BROOKHAVEN NATIONAL LABORATORY PHYSICS DEPARTMENT		**Number:** 1.1.1	**Revision:** 8
		Effective: 04/01/2004	
Subject: Guidelines for the Conduct of Operations of the Accelerator Test Facility			
Prepared by: Michael Zarcone	**Reviewed by:** ES&H Committee	**Approved by:** Department Chair	

GUIDELINES FOR THE CONDUCT OF OPERATIONS OF THE ACCELERATOR TEST FACILITY

Page

CHAPTER 1: OPERATIONS ORGANIZATION AND ADMINISTRATION

1.1 Introduction

The organization and administration of the Accelerator Test Facility (ATF) Operations Group shall ensure that a high level of operations is achieved through effective implementation and control of the operations activities. ATF policies shall describe the philosophy of standards of excellence under which the accelerator and experimental areas are operated. The effective implementation and control of operating activities are primarily achieved by establishing written standards in accelerator and experimental operations, periodically monitoring and assessing performance. This chapter discusses the policies, resources, monitoring and accountability needed in operations.

1.2 Discussion

A high level of operating performance is achieved by establishment of high operating standards by management, by communicating operating standards to the working level, by providing sufficient resources to the operation, by ensuring personnel are well trained, by closely monitoring performance, and by holding operations staff accountable for their performance in conducting operations.

Senior management establishes operating standards, considering input from the working level as appropriate. The working level will more eagerly support the standards when they have had input in developing them. The standards shall define operating objectives, establish expected performance levels and clearly define responsibilities for operations. Standards for operating activities shall be integrated into ATF procedures and programs. Operating standards shall be communicated to the working level by training workers in operating practices and by supervisory monitoring and guidance of the work involved. Sufficient staff, equipment and funding shall be allocated so that the operators can effectively perform their duties. Performance in operations shall be closely monitored by ATF management and operating reports and goals shall be used so that performance can be effectively measured. Operators shall be held accountable for their performance through supervisory counseling, performance appraisals and, when necessary, disciplinary measures. Remedial training shall be provided when appropriate.

1.3 Guidelines

1.3.1 Operations Policies

ATF operations policies is spelled out in "General Requirements and Objectives for ATF Operations," Section 1.1.0 of the ATF Handbook which is given to each new operator. As policies change, the new policy shall be distributed to all current operators and the guide shall be updated.

1.3.2 Resources

The ATF shall maintain an adequate number of trained operators including an Operations Coordinator who is in charge of ATF operations. The ATF Control Room shall be manned at all times that the machine is in a operating mode. The Operations Coordinator who shall also be a

qualified machine operator shall schedule machine and experimental operations. Designated lead experimenters shall be trained in experimental operations to such a level as to become Duty Operators.

1.3.3 Monitoring of ATF Operating Performance

Operator's performance is monitored by the ATF Head and Operations Coordinator. ATF weekly engineering meetings with ATF staff and users shall be held to discuss operation problems and possible corrective actions.

1.3.4 Accountability

All operators are accountable to the ATF Head who, in turn, is accountable to the Physics Department Chair. All incidents or accidents involving personnel safety, loss of equipment, etc., even though they are not reportable by DOE or laboratory policy, may be investigated by the Physics Department's Accident/Incident Investigation Committee at the discretion of the Department Chair. Operational errors are normally dealt with through individual counseling, more serious errors may demand oral or written reprimand. Repeated flagrant disregard for Laboratory policy can result in suspension without pay and ultimately, termination.

1.3.5 Management Training

The Laboratory offers mandatory supervisory development courses to which all Operations Group supervisors shall be sent as operational considerations permit. The Laboratory also offers elective supervisory development courses to which Operations Group supervisors may attend if desired or if recommended by the ATF Head as operational considerations permit.

CHAPTER 2: OPERATING PRACTICES

2.1 Introduction

The guidelines in this chapter describe operating practices that apply to all operations personnel. Additional guidelines for activities in the Control Room are delineated in Chapter 3, Control Room Activities. Chapter 4, Communications, describes some communication practices applicable to all operations personnel. This chapter describes some important aspects of routine shift activities and operating practices.

2.2 Discussion

Professional conduct and good working practices result in appropriate attention to accelerator and experimental area conditions. Effective ATF equipment monitoring is necessary to detect abnormal conditions or adverse trends so that appropriate action can be taken before equipment malfunction occurs. Notifying the operations coordinator promptly of unusual or unexpected situations helps ensure that proper attention is given to changing and off-normal conditions. Equipment status and the authority to operate equipment shall be understood by all operations personnel so that activities can be controlled and coordinated. Operations personnel shall follow proper industrial safety, radiological protection and quality assurance practices. These items are key elements that shall be included in an effective operator training program. A desire to conduct assigned tasks expediently shall not interfere with attentiveness to the accelerator, other operations, duties, practices.

It is the responsibility of the on-shift operating crew to safely operate the facility through adherence to operating procedures and technical specifications and through sound operating practices. The authority for ATF operations shall be vested in the on-shift operator to another qualified operator following established procedures.

The on-shift ATF Operator or Duty Operator shall maintain authority and responsibility for all accelerator and area operations. If a special test, evaluation or abnormal condition arises, ATF personnel shall be aware that the responsibility and authority to determine corresponding operating conditions, system alignments, or equipment manipulations rests fully with the on-shift operator. He or she shall not permit any individual to bypass or overrule his or her operational judgment without bringing the matter to the attention of higher line operational authority. Whenever the ATF is operating for experimental purposes there shall be a designated physicist who shall be responsible for the safe operation of the experiment and shall assist the on-shift operator in conducting the experiment. There shall also be a designated Laser Operator who shall be responsible for all local laser operations and monitor laser performance. The Laser Operator shall be trained to carry out search and secure procedure in the secured laser areas as detailed in ATF Laser Interlock System Search Patterns.

2.3 Guidelines

2.3.1 Status Reports

Changes in status of the ATF components are normally communicated to the on-shift operators through the console indicator system. Any difficulties in performing assigned tasks, or

any abnormal occurrences are reported to the Operations Coordinator or to a designated equipment expert through the call-in list provided in the Control Room.

2.3.2 Safety Practices

ATF Operations personnel shall comply with all Subject Areas, policies, and provisions of the BNL Standards Based Management System (SBMS) and with the ATF Handbook kept in the ATF Control Room.

2.3.3 Radiological Protection

All ATF Operators shall be trained in proper radiation procedures as required by BNL SBMS and the BNL RadCon Manual. They shall also abide by the provisions of the ATF Handbook. Radiation safety procedures are emphasized during new operator training and are part of the annual employee evaluation process.

2.3.4 Response to Indications

Prompt action is always to be taken in response to alarm indications. Once the problem is identified, the operator shall rectify it or activate the call-in list if he or she is unable to do so.

2.3.5 Resetting Protective Devices

A trip (beam dump, power supply, rf, etc.) is not generally reset until the cause is investigated. The only exception shall be if there is a repetitive, well understood problem which cannot be immediately corrected, and resetting the trip will not involve any increased safety hazard.

2.3.6 Authority to Operate Equipment

The on-shift operator is in charge of all activities relating to the operation of the ATF - any work by support groups which might impact the operation shall be approved by the operator.

2.3.7 Shift Operating Base

The ATF Control Room is the base of ATF operations activities.

2.3.8 Potentially Distractive Written Material and Devices

The Operations Coordinator shall decide if there are any distracting influences in the Control Room which need to be removed.

CHAPTER 3: CONTROL ROOM ACTIVITIES

3.1 Introduction

Control Room activities shall be conducted in a manner that achieves safe and reliable ATF operation. Other activities are discussed in Chapter 2, Operating Practices. This chapter addresses the important elements of Control Room activities that are necessary to support safe and efficient ATF operations.

3.2 Discussion

The Control Room is the most critical accelerator operating station and the coordinating point for all important accelerator and experimental beam line activities. Therefore, activities in the Control Room shall be businesslike, and a professional atmosphere conducive to safe and efficient operation shall be maintained. In addition, Control Room operators shall not be overburdened with administrative responsibilities, and the ATF control room shall be preliminarily used for operation staff and personnel who are conducting the experiment. The ATF operator or duty operator has the full authority over the control access.

3.3 Guidelines

3.3.1 Control Room Access

The ATF Control Room is a posted "Authorized Personnel Only" Area. The operator grants entry to the Control Room and has the authority to ask people to leave if their presence is disruptive.

3.3.2 Professional Behavior

The Operations Coordinator enforces professional behavior in the Control Room.

3.3.3 Monitoring the ATF Status

Operators are always attentive to alarms from various areas of the ATF. Distinct audio tones are sounded from equipment requiring immediate operator action. Individual equipment status is available via the operations computer terminals or from dedicated alarm panels.

3.3.4 Control Room Operator Ancillary Duties

Operation of the ATF is, in general, the only duty assigned to the on-shift operator. If administrative tasks need to be performed, the Operations Coordinator will instruct the operator to handle them only when operational conditions permit.

3.3.5 Operation of the Control Room Equipment

The Operations Coordinator ensures that operators are properly qualified and trained to operate the ATF controls; new operators shall be supervised by a more experience operator until they are fully trained.

CHAPTER 4: COMMUNICATIONS

4.1 Introduction

Communications must be highly reliable in providing accurate transmission of information within the ATF complex. This chapter describes the important aspects of the ATF program for audible communications.

4.2 Discussion

Audible communications are used to transmit operating and emergency information within the ATF complex, oral (face-to-face), telephone, radio, public address (page) announcements, pocket pagers and special sounds (horns and bells) are examples of audible communications.

Since accurate communications are essential to the safe and efficient operation of the ATF, guidance in the use of the various forms of audible communication is necessary. This includes repeating back instructions to ensure the accuracy of transmission and receipt of verbal instructions. Standardized terminology and the use of a phonetic alphabet are other means of ensuring that verbal communications are understood.

Many sites use horns, sirens, bells and the public address system to alert personnel to abnormal or emergency conditions. These communications must be controlled to ensure that they do not detract from normal ATF operations and are available in an emergency.

4.3 Guidelines

4.3.1 Emergency Communications Systems

The ATF Control Room monitors the BNL plectron warning system. This system is operated by BNL Police Headquarters and gives information on BNL emergencies, evacuations, weather alerts, etc. The Control Room also has the radio receiver for use in monitoring snow storms, hurricanes, etc.

In addition to automatic fire alarm systems, the ATF operator may activate alarm bells in the event of an emergency requiring evacuation of the building. In this situation, the operator will also reinforce the evacuation by use of the public address system. The on-duty operator shall act as the Local Emergency Coordinator in the event of a BNL site emergency.

When a beam line is operational, experimental beam line personnel shall remain in contact with the ATF Control Room via the walkie-talkie system. Primary support personnel may carry pocket pagers so they can be contacted by the Control Room operator.

4.3.2 Public Address System

Operators have direct access to the ATF public address system. Whenever the experimental area is secured and the machine is about to start up an announcement of "start up" shall be made.

4.3.3 Contacting Experimental Operators

The Control Room operator can contact personnel on the experimental floor using walkie-talkies, PA systems, personnel pager or the laboratory telephone system. If the operator has to leave the Control Room, he or she shall contact the designated Experimenter and remain in contact during the time he/she is away.

4.3.4 Radios

Walkie-talkie operation is permitted in all ATF areas.

4.3.5 Abbreviations and Acronyms

Standardized abbreviations and acronyms gained through operational training and experience may be utilized during ATF operations.

4.3.6 Oral Instructions and Informational Communications

The Operations Coordinator or on-shift operator decides whether instructions shall be in written form or if oral communications will suffice. Safety related items and special instructions shall be noted in the operations log book. Detailed instructions will be formatted by the Operations Coordinator, dated and signed. There is a formal, written sign-off procedure for certain operations where personnel safety is of concern.

CHAPTER 5: CONTROL OF ON-SHIFT TRAINING

5.1 Introduction

ATF operation by personnel under instruction shall be carefully supervised and controlled so that mistakes in operation are not made by unqualified personnel and so that trainees time on-shift is effectively used. On-shift training shall be conducted so that the trainee successfully completes all of the required training objectives and receives maximum learning benefit from his or her experiences. The guidelines of this chapter relate to control of training activities by ATF operations personnel.

5.2 Discussion

On-shift training is that portion of an operator qualification program where the trainee receives training in the job environment with as much hands-on experience as possible. This period of instruction is normally controlled by the Operations Coordinator because ATF related equipment is involved. Operations administered controls are appropriate for the following aspects of the training activities.

- On-shift training shall adhere to established training programs so that instructional uniformity is maintained.

- On-shift instructors/evaluators shall be qualified for the activities they perform to ensure both correct ATF operation and quality training.

- Trainees shall be supervised by a qualified operator so that unqualified personnel do not make mistakes that could impact ATF safety.

- If trainees are used to support operations, policies shall be developed to direct how they may be used. These policies shall ensure trainee manpower is effectively and appropriately used.

- The Operations Coordinator shall approve the training program so that it will best meet operation's needs.

- On-shift training shall be appropriately documented.

5.3 Guidelines

5.3.1 Adherence to Training Programs

Each new operator is given a training guide, which outlines the training he or she is to receive as a condition of employment. This includes general BNL requirements as well as ATF specific requirements detailed in Sections 4.00 and 4.01 of the "ATF Handbook". There is a series of reference works maintained on the ATF Homepage which provide an introduction to the various parts of the ATF and its controls. Operators attend classes concerning radiation safety, electrical safety, hazard recognition, emergency procedures, interlocks and search and secure procedures, fire extinguisher use and confined spaces as required by the various sections of the BNL SBMS and the "ATF Handbook". In addition, ATF staff members regularly give lectures on accelerator physics, engineering and controls which operators are encouraged to attend. Understanding of the various

topics by new operators is tested by discussion "observation" and "walk-arounds" conducted by ATF management.

5.3.2 On-shift Instructor Qualification

The Operations Coordinator or a trained operator acts as "mentor" to new operators.

5.3.3 Qualified Operator Supervision and Control of Trainees

An operator in training is always supervised by an experienced operator. The Operation's Coordinator or trained operator ensures that operator trainees do not make any changes that would adversely affect the operation of the ATF.

5.3.4 Use of Trainees to Support Operations

The Operation's Coordinator decides when an operator trainee is sufficiently trained to be trusted to do a certain procedure by himself or herself. In case of "search and secure" qualifications, there is a formal approval sheet to ensure that the operator trainee has the necessary experience and training to perform this procedure.

5.3.5 Operator Qualification Program Approval

All operator training programs are approved by the ATF Project Head, supervised by the ATF operation coordinator.

5.3.6 Training Documentation

The Physics Department's Training Coordinator maintains records of what training operators have received and the most recent training date. The Operation's Coordinator maintains records of on-shift training. Results of "check lists" are kept on file. Operator trainees receive the web links to the ATF Handbook, Operational Procedures, and Safety Documentation for all areas of the ATF. All approvals for operation shall be signed by the Operation's Coordinator.

5.3.7 Suspension of Training

Training shall be immediately suspended in the event of an abnormal occurrence.

5.3.8 Retraining

All ATF staff involved in operations shall attend retraining courses as specified in Section 4 of ATF Handbook and the Brookhaven Training Management System (BTMS).

CHAPTER 6: INVESTIGATION OF ABNORMAL EVENTS

6.1 Introduction

A program for the investigation of abnormal events shall ensure that such occurrences are thoroughly investigated to assess the impact of the event, to determine the root cause of the event, and to identify corrective actions to prevent recurrence of the event. The program shall include the investigation of "near miss" situations to reduce the probability of a similar situation recurring as an actual ATF event. Abnormal events are not unique to ATF operations. Also, not all events that affect ATF operation are totally controlled by the ATF operator. Therefore, the guidelines of this chapter may have applicability in areas other than operations. Required notifications associated with abnormal events are addressed in Chapter 7 which covers the important aspects of the abnormal event investigation program. A more complete treatment of these procedures is contained in the SBMS Subject Area, Occurrence Reporting and Processing System (ORPS).

6.2 Discussion

An established and thorough review process shall ensure all significant aspects of an abnormal event are identified, investigated and resolved. In addition, the investigation of near miss situations can identify detrimental conditions that, if left uncorrected, can impact ATF operations.

A comprehensive review program will identify those types of events requiring investigation, list necessary qualifications for those conducting investigations, list the necessary information that must be examined, outline the steps for performing an investigation, and establish the guidelines for assigning and completing corrective action.

It is helpful to define under what circumstances an abnormal event investigation will occur. The criteria shall be available to first line supervisors so that, following an event, the investigation can begin in a timely manner. The list of events or criteria requiring an event investigation shall be based on considerations such as personnel safety, accelerator or experimental beam lines safety, and reliability issues.

The ATF Head shall have overall responsibility for the event investigation process. However, the ATF Head may delegate specific tasks in the investigation process to other personnel as appropriate.

Investigator qualifications shall be established to ensure competency in technical aspects of the ATF operation and investigative techniques. The credibility of the investigation process will depend heavily on the credibility of the event investigators.

The process of performing an abnormal event investigation shall be established to ensure the thoroughness of each investigation and to ensure consistency between investigations. The program shall describe the information collected, investigation techniques utilized and the final reporting format. Two important products of the event investigation are the identification of the root cause and assignment of corrective action to prevent recurrence.

The abnormal event investigation program is needed to thoroughly investigate abnormal

events, verify the proper operation of ATF equipment, identify the root cause of events, ensure all necessary notifications are completed and ensure appropriate corrective action steps are established to minimize the chance of the event recurring. Operators shall recognize this need and their obligation to assist in performing thorough investigations.

6.3 Guidelines

6.3.1 Events Requiring Investigations

Any event which is not part of the normal operation of the ATF is investigated to some level - this may be as simple as making an entry in the Operations Log Book, or as complex as convening a special investigative committee.

6.3.2 Event Categorization

Any abnormal event or "occurrence" may be classified in one of the following categories:

(a) emergency

(b) unusual occurrence

(c) off-normal occurrence

(d) not reportable (recordable only)

The categorization of reportable events shall be determined by the Occurrence Categorizers responsible for categorizing reportable events. Final categorization is made in consultation with the DOE Facility Representative and the DOE-HQ Program Manager. Categorization shall be made within two hours of identification of an occurrence.

6.3.3 Investigation Responsibility

Operational problems are investigated by the on-shift operator; if he or she cannot resolve the problem, a system expert is called in to assist. Actual or potential safety problems, or incidents involving personnel injury are investigated by the Physics Department's ES&H Committee which may delegate the initial investigation to the ATF Head or other appropriate people depending on the nature and severity of the incident or accident. Certain abnormal events will require the preparation of an "Occurrence Report" as described in the SBMS Subject Area, Occurrence Reporting and Processing System (ORPS) which also gives information on notifications (see Chapter 7 Notifications).

6.3.4 Investigator Qualification

The Operation's Coordinator is in charge of operational problem investigation; more serious or repetitive operational incidents will be investigated by the ATF Project Head or his designate. The Physics Department's ES&H Committee requires an investigation of any accident or incident involving safety of personnel and /or equipment even when below the threshold of required reporting under BNL policy or DOE orders.

6.3.5 Information to be Gathered

The person in charge of the investigation determines what information needs to be gathered. The Physics Department's ES&H Committee will indicate what information needs to be gathered for any investigation it requires from ATF Personnel. In the case of emergencies, the ATF Emergency Plan provides guidance in the types of information that should be gathered by the operator.

6.3.6 Event Investigation

The person in charge of the investigation determines how exhaustive the investigation needs to be; most operational problems require little in the way of formal investigation. The Physics Department's ES&H Committee will indicate the detail level of any investigation it requires from ATF Personnel.

6.3.7 Investigative Report

The person in charge of the investigation determines how detailed the report needs to be; most operational problems are documented by entries in the Operations Log Book and Control Room logbook, and by hardcopies sent to system personnel. The Physics Department's ES&H Committee will indicate the detail level of any report it requires from ATF Personnel.

6.3.8 Event Training

The Physics Department's ES&H Coordinator cooperates with ATF Operations personnel in developing and carrying out drills dealing with emergency situations that might reasonably be expected to occur during ATF operation. A post-mortem is conducted by ATF Operations, Safety, Security and Fire Department personnel. Part of a new operators training is learning how to react to abnormal situations.

6.3.9 Event Trending

During the regular evaluation of machine downtime, any repetitive failures or trends towards more frequent failures are noted and plans are formulated to reverse the trend. Unusual occurrences at this and other sites are evaluated by ATF operations and Physics Department ES&H Committee to see if they might warrant inclusion in the drill program.

6.3.10 Sabotage

The Operation's Coordinator reports any suspected sabotage to the Safeguards Security Division. A standard response procedure is followed by Security Personnel.

CHAPTER 7: NOTIFICATIONS

7.1 Introduction

Timely notification of appropriate management personnel, when required, shall be employed to ensure that the Laboratory is responsive to public health and safety concerns. This chapter provides guidelines to ensure uniformity, efficiency and completeness of these notifications. Required notifications for occurrences are given in the SBMS Subject Area, Occurrence Reporting and Processing System (ORPS).

7.2 Discussion

Events that require notification of appropriate management may occur frequently. It is essential that information be gathered and transferred in a systematic, controlled method. Procedures that define responsibilities and provide for adequate documentation are contained in the ORPS Subject Area and shall be used to control the process and ensure that the notification procedure is effective.

7.3 Guidelines

7.3.1 Notification Procedures

The on-shift operator normally decides when to activate a call-in list. ATF policy dictates that the Project Head must be notified when the machine has been down for longer than two hours. The ATF Emergency Plan delineates notification procedures in the event of an emergency. The SBMS ORPS Subject Area describes notification procedures.

7.3.2 Notification Categories

BNL policy requires that any possibly reportable abnormal event or occurrence be categorized within two hours of the incident. The notification requirements depend upon the category and are described below. Initial notification requirements are to be made by the operator or person discovering the event.

(a) Emergency Occurrences
Contact Emergency Services (ext. 2222 or 911) or Department Chair

(b) Unusual or Off-Normal Occurrences
Contact Department Chair or Emergency Services (ext. 2222 or 2238) who will notify the Chair

(c) Nonreportable Occurrences

Nonreportable occurrences that do not involve safety of personnel or equipment shall be noted in the ATF Operations Log Book and included in the information transmitted at "shift turnover". Those nonreportable occurrences that involve safety are covered in section 7.3.5.

7.3.3 Notification Responsibility

The Operation's Coordinator is responsible to ensure that those individuals listed on the appropriate call-in list have indeed been notified and that any time requirements for notification are complied with.

7.3.4 Names and Phone Numbers

Call-in lists are maintained in the operational computer system and in a loose leaf binder in the Control Room. These are broken down by both group and equipment and contain names of primary and alternate personnel, phone numbers and pager numbers (if any).

7.3.5 Notification of Safety Related Items

The on-shift operator is responsible to ensure that any safety related occurrence is reported to the Operations Coordinator, the Physics Department's ES&H Coordinator, the ATF Safety Officer or any of the alternates listed on the safety occurrence call-in list provided in the ATF Control Room. If the occurrence is of a serious nature and may be reportable, it shall be reported to line management who shall notify the Department Chair who will contact the Occurrence Categorizers.

CHAPTER 8: CONTROL OF EQUIPMENT AND SYSTEM STATUS

8.1 Introduction

Good operating discipline shall ensure that ATF equipment configuration is maintained in accordance with design requirements and that the on-shift operator knows the status of all systems. Specific applications of equipment control are addressed in Chapter 9, Lock-out/Tagging, Chapter 11, Logkeeping and Chapter 13, Operations Orders.

8.2 Discussion

It is imperative that equipment and systems in the ATF be properly controlled. Not only must an operator be aware of how equipment and systems will function for operational purposes, but must also comply with the technical specifications as established by the ATF's Safety Analysis Document (SAD), Accelerator Safety Envelop (ASE), and the Standard Operating Procedures (SOP).

Administrative control programs shall be established to handle configuration changes resulting from maintenance, modifications and testing activities. The programs shall be administered by or through the Operation's Coordinator. Typically, changes in equipment and system configuration are communicated from shift-to-shift through the ATF Operations Log Book. Turnover, checklists and equipment status boards are often used as aids for compiling and transmitting status information efficiently and accurately.

Control over equipment and systems status shall be established with formal guidance to ensure proper equipment configuration is maintained. This guidance shall include instructions for system alignments, locking of components, verification of technical specification compliance prior to ATF operating mode changes, authorization prior to removing or restoring equipment to service and identification and documentation of equipment deficiencies.

8.3 Guidelines

8.3.1 Status Change Authorization and Reporting

System groups are required to notify the Control Room prior to making any modifications that would alter the operating configuration of the ATF. The computer alarms and limit indicators notify the operating area of changes in the status of any of the accelerator components during normal running. Changes in the operating mode of the ATF are communicated during the ATF weekly meeting or ATF Operations Log Book written report.

8.3.2 Equipment and System Alignments

Computer "restore" files are used to place the ATF in a baseline configuration for startup. "Saves" of operating conditions can be made at any time, as can full or selective "Restores".

8.3.3 Equipment Locking

A system of Control Room controlled locks exists to lock out equipment deemed to present a hazard during open accesses to the accelerator and beam line enclosures. Lock-out/Tagging

procedures for other devices are specified in the BNL BTMS Subject Areas and in the Physics Department Policy.

8.3.4 Technical Specification Compliance

Operating limitations are noted in the Control Room Logbook and are pointed out during shift-change briefings. Some limitations are enforced by the controls system (e.g. control software will not allow a too-large value to be sent to the equipment and an error message appears on the console). Some equipment protection is "hard-wired" into the system.

8.3.5 Equipment Deficiency Identification and Documentation

Malfunctioning equipment is noted in the ATF Operations Log Book in the Control Room and is reported to systems groups for repair by the appropriate specialist. Instances of machine downtime are recorded in the ATF Operations Log Book and reported to management weekly by the Operation's Coordinator when the machine is operating. This is reviewed at the weekly ATF management meeting.

8.3.6 Maintenance Work Authorization and Documentation

Proposed work on the ATF equipment is approved by the Operation's Coordinator before work is allowed to proceed. Authorization for maintenance work is given either through a general or job specific work permit as required by the Subject Area, "Work Planning and Control for Experiments and Operations"

8.3.7 Equipment Post Maintenance Testing and Return to Service

All ATF personnel will comply with the requirements of the Subject Area concerning "Work Planning and Control for Experiments and Operations", "Electrical Safety", and "Lockout/Tagout". These prescribe the requirements for post maintenance testing and return to service for devices. These issues will be addressed as part of the Work Permit when deemed necessary. During machine startup after an extended down period, or when major modifications have been made to a portion of the ATF equipment, tests are performed on all major accelerator and experimental beam line components to ensure that they function correctly.

8.3.8 Alarm Status

Alarm screens are an integral part of each console in the Control Room; operator awareness of alarm conditions is enhanced by the use of color coding and by audio announcements.

8.3.9 Temporary Modification Control

Temporary modifications are noted in the log book; in addition, modifications to safety and other systems that may produce additional hazards or change the level of hazard are more formally documented and are approved by the Physics Department's ES&H Committee, the Experimental Safety Review Coordinator, or ES&H Coordinator depending on the nature of the modification.

CHAPTER 9: LOCK-OUT/TAGGING

9.1 LOCKOUT/TAGOUT

A lock-out/tagout program shall provide protection for personnel and ATF components and systems during operation, maintenance and modification activities. In addition, provisions within this program shall provide for independent verification of the removal from service of safety related and other important ATF equipment. Other aspects of equipment control are addressed in Chapter 8, Control of Equipment and System Status and Chapter 10, Independent Verification.

9.2 Discussion

Lock-outs/tagouts are used to control equipment removal from service and return to service. They also protect workers and equipment during maintenance activities. Errors in the lock-out/tagout process shall be prevented to ensure a high degree of personnel and equipment safety. In addition, the program shall be correctly administered so that the status and integrity of important ATF components and systems are maintained. An effective lock-out/tagout program shall include detailed administrative procedures, uniquely identifiable tags, and appropriate control over tag preparation, approval, placement and removal; and shall provide for adequate documentation. In addition to red danger (clearance, safety, out-of-service) tags that prohibit component operation, yellow caution tags that alert operators to particular situations affecting certain components shall be provided.

9.3 Guidelines

9.3.1 Lock-Out/Tagout Procedures

Lock-out/tagout procedures are delineated in BNL BTMS Subject Areas and in the Physics Department Policy.

.

9.3.2 Lock-Out/Tag-Out Locks and Tags

The ATF Control Room provides standard locks and tags.

9.3.3 Lock-Out/Tagout Approval

All work performed on ATF components is approved by the Operation's Coordinator.

9.3.4 Lock-Out/Tagging Records

The ATF LO/TO logbook is kept in the Control so that the operator knows of the work in progress.

9.3.5 Return to Service Operational Checks

The work plan will specify operational checks to be made when any of the locked out or tagged out equipment is returned to service beyond the normal checks performed by the person doing the work. Checks on other equipment may be made at the discretion of the person doing the work or the Operation's Coordinator.

9.3.6 Lock-Out/Tagout Audits

Equipment necessary for the operation of the ATF must be returned to service prior to the end of a scheduled maintenance period. Other equipment may be out of service longer. Regular audits of these shall be carried out as required by the BNL ES&H Standard 1.5.1. A logbook of active tags shall be kept in the ATF Control Room.

9.3.7 Caution Tags

The yellow caution tag is only to be used when protecting equipment which, if activated, could result only in equipment damage and would present no danger to personnel. Yellow caution tags may never be used with lock-out. Yellow tags are available from the ATF Safety Officer.

9.3.8 Training

Only persons who have been trained in lock-out/tag-out procedures are carried as "authorized employees" in the Physics Department's listing. They are intimately familiar with the equipment by virtue of their position or have received documented "hands on experience" in safety related technical aspects of the equipment, and therefore may use these procedures (see ES&H standard 1.5.1, Part III for details of employee qualification requirements).

CHAPTER 10: INDEPENDENT VERIFICATION

10.1 Introduction

An independent verification program shall provide a high degree of reliability in ensuring the correct position of components such as valves, switches, shutters and circuit breakers. This chapter describes the important aspects of an independent verification program. Other equipment status control programs are addressed in Chapter 8, Control of Equipment and System Status and some applications of independent verification are addressed in Chapter 9, Lock-Out/Tag-Out. Additionally, appropriate investigations for component mispositioning events are discussed in Chapter 6, Investigation of Abnormal Events.

10.2 Discussion

Independent verification is the act of checking a component position independently of activities related to establishing the components position. A comprehensive independent verification program will identify components to be included in the program, define when independent verification is required and prescribe the methods of performing independent verification.

Not all components require independent verification, because the feasibility of mispositioning may be quite remote, or because the effect of mispositioning may not be significant to safe and reliable operation. Therefore, it is important to identify those components that must be independently verified. Designing systems or components that require independent verification ensures consistent application of the program.

Definition of when independent verification is required will also help ensure consistent application of the program. The criteria shall ensure that the independent verification is performed in all cases where a reasonable potential exists for component mispositioning.

Industry events have occurred where mispositioned components have gone undetected because of inadequate verification techniques. Developing methods for performing independent verification on the different types of components ensures that all personnel performing the verifications can be trained to perform them in the same manner.

Independent verification recognizes the human element of component operation; that is, any operator, no matter how proficient, can make a mistake. This concept should be stressed in an independent verification program so that operators' confidence in the ability of their peers will not cause a relaxation of attentiveness to the verification tasks. Operators should understand the importance of the independent verification program and address this task with a high level of personal integrity and discipline.

10.3 Guidelines

10.3.1 Components Requiring Independent Verification

Virtually all of the adjustable ATF devices are independently verified through the controls system (see 10.3.3 below). All adjustable components of the ATF safety system are verified through both hardware and software. Systems that present significant personnel hazards (flammable gas,

systems with significant stored energy, shielding, etc.) are reviewed by the Physics Department's Environmental Safety and Health Committee prior to installation and are inspected and authorized for operation by the ATF Safety Officer or Physics Department's ES&H Coordinator as specified by the ES&H Committee or the Work Control Permit after any modifications or an extended ATF shutdown.

10.3.2 Occasions Requiring Independent Verification

Systems verified through the controls system and the ATF safety system is verified continuously during operation. As noted above, certain systems are independently verified just prior to machine start-up after an extended maintenance period.

10.3.3 Verification Techniques

The adjustable ATF devices are continuously verified by means of the application program software and the previously cited "alarms and limits" software.

Positions of valves and movable components such as collimators and beam stops have microswitches to verify their "in" or "out" status.

Modulator power supplies have mechanical and electrical grounding devices to enforce proper grounding before entry into the high voltage compartment and also have microswitches on all doors or externally removable panels.

All personnel safety system devices have redundant "hardwire" and logic loops to verify that they are in the proper state. A "search and secure" procedure (as well as the presence of all access keys in the capture tree, where applicable) verifies that all personnel are out of "secured" areas prior to machine start up; the correct search procedure is enforced by the logic loop which will not allow the safety system to be reset if an incorrect procedure is used. Access door positions are monitored by redundant microswitches.

Access keys are stored in "capture key trees" at the Control Room and, possibly, some remote access points. Removal of a key will automatically turn off the systems under control.

In some instances personnel from other than the operations group will monitor the functioning of equipment in their systems. This shall be done in consultation with the on-shift operator.

CHAPTER 11: LOGKEEPING

11.1 Introduction

The ATF Operations Log Book shall contain a narrative log of the ATF's status and of all events as required to provide an accurate history of operations, including machine studies. As used in this context, operational logs are defined as a narrative sequence of events or functions performed at a specific shift position. The Security Key Log Book shall contain entries for each time a key is removed and returned to either Controlled Key Box. This chapter describes the features needed in the operation logs and Security Key Logs to ensure they are properly maintained.

11.2 Discussion

Operating logs shall be established for key shift positions in order to fully record the data necessary to provide an accurate history of ATF operation. Events should be recorded in a timely fashion in order to ensure the accuracy of the entry. The scope, type, and format for all log entries shall be determined so that the necessary data required by ATF management is properly entered into the logs. This includes documentation of actions taken, activities completed, transfer of information among operators, and data necessary for event reconstruction.

Security Key Logs shall be established for maintaining control over the security keys located in the Controlled Key Boxes. Removal and return of keys shall be immediately recorded so that operators are fully cognizant of the state of readiness of equipment, security interlocks, etc.

A review schedule for the logs shall be established to ensure they are adequately maintained and that operations personnel are aware of the information contained in the logs. Administrative controls shall be established that ensure all the logs are readily available for a sufficient period of time to allow for the transfer of information among the operators.

11.3 Guidelines

11.3.1 Establishment of Logs

The ATF Operations Log Book is kept in the ATF Control Room. Although all operators may make entries in the log, it is the Operation Coordinator's responsibility to ensure that the logbook is maintained as specified by ATF management policy. Operational checklists are also maintained and monitored in a similar fashion as the logbook.

The Security Key Log Book is kept in the ATF Control Room. All those who remove keys from the Controlled Key Boxes shall record the removal and return of each key. It is the Operation's Coordinator's responsibility to ensure that the logbook is maintained as specified by ATF management policy.

11.3.2 Timeliness of Recordings

Information shall be promptly recorded in the logbooks.

11.3.3 Information to be Recorded

All information pertaining to the safe and efficient operation of the accelerator and experimental beam lines, special instructions, call-ins, unusual incidents and an end-of-shift summary are written in the Operations Logbook. This shall include system status as dealt with in Chapter 8. Date and time of removal and return of keys, the name of the person taking the keys and the reason for use shall be recorded in the Security Key Logbook.

11.3.4 Legibility

ATF policy specifies that log entries are to be legible and made with a pen in a color that can be photocopied.

11.3.5 Corrections

ATF policy specifies that incorrect entries are not to be obscured.

11.3.6 Log Review

The logbooks are reviewed by the ATF Project Head or other person designated by him. At the commencement of any given operational period the assigned operator shall read the logbooks prior to commencing operations.

11.3.7 Care and Keeping of Logs

The logs are permanently filed by the Operation's Coordinator.

CHAPTER 12: REQUIRED READING

12.1 Introduction

Proper use of a required reading file by ATF operations personnel shall ensure that they are made aware of important information that is related to their job assignment. This chapter describes an effective required reading program.

12.2 Discussion

It is usually not necessary for a document to be read by all Control Room personnel. However, it is essential that a method be provided to ensure that each individual receives the information important to his or her position. The method shall designate which documents shall be read by whom and by when. Personnel shall be required to understand assigned material. When written material is not understood, appropriate questions shall be directed to a supervisor.

12.3 Guidelines

12.3.1 Reading File Index

Operations personnel and various ATF systems personnel generate equipment operation guides which specifically apply to machine operating procedures.

12.3.2 Reading Assignments

All operators are made aware of the equipment guides which are included in the ATF web pages on the internet from the Operations Coordinator. They shall read them and understand them. Any questions shall be addressed to the Operation's Coordinator.

12.3.3 Required Duties for Completion of Reading

Operators are expected to read these Equipment Operations Guides and the other sections of the ATF Handbook as specified in the training procedures at the first available opportunity.

12.3.4 Documentation

Titles, document numbers, authors, etc., are stored on the internet in the ATF web pages. Operators can use the ATF web pages to find information on a particular subject.

12.3.5 Review

A list of documents and the latest revision date is included in the document file index and is updated whenever a control document is updated.

CHAPTER 13: OPERATIONS ORDERS

13.1 Introduction

The operations orders program shall provide a means for ATF management to communicate short-term information and administrative instructions to operations personnel. Other means of disseminating guidance to operators are addressed in Chapter 14, Operations Procedures and Chapter 15, Operator Aid Postings. This chapter describes the key features of an effective operations orders program.

13.2 Discussion

The constantly changing requirements of ATF operations necessitates that a formal program be implemented to disseminate information to operations personnel in a timely manner. Due to operations schedules, providing information to the operators becomes difficult and, therefore, deserves special attention. To ensure this information remains current, periodic reviews to remove outdated information shall be included in the program.

13.3 Guidelines

13.3.1 Context and Format

Any special information required on a particular shift is written in the logbook by the Operation's Coordinator and verbally emphasized during the briefing. Operating changes that are intended to become permanent may be implemented in this manner temporarily, but as soon as time permits, the changes are implemented in the applications program software.

13.3.2 Issuing, Segregating and Reviewing Orders

Orders are generally placed in the logbook by the Operation's Coordinator; occasionally special instructions or requests for operator action are entered by systems personnel, however, these have the prior approval of the Operation's Coordinator.

13.3.3 Removal of Orders

Orders in the logbook are normally meant to be valid for not more than 24 hours; orders intended to be in effect for longer than this are issued as Equipment Operations Guides (see Chapter 14).

CHAPTER 14: EQUIPMENT OPERATIONS GUIDES

14.1 Introduction

Equipment Operations Guides are written to provide specific direction for operating systems and equipment during normal and postulated abnormal and emergency conditions.

Operation procedures shall provide appropriate direction to ensure the ATF is operated within its design bases and shall be effectively used to support safe operation of the ATF. Other methods of disseminating operational information are addressed in Chapter 13, Operations orders and Chapter 15, Operator Aid Postings. This chapter describes the important aspects of operations procedure development and use.

14.2 Discussion

Studies have shown that procedures are a key factor affecting operator performance. The probability of operator error increases greatly with the use of poorly written procedures. In addition, deficient procedures and failure to follow procedure are major contributors to many significant operational events. Appropriate attention shall be given to writing, reviewing and monitoring operations guides to ensure the content is technically correct and the wording and format are clear and concise. Although a complete description of a system or process is not needed, operations guides shall be sufficiently detailed to perform the required functions without direct supervision. Consistency in procedure format, context and wording is essential to achieving uniformly high standard of operator performance. Operators shall not be expected to compensate for shortcomings in procedures such as poor format or confusing, inaccurate, or incomplete information. Instead, procedures shall be written so that they can be easily used without making mistakes.

During the course of ATF operations, technical and operational requirements change, and better ways of doing things develop. To ensure that procedures in use provide the best possible instructions for the activities involved, periodic review and feedback of information are essential.

The Laboratory policy on procedure use shall be clearly understood by all operators. Properly controlled and readily available procedures promote their use and ensure operational activities will be conducted in the manner intended.

14.3 Guidelines

14.3.1 Equipment Operations Guide Procedure Development

Most ATF operating procedures are enforced by the software applications programs. Needed applications are either developed by the operations group or a request is generated by the Operation's Coordinator to the development personnel for the required software. Safety and emergency procedures are developed by ATF, Physics Department and BNL safety personnel.

A file of written equipment operations guides for each area of the ATF is kept on the ATF website; these are generally not step-by-step procedures, but are reference documents used by the operators when operating conditions are being changed.

14.3.2 Equipment Operations Guide Content

Appearance and general content of applications programs are the responsibility of ATF Management and the overseeing committees.

14.3.3 Equipment Operations Guide Procedure Changes and Revisions

Changes to system software are automatically documented when the program is loaded into the operating computers. A new revision number is assigned and a new index with data changes issued.

Safety and emergency procedures are periodically reviewed (at least annually) to determine if changes are required; changes are brought to the attention of those affected and may require additional training or acknowledgement.

14.3.4 Equipment Operations Guide Procedure Approval

Proposed software changes are submitted to the Operation's Coordinator for approval before they are implemented. Changes to safety and/or emergency procedures must be approved by the head of the ATF, Physics Department's ES&H Committee, and BNL Safety Organizations as necessary.

14.3.5 Equipment Operations Guide Procedure Review

Safety procedures are periodically reviewed by the head of the ATF and the Physics Department's ES&H Committee. Since other ATF operations are more generic, they do not undergo a formal periodic review; however, these procedures are informally reviewed each time they are used. Any difficulties with applying the procedure, or incorrect results obtained through its use are noted by the operator and repeated to the Operation's Coordinator who may direct are-write of the procedure if necessary.

14.3.6 Equipment Operations Guide Procedure Availability

Applications programs for all areas of the ATF are available at the operators console and at other conveniently located computer terminals throughout the facility. Written procedures are maintained on the ATF website as is the ATF Emergency Plan.

14.3.7 Equipment Operations Guide Procedure Use

All of the operations of the ATF are done via the computer console applications pages - there is no option to quickly or easily modify the procedure contained in the software. Where many applications pages need to be accessed to perform a procedure, sequence programs may control the calling up of individual applications, thus minimizing the possibility of human error.

Operators are required to understand all ATF emergency procedures, so that correct responses can be undertaken immediately.

CHAPTER 15: OPERATOR AID POSTING

15.1 Introduction

ATF operator aids (information posted for personnel use) shall provide information useful to operators in performing their duties. An operator aid program shall be established that ensures that operator aids posted are current, correct and useful. This chapter describes the important aspects of an operator aid program.

15.2 Discussion

Operator aids provide an important function in the safe operation of the ATF. They may come in many forms: copies of procedures (portion or pages of), system drawings, handwritten notes, information tags, curves and graphs. It is important to make sure that these types of postings reflect the most current information available and that they do not supersede or conflict with any other controlled procedures or information.

15.3 Guidelines

15.3.1 Operator Aid Development

There may be on-line "help" programs for some applications pages; these are the product of operators and system staff personnel. Hardware and software documentation memos are written for new and modified equipment and programs. These are distributed to all operators. Dedicated graphics displays may be placed on screens in the Control Room.

15.3.2 Approval

The Operations Coordinator reviews and approves "operator aids" for use in operations. They may be signed by the Operations Coordinator or the ATF Head.

15.3.3 Posting

Help pages and graphics displays are a part of each operating console.

15.3.4 Use of Operator Aids

Help pages are only used for informational purposes, their use is not required.

15.3.5 Documentation

Help pages are an integral part of all applications pages and so are listed on the operating consoles.

15.3.6 Review

Incorrect information or help pages is noted in the normal course of operations and is corrected on the spot.

CHAPTER 16: EQUIPMENT LABELING

16.1 Introduction

A well-established and maintained equipment labeling program shall help ensure ATF personnel are able to positively identify equipment they operate. This chapter describes the important aspects of the ATF labeling program.

16.2 Discussion

Improper or inadequate component labeling has caused or been a contributor to many safety problems. A good labeling program, understood and maintained by ATF personnel, will enhance training effectiveness and will help reduce operator and maintenance errors resulting from incorrect identification of ATF equipment.

The accelerator labeling program shall continue throughout the life of the ATF. Because equipment labels will be continually misplaced or damaged, an ongoing labeling program shall exist that allows for ATF personnel to identify components needing labels, identifies a person or persons responsible for making new labels, and ensures the new labels are correct and placed on the proper equipment. In addition to equipment, doors to rooms shall be labeled so that personnel can identify the room and, if applicable, the equipment inside.

16.3 Guidelines

16.3.1 Components Requiring Labeling

All equipment built by the ATF systems personnel is labeled according to existing laboratory conventions. Commercially built equipment is labeled by the manufacturer. Emergency locations (fire extinguishers, fire alarms, halon pull boxes, etc.) are labeled in a standard industrial format. Circuit breaker panels are labeled so as to designate which circuit they are fed from, and what devices they feed. All adjustable ATF components are identified by a unique mnemonic in the central system database. Devices on the electrical lock-out list have labels both on the supply and on the power disconnect switch. All cables, wires and cable trays are labeled and their function recorded in a cable directory.

16.3.2 Label Information

Labels shall follow established Laboratory naming conventions.

16.3.3 Label Placement

Labels are placed on the equipment to which they apply if feasible; otherwise they are placed as close to the equipment as possible.

16.3.4 Replacing Labels

Operators note and report missing labels during routine activities. The fact that each device is uniquely identified and controlled through the computer system lessens the reliance on physical identification labels.

APPENDIX I

Standards and References for ATF Conduct of Operations Guide

I.A Brookhaven National Laboratory Standard Based Management System's Subject Areas, Environmental Safety and Health Standards, and RadCon Manual

I.B ATF Handbook I

I.C Physics Department's Policies and Procedures

APPENDIX II

Definitions

Accelerator Operator	The Accelerator Operator, typically an ATF staff member responsible for the design and/or construction of the ATF, has overall responsibility for machine operation. He/she is responsible for carrying out all operations procedures and check lists (though trained laser operators may also conduct laser procedures). The Accelerator Operator has singular responsibility for control of the master key at all times and maintains operations and key logbooks.
Duty Operator	The Duty Operator is generally an experimenter familiar with the experiment currently under study and trained in the safe operation of the experiment and in Experimental Area Radiation and Laser Security Checks. This person may adjust beam energy, intensity, and profile using the ATF computer system either in the Control Room or in a remote location such as the FEL Room. He/she may work on experimental equipment on which he/she is trained and knowledgeable. A Duty Operator may not work on accelerator equipment such as the modulators, klystrons, magnet power supplies, etc. Only persons trained on that equipment may work on it. However, Duty Operators may turn off such equipment at the end of an Experimental shift or an emergency and are trained for this eventuality.
Operations Coordinator	An individual appointed by the ATF Head who is in charge of all ATF operations. The Operations Coordinator for the ATF has overall responsibility for the machine studies program that determines the operating parameters for the accelerator. This person also acts as liaison with the Lead Experimenters on machine related issues and has responsibility for on-the-job training of all operating personnel designated in the following Sections. The Operations Coordinator is responsible for maintaining an operations log book and for maintaining current data files for operational use.
Operating or Running Mode	A mode of operation where the Linac is energized (RF), the main (beamline) shutter is open or closed and the YAG laser shutter is open (photoelectrons are generated).
Stand-By Mode	A mode of operation where the Linac is energized (RF) but the main (beamline) shutter is closed and the YAG laser shutter is closed (no electrons, but there may be a small amount of dark current present).