Department of Energy
Washington, DC 20585

December 3, 2007

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. John J. Grossenbacher
President and Laboratory Director
Battelle Energy Alliance, L.L.C.
2525 North Fremont Avenue
Idaho Falls, Idaho 83415-3695

EA-2007-06

Dear Mr. Grossenbacher:

This letter refers to the Department of Energy (DOE) investigation into the facts and circumstances associated with the August 20, 2006, unplanned automatic shutdown of the Neutron Radiography (NRAD) reactor and the subsequent restart of the reactor. The Investigation Report, dated July 13, 2007, was provided to you and an Enforcement Conference was conducted on September 12, 2007, in Idaho Falls, Idaho. A summary of the conference is enclosed.

DOE is concerned with the lack of formality with which the NRAD reactor was operated on August 20, 2006, and the extended duration of this condition prior to the unplanned shutdown of the reactor. Based on our evaluation of the evidence in this matter, including information that you and members of your staff presented during the Enforcement Conference, DOE has concluded that violations of 10 C.F.R. Part 830, *Nuclear Safety Management*, occurred. The enclosed Preliminary Notice of Violation (PNOV) EA-2007-06 describes the violations and proposes a total civil penalty of $123,750.

DOE's expectations for formality of operations of this hazard category 2 nuclear reactor are high. We recognize that the NRAD reactor performed as designed when a low-voltage condition was detected, and that reactor safety systems were not compromised. However, the lack of formality in reactor operations represents a significant concern. Reactor personnel (including the reactor supervisor) did not appropriately apply some fundamental aspects of reactor operations, such as log-keeping, effective communication, alarm response, and troubleshooting and maintenance. Of particular concern was the unauthorized manipulation that reactor personnel performed on the flux regulator, which plays an important role in

controlling reactor power when the reactor is placed in the automatic mode of operation. Although this condition existed for several years, Battelle Energy Alliance (BEA) failed to appropriately address the problem in the 18-month interval since assuming responsibilities as the prime contractor in February 2005 and the occurrence of this event in August 2006.

Our investigation of the reactor shutdown event revealed that the deficiencies in reactor operations and flux regulator operability existed for some time prior to the event. Consequently, the management systems in place to identify these types of deficiencies in your operations were ineffective. For example, the NRAD Facility Manager did not identify and correct the deficiencies in reactor operations evident by this event although your Manager was consistently present during most reactor operations. Similarly, your management and independent assessments related to NRAD operations have been limited in number and ineffective in identifying deficiencies in reactor operations. Although you have performed one independent assessment of nuclear operations conduct of operations, which included the NRAD reactor, that assessment failed to identify any significant issues in reactor operations.

With regard to mitigation, DOE considers the reactor scram to be a self-disclosing event initiated by a noncompliant action taken by the NRAD reactor supervisor. However, DOE recognizes that the automatic shutdown of the reactor on August, 20, 2006, might not have been revealed if the NRAD reactor Facility Manager subsequently had not identified that the reactor shutdown had occurred and taken prompt and appropriate compensatory actions. Consequently, DOE is reducing the penalty by providing 25 percent mitigation for all Severity Level II violations, with the exception of the quality improvement violation. Additionally, DOE is providing and additional 25 percent mitigation for all Severity Level II violations for your root cause analysis and the corrective actions you have taken. Typically, DOE reduces the penalty up to 50 percent for thorough analysis and comprehensive corrective action but chose not to in this case. While the root cause analysis captures most of the significant causes of the event, some areas of concern are not adequately addressed. For example, you did not conduct an extent-of-condition review in conjunction with the root cause analysis or provide a rationale why one was not needed. In addition, although your root cause analysis addressed the subject of NRAD assessments, it did not draw general conclusions about how your assessment program contributed or did not contribute to the discovered deficiencies, and did not identify any assessment-related causal factors. It is DOE's determination that deficiencies in your assessment process were present and contributed to your inability to identify NRAD reactor operational deficiencies in a proactive and timely manner.

We commend you for recently initiating a common cause review of six events that included the automatic shutdown of the NRAD reactor. That review, however, cannot be considered a timely response to the August 20, 2006, event, and it is not viewed as a replacement for an extent-of-condition review.

In accordance with 10 C.F.R. Part 820.24, *Preliminary Notice of Violation,* you are required to respond within 30 days of the date of this letter and to follow the instructions specified in the enclosed PNOV when preparing your response. After reviewing your response to the PNOV, including any proposed, additional corrective actions entered into the Noncompliance Tracking System, DOE will determine whether further enforcement action is necessary to ensure compliance with DOE nuclear safety requirements. DOE will continue to monitor the completion of corrective actions until these matters are resolved.

Sincerely,

Arnold E. Guevara
Director
Office of Enforcement
Office of Health, Safety and Security

Enclosure

cc: Alan Wagner, BEA
Richard Azzaro, DNFSB

Preliminary Notice of Violation

Battelle Energy Alliance, L.L.C.
Idaho National Laboratory

EA-2007-06

As a result of a Department of Energy (DOE) investigation into the facts and circumstances associated with the unplanned shutdown of the Neutron Radiography (NRAD) reactor during informal troubleshooting activities, multiple noncompliances with DOE nuclear safety requirements were identified. Areas of noncompliance included: (1) violation of technical safety requirements (TSRs); (2) failure to follow procedures; (3) inadequacies in procedures; (4) failure to correct known problems in reactor equipment; and (5) deficiencies in the Battelle Energy Alliance (BEA) management assessment program. The associated violations have been grouped and categorized as four Severity Level II violations and one Severity III violation, for a combined proposed civil penalty of $123,750.

In accordance with 10 CFR 820, Appendix A, *General Statement of Enforcement Policy*, the violations are listed below. 10 CFR 830.121(a) requires contractors conducting activities that may affect the nuclear safety of DOE nuclear facilities to conduct work in accordance with the quality assurance criteria of 10 CFR 830.122. The following sections of the Preliminary Notice of Violation (PNOV) enumerate the specific BEA violations of 10 CFR 830.122 and 10 CFR 830 Subpart B, *Safety Basis Requirements*, that occurred during the startup of the NRAD reactor, the automatic shutdown of the reactor, and the subsequent restart of the reactor on August 20, 2006.

VIOLATIONS

I. TSR Violations

10 CFR 830.201 states that "a contractor must perform work in accordance with the safety basis for a hazard category 1, 2, or 3 DOE nuclear facility and, in particular, with the hazard controls that ensure adequate protection of workers, the public, and the environment."

Contrary to the preceding requirements, BEA did not perform work in accordance with the NRAD reactor (hazard category 2 nuclear facility) safety basis documentation, as evidenced by the following:

1. Nuclear Operations NRAD-TSRs, *NRAD Technical Safety Requirements*, Revision 3, Technical Safety Requirement (TSR) 3.1.2, Surveillance Requirement 4.1.2, dated June 21, 2006, states that the "core excess reactivity shall be determined during each reactor start-up."

On the afternoon of August 20, 2006, following the automatic scram of the NRAD reactor due to an HV-2 alarm and the subsequent clearing of the alarms, the Reactor Supervisor directed that the reactor be restarted. However, the Reactor Supervisor and Reactor Operator failed to execute the restart protocol as required and did not determine the core excess reactivity. The failure to perform surveillance requirement 4.1.2 represents a violation of TSR 3.1.2.

2. Nuclear Operations NRAD-TSRs, *NRAD Technical Safety Requirements*, Revision 3, TSR 5.7(1), dated June 21, 2006, states that reactor logs "shall contain chronological entries as required for a continuous record of operation including supervisors and operators present, rod positions at critical, reactor power, and any abnormal occurrence." A review of reactor logs for the afternoon of August 20, 2006, revealed that BEA had failed to record the operator in control of the reactor console, rod positions at critical, and the complete sequence of events, beginning with the failure of the reactor to engage in the automatic mode of operation. This failure to accurately maintain the reactor log represents a violation of TSR 5.7.

Collectively, these violations constitute a Severity Level II problem.
Proposed Civil Penalty - $27,500

II. Failure to Follow Procedures

10 CFR 830.122(e)(1) states that DOE contractors are to "perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means."

Contrary to the preceding requirements, during NRAD reactor operations on August 20, 2006, BEA reactor personnel did not perform work consistent with approved instructions and procedures, as evidenced by the following:

1. NRAD-OI-5100, *Reactor Operations*, Revision 1a, dated August 12, 2005, provides NRAD reactor operating instructions to BEA personnel responsible for the operation of the reactor. On August 20, 2006, reactor personnel did not perform work consistent with these Operating Instructions as exhibited by the following:

   A. On the morning of August 20, 2006, the Reactor Supervisor and the Reactor Operator signed the Weekly Checklist as complete. However, item 20 of the Weekly Checklist (Verify that demineralizer inlet and outlet water samples have been drawn for analysis by the Chemistry Laboratory) was not initialed as completed, nor was the activity executed prior to reactor start-up as required by section 4.10 of the Operating Instructions which states that the Weekly Checklist "must be completed prior to start-up each week the reactor is operated."

   B. Following the automatic scram and after clearing the trouble alarms on the reactor console, the Reactor Supervisor then attempted to restart the reactor. However, the reactor was restarted without first completing the Pre-startup Checklist as required by

section 4.11 of the Operating Instructions which states that a Pre-startup Checklist "must be completed for every reactor start-up."

C. Following the automatic scram and after clearing the trouble alarms on the reactor console, reactor personnel restarted the reactor. However, the reactor was restarted without first executing the activities delineated in section 8.1 of the Operating Instructions which requires the performance of over 25 activities associated with the restart of the NRAD reactor.

D. A late entry into the NRAD Operations Logbook was made to record the fact that an HV-2 alarm was received and that the reactor had scrammed. However, the underlying reason for the HV-2 alarm and the associated scram was neither determined nor recorded by the Reactor Supervisor as required by section 8.3.2[1]a of the Operating Instructions which states that the NRAD Reactor Supervisor is to "determine and record the reason for the scram."

E. Following the shutdown of the NRAD reactor for the day, the NRAD Facility Manager returned the Reactor Supervisor's call, at which time the supervisor informed the Facility Manager of the problems that they were having with the secondary coolant flow and his decision to shut down the reactor for the day. However, no mention was made of the automatic scram that had previously occurred as required by section 8.3.2[1]b of the Operating Instructions which states that the Reactor Supervisor is to "notify the NRAD Reactor Manager (or designated alternate) of the reactor scram."

2. LWP-14002, *Stop Work Authority*, Revision 0, section 4.1.1.1, dated September 29, 2005, states that when a concerned employee becomes aware of a stop-work condition, he/she is to "stop the unsafe work activities and that of any other individuals in the area who may be affected by the situation." However, following the automatic scram of the NRAD reactor, the Reactor Supervisor ordered the reactor to be restarted without first stopping further activities and determining the cause of the HV-2 alarm to assure that it was safe to continue to operate the reactor.

3. Following the failure of the flux regulator to engage in the automatic mode, the Reactor Supervisor inserted the key in the reactor console cabinet and jostled the cabinet in an attempt to get the flux regulator to engage. However, no maintenance request to troubleshoot and repair the flux regulator was prepared as required by AWP-2.1, *Work Control*, Revision 7, appendix A, dated October 11, 2005, which lists those work activities requiring a work request and includes activities involving troubleshooting and corrective maintenance.

Collectively, these violations constitute a Severity Level II problem.
Proposed Civil Penalty - $27,500

III. Inadequacies in NRAD Operating Instructions

10 CFR 830.122(e)(1) states that DOE contractors are to "perform work consistent with technical standards, administrative controls, and other hazard controls adopted to meet regulatory or contract requirements, using approved instructions, procedures, or other appropriate means."

Contrary to the preceding requirements, the approved NRAD Operating Instructions were inadequate to the extent that BEA personnel could not assure consistent performance in carrying them out, as evidenced by the following:

1. NRAD-OI-5100, *Reactor Operations, R*evision 1a, section 5, dated August 12, 2005, lists TSRs that are applicable during the performance of the procedure. These include:

   - Safety Limit 2.1
   - Limiting Control Setting 3.3.1
   - Section 3/4 Operating Limits and Surveillance Requirements
   - Administrative Requirement 5.1.2.1
   - Section 6 Design Features.

   NRAD-TSRs, *NRAD Technical Safety Requirements*, Revision 3, dated April 5, 2006, defined the TSRs associated with the NRAD Reactor. A review of these TSRs suggests that several other TSRs such as TSR 5.6 (*TSR Violations and Responses*) and TSR 5.7 (*Recordkeeping*) are also applicable during the performance of procedure NRAD-OI-5100. However, these TSRs are not listed in section 5 of the procedure.

2. NRAD-OI-5100, *Reactor Operations*, Revision 1a, section 8.3.2[1]b, dated August 12, 2005, states that the Reactor Supervisor is to "notify the NRAD Reactor Manager (or designated alternate) of the [unscheduled] reactor scram." In addition to this requirement, BEA management stated that it is their intention that the NRAD Facility Manager provides approval prior to restarting the reactor. However, the expectation for this approval was not delineated in NRAD-OI-5100.

3. NRAD-OI-5100, *Reactor Operations*, Revision 1a, section 8.3.2[1]d, dated August 12, 2005, states that "IF the [unscheduled] scram **is not** a reportable occurrence, THEN verify that the condition causing the scram has been corrected." However, the procedure does not go on to delineate the actions required if the unscheduled scram **is** a reportable occurrence.

Collectively, these violations constitute a Severity Level III problem.
No Proposed Civil Penalty

IV. Quality Improvement Violation

10 CFR 830.122 (c) requires DOE contractors to (1) "establish and implement processes to detect and prevent quality problems;" (2) "identify, control, and correct items, services, and processes that do not meet established requirements;" and (3) "identify the causes of problems and work to prevent recurrence as a part of correcting the problem."

Contrary to these requirements, BEA failed to correct problems with the reactor flux regulator failing to engage when desired. This had been a known problem at the NRAD reactor for several years (dating back to the mid to late 1990s). Typically, the problems appear upon initial start-up of the reactor after the reactor had been shut down for several months. The cause of the problem was believed to be an electrical contact that bonded to its mating surface while the reactor was idle. The action taken by NRAD personnel to remedy this problem involved jostling the flux regulator in an attempt to reinitiate the automatic control of the reactor. However, BEA failed to appropriately identify, control, and correct the problem in the 18-month interval between assuming responsibilities as the prime contractor in February 2005 to the time of the unplanned automatic shutdown of the NRAD reactor in August 2006.

This violation constitutes a Severity Level II problem.
Proposed Civil Penalty - $41,250

V. Management Assessment Inadequacy

10 CFR 830.122(i) states that DOE contractors are to "Ensure managers assess their management processes and identify and correct problems that hinder their organization from achieving its objectives."

Contrary to this requirement, BEA facility management did not adequately assess their management processes as they relate to NRAD reactor operations, as evidenced by the following:

NRAD reactor operating personnel did not meet DOE expectations with regard to the formality of activities in response to the automatic NRAD reactor shutdown and the associated restart. Discussions with DOE Idaho Operations Office personnel and BEA management indicate that the expert-based, informal approach to reactor operations has been in place for an extended period of time and is a carryover from the approach used by the previous contractor (contract was awarded to BEA in February 2005). However, the formally documented BEA management assessments directed at NRAD reactor operations over the 18 months preceding the August 20, 2006, automatic shutdown of the reactor were very limited in number and not effective in identifying longstanding and profound problems in reactor operations.

This violation constitutes a Severity Level II problem.
Proposed Civil Penalty - $27,500

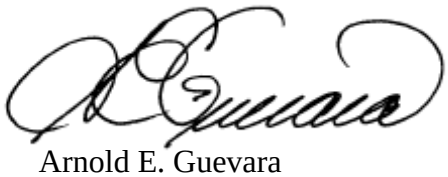
REPLY

Pursuant to the provisions of 10 CFR 820.24, BEA is hereby required, within 30 days after the date of filing this PNOV, to submit a written reply by overnight carrier to the following address:

Director, Office of Enforcement
Attention: Office of the Docketing Clerk
270 Corporate Square Building
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

Copies should also be sent to the Assistant Secretary for Nuclear Energy and the Manager of the DOE Idaho Operations Office. This reply should be clearly marked as a "Reply to a Preliminary Notice of Violation" and should include the following for each violation: (1) any facts, explanations, and arguments supporting a denial that a violation has occurred as alleged; (2) facts that demonstrate any extenuating circumstances or other reasons why the proposed remedy should not be imposed or should be mitigated; and (3) full and complete answers to any questions set forth in the Notice. Copies of all relevant documents shall be submitted with the reply. The reply shall include a discussion of the relevant authorities that support the position asserted, including rulings, regulations, interpretations, and previous decisions issued by DOE. Corrective actions that have been or will be taken to avoid further violations should be delineated, with target and completion dates in DOE's Noncompliance Tracking System. If BEA agrees to comply with the proposed remedy and waives any right to contest the Notice or the remedy, this PNOV will constitute a Final Order upon the filing of the reply.

If BEA agrees to comply with the proposed remedy in its reply, the penalty of $123,750 must be paid within 60 days after the reply is filed by check, draft, or money order payable to the Treasurer of the United States (Account 891099) and mailed to the Director, Office of Enforcement, Attention: Office of the Docketing Clerk, at the above address. If BEA should fail to reply within the time specified, the Director will request that a default order be issued against BEA. If additional mitigation of the proposed civil penalty is requested, BEA should address the adjustment factors described in 10 CFR 820, appendix A, section IX.3.



Arnold E. Guevara
Director
Office of Enforcement
Office of Health, Safety and Security

Washington, DC
this 3rd day of December 2007

Battelle Energy Alliance, L.L.C.

Enforcement Conference Summary

Unplanned Automatic Shutdown of the Neutron Radiography Reactor and Subsequent Restart

An enforcement conference was held with Battelle Energy Alliance, L.L.C., (BEA) on September 12, 2007, in Idaho Falls, Idaho, to discuss potential violations of nuclear safety requirements. These potential violations were identified in an Office of Enforcement Investigation Summary Report issued on July 13, 2007. Mr. Arnold Guevara, Director, Office of Enforcement, was the presiding officer for the conference. Mr. Guevara opened the conference by explaining its purpose, and summarized the deliberation process that would occur following the conference in order to determine the enforcement outcome. Selected key points from the conference are summarized below.

Mr. John Grossenbacher, BEA President and Idaho National Laboratory Director, in his opening remarks, stated that BEA has established a strong leadership and management team. Further, he believes in a strong fitness-for-duty program. Mr. Grossenbacher remarked that when BEA assumed responsibility for the site, formally called the Argonne-West Site, the workforce was found to have an expert-based culture and did not exhibit sound nuclear safety work practices. He stated that he believes the right people are now in place at the Materials and Fuels Complex.

Mr. David Richardson, Director of Nuclear Operations, stated that there were some inaccuracies in the Investigation Summary Report, but nothing that would diminish BEA's responsibility for the Neutron Radiography (NRAD) reactor event. From the beginning, BEA put a high emphasis on field observations and even assigned an experienced reactor manager from another facility to oversee, in part, NRAD reactor activities. The one occurrence in which the NRAD reactor Facility Manager was not in the control room during reactor operation happened to be when the scram and subsequent restart event occurred. Mr. Richardson took exception to the Office of Enforcement's conclusion that a technical safety requirement (TSR) violation existed when BEA personnel failed to enter Limiting Condition of Operation 3.4.3 when the flux regulator failed to engage. Mr. Richardson also disagreed with the Investigation Summary Report's statement that the NRAD reactor Facility Manager was aware of the problem with the flux regulator and did not object to the practice of jostling the flux regulator in an attempt to reinitiate automatic control of the reactor. Mr. Richardson then produced a typed statement from the NRAD reactor Facility Manager indicating that he neither stated nor implied any acceptance of the reactor operators' practice of having to occasionally jostle the flux regulator. The Office of Enforcement stated that BEA's exceptions with the Investigation Report would be entered into the case docket.

Mr. Art Clark, Deputy Laboratory Director for Operations, discussed the corrective actions taken by BEA. The first was to take control of the reactor control panel keys shortly after learning of

the unauthorized restart of the reactor. This action was followed by the suspension of the reactor operators' qualifications, conduct of a root cause analysis, and performance of two management assessments. The first management assessment was similar to an operational readiness review, and the second focused on reactor restart activities. Mr. Richard Day, Enforcement Officer, Office of Enforcement, and lead investigator for the NRAD event, asked whether an extent-of-condition review had been completed. Mr. Clark stated that a review was currently in the planning stages and that he would provide the Office of Enforcement with a description of the scope of the review and the schedule for completing the review.

Mr. Alan Wagner, BEA's Program Manager for Price-Anderson Amendments Act (PAAA) matters, next spoke with respect to enforcement considerations. He stated that the TSRs that were not followed were administrative in nature and of low safety significance. Furthermore, the event was self-identified by way of the Noncompliance Tracking System report that was filed. In closing, Mr. Wagner stated that BEA was entitled to full mitigation as a result of its investigation and corrective actions, that an enforcement action was not warranted based on historical case precedents, and that an enforcement action in this case would be considered punitive.

Mr. Grossenbacher provided closing remarks and added that BEA has hired a person to review all management assessments for effectiveness.

Mr. Guevara thanked everyone for their participation and concluded the conference.

List of Attendees

Office of Enforcement

Arnold Guevara, Director, HS-40
Martha Thompson, Acting Deputy Director, HS-40
Kathy McCarty, Acting Director, HS-41
Richard Day, Acting Director, HS-42
Steven Zobel, Enforcement Officer, HS-42

Idaho Operations Office

Ray Furstenau, Deputy Director
Robert Stallman, Operations and Safety Officer
Jacquelyn Carrozza, PAAA Coordinator
Bill Hamel, Assistant Manager for Infrastructure Support
Dary Newbry, Operations and Safety Officer
Richard Dickson, Lead Health Physicist
Christian Natoni, Facilities and Infrastructure Support
Mark Gardner, Supervisor, Quality and Safety Division

Battelle Energy Alliance

John Grossenbacher, Laboratory Director
Arthur Clark, Deputy Laboratory Directory for Operations
Dave Richardson, Director for Nuclear Operations
Alan Wagner, PAAA Program Manager
Sherry Kontes, Nuclear Operations Compliance Officer

Battelle Memorial Institute

James Tarpinian, Environment, Safety, Health and Quality Officer