

Brookhaven National Laboratory/National Synchrotron Light Source			
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<b>Number:</b>	LS-CO-0001	<b>Revision:</b>	B
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Prepared By:	M. Buckley	Approved By:	E. Zivogel    A. Ackerman    S. Dierker J. Murphy    C-C. Kao
			<a href="#">Revision Log</a>

\*Approval signatures on file with master copy.

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## INTRODUCTION

**DOE Order 5480.19** To improve the quality and uniformity of operations at the Department of Energy's facilities, the DOE issued [Order 5480.19 "Conduct of Operations Requirements at DOE facilities."](#) This order recognizes that the success of a facility's mission critically depends upon 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 Brookhaven National Laboratory's and the National Synchrotron Light Source's acknowledgment of the principles of Conduct of Operations and the response to DOE Order 5480.19.

Because of the great diversity of the facilities operated by DOE and its contractors, Order 5480.19 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." DOE5480.19 does not directly address technical aspects of equipment operation as these are "...facility specific, requiring unique direction." In applying DOE Order 5480.19 to the NSLS, 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. In addition, all exceptions and deviations are documented in the NSLS "Conduct of Operations Exceptions and Deviations to DOE O 5480.19" matrix. The matrix also identifies the corresponding chapters and sections within this manual to indicate implementation of each of the DOE guidelines.

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## CHAPTER I

### OPERATIONS ORGANIZATION AND ADMINISTRATION

#### A. INTRODUCTION

The organization and administration of the NSLS operations, 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, and 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 NSLS achieves a high level of excellence by having the operations management establish high levels of performance. Management communicates these standards to the NSLS staff. Personnel are well trained and their performance monitored. The Operations Section Head, establishes standards, defines goals, 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 [NSLS ES&H Policies and Requirements Manual](#) (PRM), NSLS Facility Manuals (located in the NSLS control room), and [NSLS Quality Assurance Manual](#) provide the ESH&Q and operation policies and procedures for the department. The [NSLS organization chart](#) and [NSLS ES&H organization chart](#) denotes the department structure. Each person involved in the operation is shown and to whom that person is primarily responsible along with alternative supervision. The NSLS Chairman periodically reviews the organization chart to insure its accuracy. The organization chart reflects all modes of operation in the NSLS. The NSLS PRM includes responsibilities for staff, visitors, users, students, and non-BNL personnel.

There are written operational procedures for all activities that could adversely impact the environment, safety, health, operations, or quality. The NSLS Operations Group procedures and policies are in accordance with the BNL [Standards Based Management System \(SBMS\)](#) and the [NSLS Accelerator Safety Envelope \(ASE\)](#). Formal training is provided for critical or complex procedures. General operations training is provided through Required Reading and On-The-Job training which is documented on a Qualification Matrix. On the job machine operator training is supervised by experienced personnel selected by NSLS management and staff supervisors.

Visiting scientists and associates must go through an extensive process of registration and training before accessing the experimental floor and conducting an experiment. This process can be viewed on the [User Access](#) page of the NSLS User Administration website .

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Operational goals are defined or discussed at weekly user meetings, within [NSLS Advisory Committees](#), and by NSLS management. Performance standards are set, monitored, and recorded at these meetings. Monthly charts of machine performance are kept and published in the [National Synchrotron Light Source Activity Report](#).

A fault reporting system accounts for all machine downtime. The engineering and technical staff reviews these reports periodically. The Operations Section Head reviews daily performance of the storage rings. Computer history programs allow responsible individuals to review machine operational parameters in detail and allow diagnosis of problems.

## 2. Resources

The NSLS Chairman assures that there are sufficient resources for safe and efficient operation of the facility. The NSLS management considers long-range staffing needs and develops plans to implement them. These plans are consistent with the allotted funding and the NSLS's mission.

NSLS Machine Operators and Operations Coordinators operate on a shift basis with minimal overtime. NSLS technical staff has been assigned with equipment responsibilities identified in the [Equipment Information System \(EIS\)](#), and are called in to repair, test, or service equipment as needed. The ESH&Q group is available to carry out responsibilities within its area to help the safe operation of the facility.

## 3. Monitoring of Operating Performance

Real-time machine parameters and 24-hour performance histories are displayed on monitors distributed throughout the NSLS. In addition this information is available on the [Machine Status and History page](#) on the NSLS website. All operating problems or conditions are recorded in the machine operator and/or operations coordinator logbook. Machine faults are recorded and reported in writing to the responsible engineer or technician daily by generating a fault report. Operations Coordinators monitor the NSLS experimental program via log entries, experimental approval forms, regular tours, and weekly meetings. Management holds monthly reviews to determine performance trends.

NSLS has an ALARA program and a routine radiation monitoring system is in place. Environmental, safety, and health inspections are carried out every three months and reports of which are sent to applicable management. Radiological and Laser interlock tests are completed under accordance with NSLS procedure, "[Interlock Safety](#)" on a 6-month basis or when the interlock system is modified or repaired.

Self-Assessments are conducted in accordance with the NSLS self-assessment plan or when deemed necessary by the NSLS ESH&Q division manager or other NSLS management. Such assessments may address Environmental, Safety, Quality, & Operations. Self-assessment reports are developed and distributed to appropriate NSLS & BNL management.

## 4. Accountability

All NSLS staff have individual Roles, Responsibilities, Accountabilities, & Authorities (R2A2) which are maintained in the chairman's office and on the Human Resources employee performance data system. NSLS 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 NSLS policies and/or procedures.

## 5. Management Training

"[NSLS Training Policy](#)", "[Training Requirements For NSLS](#)", and the BNL "[Training and Qualifications](#)" subject area " addresses training requirements for management, staff, users, and any other

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individual working or entering the NSLS facility. The NSLS management and supervisors in conjunction with the NSLS Training Coordinator assign Job Training Assessments (JTAs) to determine which BNL and NSLS-specific training must be given to support operational activities. NSLS management and supervisors will attend BNL required training and any training deemed necessary by the NSLS Chairman.

## 6. Planning for safety

All operational activities are carried out under the constraints of the [NSLS Accelerator Safety Envelope \(ASE\)](#) and according to the Operational Safety Limits (posted in the NSLS Control Room). Policies and procedures in the [NSLS PRM](#) and Facility manuals were developed to meet these constraints and are expected to be understood by all affected personnel. The policies and procedures within the NSLS PRM address department specific requirements within the BNL [Standards Based Management System \(SBMS\)](#). Operations Coordinators are trained to implement these NSLS policies for beamline operations.

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## CHAPTER II

### SHIFT ROUTINES & 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 the 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 Operations Section Head or designee promptly of unusual or unexpected situations will help to assure that attention is given to any problems. The Operations Section Head is responsible for NSLS operations and formally transfers authority to operate to the Operations Supervisor. The Operations Section Head decides on the response to abnormal conditions and reviews and approves any special tests. NSLS personnel must follow the proper practices for industrial safety, radiological protection, environmental, health, and quality assurance.

#### C. PRACTICE

##### 1. Status Reports

Operators & Coordinators must monitor the various instruments that provide the NSLS status and the operations of the facility. The operations group follows the occurrence reporting requirements stated within BNL subject area, "[Occurrence Reporting and Processing System](#)" (ORPS). If the occurrence involves personnel safety, health, or is environmental, the NSLS ES&H Coordinator and/or Safety Officer shall be notified. Operators must notify the Head of the Operations Group or designee when the machine has been down for more than two hours. Operators must prepare a fault report for all unscheduled downtime. The Operations Supervisor prepares status reports on downtime and machine performance for management review.

##### 2. Safety Practices

During operations, a fully qualified Machine Operator and two fully qualified Operations Coordinators shall be on duty. These individuals shall follow operations and ESH&Q guidelines and procedures stated within the Operational Safety Limits, NSLS Policies and Requirements Manual (PRM), the Accelerator Safety Envelope (ASE), NSLS QA Manual, the BNL Standards Based Management System (SBMS), and operations procedures within the facility manual.

The Machine operator must assure that the RAD MON micro is functioning while the LINAC-Booster, VUV ring, or X-Ray ring are in operation. This requirement is addressed in more detail in NSLS Procedure, "Response to "Workday & Hourly Radiation Alarms - Channel 26".

##### 3. Inspection Tours

Operation Coordinators carry out regular tours of the experimental areas at least once per shift. Checks are made to insure beamline conformance with the Experimental Safety Approval Form (SAF), the Beamline Safety Checklist, the Beamline Padlock Checklist, and Beamline Vacuum Procedures. Significant abnormalities encountered will be recorded in the operations log and disseminated to the

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appropriate responsible individual. Beamline status is monitored both locally and via computer. Tier I inspections are completed by the NSLS Safety Engineer on a routine basis for all NSLS areas and followed up to ensure conformance.

#### 4. Personnel Protection

The Operations Section Head in conjunction with NSLS ESH&Q division manager reviews operational practices to maintain personnel exposures to hazards "As Low As Reasonably Achievable" (ALARA). The [Radiation Safety section](#) of the NSLS PRM contains numerous policies and procedures that are specific to the NSLS and address the BNL ALARA Program. Areas addressed in this section include [Collective Dose Goals](#), [Administrative Control Levels](#), and [Safety System Work Permits](#). The NSLS ESH Coordinator monitors the dosimeter reports on a monthly basis and, if the need arises, disseminates any discrepancies to the worker and his/her supervisor.

The NSLS [Work Planning and Control](#) process applies to all physical work performed within the NSLS. 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. In addition, the NSLS Policies & Requirements Manual addresses [ES&H 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 Operations Section Head and Operations Supervisor in conjunction with the NSLS Safety Officer, and NSLS Training Coordinator determines which BNL safety courses and NSLS-specific courses operational personnel must take. All Operators and Coordinators receive "Radiological Worker I Training" and "HAZCOM Training". BNL Facility Support Representatives assigned to the NSLS carry out routine radiation surveys and perform surveys at the request of the Operations Group and NSLS Safety Staff. There is an ongoing radiation monitoring process for the experimental floor using Thermoluminescence Dosimeters (TLD's) and chipmunk devices, which are routinely monitored by the NSLS safety officer and Facility Support representatives.

#### 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 Operations Section Head or designee is responsible for scheduling corrective actions and notifying all effected personnel of operational problems.

#### 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 limit. Corrective action by the operator or technical staff is taken and reported as needed. Major occurrences are reported and investigated as required by BNL subject area, ["Occurrence Reporting and Processing System" \(ORPS\)](#).

#### 7. Authority to Operate

The NSLS Chairman vests authority for operation of the facility with the Deputy Chair for **Accelerator & Operations**, and the Operations Section Head. The Operations Section Head has the authority to call upon the resources of any division of the NSLS to ensure the safe and efficient operation of the facility. The Operations Section Head transmits the authority to operate to the Operations Supervisor but maintains the responsibility for all NSLS operations. The Machine Operators and Operations Coordinators are responsible for operating the NSLS safely and efficiently by adhering to operation

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procedures, operational safety limits, ES&H, and NSLS quality assurance requirements. Any work by support groups, which might impact the operation of the accelerators, shall be approved by the on-duty Machine Operator.

### **8. Shift Operating Base**

The NSLS Control Room is the base of NSLS accelerator operational activities including communications and shift turnover.

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

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



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## CHAPTER III

### CONTROL AREA ACTIVITIES

#### A. INTRODUCTION

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

#### B. DISCUSSION

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

#### C. PRACTICE

##### 1. Access to the Control Area

The NSLS Control Room is a posted restricted area with access limited to authorized personnel. The Operations Supervisor or on duty Operator grants entry to the control room 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 Operations Section Head and Machine 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 control room must be staffed at all times when the accelerator machine equipment is operating (i.e. operations, studies, and short-maintenance periods where monitoring of equipment is needed). Only knowledgeable personnel shall be permitted to monitor the control room in the absence of the on-duty operator. Operators monitor, prepare printouts and save files of the main operating parameters and major changes in operational requirements. Operators and Coordinators log and respond to malfunctions and alarms according to established procedure so that effective corrective action can be taken.

NSLS machine status is displayed on monitors located above the operator console and individual equipment status is available via the operations computer terminals and website. All machine set points are stored in computer memory and can be restored or compared to the current set points. All equipment is individually protected to "failsafe" and does not depend upon computer intervention.

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

The Operations Section Head and Operations 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

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Only operators trained and authorized by the Operations Group Section Head or designee may operate the NSLS controls. A list of qualified operators and coordinators is posted in the control room and maintained as part of the NSLS 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 Operations Section Head formally approves their ability to operate the controls. In addition Physicists and Engineers may operate equipment that they have the responsibility for and perform machine studies in accordance with NSLS Conduct of Operations and with the knowledge of the on-duty operator.

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## CHAPTER IV

### COMMUNICATIONS

#### A. INTRODUCTION

Communications should be reliable and accurate when transmitting information within the NSLS. Communications systems should be designed to insure that information is readily accessible to NSLS staff and users.

#### B. DISCUSSION

Verbal and computer communications are the primary means of sending 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 to 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 NSLS control room utilizes the BNL telephone system and Fire Radio System to contact BNL emergency response personnel. The emergency number is extension 2222 or 911 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. Communication systems are tested periodically to insure they are functional.

The NSLS on-duty Machine Operator is the "Acting Local Emergency Coordinator" for the NSLS facility as specified in NSLS procedure "Response to Emergencies at NSLS" (Operations Group Response) contained in the Facility Manual.

The BNL "Plectron Receiver" sounds in the control room and transmits information on BNL emergencies, evacuations, weather alerts, etc. The BNL Safeguards and Security Division transmits the emergency information through this system.

The automatic fire alarm system sounds warning bells and illuminates strobe lights (in high noise areas) across NSLS areas 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 the NSLS. In conjunction with the fire alarm system, the operator utilizes the Public Address (PA) system to disseminate important information to personnel throughout the building. The operator can override telephone access to the PA system and gain full control during an emergency. The Plectron Receiver, fire alarms, and PA system are tested periodically.

##### 2. Public Address System

The public address system is used to broadcast information regarding machine operations to the experimental floor. The system is also used to make general announcements that are broadcasted on the experimental floor areas and on monitors tied into the NSLS display system. The microphone for this

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system is situated in the Control Room and is controlled by the on-duty Machine Operator. The PA system may also be accessed from any telephone system on extension 7878. The messages transmitted by way of the telephone are restricted to the experimental floor areas and monitors connected to the NSLS display system only. The control room microphone may be used to selectively broadcast to the VUV floor, X-Ray floor, both areas including monitors connected to the NSLS display system, or the entire building (used for emergencies).

Excessive use of the PA system for contacting department personnel and unnecessary announcements should be avoided. For normal communications pocket pagers, facility telephones, cellular phones and e-mail are used.

### **3. Contacting Operators**

The machine operators can normally be contacted using the telephone system at extension 2550. Experimenters may contact the Operations Coordinators by pocket pager #5824 or on telephone extension 5046. Portable radios are utilized by the Operations Coordinators to maintain contact with the control room and each other for operational and emergency situations.

### **4. Radios**

Portable radios are used throughout the NSLS by the operations staff to maintain contact with the control room and each other. Channel F1 is dedicated to operations and will transmit to the control room. Channel F2 can be used to transmit from radio to radio. Channel 3 is used to transmit directly to BNL Fire Rescue. Other groups may use the "Loaner" radios that 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 and Coordinators should only use commonly known abbreviations and acronyms in communications.

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

Verbal instructions should be clear and 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 understood.

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## CHAPTER V

### CONTROL OF ON-SHIFT TRAINING

#### A. INTRODUCTION

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

#### B. DISCUSSION

On-the-job training is that part of the training in which the trainee receives hands-on experience with NSLS controls and equipment. Experienced operations personnel supervise this instruction. The Operations Section Head and Operations Supervisor, in conjunction with the NSLS Training Coordinator, is 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 Operations Section Head and Operations Supervisor, determine the training requirements, duration of training and when an operator is qualified to operate the NSLS without direct supervision. In addition, a checklist shall be used to assure completion of training requirements as part of the Qualification Matrix Process.

Trainees are required to familiarize themselves with the NSLS Facility Manuals, NSLS systems, policies, and procedures. The Operations Section Head and Operations Supervisor selects which NSLS-specific, BNL-wide, or other training programs personnel must attend to be qualified to operate or use the facility.

The Operations Section Head 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](#)" subject area. Required training courses for the NSLS Operators and Coordinators are located in the [Brookhaven Training Management System \(BTMS\)](#) under NSLS operator coordinator JTA. On-the-job training checklists are part of the Qualification Matrix for the Machine Operators and Operations Coordinators. This training must be completed and approved prior to Machine Operator/Operations Coordinator qualification.

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

The Operations Section Head, authorized by the NSLS Chairman and Deputy Chair for Accelerator and Operations, has the authority to operate the NSLS. The Operations Section Head determines who is qualified to instruct the trainees. Instructor qualifications will be documented and retained according to the BNL "[Training and Qualifications](#)" subject area.

##### 3. Qualified Operator Supervision & Control of Trainees

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Qualified operators supervise training whenever trainees operate equipment, insuring that errors are not made that could degrade NSLS safety or operation. Qualified Operators review information recorded by trainees in the operator's log.

#### **4. Operator Qualification Program**

The Control Room Supervisor shall approve the Machine Operator Qualification Program. The Control Room Supervisor shall coordinate any changes in the program. The Operations Section Head or designee, and the operations supervisor shall provide their signature of approval for qualified Machine Operators and Operations Coordinators.

#### **5. Training Documentation**

Completion of the Operator and Coordinator training program shall be documented in accordance to the BNL "[Training and Qualifications](#)" 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 one new Operator trainee and no more than two new Operations Coordinator trainees on any given shift.

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

The Operations Supervisor decides when an operator or coordinator 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's 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 are required to appropriately report abnormal events or conditions that they perceive may

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

When an abnormal event or condition is reported to a Department Chair/Division Manager, it is subsequently relayed to an Event Categorizer who determines if the event or condition meets the criteria for a reportable occurrence. The Event Category drives a graded approach to the level of follow-up actions required for internal and external notifications, occurrence investigation and analysis, and occurrence reporting. After a reportable occurrence is categorized and appropriate notifications are made, it is evaluated to assess its significance and programmatic impact, causal factors, generic implications, and the need for and implementation of corrective actions. The information identified in this process forms the basis for the Final Occurrence Report. This information also assists in improving policies and procedures and communicating lessons learned.

#### C. PRACTICE

##### 1. Events requiring investigation

The BNL SBMS subject areas, "[Event/Issues Management](#)" and "[Occurrence Reporting and Processing System \(ORPS\)](#)" lists all events requiring investigation of abnormal events.

##### 2. Investigation Responsibilities

Staff appointed by the NSLS Chairman or designee shall act as Facility Managers for the NSLS Department. A list of Facility Managers is located in the NSLS Control Room "Call-In list".

##### 3. Investigator Qualifications

The NSLS Chairman or designee in conjunction with the Operations Section Head is responsible for appointing knowledgeable persons from the facility and BNL safety professionals to investigate events.

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BNL staff members from the Environmental, Safety & Health, (ESH) directorate, are available to assist in investigations.

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

NSLS 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.

#### **5. Event Investigation & Report**

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 \(ORPS\)](#)".

#### **6. Event Training**

Information collected by NSLS personnel and by the BNL ORPS Coordinator of the BNL Quality Management Office (QMO) will be used for "lessons-learned" feedback to NSLS/BNL personnel, so that operations, maintenance and training can be improved. The NSLS Operations and ESH&Q groups develop and carry out annual drills dealing with emergency situations that might reasonably be expected to occur during NSLS operations.

#### **7. Event Trending**

The ORPS Coordinator/QMO tracks all occurrences and issues reports to NSLS Safety personnel for review and analysis.

#### **8. Sabotage**

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



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## CHAPTER VII

### NOTIFICATIONS

#### A. INTRODUCTION

NSLS 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 operations supervisor or facility manager upon the event or discovery of the event.

#### C. PRACTICE

##### 1. Notification Procedures

The Department Chair/Division Manager contacts the Event Categorizer via pager number 631-433-0443 as soon as practical, but allowing enough time so that a determination of reportability will take place within two hours of the event or condition discovery. . The NSLS Emergency Plan, maintained in the NSLS Facility Manual, describes notification procedures in the event of an emergency.

NSLS policy dictates that the Operations Section Head or designee is notified when the machine has been down for longer than two hours. The on-duty Machine Operator normally decides when to call responsible personnel from the Equipment Information System or call-in list.

##### 2. Notification Responsibility

For operational situations, the NSLS Operations Section Head or designee is responsible to ensure that those individuals listed on the appropriate call-in list have indeed been notified and that any requirements for notification have been complied with.

##### 3. Names and Phone Numbers

The names and phone numbers of the NSLS Facility Manager and alternates for emergencies and abnormal events are listed in the NSLS Control Room Call-In List book. The Equipment Information System can be used to determine the responsible individual for a particular piece of equipment or system.

##### 4. Documentation

The BNL QMO maintains the documentation for all occurrences. The NSLS Machine Operator and/or Operations Coordinator are required to record all relevant information associated with emergencies and abnormal events in the operations log.

##### 5. Communication Equipment

The on-duty Machine Operator will use the BNL telephone system to notify NSLS management of an occurrence. The NSLS Facility Manager or designee will notify the Event categorizer by telephone or pager.

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## CHAPTER VIII

### CONTROL OF EQUIPMENT AND SYSTEM STATUS

#### A. INTRODUCTION

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

#### B. DISCUSSION

Machine Operators must be aware of how the equipment and systems function. Machine Operators and Operations Coordinators also 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 operations logbook(s), or by using other methods to allow Operators to review the changes.

The status of the equipment and systems is controlled according to NSLS procedures, which includes ensuring conformance with operational safety limits before changes are made to operational modes and including 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

Modifications or additions to the NSLS facility or equipment require a review in accordance with NSLS PRM, "[Facility Design and New Program Review](#)". The Operations Section Head or designee may authorize non-safety operational changes. Equipment group personnel must notify the on-duty Machine Operator of any equipment changes that may affect the performance of the NSLS. Machine Operators insure that changes in the NSLS configuration and status are communicated to all accelerator operations personnel and must document those changes in the NSLS operations log. Computer "Restore" files are used to place the NSLS equipment in a baseline configuration for startup.

The configuration of experimental beamlines is reviewed and documented by the NSLS Beamline Review Committee in accordance with NSLS procedure, "[Beamline Safety Review](#)". The Beamline Review Committee works with the ES&H committee and the Safety Officer, reporting to the NSLS ESH&Q division manager. Upon completion of a newly built or modified beam line, the Safety Officer, in conjunction with the beam line review committee, performs a final review of the experimental beamline before permission to operate is given. Individual experiments are all reviewed prior to operation via an [Experimental Safety Approval Form \(SAF\) review](#) by the Experimental Review Coordinator (ERC).

##### 2. Equipment and Systems Check

Equipment operational checks are carried out after shutdowns for maintenance or repairs. Checklists are used as needed or appropriate. Machine startup and shutdown checklists are maintained in the control room. The Operations Section Head is responsible for insuring adequate commissioning time and training after equipment or system changes.

Configuration control is exercised on the beamlines through intervention and oversight by the Operations Coordinators, Safety Officer, Safety Engineer, and Quality Manager. Prior to operation or after a lockout

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condition, a detailed [Beamline Safety Checklist](#) must be completed and signed before the beamline is enabled. In addition, beamline padlock checklists/logs are either checked or verified prior to operations when applicable.

Work on the beamline hardware or interlocks require a lockout and if applicable, the completion of an [NSLS Safety Work Permit](#). An interlock test must be completed if the integrity of the interlock system has been changed. A checklist is used to record the results of the tests and is maintained by the NSLS ESH Group.

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

The Qualification Matrix for each group identifies the equipment and personnel trained to LOTO that equipment either at the Authorized Knowledgeable or Responsible level. The Operations Section Head and/or Operations 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 Safety Officer, Safety Engineer, or Quality Manager to be a hazard during open-access to the storage rings or beamline enclosures. Refer to [Chapter IX](#) in this manual for further information on lockout/tagout.

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

All NSLS equipment is designed to be self-limiting and in addition, contains protective devices (e.g. temperature & water flow switches) to prevent a safety hazard or equipment damage. However, to operate within the design parameters of the [NSLS Accelerator Safety Envelope \(ASE\)](#), and also to keep radiation exposures "As Low As Reasonably Achievable" (ALARA) certain Operational Safety Limits (OSL) have been established and are posted in the NSLS Control Room. The on-duty Machine Operator is responsible for maintaining these operational limits.

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

Equipment and system faults are noted in the operations log and a fault report sent to the responsible group supervisor or engineer. The Operations Supervisor generates monthly and yearly fault charts.

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

Maintenance and equipment upgrades are planned on a monthly basis. Work schedules are drawn up by the Maintenance Coordinators and approved by the Deputy Chair for Accelerator and Operations or designee. The schedules are distributed to all applicable personnel and are posted in the NSLS Control Room. The operations group in conjunction with the Mechanical and Electrical Engineer Section Heads plan long-range shutdowns. Preventive maintenance is performed on a work order basis generated by the [Equipment Information System \(EIS\)](#) database. The maintenance coordinator maintains this database system. Refer to NSLS document, "Maintenance Management Program" for further maintenance information.

Experiments operate under the limits imposed by the Experimental Safety Approval Form, signed by the Experimental Review Coordinator (ERC). The NSLS [Safety System Work Permit](#) and [Work Planning](#) program is used to monitor and control all work in progress on the accelerators and beam lines, which may affect safety, environment, programmatic impact, and quality assurance.

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

The responsible equipment groups prior to operational startup perform post-maintenance equipment checks. These checks ensure that the startup is performed in an efficient manner and the storage rings operate at their design/normal operating levels.

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The on-duty Machine Operator checks and records certain operational outputs versus equipment set points as part of the machine turn-on procedure. Computer "Save and Restore" programs are used to set the machine parameters to a baseline configuration and other programs check equipment for errors.

Following any work on the safety system the entire system is rigorously functionally tested and documented by the Safety Officer, Safety Engineer, and/or Quality Manager.

Work which may affect beamline and ring configuration is monitored by work permits, safety system work permits, and the beamline safety & padlock checklists. They are revised and approved prior to experimental beamline and accelerator restart.

## 8. Alarm Status

Operators and Coordinators are trained to respond to NSLS equipment and system alarms. After establishing and/or correcting the cause, the Operator, Coordinator, or responsible technician may reset equipment alarms.

The Fire alarm status is latched at the NSLS remote fire alarm display panel in the control room and at the BNL firehouse. The Machine Operators and Operations Coordinators are trained in responding to emergencies in accordance with NSLS procedure, "Response to Emergencies (Operations Group Response).

NSLS areas monitored for oxygen deficiency hazard (ODH) contain safety system hardware which display the system status. Faults are latched and indicated by lights and/or audible alarms that require review and resetting by the safety personnel according to procedure.

## 9. Temporary Modification Control

The Operations Section Head or designee must approve temporary modifications. They shall be logged in the operations log book(s) by the on-duty Machine Operator and/or Operations Coordinator. All modifications to safety systems must be approved and documented by the NSLS ESH&Q division manager, Safety Officer, Safety Engineer, and/or Quality Manager.

Temporary operating procedures must be prepared in accordance with NSLS procedure "[Temporary Procedures](#)". These temporary procedures must be reviewed by the on-duty Machine Operator and/or Operations Coordinator at the start of their shift.

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

The NSLS Master File maintained in the NSLS Design Room contains the latest design documents including drawings and specifications, design review documents, beam line reviews, incoming test documents, and non-conforming material control documents. These documents are maintained and controlled in accordance with NSLS QA procedure, "[Drawing and Specification Distribution](#)". The NSLS Facility Manual maintained in the NSLS Control Room contains the latest NSLS operations policies, procedures and revisions. These documents are controlled, maintained, and tracked by the NSLS 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. The NSLS shall perform Lockout/Tagout according to [BNL subject area "Lockout/Tagout \(LOTO\)"](#) and NSLS 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

NSLS specific procedure "[Lockout/Tagout Requirements](#)" and BNL subject area "Lockout/Tagout (LOTO) provide guidance and requirements on the use of Lockout and Tagout devices. In addition, the procedures address the following areas:

- Lockout/Tagout Implementation
- Protective Materials and Hardware
- Lockout/Tagout Program
- Procedures for Lockout/Tagout
- Application of Lockout/Tagout
- Lockout/Tagout Implementation
- Outside Contractors
- Group Lockouts
- Shift or Personnel Changes

Personnel working at the NSLS shall use Lockout and Tagout devices to isolate energy sources when required. Locks, tags, and lockout devices are available in the NSLS Control Room. 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

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Testing or positioning of equipment at the NSLS shall be accomplished only by authorized and trained personnel.

### 3. Periodic Inspections

The Operations Section Head or designee shall periodically audit the lockout/tagout logbook and outstanding tags. 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 at the NSLS 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 NSLS Operations Group specific yellow caution tags are available in the NSLS Control Room. The NSLS "[Caution \(Yellow\) Tags](#)" procedure provides the policies and requirements for the use of caution tags in the NSLS.

### 5. Training and Communication

The BNL Training Program provides the general electrical and lockout/tagout training through classroom instruction and/or computer-based training (CBT). NSLS supervisors and/or system experts provide on-the-job training to obtain authorized worker status and document the training in the Qualification Matrix process. A list of LOTO authorized workers is included in the NSLS [Qualification Matrices](#).

### 6. Notification of Personnel

Lockout of equipment affecting the performance of the NSLS storage rings, other than maintenance periods, must be with the knowledge of the on-duty Machine Operator and noted in the operations logbook. BNL subject area "Lockout/Tagout (LOTO establishes generic notification requirements.

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## CHAPTER X

### INDEPENDENT VERIFICATION

#### A. INTRODUCTION

The independent verification program provides a high degree of reliability in the NSLS operation. 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, radiation shielding, etc.) are reviewed by the NSLS Operations Section Head, Engineering Section Heads, NSLS ESH Committee, Interlock Working Group Committee, or Beamline Review Committee prior to installation, and are inspected and authorized for operation by the NSLS Safety Officer, Safety Engineer, and/or Quality Manager after any modifications or extended NSLS shutdown.

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 NSLS performance 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 NSLS Safety Officer/Engineer after any modification or extended NSLS shutdown. Qualified NSLS ESH Group members test beamline and accelerator radiological interlock systems and class IV laser interlock systems in accordance with NSLS procedure "[Interlock Safety](#)". The responsible technical groups perform equipment turn on and performance checks after extended shutdowns and prior to machine startup.

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### 3. Verification Techniques

The Machine Operators, Operations Coordinators, and NSLS technical staff are trained in the techniques for verifying the status of NSLS equipment. Computer applications programs, software and hardware limits, and alarms continuously verify the status of NSLS 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 machine startup. The correct procedure is enforced by the safety system logic, which will not permit the safety system "ring secured" enable condition if the incorrect procedure is used. Redundant door switches monitor access door positions in beamline hutches 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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## CHAPTER XI

### LOGKEEPING

#### A. INTRODUCTION

Operations records contain a narrative log of the NSLS status 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 operations staff.

#### B. DISCUSSION

Operation logs are established to record the data necessary to provide a history of the NSLS's operation. 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 operations personnel are aware of the information in the logs.

#### C. PRACTICE

##### 1. Establishment of Operating Logs

The NSLS Machine Operators and Operations Coordinator paper logs are maintained in the NSLS Control Room. Electronic logs are maintained on the NSLS computer server, which is routinely backed-up. Entries are made only by NSLS Operators, Operations Coordinators, Operations Supervisor, Head of Operations, or by an individual with permission from any of the aforementioned.

##### 2. Timeliness of Recordings

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

##### 3. Information to be Recorded

The Operations Coordinator logs must be stamped and signed by the on-coming shift personnel after they have read and understood the content. Machine Operators need to log into the electronic Machine Operators log at the start of each shift. All information pertaining to the safe and efficient operation of the NSLS is recorded in the operations logbooks. To aid in reconstructing events, as much information as possible is logged during emergencies, and abnormal or unexpected events.

Minimum information required:

- Machine modes for X-Ray/VUV rings, undulators, and wigglers (e.g. operations, shutdown, maintenance, bunch pattern, system contents, system position, etc.);
- Changes in NSLS operating mode or condition;
- 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;
- Initiation and completion of tests or studies;
- Security, Medical, and Fire incidents;
- Shift relief and call-ins;
- Completion of activity (e.g. monitored beam line bleed-up, padlock removal, enabling of beam line, etc.);
- New or changes to radiological postings.

#### **4. Legibility**

All log entries must be legible, understandable, and made in pen of a color that can be photocopied (for paper logs).

#### **5. Corrections**

Incorrect entries are scored with a single line and initialed. References to incorrect entries are made in the shift summary.

#### **6. Log Review**

The Operations Section Head and/or Supervisor review the operations logbook on a periodic basis. The section head will provide a signature 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.

#### **7. Care and Keeping of Logs**

The Operators Supervisor has the responsibility for filing and storing the logs for the expected life of the facility. Backlogs are available from the Operations Supervisor for review by Operators, Coordinators, or staff returning after an absence. The logs must be backed-up and retained in accordance with the records management subject area.

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## CHAPTER XII

### OPERATIONS TURNOVER

#### A. INTRODUCTION

Operations turnover provides oncoming operators with an accurate picture of the overall status of the NSLS. 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 the NSLS's operation. 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 off-going personnel have a high degree of confidence that an appropriate information transfer has taken place.

Oncoming personnel shall review the 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 NSLS. Appropriate shift-overlap time must be allowed to accomplish proper information transfer.

#### C. PRACTICE

##### 1. Turnover Checklists

Computer "Save and Restore" files are used to store all machine parameters and are used in place of shift checklists. The on-coming Operator will familiarize himself/herself with the current save and restore files. In addition, each shift logs files used and changes in parameters.

##### 2. Document Review

Oncoming Machine Operators and Operations Coordinators use the first several minutes of the shift scanning various monitors, alarm displays, computer pages and reading the on-going log to familiarize themselves with the current operating conditions.

##### 3. Control Panel Walkdown

As part of operator take-over, the on-coming Machine Operator and Operations Coordinator reviews the machine status and previous operational history displayed on TV monitors in the control room.

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

Before taking responsibility for operating the NSLS, the on-coming Machine Operator and Operations Coordinators will sit with their out-going counterpart to ensure that he/she is fully cognizant of the operating conditions. The Machine Operator and Operations Coordinators- will then sign their names in the log.

##### 5. Shift Crew Briefing

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The on-coming Machine Operator and Operations Coordinator is given a verbal briefing by the out-going Machine Operator/Operations Coordinator, covering what has occurred since he/she was last on shift. In addition, the on-coming Operator and Coordinator will review the log since his/her last working shift.

## **6. Reliefs Occurring During the Shift**

The on-duty Operator may be relieved from the control room by the Operations Supervisor, a qualified Operator, or a qualified Operations Coordinator, cognizant with the operating conditions of the facility. The Operations Supervisor, a qualified Operations Coordinator or a qualified Operator may relieve the on-duty Operations Coordinator. The on-coming Machine Operator or Operations Coordinator is given a verbal briefing by the out-going Machine Operator or Operations Coordinator when a relief occurs during the shift.

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## CHAPTER XIII

### OPERATIONS ASPECTS OF FACILITY PROCESS CONTROL

#### A. INTRODUCTION

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

#### B. DISCUSSION

The Machine Operators and Operations Coordinators must understand process control operations. They also must understand and maintain the safe handling of chemicals and gases.

#### C. PRACTICE

##### 1. Operator Responsibilities

The Operations Coordinators, who have the responsibility for safety on the experimental floor, are trained to monitor systems and respond to adverse situations in those systems. Examples are the cryogenic facilities, machine cooling systems, liquid nitrogen storage facility, and beamline safety systems.

##### 2. Operator Knowledge

On-the-job training (OJT) takes place for machine support systems. In addition, training is accomplished through formal BNL and NSLS training in HAZCOM, and Radiation Worker Training. Training is documented and recorded by the NSLS Training Coordinator, operations supervisor, in a qualification matrix or in the BTMS.

##### 3. Operator Response To Process Problems

NSLS Operators and Operations Coordinators are trained to make appropriate responses to out of normal 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 operations log in the NSLS Control Room.

##### 4. Communication Between Operators and Process Personnel

Fault reports are generated by the on-duty operator and sent 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 have arisen.

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## CHAPTER XIV

### REQUIRED READING

#### A. INTRODUCTION

A file of required reading for 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

NSLS operations personnel receive important information from various groups and individuals through the Operators Supervisor or designee, who is responsible for distribution of information to the operators.

#### C. PRACTICE

##### 1. File Index

A list of documents maintained in the Operator and Coordinator required reading file include:

- The operational logs.
- The NSLS Conduct of Operations.
- The [NSLS Policies and Requirements Manual \(PRM\)](#).
- Safety requirements (e.g. Emergency Plan - Bldg. 725, Response to emergencies at the NSLS).
- X-Ray Tunnel Search, VUV Ring Search, and LINAC/Booster Search procedures
- Operational Bulletins (containing changes in operational procedures and equipment).
- Operational schedules, maintenance, and studies schedules.
- The NSLS operational procedures.

##### 2. Reading Assignments

The Operators Supervisor assigns reading assignments to the Machine Operators and Operations Coordinators. Certain assignments require signatures by the Machine Operators and Operations Coordinators to indicate that they have read and understood the document.

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

The Machine Operator and Operations Coordinator logs must be read by the on-coming shift before relief of the out-going personnel. Operational Bulletins, information pertaining to operational schedules or changes must be read by the on-coming Operators and Coordinators such that they are fully cognizant with the status of the facility before taking over the shift. Completion dates for all other required reading is determined upon assignment.

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#### **4. Documentation**

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

#### **5. Review**

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

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## CHAPTER XV

### TIMELY ORDERS TO OPERATORS

#### A. INTRODUCTION

There shall be a means for NSLS management to communicate short-term information and administrative instructions to operations personnel. Other ways of directing Operators and Coordinators are discussed in Chapter XVI, Operations Procedures, and Chapter XVII, Operator Aid Postings.

#### B. DISCUSSION

The changing requirements of NSLS operations require that there is a program to quickly issue information to operations personnel.

#### C. PRACTICE

##### 1. Content and Format

Special information required on a particular shift is written in the log(s) or issued as a bulletin by the Operations Supervisor and verbally emphasized during briefing. 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 shall be prepared in accordance with NSLS procedure, "[Temporary Procedures](#)".

Operations schedules, schedule changes, and other operational information are displayed on display monitor information channels and the NSLS website.

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

The Operations Supervisor gives out shift orders to the Machine Operators and Operations Coordinators. The Operations Section Head or another NSLS manager occasionally gives special instructions to the operators. However, these special instructions have the prior approval of the Operations Supervisor.

##### 3. Removal of Orders

The Operations Supervisor is responsible for canceling and removing orders that are no longer applicable. The Operations Supervisor periodically reviews operations bulletins and postings to assure that they are current.



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## CHAPTER XVI

### OPERATIONS PROCEDURES

#### A. INTRODUCTION

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

#### B. DISCUSSION

Procedures are a key factor affecting the Machine Operator's and Operations Coordinator's performance. 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 insure 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 all normal operations, 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 Machine Operators and Operations Coordinators, 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 department requirements for procedure development, content, changes & revisions, approval, review, availability, and use are included in the NSLS QA procedure, "[Document Preparation and Control](#)" and in "[Temporary Procedures](#)". Specific requirements relating to the operations and ESH&Q group are discussed in the following sections.

NSLS and BNL ESH&Q personnel develop safety and emergency procedures.

##### 2. Procedure Content

To provide uniformity in operations procedures, NSLS procedures conform to the following guidelines:

- a.) All procedures must be prepared in accordance with NSLS procedure, "[Document Preparation and Control](#)" or "[Temporary Procedures](#)" (as applicable).
- b.) To enhance rapid retrieval, emergency procedures are kept separate from normal operations procedures and are distinguishable by the use of a Red colored binder.
- c.) Procedures include information from source documents, such as the [NSLS Accelerator Safety Envelope \(ASE\)](#) and NSLS Machine Operating Limits (posted in the NSLS Control Room).
- d.) Warnings, notes, and cautions are easily identifiable (printed in bold) and appear on the same page as the step to which they apply.

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### 3. Procedure Changes and Revisions

Changes and revisions to procedures are made to reflect current operating practices and requirements. Operations staff must be notified of all revisions to operational and applicable ESH&Q procedures when they are released. When notified, they are required to read and understand the changes and revisions without any further direction. The operations supervisor 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 Operations Section Head or designee, and/or the operations supervisor review operations procedures before issuance and approval. The Operations Supervisor is responsible for approving all Operations procedures.

### 5. Procedure Review

NSLS ESH&Q personnel review safety and emergency procedures to insure all appropriate aspects have been fully covered before issuance. The NSLS ESH&Q 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.

Operational procedures, bulletins, postings, computer applications programs and files are periodically reviewed by the Operations Supervisor to insure that they are accurate and current. When applicable, new procedures should be walked through to ensure their workability.

### 6. Procedure Availability

Controlled copies of operations procedures are maintained in the NSLS Facility Manual for quick reference. The facility manuals are located in a designated area within the NSLS control room. Controlled copies of emergency procedures are also included in the NSLS Facility Manual for quick reference. ESH&Q documentation is accessible from the [ESH&Q website](#).

Operational applications programs for all areas of the NSLS are available at the operators console and at other conveniently located computer terminals throughout the facility.

### 7. Procedure Use

NSLS 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.

Machine Operators and Operations Coordinators 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 Machine Operator and/or Operations Coordinator knowledge. Machine Operators and Operations Coordinators 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 AID POSTING

#### A. INTRODUCTION

Operator aids should provide information to Operators and Coordinators in performing their duties. An operator aid program should be established to insure that the operator aids posted are current, correct, and useful.

#### B. DISCUSSION

Operator aids have an important function in the safe operation of the NSLS and may come in many forms: complete or partial copies of procedures, system drawings, hand written 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. Operator Aid Development

Any NSLS technical staff member may develop an operator aid; however, the Operations Section Head or Operations Supervisor must first approve them before posting in the control room. Help aids are developed by the Computer Systems Group, in consultation with the Operations Section Head, for the operations applications programs. Equipment operating aids are developed by technical support groups and reviewed by the group supervisor or responsible engineer.

##### 2. Approval

The Operations Supervisor must approve of all operator aids used by the Machine Operator and Operations Coordinator on the NSLS Control Room Operator Aid Index. All other operator aids in the department are to be approved in accordance of NSLS procedure, "[Document Preparation and Control](#)".

##### 3. Postings

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

Operator aids are not required to be listed or entered into the operations log. Operator aids will be listed in NSLS Control Room Operator Aid Index.

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## 6. Review

During routine inspections of the control room area, the Operations Supervisor reviews operator aids to ensure that they 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 operator aids have been reviewed. NSLS ATS will be used to assist in tracking and monitoring the active operator aids.

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## CHAPTER XVIII

### EQUIPMENT and PIPING LABELING

#### A. INTRODUCTION

A well-established and maintained program for labeling equipment will help to insure that the NSLS 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 operations and maintenance personnel, enhances the effectiveness of training. It also helps to reduce errors in operations and by maintenance personnel. Errors can result from incorrect identification of equipment and controls. A good labeling program is consistent with NSLS's ALARA goals because the exposure of personnel to radiation and to hazardous materials is reduced if the 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 and support personnel to identify rooms, and if applicable, the equipment inside.

#### C. PRACTICE

##### 1. Components Requiring Labeling

- All equipment built by the NSLS technical personnel is labeled according to existing laboratory conventions (e.g. BNL subject area, "[Design and Installation of Electrical Equipment](#)"). Commercial 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.
- Equipment racks are labeled and their location documented.
- Equipment switches are labeled to indicate their associated device and operation.
- All transport line and ring magnets, together with their associated power supplies, are labeled with their appropriate mnemonic.
- Piping is labeled with its function and flow direction according to BNL Standard 1.14.0, "[Piping Systems, Identification of](#)".
- Also included in the facility-labeling program are cabinets containing hazardous substances, controlled areas, and room doors.

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## 2. Label Information

Label information is consistent with the information found in NSLS 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 NSLS/BNL group is responsible for insuring that missing or damaged labels, once identified, are promptly replaced. The Operations Section Head or designee is responsible for upholding these groups to this responsibility.

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