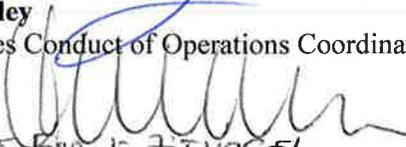
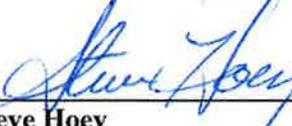
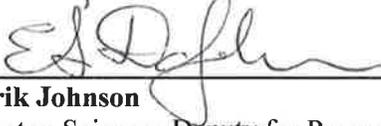
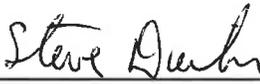


## NSLS-II Conduct of Operations Manual

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## INTRODUCTION

**DOE Order 422.1** To improve the quality and uniformity of operations at Department of Energy (DOE) facilities, the DOE issued Order 422.1, “Conduct of Operations Requirements at DOE Facilities.” This order recognizes that the success of a facility’s mission critically depends on a high level of performance by its personnel and equipment. This performance can be severely impaired if the facility’s Conduct of Operations pays inadequate attention to issues of organization, safety, health, and the environment. These guidelines are acknowledgment by Brookhaven National Laboratory (BNL) and the Photon Sciences (PS) Directorate of the principles of Conduct of Operations and the response to DOE Order 422.1.

Because of the great diversity of the facilities operated by DOE and its contractors, Order 422.1 calls for “A graded approach... to assure that the depth of detail required and the magnitude of resources expended for operations are commensurate with each facility’s programmatic importance and potential environmental, safety and health impact.” Further, “The guidelines are written to be flexible, so that they encompass the range from large, permanent DOE test or production facilities to small research or testing facilities...” and “It is expected that facilities may use different approaches or methods than those defined in the guidelines, but facilities are expected to meet the intent of these guidelines.” DOE O 422.1 does not directly address technical aspects of equipment operation as these are “...facility specific, requiring unique direction.” In applying DOE Order 422.1 to the National Synchrotron Light Source II (NSLS-II), this facility has used the graded approach to comply with the general nature of the Order’s requirements.

This manual addresses all eighteen elements of the DOE Order and its implementation for the NSLS-II linear accelerator (LINAC) in Building 740. This manual is applicable to the commissioning phase of the NSLS-II LINAC. A BNL vendor will work collectively with Photon Sciences staff to complete this task as well as to develop additional operating procedures, where necessary. This document will be expanded as other major systems are ready for commissioning (i.e., booster, storage ring, and routine operations including beamlines) with a final comprehensive Conduct of Operations plan in place for the start of operations.

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ALARA	As Low As Reasonably Achievable
ALD	Associate Laboratory Director
ATS	Assessment Tracking System
BNL	Brookhaven National Laboratory
BTMS	Brookhaven Training Management System
CASE	Commissioning Accelerator Safety Envelope
CBT	Computer Based Training
CRIC	Control Room IN-Charge
CSAD	Commissioning Safety Assessment Document
DOE	Department of Energy
ESH	Environment, Safety, and Health
HAZCOM	Hazard Communication
IRR	Instrument Readiness Review
IWG	Interlock Working Group

LINAC	Linear Accelerator
LOTO	Lockout/Tagout
NEPA	National Environmental Protection Act
NSLS-II	National Synchrotron Light Source II
OJT	On-The-Job Training
ORPS	Occurrence Reporting and Processing Sys.
OSL	Operational Safety Limits
PA	Public Address
PRM	Policies and Requirements Manual
PS	Photon Sciences
QA	Quality Assurance
QMO	Quality Management Office
SBMS	Standards Based Management System
TAR	Tone Alert Radio

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## **CHAPTER I - ORGANIZATION AND ADMINISTRATION**

### **A. INTRODUCTION**

The organization and administration of the operation of the NSLS-II accelerators is intended to achieve a high level of safety and performance that is accomplished through effective implementation and control of operational activities. Operational policies and procedures recognize that protecting the environment, assuring safety, and efficient operations are compatible goals. Such policies and procedures reflect the standards of excellence used in operating this facility. These policies set up the lines of responsibility for normal and emergency operations, and provide a method to monitor and assess performance. This chapter discusses the policies, resources, and assessment needed in operations.

### **B. DISCUSSION**

The Photon Sciences directorate achieves a high level of excellence by having the accelerator operations management establish high levels of performance for the NSLS-II facility. Management communicates these standards to the Photon Sciences staff. Personnel are well trained and their performance is monitored. The Accelerator Operations Group Leader, establishes standards, goals, communicates to the operations staff and determines the responsibilities of the operational staff. The operations staff provides input and feedback to standards and training. Management uses reports and goals to measure performance. Personnel are held accountable for their performance through supervisory counseling, performance appraisals, and when necessary, administrative action. Remedial training is provided, if appropriate.

### **C. PRACTICE**

#### **1. Operational Policies**

The Photon Sciences ESH Policies and Requirements Manual (PRM), the NSLS-II Facility Manuals (operating, response, and emergency procedures located in the NSLS-II control room and the online Photon Sciences Document Center), and the Photon Sciences Quality Assurance (QA) procedures provide the ESH, operations, and QA procedures for the accelerators. The Photon Sciences organization chart denotes the directorate structure. Each person involved in the operation is listed and to whom that person is primarily responsible, along with alternative supervision. The PS organization chart reflects the support for accelerator operations. The Associate Laboratory Director (ALD) for Photon Sciences periodically reviews the organization chart to insure its accuracy. The Photon Sciences ESH PRM includes responsibilities for staff, visitors, users, students and non-BNL personnel.

There are written accelerator operational procedures for all activities that could adversely impact the environment, safety, health, operations, or quality. The accelerator operations procedures and policies are in accordance with the BNL Standards Based Management System (SBMS) and the NSLS-II Commissioning Accelerator Safety Envelope (CASE). Formal training is provided for critical or complex procedures. General operations training is provided through Required Reading and on-the-job training (OJT). On the job Accelerator Operator training is supervised by experienced personnel selected by Photon Sciences management and staff supervisors.

The NSLS-II fault tracking system accounts for all accelerator downtime. The engineering and technical staff reviews these reports periodically. The Accelerator Operations Group Leader reviews daily

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performance of the accelerators. Computer history programs allow responsible individuals to review accelerator operational parameters in detail and allow diagnosis of problems.

## **2. Resources**

The ALD for Photon Sciences, the Deputy for Programs and the Accelerator Division Director assure that there are sufficient resources for safe and efficient operation of the facility. Photon Sciences management evaluates long-range staffing needs and develops plans to implement them. These plans are consistent with the allotted funding and NSLS-II's mission.

NSLS-II Accelerator Operators operate on a shift basis with minimal overtime. PS technical staff has been assigned with equipment responsibilities and are called in to repair, test or service equipment as needed. The ESH group is available to carry out responsibilities within its area to help with the safe operation of the facility.

## **3. Monitoring of Operating Performance**

All operating problems or conditions are recorded in the Accelerator Operator Log. Machine faults are recorded and reported in writing to the responsible engineer or technician daily via a fault report. Accelerator Operators monitor the NSLS-II accelerator areas routinely. Accelerator engineers and Photon Sciences Management and the LINAC vendor continuously monitor accelerator performance trends. Photon Sciences has an "As Low As Reasonably Achievable" (ALARA) program and a routine radiation monitoring system in place. Environmental, safety and health inspections are carried out routinely and reports are sent to applicable management. Personnel protection interlocks must be tested and maintained in accordance with the requirements specified in the BNL Standards Based Management System and Radiological Control Manual.

Self-assessments are conducted in accordance with the Photon Sciences self-assessment plan or when deemed necessary by the Photon Sciences ESH manager, Photon Sciences QA Manager, or other Photon Sciences management. Such assessments may address Environment, Safety, Quality or Operations. Self-assessment reports are developed and distributed to appropriate Photon Sciences and BNL management.

## **4. Accountability**

All Photon Science staff have individual Roles, Responsibilities, Accountabilities, and Authorities (R2A2) descriptions, which are maintained in the Human Resources employee performance data system. Photon Sciences management performs evaluations of all personnel to determine their level of performance. Retraining or administrative action is considered for personnel involved in significant or frequent violations of Photon Sciences policies and/or procedures.

## **5. Management Training**

The "Photon Sciences Training Program" and the BNL "Training and Qualifications" subject area address the training requirements for management, staff, users and any other individual working in, or entering, the NSLS-II facility. Photon Sciences management and supervisors, in conjunction with the Photon Sciences Training Coordinator, assign Job Training Assessments (JTAs) to determine which BNL- and Photon Sciences-specific training must be given to support operational activities. Photon Sciences management and supervisors will attend BNL required training and any training deemed necessary by the Photon Sciences ALD.

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## 6. Planning for Safety

All operational activities are carried out under the constraints of the NSLS-II Commissioning Accelerator Safety Envelope (CASE) and according to the NSLS-II Commissioning Safety Assessment Document (CSAD). Policies and procedures in the Photon Sciences ESH PRM and NSLS-II Facility manuals were developed to meet these constraints and are expected to be understood by all engaged personnel. The policies and procedures within the Photon Sciences ESH PRM address directorate specific requirements within the BNL SBMS.

Work performed in the facility is subject to the BNL Work Planning requirements and are administered by PS Work Control Coordinators.

BNL Operations Security and Cyber Security subject areas are followed to assure computer and operations integrity. PS staff receives training in these areas of security which provides an understanding of the requirements and responsibilities of the workers.

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## **CHAPTER II - SHIFT ROUTINES and OPERATING PRACTICES**

### **A. INTRODUCTION**

This chapter describes some important aspects of routine operations and practices. Chapters III, “Control Area Activities,” and Chapter IV, “Communications,” contain related guidelines.

### **B. DISCUSSION**

Effective monitoring of equipment is necessary to detect abnormal conditions or adverse trends. Monitoring allows actions to be taken before the equipment malfunctions. Notifying the Accelerator Operations Group Leader or designee promptly of unusual or unexpected situations will help to assure that attention is given to any problems. The Commissioning Coordinator is responsible for commissioning the accelerator. The Accelerator Operations Group Leader is responsible for accelerator operations. Both individuals formally transfer authority to commission and operate to the Control Room Supervisor. The Commissioning Coordinator or the Accelerator Operations Group Leader shall fulfill the role of Control Room Supervisor in his/her absence. The Commissioning Coordinator and Accelerator Operations Group Leader decide on the response to abnormal conditions and reviews and approve any special tests. Photon Sciences personnel must follow the proper practices for industrial safety, radiological protection, environmental, health and quality assurance.

During the LINAC commissioning phase, two control rooms will be utilized to operate and monitor the LINAC. These two control rooms are the “Injector Control Room” located in Bldg. 740 in the Injection Building and the “Main Control Room” located in Bldg. 725, NSLS.

### **C. PRACTICE**

#### **1. Status Reports**

Accelerator Operators must monitor the various instruments that provide the operational status of the NSLS-II facility. Instructions for reporting abnormal events are provided in PS procedure “Reporting of Events.”

The Control Room Supervisor prepares progress reports on commissioning progress for management review.

#### **2. Safety Practices**

The Accelerator Operator must assure that the Control System is functioning for radiation area monitoring while the Accelerators are operating.

One Accelerator Operator shall be on duty along with a “Knowledgeable Person.” The Accelerator Operator shall follow operations and ESH procedures, Operational Safety Limits, the PS ESH Policies and Requirements Manual (PRM), the NSLS-II Commissioning Accelerator Safety Envelope (CASE), PS QA Manual, the BNL SBMS, and NSLS-II accelerator operations procedures. The Knowledgeable Person needs to have a minimum knowledge of monitoring control room alarms and the means of contacting the operator. The Knowledgeable Person shall be familiar with emergency and operating procedures to the level that they can respond to an emergency (fire, flood, spill, etc.) and monitor machine alarms

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(radiation, machine, etc.). The Knowledgeable Person shall monitor the control room in the operator's absence and shall be in communication with the operator during this period. The Commissioning Coordinator, Accelerator Operations Group Leader, or Control Room Supervisor will determine Knowledgeable Person status. These individuals shall not monitor the control room for an extended period of time, as it is the Accelerator Operator's responsibility to monitor the control room and the potential for confusion must be kept to a minimum.

### **3. Inspection Tours**

Accelerator Operators or Knowledgeable Persons carry out tours of the accelerator areas during the course of their shift. Equipment walk downs of the accelerator areas will occur during start-up of the accelerator after long-period shut downs.

### **4. Personnel Protection**

The Commissioning Coordinator and Accelerator Operations Group Leader in conjunction with the ESH Manager review operational practices to maintain personnel exposures to hazards As Low As Reasonably Achievable. The Radiation Safety section of the Photon Sciences ESH PRM contains numerous policies and procedures that are specific to NLSL-II and address the BNL ALARA Program. Areas addressed in this section include Collective Dose Goals, Administrative Control Levels and Safety System Work Permits. The ESH Coordinator monitors the dosimeter reports on a monthly basis and, if the need arises, disseminates descriptions of any discrepancies to the worker and his/her supervisor.

The PS Work Planning and Control process applies to all physical work performed within NLSL-II. The process uses a graded approach to identify hazards, risks, and complexity levels and is used to establish the level of rigor for planning and review. This process requires use of a work permit form for all moderate and high hazard work that is not already covered in Standard Operating Procedures. A Radiation Work Permit (RWP) will be utilized for work planned in radiation areas. In addition, the Photon Sciences ESH PRM addresses ESH Policy and Organization, Responsibility and Authority, General Safety, Industrial Hygiene, Fire Safety, Cryogenic Safety, Environmental Management, Hazardous Waste Management, Training and the Local Emergency Plan.

The Commissioning Coordinator, Accelerator Operations Group Leader and Control Room Supervisor in conjunction with the PS ESH Group and PS Training Coordinator determine which BNL safety courses and Photon Sciences-specific courses operational personnel must complete. All Operators receive "Radiological Worker I Training" and "Hazard Communications Training." BNL Facility Support Representatives assigned to NLSL-II carry out routine radiation surveys and perform surveys at the request of the Accelerator Operations Group and PS ESH staff. A radiation monitoring process for the accelerator areas using radiation area monitors will be routinely monitored by the PS ESH Group and Facility Support representatives. Specific operating and response procedures for radiation protection include the Operator Response to Radiation Alarms.

### **5. Response to Indicators**

Operators must report and log any abnormal operations, systems or equipment failures. A fault report must be written and affected personnel must be made aware of the potential consequences of these problems. The Commissioning Coordinator, Accelerator Operations Group Leader, or designee is responsible for scheduling corrective actions and notifying all effected personnel of operational problems.

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## **6. Resetting Protective Devices**

Protective devices are installed to protect personnel and equipment from operating beyond their design limits. Protective devices may only be reset after establishing the cause of exceeding the device threshold. Corrective action by the operator or technical staff is taken and recorded in the Accelerator Operator Log. Major occurrences are reported and investigated as required by the PS Reporting of Events procedure and BNL subject area, "Occurrence Reporting and Processing System" (ORPS).

## **7. Authority to Operate**

The ALD for Photon Sciences vests authority for operation of the NSLS-II facility with the Photon Sciences Deputy for Programs, Accelerator Division Director, Commissioning Coordinator, and Accelerator Operations Group Leader. The Commissioning Coordinator and Accelerator Operations Group Leader have the authority to call upon the resources within the Accelerator Division to ensure the safe and efficient operation of the facility. The Commissioning Coordinator and Accelerator Operations Group Leader transmit the authority to operate to the Control Room Supervisor; however, they maintain the responsibility for all NSLS-II commissioning and operations. The Accelerator Operators are responsible for operating the accelerators safely and efficiently by adhering to operation procedures, operational safety limits, ESH, and quality assurance requirements. Any work by support groups, which might impact the operation of the accelerators shall be approved by the Commissioning Coordinator or Accelerator Operations Group Leader. In the event the Commissioning Coordinator or Accelerator Operations Group Leader is not available, approval for such work shall go through the on-duty Accelerator Operator.

## **8. Shift Operating Base**

The Main Control Room and Injector Control Room are the bases of NSLS-II accelerator operational activities, including communications and shift turnover.

## **9. Potentially Distractive Materials and Devices**

The Control Room Supervisor must approve the use of computerized, written, audio, or visual material not having to do with operations inside the Accelerator Control Room.

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This chapter discusses the control area activities that help to achieve safe and efficient operations.

**B. DISCUSSION**

The control area (i.e., Main and Injector Control Rooms) is the coordination point for commissioning and operations. Operators should not be overburdened with administrative responsibilities. Access to the control area should be controlled so that operators are not distracted from properly monitoring and adjusting facility parameters.

**C. PRACTICE****1. Access to the Control Area**

The NSLS-II control rooms are posted restricted areas with access limited to authorized personnel. The Control Room Supervisor or on duty Operator grants entry to the control rooms and has the authority to restrict access. Personnel not specifically trained and authorized are restricted from operating the controls. Visitors accompanied by authorized personnel will be admitted access to the control room at the discretion of the on-duty Operator.

**2. Professional Behavior**

The Commissioning Coordinator, Accelerator Operations Group Leader, Control Room Supervisor and Accelerator Operators are responsible for enforcing professional behavior in the control room. Personnel disrupting operations will be removed from the control room.

**3. Monitoring the Main Control Panels**

The accelerators may be operated from either the Main Control Room or the Injector Control Room. One Accelerator Operator and at least one knowledgeable person must be on duty when the accelerator machine equipment is operating. A Control Room In-Charge (CRIC), either the Injector Control Room or Main Control Room, shall be determined during the course of each shift to identify which control room is in control of operating the accelerators. This control function must be determined at the start of each shift and may change at any time during the shift. The CRIC must be identified in the Accelerator Operator Log at the start of each shift and when changes are made. Only knowledgeable personnel shall be permitted to monitor the CRIC in the absence of the on-duty operator.

Operators 1) monitor the main operating parameters, 2) save files of major changes in operational requirements in the Accelerator Operator Log, and 3) respond to malfunctions and alarms according to established procedure so that effective corrective action can be taken.

NSLS-II machine status is displayed on monitors located near the operator console, and individual equipment status is available via the operations computer terminals. All machine set points are stored in computer memory and can be restored or compared to the current set points. As all equipment is designed to be individually protected to be "failsafe," human-induced (operator) or computer intervention is not required for equipment protection functionality.

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#### **4. Control Room Operator Ancillary Duties**

The Commissioning Coordinator, Accelerator Operations Group Leader and Control Room Supervisor are responsible for reviewing operator tasks to assure that operators are not performing duties that could interfere with the proper monitoring of operations. Operators perform administrative tasks only when operating conditions permit.

#### **5. Operation of Control Area Equipment**

Only operators trained and authorized by the Commissioning Coordinator, Accelerator Operations Group Leader or designee may operate the controls. A list of qualified operators is posted in the control room and maintained as part of the NSLS-II Facility Manual. New operating personnel receive operations training through a documented On-The-Job training (OJT) program. Experienced operators supervise new operating personnel until the Commissioning Coordinator or Accelerator Operations Group Leader formally approve of their ability to operate the controls. In addition Physicists, Engineers and contractors may operate equipment that they have the responsibility for and perform machine studies in accordance with NSLS-II Conduct of Operations and with the knowledge and approval of the on-duty operator.

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## **CHAPTER IV - COMMUNICATIONS**

### **A. INTRODUCTION**

Communications should be reliable and accurate when transmitting accelerator status and operations information within NSLS-II. Communications systems should be designed to insure that information is readily accessible to Photon Sciences staff and NSLS-II users.

### **B. DISCUSSION**

Verbal and computer communications are the primary means of conveying operations information. Since accurate communication is essential for safe and efficient operation, guidance in its use is necessary. Operators use the facility's audio and visual warning devices to alert personnel of abnormal or emergency conditions. These communications are controlled to insure that they do not detract from normal operations and are available in an emergency. Specific information on communication procedures must be given to outside users.

### **C. PRACTICE**

#### **1. Emergency Communications Systems**

The control rooms utilize the BNL telephone system and Fire Radio System to contact BNL emergency response personnel. The emergency number is extension 2222 or 911 from any BNL phone and is posted in the control room. The backup system for emergency response is through activation of the manual fire-alarm station and/or cellular phone (631-344-2222). Communication systems are tested periodically to ensure they are functional.

The on-duty Accelerator Operator is the "Acting Local Emergency Coordinator" (LEC) for the Bldg. 740 LINAC as specified in the Building Local Emergency Plans as well as the "Building 740 LINAC Emergency Response Procedure."

The BNL "Tone Alert Radio" (TAR) sounds in the control rooms and transmits information regarding BNL emergencies, evacuations, severe weather alerts, etc. The BNL Laboratory Protection Division transmits the emergency information through this system. The Accelerator Operator is to convey emergency announcements received on the TAR to Injection Building personnel.

The automatic fire alarm system sounds warning bells and illuminates strobe lights throughout the Injection Building in the event of an emergency requiring a building evacuation. This system can also be activated manually by the use of fire alarm pull switches located throughout Injection Building. The operators have the ability to investigate an alarm and coordinate with BNL Fire Rescue Division. In conjunction with the fire alarm system, a Public Address (PA) system can be used to disseminate important information to personnel throughout the Injection Building. The TAR, fire alarms, and PA system are tested periodically.

#### **2. Public Address System**

The public address system for NSLS-II is used to broadcast emergency information throughout the Injection Building. The microphones for this system are situated in Fire Control Panels and are available to the on-duty Accelerator Operator and other authorized personnel.

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### **3. Contacting Operators**

The Accelerator Operators can normally be contacted using the telephone system at extension 2550, for both the Main and Injector Control Room, or extension 5157 for the Injector Control Room.

### **4. Radios**

Portable radios are used throughout the Injection Building by the operators to maintain contact with the control room and support personnel for operational and emergency situations. Channel F1 is dedicated to operations and will transmit to the control room. Channel F2 can be used to transmit from radio to radio. Dedicated radios also have radio channel 3, which is used to transmit directly to BNL Fire Rescue. Support groups may use the "Loaner" radios that transmit from radio to radio only and do not transmit to Fire Rescue. Areas should be posted where the use of radios will cause interference with equipment.

### **5. Abbreviations and Acronyms**

Operators should only use commonly known abbreviations and acronyms in communications.

### **6. Oral Instructions and Information Communication**

Verbal instructions should be clear, concise and the sender and intended receiver should be readily identifiable. Instructions involving the operation of equipment, should be repeated by the receiver, when necessary, to insure that the instructions are received and understood.

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## **CHAPTER V - CONTROL OF ON-SHIFT TRAINING**

### **A. INTRODUCTION**

The primary mode of training for operating the NSLS-II accelerators is through on-the-job training (OJT). Training must be carefully supervised and controlled to avoid mistakes in operations. This chapter discusses the operations training requirements.

### **B. DISCUSSION**

On-the-job training is when the trainee receives hands-on experience with NSLS-II controls and equipment. Experienced operations personnel supervise this instruction. The Commissioning Coordinator, Accelerator Operations Group Leader and Control Room Supervisor, with the assistance of the Photon Sciences Training Coordinator, are responsible for determining the training methods, materials, and documentation according to BNL training policies identified in the BNL "Training and Qualifications" subject area.

### **C. PRACTICE**

#### **1. Adherence to Training Program**

The Commissioning Coordinator, Accelerator Operations Group Leader and Control Room Supervisor determine the training requirements, duration of training and when an operator is qualified to operate the NSLS-II accelerators without direct supervision. In addition, a checklist shall be used to assure completion of training requirements as part of the qualification process.

Trainees are required to familiarize themselves with the NSLS-II Facility Manuals, systems, policies and procedures. The Commissioning Coordinator, Accelerator Operations Group Leader and Control Room Supervisor select which PS-specific, BNL-wide or other training programs personnel must complete to be qualified to operate or use the facility.

The Commissioning Coordinator and Accelerator Operations Group Leader may authorize training exemptions based on an assessment of personnel experience. Exemptions should be recorded on the training checklist, other relevant documentation, or if applicable, as per the BNL "Training and Qualifications" SBMS subject area. Required training courses for the Accelerator Operators are located in the Brookhaven Training Management System (BTMS) under NSLS-II Operator JTA. On-the-job training checklists are part of the qualification process for the Accelerator Operators. This training must be completed and approved prior to Accelerator Operator qualification.

#### **2. On-Shift Instructor Qualifications**

The Commissioning Coordinator and Accelerator Operations Group Leader, authorized by the ALD for Photon Sciences, Deputy for Programs and Accelerator Division Director have the authority to operate the NSLS-II accelerators. The Commissioning Coordinator and Accelerator Operations Group Leader determine who is qualified to instruct the trainees. Instructor qualifications will be documented and retained according to the BNL "Training and Qualifications" SBMS subject area.

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**NLSL-II Conduct of Operations Manual**Number: **PS-C-PRJ-MAN-001**Revision: **A**Effective: **2/13/2012**Page **14** of **39****3. Qualified Operator Supervision and Control of Trainees**

Qualified operators supervise training whenever trainees operate equipment, insuring that errors are not made that could degrade NLSL-II safety or operation. Qualified Operators review information recorded by trainees in the Accelerator Operator Log.

**4. Operator Qualification Program**

The Control Room Supervisor shall approve the Accelerator Operator Qualification Program as well as coordinate any changes in the program. The Commissioning Coordinator, Accelerator Operations Group Leader or designee, and the Control Room supervisor shall provide their signature of approval for qualified Accelerator Operators.

**5. Training Documentation**

Completion of the Accelerator Operator training program shall be documented in accordance to the BNL "Training and Qualifications" SBMS subject area.

**6. Suspension of Training**

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

**7. Maximum Number of Trainees**

There shall be no more than two new Accelerator Operator trainees on any given shift during commissioning. In the event there is a need to exceed this limit, the Commissioning Coordinator or the Accelerator Operations Group Leader will determine and approve the maximum number of trainees on a given shift.

**8. Use of Trainees to Support Operations**

The Control Room Supervisor decides when an operator trainee, under normal operating conditions, is permitted to perform certain procedures by himself/herself.

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## **CHAPTER VI - INVESTIGATION OF ABNORMAL EVENTS**

### **A. INTRODUCTION**

BNL policy for investigating and reporting abnormal events is defined in the BNL SBMS subject areas, “Event/Issues Management” and “Occurrence Reporting and Processing System (ORPS).” These subject areas identify the process for staff and management who perform specific duties related to the discovery, response, notification, investigation and reporting of events to BNL and DOE management.

### **B. DISCUSSION**

All staff is required to appropriately report abnormal events or conditions that they perceive may do one or more of the following:

- endanger the health and safety of staff or the public
- adversely affect on the environment
- seriously impact the operations and intended purpose of BNL facilities
- result in loss or damage of property
- adversely affect national security or the security interest of DOE or BNL

Instructions for reporting events are provided in the “PS Reporting of Events” procedure.

### **C. PRACTICE**

#### **1. Events Requiring Investigation**

The BNL SBMS subject areas, “Event/Issues Management” and “Occurrence Reporting and Processing System (ORPS)” identify events requiring the investigation of abnormal events.

#### **2. Investigation Responsibilities**

Staff appointed by the ALD for Photon Sciences or designee shall act as Facility Managers for the Photon Sciences Directorate. A list of Facility Managers is located in the PS Reporting of Events procedure.

#### **3. Investigator Qualifications**

The ALD for Photon Sciences or designee in conjunction with the PS ESH Manager is responsible for appointing knowledgeable persons from the facility and BNL safety professionals to investigate events. BNL staff members from the ESH Directorate are available to assist in investigations.

#### **4. Information to be Gathered**

NLSL-II personnel, together with the professional staff of the BNL ESH directorate will collect all necessary information to complete an investigation of an event. This information should include the initial condition of the facility, statements of operators and other personnel, logs, and other pertinent documents.

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## **5. Event Investigation and Reporting**

Investigations of events and the investigation report shall follow the approved format specified in the BNL SBMS subject areas, “Event/Issues Management” and “Occurrence Reporting and Processing System (ORPS)” or PS ESH procedures, as appropriate.

## **6. Event Training**

Information collected by Photon Sciences personnel and by the BNL ORPS Coordinator of the BNL Quality Management Office (QMO) will be used for “lessons-learned” feedback to PS/BNL personnel so that operations, maintenance and training can be improved. The PS ESH group develops and implements an annual drill dealing with emergency situations that might reasonably be expected to occur during NLSL-II accelerator operations. The Accelerator Group and Injection Building personnel are assessed during these drills.

## **7. Event Trending**

The BNL ORPS Coordinator/QMO tracks all occurrences and issues reports to Photon Sciences ESH personnel for review and analysis.

## **8. Sabotage**

The Accelerator Operations staff will immediately report any suspected sabotage to the BNL Safeguards and Security Division and Photon Sciences management.

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## **CHAPTER VII - NOTIFICATIONS**

### **A. INTRODUCTION**

Photon Sciences management and DOE must be notified promptly of abnormal occurrences to assure that the Laboratory is responsive to public health and safety concerns. This chapter provides guidance to assure the uniformity, efficiency and completeness of these notifications according to the requirements within the BNL SBMS subject areas, “Event/Issues Management” and “Occurrence Reporting and Processing System (ORPS).”

### **B. DISCUSSION**

Abnormal events require verbal notification to the Commissioning Coordinator, Accelerator Operations Group Leader, Control Room supervisor, ESH staff member or Facility Manager upon the event or discovery of the event as per the PS Reporting of Events procedure.

### **C. PRACTICE**

#### **1. Notification Procedures**

The ESH manager and/or PS Facility Manager or designee contact the Event Categorizer via extension 1234 (631-344-1234) or 631-433-0443 as soon as practical, but allowing enough time so that a determination of reportability will take place within 2 hours of the event or condition discovery. Specific instructions for notification are included in PS Reporting of Events procedure. PS policy dictates that the Commissioning Coordinator, Accelerator Operations Group Leader, or designee is notified when the machine has been down for longer than 2 hours when in operations. The on-duty Accelerator Operator normally decides when to call responsible personnel from the call-in list.

#### **2. Notification Responsibility**

For operational situations, the Commissioning Coordinator, Accelerator Operations Group Leader or designee is responsible to ensure that those individuals listed on the appropriate call-in lists have indeed been notified and that any requirements for notification have been satisfied.

#### **3. Names and Phone Numbers**

The names and phone numbers of the Photon Sciences Facility Manager, alternates for emergencies and abnormal events are listed in the Control Room Call-In List book (located in the Main and Injector Control Room) as well as in the Reporting of Events procedure.

#### **4. Documentation**

The BNL QMO maintains the documentation for all occurrences. The Accelerator Operator is required to record all relevant information associated with emergencies and abnormal events in the Accelerator Operator Log .

#### **5. Communication Equipment**

The on-duty Accelerator Operator will use the BNL telephone system or cell phone to notify Photon Sciences management of an occurrence. The ESH manager or Facility Manager will notify the Event categorizer by telephone.

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## **CHAPTER VIII - CONTROL OF EQUIPMENT AND SYSTEM STATUS**

### **A. INTRODUCTION**

Good operating practices will maintain the NSLS-II accelerator configuration within its design limits and provide the Operators with knowledge of the status of the equipment and systems.

### **B. DISCUSSION**

Accelerator Operators must be aware of how the equipment and systems function. Accelerator Operators must be aware of operational safety and reliability limits. Changes in equipment and system configuration must be communicated to the affected operating personnel, by noting these changes in the Accelerator Operator Log or by using other methods to allow Operators to review the changes.

The status of the equipment and systems is controlled according to Photon Sciences procedures, which includes ensuring conformance with operational safety limits before changes are made to operational modes and includes information on the removal or restoration of equipment to service. Identification and documentation of equipment deficiencies is important to assure safe and reliable operation.

### **C. PRACTICE**

#### **1. Status Change Authorization and Reporting**

As a part of integrated safety management, additions or modification to facilities and equipment (or portions of facilities) require review by the Photon Sciences ESH Committee, a formal Design Review or other committees to ensure that hazards are identified and that appropriate controls are established to minimize the risk.

Depending on the nature of the changes, review by laboratory level committees and modifications to the NSLS-II Facility Authorization Documents may be required.

Additional information applicable to facility changes can be found in the PS Engineering Design procedure and the Accelerator Safety, National Environmental Protection Act (NEPA) and Readiness Evaluation subject areas.

The Commissioning Coordinator, Accelerator Operations Group Leader or designee may authorize non-safety operational changes. Equipment group personnel must notify the on-duty Accelerator Operator of any equipment changes that may affect the performance of the accelerators. Accelerator Operators insure that changes in the accelerator configuration and status are communicated to all accelerator operations personnel and must document those changes in the Accelerator Operator Log. Computer "Restore" files are used to place the accelerator equipment in a baseline configuration for startup.

#### **2. Equipment and Systems Check**

Equipment operational checks are carried out after shutdowns, maintenance or repairs. Checklists are used as they apply to the work being performed. Accelerator startup and shutdown checklists are maintained in the control room. The Commissioning Coordinator or Accelerator Operations Group

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Leader is responsible for insuring adequate commissioning time and training after equipment or system changes.

Work on the accelerator shielding or interlocks require a lockout and if applicable, the completion of a PS Safety System Work Permit. An interlock test must be completed if these systems might have been affected by any type of work to assure that the integrity of the personnel protection interlock system has not been compromised. A checklist is used to record the results of the tests and is maintained by the PS ESH Group.

### **3. Equipment Locking and Tagging**

Each PS Group is responsible for qualifying its workers to LOTO specific equipment and training them to the Authorized or Responsible level. The Commissioning Coordinator, Accelerator Operations Group Leader and/or Control Room Supervisor will determine the appropriate level of Lockout/Tagout training needed for operations staff. A system of controlled locks is available to lockout equipment deemed by the ESH group to be a hazard during open-access to the accelerators. Refer to Chapter IX in this manual for further information on lockout/tagout.

### **4. Operational Limits Compliance**

All equipment is designed to be self-limiting and in addition, contains protective devices (e.g., temperature and water flow switches) to prevent a safety hazard or equipment damage. However, to operate within the design parameters of the NLS-II Commissioning Accelerator Safety Envelope (CASE) and also to keep radiation exposures ALARA, certain Operational Safety Limits (OSL) have been established and are posted in the control room. The on-duty Accelerator Operator is responsible for maintaining these operational limits.

### **5. Equipment Deficiency Identification and Documentation**

Equipment and system faults are noted in the Accelerator Operator Log and a fault report sent to the responsible group supervisor or engineer. The Control Room Supervisor generates monthly and yearly fault charts. Faults are reviewed during periodic operations meetings.

### **6. Work Authorization and Documentation**

Maintenance and equipment upgrades are planned on a monthly basis. Work schedules are drawn up by the Maintenance Coordinator and approved by the Accelerator Division Director or designee. The schedules are distributed to all applicable personnel and are posted in the control room. The PS Safety System Work Permit and Work Planning program is used to monitor and control all work in progress for the accelerators which may significantly affect safety, environment, programmatic impact and quality assurance.

### **7. Equipment Post-Maintenance Testing and Return to Service**

Post-maintenance equipment checks are performed by the responsible equipment groups prior to operational startup. These checks ensure that the startup is performed in an efficient manner and the accelerators operate at design/normal operating levels.

The on-duty Accelerator Operator checks and records certain operational outputs versus equipment set points as part of the turn-on procedure. Computer "Save, Compare and Restore" functions are used to set the accelerator parameters to a baseline configuration for startup.

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Following any work on the safety system the entire system is rigorously functionally tested and documented by an ESH staff member.

Work which may affect accelerator configuration is monitored by general BNL work permits and PS safety system work permits. They are revised and approved prior to accelerator restart.

## **8. Alarm Status**

Operators are trained to respond to equipment and system alarms. After establishing and/or correcting the cause, the Operator or responsible technician may reset equipment alarms. Alarms and responses are documented in the Accelerator Operator Log.

The Fire alarm status is latched at the NSLS-II fire alarm display panel and at the BNL firehouse. The Accelerator Operators are trained in responding to emergencies in accordance with Bldg. 740 Emergency Response procedure and Emergency Plan.

## **9. Temporary Modification Control**

The Commissioning Coordinator, Accelerator Operations Group Leader or designee must approve temporary modifications of the accelerator controls. They shall be logged in the Accelerator Operator Log by the on-duty Accelerator Operator. All modifications to safety systems must be approved and documented by the PS ESH Group or Interlock Working Group (IWG).

Temporary operating procedures must be prepared in accordance with Photon Sciences procedure "Temporary Procedures." These temporary procedures must be reviewed by the on-duty Accelerator Operator at the start of their shift.

## **10. Distribution and Control of Equipment and System Documents**

Drawings are maintained in the PS design room. The Photon Sciences Document Center contains the latest design specifications. These documents are maintained and controlled in accordance with procedure "Drawing and Specification Distribution." Other design documents, including design review documents, incoming test documents, and non-conforming material control documents are maintained in electronic databases. The NSLS-II Facility Manual maintained in the NSLS-II Injector Control Room contains the latest operations policies, procedures and revisions. These documents are controlled, maintained and tracked by the Quality Assurance Group in accordance with procedure Document Preparation and Control."

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## **CHAPTER IX - LOCKOUT/TAGOUT**

### **A. INTRODUCTION**

This chapter provides a method to control equipment through tagging and/or locking. These actions protect personnel from injury and protect equipment from damage. Accidental operation of equipment during normal operation, servicing or maintenance activities has the potential to cause personal injury or equipment damage. The Lockout/Tagout program allows workers to be sure that equipment has been removed from service and later restored to operation.

### **B. DISCUSSION**

Tagout is the application of a Hold tag on an energy-isolating device. Tagout shows that the energy-operating device and the equipment it controls must not be operated. Lockout is the placement of a lock or similar mechanism on an energy-isolating device. Photon Sciences shall perform Lockout/Tagout according to BNL subject area "Lockout/Tagout (LOTO)" and PS procedure, "Lockout/Tagout Requirements." Personnel who perform Lockout/Tagout shall be trained and authorized in accordance to the BNL training requirements.

### **C. PRACTICE**

#### **1. Lockout/Tagout Use**

Photon Sciences specific procedure "Lockout/Tagout Requirements" and BNL subject area "Lockout/Tagout (LOTO)" provide guidance and requirements on the use of lockout and tagout devices.

PS personnel shall use Lockout and Tagout devices to isolate energy sources when required. Locks, tags and lockout devices are available at designated LOTO Stations. Only authorized individuals trained in the use of lockout/tagout are permitted to implement lockout/tagout procedures.

#### **2. Testing or Positioning of Equipment or Components**

Testing or positioning of equipment in the Photon Sciences Directorate shall be accomplished only by authorized and trained personnel.

#### **3. Periodic Inspections**

The Accelerator Operations Group Leader or designee shall periodically (at least every 2-months) audit the lockout/tagout logbook and outstanding tags. Periodic inspections (audits) of LOTO in progress and LOTO plans shall be conducted in accordance to the BNL Lockout/Tagout subject area. Records will be made available to BNL and DOE auditors. Any discrepancies found will be recorded and a notification will be sent promptly to the responsible individual.

#### **4. Caution Tags**

Yellow Caution tags are used in Photon Sciences to convey information about the status of equipment and to prevent equipment damage, where equipment damage is not a personnel hazard. Standard BNL red hold tags must be used in all personnel safety lockouts. Standard BNL caution tags are available from BNL stock and Accelerator Operations Group specific yellow caution tags are available in the NSLS-II Control Rooms. The "Caution (Yellow) Tags" procedure provides the policies and requirements for the use of caution tags in Photon Sciences.

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The BNL Training Program provides the general electrical and lockout/tagout training through classroom instruction and/or computer-based training (CBT). PS supervisors and/or system experts provide on-the-job training to obtain authorized worker status and document the training. Each group supervisor maintains a list of LOTO authorized workers.

**6. Notification of Personnel**

Lockout of equipment affecting the performance of the accelerators, other than maintenance periods, must be with the knowledge of the on-duty Accelerator Operator and noted in the Accelerator Operator Log. BNL subject area "Lockout/Tagout (LOTO)" establishes generic notification requirements.

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**NSLS-II Conduct of Operations Manual**Number: **PS-C-PRJ-MAN-001**Revision: **A**Effective: **2/13/2012**Page **23** of **39****CHAPTER X - INDEPENDENT VERIFICATION****A. INTRODUCTION**

The independent verification program provides a high degree of reliability in operation of the NSLS-II accelerators. This chapter describes the important aspects of this program. Other control programs for equipment status are given in Chapter VIII, Control of Equipment and System Status, and some applications of independent verification are discussed in Chapter IX, Lockout/Tagout.

**B. DISCUSSION**

Independent verification is the act of checking that a given operation conforms to established operating criteria, as well as checking a component's status independently of activities related to establishing the component's position. The independent verification program identifies critical components, establishes when independent verification is required and describes the methods for performing independent verification. Not all components require independent verification because the possibility of improper status may be remote or its effect would not be significant to safe and efficient operation.

**C. PRACTICE****1. Components Requiring Independent Verification**

Systems that present significant personnel hazards (e.g., flammable gas, large cryogenic systems, large stored energy systems, etc.) are reviewed by the Accelerator Operations Group Leader, Engineering Group Leaders, ESH Committee, Interlock Working Group Committee or the Instrument Readiness Review (IRR) committee prior to installation and are inspected and authorized for operation by the ESH Group after any modification or extended shutdown of the NSLS-II accelerators.

The general criteria in deciding if independent verification is warranted are as follows:

- a) Could improper equipment status affect the safety or health of personnel?
- b) Could improper equipment status affect the environment?
- c) Could improper equipment status significantly affect the performance of the NSLS-II accelerators or cause program loss?
- d) Would improper equipment status be recognized immediately by an operator?
- e) Could significant exposure to radiation or other hazardous substances be received by the person(s) performing the independent verification?

**2. Occasions Requiring Independent Verification**

Safety systems are checked and authorized by the ESH Group after any modification or extended shutdown of the NSLS-II accelerators. Qualified NSLS-II ESH Group members test accelerator radiological interlock systems in accordance with procedure "Interlock Safety." The responsible technical groups perform equipment turn on and performance checks after extended shutdowns and prior to accelerator startup.

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### 3. Verification Techniques

The Accelerator Operators and technical staff are trained in the techniques for verifying the status of NSLS-II accelerator equipment. Computer applications programs, software and hardware limits, and alarms continuously verify the status of NSLS-II accelerator devices. Personnel safety systems have independent hardware and logic to verify that they are in the proper state.

Search and secure procedures verify that personnel are out of “secured” areas prior to accelerator startup. The correct procedure is enforced by the safety system logic, which will not permit the safety system “Area secured” enable condition if the incorrect procedure is used. Redundant door switches monitor access door positions and at accelerator entrances. Equipment damage protection is verified by means of independent equipment interlocks that verify temperature and water flow.

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Operations records contain a narrative log of the status of the NLSL-II accelerators and of all events required to reconstruct a history of operations. In this context, logs are defined as a narrative sequence of events or functions performed by the Accelerator Operator.

**B. DISCUSSION**

Operation logs are established to record the data necessary to provide a history of the operation of the NLSL-II accelerators. The scope, type and amount of data required by management are entered into the logs, including documentation of actions taken, activities completed and data necessary to reconstruct events. Logs are reviewed to insure they are adequately maintained and that operators are aware of the information in the logs.

**C. PRACTICE****1. Establishment of Operating Logs**

The electronic operation logs are used by the Accelerator Operators and are maintained on the PS computer server, which is routinely backed-up. If the electronic logs are inaccessible, the Accelerator Operators shall record all events in paper logs. Current and previous paper logs are maintained in the control room. Entries are made only by Accelerator Operators, Commissioning Coordinator, Control Room Supervisor, or Accelerator Operations Group Leader.

**2. Timeliness of Recordings**

Information is entered promptly or as soon as reasonably possible to prevent inaccuracies. Logkeeping does not take precedence over controlling and monitoring the accelerators.

**3. Information to be Recorded**

Accelerator Operators need to log into the electronic Accelerator Operators log at the start of each shift. All information pertaining to the safe and efficient operation of the accelerators is recorded in the Accelerator Operator Log. To aid in reconstructing events, as much information as possible is logged during emergencies, and abnormal or unexpected events.

Minimum information required:

- Accelerator Operating mode (e.g., Commissioning, maintenance, bunch pattern, system contents, system position, etc.)
- Changes in accelerator operating mode or condition
- Control Room in Charge (CRIC)
- On-Duty Personnel
- Record of critical data
- Abnormal facility configurations
- Status changes in safety-related or important equipment;

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- Occurrences of reportable events, as applicable to the LINAC
- Initiation and completion of tests or studies
- Security, Medical and Fire incidents
- Shift relief and call-ins
- Completion of activity (e.g., completed startup checklist, survey completed, etc.)
- New or changes to radiological postings

**4. Legibility**

All log entries must be in English, legible, and understandable. If a paper log is used, entries must be made in pen of a color that can be photocopied.

**5. Corrections**

Permission must be obtained by the Commissioning Coordinator or Accelerator Operations Group Leader to make any changes in the electronic Accelerator Operator log after being closed. For paper log entries, incorrect entries are scored with a single line, initialed, and dated. References to incorrect entries are made in the shift summary.

**6. Log Review**

The Commissioning Coordinator, Accelerator Operations Group Leader and/or Control Room Supervisor review the Accelerator Operator Log on a periodic basis. The Commissioning Coordinator and/or Accelerator Operations Group Leader will provide a signature and date in any available space on the log page. The signature on the log page will signify all log pages have been reviewed from the previous time of signing to the present. This may include electronic signature or handwritten signature.

**7. Care and Keeping of Logs**

The Control Room Supervisor is responsible for filing and storing the logs for the expected life of the facility. Paper backlogs are available from the Control Room Supervisor or electronic backlogs on the server for review by Accelerator Operators or staff returning after an absence. The electronic logs must be backed up and all logs are retained in accordance with the SBMS subject area Records Management.

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## **CHAPTER XII - TURNOVER and ASSUMPTION of RESPONSIBILITIES**

### **A. INTRODUCTION**

Operations turnover provides oncoming operators with an accurate picture of the overall status of the accelerator. This chapter compliments the guidelines of Chapter II, Operating Practices, and Chapter III, Control Area Activities, and describes the important aspects of good operations turnover.

### **B. DISCUSSION**

Operations turnover is a critical part of accelerator operations. Inaccurate or improper (incomplete) shift turnover can contribute to or cause safety incidents, so it is essential that operations personnel perform shift turnovers such that an effective transfer of information takes place. Personnel shall not assume operational duties unless they are physically and mentally fit to do so, and until they and the offgoing personnel have a high degree of confidence that an appropriate information transfer has taken place.

Oncoming personnel shall review the electronic/written (logs, records) and visual (monitors, oscilloscopes, computer pages, and alarm pages) information and receive a verbal briefing before assuming the responsibility of operating the accelerators. Appropriate shift-overlap time must be allowed to accomplish proper information transfer.

### **C. PRACTICE**

#### **1. Turnover Checklists**

The Control System is used to store all machine parameters and is used in place of shift checklists. The oncoming Accelerator Operator will familiarize himself/herself with the current save and restore files.

#### **2. Document Review**

Oncoming Accelerator Operators use the first several minutes of the shift to scan various monitors, alarm displays, and computer pages and to read the ongoing log to familiarize themselves with the current operating conditions.

#### **3. Control Panel Walkdown**

As part of operator shift turn-over, the oncoming Accelerator Operator reviews the accelerator status and previous operational history displayed on monitors in the control room.

#### **4. Discussion and Exchange of Responsibility**

Before taking responsibility for operating the accelerators, the outgoing Accelerator Lead Operator will brief the oncoming Accelerator Lead Operator to ensure that he/she is fully cognizant of the operating conditions. The Accelerator Operator will then sign the log.

#### **5. Shift Crew Briefing**

The oncoming Accelerator Lead Operator is given a verbal briefing by the outgoing Accelerator Lead Operator, covering what has occurred since he/she was last on shift. The briefing is to be attended by all oncoming shift personnel. In addition, the oncoming Accelerator Operator(s) will review the log since his/her last working shift.

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The on-duty Accelerator Operator(s) may be relieved from the control room by the Control Room Supervisor or a qualified Accelerator Operator cognizant with the operating conditions of the facility. The oncoming Accelerator Operator is given a verbal briefing by the outgoing Accelerator Operator when a relief occurs during the shift as well as reviewing the log and accelerator status.

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## **CHAPTER XIII - CONTROL OF INTERRELATED PROCESSES**

### **A. INTRODUCTION**

This chapter discusses the importance of process control systems when used as part of accelerator operations.

### **B. DISCUSSION**

The Accelerator Operators must understand process control operations. They also must understand the requirements for the safe handling of chemicals and gases. Accelerator Operators need to have an integrated knowledge of the process interactions in order to prevent adverse effects on the System. Interrelated processes are processes or activities that can affect operations, but are under the control of persons other than the affected operators, such as shared support systems or special testing (e.g., deionized (DI) water, processed chilled water, etc.).

### **C. PRACTICE**

#### **1. Accelerator Operator Responsibilities**

The operators are trained to monitor systems and respond to adverse situations.

#### **2. Accelerator Operator Knowledge**

OJT takes place for accelerator support systems. In addition, training is accomplished through formal BNL and PS training in HAZCOM and Radiation Worker Training. Training is documented and recorded by the Training Coordinator and operations supervisor in the Operations Training Files or the Brookhaven Training Management System (BTMS).

#### **3. Accelerator Operator Response to Process Problems**

NSLS-II Operators are trained to make appropriate responses to abnormal events or problems. The response may be following specific procedures or shutting down systems or equipment. If necessary, additional expert assistance is obtained through a call-in list. These events are logged in the Accelerator Operator Log.

#### **4. Communication between Accelerator Operators and Process Personnel**

Open lines of communication must exist between Accelerator Operators and process support personnel. Fault reports are generated through the electronic log system by the on-duty Accelerator Operator and directed to the appropriate supervisor or engineer whenever there is an equipment or system failure. Meetings are held, as needed, to provide the forum for reporting and analyzing the situations that arise.

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## **CHAPTER XIV - REQUIRED READING**

### **A. INTRODUCTION**

A file of required reading for accelerator operations personnel should assure that appropriate individuals are aware of the important information related to job assignments. This chapter describes such a required reading program.

### **B. DISCUSSION**

PS accelerator operations personnel receive important information from various groups and individuals through the Control Room Supervisor or designee, who is responsible for distribution of information to the Accelerator Operators.

### **C. PRACTICE**

#### **1. File Index**

The Control Room Supervisor or designee will determine which documents are to be placed in the required reading file. These documents may include:

- Accelerator operational logs
- Procedure/manual changes or revisions
- NLSL-II Conduct of Operations Manual
- Policy changes
- Temporary modifications to systems or equipment
- Events and Issues
- Other information necessary to keep accelerator operations personnel aware of current activities

#### **2. Reading Assignments**

The Control Room Supervisor, Accelerator Operations Group Leader, Commissioning Coordinator, Conduct of Operations Coordinator, or designee assigns reading assignments to the Accelerator Operators and other appropriate personnel. Certain assignments require signatures by the Accelerator Operators to indicate that they have read and understood the information included in specified documents. The decision to require signatures and to whom will receive the assignments will be made by those listed above.

#### **3. Required Dates for Completion of Reading**

The Accelerator Operator Log must be read by the oncoming shift before relief of the outgoing personnel. Operational Bulletins, information pertaining to accelerator operational schedules or changes must be read by the oncoming Accelerator Operators such that they are fully cognizant with the status of the accelerator before taking over the shift. Completion dates for all other required reading is determined upon assignment.

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Certain Accelerator Operator documents and training notes must be signed by Accelerator Operators indicating that they have read and understood the content. The Control Room Supervisor assigns required reading to the Accelerator Operators. A record is kept of all completed reading assignments.

**5. Review**

Periodic reviews of required reading will be made by the Control Room Supervisor to ensure that only relevant and up-to-date information is available.

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## **CHAPTER XV - TIMELY INSTRUCTIONS/ORDERS**

### **A. INTRODUCTION**

There shall be a means for PS management to communicate short-term information and administrative instructions to Accelerator Operations personnel. Other ways of directing Accelerator Operators are discussed in Chapter XVI, Technical Procedures, and Chapter XVII, Operator Aids.

### **B. DISCUSSION**

The changing requirements of NLSL-II accelerator operations require that there is a program to quickly issue information to accelerator operations personnel.

### **C. PRACTICE**

#### **1. Content and Format**

Special information required for a particular shift is written in the log(s) or issued as a bulletin by the Control Room Supervisor, Commissioning Coordinator, or Accelerator Operations Group Leader and verbally emphasized during briefing. Accelerator operational changes that are expected to become permanent are implemented as soon as possible in the applications software or Facility Manual. All short-term orders are to be clearly written, dated, and properly maintained. Temporary procedures are to be prepared in accordance with the procedure, "Temporary Procedures."

Commissioning schedules, schedule changes and other accelerator operational information are posted in the control room or available in the PS Document Center and/or website.

#### **2. Issuing, Segregating and reviewing Orders**

The Control Room Supervisor, Accelerator Operations Group Leader, Commissioning Coordinator, and/or Accelerator Division Director give shift orders to the Accelerator Operators. At times, other PS Managers provide special instructions to the Accelerator Operators; however, these special instructions have the prior approval of the Control Room Supervisor, Commissioning Coordinator, or Accelerator Operations Group Leader.

#### **3. Removal of Orders**

The Control Room Supervisor, Accelerator Operations Group Leader, or Commissioning Coordinator is responsible for canceling and removing orders that are no longer applicable. The Control Room Supervisor periodically reviews accelerator operations bulletins and postings to assure they are current.

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## CHAPTER XVI - TECHNICAL PROCEDURES

### A. INTRODUCTION

Accelerator operations procedures provide specific direction for operating accelerator systems and equipment during normal, postulated abnormal and emergency conditions. This chapter describes the important aspects of the development and use of accelerator operations procedures.

### B. DISCUSSION

Procedures are a key factor affecting the Accelerator Operator's performance. Accelerator operations procedures should be sufficiently detailed so that the required actions can be undertaken without direct supervision. The format may range from detailed step-by-step instructions to general operating guidelines, or outlines based on complexity and risk. In all cases, procedures should be written so they can be easily used without making mistakes. To ensure that procedures are effective and the best possible instruction is provided, procedures shall receive periodic review and feedback.

### C. PRACTICE

#### 1. Procedure Development

Procedures exist for normal accelerator operations, as well as postulated abnormal and emergency situations. The detail used in the procedures is based on the complexity of the task, the experience and training of the Accelerator Operators, the frequency of performance, and the significance of the consequences of errors. Therefore, procedures can range from step-by-step instruction to general operating policies/guidance.

General requirements for procedure development, content changes and revisions, approval, review, availability, and use are included in the procedure "Document Preparation and Control" and in "Temporary Procedures." Specific requirements relating to the Accelerator Operations and ESH group are discussed in the following sections.

PS and BNL ESH personnel develop safety and emergency procedures as well as applicable accelerator operating procedures.

#### 2. Procedure Content

To provide uniformity in accelerator operations procedures, Accelerator Operations procedures conform to the following guidelines:

- a) All procedures must be prepared in accordance with procedure, "Document Preparation and Control" or "Temporary Procedures" (as applicable).
- b) To enhance rapid retrieval, printed emergency procedures in the control room(s) are kept separate from normal accelerator operations procedures and are distinguishable by the use of a red binder.
- c) Procedures include information from source documents, such as the NSLS-II Commissioning Accelerator Safety Envelope (CASE) and NSLS-II Accelerator Operating Limits (posted in the Control Rooms).

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- d) Warnings, notes, and cautions are clear, they do not contain actions, they are easily identifiable (e.g., printed in bold), and they appear on the same page as the step to which they apply, preceding the applicable step.

### **3. Procedure Changes and Revisions**

Changes and revisions to procedures are made to reflect current accelerator operating practices and requirements. Accelerator operations staff must be notified of all revisions to operational and applicable ESH and QA procedures when they are released. When notified, they are required to read and understand the changes and revisions without any further direction. The Control Room supervisor, Accelerator Operations Group Leader, Commissioning Coordinator, or responsible individual may request the document be read through the use of the required reading process at his/her discretion.

### **4. Procedure Approval**

To ensure accuracy and practicality, the Commissioning Coordinator, Accelerator Operations Group Leader or designee, and/or the Control Room supervisor review accelerator operations procedures before issuance and approval. The Control Room Supervisor or designee is responsible for approving all accelerator operations procedures.

### **5. Procedure Review**

Photon Sciences ESH personnel review safety and emergency procedures to insure all appropriate aspects have been fully covered before issuance. The PS ESH personnel also periodically review emergency procedures to ensure they are accurate and up-to-date. Applicable procedures are reviewed after any abnormal event to ensure their adequacy.

Accelerator operational procedures, bulletins, postings, computer applications programs, and files are periodically reviewed by the NSLS-II Control Room Supervisor or designee to ensure that they are accurate and current. When applicable, new procedures should be walked through to ensure their workability.

### **6. Procedure Availability**

Accelerator operations procedures are maintained and controlled in the PS Document Center. Copies of operations procedures, as determined by the Commissioning Coordinator, Operations Group Leader, or designee, are maintained in the NSLS-II Facility Manual, and are located in a designated area within the control rooms. Copies of emergency procedures are also included in the NSLS-II Facility Manual for quick reference. ESH and QA documentation is accessible from the PS Document Center.

Accelerator operational application programs for all accelerators at NSLS-II are available at the Accelerator Operators console and at other conveniently located computer terminals throughout the facility.

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## 7. Procedure Use

NSLS-II accelerator commissioning and operations are conducted according to procedures that reflect the requirements of an experimental user research facility and are carried out in a safe and efficient manner.

Accelerator Operators take whatever action is necessary during emergency conditions to make the facility safe and to protect equipment, personnel, and public safety without placing themselves or others in harm's way. These actions are based on training and Accelerator Operator knowledge. Accelerator Operators need not look up emergency procedures when taking immediate actions in emergency situations, but the procedures must be readily available during and after an occurrence to validate the action.

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## **CHAPTER XVII - OPERATOR AIDS**

### **A. INTRODUCTION**

Accelerator operator aids should provide information to accelerator operators in performing their duties. An accelerator operator aid program should be established to ensure that the operator aids posted are current, correct, and useful.

### **B. DISCUSSION**

Accelerator operator aids have an important function in the safe operation of the NSLS-II accelerators and may come in many forms: complete or partial copies of procedures, system drawings, handwritten notes or computer and display monitors. These postings must reflect the most current information and must not supersede or conflict with any procedure.

### **C. PRACTICE**

#### **1. Accelerator Operator Aid Development**

Any NSLS-II technical staff member may develop an accelerator operator aid; however, the Control Room Supervisor must first approve them before posting in the control rooms. Help aids are developed by the PS Support Groups, in consultation with the Commissioning Coordinator or Accelerator Operations Group Leader, for the accelerator operations applications programs. Equipment operating aids are developed by technical support groups and reviewed by the group supervisor or responsible engineer.

#### **2. Approval**

The NSLS-II Control Room Supervisor must approve of all accelerator operator aids used by the Accelerator Operator on the Accelerator Operator Aid Index. All other accelerator operator aids are to be approved in accordance with procedure "Document Preparation and Control." The accelerator operator aid must contain the name or signature of the person who approved it and the effective date.

#### **3. Postings**

Accelerator Operator aids are posted so they do not obscure instruments or controls. Aids are located near the area of their expected use.

#### **4. Use of Aids**

Operator aids are used as a convenience and for supplementing approved procedures. They are not used to circumvent approved procedures. Computer "Help" programs are for information purposes only and do not circumvent the application program.

#### **5. Documentation**

Accelerator operator aids are not required to be listed or entered into the Accelerator Operator Log. Accelerator Operator aids will be listed in the Accelerator Operator Aid Index.

#### **6. Review**

During routine inspections of the control room areas, the Control Room Supervisor, Commissioning Coordinator or Accelerator Operations Group Leader review accelerator operator aids to ensure that they

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are accurate, current, and necessary. As procedures are updated, related aids should be updated. A review date and initial shall be added to the Control Room Operator Aid Index at least every six months to indicate that the accelerator operator aids have been reviewed. The Assessment Tracking System (ATS) or PS database will be used to assist in tracking and monitoring the active accelerator operator aids.

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## **CHAPTER XVIII - COMPONENT LABELING**

### **A. INTRODUCTION**

A well-established and maintained program for labeling equipment will help to insure that Photon Sciences and support personnel can identify instrumentation, controls and equipment. In addition, equipment labeling is required by Occupational Safety and Health Administration (OSHA) regulations and various national consensus standards.

### **B. DISCUSSION**

A good labeling program, understood and maintained by accelerator operations and maintenance personnel, enhances the effectiveness of training. It also helps to reduce errors in accelerator operations and by maintenance personnel. Errors can result from incorrect identification of equipment and controls. A good labeling program is consistent with Photon Sciences ALARA goals because the exposure of personnel to radiation and to hazardous materials is reduced if the accelerator operations staff spends less time identifying components.

The labeling program should allow personnel to identify instrumentation, controls and equipment needing labels. In addition to equipment, doors to rooms should be labeled to help NSLS-II and support personnel to identify rooms, and if applicable, the equipment inside.

### **C. PRACTICE**

#### **1. Components Requiring Labeling**

- All equipment built by PS technical personnel is labeled according to existing laboratory conventions, as applicable (e.g., BNL subject area "Electrical Safety," Photon Sciences Standards). Commercially built equipment is labeled by the manufacturer.
- Emergency exits, fire alarms, fire extinguishers and fire protection equipment 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.
- Cable and wire runs are labeled at each end. Their function and destination are recorded in a cable directory or equivalent.
- Equipment racks are labeled and their location documented.
- Equipment switches are labeled to indicate their associated device and operation.
- All Accelerator power supplies and magnets are labeled with their appropriate site specific name and model number.
- Piping with hazardous liquids and gases is labeled with its function and flow direction according to BNL subject area, "Piping Systems, Identification of."
- The facility-labeling program includes cabinets containing hazardous substances, controlled areas and room doors.

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Label information is consistent with the information found in PS procedures, drawings and other documentation. Labels are permanently attached and have easy to read information.

**3. Label Placement**

Labels are placed on or as near as practical to the controls or equipment being labeled. Labels are oriented so they are easy to read.

**4. Replacing Labels**

Each PS/BNL group is responsible for ensuring that missing or damaged labels, once identified, are promptly replaced. The Commissioning Coordinator, Accelerator Operations Group Leader or designee is responsible for upholding these groups to this responsibility.

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