regarding immediate and long-term corrective actions. The inspectors reviewed selected aspects of the following documents:

- NCS-2010-002, "NCS Violation and Observation Summary 4th Quarter 2009," dated January 25, 2010
- NCS-2009-166, "NCS Violation and Observation Summary 3rd Quarter 2009," dated October 21, 2009

b. Observations and Findings

The inspectors reviewed selected internally reported conditions which had been reported by the licensee's staff and required evaluation by NCS staff. The inspectors determined that unusual conditions and events were investigated in accordance with written procedures and appropriate corrective actions were assigned.

c. <u>Conclusions</u>

No safety concerns were noted regarding licensee identified NCS-related events.

4.0 Nuclear Criticality Safety Inspections, Audits, and Investigations (IP 88015)

a. Inspection Scope

The inspectors reviewed the licensee's NCS audit and inspection program to assure that the program was implemented in accordance with written procedures and the license. The inspectors reviewed selected aspects of the following documents:

- NCSE-02, "NCSAs and QA Reviews," Revision 38, dated October 30, 2009
- NCSE-03, "Audits and Assessments," Revision 24, dated February 27, 2009

b. <u>Observations and Findings</u>

The inspectors spoke with the licensee's staff and determined that the licensee's NCS inspections were conducted in accordance with written procedures. The inspectors noted that the audits were performed by NCS engineers who reviewed open NCS issues from previous audits; reviewed new violations that occurred during the audit quarter; reviewed the adequacy of control implementation; reviewed plant operations for compliance with license requirements, procedures, and postings; examined equipment and operations to determine that past evaluations remained adequate; and analyzed non-compliances for potential trends. The inspectors accompanied an NCS engineer on two NCS inspections in the well counting area and the chemistry laboratory.

c. <u>Conclusions</u>

No safety concerns were identified regarding NCS audits.

5.0 Nuclear Criticality Safety Training (IP 88015)

a. <u>Inspection Scope</u>

The inspectors reviewed records and procedures associated with training and qualification of NCS staff members. The inspectors reviewed selected portions of the following documents:

- NCSE-07, "Qualification and Training Requirements for a Nuclear Criticality Safety Engineer," Rev. 11, dated February 27, 2009.
- NCS-2009-174, "NCS Qualified Auditor," dated January 26, 2010.
- NCS-2009-216, "Qualification of Engineer A as QA Reviewer," dated November 19, 2009.
- NCS-2010-003, "Qualification of Engineer B as an NCS Auditor," dated January 14, 2010.

b. Observations and Findings

The inspectors reviewed procedure NCSE-07, which specifies the requirements for the training and qualification of NCS staff members. There are four staff positions having responsibility for NCS: NCS Engineer, NCS Auditor, NCS Evaluator, and NCS QA Reviewer. NCSE-07 contains both requirements and responsibilities for each position. The inspectors reviewed the qualification requirements for each position to determine whether they were commensurate with the responsibilities to be performed. The inspectors noted that NCS Engineers are allowed to perform a QA code validation and verification, but knowledge of procedure NCSE-11, "Verification and Validation of Computer Codes Used," is only required for NCS Auditors, Evaluators, and QA Reviewers. The licensee stated that this was an oversight, and issued Corrective Action CA2010000197, dated January 28, 2010, to revise the procedure to require staff performing these functions to be familiar with NCSE-11. Revision of the training and qualification procedure NCSE-07 with regard to what training is required before an NCS engineer can perform a QA computer code validation will be tracked as **IFI 70-27/2010-201-03**.

The inspectors interviewed recently qualified NCS staff concerning items listed in their qualification memos, as well as recently issued or revised analyses for which they had had responsibility. The inspectors determined that the items listed in NCS staff qualification memos satisfied the requirements of procedure NCSE-07, that training involved considerable mentoring by senior staff and questioning by the NCS Manager, and that staff appeared knowledgeable in all aspects of NCS.

c. <u>Conclusions</u>

A weakness was identified regarding what training is required before an NCS engineer can perform a QA computer code validation.

Other than the weakness above, no safety concerns were identified with regard to training and qualification of NCS staff.

6.0 Criticality Accident Alarm System (IP 88017)

a. Inspection Scope

The inspectors reviewed records and procedures associated with the testing and maintenance of the criticality accident alarm system. The inspectors reviewed selected portions of the following documents:

- RP-07-28, "Maintaining and Testing the Plant Criticality Monitoring System and RMS[Remote Monitoring System] II Area Monitors," Rev. 22, dated November 2, 2009.
- "Calibration and Monthly Check of Criticality Monitors 2010" (logbook)
- "Criticality Alarm System Failure Event Log 2010" (logbook)

a. Observations and Findings

The inspectors performed walkdowns at the Radiation Control Office where criticality alarm monitors are located and discussed testing and calibration with facility personnel. The inspectors determined that procedure RP-07-28 requires periodic testing of criticality accident alarm detectors, monitors, and the evacuation alarm system (EAS), including the alarm howlers and warning lights. The inspectors determined that all alarms were reading at the specified background level. The inspectors reviewed the log entries for the quarterly sounding of the EAS (Form 3 from RP-07-28), annual testing of each EAS horn and area warning light (Form 10), and failure/corrective maintenance records (Form 6). The inspectors determined that functional testing and preventive and corrective maintenance were being performed in accordance with procedures and so as to ensure the entire alarm system was maintained to a high degree of reliability.

The inspectors reviewed the licensee procedure to avoid spurious actuation of the criticality alarm system; if a single detector experiences a high-level alarm (two or more are required to actuate the howlers), operators attempt to manually reset the system. The licensee stated that there would be a high radiation field for at least several minutes following inadvertent criticality (as indicated in references such as NUREG/CR-6504, "An Updated Nuclear Criticality Slide Rule"), so that in the event of an actual criticality the

detector could not be reset. In addition, the licensee establishes a storm watch during lightning storms, which have been known to cause the false actuation of multiple detectors throughout the facility. During storm watches, operators will observe the criticality monitors and attempt manual reset before activating the howlers, to avoid unnecessarily endangering personnel due to lighting strikes. The licensee stated that no actuation due to lightning had occurred since design changes had been made to incorporate lightning protection. The inspectors also verified that all areas were covered by at least two pairs of detectors, such that dual coverage would still be maintained if a single detector channel failed. The inspectors determined that the licensee took prompt and effective corrective action to system failures, most of which resulted from power interruptions.

b. Conclusions

No safety concerns were identified with regard to the criticality alarm system.

7.0 Plant Operations (IP 88015)

a. Inspection Scope

The inspectors performed plant walkdowns to review activities in progress and to determine whether risk-significant fissile material operations were being conducted safely and in accordance with regulatory requirements. The inspectors interviewed operations staff and NCS engineers both before and during walkdowns.

b. Observations and Findings

The inspectors performed walkdowns in fuel fabrication and machining areas; the container storage building; the uranium recovery area; and the RTRT area. The inspectors verified that controls identified in NCS analyses were installed or implemented and were adequate to ensure safety. The inspectors also verified that safety was maintained for observed facility operations. The cognizant NCS engineers were knowledgeable and interacted regularly with operators on the process floors. The inspectors verified the adequacy of management measures for assuring the continued availability, reliability, and capability of safety-significant controls relied upon by the licensee for controlling criticality risks.

c. Conclusions

No safety concerns were identified during walkdowns of the facility and operations.

8.0 Open Item Review

Corrective Actions for the DoAll Saw Event

The inspectors interviewed licensee staff and reviewed database information relating to assignment of corrective actions for the DoAll saw unsafe geometry reservoir event. The inspectors determined that the licensee had identified corrective actions related to criticality safety that would need to be completed before the violations could be considered closed, including:

- Perform extent of condition walkdowns.
- Review nuclear safety release requirements in the facility for the last 10 years to identify similar problems.
- Revise nuclear safety release procedures to include specific instructions for verification.
- Develop and implement system for peer checking nuclear safety releases.
- Develop and implement modifications to the DoAll saw.
- Perform an integrated safety review of the sectioning facility including development of a new DoAll saw criticality safety analysis.
- Analyze the failure mode of the favorable geometry coolant system.

The inspectors reviewed the new criticality analysis, NCS-2009-219, which is the second corrective action listed above and had no safety concerns regarding the corrective actions or their technical basis. Other corrective actions will be reviewed during future inspections. The DoAll saw remains shut down pending completion of corrective actions.

VIO 70-27/2009-006-02

This violation concerned the failure to adequately disable the band saw cutting fluid reservoir in accordance with the nuclear safety release SER 03-087. The inspectors performed a walkdown in the sectioning shop and discussed planned modifications to the band saw equipment with NCS staff. The inspectors noted that the licensee planned to disable the reservoir and establish double contingency by cutting an opening in the reservoir side wall that would only allow a one-inch slab in the reservoir. NCS analysis for the reservoir modification was complete; however, modifications to the band saw reservoir were not complete and will be reviewed during a future inspection. This item remains open.

VIO 70-27/2009-006-03

This violation concerned the failure to establish double contingency for the band saw cutting fluid reservoir in the modified configuration. The licensee's NCS analysis, NCS-2009-219, established the overall technical basis for the bandsaw. The licensee discussed several modifications planned for the saw including a cutaway in the side of the bandsaw body, replacing the safe geometry reservoir with a clear column, and replacing the coolant tubing with clear tubing. The inspectors concluded that adequately disabling the saw reservoir would effectively establish double contingency. Modifications to the bandsaw were pending. This item remains open.

VIO 70-27/2009-006-04

This violation concerned the failure to evaluate an accident scenario or establish appropriate controls preventing the accumulation of fissile material and moderator in the band saw cutting fluid reservoir, an unfavorable geometry vessel. This item concerns the determination of whether the performance requirements are met for the accident sequence of an unsafe accumulation of fissile solution in the bandsaw reservoir. The inspector determined that the licensee had completed evaluation of the accident scenario of fissile solution accumulation in the old reservoir. The inspectors had no safety concerns regarding the licensee's evaluation. Completion of corrective actions was pending. This item remains open.

9.0 Exit Meeting

The inspectors presented the inspection scope and results to members of the licensee's management and staff during an exit meeting on January 29, 2010. The licensee acknowledged and understood the findings as presented.

SUPPLEMENTARY INFORMATION

1.0 List of Items Opened, Closed, and Discussed

Items Opened	
IFI 70-27/2010-201-01	Tracks revision of validation and supporting calculations to adequately justify use of PVC piping as a neutron absorber.
VIO 70-27/2010-201-02	Failure to adequately demonstrate subcriticality under bounding moderation and spacing conditions for bowed fuel on the RTRT fuel cart.
IFI 70-27/2010-201-03	Tracks revision of the training and qualification procedure NCSE- 07 with regard to what training is required before an NCS engineer can perform and a QA computer code validation.
Items Closed	
None.	
Items Discussed	
VIO 70-27/2009-006-02	Failure to adequately disable the band saw cutting fluid reservoir in accordance with the nuclear safety release SER 03-087.
VIO 70-27/2009-006-03	Failure to establish double contingency for the band saw cutting fluid reservoir in the modified configuration.
VIO 70-27/2009-006-04	Failure to evaluate an accident scenario or establish appropriate controls preventing the accumulation of fissile material and moderator in the band saw cutting fluid reservoir, an unfavorable geometry vessel.

2.0 Inspection Procedures Used

IP 88015Nuclear Criticality Safety ProgramIP 88016Nuclear Criticality Safety Evaluations and AnalysesIP 88017Criticality Accident Alarms

3.0 Partial List of Persons Contacted

B&W NOG

General Manager, B&W NOG
Manager, Licensing and Safety Analysis
Nuclear Criticality Safety
Group Lead, Licensing & Safety Analysis
Manager, Radiation Protection
Manager, EHS&S

NRC

D. Morey	Senior Criticality Safety Inspector, NRC Headquarters
C. Tripp	Senior Criticality Safety Inspector, NRC Headquarters
S. Subosits	Senior Resident Inspector, B&W NOG
M. Thomas	Senior Fuel Facility Inspector, NRC Region II
J. Foster	Fuel Facility Inspector, NRC Region II

4.0 List of Acronyms

ATR	Advanced Test Reactor
B&W NOG	Babcock and Wilcox, Nuclear Operations Group, Inc.
CA	corrective action
EAS	evacuation alarm system
IFI	inspector follow-up item
IP	inspection procedure
LCO	limiting condition for operation
MFP	modified fuel process
NCS	nuclear criticality safety
NCSA	nuclear criticality safety analysis
NCSE	nuclear criticality safety evaluation
NOV	notice of violation
PVC	polyvinyl chloride
QA	quality assurance
RMS	Remote Monitoring System
RTRT	Research, Test Reactor and Target
SCA	safety concern analysis
SER	safety evaluation report
SNM	special nuclear material