

April 15, 1999

Dr. John Marburger
[]
Brookhaven Science Associates
Brookhaven National Laboratory
Building 460
Upton, NY 11973

EA-1999-02

Subject: Preliminary Notice of Violation and Proposed Imposition of Civil Penalty
\$27,500

Dear Dr. Marburger:

This letter refers to the Department of Energy's (DOE) evaluation of a number of incidents that occurred throughout 1998 at the Brookhaven National Laboratory (BNL) revealing deficiencies in radiological protection and work process controls. The deficiencies involved the following: (1) apparent intentional violations of radiation protection requirements related to activities at the High Flux Beam Reactor (HFBR), (2) failure to maintain proper access controls at the Alternating Gradient Synchrotron (AGS) accelerator resulting in a person being left inside the AGS ring, and (3) the bypassing of a safety interlock during operation of the linear electron accelerator.

The Office of Enforcement and Investigation, in coordination with the DOE Brookhaven Group, conducted an investigation of these events in November 1998 and issued an Investigation Summary Report. This report was transmitted to you on February 19, 1999. An Enforcement Conference was held on March 11, 1999, with you, Dr. Shirley Strum Kenny, as well as members of your staff and Stony Brook University Hospital (SBUH) management. This conference included a discussion of the potential violations, their safety significance, and the status of corrective actions. A Conference Summary Report is enclosed.

Based on DOE's investigative results and the information you provided during the Enforcement Conference, DOE has concluded that violations of 10 CFR 830.120 (Quality Assurance Rule) and of 10 CFR 835 (Occupational Radiation Protection Rule) likely occurred. The violations are described in the enclosed Preliminary Notice of Violation (PNOV).

Section I of the enclosed PNOV describes violations that occurred while operators were performing work on the fuel test loop system at the HFBR. During this work, an experienced Reactor Operator ignored posted radiological warnings and removed potentially contaminated equipment from the controlled area without adhering to either the protective clothing requirements or making the required notification to radiation protection personnel prior to entry into the controlled area. Further, when two separate stop work instructions were given to the operator in accordance with BNL's established stop work authority, the operator failed to comply. While the violations do not affect reactor safety, they are of concern to DOE because an experienced Reactor Operator consciously chose to ignore your established radiation protection requirements. Further, the broader programmatic implications associated with this event were not recognized by BSA line management until a subsequent investigation was initiated by BSA's Independent Oversight Office. This investigation was initiated after an employee filed a concern with the "ES&H Concerns Review Program" stating that she had been intimidated by Reactor Division personnel during their investigation of the event at the HFBR.

In accordance with the "General Statement of Enforcement Policy (Enforcement Policy)," 10 CFR 820, Appendix A, the violations described in Section I of the enclosed PNOV have been classified in the aggregate as a Severity Level II problem. The base civil penalty for a Severity Level II violation is \$55,000. After considering the escalation and mitigation factors set forth in the Enforcement Policy, the proposed civil penalty has been reduced by 50% to \$27,500. In reducing the civil penalty, DOE considered that this event occurred just shortly after BSA assumed operational responsibility of BNL, and DOE has observed measurable improvement in overall management at BNL since that time. Further, the newly created BNL Independent Oversight Office conducted a thorough and critical examination of this event that led to the identification of broader programmatic issues for which a corrective action plan has been developed. Full mitigation for these violations is not appropriate (1) because of the intentional nature of the violation and (2) because the broader site-wide corrective actions to address radiological control, procedure quality and compliance problems have not yet been fully implemented across the site.

Section II of the enclosed PNOV describes violations that occurred on June 2, 1998, associated with the failure to adequately develop and implement necessary and appropriate controls for personnel access into the Alternating Gradient Synchrotron (AGS). In the June 2, 1998, event three of six levels of access control failed resulting in an individual being left inside the AGS ring. This incident is of significant regulatory concern because the AGS becomes a "high radiation area" during AGS operation. Furthermore, this event raised concerns within DOE regarding the adequacy of AGS management oversight of the entry control program in that AGS personnel did not exhibit an understanding and appreciation of the importance of AGS entry control measures that were in place, and further, the AGS team appointed to perform an internal review of the event

very narrowly limited the scope of their review. Consequently, identification of the root cause of the safety issue and the subsequent implementation of effective corrective actions by the internal AGS Department was limited in scope until the AGS Chair and the Associated Laboratory Director for High Energy and Nuclear Physics requested a special investigation by the BNL Independent Oversight Office. Further, rigorous implementation of your administrative controls to prevent recurrence had not been fully demonstrated at the time of the Enforcement Conference. For example, DOE identified several recent omissions in the access control logs that are relied upon, in part, to ensure personnel accountability in the AGS ring.

The violations described in Section II of the PNOV have been classified as a Severity Level II problem. These violations are of particular concern because, like the violations described in Section I, the initial investigation by BSA line management did not identify the full extent of the deficiencies that led to the event. Only after the BSA Independent Oversight Office reviewed the matter did the full extent of the problems surface. The base civil penalty for the Severity Level II violations associated with the AGS would normally be \$55,000. However, the Atomic Energy Act of 1954 as amended, does not provide for civil penalties arising from violations involving accelerator-produced radiation. Therefore, the civil penalty associated with these violations is remitted. If a civil penalty would have been issued, it would have been reduced by 50% to \$27,500. Mitigation would have been appropriate because your Independent Oversight Office conducted a comprehensive investigation of the event and identified broader programmatic issues with this event and reported the deficiencies to DOE.

Section III of the PNOV describes violations that involved the linear electron accelerator in the Radiation Therapy Facility (RTF) located in Building 490[]. This accelerator is used to treat cancer patients and is owned and operated by the Stony Brook University Hospital under a contractual arrangement with BSA. The violations occurred when one of two safety interlocks was taped over to permit continued operation of the accelerator. The redundant interlocks were required to be operable to minimize the possibility of unplanned radiation exposure to personnel working in the facility during patient treatment. While the safety significance of these violations is low because one interlock still functioned, DOE is concerned that BSA did not adequately ensure that SBUH was adhering to BSA's established safety requirements.

In accordance with 10 CFR 820.24 you are required to respond to this letter and you should follow the instructions specified in the enclosed PNOV when preparing your response. In your response, you should document the specific actions taken and any additional actions you plan to prevent recurrence.

After reviewing your response to this Notice, including your proposed corrective action plan, DOE will determine whether further actions are necessary to ensure compliance with the applicable nuclear safety requirements.

Sincerely,

A handwritten signature in black ink, appearing to read 'D. Michaels', written in a cursive style.

David Michaels, PhD, MPH
Assistant Secretary
Environment, Safety and Health

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Enclosures:
Preliminary Notice of Violation
Enforcement Conference Summary
List of Attendees

**PRELIMINARY NOTICE OF VIOLATION
AND
PROPOSED IMPOSITION OF CIVIL PENALTY**

Brookhaven Science Associates
Brookhaven National Laboratory

EA-1999-02

As a result of a Department of Energy (DOE) evaluation of radiological events occurring during 1998 at various facilities at Brookhaven National Laboratory, violations of DOE nuclear safety requirements were identified. In accordance with the "General Statement of Enforcement Policy," 10 CFR 820, Appendix A, DOE proposes to impose civil penalties pursuant to Section 234A of the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2282a, and 10 CFR 820. The particular violations and associated civil penalties are set forth below.

I. Violations Related to Activities at the High Flux Beam Reactor

10 CFR 830.120(2)(c)(i) requires that "work shall be performed to established technical standards and administrative controls using approved instructions, procedures, or other appropriate means."

Contrary to the above, on March 25, 1998, work was not performed in accordance with established administrative controls using approved instructions, procedures or other appropriate means on the equipment level at the High Flux Beam Reactor (HFBR) in that

1. A radiological area which included the decontamination sink on the equipment level of the HFBR was posted with the following radiological warning signs: Radiation Area, Contamination Area, RWP [Radiological Work Permit] Required, and Contact HP (Health Physics) Prior to Entry.

However, on March 25, 1998, a Reactor Operator violated the radiological area posting requirements in that he accessed the radiological area containing the decontamination sink and removed a bucket without using an RWP and without contacting HP prior to entry into the radiological area as required.

2. RWP Number HFBR 98-04, dated January 1, 1998, identified protective clothing requirements for entry into the radiologically posted area at the decontamination sink on the equipment level at the HFBR which were as a minimum: laboratory coat, rubber gloves, latex gloves, rubbers, and booties.

However, on March 25, 1998, RWP requirements were not adhered to in that a Reactor Operator entered the area at the decontamination sink and removed a bucket without wearing the required protective clothing.

3. BNL stop work authority instructions are contained in *BNL Stop Work Policy*, dated May 1, 1997, and in *1.25 RD Policy and Procedure on Stop Work Authority*. In accordance with *#1.25 RD Policy and Procedure on Stop work Authority*, "any employee who receives a 'Stop Work' instruction must immediately comply with that order." *The BNL Stop Work Policy* identified a failure to comply with a radiation control barrier as an example of when a stop work instruction is appropriate.

However, on March 25, 1998, a Reactor Operator failed to comply with two stop work instructions from a Health Physics Technician (HPT) after the HPT observed the Reactor Operator enter a radiologically posted area at the decontamination sink on the HFBR equipment level without adhering to posted radiation control barrier requirements.

Collectively, these violations represent a Severity Level II problem.
Civil penalty - \$27,500

II. Violations Related to Activities at the Alternating Gradient Synchrotron

10 CFR 835.1001(b) required that for specific activities where use of physical design features are demonstrated to be impractical, administrative controls and procedural requirements shall be used to maintain radiation exposures as low as reasonably achievable (ALARA).

Contrary to the above, administrative controls and procedural requirements were not used to maintain radiation exposures ALARA in that

1. AGS Operating Procedure 4.3, *Procedure for Primary Beam Enclosure Gate Reset Under Controlled Access Conditions*, Revision 01, November 15, 1995,
 - a. Section 2.2 required that "an AGS [Alternating Gradient Synchrotron] Main Control Room (MCR) Operator at the gate and an operator in MCR shall ensure that the AGS Gate Security Log Sheet has been completed."

- b. Section 5.2.1 required that “the MCR Operator at the Gate shall confirm that all who signed in on log sheet have also signed out (initial sheet).”
- c. Section 5.3 required that “the MCR Operator, Health Physics, or Radiation Safety Operator shall examine log sheet reconfirm that all who signed in, also signed out, and initial the log sheet.”

Contrary to these requirements, the access control personnel checks required by AGS Operating Procedure 4.3, *Procedure for Primary Beam Enclosure Gate Reset Under Controlled Access Conditions*, Revision 01, November 15, 1995, were inadequate in that on June 2, 1998, the examination of the AGS Gate Security Log Sheet by operations personnel resulted in the declaration that all personnel were accounted for when, in fact, one technician was left inside the AGS ring when Operations reset the ring to “Beam Enabled” status. This area becomes a High Radiation Area upon beam introduction.

- 2. AGS Operating Procedure 2.7, *Logkeeping*, Revision 01, December 31, 1996, Section 2.5 required that incorrect entries to logs “are to be crossed out with a single line and are not to be completely obscured.”

However, when exiting the AGS ring after performing work on June 2, 1998, one worker incorrectly signed out of the ring on Sheet #2 of the AGS Gate Security Log Sheet in an incorrect space. Recognizing the mistake, the worker completely obscured his sign-out initials on the log sheet so that the correction was illegible, thus contributing to the Gate Watch’s incorrect assumption that all persons were accounted for when, in fact, one person remained within the AGS ring with the ring placed in the “Beam Enabled” status.

- 3. AGS Operating Procedure 4.1, *Procedure for Entry Into Primary Radiation Areas Under Controlled Access Conditions*, Revision 03, November 15, 1994, Section 4.4 required that “IF the number of entries exceeds 25 or the gate has been open for more than four hours THEN a cursory sweep or a re-sweep of the primary beam enclosure is required.”

AGS Operating Procedure 4.2, *Procedure for Primary Beam Enclosure Gate Watch - Controlled Access*, Revision 01, November 15, 1994, Section 5.3.3 required that “IF number of entries exceeds 25 THEN a Cursory Sweep is Required.”

AGS Operating Procedure 4.3, *Procedure For Primary Beam Enclosure Gate Reset Under Controlled Access Conditions*, Revision 01, November 1994, Section 5.2.2.1 stated that “IF either 5.2.2 has been exceeded (no more than 25 entries and the gate open for less than 4 hours), or if Section

5.2.1 is not true (all who signed in on log sheet have also signed out), THEN notify the Coordinator that cursory sweep is needed.”

Although AGS Operating Procedures 4.1, 4.2 and 4.3 required that a cursory sweep be performed when more than 25 personnel entries had been made or when the gate was open for more than four hours, these procedures were inadequate to ensure that the required cursory sweep was performed in a timely manner and before the AGS ring was reset. As a result, on June 2, 1998, one Operations Technician was left inside the AGS ring when the ring was reset to the “Beam Enabled” status without the cursory personnel sweep being performed. The inside of the AGS ring becomes a High Radiation Area upon beam introduction.

Collectively, these violations constitute a Severity Level II problem.
Civil Penalty - \$27,500 (Remitted)

III. Violations Related to Activities at the Radiation Therapy Facility

- A. 10 CFR 835.501(b) requires that the degree of control of radiological areas shall be commensurate with existing and potential radiological hazards within the area.

Contrary to the above, on March 16, 1998, through March 23, 1998, entry to the linear electron accelerator room of the Radiation Therapy Facility (RTF) was not controlled to the degree commensurate with existing radiological hazards within the area in that one of two microswitches acting as a redundant interlock for the door to the linear electron accelerator room failed and the failed interlock was bypassed by taping the microswitch closed. Failure to use the redundant safety interlock permitted continued operation of the accelerator even though control devices to prevent personnel entry into a High Radiation Area were not in operation as required.

- B. 835.1003(a)(3) requires that during routine operations, the combination of design features and administrative control procedures shall provide that exposure levels are as low as reasonably achievable.

Contrary to the above, during the investigation of the events concerning the bypassed interlock at the RFT accelerator room, it was determined that the administrative controls were not used as required in that the contractor discovered that interlock tests were performed on a semi-annual basis rather than monthly as required by the RTF Safety Analysis Report (SAR) dated April 1991.

- C. 10 CFR 835.501(d) requires that administrative procedures shall be written as necessary to demonstrate compliance with the provisions of

10 CFR 835, Subpart F, and procedures shall include actions essential to ensure the effectiveness and operability of barricades, devices, alarms, and locks.

Contrary to the above, administrative procedures were not written to include actions essential to ensure the effectiveness and operability of barricades and locks. Specifically, procedures were neither developed nor implemented to inspect the RTF's roof fence and fence lock on a quarterly basis as required by the RTF SAR.

The above constitute, in the aggregate, a Severity Level III violation.

Pursuant to 10 CFR 820.24, BSA, is hereby required within 30 days of the date of this Notice and Proposed Imposition of Civil Penalty, to submit a written statement or explanation to the Director, Office of Enforcement and Investigation, Office of the Assistant Secretary for Environment, Safety and Health, U.S. Department of Energy, P.O. Box 2225, Germantown, MD 20874-2225, Attention: Office of the Docketing Clerk, with copies to the Manager, DOE Brookhaven Group, and to the cognizant DOE Secretarial Offices for the facilities that are the subject of this Notice. This reply should be clearly marked as a "Reply to a Preliminary Notice of Violation and Proposed Civil Penalty" and should include the following for each violation: (1) admission or denial of the alleged violations, (2) the facts set forth above which are not correct and the reasons for the violations if admitted, and if denied, the reasons they are not correct, (3) the corrective steps that have been taken and the results achieved, (4) the corrective steps that will be taken to avoid further violations, and (5) the date when full compliance will be achieved.

Any request for remission or mitigation of civil penalties must be accompanied by a substantive justification demonstrating extenuating circumstances or other reasons why the assessed penalties should not be imposed in full. Unless the violations are denied, or remission or mitigation is requested within the 30 days after the issuance of the Preliminary Notice of Violation and Civil Penalty, BSA, shall pay the civil penalties totaling \$27,500 (imposed under Section 234A of the Act) by check, draft or money order payable to the Treasurer of the United States (Account Number 891099) mailed to the Director, Office of Enforcement and Investigation, U.S. Department of Energy. Should the contractor fail to answer within the time specified, an order imposing the civil penalty will be issued.

If requesting mitigation of the proposed penalty, BSA should address the adjustment factors described in Section VIII.C. of 10 CFR 820, Appendix A.

A handwritten signature in black ink, appearing to read 'D. Michaels', written in a cursive style.

David Michaels, PhD, MPH
Assistant Secretary
Environment, Safety and Health

Dated at Washington, D.C.
This 15th day of April 1999