

**Accelerator Safety Envelope**

**Title of Facility: Booster Applications Facility (BAF)**

**Date of Initial ASE: June 15, 2001**

**Subsequent Revision Dates:**

**Version of the SAD that the ASE applies to: [Booster Applications Facility Safety Assessment Document, Revision 1, June 15, 2001](#)**

**Signature of Preparer:**

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**Signature of Collider-Accelerator Department Chair:**

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**Signature of High Energy and Nuclear Physics Associate Laboratory Director:**

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**Signature of Deputy Director of Operations:**

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## Section 1. Introduction

General actions to be taken upon discovery of a violation of the Safety Envelope:

- 1.1. A variation beyond the boundaries described in Sections 2, 3 and 4 shall be treated as a reportable occurrence, as defined by [SBMS Subject Area on Occurrence Reporting](#). C-A Department staff shall make notifications of occurrences according to the requirements in the [C-A Operations Procedure Manual](#).
- 1.2. The method used by the Collider-Accelerator Department for change control of the ASE is documented in the [C-A Operations Procedure Manual](#).

## Section 2: BNL Safety Envelope Limits

This section contains the absolute limits that BNL places on its operations to ensure that we meet the regulatory limits established to protect our environment, public and staff/visitors and that those operations are conducted within the assumptions of the BAF safety analyses documented in the [BAF SAD](#). BNL Safety Envelope Limits for BAF operations are:

- 2.1. Less than 25 mrem in one year to individuals in other BNL Departments or Divisions adjacent to this Collider-Accelerator Department accelerator facility.
- 2.2. Less than 5 mrem in one year to a person located at the site boundary.
- 2.3. Offsite drinking water concentration and on-site potable well water concentration must not result in 4 mrem or greater to an individual in one year.
- 2.4. Less than 1250 mrem in one year to a Collider-Accelerator Department staff member.
- 2.5. Maximum tritium concentration of 10,000 pCi/L in the BNL sanitary sewer effluent, caused by liquid discharges from BAF facilities averaged over a 30-day interval.
- 2.6. Groundwater contamination from soil activation is to be prevented.
- 2.7. Airborne effluents from BAF facilities shall not result in a dose that exceeds 0.1 mrem in one year to a person at the site boundary.

## Section 3: Corresponding BAF Safety Envelope Parameters

This section identifies the measurable limitations on critical operating parameters that, in conjunction with the specifically identified hazard control considerations established by the facility design and construction, ensure that BAF operations will not exceed the

corresponding BAF Safety Envelope Limits discussed in Section 2. These parameters are derived from the safety analyses described in Chapter 4 of the BAF SAD. BAF safety envelope parameters are:

### **BAF Beam Limits in Terms of the Product of Nucleon Energy and Flux**

- 3.1. The annual limit on the number and kinetic energy of high-energy nucleons extracted from the Booster SEB system shall be no greater than  $10^{17}$  GeV in one year.
- 3.2. The hourly limit on the number and kinetic energy of high-energy nucleons extracted from the Booster SEB system shall be no greater than  $6 \times 10^{14}$  GeV in one hour.
- 3.3. The hourly limit on the number and kinetic energy of high-energy nucleons entering the BAF Target Room and beam stop shall be no greater than  $6 \times 10^{14}$  GeV in one hour.
- 3.4. The maximum annual high-energy flux on the BAF beam stop shall be no greater than  $3 \times 10^{16}$  GeV in one year.

### **Control of Beam Loss**

- 3.5. Loss monitoring results and radiation survey results shall be used in order to maintain beam loss "As Low as Reasonably Achievable" as defined in the [BNL Radiological Manual](#).
- 3.6. Beam loss induced radiation within uncontrolled areas is to be less than 0.5 mrem in an hour and for repeated losses less than 25 mrem in a year.
- 3.7. Beam loss induced radiation in an occupied Controlled Area is to be less than 5 mrem in an hour and for repeated losses less than 100 mrem in a year.

### **Classification of Radiological Areas**

- 3.8. Radiological area classifications during operations shall be in accord with requirements in the [BNL Radiation Control Manual](#).

### **Access Controls**

- 3.9. The Access Controls System shall be functional during operations with beam.
- 3.10. During the running period, area radiation monitors that are interfaced with the Access Controls System shall be within their calibration date.

- 3.11. During the running period, the locations of area radiation monitors interfaced with the Access Control System are to be configuration controlled.

### **Fire Protection**

- 3.12. Appropriate action shall be taken if fire detection/protection systems are impaired. These actions may either be to prohibit personnel from working in a specific area and/or to de-energize equipment.
- 3.13. BAF magnets and power supplies may be energized if the smoke detection system for the energized area can transmit an alarm to summon the BNL Fire/Rescue Group. Transmittal may be automatic or via a fire watch.

### **Section 4: Engineered Safety Systems Requiring Calibration, Testing, Maintenance, and Inspection**

The systems and requirements for calibration, testing, maintenance, accuracy or inspections necessary to ensure the integrity of the BAF safety envelope parameters during operations are:

- 4.1. The Access Control System shall be functionally tested in accordance with requirements in the [BNL Radiation Control Manual](#).
- 4.2. Target Room and Support Building ventilation exhaust fans shall undergo annual testing (not to exceed 15 months).
- 4.3. BAF fire protection shall undergo annual testing (not to exceed 15 months).
- 4.4. Area radiation monitors shall undergo annual testing (not to exceed 15 months).
- 4.5. Radiological barriers shall undergo annual visual inspection (not to exceed 15 months).
- 4.6. Rainwater barriers for activated soil shall undergo annual visual inspection (not to exceed 15 months).
- 4.7. In the Support Laboratories, Class II Type A biological-safety-cabinet (BSC) HEPA-filter efficiency and cabinet face-velocity-tests shall be performed *in situ* at the time of installation, at any time the BSC is moved, and at least annually thereafter (not to exceed 15 months).
- 4.8. In the Support Laboratories, HEPA filter efficiency shall be tested for the exhaust from animal rooms annually (not to exceed 15 months).

## Section 5: Administrative Controls

Administrative controls necessary to ensure the integrity of the BAF safety envelope parameters during operations are:

### 5.1. Minimum Main Control Room Staffing

- 5.1.1. C-A Main Control Room: one Operations Coordinator and one Operator shall be on duty when BAF beam is in operation. During normal operations, one of the two must remain in the Main Control Room at all times.

### 5.2. Experiment Area Staffing

- 5.2.1. The minimum experimental area staffing shall be a qualified Collider Accelerator Support (CAS) watch person for BAF experimental operations with beam.

5.3. Operations staff shall be trained and qualified on their safety, operational and emergency responsibilities. Records of training and qualification shall be maintained on the Brookhaven Training Management System ([BTMS](#)).

5.4. Work planning and control systems shall comply with the requirements in the [C-A Operations Procedure Manual](#).

5.5. Environmental management shall comply with the requirements in the [C-A Operations Procedure Manual](#).

- 5.5.1. Monitoring well location and frequency of monitoring shall be reviewed periodically and adjusted based on prior measurement results.

5.6. Experiment modification and review shall comply with the requirements in the [C-A Operations Procedure Manual](#).

- 5.6.1. Each experiment in the BAF Target Room shall be reviewed before running with beam. It is noted that an experiment may lie dormant for a period greater than one year between runs and not require a review during the dormancy period. For experiments that may run more than once within a 12-month period, review shall occur before each singular scheduled run.

5.7. Work on energized electrical systems shall comply with working hot permits and other controls in accord with the requirements in [SBMS](#).

5.8. High noise areas at BAF shall be evaluated in accord with requirements in [SBMS](#).



# U.S. DEPARTMENT OF ENERGY

## BROOKHAVEN AREA OFFICE

### MEMORANDUM

DATE: September 25, 2001

TO: Ray Karol, C-AD

FROM: Peter Kelley

**SUBJECT: BOOSTER APPLICATIONS FACILITY AUTHORIZATION BASIS DOE-BAO REVIEW**

Per your request, the following is the status of the review being performed by DOE-BAO on the Booster Applications Facility (BAF) Safety Assessment Document (SAD) and Accelerator Safety Envelope (ASE).

DOE-BAO received the BAF SAD and ASE as an attachment to the July 9, 2001 Sheridan to Holland letter requesting our review. As you are aware, the ASE is based on the information in the SAD. Therefore, to date, most of our review emphasis has been on the SAD to determine its adequacy per DOE Order 420.2A, Safety of Accelerator Facilities. Following our successful review of the SAD and ASE, DOE-BAO will approve the ASE at the appropriate time.

If you have any questions, please call me at extension 5784.

A handwritten signature in cursive script that reads "Peter W. Kelley".

Peter Kelley  
Facility Representative

cc: E. Lessard, C-AD



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for the U.S. Department of Energy

[www.bnl.gov](http://www.bnl.gov)

July 9, 2001

Mr. Michael Holland, Manager  
Brookhaven Area Office  
U.S. Department of Energy  
Building 464  
Upton, NY 11973

**SUBJECT: C-AD Booster Accelerator Facility SAD & ASE**

Dear Mr. Holland:

At the recommendation of BNL's Environmental, Safety and Health Committee, I have approved the Booster Application Facility (BAF) Safety Assessment Document (SAD), and the proposed Accelerator Safety Envelope (ASE), which I forward for your review and comment. Also attached is a draft of the proposed Commissioning and Acceptance Plan for Operations of the BAF dated June 15, 2001.

In order to receive DOE approval of the ASE during FY01, I would appreciate your timely response regarding recommended changes, if any, to this document. Questions or comments on any of the above-mentioned documents should be directed to Ed Lessard on Ext. 4250.

Sincerely yours,

A handwritten signature in black ink, appearing to read "T. Sheridan", written over a horizontal line.

Thomas R. Sheridan  
Deputy Director, Operations

cc: D. Lowenstein ✓  
E. Lessard  
T. Kirk

Attachments:

BAF SAD, Revision 1, Copy #9  
Proposed BAF ASE  
Draft BAF Commission/Operations Plan

**Accelerator Safety Envelope**

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**Subsequent Revision Dates:**

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**Signature of Preparer:**

*Edward T. Leland*  
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**Signature of Collider-Accelerator Department Chair:**

*[Signature]*  
\_\_\_\_\_

**Signature of High Energy and Nuclear Physics Associate Laboratory Director:**

*Thomas B. W. [Signature] 6/29/01*  
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**Signature of Deputy Director of Operations:**

*[Signature]*  
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