



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

August 8, 2008

EA-08-171  
EN 44035

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

**SUBJECT: NRC INSPECTION REPORT NO. 70-27/2008-202**

Dear Mr. Cochrane:

This letter refers to the inspection activities conducted from March 10-13, 2008, at your facility in Lynchburg, VA. The purpose of the inspection was to review a matter involving BWXT's discovery of a Raschig ring-filled vacuum cleaner (RRVC), used for cleaning spills of material and floor mopping solution, that contained an inadequate level of Raschig rings. The results of our review of this matter, including the identification of three apparent violations, were documented in NRC Report No. 70-27/2008-202, dated April 11, 2008.

In the letter transmitting the inspection report, we provided you with the opportunity to address the apparent violations identified in the report by either attending a pre-decisional enforcement conference or by providing a written response before we made our final enforcement decision. In a letter dated July 25, 2008, you provided a response to the apparent violations. In your response, you acknowledged the violations, and concluded that a nuclear criticality accident was highly unlikely. BWXT's response also provided detailed information regarding the root and contributing causes, and corrective actions planned and completed to preclude recurrence.

Based on the information developed during the inspection and the information provided in your response, the NRC has determined that three violations of NRC requirements occurred. The violations are cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the NRC's inspection report of April 11, 2008. In summary, the three violations involved: (1) multiple examples of failure to comply with visual inspection Operating Procedures (OPs) 1001099 for Raschig ring-filled RRVCs to ensure adequate levels of Raschig rings; (2) a failure to establish double contingency for the RRVCs as required by Section 5.1.1 of the BWXT License Application; and (3) a failure to comply with Section 5.2.4 of the License Application, which requires that Raschig rings be used in accordance with American National Standards Institute (ANSI) / American Nuclear Society (ANS) Standard 8.5-1996.

In this case, no actual consequences resulted because an inadvertent criticality accident did not occur. However, the NRC has concluded that a criticality event, although unlikely, was in fact credible. BWXT's Integrated Safety Analysis designates RRVC's as an Item Relied on For Safety (IROFS), in part because of the potential use with concentrated uranium-bearing solutions such as those processed in the Uranium Recovery (UR) process. In this case, on March 5, 2008, an RRVC was identified by BWXT staff to contain an inadequate level of Raschig rings. The NRC also notes that follow-up review by BWXT identified additional RRVC's with inadequate Raschig ring levels. Although the degraded RRVC was found in a chemistry laboratory that does not handle fissile solutions, areas adjacent to the chemistry laboratory that handle limited quantities of fissile solutions were in fact authorized by Nuclear Criticality Safety to possess highly-enriched uranium (HEU) solution. Although it was unlikely that this RRVC would have been transported from the Chemistry Lab to an area where HEU solutions are available, and subsequently used, BWXT had not established any controls to preclude such use. As a result, an RRVC with inadequate ring levels could have been used by BWXT staff to vacuum reasonably available fissile material (HEU), thereby creating the possibility for a nuclear criticality accident. Based on the above and because the three violations were interrelated to the incident of March 2008, the NRC has characterized the significance of the violations together as a Severity Level III Problem, in accordance with the NRC Enforcement Policy.

In accordance with the Enforcement Policy, a base civil penalty in the amount of \$32,500 is considered for each Severity Level III violation or problem. Because BWXT has been the subject of escalated enforcement within the past two years<sup>1</sup>, the NRC considered whether credit was warranted for *Identification* and *Corrective Action* in accordance with the civil penalty assessment process in Section VI.C.2 of the Enforcement Policy.

The condition involving the RRVC with an inadequate level of Raschig rings was identified by a BWXT supervisor on March 5, 2008, during a routine maintenance check of the RRVC. Upon identification, the condition was promptly reported to representatives of Nuclear Criticality Safety. BWXT's follow-up review of the incident resulted in the recognition of procedural issues associated with operation and maintenance of RRVCs. As such, credit is warranted for the factor of *Identification*.

As provided in its written response, BWXT's corrective actions included, in part: (1) the removal from service and inspection of all RRVCs to ensure adequate Raschig-ring levels; (2) the return to service of only a limited number of RRVCs, together with Radiation Work Permit (RWP) and temporary Nuclear Criticality Safety (NCS) postings to limit the maximum concentration of solution that could be vacuumed; (3) the conduct of training to an internal audit group on Integrated Safety Analysis (ISA) programs, for the purpose of promoting the identification of unanalyzed conditions at the facility; and, (4) the conduct of reviews to reduce the number of RRVCs in service. BWXT's written response also identified additional corrective actions to preclude recurrence. The NRC also reviewed the initial corrective actions implemented by BWXT during the inspection of March 10-13, 2008. Based on the above, credit is warranted for the factor of *Corrective Action*.

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<sup>1</sup> A Severity Level III violation was issued on January 24, 2008, involving an RRVC that spilled a solution bearing special nuclear material (EA-07-240).

Therefore, to encourage prompt identification and comprehensive correction of violations, I have been authorized, after consultation with the Director, Office of Enforcement, not to propose a civil penalty in this case. However, significant violations in the future could result in a civil penalty. In addition, issuance of this Severity Level III Problem constitutes escalated enforcement action that may subject you to increased inspection effort.

The NRC has concluded that information regarding the reason for the violations, the corrective actions taken and planned to correct the violations and prevent recurrence, and the date when full compliance will be achieved is already adequately addressed on the docket in the subject inspection report and in your written response of July 25, 2008. Therefore, you are not required to respond to this letter unless the description therein does not accurately reflect your corrective actions or your position. In that case, or if you choose to provide additional information, you should follow the instructions specified in the enclosed Notice.

In accordance with 10 CFR 2.390 of 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 Agency-Wide Document Access and Management System (ADAMS) on the Internet at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, if you choose to respond, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,

*/RA/*

Luis A. Reyes  
Regional Administrator

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

Enclosure: Notice of Violation  
cc w/encl: (see page 4)

R. P. Cochrane

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cc w/encl:  
Barry L. Cole, Manager  
Licensing and Safety Analysis  
BWV Technologies, Inc.  
P.O. Box 785  
Lynchburg, VA 24505-0785

Leslie P. Foldesi, Director  
Bureau of Radiological Health  
Division of Health Hazards Control  
Department of health  
1500 East Main Street, Room 240  
Richmond, VA 23219

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 R. Hannah, RII  
 R. Trojanowski, RII  
 OEMAIL  
 PUBLIC

\*see previous concurrence

PUBLICLY AVAILABLE       NON-PUBLICLY AVAILABLE       SENSITIVE       NON-SENSITIVE

ADAMS: X Yes      ACCESSION NUMBER: \_\_\_\_\_

OFFICE	RII:DFFI	RII:DFFI	RII:EICS	RII:ORA	OE	NMSS	
SIGNATURE	CP 8/5/08	JS 8/5/08	SS for 8/8/08		Via email 8/6/08	Via email 8/7/09	
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DATE							
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## NOTICE OF VIOLATION

BWX Technologies, Inc.  
Lynchburg, VA

Docket No. 70-27  
License No. SNM-42  
EA-08-171

During an NRC Inspection conducted March 10 through 13, 2008, multiple violations of NRC requirements were identified. In accordance with the NRC Enforcement Policy, the violations are listed below:

- A. Safety Condition No. S-1 of Special Nuclear Material License No. SNM-42 authorizes the use of nuclear material in accordance with chapters 1-11 of the license application submitted on October 24, 2006, and supplements thereto.

Section 11.4 of the Application states that licensed material processing or activities will be conducted in accordance with properly issued and approved practices and procedures, plant practices or operating procedures.

Operating Procedure (OP) 1001099, "Raschig Ring Level inspections for RTRT Vacuum Cleaners", Section 3.1 requires a daily inspection for adequate Raschig ring levels in Raschig ring-filled Vacuum Cleaners (RRVCs)

Contrary to the above, between January 28, 2008, and March 5, 2008, the licensee failed to conduct daily inspections of the Raschig ring level for RRVCs in the Research and Test Reactors and Targets (RTRT) area in accordance with OP 1001099.

- B. Safety Condition No. S-1 of Special Nuclear Material License No. SNM-42 authorizes the use of nuclear material in accordance with chapters 1-11 of the license application submitted on October 24, 2006, and supplements thereto.

Section 5.1.1 of the Application states that process designs shall incorporate sufficient factors of safety to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible.

Contrary to the above, prior to March 5, 2008, the licensee failed to incorporate sufficient factors of safety into the process design to require at least two unlikely, independent, and concurrent changes in process conditions before a criticality accident is possible. Specifically, the licensee operated RRVCs in a configuration such that the level of fissile solution could exceed the level of the Raschig rings inside the vacuum cleaner. Operation of the RRVCs in this configuration permitted the possibility of a criticality accident with only one change in process conditions.

- C. Safety Condition No. S-1 of Special Nuclear Material License No. SNM-42 authorizes the use of nuclear material in accordance with chapters 1-11 of the license application submitted on October 24, 2006, and supplements thereto.

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Section 5.2.4 of the Application states that Raschig rings will be used in accordance with American National Standards Institute (ANSI) American Nuclear Society (ANS) Standard 8.5-1996. ANSI/ANS-8.5-1996, Section 5.1, requires that all regions of a vessel be filled with well-settled rings such that they are not likely to settle further during use.

Contrary to the above, on March 5, 2008, an RRVC was found to be in a condition in which all regions of the vessel were not filled with well-settled Raschig rings. Specifically, BWXT inspection records indicated that on January 28, 2008, an RRVC was visually inspected and found to contain an acceptable level of Raschig rings. Inventory records also indicated that the RRVC was adequately filled with Raschig rings in September 2007, following de-inventory and cleanup during the semi-annual inventory. However, on March 5, 2008, the RRVC was found to contain an inadequate level of Raschig rings, in that the level was observed to be approximately five inches below the level of the hose intake. This level of rings indicated that the RRVC was not filled with well-settled rings such that further settling would not occur during use. Subsequent licensee review and inspection identified additional RRVCs containing inadequate Raschig ring levels.

This is a Severity Level III problem (EA-08-171, Supplement VI).

The NRC has concluded that information regarding the reason for the violations, the corrective actions taken and planned to correct the violations and prevent recurrence and the date when full compliance will be achieved is already adequately addressed on the docket in Inspection Report 70-27/2008-202 and in your written response dated July 25, 2008. However, if the description therein does not accurately reflect your position or your corrective actions, you are required to submit a written statement or explanation under 10 CFR 2.201. In that case, or if you choose to respond, clearly mark your response as a "Reply to a Notice of Violation, EA-08-171." and send it to the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, One White Flint North, 11555 Rockville, MD 20852-2738, with a copy to the Regional Administrator, U.S., Nuclear Regulatory Commission, Region II, and a copy to the NRC Resident Inspector at your facility that is the subject of this NOV.

If you contest this enforcement action, you should also provide a copy of your response, with the basis for your denial, to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 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 (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, 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

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NOV

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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 8<sup>th</sup> day of August 2008

Enclosure