

# **National Synchrotron Light Source II**

## **Construction Environment, Safety and Health Plan**

### **for**

## **Conventional Construction**

### **of the Ring Building**

**July 2008**  
**April 2009 Revision 1**



**BROOKHAVEN**  
NATIONAL LABORATORY

Operated by  
Brookhaven Science Associates  
under contract with the  
U.S. Department of Energy

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Construction Environment, Safety and Health Plan for the  
Conventional Construction of the Ring Building**

**APPROVALS**

**Submitted:**

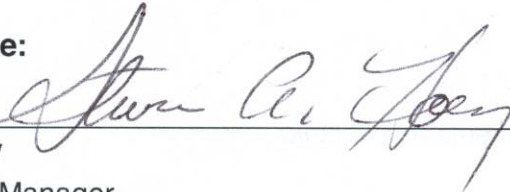


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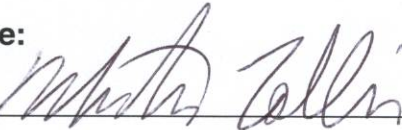


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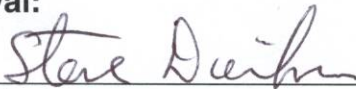


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**Record of Revisions**

<b>Rev. #</b>	<b>Effective Date</b>	<b>Section &amp; Page(s) Affected</b>	<b>Reason for Revision</b>
<b>1</b>	<b>4/3/09</b>	<b>Section 6.15 page 23</b>	<b>Typo corrected</b>
		<b>Section 6.19 page 27</b>	<b>Testing requirements modified to eliminate requirement for pre-employment alcohol testing. Determined to not be industry standard</b>

**ACRONYMS**

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
BNL	Brookhaven National Laboratory
BSA	Brookhaven Science Associates
CVO	Contractor Vendor Orientation
DART	Days Away Restricted or Transferred
DOE	U.S. Department of Energy
DOL	Department of Labor
EAP	Employee Assistance Program
ES&H	Environment, Safety and Health
EPA	U.S. Environmental Protection Agency
ISMS	Integrated Safety Management System
JHA	Job Hazard Analysis
LOTO	Lock-Out/Tag-Out
TLVs	Threshold Limit Values
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
NIDA	National Institute of Drug Abuse
NSLS-II	National Synchrotron Light Source II
NYS	New York State
OMP	Occupational Medicine Provider
PFAS	Personal fall arrest system
PHA	Phase Hazard Analysis
PPE	Personal Protective Equipment
SBMS	Standards-Based Management System

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## **1.0 CERTIFICATION LETTER**

Brookhaven Science Associates (BSA), the operator of Brookhaven National Laboratory (BNL), maintains certain safety, environmental, and health standards which are flowed down to all contractors and all levels of subcontractors.

BSA requires that each contractor working at BNL agree to these standards and certifies their intent. Appendix O is an example of such a certification letter. This letter must be signed by an officer of the General Contractor, and must be made part of the Environment, Safety and Health Plan submitted for this project. This requirement must also be made part of any contracts to each of the subcontractors performing work on this project.

## **2.0 BSA SAFETY POLICY STATEMENT**

The safety of all personnel is recognized as a primary concern to all participants at BNL's National Synchrotron Light Source II (NSLS-II). Unsafe conditions and unsafe behavior can result in injuries and deaths as well as impact schedules, cause financial losses, and damage professional reputations. As such, it is our goal that all project participants plan, manage, and execute their respective operations with the ultimate goal of conducting their operations injury-free on a daily basis.

It is the responsibility of each contractor and all tiers of subcontractor to adhere to the requirements of this plan. Each contractor and all tiers of subcontractor shall incorporate safety into the planning of each task, assure the safety of their personnel, provide all safety devices necessary for their employees, establish a safe and drug-free work environment, and confirm that their equipment meets the applicable safety standards. Each contractor and all tiers of subcontractors are responsible for any actions of their personnel that may endanger or otherwise expose other participants to potential hazards on the project site.

The Integrated Safety Management System shall be used to achieve these goals. The ISMS is a practical approach to the prevention of accidents with an emphasis on line management responsibility for safety. A central premise is that work planning starts with a focus on the nature of the job to be performed and assessment of the hazards involved in each step. Through the use of self-assessment and feedback contractor, continuous improvement in each contractor's and all tiers of subcontractor's safety process is expected.

Project participants are required to supervise and direct the work, using their best management skills and technical expertise. The contractor will be solely responsible for all work means, methods, techniques, sequences and procedures. This includes all safety precautions and programs in connection with the work, as well as coordinating all portions of the work. Each lower-tier subcontractor is likewise required to be responsible for all safety precautions and programs in connection with the work under the contractor's contractual agreement.

All personnel working on the project, including employees of the general contractor, and all subcontractors, who have been properly trained, have stop work authority for any task that represents an imminent threat to safety. Training is available via an on-line training course. Only the NSLS-II Project Manager (or designee) can authorize a restart of the identified task.

All levels of subcontractors will comply with the requirements of this Environment, Safety and Health Plan.

## 3.0 PURPOSE/INTRODUCTION

### 3.1 Definitions

**Brookhaven National Laboratory (BNL):** A research facility owned by the Department of Energy (DOE) located in Upton, New York

**Brookhaven Science Associates (BSA):** The prime contractor for operating BNL

**Contractor (GC):** The General Contractor is responsible for overall construction of the NSLS-II ring building. This is the company with whom BSA has a direct contractual relationship.

**Contractor Vendor Orientation (CVO):** Mandatory BNL-provided training for all contractor and sub-tiered employees.

**Project Manager:** This is the GC employee who has overall project controls, including budget and schedule, and has authority to speak for the General Contractor on all contractual matters.

**Project Safety Manager:** This is the general contractor's senior on-site safety representative.

**Project Superintendent:** This is the senior GC field representative who has overall day-to-day responsibility for the project.

**Subcontractors:** All subcontractor management and their employees working on the NSLS-II project

**The Plan:** This document, the Environment, Safety and Health Plan.

**The Project:** All work associated with the conventional construction of the NSLS-II ring building.

**BSA NSLS-II Project Team:** The BSA organization responsible for ensuring the successful completion of the project.

**BSA NSLS-II ES&H Manager:** A member of the NSLS-II Project Team who has overall environment, safety and health oversight for the project

**BSA NSLS-II Construction Safety Engineer:** A member of the NSLS-II Project Team having day-to-day construction safety oversight of the project.

### 3.2 General Information

The objective of this plan is to emphasize that the protection of people, the environment, and property is of paramount importance to the success of this project. To accomplish this objective, the project is committed to implementing the principles and functions of the Integrated Safety Management System described in the DOE Policy 450.4 and discussed in detail in Section 4 of this document.

While it is the responsibility of each individual to work safely, it is ultimately the contractor's and each tier subcontractor's management's responsibility to see that safety and health policies and practices are followed and enforced. The project expects each contractor's and subcontractor's supervisory personnel to be actively involved in promoting the safety and health program that they have agreed to implement on this project.

The project's goal is that of ZERO ACCIDENTS. The contractor and each tier subcontractor's line management are expected to promote this concept and develop, implement, and enforce a safety and health program that will result in a safe work environment. Safety is not to be compromised for production and must be considered an integral part of the work planning process.

### **3.3 Contractor and All Tier Subcontractor Safety Program**

A written Environment, Safety and Health Plan that meets or exceeds the requirements of this Plan must be submitted within three weeks after award of contract for review and approval by the NSLS-II project team.

All subcontractors shall also abide by the Environment, Safety and Health Plan submitted by the General Contractor. Each subcontractor must submit a letter to the GC stating that they understand the requirements of the Environment, Safety and Health Plan and will comply fully with its requirements.

The Contractor and all tier subcontractors shall budget to establish and maintain a safety and health program that meets or exceeds the requirements contained in this Plan and the applicable sections of 29 Code of Federal Regulation (CFR) 1910 and 1926, and 10 CFR 851, Worker Safety and Health Rule.

The Contractor and each sub-tier subcontractor are solely responsible for carrying out their safety and health program. Therefore, the NSLS-II Project requires that the Contractor and each sub-tier subcontractor designate a competent on-site employee to carry out this responsibility. Along with the Contractor and all tier subcontractors' line managers, this employee is directly responsible for ensuring that the safety program and employee actions comply with the minimum safety standards required by this Plan.

## **4.0 INTEGRATED SAFETY MANAGEMENT SYSTEM**

The Project has adopted the Integrated Safety Management System (ISMS) by contract as the overarching philosophy and approach to systematically integrate safety into work activities. The ISMS is the formal, organized process whereby the BSA NSLS-II Project plans, performs, assesses, and improves the safe conduct of work. The ISMS for the BSA NSLS-II Project is based on the fundamental principles and core functions discussed in DOE Policy P 450.4. The contractor and all subcontractors are committed to these fundamental principles and functions through contractual agreement. The use and implementation of this Plan is verified through the self-assessment and independent assessment processes.

The BSA-NSLS-II Project Team, its contractors, and subcontractors are committed to ensuring the health and safety of workers and the public and to protecting the environment. All work shall be performed safely and shall adhere to all applicable laws and requirements. Integral to this being accomplished is the workers' commitment to work safely and to work to the requirements.

### **4.1 Principles of the Integrated Safety Management System**

The fundamental principles described in DOE P 450.4, which are discussed below, are incorporated into the NSLS-II Project's processes to help ensure that facilities are adequately preserved, that work is conducted safely, and that suitable accident preventive and mitigative measures exist.

#### **Worker and Line Management Responsibility for Safety**

Line management is accountable for empowering workers with the training and authority necessary to establish and maintain safe operating methods commensurate with their assigned duties. Management expectations are clearly communicated to all personnel, personnel are empowered, their feedback is solicited, the tools necessary to accomplish the work safely are provided, and personnel are held accountable for their actions. Each individual, in turn, is responsible for his or her actions.

Line managers are responsible for training, motivating, and enabling their workers to understand and comply with the Project's commitment to safety, and for ensuring that work is accomplished within the authorization basis. Line managers are also responsible, by personal example and by involving their workers, for providing a working environment in which everyone is dedicated to meeting the commitment to safety.

#### **Clear Lines of Authority**

The Project's organizational structure focuses on management and worker involvement, and is centered on work planning and execution. Clear and unambiguous roles and lines of responsibility, authority, and accountability at all organizational levels must be established. Environment, Safety, and Health (ES&H) responsibility will be integrated into the Project work activities, and interfaces for processes and organizations will be clearly established to provide for good understanding and communication.

#### **Personnel Experience, Knowledge, and Skill**

The Contractor and each tier subcontractor must commit to using a workforce on the Project that has the ability to work safely and efficiently. Each individual associated with the Project shall possess the experience, knowledge, skills, and abilities necessary to discharge his or her responsibilities. Through the hiring and training process, line managers shall ensure that their workers are competent to safely accomplish the work. Line management must ensure that training and qualification requirements are flowed down to their personnel, and are responsible for the performance of their personnel.

#### **Balanced Priorities**

The Project ensures a "Safety First" culture by effectively allocating, training, and monitoring resources to ensure that work is performed safely. A Safety First attitude is a must for all personnel. Stop Work authority is given to each employee to use when he or she believes an activity is unsafe and poses and imminent danger to personnel, property, or the environment. Restart approval is given at the appropriate

management level. Specific job tasks are planned with appropriate worker involvement, and the work plan is required to be followed to ensure safe operation and environmental compliance.

### **Work and Associated Hazards**

Before work is performed, the associated hazards are evaluated and an agreed-upon set of controls is established which, if properly implemented, provides adequate assurance that the public, the workers, and the environment are protected from adverse consequences.

### **Administrative and Engineering Controls**

Administrative controls and engineering controls are essential elements of the ISMS. Wherever feasible, engineered controls are designed into the Project, and administrative controls are used to supplement engineered controls as appropriate. These controls are established through the work planning process.

### **Authorization Agreement**

The conditions and requirements to be satisfied for operations to be initiated and conducted are clearly established and agreed on by the NSLS-II Project Manager, the GC Project Manager, and the management of all tier subcontractors.

## **4.2 Core Functions of Integrated Safety Management System**

DOE P 450.4 describes the core functions of ISMS. These five functions are not independent and not necessarily sequential. Rather, they are linked and interdependent such that outcomes during the accomplishment of one may affect others. In particular, identifying and implementing opportunities for improvement may arise at any stage of the work process. The five functions are *Define the Scope of Work*, *Identify and Analyze Hazards*, *Develop and Implement Hazards Controls*, *Perform Work within Controls*, and *Provide Feedback and Continuous Improvement*.

All Contractor and subcontractor line management shall commit to these core functions of integrated safety management in the manner described below.

### **Define the Scope of the Work**

Defining the scope of work entails identifying and defining **all** the steps, each task and sub-task element, needed to complete a particular job safely. Defining the scope of work is a critical element of the safety management system, since it sets the stage for the scope and depth of hazard identification and analysis.

### **Identify and Analyze Hazards associated with the Work**

Hazard identification includes defining those hazards to workers or property expected to be encountered during the course of performing a particular task, and those that are introduced from concurrent work tasks. A Phase Hazard Analysis/Job Hazard Analysis (PHA/JHA) shall be performed for each task, to address such hazards. There is also a potential that unexpected hazards may be encountered or the nature of the known hazards might change as work activities proceed. Should this occur, the PHA/JHA shall be revised to incorporate the new conditions.

### **Develop and Implement Hazard Controls**

The development and implementation of hazard controls includes identifying controls to prevent and mitigate hazards, establishing the safety envelope (what conditions require what response) and performing periodic hazard assessments.

### **Confirm Readiness and Perform Work within Controls**

Confirmation of readiness is an effort to verify that safety controls have been implemented before starting work. Performing work within controls entails adherence to work controls in a manner such that activities remain within the safety envelope. Readiness assessments are conducted at multiple levels—from each worker assessing his or her readiness to start a task, to whatever is necessary to demonstrate Project readiness to DOE and the regulators.

**Provide Feedback on Adequacy of Controls**

Feedback and continuous improvement are based on the premise that all work activities can be planned, performed, assessed, and improved. Continuous improvement entails proactive focusing on problem prevention and performance improvement to prevent unsafe practices from occurring. The capability to prevent minor problems from becoming major risks or events relies heavily on feedback from workers; observations from those not directly involved with the work, and adequate metrics to assess trends in performance.

**4.3 Roles and Responsibilities for Integrated Safety Management System Implementation****Senior Management**

The GC Project Manager has the overall responsibility for assuring a safe workplace and for maintaining safe operations. The Project Manager approves all project plans, ensures implementation by conveying to line management their responsibilities for integration of safety performance into all work activities, and confirms management responsibility for integration of safety performance into all work activities. The Project Manager also has responsibility for evaluating the progress and status of the ISMS and adjusting resources as necessary based on feedback regarding ISMS implementation. This promotes continuous improvement in safety performance, and communicates its importance to the Project's success.

**Line Organizations**

All Contractor and subcontractor field managers and supervisors constitute the focus of "line manager responsibility" for the protection of workers, the public, and the environment within the ISMS framework for all work conducted by their assigned employees, and visitors in their assigned operating facilities.

Line managers provide the primary operating interface for employees and visitors. Within the framework of the ISMS, they contribute to work planning, pre-job communication of hazards and controls, work monitoring, and evaluation of results.

Effective integration of support from ES&H professionals into line activities is essential to achieving excellence in ISMS. Line management is responsible for defining and providing an adequate level of subject matter expert support, either from its own staff, or from external sources, as appropriate for the particular line organization and ES&H discipline involved.

**ES&H Organization**

As noted above, effective integration of ES&H into line activities is needed for success of the ISMS. The BSA NSLS-II ES&H Manager is responsible for providing overall policy and guidance on ES&H issues, and for working with the line organizations to make available necessary and agreed-upon input from ES&H professionals and other support. ES&H personnel are responsible for ensuring that the standards, requirements, and ES&H policies are effectively translated into suitable controls for work activities.

**Workers**

All employees of the on-site contractor and all subcontractors are responsible for becoming knowledgeable of and maintaining awareness of the hazards associated with their work, for contributing to the formulation of hazard controls, and for conducting their work safely in accordance with those controls. They are encouraged to identify ES&H issues in their workplace, to work with their management to provide input for improvements and to resolve concerns, and to exercise stop-work authority in cases of imminent danger to health and safety of workers or the public, or threat to the environment.

## **5.0 DOE RULE FOR WORKER SAFETY AND HEALTH (10 CFR 851)**

The worker safety and health program required by this rule establishes the framework for a comprehensive program that will reduce or prevent injuries, illnesses, and accidental losses by providing DOE contractors and their workers with a safe and healthful workplace. DOE has structured the rule this way for two main reasons: (1) To take advantage of existing and effective comprehensive worker protection programs that have been implemented at DOE facilities and (2) to minimize the burden on contractors by clarifying that they need not establish redundant worker protection programs to protect workers from occupational safety and health hazards. This rule flows down to all BSA contractors and all tiers of subcontractors working at the BNL site.

### **5.1 Safety and Health Standards**

Contractors must comply with the following safety and health standards that are applicable to the hazards at the workplace:

- Title 29 CFR, Parts 1904.4 through 1904.11, 1904.29 through 1904.33; 1904.44, and 1904.46, "Recording and Reporting Occupational Injuries and Illnesses."
- Title 29 CFR, Part 1910, "Occupational Safety and Health Standards," excluding 29 CFR 1910.1096, "Ionizing Radiation."
- Title 29 CFR, Part 1926, "Safety and Health Regulations for Construction."
- American Conference of Governmental Industrial Hygienists (ACGIH), "Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices," (2005) when the ACGIH Threshold Limit Values (TLVs) are lower (more protective) than permissible exposure limits in 29 CFR 1910. When the ACGIH TLVs are used as exposure limits, contractors must nonetheless comply with the other provisions of any applicable expanded health standard found in 29 CFR 1910.
- American National Standards Institute (ANSI) Z88.2, "American National Standard for Respiratory Protection," (1992).
- ANSI Z136.1, "Safe Use of Lasers," (2000).
- ANSI Z49.1, "Safety in Welding, Cutting and Allied Processes," sections 4.3 and E4.3 (1999).
- National Fire Protection Association (NFPA) 70, "National Electrical Code," (2005).
- NFPA 70E, "Standard for Electrical Safety in the Workplace," (2004).

### **5.2 Occupational Medicine Program**

Contractors must establish and provide comprehensive occupational medicine services to workers employed at a covered work place who: (1) Work on a DOE site for more than 30 days in a 12-month period; or (2) Are enrolled for any length of time in a medical or exposure monitoring program required by this rule and/or any other applicable federal, state or local regulation, or other obligation. A detailed Occupational Medicine Program is found in Section 6.15.

The occupational medicine services must be under the direction of a graduate of a school of medicine or osteopathy who is licensed for the practice of medicine in the state of New York.

Occupational medical physicians, occupational health nurses, physician's assistants, nurse practitioners, psychologists, employee assistance counselors, and other occupational health personnel providing occupational medicine services must be licensed, registered, or certified as required by NY State law.

Contractors must provide the occupational medicine providers access to hazard information by promoting its communication, coordination, and sharing among operating and environment, safety, and health protection organizations.



## **6.0 CONTRACTOR RESPONSIBILITIES**

### **6.1 Emergency Services and Equipment**

If a serious or life-threatening injury occurs, BSA will provide emergency ambulance and fire fighting services. Employees must phone 911 or 2222 from any internal BSA telephone or 631-344-2222 from a cellular phone.

In the event of a less-serious injury, employees will be sent to the NSLS-II on-site medical facility to be treated by the Project nurse. In addition to injury recordkeeping required by OSHA, each subcontractor shall inform the NSLS-II ES&H Manager of any injury requiring first aid and all more serious occupational injuries and illnesses within one hour of the classification of the injury.

### **6.2 Job-Site Orientation**

All Contractor personnel working on the NSLS-II Project will be required to attend an orientation provided by the Project Manager before working at the jobsite.

Newly employed, promoted, and/or transferred personnel shall be fully instructed in the safety practices required by their assignments. All employees must receive orientation prior to starting work. Visitors must also receive orientation prior to leaving the office areas, or be escorted while on the site.

In addition to the contractor's safety and health policies, the orientation must include:

- employee safety requirements and policies specific to the project,
- site-specific safety and health requirements,
- permitting procedures (if applicable), including work permits, hot work permits, etc.,
- hazard communication on a multi-employer work site,
- emergency and medical procedures, and
- other topics as circumstances require.

All employees will complete an Orientation Acknowledgment form at the end of the orientation. A copy will be maintained in the Contractor's project file.

### **6.3 Security and BNL Site Access**

Brookhaven National Laboratory is owned by the Department of Energy and is operated by Brookhaven Science Associates. All personnel entering the site must either be escorted by a BSA employee or have obtained a BNL photo identification badge. Identification badges are obtained by attending the Contractor Vendor Orientation (CVO) given daily at 8:30 a.m.

Badges must be in the possession of the individual at all times, and conspicuously displayed. The Contractor is responsible for collecting badges of all employees who are laid off or otherwise terminated from the project, and returning them to the NSLS-II ES&H Manager.

The General Contractor will ensure that access roads to the site for delivery of equipment and materials are safe and in good condition. Where holes, divots and other low points on the access road occur, the General Contractor will take action to immediately repair the road.

### **6.4 Disciplinary Policy**

The purpose of this policy is to state the Project's position on administering equitable and consistent discipline for unsatisfactory conduct on the jobsite. This policy ensures fair treatment of all employees in

making certain that disciplinary actions are prompt, uniform, and impartial. The primary purpose of any disciplinary plan is to correct the problem, prevent recurrence, and prepare the employee for satisfactory service in the future.

We recognize that employees, on the whole, normally govern their activities while at work in the same high standards of conduct that they use for their personal affairs. But we recognize that errors in judgment may occur and when they do we wish to address them in a fair, impartial, and consistent manner. By using progressive discipline, it is our hope that most employee problems can be corrected in the early stages, thus benefiting both the employee and the Project. Open and clear communications between the employee and the supervisor promotes understanding, and is the key to preclude the need for any disciplinary action.

Disciplinary action may call for any of the four following steps: Verbal warning, written warning, temporary suspension from the Project site, and denial of access to the Project site for a period of one year or more, depending on the severity of the problem and the number of occurrences.

All disciplinary actions are based on incident-free time periods (rolling date). After an active employee has gone for a time period of one year (365-days) without a reoccurrence of any progressive disciplinary action, all prior disciplinary action records will be removed from their personnel file. However, records associated with terminations will not be purged from the files.

All disciplinary actions resulting in suspension or termination shall automatically be reviewed by the appropriate Business Agent (if applicable), the Contractor's representative, GC Project Manager, and NSLS-II ES&H Manager.

Employees terminated for safety violations will not be eligible for re-employment on the Project for 12 months. Employees terminated a second time for a safety violation are ineligible for re-employment.

Appendix A provides the five categories of offenses that require some form of disciplinary action in order to ensure corrective job performance, with only Class V offenses being characterized as the most serious, for which immediate termination will result.

## **6.5 Operation of Equipment and Machinery**

Contractor employees shall be trained in the operation, inspection, and maintenance of the equipment and the safety features and procedures to be utilized during operation, inspection, and maintenance of the equipment. This training shall be based on the equipment operating manual and the hazard analysis for the activity.

Before any machinery or mechanized equipment is brought on site and placed in use for the first time, it shall be inspected and tested by a BSA competent person and certified to be in safe operating condition and documented on a Contractor Equipment Inspection Form (Appendix B).

All machinery and equipment shall be inspected daily (when in use) to ensure safe operating conditions. The Contractor shall designate competent persons to conduct the daily inspections and tests. Tests shall be made at the beginning of each shift during which the equipment is to be used, to determine that the brakes and operating systems are in proper working condition and that all required safety devices are in place and functional. Inspections and tests shall be in accordance with the manufacturer's recommendations and shall be documented. Records of tests and inspections shall be maintained at the site by the Contractor, shall be made available upon request, and shall become part of the official project file. Inspections shall include as a minimum;

- Control and drive mechanism
- Proper fluid levels
- Safety devices
- Hooks and safety clips for cranes, fork lifts, hoists and other lifting devices
- Tire condition and inflation
- Ground conditions, donnage and outriggers (level) for cranes, fork lifts, hoists and other lifting devices

- Load chart and hand signal chart
- Any dirt or contaminants

Whenever any machinery or equipment is found to be unsafe, or whenever a deficiency that affects the safe operation of equipment is observed, the equipment shall be immediately taken out of service and its use prohibited until unsafe conditions have been corrected. A tag indicating that the equipment shall not be operated, and that the tag shall not be removed, shall be placed in a conspicuous location on the equipment.

Machinery and mechanized equipment shall be operated only by designated qualified personnel. It shall not be operated in a manner that will endanger persons or property, nor shall the safe operating speeds or loads be exceeded. Persons who take prescription medication should not operate such equipment if such medication may impair their judgment or reflexes. Utilize equipment only for the purpose for which it was designed and in accordance with the manufacturer's instruction and recommendations. Modifications, extensions, replacement parts, or repairs of equipment shall maintain at least the same factor of safety as the original equipment. Modifications shall be authorized in writing by the manufacturer.

## **6.6 Evacuation of the Work Area**

Contractor employees shall observe and participate in notices to evacuate the work area.

BNL site-wide emergencies requiring site evacuation are signaled by an intermittent siren tone for five minutes. All personnel will be required to evacuate the BNL site via the quickest route or as directed by BSA police or other emergency services personnel.

The GC is required to establish an emergency response procedure for evacuation of the jobsite. All personnel working at the jobsite must be trained in this procedure as part of their initial job orientation.

## **6.7 Accident Investigation and Reporting**

All incidents involving illness/injury or property damage must be immediately reported to the Contractor's Project Superintendent. This official shall immediately notify the NSLS-II ES&H Manager, who will in turn make the appropriate notifications to BSA Management and DOE. Investigations shall be conducted for all events that result in either an OSHA reportable or OSHA recordable event, or result in a Days Away Restricted or Transferred (DART) case. Such incidents will be investigated by the GC Safety Representative or designee and the NSLS-II ES&H Manager or designee, and shall be documented on an Incident Investigation Report (Appendix C). The report must be completed and submitted to the GC Project Manager and BSA project team within 24 hours of the incident. The NSLS-II Project reserves the right to conduct an independent investigation of any incident, and must be granted access to the injured party to conduct interviews. DOE also reserves the right to conduct an independent investigation of any incident.

An incident investigation committee will investigate all major incidents. This includes, but is not limited to, any incident resulting in a medical case, lost-time injury, fatality, or significant damage to property or equipment. The committee will review the incident scene, collect photographs and defective equipment, interview all involved or witnessing parties, review all facts pertaining to the accident, and file a report with the GC Project Manager of the findings and conclusions as well as recommended measures to prevent re-occurrence. The GC will ensure that the scene and any equipment involved in the incident remains in its current condition and that nothing is removed from the site. The incident investigation committee will be comprised of, but not limited to:

- the person(s) involved in the incident,
- the first-line supervisor of the person(s) involved in the incident,
- the superintendent of the employing contractor,
- the NSLS-II on-site safety representative or designee,

- the Contractor Safety Representative or designee, and
- other personnel deemed appropriate by the GC and the NSLS-II ES&H Manager.

## 6.8 Personnel Protective Equipment

The Contractor is responsible for providing the appropriate personal protective equipment (PPE) in all operations/tasks where there is an exposure to hazardous conditions or where there is the need for using such equipment to reduce hazards to the employees.

PPE and safety equipment shall be tested, inspected, and maintained in serviceable and sanitary condition as recommended by the manufacturer. Users of PPE and safety equipment shall be trained in the use, limitations, inspection, testing, and maintenance of the equipment.

As a minimum, all employees on this project must wear eye protection, head protection, foot protection, and when there is moving equipment, appropriate high-visibility reflective clothing. Other PPE shall be worn depending on the hazard(s) present.

**Basic Eye Protection**—Employees must wear ANSI Z87 approved safety glasses with sideshields 100% of the time when exposed to hazards from flying particles; molten metal, liquid chemicals, acids, or caustic liquids; chemical gases or vapors; or potentially injurious light radiation.

**Contact Lenses**—Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments might represent an additional hazard to contact lens wearers. Hazardous environments include, but are not limited to, those in which a respirator may be required or where welding is being performed.

**Face Shield and Goggles**—When subcontractor's employees may be exposed to splashes, mists, etc., either goggles or a face shield must be worn, depending on the situation. With a face shield, basic eye protection must also be worn.

**Welding Shield**—When welding, both basic eye protection and hard hats must be worn with a welding shield. This is to protect employees from popping hot slag when the shield is raised and from overhead work exposures. If welding goggles are worn, basic eye protection is not required while welding.

**Head Protection**—All persons working in or visiting hard hat areas shall be provided with and required to wear protective headgear. Hard hat areas are those with the potential for head injury: all construction-designated areas are considered hard hat areas. All hard hats must be worn with the adjusting device toward the rear.

**Hearing Protection**—The safety representative or designee will monitor work areas to identify and post high-noise areas and provide appropriate hearing protection.

**Foot Protection**—All personnel must wear leather ANSI Z41 protective work shoes or boots. No one is permitted to wear sneakers, tennis shoes or athletic shoes of any type, sandals, high heels, or thongs on the project site.

**Clothing**—Employees shall report to work properly attired. The Project's requirements include:

- Clothing in good repair. (Frayed or tattered clothing can be hazardous to employees and will not be permitted.)
- No tank tops or sleeveless shirts. (Shirts must have at least 2" sleeves and tails must be tucked in at all times.)
- Long pants only. (No short pants, cutoffs, sweat pants, etc.)
- If working around moving machinery, no neckties, gauntlet type gloves, or baggy, loose, or ragged clothing.
- No loose, dangling jewelry. (Jewelry such as rings, watchbands, necklaces, earrings, and the like can cause or contribute to accidents.)

- Shoulder-length or longer hair must be tied back and put under the hard hat or worn in a hair net. (This will keep it from impeding vision, becoming entangled in machinery, or preventing the use of personal protective equipment.)

## **6.9 On-Site Safety Inspections**

The GC Project Safety Representative or designee shall conduct and document daily inspections of the site. An example of an inspection checklist is included in Appendix D. Inspection checklists must be provided to the NSLS-II project staff upon request.

BSA and DOE representatives shall audit and document site safety activities periodically, and communicate any deficiencies to the GC for corrective action.

Subcontractors are to conduct a weekly review of their areas and forward a copy of the report to the Contractor's Project Superintendent and to the NSLS-II ES&H Manager or designee.

Audits/Inspection reports and related abatement actions shall be documented and maintained in the Project's safety file.

Corrective actions of all safety infractions will be assigned to a specific individual with an expected completion date. Subsequent safety inspections will pay particular attention to previously identified infractions and verify that the corrective action plan has been implemented.

## **6.10 Weekly Tool-Box Meetings**

Weekly tool-box meetings will address general issues of safety. This will be the opportunity for individuals on the Project to identify safety issues and concerns of a general nature. It is also the opportunity to coordinate the control of recognized hazards and promote safety awareness. A valuable tool to instill a Safety First culture among employees is to review lessons learned from this job or from another job. Weekly toolbox meetings may be accomplished in a single or multiple sessions and may address different topics for different work crews. The weekly toolbox meetings are to be documented and forwarded to the GC Project Superintendent. Documentation should include the following:

- time and date of meeting,
- attendees (attendees must sign the attendance sheet and include their BNL ID number),
- topics/comments,
- assignments – party responsible/date corrected (if applicable), and
- person conducting the meeting.

The documentation shall be kept on the jobsite and shall be available for audit by BNL.

## **6.11 Protection of Work Area**

The Contractor shall ensure that the work areas and storage areas are conspicuously flagged and barricaded, as needed, prior to initiation of work.

The Contractor shall furnish, post, erect, and install safety devices, equipment, signs, barricades, flagging, and any other item necessary to give adequate warning and caution of hazards, and to provide instructions and directions to workers and the public.

## **6.12 Working and Storage Areas**

Housekeeping is a general indicator of a contractor's performance on site, including safety performance. Each contractor has the responsibility to maintain their area of operations in an orderly condition free of materials that could create slip/trip or fire hazards. In addition, the contractor's supervisors shall ensure a

daily walk-down of their work area is conducted, that any deficiencies are immediately corrected, and the condition of the site is reported to the GC's Project Superintendent.

All materials and equipment in storage, lay-down, staging, or work areas must be properly secured so that they are stable and secure against sliding or collapse. All materials storage and loading/unloading areas must be established at a safe distance from walkways, aisles, and traffic areas to avoid personnel injury should materials slide or collapse.

### **6.13 Hazardous Material and Hazardous Waste**

All contractors shall provide to the GC's Project Superintendent a list of hazardous materials along with a copy of the relevant Material Safety Data Sheet (MSDS) for each material that will be used on the project site. All MSDSs shall be maintained by the GC's Project Superintendent in a notebook in the construction office, and the information will be readily accessible to all employees.

The U.S. Environmental Protection Agency (EPA) ID number shall be obtained for the hazardous wastes produced by the contractors.

All hazardous wastes produced by the Project shall be packaged, transported, and disposed of by a licensed entity. Such loads shall be manifested and a copy of the manifest sent to the GC's Project Superintendent. All hazardous materials must be properly labeled and stored until removed from the project site (by a licensed hazardous waste hauler).

Hazardous materials or hazardous wastes stored in 30-gallon or 55-gallon drums shall be placed on spill containment pads, be properly labeled/placarded, and protected from damage and weather.

Report all accidental releases of a hazardous material or hazardous waste promptly to the GC's Project Superintendent. All spills, regardless of the volume, must be reported to BSA Emergency Services by calling extension 2222 or 911. All reporting will be done by BSA; however, the contractor responsible for the spill will be obligated for all costs incurred as a result of the cleanup effort.

The responsible contractor will properly clean up accidental releases of hazardous materials waste. Cleanup is to be done by properly trained personnel (meeting the requirements of 29 CFR 1926.65 (q)(6)). Hazardous waste from the cleanup must be hauled away by a licensed hauler to an approved waste disposal site permitted to accept such waste. The GC's Project Superintendent must be given a copy of the hauler's manifest and shall retain a copy of the waste transporter's permit and the disposal facility's permit.

Depending on the hazardous materials spilled, the BSA NSLS-II ES&H Manager may require the responsible contractor to hire a certified laboratory to take an appropriate number of soil samples to test at their laboratory. A copy of the results is to be given to the GC Project Manager.

Contractors shall inspect their hazardous material and waste storage areas at least weekly to ensure they are properly maintained. All inspections are to be documented, with records retained in the project files.

The GC shall randomly audit the labeling and storage of hazardous material and waste and the disposal of hazardous waste to verify that all contractors, at any tier, are fulfilling their roles as responsible parties.

### **6.14 BSA Stop-Work Policy**

All personnel (contractors, visitors, and guests) at BNL who have been trained in this policy have the right to stop their own work or the work of others if they deem that the task poses an imminent danger to themselves, their co-workers, property, or the environment. Personnel who have completed CVO are deemed to have been trained in this policy.

There will be **no reprisals** by anyone for issuance of a stop-work order.

To issue a stop-work order if you observe imminent danger, state the following:

**"Stop work! You are in imminent danger because..."**

Any person receiving a stop-work order must stop work immediately, if that can be done safely, or at the first opportunity to stop safely.

The person issuing a stop-work order **must not** verbally or physically interfere, whether or not the recipients of the stop-work order continue to work. If someone refuses to stop work, the employee issuing the stop-work order will immediately contact his/her supervisor, the GC's Project Superintendent, or the BSA on-site safety representative.

The person initiating a stop-work order also shall contact his/her own supervisor.

After the work is stopped, the recipient of the stop-work order notifies his/her supervisor that (s)he has been ordered to stop work and describes the reason why the work was stopped.

The GC's Project Superintendent, along with the BSA NSLS-II ES&H Manager, determines the conditions that must be met before work may resume.

Authorization to restart work may only be given by the NSLS-II Project Manager (or designee) and only after corrective actions and safety reviews are completed.

**6.15 Occupational Medicine Program**

To ensure the continued health of employees, the GC maintains a comprehensive occupational medicine program (OMP) in full compliance with all provisions of Section 8, "Occupational Medicine," of Appendix A of the Federal Regulation 10 CFR 851 "Worker Safety and Health Rule." This program is under the direction and control of a NYS-licensed occupational medicine provider. This program covers all GC employees and all employees of all subcontractors. Subcontractors may wish to use their own program in lieu of the GC's program. In that event, those programs must be reviewed and approved by the NSLS-II ES&H Manager.

The Occupational Medicine program covers employees who

- work at BNL for 30 or more days in a 12-month period, or
- work for any length of time at BNL and are required by statute to be enrolled in a medical or exposure monitoring program.

The GC affirms that these services are fully compliant with all provisions of Section 8 ("Occupational Medicine") of Appendix A of the Federal Regulation 10CFR851, including the following provisions:

- Services are provided by an occupational medicine provider that plans and implements the occupational medicine services and
- is under the direction of a physician licensed in the state of New York, and
- is staffed by health care professionals with valid New York State licenses in their respective professions.

**OMP Information**

OMP Name:

Address:

Phone: #

Fax #:

The OMP determines the content of the worker health evaluations in accordance with current sound and acceptable medical practices and all pertinent statutory and regulatory requirements. At a minimum, these services include:

- Medical surveillance and medical certification examinations in compliance with all OSHA, DOE, or other statutory or contractual requirements for such examinations applicable to the work to be performed and the type and level of workplace exposures. Frequency of such examinations will be determined by statute, contractual requirement, or best medical practice as determined by the OMP.
- Prior to the employee's 30<sup>th</sup> day of work at BNL, an occupational medical examination shall be conducted for workers involved in physically demanding tasks, tasks that involve potential exposure to workplace hazards, or exposure to adverse environmental conditions.
- Evaluation at the time of potentially work-related illness, potentially harmful exposure, or injury at BNL to determine work-relatedness, any need for medical restrictions or work removal, and referral for definitive care, if indicated.
- Return-to-work evaluations where a worker has been absent for 5 or more workdays due to illness or injury.
- Restricted duty as medically indicated.
- Creation and retention of a medical record that complies fully with all requirements specified in paragraph 8(f) of Appendix A 10CFR 851 for each employee for whom the OMP has provided occupational medicine services.
- Verbal and written communication to each employee as to the purpose, nature, and results of all medical evaluations and tests performed, and documentation of this communication in the medical record.
- Timely submittal of the results of health evaluations to BSA where such information will facilitate the mitigation of worksite hazards. Such communications will not include the release of confidential, personally identifiable medical information, other than in exceptional instances where there is a compelling, overriding public health or public safety need.

The following occupational medicine services may also be provided by the OMP, except where the OMP determines that they are not applicable or not feasible. Such a determination is documented in writing for each service that will not be provided, with sufficient explanation:

- Participation in worker protection teams, as well as worker safety and health team meetings and committees as defined, respectively, in paragraphs 8 (e)(2) and 8(d)(3) of 10CFR 851.
- Case management of ill or injured workers to facilitate rehabilitation and safe return to work.
- A health promotion program to include disease and risk factor screening for the major causes of morbidity and mortality within the employee population, if determined to be cost effective. If deemed not cost effective, the OMP's decision and its basis must be documented in the outline of comprehensive occupational medicine services.
- The GC's health and disability insurance claims data (de-identified) is used by the OMP in determining the major causes of morbidity and mortality within the GC's workforce, if such information is available to the GC.
- Cost effectiveness shall be judged by available evidence, published medical studies, demonstration projects at other institutions, or internal analyses.
- Review and approval of the medical and behavioral aspects of the GC-sponsored or the GC-supported programs (if they exist).
- Employee Assistance Programs (EAPs)
- Alcohol and substance abuse rehabilitation programs
- Wellness programs



- If the work requires immunization, a hazardous waste program, or involves exposure to blood-borne pathogens, the OMP shall review the medical aspects to assure their conformance to applicable guidelines.

The contractor provides to the OMP:

- Access to information (de-identified) from health, disability, and other insurance plans appropriate for determining the major causes of morbidity and mortality among the contractor's employees.
- Information on the physical demands and working conditions that are associated with each contractor employee's job.
- Employee job-task and hazard analysis information, including actual or potential worksite exposures of each employee. BSA will provide potential radiological hazard exposure information, if applicable.
- Notification when an employee has been absent because of an injury or illness for more than 5 consecutive workdays.
- Referral of employees about whom the supervisor has concerns regarding their ability to safely perform job duties.
- The opportunity to participate in worker protection teams, as well as worker safety and health team meetings and committees (where applicable).

For every Occupational Medicine Program there must be an accompanying acknowledgment by the physician.

#### **PHYSICIAN'S ACKNOWLEDGMENT**

I, \_\_\_\_\_, affirm that the services which I provide are  
(Name of Physician)

fully compliant with the provisions of Section 8 (Occupational Medicine) of Appendix A

of the Federal Regulation 10CFR851, including the following:

- Plan and implementation of the occupational medicine services.
- I am a physician licensed in the State of New York.
- My office is staffed with health care professionals with valid New York State licenses in \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
- I will provide medical surveillance and medical certification in compliance with OSHA, DOE, or other statutory or contractual requirements.

\_\_\_\_\_  
(Signature of Physician)

\_\_\_\_\_  
(Date)

#### **6.16 On-Site Medical Services**

BSA employs a full-time staff of emergency medical technicians who can provide emergency medical care and ambulance transport to any one of several area hospitals. They can be reached by calling 2222 or 911 from any BSA internal telephone or 631-344-2222 from a cell phone.

The GC will maintain a competent emergency health professional (registered nurse, licensed practical nurse, or a physician's assistant) on site whenever there are 50 or more employees on the jobsite. This professional will maintain a fully functional first aid station and attend to minor injuries. The professional

will coordinate back-to-work approval in conjunction with the Occupational Medicine provider. The health professional will receive standing orders from the Occupational Medicine Provider.

### **6.17 Sanitation**

Contractors shall establish and maintain basic sanitation provisions for all employees on the NSLS-II construction site as specified in the following paragraphs.

#### **Drinking Water**

An adequate supply of drinking water shall be provided in all places of employment. Cool water shall be provided during hot weather.

Only approved potable water systems shall be used for the distribution of drinking water. Drinking water shall be dispensed by means that prevent contamination between the consumer and the source.

Portable drinking water dispensers shall be designed, constructed, and serviced to ensure sanitary conditions; shall be capable of being closed; and shall have a tap. Containers shall be clearly marked as “**DRINKING WATER**” and shall not be used for other purposes. Water shall not be dipped from containers.

Use of a common cup (a cup shared by more than one worker) is prohibited without the cup being sanitized between uses. Employees shall use cups when drinking from portable water coolers/containers. Unused disposable cups shall be kept in sanitary containers and a waste receptacle shall be provided for used cups.

#### **Toilets**

When sanitary sewers are not available, one of the following facilities shall be used: chemical toilets, recirculation toilets, combustion toilets, or other toilet systems as approved by state/local government.

Provisions shall be made to assure that there are sufficient toilet facilities available for both male and female employees. The number of toilet facilities shall be in accordance with 29 CFR 1926.51(c)(1).

Each water closet shall occupy a separate compartment with a door that can lock from the inside, and walls or partitions, between fixtures, of sufficient height to assure privacy.

Provisions for routinely servicing and cleaning all toilets and disposing of the sewage shall be established before placing toilet facilities into operation. The method of sewage disposal and location selected shall be in accordance with federal, state, and local health regulations.

### **6.18 Drug Free Workplace**

#### **Policy Statement**

The unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace. A single violation of such prohibition shall result in the offending individual being removed from the jobsite and recommendation of participation in an approved drug abuse assistance or rehabilitation program, and/or reporting to the civil authorities for criminal prosecution.

All employees shall abide by the rules of this program, and shall notify the employer in writing of the employee's conviction under a criminal drug statute for a violation occurring in the workplace no later than 10 days after such conviction.

#### **Program Elements**

An ongoing drug-free awareness training program includes:

- Mandatory participation by all employees
- Classroom and/or toolbox discussions that shall include:

- The dangers of drug abuse in the workplace
- Distribution and discussion of the Contractor's policy of maintaining a drug-free workplace
- Any available drug counseling, rehabilitation, and employee assistance programs
- The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace
- Intervention Procedures involving the employee and supervisor
- Information on identification - signs and symptoms
- Corrective actions
- Personnel actions - program enforcement, disciplinary options, and employee assistance
- Legal or criminal actions
- Disciplinary actions up to and including termination
- Drug abuse or rehabilitation programs that are available
- Brookhaven National Laboratory's Contracting Officer shall be notified in writing within 10 days after receiving notice of an employee's conviction under a criminal drug statute for a violation occurring in the workplace. Notification shall include the position title of the employee and the appropriate personnel action to be taken within 30 days under the requirements of this Program.

## **6.19 Substance Abuse Program**

### **Introduction**

BSA and the BSA Project Team are committed to providing a safe workplace for the workers assigned to the NSLS-II construction project, promoting high standards of employee health, and fostering productivity that satisfies their quality expectations. Consistent with the intent and spirit of this commitment, the NSLS-II project has established a substance abuse testing specification for the project with the goal of maintaining a work environment that is free from the effects of the use of illegal drugs and alcohol.

This specification is not intended as a substitute for the GC's complete written substance abuse policy. Normally, such policies include other important features, including, but not limited to, an employee education and awareness program, a supervisor-training program, and an employee assistance program.

### **Program Requirements**

All tier contractors must have and enforce a written substance abuse program incorporating the testing requirements, terms, and conditions set forth below. This plan is applicable to all employees, current and prospective, in order to be eligible to perform work at the project site. The contractor must comply with this plan. Suppliers, vendors, and visitors are subject to confirmation of their abstinence from the possession or use of substances indicated in this plan. A copy of the substance abuse program must be submitted to NSLS-II Project management for approval prior to commencement of work on the project site.

The substance abuse program must apply to the employees of all tier contractors working on the project site. This includes workers, new hires, replacement workers, and supervisory personnel. No employee or prospective employee of a contractor shall be permitted to work on the project site unless such employee has submitted to testing as required by this plan and unless the results of such testing are negative as hereinafter defined. Contractors must provide the BSA NSLS-II ES&H Manager with a monthly summary report of the substance abuse program compliance.

All contractors must train their respective employees in methods that will allow them to recognize substance abusers. Supervisory employees shall be trained to take action, and to confront a substance abuser in a manner consistent with generally accepted safety training procedures.

The BSA project management reserves the right to audit any substance abuse program required by this plan, to verify compliance, upon 24-hour notice to the GC of intent to audit. BSA project management shall have free right of access to all relevant records of the contractor and their subcontractors and suppliers for this purpose, provided such record disclosures are within the scope of guidelines pertaining to the confidentiality of employee records.

The contractors' pre-engagement employees who receive a positive test result shall immediately leave the project site. Transportation of employees receiving a positive test result is the direct responsibility of the employing contractor. Furthermore, pre-engagement employees receiving a positive test result shall not be permitted to return to the project site earlier than 90 days from the date of the positive test. At that time the employee may begin the process outlined by this specification again.

If a current employee who tested positive qualifies and successfully completes the contractor assessment /substance abuse treatment program, a program approved by the Project, the employee will be exempt from the 90-day requirement if said employee agrees to the following:

- submit to substance abuse testing as described in this specification and receive a negative test result; and
- agree to random substance abuse testing not to exceed one test per 500 work hours over a 3-year period from the date of return to the project site.

### **Testing Requirements**

The BSA Project Management requires:

- pre-engagement drug testing;
- drug and alcohol testing for reasonable suspicion of illegal drug use;
- post accident / incident drug and alcohol testing; and
- drug testing following the discovery of illegal or unauthorized drugs or paraphernalia.

All drug testing must be conducted by a laboratory certified by the National Institute of Drug Abuse (NIDA), with test results interpreted by a licensed medical review officer.

Tests for alcohol shall be performed by using either a saliva test or a Breathalyzer test comparable to the type used by state or local law enforcement officials. Furthermore, alcohol confirmatory tests shall be performed by using either a blood alcohol test or a Breathalyzer test comparable to the type used by state or local law enforcement officials. The collection site(s) and collection practices shall meet the requirements outlined by NIDA.

Substance abuse testing shall be conducted in accordance with specified requirements found in 10 CFR 707. Initially, the substances that will be screened will consist of the "NIDA 5." However, the Project reserves the right to expand the test panel to include the following substances, should the need be established:

**10-Panel Test Plus Alcohol**

<b>Substance</b>	<b>Threshold Limits</b>	
	<b>Initial Limit</b>	<b>GC/MS Confirmation Limit</b>
Alcohol	0.04%	0.04%
Amphetamines	300 ng/ml	300ng/ml
Cocaine metabolites	300 ng/ml	150 ng/ml
Marijuana metabolites	20 ng/ml	10 ng/ml
Opiate metabolites	300 ng/ml	150 ng/ml
Phencyclidine	25 ng/ml	25 ng/ml
Barbiturates	300 ng/ml	100 ng/ml
Benzodiazepines	300 ng/ml	100 ng/ml
Methadone	300 ng/ml	100 ng/ml
Methaqualone	300 ng/ml	200 ng/ml
Propoxyphene	300 ng/ml	200 ng/ml

**Definitions**

**Positive Tests:** Test results that indicate the presence of legal or illegal substances at or above the threshold limit as set forth in this plan.

**Negative Tests:** Test results indicating that legal or illegal substance are at levels below the threshold limits as set forth in this plan.

**Pre-engagement Testing:** Drug testing for all substances as set forth in this plan conducted by subcontractors (including lower-tier subcontractors) for their employees or prospective employees prior to arrival on the project site.

**For-Cause Testing:** Testing for all substances set forth in this plan conducted by the respective subcontractor for their employees whose behavior on the project site causes either the Project Manager/Project personnel or the respective subcontractor supervisory personnel to reasonably conclude that such behavior may result from substance abuse.

**Post-Accident / Incident Testing:** Testing for all substances set forth in this plan conducted by the respective subcontractor for their employees involved in an injury producing accident or a “near miss” in which injury is avoided or in events resulting in damage to property as determined by the Project Manager/ Project personnel or the respective subcontractor supervisory personnel.

## **7.0 JOB-SPECIFIC WORK REQUIREMENTS**

### **7.1 Phase Hazard Analysis**

A Phase Hazard Analysis (PHA) shall be developed for each major phase of the Project to be performed on site. The PHA shall identify the task and the steps necessary to complete the task, the hazards associated with each step of the task, and the means to protect the workers performing the task from those hazards.

Examples of major phases of the project include but are not limited to:

- excavation,
- steel erection,
- concrete placement,
- interior wall erection, and
- finishing work.

Supervisors and employees are responsible for developing the PHA of their work activities. The supervisor is also responsible for:

- ensuring that hazard analyses are developed and reviewed by the employee before work begins, and
- seeking advice of the safety officer or designee as appropriate.

The Contractor shall submit all PHA's to the NSLS-II ESH Manager (or designee) for review and approval. The completed and approved PHA shall be reviewed with all personnel involved in the task. This can be done as a tool-box talk or job preparation meeting. The PHA shall be updated whenever there are changes in the work plan, changes in material used, or a new crew or subcontractor is assigned to conduct the work. PHA worksheet/guidelines are presented in Appendix E.

### **7.2 Compressed Gas**

#### **General Safety Requirements**

- Ensure that containers are not defective or leaking any product.
- Prescribed stamped markings on the container shall be located on the shoulder of the cylinder.
- The labels applied by the gas manufacturer or authorized supplier/vendor to identify the container contents shall not be defaced or removed.
- Containers may be painted by the gas suppliers to permit the suppliers to help recognize their contents and to segregate them more readily in their handling operations. However, the primary identifier is the container label. Color shall not be used to exclusively identify container content.
- Containers not bearing a legibly written, stamped, or stenciled identification of the contents shall not be used.
- Compressed gas cylinders shall not be used as rollers, supports, or for any purpose other than to contain and use the content as received.
- The container valve shall be kept closed at all times (charged or empty), except when the container is in use.

### Transporting Cylinders

- Compressed gas containers shall not be rolled in the horizontal position or dragged. A suitable hand truck, forklift, or similar material handling device should be used, with the container properly secured to the device.
- Containers shall not be lifted by using the container cap or magnets. In cases where hand trucks are designed to lift containers using the cap, the containers shall not be lifted higher than 6 inches, or for longer than it takes to properly position the container on the hand truck.
- Ropes, chains, or slings shall not be used to suspend containers unless provisions have been made on the container for appropriate lifting attachments, such as lugs. Where appropriate lifting attachments have not been provided on the container, suitable cradles or platforms to hold the containers shall be used for lifting with the containers being adequately secured.

### Storage

- Containers are not to be stored near readily ignitable substances, such as gasoline, oil, or scrap material.
- All compressed gas cylinders shall be stored and used valve-end up.
- The cylinders shall be secured at all times to prevent instability. Chains are the preferred method of securing the containers; however, heavy rope or heavy-gauge wire may also be used.
- Valve protection caps shall always be in place and hand tight, except when cylinders are in use or connected for use.
- Flammables and oxidizers shall be stored with a minimum separation of 25' or with a one hour rated five foot high fire barrier in between.

### 7.3 Confined Spaces

A "confined space" means a space that:

- is large enough and so configured that an employee can bodily enter and perform assigned work,
- has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry), and
- is not designed for continuous employee occupancy.

A "permit-required confined space" has one or more of the following characteristics:

- contains or has the potential to contain a hazardous atmosphere,
- contains a material that has the potential of engulfing an entrant,
- has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section, or
- contains any other recognized serious safety or health hazard.

The GC shall have a written Confined Space Entry Program that complies with OSHA and BNL standards. The program will require the Competent Person (as defined by OSHA) to:

- establish procedures and practices for safe entry and to determine if a permit is required,
- have air monitors to check concentration of oxygen, explosive/flammable gases and the specific contaminants of concern (e.g., hydrogen sulfide in sewer utility holes),
- test and monitor conditions to identify and evaluate hazards,
- prevent unauthorized entry,

- provide adequate non-entry retrieval systems (tripods, winches, harness and ventilation equipment)
- station an attendant outside permit spaces during entry,
- post procedures to summon rescuers and prevent unauthorized personnel from attempting rescue, and
- develop a system for preparing, issuing, using, and canceling entry permits.

All personnel who enter into a confined space must be trained in the hazards and procedures for entry. They must be able to recognize signs and symptoms of exposure. They must also be familiar with any emergency equipment in the confined space. Where a hazardous atmosphere is or may be present, all entrants must also be trained in the use of respiratory protection.

For entry into non-permit spaces, a job safety analysis, work guideline, or a standard operating procedure is required identifying necessary controls for atmospheric testing, continuous forced ventilation, and certification of safe atmosphere. Entry into a permit-required space requires a confined space permit (Appendix F). Permits must include an identification of the confined space: its hazards, a list of authorized entrants, the purpose of their entry and the date and duration of their permits; the current attendants and entry supervisor; and both the results of tests performed and any measures necessary to isolate the permit space and eliminate or control the hazards. The permit must also describe the acceptable entry conditions, emergency equipment, and the means to summon rescue and emergency services.

Operations involving a confined space entry require an evaluation of work by the contractor and the BSA NSLS-II ES&H Manager to classify the space as permit-required or non-permit.

Retrieval equipment shall be provided to facilitate non-entry rescue for all permit-required spaces unless evaluation of the permit-required confined space determines that the use of retrieval equipment creates greater health and safety hazards. In this case, rescue services shall be notified that entry into the confined space will be necessary to perform rescue operations.

#### **7.4 Electrical Safety**

Conduct installation, service, and maintenance or construction of electrical equipment in accordance with requirements in 29 CFR 1926 Subpart K, applicable requirements in 29 CFR 1910 Subpart S, and the National Electrical Code, including NFPA 70E.

Ensure electrical work is performed by qualified persons. All electricians performing work “on or near” energized circuits must be fully trained in NFPA 70E requirements, Lock-Out/Tag-Out (LOTO) and also in CPR or other resuscitative techniques. (Appendix J contains a sample LOTO program.) Electricians who are members of the IBEW and are in Local 25 and have in their possession a certification from the local have been deemed to be trained.

Provide temporary lighting hung from insulators rated for the circuit’s voltage. Remove temporary lighting when no longer required.

Provide a ground fault circuit interrupter for cord sets, receptacles, and electrical tools including plug and cord connections to generators and equipment for employee use.

All unfinished circuits are to be tested for energy, capped with wire nuts, and pushed into the box by an electrician. All employees are to be instructed that any wires not capped are assumed to be live, and are to be reported to an electrician.

Provide three-wire extension cords, continuous length without splices, and designed for hard or extra-hard use. Protect electrical extension cords from pinch points, sharp edges, pedestrian or vehicle traffic, or other potentially damaging configurations. Do not fasten extension cords with staples, hang with nails, or suspend on wires. Arrange extension cords in a manner that avoids creating tripping hazards.

Notify the BSA NSLS-II ES&H Manager prior to any work being done near overhead lines. Overhead lines shall be de-energized and grounded or other protective measures (guarding, isolating, insulating, etc.)



shall be provided, before work is performed in the vicinity of overhead lines. This preparation will be accomplished by BSA Plant Engineering personnel.

Any vehicle operated in proximity to overhead lines shall maintain the following minimum distance:

- 10 ft (305 cm) for voltage of 50 kV or below;
- 10 ft (305 cm) plus 4 inches (10 cm) per 10 kV for voltage greater than 50 kV
- 4 ft (122 cm) for vehicles in transit, with its structure lowered, for voltages 50 kV or below, with clearance increased 4 inches (10 cm) for every 10 kV over that voltage.

Live parts to which an employee might be exposed shall be put into an electrically safe work condition before an employee works on or near them, unless the deenergizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations.

Energized parts that operate at less than 50 volts to ground and containing less than 10 Joules of stored electrical energy are not required to be deenergized if there will be no increased exposure to electrical burns or to explosion due to electric arcs.

The phase hazard analysis (see Section 7.1) is utilized to ensure workers understand their role in the work to be performed, as well as what others involved in that project or task will be doing. Supervisory approval for “working on or near” or “working hot” shall be given in the Permit (Appendix K). Working “on or near” or “working hot” requires approval by the Contractor’s Project Superintendent, the BSA NSLS-II ES&H Manager, and the BSA Electrical Safety Officer. The Contractor shall follow the guidelines presented in NFPA 70E, Standard for Electrical Safety in the Workplace.

See Section 7.13 for additional information on LO/TO and “working on or near” energized electrical components.

## **7.5 Working from Heights, Fall Protection**

Each contractor must provide appropriate 100% fall protection for its employees working **6 ft or more** above the work surface. This includes all tasks associated with steel erection. The Contractor’s Project Superintendent must fully evaluate the work conditions and environmental factors (including seasonal weather changes) before selecting the appropriate fall protection system (active, passive, or a combination of measures, as appropriate). Such evaluation is to be included in the hazard analysis for the task.

Employees shall be trained in the selection and safe use of fall protection systems before the equipment is used as required by 29 CFR 1926.503. Employees who receive fall protection training are to be certified in writing by the trainer. The written certification record shall contain the name or other identify of the employee trained, the date(s) of the training, and the signature of the person who conducted the training.

Workers within a Controlled Decking Zone must also be equipped and wearing appropriate fall protection.

Under no circumstances will anyone ride a load suspended from a crane or ride the “headache ball.” Walking up or sliding down columns is strictly forbidden. Violation of these safety rules will result in immediate termination from the job with no ability to return to BNL.

### **Types of Fall Protection Systems**

- **Personal fall arrest system (PFAS):** used to arrest an employee’s fall from a work level. It consists of an anchorage, connectors, and a body harness and will include a lanyard, deceleration device, lifeline, or a combination of these. Anchorage shall be capable of sustaining static loads, applied in the directions permitted by the PFAS, of at least 5,000 lbs per user attached.

- **Restraint:** The full body harness is used as a component of a restraint system to prevent the user from reaching a fall hazard. Anchorage must support a minimum of 3,000 lbs per person attached.
- **Work Positioning:** The full body harness is used as a component of a work positioning system to support the user at a work position. Anchorage must support at least 3,000 lbs per person attached.
- **Warning line system:** a barrier erected to warn employees that they are approaching an unprotected edge. It also designates an area in which work may not take place without the use of a guardrail, personal fall arrest system, or a safety net to protect employees.
- **Guardrail system:** a barrier erected to prevent employees from falling to lower levels.
- **Controlled access zone:** an area in which certain work (e.g., overhead brick laying) may not take place without the use of guardrail, personal fall arrest, or safety net system, and access to the zone is controlled.
- **Controlled decking zone:** an area in which certain work (for example, initial installation and placement of metal decking) may take place where access to the zone is controlled.
- **Safety monitoring system:** a system in which a competent person is responsible for recognizing and warning employees of fall hazards.
- **Safety net system:** can be used when workplaces are more than 25 ft above the ground, water surface, or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines, or a safety harness is impractical.

## 7.6 Scaffolds

All scaffolds and platforms must meet the following requirements:

### General Requirements

OSHA requires that scaffolds are to be erected, moved, altered, and dismantled only under the supervision and direction of a qualified Competent Person experienced in scaffold erection and maintenance. The scaffolding Competent Person shall not have other responsibilities that could take his or her attention from the scaffolding work.

The Competent Person shall assure that all personnel engaged in the erection and/or dismantling of scaffolding have been trained in the proper scaffold procedures and precautions. The Competent Person will also assure through tool box training at the site that all personnel working on or from the scaffolds have been trained in the proper procedures and precautions with using scaffolds.

Each working level or platform of scaffolds must be in compliance with OSHA 29 CFR 1926, BNL SBMS, PE ESH-802 and be completely decked and have handrails, midrails, and toeboards installed. If for some reason a platform or working level cannot be equipped with standard handrails or completely decked, safety harnesses must be worn and properly tied off to an acceptable attach point meeting OSHA requirements.

Chain guardrails on scaffolding are not allowed.

If scaffolds will be higher than 30 ft with a working load exceeding 50 lb/ft<sup>2</sup>, a licensed professional engineer must complete sealed and signed design drawings, including load calculations. Examples are scaffolds erected for plasterers, masons, or any other trades who routinely store material on the platform.

Supported scaffolds with a height to base width (including outrigger supports, if used) ratio of more than four to one (4:1) shall be restrained from tipping by guying, tying, bracing, or equivalent means. Restraints shall be at a minimum of every 30 feet horizontally and every 26 feet vertically for scaffolds 3 ft or greater in width or every 20 ft vertically for scaffolds less than 3 ft in width.

Scaffolds must be inspected prior to each shift and tagged for the workers. Tagging must designate the requirements of the user and the conditions of the scaffold by the qualified Competent Person.

Contact the GC Project Manager if any special scaffolding issues arise.

### **Rolling Scaffolds**

No one is to ride on a rolling scaffold while it is being moved.

All materials and tools must be secured prior to moving a rolling scaffold.

No rolling scaffolds will be utilized to support other scaffolds.

All rolling scaffolds are to have lockable wheels.

### **Scaffold Planking**

Paint using a stencil or stamp scaffold planks within 12" of each end or edge to denote use for scaffold decking only.

Use only 2" x 10" or 2" x 12" scaffold grade material for scaffold planking.

### **Scaffold Tagging**

The scaffold tagging procedures are as follows:

- Under the direction of the qualified Competent Person, the crew that erects the scaffold must complete and attach the appropriate scaffold tag.
- The scaffold tag must be placed at eye level on or near the access ladder so it is easy to locate and plainly visible.
- A Competent Person needs to ensure that the scaffold is erected properly and the tag attached is proper and completely filled out.
- If the scaffold needs to be altered in any way, the person who signed the tag must be contacted to authorize the change and re-tag if necessary.
- An untagged scaffold must not be used.
- A Competent Person must inspect it prior to each shift.
- Tagging Color System:
  - A green tag is completed and attached by the erecting crew to scaffolds that have complete handrails, midrails, toeboards, and decking.
  - A yellow tag is completed and attached to scaffolds that cannot be erected with all the components complete. The yellow tag allows the erecting crew to note what portion of the scaffold is incomplete and cautions the user. A yellow tag also informs the user fall protection is required.
  - A red tag means the scaffold is being dismantled, is not yet completely erected, or for some reason not safe and shall not be used.
  - Under rare circumstances non-traditional scaffolding techniques such as needle beam scaffolds, ladder scaffolds, suspended scaffolds etc, which may be required must also comply with OSHA requirements and will be tagged as determined by the NSLS-II ESH Manager (or designee).

## **7.7 Excavations and Trenches**

The digging permit process is utilized to provide for the safety of personnel and protection of existing utilities and facilities during work activities requiring excavations.

Prior to excavation, the estimated location of utility installations (e.g., sewer, telephone, water, fuel, electric lines) underground and in walls, floors, etc. shall be determined and protected from damage or displacement. The BSA Plant Engineering group shall be contacted to locate the installations and issue the digging permit (Appendix G). The digging permit shall be posted at the work site.

A competent person shall be identified and designated by the GC Project Manager. Appendix H is an example of a letter indicating the name of the competent person. A copy of this letter is also posted at the jobsite.

### **Excavation Plan**

The proposed method to prevent undermining existing structures and to protect personnel from potential cave-ins is described below.

- The soil for this project is to be considered type-C, unless another classification is determined by one of the methods described in 29 CFR 1926 Subpart P Appendix A, and all cave-in protection shall conform to the applicable OSHA requirements.
- Methods intended for supporting existing utilities and maintaining surface appurtenances such as roadways, sidewalks, and other anticipated encumbrances are briefly described below.
- A contingency plan for notifying Plant Engineering upon suspicion or discovery of any contaminated soils, live munitions, or other materials shall be implemented.
- For excavations 5 ft or deeper or where there is a risk of cave-in, where sloping is to be used as cave-in protection, the slopes shall be no greater than one to one and one-half, rise to run, or approximately 34 degrees from the horizontal.
- Satisfactory lumber/timber shall be used (i.e., badly cracked/broken timber shall not be used for bracing or support of excavations). All shoring material(s) must comply with OSHA requirements.
- An adequate number of ladders shall be present in the excavation for access. OSHA requires no more than 25 ft of lateral travel between ladders in excavations 4 ft or greater in depth. Ladders shall extend 3' above grade.
- Excavated materials shall be placed a minimum of 2 ft away from the excavation cut in order to decrease additional loading on the support system as well as decreasing the potential for excavated material to slough off into the cut.
- Inspections shall be done and documented by the competent person to monitor the condition of the excavation and support system. Inspections shall be conducted daily at the start work, as necessary during the day, and after a rain storm or other hazardous situations arise.
- A plan for proper de-watering and an excavation plan that fully describes the method used to protect workers from cave-in is required to be submitted.
- Proper permits shall be filled out and approved before beginning work (i.e., digging, confined space entry permits, etc.).
- There shall be barricading against people and vehicles to eliminate the possibility of introducing any hazards

### **Cave-In Protection Equipment**

- Cave-in protection equipment shall be provided if 5ft or deeper. For excavations greater than 20 ft in depth, the protective systems shall be designed and approved by a registered professional engineer with a specialty in soil mechanics.
- Where shoring, shielding, or systems other than sloping are proposed, there shall be a submittal of manufacturer's or engineer's data on the system to be used, the depths of the excavations where it shall be applied, and the system configurations to be utilized.
- Sub-type of soil as defined by the manufacturer's or engineer's specifications shall be determined; and there shall be a submittal of soil type determinations and the system

configuration selections to the NSLS-II ES&H Manager for approval prior to work being performed in the excavation/trench.

## **7.8 Fire Protection**

Only approved containers and portable tanks shall be used for storage and handling of flammable and combustible liquids. Approved safety cans or Department of Transportation approved containers shall be used for the handling and use of flammable liquids in quantities of 5 gallons or less (this does not apply to those liquids which are extremely hard to pour, which may be handled in original containers). For quantities of 1 gallon or less, the original container may be used for storage, use, and handling of flammable liquids.

Containers of flammable and combustible liquids shall be tightly capped when not in actual use. Containers shall be approved DOT with functioning self closing tops and flame arrestors. Use of "residential" type flammable liquid containers are prohibited.

Flammable liquids may be used only where there are no open flames or other sources of ignition within 50 ft of the operation, unless conditions warrant greater clearance.

All sources of ignition shall be prohibited in areas where flammable and combustible liquids are stored, handled, and processed. Suitable No Smoking or Open Flame signs shall be posted in all such areas. At least one BC-rated portable fire extinguisher with a minimum 12-pound rating shall be mounted at the entrance to the area where flammable liquids are handled or stored.

Areas where flammable or combustible liquids are transferred in quantities greater than 5 gallons from one tank or container shall be separated from other operations by 25 ft distance or by construction having a fire rating of at least 1 hour.

During vehicle refueling operations, appropriate grounding precautions must be taken to prevent sparks from causing a fire.

A fire extinguisher, rated not less than 10B, shall be provided within 50 ft of wherever more than 5 gallons of flammable or combustible liquids are being used on the jobsite. This does not apply to the integral fuel tanks of motor vehicles.

Portable fire extinguishers with at least a 2A rating are to be deployed in every 3,000 ft<sup>2</sup> of floor space with a maximum travel distance of 100 ft.

BSA will provide fire fighting services. Contractor employees must use an in-house phone to dial 911 or 2222 for emergency response. If using a privately owned cell phone, the reporting personnel must call 631-344-2222.

"Red Flag" days exist when weather conditions pose a severe threat of brush and wildland fires. On such days, the BSA Fire Rescue Group will make an announcement to the laboratory population prohibiting all outside work, e.g., welding, flame cutting, etc. Indoor work that does not pose a fire threat to the outdoors may continue.

Prior to performing any cutting, welding, burning, brazing, or other activities which may be a source of heat or ignition, the Contractor must obtain a hot work permit (Appendix I) from the BSA Fire Rescue/Group. This permit must be conspicuously posted in the area of the work. If a general permit for the project is obtained, it may be posted in the construction office or trailer.

### **Wildfire Danger**

Portions of the work will be performed in a wildland area of BNL, where brush fires are a real concern. The contractor shall ensure that the conduct of operations minimizes the potential of the occurrence of wildland fires.

Preventing the parking of vehicles on grassy areas with engines running, and control of disposal of smoking materials, is the responsibility of the contractor's Safety Representative.

Ensure gasoline-engine-driven portable generators and air compressors are equipped with spark arresters and that personnel are aware of fire break names if calls to the Fire Department [Ext. 2222 or (631) 344-2222] become necessary.

## **7.9 Hand and Power Tools**

Hand and power tools shall be used, inspected, and maintained in accordance with the manufacturer's instructions and shall be used only for the purpose for which designed.

Power tools designed to accommodate guards shall be equipped with such guards when in use. Reciprocating, rotating, and moving parts of equipment shall be guarded if exposed to contact by employees or otherwise create a hazard.

Tools and equipment showing evidence of safety hazards shall not be brought on site. Should hazards become evident after work is initiated, remove the tool from use, clearly indicate the tool is not to be used, and take the tool from the site at the end of the work shift.

Each subcontractor will color code their power tools and extension cords for easy identification and facilitate inspection. An acceptable method for identification is to use colored electrical tape on each end of the cord. The GC Project Manager will maintain a master list of contractor ID markings.

## **7.10 Hazard Communication**

### **Purpose**

The purpose of this hazard communication program is to inform NSLS-II project employees and all contractor employees of known chemical hazards that may exist in the workplace.

### **Application**

This program applies to chemicals known to be present in the workplace in such a manner that employees may be exposed under normal conditions, non-routine tasks, or foreseeable emergencies.

This hazard communication program relies on Material Safety Data Sheets (MSDS) from suppliers for purposes of hazard determination.

### **Program Summary**

The major elements of this program are as follows:

- labels and other forms of warning,
- Material Safety Data Sheets from suppliers,
- employee information and training,
- list of hazardous chemicals known to be present in the workplace,
- methods for informing employees of hazards of non-routine tasks, and
- methods for informing contractor employers of hazards their employees may be exposed to while working on the project.

### **Labels and Other Forms of Warning**

Each container of hazardous chemicals shall be labeled, tagged, or otherwise marked with:

- the identity of the hazardous chemical(s), and
- appropriate hazard warnings.

Labels and other forms of warning shall be legible and in English, and shall be prominently displayed or readily available in the work area during each shift.

**Material Safety Data Sheet**

An MSDS shall be kept for each hazardous chemical known to be present in the workplace.

MSDSs are kept in the construction office and are readily accessible by employees during each work shift.

The GC Project Manager is responsible for maintaining MSDSs in a complete and up-to-date manner.

**Training and Information**

All employees shall be trained according to a written hazard-communication training plan that is part of the company's overall hazard communication program.

Training shall extend to non-routine tasks, as necessary, and to foreseeable emergencies. All employees shall be trained on any revisions to this program.

A typical training program is included in Appendix L.

**Revisions**

This program shall be amended as changes in work operations, new materials or processes, or new information dictate.

**7.11 Heat and Cold Stress****Heat Stress**

Heat stress is a name given to a collection of health hazards that can occur as a result of strenuous work in hot, humid environments. The effects range from minor discomfort to life-threatening implications.

The cause of heat stress is:

- metabolic heat: When we work, our body produces heat.

We LOSE most of that metabolic heat to the environment by:

- sweat (evaporation), and
- wind cooling (convection).

When environmental and/or work condition prevents losing enough metabolic heat, health consequences result = heat stress. The major conditions make us more susceptible to heat stress are:

- hot and humid weather, and
- PPE blocks evaporation and wind.

BSA provides environmental monitoring for Heat Stress conditions in the late spring, summer, and early fall. These notifications can alert workers of environmental conditions, that when mixed with strenuous work, make the worker susceptible to heat stress. Personnel assigned to the NSLS-II construction project will abide and adhere to the precautions concerning work and rest regimens determined by the BSA Industrial Hygiene Group. These instructions follow the ACGIH guidelines as required by 10 CFR 851.

**Cold Stress**

Prolonged exposure to freezing or cold temperatures can result in serious health problems such as trench foot, frostbite, and hypothermia. In extreme cases, including cold-water immersion, exposure can result in death. Danger signs include uncontrolled shivering, slurred speech, clumsy movements, fatigue, and confused behavior. If these signs are observed, call for emergency help.

These factors contribute to cold stress:

- Cold temperatures: A cold environment forces the body to work harder to maintain its temperature.
- High or cold wind: Wind chill is the combination of air temperature and wind speed. For example, when the air temperature is 40°F and the wind speed is 35 mph, your exposed skin receives conditions equivalent to the air temperature being 11° F.
- Dampness and cold water: Cold air, water, and snow all draw heat from the body. Cold stress can be brought about by temperatures in the 50s coupled with some rain and wind.

Anyone working in a cold environment may be at risk for cold stress. However, older adults may be at more risk than younger adults, since older people are not able to generate heat as quickly. Certain medications may prevent the body from generating heat normally. These include anti-depressants, sedatives, tranquilizers, and some heart medications. Persons with existing medical conditions that are aggravated by cold temperatures or who are taking these types of medication should be evaluated by the OMP before extended periods of outdoor work in cold weather.

#### **Prevention and Protection**

- In cold, wet, and windy conditions, workers need to wear proper clothing, including layers so they can adjust to changing conditions.
- Workers need to take frequent short breaks in warm, dry shelters to allow the body to warm.
- Try to schedule work for the warmest part of the day.
- Use the buddy system – work in pairs so that one worker can recognize danger signs.
- Drink warm, sweet beverages (sugar water, sports-type drinks) and avoid drinks with caffeine (coffee, tea, sodas, or hot chocolate) or alcohol. Eat warm, high-calorie foods such as hot pasta dishes.

### **7.12 Hoisting and Rigging**

All rigging equipment, including cranes, fork trucks, extending fork trucks, slings, and hardware brought onto the BNL site for the first time must be inspected by the BSA rigging inspection supervisor. All operators must be qualified and must present their operating license to the inspector when requested. All inspection documents must be available to the BSA rigging inspector, and such documents must be current. Subsequent inspections will be made by the operator and user of the equipment.

Perform hoisting and rigging activities in accordance with 29 CFR 1910 Subpart N, 29 CFR 1926 Subparts H and N, the DOE Standard for Hoisting and Rigging, and the ANSI B30 and B56 Series. Provide for review by GC Project S&H Manager, documents of certification that contractor's hoisting and rigging equipment meets the requirements in these documents. If an inspection certificate expires while the equipment is on site, re-inspect the equipment and update the inspection certificate before continuing work activities.

Equipment operators/riggers, including alternates, shall be qualified to perform their assigned functions. Qualifications shall include physical, knowledge, and skills proficiency based on job function and a valid license for the piece of equipment.

All operations that require hoisting and rigging shall have a PHA and/or an appropriate safety checklist completed prior to beginning work to ensure safety and compliance.

Each lift shall be reviewed to determine if the lift is classified an ordinary lift or critical.

All lifts, with the exception of off-loading material from the delivery vehicle or moving equipment from one location to another provided the equipment is not raised more than 3 ft above the ground and does not pass over any other vital equipment, must follow an approved lift plan. Such plans are reviewed and



approved by the BSA rigging inspector. Ordinary lift plans usually take 2 days to approve; critical lift plans usually take about a week for approval (depending on the complexity of the lift).

### Critical Lift

A lift will be considered critical when any **one** of the following conditions exists:

- The load item is unique and, if damaged, would be: (1) irreplaceable; or (2) not repairable and is vital to a system, facility, or project operation.
- The cost to replace or repair the load item or the delay in operations of having the load item damage would have a negative impact on facility, organizational, or DOE budgets to the extent that it would affect program commitments.
- The lift involves more than one crane or other motorized lifting device lifting a common load.
- The lift is 85% or more (mobile crane) or 75% for steel erection, or 90% or more (fixed crane) of the rated capacity.
- The load requires exceptional care in handling because of size, weight, close-tolerance installation, high susceptibility to damage, or other unusual factors.
- The lift has a gross weight over 50 tons.
- Collision, upset, or dropping could result in significant release of hazardous material or other undesirable conditions.

There are other conditions which **might** constitute a critical lift and should be evaluated by the Subcontractor. Such conditions include:

- Lifts where the load could fall on pipelines or vessels containing flammable gases or liquids, or which may result in a release of hazardous materials to the environment.
- Lifts in tight spaces.
- Lifts involving non-rigid objects like tank shells.
- Lifts with lifting points are below the center of gravity of the load.

The Critical Lift Evaluation Form (Appendix M) must be developed by the GC, and all reviews/approvals must be obtained prior to the lift being made.

Required attachments to the Critical Lift Plan include:

- Crane operator certification – All crane operators shall possess a valid NYS Department of Labor (DOL) Crane Operator's Certificate of Competence or equivalent certification if accepted by the NYS DOL. The crane operator's certification must be up to date. All operator certifications must be attached to the plan or be on file.
- Type, size, capacity, engineered designs, and manufacturer of shackles, hooks, jacks, rollers, come-a-longs, spreader bars, and slings
- Type, size, capacity rating, manufacturer, capacity certificates, and monthly inspection reports for all cranes and other lifting equipment
- Lift geometry and free body diagrams to illustrate the individual tensions of each sling involved in the lift, and any shift of weight when the load is lifted
- A complete rigging diagram must be attached to the critical lift plan. The rigging diagram must include the entire rigging process and the following minimum information, when it applies:
  - Type and capacity of lifting equipment
  - Crane boom length, radius, and location of outriggers

- A plot of the path of travel including all vertical and horizontal clearances from such items as adjacent equipment, power lines, and other encumbrances or hazards
- Location, size, and capabilities of lifting lugs, slings, spreader bars and other rigging accessories, as well as the method of attachment
- Position of load in relation to the boom to show hook clearance and distance between the boom and the load
- Description, size, capacity, and location of miscellaneous equipment such as dollies, jacks, hand wrenches, rollers, etc.
- Method to determine that the location where the crane is to be placed is on stable ground prior to the placement of lifting mats or cribbing
- Location of mats and cribbing used before, during, and after the lift
- Location and orientation of equipment
- Location of underground lines (utility lines, electrical duct banks, cables, etc.), abandoned vessels and tanks, and foundations

Examples of an acceptable Critical Lift Plan are available from the NSLS-II ES&H Manager, upon request.

### **Ordinary Lift**

Any lift that does not meet the definition of a critical lift is considered an ordinary lift. The lift plan must include the following information:

- Description of lift, including weight, dimensions, center of gravity, and objects to be lifted
- Hoisting and rigging equipment with capacities
- Rigging sketches/drawings

Ordinary lift plans must be reviewed and approved by the BSA Rigging Inspector.

### **Generic Lift**

Generic lift plans can be prepared for lifts that occur on a routine basis, such as removing equipment and material from a delivery vehicle and landing it on the ground near the truck, and moving material from the ground level to an upper level using an extending fork truck (e.g., LULL). Generic plans are prepared and approved at the start of the job and will remain in effect for the duration of the job or until there is a change of conditions which require the plan to be revised. An example of a generic lift plan is included in Appendix M.

### **Safe Lifting Practices**

- Determine the weight of the load before designing the method that will be used to lift it. Consider whether vessels will contain fluid, sludge, internal equipment, etc. These items can add significantly to the nominal weight and can create dynamic motion.
- If possible, distribute the load evenly on all legs of a sling.
- When using multiple leg slings, keep in mind that the load is not always divided equally.
- The four-leg slings shall be rated as two-leg slings, since it cannot always be determined that all legs will be loaded equally. Other multiple-leg slings should be given due consideration for possible uneven loading.
- Check choker rotation to eliminate jerking or slipping while upending or laying down.
- When fastening chain hoists, or snatch blocks to permanent structures, verify that the structure is strong enough to support the load.
- Always refer to the manufacturer's specification chart for safe working loads of shackles.

- Never replace the shackle pin with a bolt; only the proper fitted pin shall be used.
- The crane rated loads do not account for the weight of rigging accessories, such as blocks, auxiliary boom head, hooks, slings, spreader bars, jibs, material handling equipment, and other elements of lifting tackle. The combined weight of such items must be added to the total weight.
- The maximum safe working load of cranes is determined from static loads. The capacity charts do not take into account impact loads due to the dynamic motions of the load or crane.
- Are softeners required to reduce cutting to the slings?
- Conduct a detailed investigation to identify all possible interference in the vicinity of the work whether overhead, at grade, or underground.
- Prior to lift, develop a method of unhooking and hooking up the load.
- Always assure that rigging is placed to assure proper orientation of the piece in its final position.
- Surveying equipment may be needed to insure that loads remain within vertical and horizontal limits and to assure stability during the lifting operation.

### **Safety Precautions for Lifting in Tight Spaces**

- Plot in detail the location of the crane and/or other equipment with respect to the work, including the location of outriggers.
- Establish limits of allowable motion for the boom in both the vertical and horizontal directions for each crane location in order not to damage existing facilities.
- Devise and provide means to protect existing operating facilities. Mechanically protect small protrusions on operating equipment, such as valves, instrumentation, brackets, etc., which could be damaged if contact is made with the load.
- Consider shutting down and depressurizing operating equipment that could be jeopardized by the lift.
- Use tag lines to stabilize the load during the lift.

### **Method of Attachment and Handling**

- If attachment points or lifting lugs are provided on the piece, verify that they are intended for handling operations, to prevent damage.
- What are the manufacturer's care and control restrictions of the object to be lifted during handling the entire piece and not a component?
- Are there any requirements for shipping skids or other handling devices and their availability?
- Review the sequence of proper assembly or disassembly when the structure consists of components.

### **Lifting Lug Requirements**

- Lifting lugs must be engineered to withstand the load plus an additional 125% of the load as a safety factor.
- All engineering of the lugs must be done by a professional engineer of the appropriate discipline.
- Welds on both old and new lifting lugs must be magnetic-particle tested to ensure soundness.

### **Matting Requirements**

- Matting must be made of through bolted hard wood, or heavy duty 12" X 12" crane timbers.
- Matting must be thoroughly inspected before use.

### Ground Stability

- Ascertain the load carrying capacity of the soil and beware of recently excavated and backfilled areas or areas with weak soils having limited bearing capacity. Examine the rigging diagram to verify that cranes, dollies, and trailers are adequately supported and that the diagram includes cribbing or mats under the crane and outriggers where required.
- Check the entire path of movement during the lift for all holes, rocks, and soft ground.
- Check all load restrictions on floors, structures and access roads.

### Tag Lines

- Always use a tag line even for smaller lifts unless the tag line increases the hazard. It is much easier to maintain control of the lift than to regain control when it is swinging or spinning.
- There shall be no knots in the trailing end of tag lines.

## 7.13 Lock-Out/Tag-Out (LOTO)

### Policy

It is BNL Policy that working on or near energized electrical circuits will only be allowed when all methods available to perform the work in a de-energized state have been evaluated and determined to be infeasible. Working on or near energized conductors is subject to the restrictions and provisions of the Standard for Electrical Safety in the Workplace (NFPA 70E), and the BNL SBMS subject area Electrical Safety.

The use of the LO/TO Program is to prevent an unexpected operation or release of energy of electrical or electronic equipment. The unexpected starting of motors may injure persons working on them, or unexpected energizing of equipment can produce an electrical shock and/or damage to the equipment. The LO/TO Program combines the use of tags and locks, or other electrical or physical systems to lock out power to the equipment while it's broken, or being worked on.

Locking and tagging key points are proven methods of controlling the release of energy or hazardous materials, and an important way of safeguarding workers who operate or repair machines or processes in the plant. This document defines LO/TO, lists specific procedures to follow for LO/TO, define responsibility for LO/TO, and show the importance of both education and discipline in these procedures.

A Lock-Out/Tag-Out program shall be included in the Construction Environment Safety and Health Plan that complies with OSHA and is tailored to BNL's LOTO program. A sample Lock Out/Tag Out Program is presented in Appendix J.

### Introduction

Most accidents happen around machinery of some type. Often, the accident involves electrical shock, burns, or exposure to hazardous materials or moving machinery. These accidents share one thing in common: the uncontrolled release of energy.

To protect yourself and your co-workers from danger in the workplace, you must understand that energy, left uncontrolled, can be very dangerous. Energy, simply defined, is the capacity for doing work. Kinetic (moving) energy is the force caused by the motion of an object, such as a spinning flywheel. Potential (stored) energy is the unseen force inside an object when not moving, such as a spring under tension. There are many sources of energy that can provide power to machinery. The Phase Hazard Analysis (Section 7.1) identifies specific hazardous energy sources. These may include:

- Gravity
- Electrical
- Mechanical

- Chemical
- Hydraulic
- Pneumatic
- Thermal
- Nuclear

A LOCK-OUT is simply a locking device, such as a padlock, placed on a power source to prevent the release of hazardous energy that could set a machine in motion or otherwise endanger an employee working on the machine. Locks may be used with a lock-out device that holds an energy control point, such as a switch, lever or valve, in the off position, making it impossible to operate.

A TAG-OUT is a written warning tag telling all others not to operate a switch or valve that could release hazardous energy or set a machine in motion. The tag-out is placed prominently on the switch or lever so as not to be missed.

### **Responsibility**

Locking and tagging key points are proven methods of controlling the release of energy or hazardous materials, and an important way of safeguarding workers who operate or repair equipment, or machines, and processes in the plant. This document lists specific procedures to follow to properly LO/TO, and show the importance of both education and discipline to these procedures.

It is the responsibility of the on-site GC supervisor to enforce the LO/TO procedure as well as provide the necessary equipment to comply in all respects with the procedure. Transferred employees shall be instructed by their supervisor in the purpose and use of lock-out/tag-out procedure. Supervisors shall be responsible for enforcing the specific lock-out/tag-out procedures listed below.

- Production and support departments shall be responsible for being knowledgeable of and adhering to this procedure. No locks shall be removed from equipment without first consulting the Maintenance Department.
- A LO/TO shall only be removed by the person who implemented it, or in rare circumstances if that person is not available, by a committee of knowledgeable personnel per written procedure.
- If more than one individual is required to lock-out or tag-out equipment, they shall place their own lock and tag on the affected equipment in such a way as to be certain the equipment is locked out. If the affected equipment cannot accept multiple locks or tags, a multiple LO/TO hasp shall be used.

### **Equipment**

LO/TO equipment shall consist of the following and be controlled and distributed by the on-site GC supervisor:

- Padlocks. Sufficient quantities of padlocks; each lock to have an individual key, and one master key controlled by maintenance supervision.
- Multiple lock tongues. To be used in case more than one department is involved in a job.
- Danger/Warning tags. To be used wherever it is necessary to warn maintenance employees and operators of a repair.

### **When to LO/TO**

Most equipment is designed with safe switches that disable the equipment for minor repair or calibration during normal operation. In general, these switches provide adequate protection for minor repair that is routine, repetitive, and necessary to the normal use of the equipment. LO/TO procedures shall be used for the following situations:

- Major repairs or overhaul
- When working alone, out of visual contact of the controlling switch

- Any time there is danger of injury from an unexpected release of energy
- Any situation that threatens an employee's safety

### **LO/TO Procedures**

The following are specific procedures to be followed for LO/TO:

- Notify all affected areas and employees of the impending lockout situation, the reason for it, and the estimated start and duration times.
- Equipment shutdown and isolation. Place all switches in the "off" or "safe" position. Disconnect sources of power, ensuring all sources of both primary and secondary power to the equipment are interrupted.
- Dissipate residual energy. Shutting down equipment does not mean there is no energy left in it. Check for trapped pressure or residual electricity in the system.
- LO/TO all in-line points of control. In most cases, this may be more than one place, or more than one lock, if several people are working on the equipment.
- Lock-out verification. Take nothing for granted. Verify that the locked-out switch or control cannot be overridden. Test the equipment to be certain that the locked-out switch is de-energized and not simply malfunctioning. Press all start buttons or valves to see if the equipment starts. Ensure the system you are working on is the same one that has been locked out.
- Perform the work scheduled. Try to foresee all possible hazards. Ensure the new/repair work does not bypass the lockout and reactivate the system.
- Lock and/or tag removal. All locks and tags shall be left in place until work is completely finished. This is especially true when more than one employee is working on the equipment. A lock is never to be removed except by the person who placed it there unless emergency removal is required as stated below.

**NOTE: Only immediate supervisors are to authorize emergency removal of a lock or tag. The individual who applied the tag must be notified that the tag is being removed.**

- Equipment start-up. Make a final safety check before restarting equipment, to be certain it is safe to operate. Make sure of the following:
  - All tools and other items have been removed.
  - All machine guards are returned to their proper position.
  - All electric, hydraulic, pneumatic, or other systems are properly reconnected.
  - All employees are clear of equipment.

Many of the LO/TO procedures appear to be common sense, and they are. Following them will ensure safe operation calibration, maintenance, and repair of equipment and/or processes, without dangerous surprises or injury.

### **Working On or Near Energized Circuits**

It is the policy of BSA that, except under extreme circumstances, work shall not be done on energized circuits.

Justification must be made to the NSLS-II Project Management, of the need to work on energized circuits. The Contractor will arrange for the issuance of a "Working On or Near" Permit as required by the SBMS subject area Electrical Safety. See Appendix K for a sample Energized Electrical Work Permit. The Contractor shall give BNL a minimum of two business days notice of any requirement to "Work On or Near," to allow time for the BNL permitting process. Working on or near operations that only involve testing, diagnostic work, and/or service tasks on equipment for voltages less than 600 volts AC to ground may be covered by a testing, troubleshooting, and voltage monitoring energized work permit, which may cover the entire project period. Operations involving "Working On or Near" for voltages greater than 50

volts AC to ground may require a specific "Working On or Near" permit for each work situation required. Work will proceed when the "Working On or Near" permit is completed and all parties performing the work have been informed of the hazards involved and what PPE is to be worn. An authorized supervisor from the contractor who is performing the work and a BNL-designated Line Manager must sign the permit before any work can be performed.

Work with voltages less than 50 volts (in BSA Range "A") is not considered working on or near energized conductors. Energized parts that operate at less than 50 V to ground are not required to be de-energized if there must be no increased exposure to electrical burns or to explosion due to electric arcs. BSA will issue energized work permits.

Energized work permits shall address, as a minimum, **all** of the following elements:

- A description of the circuit and equipment to be worked on and their location
- Justification for why the work must be performed in an energized condition
- A description of the safe work practices to be employed
- Results of the shock hazard analysis
- Determination of shock protection boundaries
- Results of the flash hazard analysis
- The Flash Protection Boundary
- The necessary personal protective equipment to safely perform the assigned task;
- Means employed to restrict access of unqualified persons from the work area
- Evidence of completion of a job briefing, including a discussion of any job-specific hazards (include in Phase Hazard Analysis)
- Energized work approvals by the NSLS-II Project Management and the Chairman of the BSA Electrical Safety Committee

For all energized work, regardless of the voltages, the appropriate personal protective equipment shall be worn.

Work performed on or near energized circuits performed by qualified persons related to testing, troubleshooting, voltage measuring, etc., is permitted without an energized work permit, provided appropriate safe work practices and personal protective equipment in accordance with NFPA 70-E is used.

### **Education and Discipline**

The key to worker safety is education. The purpose of this document is to ensure that everyone understands the importance of LO/TO and how to recognize when it is in use. These elements shall be covered during initial contractor/vendor orientation and during the pre-job and periodic "tool-box" talks. By educating all employees to the importance of following proper safety procedures, a safer working environment can be ensured.

As with all safety procedures, a fair, uniform enforcement of discipline must be in place. Employees are responsible for their own safety, the safety of their fellow employees, and the safety of the facility. Violating LO/TO procedures is a major safety violation and will subject the employee to immediate discipline.

BNL shall have the right to request that the Contractor provide the appropriate documentation that clearly indicates the qualifications and training of any and/or all employees performing such work.

The Contractor shall provide his own locks (types specified by BNL), lockout devices, red tags for Lock-Out/Tag-Out of energy sources(s) and personal protective equipment. A logbook shall also be maintained and kept in a designated area assigned by BNL.

- In order to comply with this Policy, the Contractor shall ensure that all employees who may be required to "Work On or Near" electrical circuits within the BNL AC Distribution System and all associated equipment shall be authorized employees. An authorized employee is deemed as an individual who has been qualified in the skills and knowledge related to the service, maintenance, construction and/or operation of electrical equipment and installations, and has received safety training on the hazards involved, including the wearing of the appropriate personal protective equipment (PPE).

#### **7.14 Respiratory Protection**

The Contractor will determine which respirator type or class will offer adequate protection, based on:

- the respiratory hazard(s) to which the worker may be exposed,
- the workplace and user factors that have the potential to affect respirator performance and reliability,
- his or her informed professional judgment (based on the material safety data sheet or personnel air monitoring results), and
- the scientific literature.

The Contractor shall provide respirators in accordance with the following:

- If contractor employees are required to wear negative or positive pressure, tight-fitting respirators, they shall have been medically evaluated, and the completed medical evaluation shall be retained in the GC Project files.
- Ensure respirator wearers have completed the respirator quantitative fit testing and respirator training. Training documents shall be retained by the GC.
- Provide respirators and cartridge type specified to protect worker from exposure to identified or suspected hazards as specified in the hazard analysis.
- Provide breathing air, if required. Submit data to the GC Site Superintendent demonstrating the compressed breathing air quality supplied to the air respiratory protections systems meets the requirements of ANSI/CGA G7.1, Commodity Specification for Air.
- Provide optical corrections for appropriate respirators.
- All respirators shall be certified by the National Institute of Occupational Safety and Health (NIOSH).

#### **7.15 Sources of Radiation**

##### **Lasers**

Only lasers that are Class 2, 3A, or 3R will be permitted on the construction site.

Only qualified and trained employees will be assigned to install, adjust, and operate laser equipment. Proof of qualification of the laser equipment operator will be available and in possession of the operator at all times. The GC shall have the training documentation on file or readily available.

Areas where lasers are used shall be posted with standard laser warning placards. Only those devices labeled as Class 2 or 3a, or 3r (**no greater than 5 milliwatts**) shall be used.

Never intentionally stare into the laser beam.



Never intentionally aim the beam at oneself or another person, particularly in the facial area.

The beam will be turned off when not in use.

Avoid mirror-like surfaces when directing the laser beam. A reflected beam can act like a direct beam on the eye.

Areas where lasers are used shall be posted with standard laser warning placards. These can be obtained from the BSA Laser Safety Officer.

Beam shutters or caps shall be utilized, or the laser turned off, when laser transmission is not actually required. When the laser is left unattended for a substantial period of time, such as during lunch hour, overnight, or at change of shifts, the laser shall be turned off.

When it is raining or snowing, or when there is dust or fog in the air, the operation of laser systems will be prohibited where practicable; in any event, employees will be kept out of range of the area of source and target during such weather conditions.

The laser unit in operation should be set up above the heads of the employees, where possible.

### **Ionizing Radiation Sources**

The NSLS-II Project Management must be notified in advance of all sources of ionizing radiation (e.g., Troxler Density Gauges, radiography sources, etc.) brought to the site. Contractors who use these sources in the performance of work at BNL shall demonstrate that they are properly licensed by the State of New York to own and use these sources. These sources shall be used and controlled consistent with the BNL Radiological Control Manual and NYS Industrial Code Rule 38 (NY Labor Law section 27, General Business Law Section 483 part 38), Ionizing Radiation Protection.

[https://sbms.bnl.gov/SBMSearch/ProgDesc/RadCon/RadCon\\_PD.cfm](https://sbms.bnl.gov/SBMSearch/ProgDesc/RadCon/RadCon_PD.cfm)

and sitewide radiological control procedures.

Work with radiation sources will be performed by competent persons trained in the use of radiological devices and in the hazards associated with them.

- All work with these sources of ionizing radiation shall be authorized through a BSA Work permit and/or Radiological Work Permit (RWP).
- The Facility Support Representative will determine if a RWP is required.
- The NSLS-II ES&H Coordinator will be made aware of the intent to use radiation sources.
- Appropriate BSA radiological postings will be maintained while the radiation source is in use.
- Only authorized and trained personnel will be allowed access to the radiologically controlled area.
- Appropriate dosimeters will be worn at all time while in the area and maintained in accordance with the RWP

### **7.16 Industrial Hygiene Monitoring**

All work on the project shall be done within the occupational exposure limits for Industrial Hygiene hazards set in OSHA 29CFR1926, 29CFR1910, and American Conference of Governmental Industrial Hygienists (ACGIH) *Threshold Limit Values®* (TLV). These hazards include, but are not limited to, chemicals, lead, silica, asbestos, beryllium, noise, non-ionizing radiation, and heat stress hazards on the project). Compliance with the OSHA Permissible Exposure Limits and ACGIH *Threshold Limit Values®* shall be determined by representative personnel exposure monitoring and dosimetry conducted by the General Contractor or GC representative. The details of the project's exposure monitoring equipment, methods, and monitoring strategy are included in this Environment, Safety and Health Plan.

If data are available to support the supposition that real-time monitoring is not necessary (i.e., data from a previous job or in peer-reviewed literature showing that neither the ACGIH nor OSHA exposure limits are exceeded), then such data must be included with this Environment, Safety and Health Plan, and reviewed and approved by either the BSA Industrial Hygiene Group or the NSLS-II ES&H Manager.

The GC or GC representative will provide qualified monitoring and hazard assessment personnel to conduct all Industrial Hygiene monitoring. In addition, personnel who conduct exposure monitoring on workers who handle, disturb, or remove friable asbestos-containing material will maintain training and certifications required by the NYSDOL Industrial Code Rule 56 and USEPA. Copies of all monitoring personnel certifications are included as part of this Environment, Safety and Health Plan.

The GC or GC representative shall monitor with calibrated equipment using analytical methods approved by NIOSH or OSHA, and will have the analysis conducted by a laboratory certified for Proficiency Analytical Testing by the American Industrial Hygiene Association (AIHA), or by the use of National Institute of Standards and Testing (NIST)-traceable calibrated direct reading instrumentation. Prior to use in the field, all instrumentation used for surveys shall be calibrated in compliance with the manufacturer's specification.

Copies of all equipment calibration, field sampling sheets, laboratory analysis reports, and hazard assessment evaluation reports shall be submitted to the BSA IH Group or the NSLS-II ES&H Manager within 5 days after the receipt of results from analytical laboratories or within 5 days after analysis by direct reading instruments, meters, or monitors. The monitoring equipment to be used on this project is listed on the attached table.

Materials and conditions that require exposure monitoring include, but are not limited to:

- Asbestos
- Beryllium
- Chemicals, adhesives, or lead
- Carcinogens
- Confined spaces
- Natural hazards in the environment (for example, heat stress)
- High noise levels
- RF/microwave
- Static magnetic fields
- Silica (from grinding, drilling, core boring, jackhammering of concrete, masonry, mortar etc.)

### **7.17 Penetrations**

Concrete and/or masonry penetrations are of specific safety concern at BNL. It is BNL policy that the Contractor ensures safe penetration into or through any existing concrete or masonry surface.

BNL SBMS instructions, ES&H standards, and Plant Engineering policies and procedures shall be followed, including the completion of appropriate Penetration Permits and the provision and use of utility locating/detecting equipment.

In order to comply with these guides, the Contractor shall provide trained "Authorized Employees" and shall submit, for NSLS-II review and approval, the name and type of the utility locating/detecting equipment to be used, as well as the specific names of the trained personnel who will perform the locating task with this equipment and who will execute the penetration work.

Non-aggressive penetrations cannot be executed without first using utility locating/detecting equipment and obtaining approval by NSLS-II.

Aggressive penetrations cannot be executed without first using utility locating/detecting equipment, followed by the completion and approval of an NSLS-II Aggressive Penetration Permit.

### 7.18 Steel Erection

The erection and assembly of structural steel is perhaps one of the most hazardous aspects of a construction project. Typical hazards involve material handling, working from heights, welding, and flame cutting.

The OSHA Standard 1926 Subpart R applies to work on this project with the following notable exceptions

- All steel work greater than 6 feet above the next lower level will require 100% fall protection.
- Fall protection within a Controlled Decking Zone (CDZ) is required

The steel erection contractor (usually a subcontractor to the steel supplier) must prepare and have approved by the NSLS-II ES&H Manager a comprehensive steel erection plan prior to erecting the first piece of steel. The plan must contain as a minimum the following information:

- The sequence of erection;
- Material deliveries, material staging and storage areas;
- Coordination with other trades on site;
- Description of crane selection and placement procedures including evaluation of soil conditions prior to crane deployment;
- Site preparation;
- Pathways for over head and suspended loads, and methods to designate the lift areas and pathways;
- Critical Lifts;
- Description of erection activities and procedures;
- Hazards associated with weather causing cessation of steel erection activities;
- Description of fall protection procedures that will be used on site;
- Description of procedures to prevent objects from falling off the structure at the site (other than steel being hoisted);
- Any non routine tasks to be performed;
- Certification that each worker has received training for performing steel erection operations;
- A list of qualified and competent persons (for steel erection and associated activities);
- Rescue procedures. BNL Fire/Rescue (F/R) Group will provide rescue operations. Before erection can commence, the F/R group must conduct a walk-through of the facility and identify the quickest means to access the site, and the placement of rescue equipment, and the ambulance. Depending on the nature of the construction site, the F/R Chief may require that an emergency drill be conducted prior to commencing actual work.

The steel erection plan may be included in the Phase Hazard Analysis of the general contractor's Construction Environment, Safety and Health Safety Plan. Additional hazards associated with steel erection must be identified in the PHA along with mitigating measures to be taken by the General Contractor or the Steel Erector. Typical hazards include crane and lifting operations, rigging, protection of holes and openings in the decking.

All documentation relating to the erection of steel including training records and tool-box talk attendance and topics must be maintained by the General Contractor and subject to inspection by the NSLS-II ES&H Manager or his designee.

### **7.19 Concrete and Masonry Operations**

Concrete and masonry operations shall be conducted according 1926 subpart Q, Concrete and Masonry Construction. As stated in the NSLS II Phase Hazard Analysis, safety is a primary consideration and as such all protruding rebar and anchor bolts shall be capped or otherwise protected to eliminate any impalement hazard.

In addition to the general PPE required at this site, all pump truck hose handlers shall wear a face shield over their required safety glasses. Impervious gloves and overshoes (worn over their safety shoes) shall be worn by all concrete workers during pouring operations.

All formwork, precast panels and shoring shall be prepared by a qualified designer and be inspected by that qualified engineer prior to the pour.

Limited Access Zones (LAZ) shall be established around all masonry construction on the side of the wall not scaffolded. The LAZ will be entered only by the workers performing masonry wall construction. The LAZ shall remain in place until the wall is adequately supported.

All concrete and masonry operations shall comply with the NSLS-II requirement of the six (6) foot fall rule.

## **8.0 ENVIRONMENTAL PROTECTION AND WASTE MANAGEMENT**

The following sections provide environmental protection and waste management requirements for construction activities associated with the NSLS-II project.

### **8.1 Stormwater Pollution Prevention and Control**

Prior to mobilization to the site, perform an inspection of equipment containing liquid systems including, but not limited to, bulldozers, backhoes, bobcats, drill rigs, trucks, hoists, and cranes, to ensure no leaks exist. Verify hoses, tubing, and hydraulic lines are in good operating condition. Make all necessary repairs before delivery of equipment or vehicles to the site. The use of biobased hydraulic systems is encouraged.

Perform daily inspections to ensure continued good operating condition of equipment and promptly repair all deficiencies.

Store all materials indoors or otherwise protected from weather.

For outdoor painting operations, minimize overspray, and use tarps/vacuums/enclosures to contain sandblasting waste and paint chips from paint removal operations.

Petroleum products stored in quantities greater than 500 gallons shall be appropriately labeled and have secondary containment capable of preventing any release to a drainage system or the environment. Use of B-20 is preferred.

Minimize all potential for spills. Specifically, do not allow liquids, including (but not limited to) gasoline, diesel fuel, lubricating oil, or antifreeze, to enter the storm sewer systems, waterways, drainage ditches, or the ground.

Use due caution when operating oil-bearing equipment near aquatic resources. Where necessary, implement appropriate control measures, including but not limited to the use of physical barriers (plastic or tarps, berms, etc.) and/or absorbent materials to prevent leaks or spills from entering waterways.

Maintain a 25-ft minimum buffer zone from streams, be aware of storm drain inlets, and cover or contain debris stored outside.

Flushing empty concrete trucks or dumping excess concrete is prohibited. Transport excess concrete back to the batch plant. The truck chute may be washed at the work site. Flush the truck chute at an on-site location designated by the NSLS-II ES&H Manager. Solidified cement waste from truck chute cleaning is solid waste and shall be cleaned up and transported to the landfill.

Conduct all pipeline sterilization, flushing, hydro-testing, etc. in a manner protective of the environment. The NSLS-II ES&H Manager will designate the approved discharge location(s).

Water used to sterilize or flush pipelines should not be released uncontrollably to the environment, due to a possible high concentration of chlorine. The NSLS-II ES&H Manager will determine the appropriate means of waste disposal.

Stormwater that has accumulated in excavated areas, chlorinated rinse water, and chlorinated water used to sterilize/flush pipelines shall not be directly discharged or otherwise allowed to enter the storm systems, waterways, or drainage ditches without written approval from the NSLS-II ES&H Manager.

### **8.2 Erosion Prevention and Sediment Control**

Manage excavated soil and spoil material in a manner protective of the environment. Cover stockpiled material to prevent erosion and/or install appropriate sediment controls. Use due caution during excavation or any other soil management in the vicinity of sanitary or storm systems, waterways, or drainage ditches.

All erosion prevention measures and sediment controls (silt fence, straw bales, catch basins, etc.) shall be in place and approved by the NSLS-II ES&H Manager prior to beginning land clearing, excavations,

road building, etc. Sediment barriers such as silt fence and straw bales shall be entrenched and of sturdy construction.

The GC shall inspect erosion and sediment controls on a weekly schedule, prior to expected storm events, and after each heavy rainfall event. Document each inspection. Damaged control measures shall be attended to within eight hours of the time of discovery.

Where appropriate, provide temporary or permanent modifications to surface terrain gradient (soil or crushed stone berms, sediment retention basins, etc.) in order to minimize the flow of stormwater into or out of excavated or otherwise disturbed areas.

All erosion and sediment control measures shall be maintained throughout the course of the project and removed at the completion of the project, and appropriate measures shall be taken to return the area to its previous state. Maintenance shall include but not be limited to removal of accumulated sediment, repairs, and/or replacement of storm-damaged or otherwise deteriorated structures.

All disturbed areas shall be stabilized as soon as practicable by appropriate means, including but not limited to the use of mulch or other temporary cover, seeding with native vegetative ground cover, etc.

### **8.3 Spill Prevention and Control**

Report all spills promptly to the BSA Emergency Services Division at extension 2222 or 911 from a BSA phone, or 631-344-2222 from a cell phone, and then to the NSLS-II ES&H Manager. The NSLS-II ES&H manager will notify the Environmental and Waste Management Services Division, who will notify the appropriate regulatory agency.

All spills of petroleum-based materials to soil or water, regardless of quantity, must be reported to the New York State Department of Environmental Conservation. Notifications must therefore be made immediately upon spill discovery.

The responsible contractor will perform or pay for proper cleanup of accidental releases of materials. Cleanup is to be done by properly trained personnel meeting the requirements of 29 CFR 1926.65(q)(6). All waste from the cleanup must be packaged, transported, and disposed of by a licensed entity. The NSLS-II ES&H Manager must be given a copy of the hauler's manifest.

Depending on the materials spilled, the NSLS-II ES&H Manager may require the responsible contractor to hire a certified laboratory to take an appropriate number of soil samples to test at their laboratory. A copy of the results is to be given to the NSLS-II ES&H Manager.

For inside work, provide a spill kit, prevent spills to floor drains and do not discharge waste into any BNL system without approval.

For outside work, provide a spill kit, inspect equipment for leaks, and repair leaking equipment in a timely manner.

During extended periods (e.g., overnight) of non-use, construction equipment should be located over impermeable surfaces to minimize release to soils. If an impermeable surface is not readily available, the equipment should be underlain by a geomembrane or plastic tarp.

### **8.4 Waste Management**

This project is applying for Leadership in Energy and Environmental Design (LEED) certification. To this end:

- The GC shall provide containers and/or transport vehicles for excess property for salvage, universal waste, sanitary/industrial waste, and construction/demolition debris.
- Waste Minimization principles shall be incorporated in all activities to ensure the greatest environmental benefits and minimize future liability for the waste that is generated.
- All work shall be performed in a manner that maximizes salvage. Recycling and waste disposal to landfills shall be minimized.

- Characterization methods and procedures shall be employed by all parties to the contract to ensure that the characteristics of the waste are known and adequately recorded during all stages of the waste management process.
- The GC is responsible for properly handling and disposing of all wastes generated.

**APPENDIX A**  
**OFFENSES REQUIRING DISCIPLINARY ACTION**



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OFFENSE	FIRST	SECOND	THIRD
<b>Class I</b> <ul style="list-style-type: none"> <li>Creating or contributing to unsanitary conditions due to poor housekeeping</li> <li>Posting or removing notices on bulletin boards without permission</li> <li>Eating in unauthorized areas</li> <li>Failure to report the use of prescription drugs</li> <li>Unauthorized soliciting of contributions on NSLS-II Project</li> <li>Smoking in unauthorized areas (Note: This may be upgraded to a Class V offense if in a hazardous area)</li> </ul> <p>For Fourth Offense, next step in Progressive Disciplinary Policy is 30-day suspension, followed by Access Denial for the Fifth Offense within a 365-day time period.</p>	Verbal reprimand	Written reprimand	3-day suspension
<b>Class II</b> <ul style="list-style-type: none"> <li>Unauthorized use of equipment, tools, or machinery</li> <li>Failure to observe traffic and parking rules on NSLS-II project</li> <li>Horseplay</li> </ul> <p>For Fourth Offense within a 365-day time period, next step is Access Denial.</p>	Written reprimand	3-day suspension	30-day suspension
<b>Class III</b> <ul style="list-style-type: none"> <li>Gambling on NSLS-II site</li> <li>Disregard for safety rules (other than those mentioned elsewhere)</li> <li>Failure to report an injury or accident</li> </ul>	3-day suspension	30-day suspension	Access denied to site
<b>Class IV</b> <ul style="list-style-type: none"> <li>Threatening or intimidating other employees or supervisors</li> </ul>	30-day suspension	Access denied to site	
<b>Class V</b> <ul style="list-style-type: none"> <li>Any violation of safety procedures that contribute to the potential for loss of life or limb (see Note 1 for examples)</li> <li>Possession of weapons or firearms on company property, including site parking areas</li> <li>Possession of drugs, alcohol, and related paraphernalia on company property, including site parking areas</li> <li>Any other violations of the Drug Free Work Place policy</li> <li>Theft of property from company, client or other employees</li> <li>Assault on a supervisor or other employee</li> </ul>	Access denied to site		
<b>Note 1: Examples of Safety Violations</b> <ul style="list-style-type: none"> <li>Failure to comply with Company 100% fall protection policy</li> <li>Violation of confined space entry procedures</li> </ul>			

NOTE: This policy is designed to set minimum standards and is not meant to supersede a subcontractor's policy or policies which may be more stringent.

#### Progressive Discipline Policy

##### Acknowledgement:

I have read and understand the Project policy on discipline. I further understand that not following the company or client's rules and regulations will result in disciplinary action up to and including denial of Project site access.

Print Name \_\_\_\_\_

Signature \_\_\_\_\_

Date \_\_\_\_\_

Witness \_\_\_\_\_

Date \_\_\_\_\_

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**APPENDIX B**  
**CONTRACTOR INSPECTION FORM**

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**Plant Engineering Inspection Form for Contractor Equipment**

The BNL inspection of this equipment is solely for the purpose of allowing the equipment on the BNL site. The operators of the equipment are responsible to maintain and operate the equipment in a safe manner and in accordance with the equipment operator's manual and the appropriate OSHA standard.

General Contractor:  CEIR #: Sub-Contractor:  BNL Contact: Job #:  Site Location:  Equipment: Hour Meter:  S. N.:  48 Hour Notice Given: 

Item	Item
<b>General Appearance</b>	<b>Carrier:</b>
Cab	Outriggers
Fire Extinguisher	Boom Type
Glass	Anti-Two Block Device
Operator's Manual	Hook Latch
Load Charts/Capacity Plates	Wire Rope
Inspection Records	Tires/Tracks
<b>Operating Condition:</b>	<b>Rigging Equipment:</b>
Operating Controls	BTH Lifting Devices
Cooling System	Chain Hoists
Oil Leaks	Slings
Engine Instruments	Shackles
All Guards in Place	<b>Certification:</b>
Back-Up Alarm	Operators License
Lights	Training Records
Mirrors	Other
Seat Belts	
Hoses	

\*NDF = No Defects Found \*SR = Service Required N/A = Not Applicable

Comments:

Inspected By: cc: Project Engineer Contractor Safety Rep. BNL Contact 

F&amp;O ESHT&amp;Q File

EP-ESH-820B, Rev.3; June 26, 2003;Apprv.

Date: 

F:\DATABASE\CD\CDMSMGR.MDB

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**APPENDIX C**  
**INCIDENT INVESTIGATION REPORT**



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## Instructions for Completing the Line Organization Accident/Incident Investigation Report Form

The following provides guidance for completing the Line Organization Accident/Incident Investigation Report form. This form is intended to provide a means of collecting data for all types of events occurring at BNL from illness and injury to property and vehicle damage to include those involving non-employees, such as visitors, contractors, etc.. It is divided into two parts. The first part is mandatory and the second part is intended for use by those interested in carrying the investigation through to the event's root causes, ameliorating the condition and providing for other information. If the section is not applicable, draw a line through it or check the box if provided.

### **Part 1: This part must be completed for all investigations**

**Part 1, Page 3: Case Number:** Leave this number blank, it will be filled in by personnel responsible for OSHA Recordkeeping.

**Section A:** This is to identify individuals involved in the event, their occupation, line organization and supervisors. Space is provided for more than one individual. The first named individual is the victim, or subject about whom this investigation is proceeding. If this is an incident involving more than one victim, please provide a completed investigation for each. If others identified are witnesses, please indicate that by placing a "W" next to the name.

**Name:** The first name listed should be that of the injured/ill individual. Please do not use nicknames.

**Occupation:** If you know the person's official job title, please use same.

**Hospital:** If the individual was transported to a hospital, please indicate which one.

**Life #:** Please use Life Numbers for employees. If not a badged employee, use Social Security number

**Telephone #:** Extension at BNL through which the employee is reachable if the need arises.

**Line Organization:** If a BSA employee, use the Lab organization (Department or Division). If it is a contractor, use the contractor's employer.

**Supervisor:** Please provide the name of the immediate BSA supervisor, or contractor's supervisor.

**Section B:** Please indicate by a check mark in front of the classification listed that which applies. If none apply then use other. If you don't know, leave it blank.

**Section C:** Please indicate the date and time of the event on the first line. The date the employee notified the BSA Line organization, or non BSA employee notified his/her organization follows on the next line. Please be as specific as possible about where the event occurred. Please place check marks as appropriate in the rest of this section. NOTE: Type C Investigation is for recordable injuries and requires completion of all applicable sections of the report.

**Section D:** This section is only pertaining to non-BSA personnel.

**Section E:** Place check marks in the box in front of each item relating to this for injury/illness only. If you do not know the answer, contact Safety Engineering or your ESH Coordinator. (This section is similar to the front page of the CAIRS report.)

**Section F:** This section applies only to non-illness/injury events and is intended for use in reporting DOE property/DOE vehicle damage for the DOE CAIRS reporting process, and/or losses from radiological or environmental events.

**Section G:** Indicate who notified Line Management of this injury, including date and time, and who was notified.

### **Part 1, Page 4: REQUIRED INVESTIGATION INFORMATION**

**Section H:** Indicate what the person was doing at the time of the event, the purpose of the work, what equipment was used and where it was being done. Indicate also how often the task is performed and how often this individual performs the task.

**Section I:** Just check yes or no.

**Section J:** Tell what happened, how it happened and the severity of the injury or damage if known.

**Section K:** Request the diagnosis from OMC staff and enter it here.

**Section L:** Has been changed to section M. The new Section L is to identify the body part injured.

**Section M:** The old section M has been moved to Part 2, G. If the source of the diagnosis is a non-BSA practitioner, indicate the name here...also if you know that medical treatment beyond first aid is being provided, list the treating practitioner here. You must provide the name of the hospital only if the employee is admitted overnight.

**Section N:** Signature block at the end of Part 1 is for first aid cases or for near misses only. If the case meets the criteria for recordability, skip this section and move on to Part 2.

### **Part 2, Page 5: REQUIRED FOR ALL CASES MEETING THE CRITERIA FOR RECORDABILITY Complete only those sections which apply. You may draw a line through those sections which do not apply.**

**Section A:** Place a check mark in the box provided in front of those surfaces and conditions that apply.

**Section B:** Complete this section only if the event was outdoors or if weather somehow contributed to the event causality.

**Section C:** If this event involved tools, machines or equipment, place a check mark in the space provided in front of the item and then identify the tool, machine or equipment (e.g., [x] Non-powered Hand Tool ...hammer). If machines or other equipment are involved, indicate if they are part of a Preventive Maintenance Program and if Lockout/Tagout was applicable.

**Section D:** This box addresses miscellaneous items that are usually peripheral to accidents, incidents and injuries, but may have some contributing impact to the event. Please check only those items that apply.

**Section E:** This section only applies to events that involved the use of a vehicle. Please check only those events that apply.

**Section F:** **Completion of this section is required for all Type C Investigations.** Please place a mark in those boxes that identify those hazards that apply.

**Section G:** **Completion of this section is required for all Type C Investigations.** There may be no right or wrong answer here. It may be necessary for you to seek assistance from your ESH Coordinator, or the Safety Engineering Group to complete this portion. If you are unable to determine the causality, use the comment section in the box to relay that information...or you may wish to use that space to provide some clarification of your choices. "n.o.c." means not otherwise classified. If this is a recordable case, you must provide corrective actions to address and eliminate, if possible the direct cause of the accident... If the root cause is identified, the actions recommended should reflect plans to minimize and omit it. If the risk is acceptable otherwise, indicate "Not Applicable." When providing corrective actions, you must indicate who will be responsible and when it will be completed. If you need to investigate the incident further by talking with witnesses, please fill in the information requested.

**Section H:** In the course of your investigation of any case involving those items listed, the OMC has probably already referred the case, but you should follow-up by contacting the Industrial Hygiene Group for assistance and/or confirmation that a condition exists and get IH recommendations to ameliorate the issues if possible.

**Section I:** **Completion of this section is required only if there is restricted work and/or days are lost away from work.** If there is no associated lost time (Restricted Workdays or Days Away From Work) beyond the initial date of injury/illness, do not fill in this section.

**Section J:** This section is intended for those cases that need special attention. Please answer accordingly and refer to those SBMS areas indicated.

**Section K:** **Completion of this section is required for all Type C Investigations.**

**Section L:** This section is provided for the Line Organization's Comments. Completion is not required for these investigations. It merely provides space for comments and room for the Line to review the reports for completion prior to sending same to Safety Engineering for input into internal database (OSMIS) or submittal to CAIRS.

**Section M:** This section is reserved for Safety Engineering Use only.

**Completed Investigations must be signed and forwarded to the NSLS-II ES&H Manager**

## Line Organization Accident/Incident Investigation Report BROOKHAVEN NATIONAL LABORATORY

**A. Who was involved in this accident/incident? (The first name should be the victim/injured/ill person):**

Name	Occupation	Hospital, if transported	Life #/ID	Telephone # at workplace	Contractor	Supervisor's Name

**B. Job Classification**
**C. When was the Occurrence (as reported by employee/non-employee)?** \_\_\_\_/\_\_\_\_/\_\_\_\_ **Time:** \_\_\_\_\_am/pm

 When was the date of notification to BSA NSLS-II Project Staff \_\_\_\_/\_\_\_\_/\_\_\_\_ **How?** \_\_\_\_\_

Where did this event happen? \_\_\_\_\_

**Type of Accident/Incident:** ☐ Injury/Illness ☐ Property ☐ Vehicle ☐ Radiological ☐ Environmental ☐ Near Miss

**BSA Investigation Type:** ☐ Type C ☐ First Aid ☐ Near Miss ☐ MVA ☐ Contamination ☐ Fire ☐ Other

**D. If victim or injured/ill person is not a BSA employee, please indicate identity of employer here.** ☐ Not Applicable

**E. OSHA Information (Injury/Illness)** **Death?** \_\_\_\_\_ ☐ Yes ☐ No

☐ Injury **Does this case involve days away from work?** ☐ Yes ☐ No

☐ Skin disease or disorder **Are there multiple victims?** ☐ Yes ☐ No

☐ Respiratory conditions **Was the employee hospitalized overnight?** ☐ Yes ☐ No

☐ Poisoning **Was there an on-the-job transfer or restriction?** ☐ Yes ☐ No

**Has the employee returned to full duty?** ☐ Yes ☐ No

☐ All other illnesses **If applicable, has employee brought BTW slip from nurse?** ☐ Yes ☐ No

**Experience on this task:** ☐ under 3 months ☐ 3–12 months ☐ over 12 months

**F. Property Loss Type** ☐ Not Applicable  
 (For property/vehicle and/or radiological or environmental losses only; otherwise, mark NA and skip this section.)

**Fire/Smoke:** ☐ Building ☐ Equipment ☐ Brush ☐ Vehicle ☐ Other

**Electrical:** ☐ Equip. Contact ☐ Wiring ☐ Overload ☐ Insulation ☐ Polarity ☐ Grounding ☐ Other

**Explosion:** ☐ Vapor ☐ Chemical ☐ Fluids ☐ Dust

**Mechanical:** ☐ Linear energy ☐ Rotational energy ☐ Pressure ☐ Falls ☐ Mech. breakdown ☐ Overload

**Act of Nature:** ☐ Wind ☐ Rain/Hail ☐ Freezing rain ☐ Snow ☐ Lightning ☐ Earthquake ☐ Other

**Leaks, spills, releases, or contamination:** ☐ Chemical ☐ Biological ☐ Nuclear/Radiological

☐ Environmental Impairment/Impact ☐ Poisoning ☐ Other

**Miscellaneous:** ☐ Thermal Damage ☐ Corrosion ☐ Water Damage ☐ Sabotage ☐ Other

**F. Property Loss Type (cont.)**
**Vehicle Loss Type:** ☐ Government-owned ☐ Contractor-owned ☐ Personal/Private-owned ☐ Other

**Light Highway:**      ☐ Automobile      ☐ Van      ☐ Cushman-type vehicle  
                                  ☐ Pickup Truck      ☐ Motorcycle, moped      ☐ Highway vehicle. n.o.c.

**Heavy Highway:**      ☐ Bus      ☐ Delivery Truck      ☐ Dump truck      ☐ Semi      ☐ Crane      ☐ Truck, n.o.c.

**Construction Vehicles:** \_\_\_\_\_

**Other Vehicles:** \_\_\_\_\_

Was vehicle equipped with seat belts?      ☐ Yes      ☐ No

Did vehicle accident involve a recordable injury?      ☐ Yes      ☐ No

Did equipment design or defect contribute to accident cause or severity?      ☐ Yes      ☐ No

**Total Damage (if known):** \$ \_\_\_\_\_

**G.** Line Management was notified by \_\_\_\_\_ Date/Time: \_\_\_\_\_  
 Manager notified: \_\_\_\_\_ Title: \_\_\_\_\_

## REQUIRED INVESTIGATION INFORMATION (ALL CASES)

H. What was the activity in progress at the time of the accident/incident and why was it being performed?

\_\_\_\_\_

\_\_\_\_\_

How often is this activity performed (generally)? \_\_\_\_\_

How often is this activity performed by this person? \_\_\_\_\_

I. Was a supervisor present at the scene at the time of the incident?      ☐ Yes      ☐ No

J. Describe the accident sequentially, beginning with initiating events. Tell **what** happened, **how** it happened and end with the nature and extent of damage and/or injuries (use additional pages if necessary)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**K.** Describe the **nature and severity of the incident**, use preliminary diagnosis of medical professional if known (e.g., right shoulder strain/chemical spill/radiological contamination/vehicle accident, etc.)

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**L. Body Part (s) Injured:**

(Indicate whether it is left or right, if applicable):

☐ N/A☐ Unknown

<input type="checkbox"/> Abdomen	<input type="checkbox"/> Face	<input type="checkbox"/> Lip	<input type="checkbox"/> Shoulder
<input type="checkbox"/> Ankle	<input type="checkbox"/> Finger	<input type="checkbox"/> Lung	<input type="checkbox"/> Skull
<input type="checkbox"/> Arm	<input type="checkbox"/> Foot	<input type="checkbox"/> Lungs	<input type="checkbox"/> Testicle
<input type="checkbox"/> Back	<input type="checkbox"/> Groin	<input type="checkbox"/> Mouth	<input type="checkbox"/> Thigh
<input type="checkbox"/> Brain	<input type="checkbox"/> Hand	<input type="checkbox"/> Multiple Parts	<input type="checkbox"/> Throat
<input type="checkbox"/> Buttock	<input type="checkbox"/> Head	<input type="checkbox"/> Musculoskeletal system	<input type="checkbox"/> Thumb
<input type="checkbox"/> Cardiopulmonary	<input type="checkbox"/> Heart	<input type="checkbox"/> Nervous system	<input type="checkbox"/> Toe
<input type="checkbox"/> Chest	<input type="checkbox"/> Hips	<input type="checkbox"/> Nose	<input type="checkbox"/> Tooth
<input type="checkbox"/> Digestive System	<input type="checkbox"/> Jaw	<input type="checkbox"/> Other	<input type="checkbox"/> Torso
<input type="checkbox"/> Ear	<input type="checkbox"/> Kidney, Bladder, Intestine	<input type="checkbox"/> Pulmonary system	<input type="checkbox"/> Wrist
<input type="checkbox"/> Elbow	<input type="checkbox"/> Knee	<input type="checkbox"/> Respiratory system	
<input type="checkbox"/> Eye	<input type="checkbox"/> Leg	<input type="checkbox"/> Scalp	

**M. Name of outside (non-BSA) medical provider, if applicable**☐ Not Applicable**Hospital** (only if admitted overnight — not ER) \_\_\_\_\_**N. NOTE:** If this is a recordable case, mark NA and proceed to Part 2.☐ NA (Not Applicable)

If this is a First Aid case, complete the signature block below. Part 2 is optional for first aid cases.

Investigated by: \_\_\_\_\_ Date: \_\_\_\_\_

Employee Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Contractor Project Superintendent Signature: \_\_\_\_\_ Date: \_\_\_\_\_

NSLS-II ESH Manager or other Designated Safety Person: \_\_\_\_\_ Date: \_\_\_\_\_

**End of Part 1**

**PART 2:** (The following is required for all investigations of cases meeting the OSHA general recordkeeping criteria for recordable cases. Please complete only those sections that apply. **This part is optional for First Aid cases and Near Misses.**)

**A. Walking and Working Surfaces**

☐ Not Applicable

<input type="checkbox"/> Dry	<input type="checkbox"/> Wet	<input type="checkbox"/> Slippery	<input type="checkbox"/> Not Specified
<input type="checkbox"/> Grass/Soil	<input type="checkbox"/> Tile, Concrete or Wood Floor	<input type="checkbox"/> Stairs	<input type="checkbox"/> Ladder
<input type="checkbox"/> Ramp	<input type="checkbox"/> Pavement/Sidewalk	<input type="checkbox"/> Parking Lot	<input type="checkbox"/> Platform
<input type="checkbox"/> Other Elevated Surface	<input type="checkbox"/> Confined Space	<input type="checkbox"/> Roadway/Street	<input type="checkbox"/> Not Specified
<input type="checkbox"/> Not Applicable	<input type="checkbox"/> Other, Specify:		

**B. Outdoor and Weather-related:** If this was an **outdoor activity**, or if **weather related** to the incident in any way, please complete the following by checking all that apply:

☐ Not Applicable

<input type="checkbox"/> Snow/Sleet-related	<input type="checkbox"/> Rain/Water-related	<input type="checkbox"/> Wind/Hurricane-related	<input type="checkbox"/> Ice related
<input type="checkbox"/> Response-related	<input type="checkbox"/> Athletic/Recreational	<input type="checkbox"/> Extreme Hot/Cold-related	

**C. Tool, Machine or Equipment-related**, please check those that apply, or Other:

☐ Not Applicable

- ☐ Fixed Machinery, please identify: \_\_\_\_\_
- ☐ Non-powered Hand Tool, please identify: \_\_\_\_\_
- ☐ Portable Electric Tool, please identify: \_\_\_\_\_
- ☐ Portable Compressed Air-driven Tool, please identify: \_\_\_\_\_
- ☐ Laboratory Equipment, please identify: \_\_\_\_\_
- ☐ Office Equipment, please identify: \_\_\_\_\_
- ☐ Maintenance Equipment, please identify: \_\_\_\_\_
- ☐ Other, please identify: \_\_\_\_\_

Is equipment on a **Preventive Maintenance (PM)** schedule? ☐ Yes ☐ No If so, date of last PM \_\_\_\_\_

Was **Lockout/Tagout** applicable? ☐ Yes ☐ No

Was employee authorized for this procedure? ☐ Yes ☐ No

**D. Miscellaneous** Please check those that apply:

☐ Not Applicable

Was a **Job Risk Assessment or Hazard Analysis** performed for this job?

☐ Yes ☐ No

If no, is one scheduled?

☐ Yes ☐ No When? \_\_\_\_\_

Was this employee involved in the **work planning**?

☐ Yes ☐ No

Was this job considered "**skill of the craft**"?

☐ Yes ☐ No Why or why not?

What **feedback** has the employee been given about this job?

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**D. Miscellaneous** (cont.)

What **Personal Protective Equipment** was provided for this job?

\_\_\_\_\_

\_\_\_\_\_

If Personal Protective Equipment was required for this job, was it worn? ☐ Yes ☐ No

Was it worn properly? ☐ NA ☐ Yes ☐ No

Was a special **permit (hot work, confined space, radiological, etc.)** required for this job? ☐ Yes ☐ No

Why? \_\_\_\_\_

Is all of this person's **applicable training** current for this job? ☐ Yes ☐ No

**E. If Vehicle(s)** were involved, please complete the following by checking the applicable items ☐ Not Applicable

☐ Rented Vehicle, Type: \_\_\_\_\_

☐ Personally-owned vehicle, Type: \_\_\_\_\_

☐ Government-owned vehicle Type: \_\_\_\_\_

☐ Construction Equipment Type: \_\_\_\_\_

Was vehicle equipped with a seat belt? ☐ Yes ☐ No

Was it used at the time of the incident? ☐ Yes ☐ No

**F. Hazards Identified** as part of this event: (Required for Type C Investigations.) ☐ Not Applicable

☐ Integrated Safety Management Hazard Recognized \_\_\_\_\_

☐ Manual Material Handling, less than 20 lbs ☐ Flying particles

☐ Manual Material Handling, more than 20 lbs ☐ Point of Operation

☐ Keyboarding, data entry or manipulation ☐ In-going Nip Points

☐ Risk of Possible Biological exposure ☐ Poor/Inadequate/No Lighting

☐ Risk of Possible Chemical exposure ☐ Possible Noise exposure

☐ Risk of Possible Radiological exposure ☐ Rotating Part(s)/Rotating Blade(s)

☐ Workstation Design/other Ergonomic issues ☐ Traffic-Related Problem

☐ Unacceptable Behavior ☐ Sharp edges

☐ Unprotected low hanging surfaces ☐ Other (Please Specify) \_\_\_\_\_



**G. Accident Causes (REQUIRED)** Indicate your choice of the Direct [or immediate cause] by placing a "D" in front of that item on the list. Do the same for Contributing ("C") and Root ("R") causes. There may be more than one of each. If you do not know, or do not wish to go through this exercise, pass it up the Line. **NOTE:** This section must be completed by the Line Organization and should be used to help determine corrective actions. The report will be reviewed by Safety Engineering and incomplete reports will be returned prior to submittal of CAIRS Reports to DOE.

☐ Equipment/material problem, n.o.c.      ☐ Personal error      ☐ Error in equipment or material selection  
☐ Defective or failed part      ☐ Inadequate work environment      ☐ Drawing, spec or data errors  
☐ Defective or failed material      ☐ Inattention to detail/surroundings      ☐ Training issues, n.o.c.  
☐ Defective weld, brazed, or soldered joint      ☐ Other human factors error (identify) \_\_\_\_\_  
☐ Inadequate supervisor or admin. control      ☐ Error by manufacturer, or in shipping      ☐ Design problem, n.o.c.  
☐ Work org. & planning deficiency      ☐ Procedure problem, n.o.c.      ☐ Inadequate surface preparation  
☐ Noise, electrical, instrument, machine      ☐ Verbal communication problem      ☐ Management problem, n.o.c.  
☐ Contamination      ☐ Violation of requirement/procedure      ☐ Inadequate barriers  
☐ Defective or inadequate procedure      ☐ Inadequate or defective design      ☐ Lack of procedure  
☐ Fire/Explosion/vandalism/weather      ☐ Inadequate man/machine interface      ☐ Theft/sabotage/power failure  
☐ External phenomena, n.o.c.      ☐ Other ("not otherwise classified" --n.o.c.) \_\_\_\_\_

**Comments on Causality** (not required, but may be used for clarity):

**Corrective Actions:** (Should address any causes identified (see above). If a first aid case and risk is acceptable, corrective actions may not be necessary. If so, indicate "Not Applicable". However, if this is a recordable case, corrective actions are required.) [ ] Not Applicable

1. Immediate actions to mitigate direct cause of accident/incident:

\_\_\_\_\_

2. Actions recommended to mitigate contributing and root causes:

\_\_\_\_\_

3. If a corrective action was required, who is responsible for its completion?

\_\_\_\_\_

4. When will it be completed?

\_\_\_\_\_

5. If followup is/was needed) Names of witnesses/others to be interviewed:

[ ] Not Applicable

\_\_\_\_\_

**H. Cases needing referral to, or follow up by, Industrial Hygiene:** **Note:** If there is a report that any of those conditions asterisked (\*) below occur, you must contact the Industrial Hygiene Group of the Safety & Health Services Division for help in further evaluation and/or ameliorization of the problem. EACH of these may be OSHA Recordable incidents and a more complete investigation may be necessary.

If this is an occupational illness or chronic condition, please check those that apply.

☐ Not Applicable

- ☐ Allergic reaction to bites or stings
- ☐ Chemical Sensitization \*
- ☐ Contact Dermatitis or other skin disease or disorder
- ☐ Pleural Plaques, Asbestosis, Silicosis, breathing hazardous biological agents, Berylliosis or other dust, gas, vapor, or fumes resulting in toxic inhalation and other diseases of the lungs \*
- ☐ Tuberculosis infection (positive skin reaction or medical professional's diagnosis following exposure) \*
- ☐ Poisoning evidenced by abnormal concentrations of toxic substances in the blood (such as lead, cadmium, mercury, other metals, carbon monoxide, benzene, insecticide sprays, formaldehyde \*)
- ☐ Needle stick or injury from a sharp object that may be contaminated with blood or other potentially infectious material \*
- ☐ Cancer, or other chronic irreversible disease \*
- ☐ Case requiring an employee to be removed from work under the requirements of an OSHA health standard \*
- ☐ Effects of environmental heat (heat stress, sunstroke) \*
- ☐ Effects of exposures to low temperatures (frostbite) \*
- ☐ Effects of non-ionizing radiation (welding flash, lasers) \*
- ☐ Exposure to anthrax, bloodborne pathogens (AIDS, HIV, hepatitis B or C, etc.) \*
- ☐ Muscular-skeletal Disorders (MSDs) resulting from cumulative trauma (white finger syndrome, certain losses of function) or repetitive motion (carpal tunnel syndrome) in conjunction with general recording criteria. \*
- ☐ Standard Threshold Shift of >25 decibels on the A scale in the 2000-4000 Hertz Range in either ear from established baseline \*
- ☐ Other (Please explain):  
\_\_\_\_\_

#### I Lost Workday Information

☐ Not Applicable

☐ Information not yet available

##### Days Away From Work:

First Full Day Missed: (MM/DD/YY) \_\_\_\_\_

☐ Did not return to work on the next day

☐ Returned to work, anticipate no further lost time

Return to Work Day: (MM/DD/YY) \_\_\_\_\_

☐ Sent Home Sick on day of event

##### Restricted Workdays:

First Full Day Assigned: (MM/DD/YY) \_\_\_\_\_

Day returned to Full Duty: (MM/DD/YY) \_\_\_\_\_

☐ Information does not apply

**Was a Return-to-Work Plan developed for this incident?** ☐ Yes ☐ No ☐ Information not yet available

Describe Restrictions:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**J. Is Special Attention Needed?**

[ ] Not Applicable

Is this an ORPS event?

[ ] Yes [ ] No

HAVE YOU CONTACTED THE ORPS CATEGORIZER (631-433-0443)?

[ ] Yes [ ] No

Has a separate BSA or DOE **investigation Board or committee** been assigned/charged?

[ ] Yes [ ] No

Has this report been forwarded to the organization's **Lessons Learned Coordinator**?

[ ] Yes [ ] No

If yes, when? \_\_\_\_\_

Has the organization's **ESH Coordinator** been notified?

[ ] Yes [ ] No

If this involves another organization, has a copy been provided to that organization?

[ ] Yes [ ] No

Please note other organization and the date they were notified:

\_\_\_\_\_ Date: \_\_\_\_\_

**K. TYPE C INVESTIGATION SIGNATURE BLOCK**

Report Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

Employee Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Contractor Project Superintendent Signature: \_\_\_\_\_ Date: \_\_\_\_\_

NSLS-II ESH Manager or other Designated Safety Person: \_\_\_\_\_ Date: \_\_\_\_\_

**L. Reviewer's/Manager's Notes:**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**M. Comments by Safety Engineering**

Forward for CAIRS Report\_\_

[ ] Yes [ ] No

Reject and return to Line Manager\_\_\_\_\_

Workers' Compensation Claim filed?

[ ] Yes [ ] No

Reasons for

rejection\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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## **APPENDIX D**

### **INSPECTION CHECKLIST**

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## CONSTRUCTION SAFETY INSPECTION CHECKLIST

Date Inspection Conducted: \_\_\_\_\_ Location: \_\_\_\_\_  
 BSA Contact Person/Project Engineer: \_\_\_\_\_  
 Prime Contractor: \_\_\_\_\_ Job #, Task Order # \_\_\_\_\_ Contact # \_\_\_\_\_  
 Name(s) of person(s) participating in this inspection: \_\_\_\_\_  
 Indicate either:      S=Satisfactory/Yes      U=Unsatisfactory/No      N/A=Not Applicable  
 NOTE: A check in the box to the right of the heading indicates the entire category was satisfactory.

8.0 PERSONAL PROTECTIVE EQUIPMENT	9.0 HAZ COM
Safety glasses and/or goggles available & being used? [1926.102]	MSDS openly available to all employees? [1910.1200(g)]
Face shield available for bulk liquid tasks? Grinding? [1926.102]	Flammable liquids are in approved safety cans? [1926.152(a)(1)]
Hand protection used/worn as required? [1926.951]	Flammable liquids storage containers labeled properly? [1910.1200(f)(5)]
Foot protection worn as required? [1926.96]	All hazardous containers labeled appropriately? [1910.1200(f)(5)]
Hearing protection worn where required? [1926.101]	Supplies on hand for accidental chemical spills?
Hard hats worn on construction site at BNL? [1926.100]	<b>10.0 LADDER/STAIR SAFETY</b>
Respirators if required? Type? [1926.134]	Ladders are safe and inspected as appropriate? [1926.1053(b)(15)]
Fall protection, full body harness & lanyard used at > 6 ft? [1926.104]	Stair rails - for 30" change in elevation or 4 risers? [1926.1052(c)(1)]
<b>11.0 ELECTRICAL SAFETY</b>	Stairs or ladder provided for access points > 19" high? [1926.1051(f)]
GFCI's used for all portable electrical hand tools? [1926.404]	Extension & straight ladders extend 3' beyond landing? [1926.1053(b)(4)]
Electrical panels are labeled appropriately? [1910.303(f)]	Stepladders are only used in open position? [1926.1053(b)(4)]
Light bulbs for illumination protected from breakage? [1919.303(g)(2)(i)]	<b>12.0 CONFINED SPACE</b>
LO/TO is being used for appropriate tasks? [1910.147]	Confined space entry work? Posted? [1910.146(c)]
Strain relief integrity for cords and plugs intact? [1926.405(g)(2)]	Permit for 2C spaces? [1910.146(e)]
For extension cords: hard usage cord includes three-wire cords marked SO, STO, SJ, SJO, SJT, or SJTO [1926.405(5)(a)(2)]	Fire/Rescue notified for 2C permitted spaces? [1910.146(k)]
Electrical cords inspected & have all prongs intact? [1926.404(f)(8)]	Air monitoring? [1910.146 App B]
Portable generators are grounded per NEC requirements? [1926.404(f)]	Training in place? [1910.146(g)]
Electrical power tools are double insulated or grounded? [1926.302(a)]	<b>13.0 MATERIAL HANDLING</b>
<b>14.0 COMPRESSED GASSES</b>	Employees operating PITs are trained on the equipment? [1910.179(b)(5)]
Compressed gas cylinders stored secured & upright? [1926.350(a)]	Wire rope used for lifting? Deterioration is absent? [1926.552(a)(3)]
Oxygen/acetylene torch units have flash back arrestors? [1926.350(g)]	Web slings used for lifting? Deterioration is absent? [1910.184(i)(9)]
Compressed gas cylinders not in use have caps in place? [1926.350(a)]	Crane used? Approved written plan on file w/ load capacities? [1910.179(b)(5)]
<b>15.0 EXCAVATION</b>	Hooks used for lifting have safety latch in place? [1910.181(j)(2)]
Excavation-ladders if > 4ft deep? Extend 3 ft? 50 ft apart? [1926.651(c)]	<b>16.0 EMERGENCY/FIRST AID</b>
Excavation – protection from cave-ins for > 5 ft? [1926.652(a)]	Emergency phone numbers posted and known by all? [1926.35]
Sloping, shoring evaluated? [1926.652(f)]	Emergency eyewash and/or shower units accessible?
Daily inspection? [1926.651(k)]	First aid kit available at work site? [1926.50(d)(1)]
<b>17.0 HAND TOOLS/POWER TOOLS</b>	Fire extinguishers readily available (not blocked)? [1929.150(c)(1)]
Grinders (portable & stationary) have guards in place? [1926.300(b)]	Fire extinguishers inspected? [1926.150(a)(4)]

Impact style air tools have safety clips/retainers installed? [1926.302(b)]	<b>18.0 HOT WORK/BURNING PERMITS USED FOR GRINDING, CUTTING, WELDING</b>
Pneumatic power tools have hoses secured? [1926.302(b)(1)]	Exits marked? Not blocked? [1926.34]
Portable circular saws equipped with protective guards? [1926.304(d)]	<b>19.0 GENERAL SAFETY</b>
Unsafe hand tools are prohibited? [1926.301(a)]	General housekeeping is neat and orderly? [1926.25]
Impact tools, hammers kept free of splinters/mushrooms? [1926.301(c)]	Wall openings & floor holes are covered or guarded? [1910.23(a)&
<b>20.0 OTHER</b>	Rebar caps used for protruding bars? [1926.701(b)]
Permits in place (environmental, concrete penetration, digging, burning)	Concrete work? Silica dust training documented for all? Respirator [1910.134]
Tool-box talks conducted and documented?	Scaffolding-guardrails used? [1926.451(g)]
Signs/signals/barricades in place?	Competent person on site? [1926.451(f)]
Training conducted and documented?	Scaffold design by qualified person? [1926.451(a)(6)]
Health and Safety Plan available and reviewed with workers?	Monitoring of personnel and/or atmosphere as required [1910.100]
Lasers in use (Class 2 or 3A/3R only)? – area posted [1926.54]	Illumination adequate? [1926.56]
Erosion and sediment controls in place and functional?	

**CORRECTIVE ACTION PLAN**

For all items marked as “U,” list the item, person responsible, and expected completion date.

ACTION ITEM	PERSON RESPONSIBLE	DATE DUE	DATE VERIFIED*	Verified by**

**OTHER OBSERVATIONS NOT RECORDED ABOVE**

OBSERVABLE ITEM	REF.	PERSON RESPONSIBLE	DATE DUE	DATE VERIFIED*	Verified by**

\* Date Observation/Corrective Action was verified as completed.

\*\* Initials of the individual verifying the Observation/Corrective Action was verified as completed.

Reference columns should contain the OSHA regulation, SBMS Subject Area or other standard or regulation being cited.

**NO VIOLATIONS NOTED DURING THIS INSPECTION**

☐

Signature of Inspector: \_\_\_\_\_

Signature of Contractor rep. (for a report with any unsat item) \_\_\_\_\_

Cc: GC Project Superintendent  
BSA Construction Safety Engineer



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## **APPENDIX E**

### **PHA WORKSHEET/GUIDELINES**

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**Title of Job/Operation:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Analysis Performed By:** \_\_\_\_\_

**Prime Contractor or Subcontractor:** \_\_\_\_\_

**Reviewed By:** \_\_\_\_\_

Sequence of Basic Job Steps	Potential Accidents or Hazards	Recommended Safe Job Procedures

**Potential Hazard Codes:**

- |                            |     |
|----------------------------|-----|
| 1. Struck By               | SB  |
| 2. Struck Against          | SA  |
| 3. Contacted By            | CB  |
| 4. Contact With            | CW  |
| 5. Caught On               | CO  |
| 6. Caught In               | CI  |
| 7. Caught Between          | CBT |
| 8. Fall-Same Level         | FS  |
| 9. Fall to Different Level | FDL |
| 10. Overexertion           | OE  |
| 11. Exposure               | E   |

**PHASE HAZARD ANALYSIS (PHA)****STEP 1.**

Identify jobs posing the greatest accident risk.

**STEP 2.**

Prioritize selected jobs into four (4) main areas.

1. Jobs with high accident frequency
2. Jobs with lower frequency but higher severity
3. Jobs with serious injury potential
4. New jobs with no accident history

**STEP 3.**

Conduct job analysis

1. Use either the direct observation method or the discussion method.
2. For best results observe and discuss job using an experienced employee in that job.

**STEP 4.**

You need an understanding of the types of accidents possible in your workplace and you must review the records of the past accidents.

There are six (6) categories of accidents:

1. Struck (By or against)
2. Contact (abrasion, electric shock, etc.)
3. Caught (in, on, between, under)
4. Fall (from elevation or same level)
5. Over exertion (stress or strain)
6. Exposure (exposed to gases, fumes, mists, etc.)

**STEP 5.**

Develop recommended safe work procedures. Use complete JSA to conduct initial training of new employees, or to review safe procedures with existing employees. JSA are also useful for accident investigation as a resource.

Below is an example of a section of a Phase Hazard Analysis.

TASK	ACTIVITY	HAZARDS	MITIGATION REDUCTION	COMMENTS
<i>Concrete Canal Removal</i>				
	Concrete demolition	Eye injury from flying debris; Impact injury	Ensure the demolition area is clear of all unnecessary personnel; Wear proper eye protection and PPE; Install safety screens over top and front glass of heavy machines with concrete demolition attachment; Use of other demolition methods, such as non-explosive expansive agents (DEXPAN)	
		Silica dust inhalation	Use engineering controls and containment methods such as wetting of concrete; When sawing concrete, use saws that provide water to the blade; Wear disposable or washable protective clothes at the worksite; Shower (if possible) and change into clean clothes before leaving worksite to prevent contamination of vehicles, homes, and other work areas; Conduct air monitoring to measure worker exposures and ensure that controls are providing adequate protection for workers; Use adequate respiratory protection when source controls cannot keep silica exposures below the TLV; Provide workers with training that includes information about health effects, work practices, and protective equipment for respirable crystalline silica	

TASK	ACTIVITY	HAZARDS	MITIGATION REDUCTION	COMMENTS
<i>Concrete Canal Removal</i>				
	Concrete demolition	Man/machine impact resulting in personnel injury	Use high visibility vests; Only qualified Equipment Operators and Riggers shall be directly involved in work activities ; Keep non-essential personnel away from work activities; Keep personnel from under loads; Inspect swing arc prior to beginning work to ensure workers will not have a need to impinge on the operational radius of the machine. Heavy equipment shall be outfitted with operational back-up alarms; Pull long hair back and do not wear loose clothing that can get caught in machinery; Remove any jewelry that can interfere with safe machinery operation	
		Hearing impairment	Hearing protection will be worn during evolutions where noise levels exceed 85 decibels; Use silencers on jack hammers; Use compressors insulated against noise; Organize and design work practices to minimize the number of people exposed and the noise levels to which they are exposed to	
	Material transfer	Load drops (personal injury, equipment damage)	Inspect all below hook lifting devices and crane; Use only approved and documented lifting designs; Use only qualified crane operation and riggers to make lifts; Keep personnel away from loads; Keep non-essential personal out of work area; Verify weight of load before lift; use crane load cell	
		Spread of contamination, personnel contamination	Read and follow radiological postings in area; follow RCT directions; proper radiological worker practices; Apply fixative, wrap or package prior to removal from area	
		Personal injury resulting from man/machine impact	Use spotters when using crane or excavator; one Person-in-Charge (PIC); inspect crane travel path prior to operating crane	

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## **APPENDIX F CONFINED SPACE PERMIT**

**CONFINED SPACE ENTRY PERMIT**

<b>GENERAL INFORMATION</b>			<b>CONTROLS/EQUIPMENT</b> (check all that apply)	
Permit Space Location: _____			<input type="checkbox"/> ISOLATION <input type="checkbox"/> LOCKOUT/TAGOUT <input type="checkbox"/> BLANKING/BLINDING  <input type="checkbox"/> DOUBLE BLOCK AND BLEED <input type="checkbox"/> LINEBREAKING/MISALIGNMENT <input type="checkbox"/> OTHER	
Purpose of Entry: _____				
Entry Permit Valid for _____ Date: _____ to Date: _____ Time: _____ to Time: _____				
<b>21.0 CONFINED SPACE HAZARDS</b>			<b>23.0</b>	
ATMOSPHERIC	YES	NO	<input type="checkbox"/> INERTING <input type="checkbox"/> PURGE/CLEAN <input type="checkbox"/> METHODS FOR SAFE COVER REMOVAL AND SECURING AREA <input type="checkbox"/> ATMOSPHERIC TESTING <input type="checkbox"/> Periodic (give interval) <input type="checkbox"/> Continuous  <input type="checkbox"/> VENTILATION <input type="checkbox"/> Natural <input type="checkbox"/> Continuous forced air <input type="checkbox"/> Local exhaust <input type="checkbox"/> ENTRY EQUIPMENT <input type="checkbox"/> Ladders <input type="checkbox"/> Other _____ <input type="checkbox"/> PERSONAL PROTECTIVE EQUIPMENT <input type="checkbox"/> Respiratory <input type="checkbox"/> SAR  <input type="checkbox"/> Air Purifying <input type="checkbox"/> Protective Clothing (specify) _____  <input type="checkbox"/> Eye and face protection <input type="checkbox"/> Hearing protection <input type="checkbox"/> RESCUE AND RETRIEVAL EQUIPMENT <input type="checkbox"/> Full Body Harness <input type="checkbox"/> Lifeline <input type="checkbox"/> Tripod w/mechanical winch  <input type="checkbox"/> Explosion proof lighting <input type="checkbox"/> NON-SPARKING TOOLS <input type="checkbox"/> INTRINSICALLY SAFE ELECTRICAL EQUIP & GFCI <input type="checkbox"/> COMMUNICATION EQUIPMENT <input type="checkbox"/> Radio <input type="checkbox"/> Phone <input type="checkbox"/> Other _____ <input type="checkbox"/> WORKING ON OR NEAR ENERGIZED EQUIPMENT <input type="checkbox"/> FIRE EXTINGUISHERS	
Oxygen Deficiency	<input type="checkbox"/>	<input type="checkbox"/>		
Oxygen Enrichment	<input type="checkbox"/>	<input type="checkbox"/>		
Explosive (Gas/Vapor)	<input type="checkbox"/>	<input type="checkbox"/>		
Carbon Monoxide	<input type="checkbox"/>	<input type="checkbox"/>		
Hydrogen Sulfide	<input type="checkbox"/>	<input type="checkbox"/>		
Other Toxic Gases/Vapors (e.g. solvents; welding fumes)	<input type="checkbox"/>	<input type="checkbox"/>		
ENGULFMENT		<input type="checkbox"/>		
CONFIGURATION (ENTRAPMENT)	<input type="checkbox"/>	<input type="checkbox"/>		
MECHANICAL	<input type="checkbox"/>	<input type="checkbox"/>		
ELECTRICAL	<input type="checkbox"/>	<input type="checkbox"/>		
SUBSTANCE HAZARDOUS TO SKIN OR EYES	<input type="checkbox"/>	<input type="checkbox"/>		
HEAT STRESS	<input type="checkbox"/>	<input type="checkbox"/>		
OTHER POTENTIAL HAZARDS	<input type="checkbox"/>	<input type="checkbox"/>		
RADIATION	<input type="checkbox"/>	<input type="checkbox"/>		
NOISE	<input type="checkbox"/>	<input type="checkbox"/>		
<b>PERSONNEL</b>				
Entrant(s) _____	Time in _____	Time out _____		
_____	_____	_____		
_____	_____	_____		
_____	_____	_____		
Attendant(s) _____				
Entry Supervisors(s) _____				
_____				
<b>COMMUNICATION PROCEDURES USED BY ENTRANT(S) &amp; ATTENDANT(S)</b> check all that apply				
<input type="checkbox"/> Visual	<input type="checkbox"/> Rope			
<input type="checkbox"/> Voice	<input type="checkbox"/> Radio			
<input type="checkbox"/> Other (specify) _____				
<b>RESCUE AND EMERGENCY SERVICES</b>			<b>RESCUE PROCEDURES</b>	
_____			_____	
_____			_____	
Summation Procedure: _____			_____	
_____			_____	
_____			Verify Fire Rescue availability before entry is made <input type="checkbox"/> Yes Date _____	

<b>ATMOSPHERIC TESTING RECORD</b>					
<b>TESTING EQUIPMENT USED</b>					
Make/Model:	Serial #	Calibration Date:			
Make/Model:	Serial #	Calibration Date:			
Day of Use Sensor Check <input type="checkbox"/> Yes <input type="checkbox"/> No			Field Check (Bump Test) <input type="checkbox"/> Yes <input type="checkbox"/> No		
Tested By:		BNL No:			
Date & Time	Oxygen % (%O <sub>2</sub> )	Flammable Gas (% LEL)	Carbon Monoxide (CO ppm)	Hydrogen Sulfide (H <sub>2</sub> S ppm)	Other:
Pre-Entry					
Acceptable Reading	19.5 – 23.5	< 10 %	25 ppm	10 ppm	
Atmosphere Tester (Tested By):		BNL Life Number:			
<b>ENTRY AUTHORIZATION</b>					
<b>ENTRY AUTHORIZED BY:</b> (Entry Supervisor and NSLS-II ESH Manager (or designee))					
NAME: _____			TIME: _____		
SIGNATURE: _____			DATE: _____		
NAME: _____			TIME: _____		
SIGNATURE: _____			DATE: _____		
<i>POST ENTRY PERMIT AT ENTRANCE TO CONFINED SPACE</i>					
<b>ENTRY CANCELLATION</b>					
<b>ENTRY CANCELLED BY (Entry Supervisor):</b>					
NAME: _____			TIME: _____		
SIGNATURE: _____			DATE: _____		
NOTIFICATION OF CANCELLATION MADE TO FIRE RESCUE		DATE: _____		TIME: _____	
REASON FOR CANCELLATION:					
<input type="checkbox"/> Entry Operation Completed <input type="checkbox"/> Prohibited Condition Arose (Specify) _____ _____ _____					
Personnel's Comments:					
Cancelled Permit Review by:				Date:	
Return Permit to NSLS-II ESH Manager upon Completion					

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## **APPENDIX G DIGGING PERMIT**

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# BROOKHAVEN NATIONAL LABORATORY

NSLS-II Construction Environment, Safety and Health Plan

## DIGGING PERMIT

NUMBER \_\_\_\_\_



### A: GENERAL INFORMATION

1. Name of Project Manager:		2. Project Manager's Telephone #:		3. Today's Date:	
4. Name of Project:		5. Project # / Work Order #:		6. Maximum Proposed Depth of Excavation:	
7. Scheduled Excavation Start Date:		8. How has the perimeter of the proposed excavation site been identified in the field? <input type="checkbox"/> by markers <input type="checkbox"/> by white paint <input type="checkbox"/> other (explain):			
9. Description of work to be done:		10. List affected facilities at proposed excavation site			
11. Location (attach drawings obtained from Infrastructure Mgmt indicating proposed excavation and the locations of all known utilities):					

### B: RADIATION and CHEMICAL Contamination, CERCLA Institutional Controls REVIEW: required in areas of waste transfer lines ("D-waste"), areas of suspect chemical or radioactive contamination, and buried ordinances (<http://luic.bnl.gov/website/landcontrols>).

Long Term Response Actions (LTRA) (2828)		(if checked "Yes", complete section 'C')	
Non-Potable Water in area Yes <input type="checkbox"/> No <input type="checkbox"/> (if Yes, requires mark out and sign off in Block E)		CONTAMINATION / RADIATION / CHEMICAL Yes <input type="checkbox"/> No <input type="checkbox"/>	
		24.0 UNEXPLODED ORDINANCE/BURIED MUNITIONS YES <input type="checkbox"/> NO <input type="checkbox"/>	

Comments :	SIGNATURE:	LIFE #:	DATE:
------------	------------	---------	-------

Environmental & Waste Mgt Services Division (EWMSD) (3091/3148)	ENDANGERED SPECIES HABITAT <input type="checkbox"/>	DATE:
SIGNATURE:	TYPE:	LIFE #:

### C:

For Radiation / Chemicals: FS Rep. (8248/484-1728) FS Group (2776)	ACTION TAKEN: Work Permit <input type="checkbox"/> Hand dig only <input type="checkbox"/> Postings <input type="checkbox"/> Other <input type="checkbox"/>	SIGNATURE:	LIFE #:	Date:
For former CERCLA sites: LTRA Rep (2828)	Site Specific LUIC's:	SIGNATURE:	LIFE #:	Date:

### D: LIMITED UTILITY MARKING: required for all machine digging in developed areas and for all excavations greater than 6 inches in depth in developed areas. ON-SITE ☐ OFF-SITE ☐

For Off-site call 1-800-272-4480 for Mark Out. Confirmation # \_\_\_\_\_ and Mark Out completion Date \_\_\_\_\_  
 For Off-site with Confirmation and Mark Out, No other Utility Signatures Required


UTILITY- (PHONE/PAGER or CELL PHONE)	MARKING METHOD/COMMENTS:	SIGNATURE:	LIFE#:	Date:
Electric (2808/872-8970)	(red)			
Fire Alarm (4556/872-5082)	(orange)			
Tele/Fiber Optic (5522)	(orange)			
CATV/Satellite TV (4263)	(orange)			
Facility Specific (e.g. earth shielded accelerator beam lines, D-waste, Off-gas, Non-contact cooling water, etc.) See Work Control Manager Web Page List: <a href="#">Work Control Manager Web Page List</a>				

EP Surveyor \_\_\_\_\_ the Surveyor signoff is not required at this time

### E: ADDITIONAL UTILITY MARKING: required (in addition to section D) for machine digging 18 inches or greater in depth in developed areas, machine digging 3 feet or greater in depth in all areas, and all digging 5 feet or greater in depth in any area

UTILITY- (PHONE/PAGER or CELL PHONE)	MARKING METHOD/COMMENTS:	SIGNATURE:	LIFE#:	Date:
Chilled Water (7136/514-1282)	(purple)			
Compressed Air (7136/514-1282)	(yellow)			
Propane (3288/872-8972)	(yellow)			
Sewer (7136/514-1282)	(green)			
Steam/Condensate (3288/872-8972)	(yellow)			
Storm Drains (7136/514-1282)	(green)			
Potable Water (7136/514-1282)	(blue)			
Non-Potable Water (7136/514-1282)	(purple)			
Natural Gas (7136/514-1282)	(yellow)			

Marking Expiration Date \_\_\_\_\_

<b>BROOKHAVEN NATIONAL LABORATORY</b>					
<b>DIGGING PERMIT (CONT.)</b> NUMBER _____					
<b>F: Toning Information (answer all questions in this section):</b> List Toning Equipment Used to Locate Utility: _____ Instrument Tool Crib # _____					
1. Peak and Null Agree: Yes <input type="checkbox"/> No <input type="checkbox"/>		2. Consistent Signal Strength: Yes <input type="checkbox"/> No <input type="checkbox"/>		3. Depths are Consistent and Logical: Yes <input type="checkbox"/> No <input type="checkbox"/>	
4. Has Utility been traced to a termination Point? Yes <input type="checkbox"/> No <input type="checkbox"/>		5. Conductive Hook-up Used: Yes <input type="checkbox"/> No <input type="checkbox"/>		6. Inductive Hook-up Used: Yes <input type="checkbox"/> No <input type="checkbox"/>	
7. Comments:					
8. Date/time of toning:		9. Has another locating device been used? Yes <input type="checkbox"/> No <input type="checkbox"/> Type/Model: _____		10. Completed Checklist Attached: Yes <input type="checkbox"/> No <input type="checkbox"/>	
11. Name:		12. Signature:		13. Life #	
14. Date:					
<b>G: Project Manager's final approval:</b>  This permit has been properly prepared and distributed, and utilities have been clearly marked:  Project Manager Approval Signature and Date: _____					
<b>H: Utility Marking Evaluation:</b>  Prior to the start of excavation activities, Utility Markings shall be inspected and maintained according to this schedule: <ul style="list-style-type: none"> <li>Every 10 days for natural gas lines.</li> <li>Every 30 days for all other utilities.</li> </ul> Enter the date of the of the last evaluation and the date of the next scheduled evaluation:  Natural Gas: Evaluation date(s): _____  Other Markings Evaluation date(s): _____					
<i><b>Note: Once excavation activities start it is the responsibility of the Contractor and/or Plant Engineering Personnel who are doing the work to inspect and maintain utility markings.</b></i>					
<b>I: Excavation Personnel Acknowledgement (Contractor or Plant Engineering Personnel Performing the Work):</b> I have received a briefing on the scope of work to be performed. I have reviewed the Digging Permit, marked-up utility drawings and understand the responsibility to inspect and maintain utility markings during this project. Date: _____ Signature: _____					
<b>J: PRELIMINARY INSPECTION, TO BE COMPLETED BY COMPETENT PERSON: required for all excavations with "worker exposure."</b>					
1. Name of Competent Person:		2. Company/Dept.:		3. Telephone #:	
				4. Preliminary Inspection? YES <input type="checkbox"/> NO <input type="checkbox"/> If no, explain:	



<b>5. Preliminary Soil Analysis</b> Class C soil? YES <input type="checkbox"/> NO <input type="checkbox"/> If no, provide analysis and Documentation explaining why it is a different soil Type.	<b>6. Special Instructions -</b> (use of shoring, trench box, etc):	<b>7. Signature:</b>	<b>8. Date:</b>
<b>9. Describe any changes in protective system:</b>		<b>10. Date of Change:</b>	<b>11. Initial:</b>
<b>12. Additional Comments:</b>			

**DISTRIBUTION:** PROJECT MANAGER (Original), COPIES: COMPETENT PERSON, CONSTRUCTION INSPECTOR, EP CONSTRUCTION SAFETY SPECIALIST, INFRASTRUCTURE MANAGEMENT GROUP, CONTRACTOR OR EP PERSONNEL RESPONSIBLE FOR PERFORMING THE WORK. This form was last printed on 5/1/2009 2:23:00 PM. Please verify it is the latest revision by going to the Plant Engineering Procedure Web Page:

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**APPENDIX H**  
**COMPETENT PERSON CERTIFICATION LETTER**

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**SAMPLE COMPETENT PERSON QUALIFICATION SUBMISSION**

\_\_\_\_\_ is the designated competent person responsible for  
\_\_\_\_\_ on the NSLS-II Project.

\_\_\_\_\_ is trained and knowledgeable in the hazards associated with  
this evolution, OSHA safety standards, and safe working requirements.

\_\_\_\_\_ is capable of identifying excavation hazards and has  
authority to take all precautions necessary to protect personnel, property and the environment from  
harm.

The competent person shall be responsible for:

- Implementing the project-specific Environment, Safety and Health Plan
- Making frequent daily inspections to verify proper implementation
- Taking all precautions necessary, up to and including work stoppage
- Advising BSA and workers on any approved changes to the plan
- Briefing workers on project-specific hazards
- Securing and clearly making the area during working and non-working hours
- Disciplining violators up to and including termination

\_\_\_\_\_  
Site Superintendent

\_\_\_\_\_  
Date

## **APPENDIX I**

### **HOT WORK PERMIT**

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# WARNING!

## HOT WORK IN PROGRESS

### WATCH FOR FIRE!

PART 2

#### INSTRUCTIONS

1. Person doing Hot Work: Indicate time started and post permit at Hot Work location. After Hot Work, indicate time completed and leave permit posted for Fire Watch.
2. Fire watch: Prior to leaving area, do final inspection, sign, leave permit posted and notify Firesafety Officer.
3. Monitor: After 4 hours, do final inspection, sign and return to Firesafety Officer.

HOT WORK BEING DONE BY:

☐ EMPLOYEE \_\_\_\_\_ LIFE NO. \_\_\_\_\_

☐ CONTRACTOR \_\_\_\_\_ CO. \_\_\_\_\_

DATE \_\_\_\_\_ JOB NO. \_\_\_\_\_

LOCATION/BUILDING & FLOOR \_\_\_\_\_

NATURE OF JOB \_\_\_\_\_

NAME OF PERSON DOING FIRE WATCH \_\_\_\_\_

I verify the above location has been examined, and permission is authorized for this work.

SIGNED: (FIRE/SAFETY OFFICER) \_\_\_\_\_

DATE:

PERMIT EXPIRES	DATE	TIME
		AM PM

I verify that the List of Precautions is Understood and work will proceed only if precautions are followed:

Signed: (Supervisor) \_\_\_\_\_

#### FIRE WATCH SIGNOFF

Work area and all adjacent areas to which sparks and heat might have spread were inspected during the fire watch period and were found fire safe.

Signed: \_\_\_\_\_

#### FINAL CHECKUP

Work area was monitored following Hot Work and found fire safe.

Signed: \_\_\_\_\_

#### Required Precautions Checklist

**MAY BE RETAINED AS RECORD OF HOT WORK ACTIVITY**

☐ Available sprinklers, hose streams and extinguishers are in service/operable.

☐ Hot Work equipment in good repair.

**Requirements within 35 ft (10m) of work**

☐ Flammable liquids, dust, lint and oil deposits removed.

☐ Explosive atmosphere in area eliminated.

☐ Floors swept clean.

☐ Combustible floors wet down, covered with damp sand or fire-resistive sheets.

☐ Remove other combustibles where possible. Otherwise protect with fire-resistive tarpaulins or metal shields.

☐ All wall and floor openings covered.

☐ Fire-resistive tarpaulins suspended beneath work.

**Work on walls or ceilings**

☐ Construction is noncombustible and without combustible covering or insulation.

☐ Combustibles on other side of walls moved away.

**Work on enclosed equipment**

☐ Enclosed equipment cleaned of all combustibles.

☐ Containers purged of flammable liquids/vapors and monitored for vapor buildup.

**Fire watch/Hot Work area monitoring**

☐ Fire watch contractor/department will supply during and for 60 minutes after work, including any coffee or lunch breaks.

☐ Fire watch is supplied with suitable extinguishers, charged small hose.

☐ Fire watch is trained in use of this equipment and in sounding alarm (telephone, alarm box, radio).

☐ Fire watch may be required for adjoining areas, above, and below (see other precautions).

☐ Monitor Hot Work area for 4 hours after job is completed.

**Other Precautions Taken**

☐ False alarm with detection systems considered.

☐ \_\_\_\_\_

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**APPENDIX J**  
**SAMPLE LOCK OUT/TAG OUT PROGRAM**

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**Lock-Out/Tag Out Program Policy**

The use of the Lock-Out/Tag-Out Program is to prevent an unexpected operation or release of energy of electrical or electronic equipment. The unexpected starting of motors may injure persons working on them, or unexpected energizing of equipment can produce an electrical shock and/or damage to the equipment. The Lock-Out/Tag-Out Program combines the use of tags and locks, or other electrical or physical systems to lock out power to the equipment while it's broken, or being worked on.

Locking and tagging key points are proven methods of controlling the release of energy or hazardous materials, and an important way of safeguarding workers who operate or repair machines or processes in the plant. This document defines lock-out/tag-out, list specific procedures to follow to properly lock-out/tag-out, define responsibility for lock-out/tag-out, and show the importance of both education and discipline in these procedures.

**INTRODUCTION**

The majority of accidents happen around machinery of some type. Often, the accident involves electrical shock, burns or exposure to hazardous materials or moving machinery. These accidents share one thing in common: the uncontrolled release of energy.

To protect yourself and your co-workers from danger in the workplace, you must understand that energy, left uncontrolled, can be very dangerous. Energy, simply defined, is the capacity for doing work. Kinetic (moving) energy is the force caused by the motion of an object, such as spinning flywheel. Potential (stored) energy is the unseen force inside an object when not moving, such as a spring under tension. There are many sources of energy, which can provide power to machinery. The Phase Hazard Analysis identifies specific hazardous energy sources. These may include:

- Gravity
- Electrical
- Mechanical
- Chemical
- Hydraulic
- Pneumatic
- Thermal
- Nuclear

A LOCK-OUT is simply a locking device, such as a padlock, placed on a power source to prevent the release of hazardous energy that could set a machine in motion or otherwise endanger an employee working on the machine. Locks may be used with a lock-out device that holds an energy control point, such as a switch, lever or valve, in the off position, making it impossible to operate.

A TAG-OUT is a written warning telling all others not to operate a switch or valve that could release hazardous energy or set a machine in motion. The tag-out is placed prominently on the switch or lever so as not to be missed.

**RESPONSIBILITY**

Locking and tagging key points are proven methods of controlling the release of energy or hazardous materials, and an important way of safeguarding workers who operate or repair equipment, or machines, and processes in the plant. This document lists specific procedures to follow to properly lock-out/tag-out, and show the importance of both education and discipline to these procedures.

It is be the responsibility of the (insert name of responsible individual) to enforce the lock-out/tag-out procedure as well as provide the necessary equipment to comply in all respects with the procedure. Transferred employees shall be instructed by their supervisor in the purpose and use of lock-out/tag-out

procedure. Supervisors shall be responsible for enforcing the specific lock-out/tag-out procedures listed below.

1. Production and support departments shall be responsible for being knowledgeable of and adhering to this procedure. No locks shall be removed from equipment without first consulting the Maintenance Department.
2. A lock-out/tag-out continued from one shift to the next shall be the responsibility of the craftsmen involved to remove the appropriate lock and replace it with a new one.
3. If more than one individual is required to lock-out or tag-out equipment, each shall place their own lock or tag on the affected equipment in such a way as to be certain the equipment is locked out. If the affected equipment cannot accept multiple locks or tags, a multiple lock-out or tag-out hasp shall be used.

### **EQUIPMENT**

Equipment shall consist of the following:

1. Padlocks. Sufficient quantities of padlocks, each lock to have an individual key, and one master key controlled by maintenance supervision.
2. Multiple lock tongues. To be used in case more than one department is involved in a job.
3. Danger/Warning tags. To be used wherever it is necessary to warn maintenance employees, and operators of a repair.

Equipment shall be distributed and controlled by (insert name of responsible individual).

### **WHEN TO LOCK-OUT-TAG-OUT**

Most equipment is designed with safe switches, disabling the equipment for minor repair or calibration during normal operation. In general, these switches provide adequate protection for minor repair which is routine, repetitive, and necessary to the normal use of the equipment. Lock-out/tag-out procedures shall be used for the following situations:

1. Major repairs or overhaul.
2. When working alone, out of visual contact of the controlling switch.
3. Anytime there is danger of injury from an unexpected release of energy.
4. Any situation that threatens an employee's safety.

### **LOCK-OUT/TAG-OUT PROCEDURES**

The following are specific procedures to be followed for lock-out/tag-out:

1. Notify all affected areas and employees of the impending lockout situation, the reason for it and estimated start and duration times.
2. Equipment shutdown and isolation. Place all switches in the "off" or "safe" position. Disconnect sources of power, ensuring all sources of both primary and secondary power to the equipment are interrupted.
3. Dissipate residual energy. Shutting down equipment does not mean there is no energy left in it. Check for trapped pressure or residual electricity in the system.

4. Lock-out or tag-out all in-line points of control. In most cases, this may be more than one place, or more than one lock, if several people are working on the equipment.
5. Lock-out verification. Take nothing for granted. Verify that the locked-out switch or control cannot be overridden. Test the equipment to be certain that the locked-out switch is de-energized & not simply malfunctioning. Press all start buttons or valves to see if the equipment starts. Ensure the system you are working on is the same one that has been locked out.
6. Perform the work scheduled. Try to foresee all possible hazards. Ensure the new/repair work does not bypass the lockout and reactivate the system.
7. Lock and/or tag removal. All locks and tags are to be left in place until work is completely finished. This is especially true when more than one employee is working on the equipment. A lock is never to be removed except by the person who placed it there.

**NOTE:** Only immediate supervisors are to authorize emergency removal of a lock or tag. The individual who applied the tag must be notified that the tag is being removed.

8. Equipment start up. Make a final safety check before restarting equipment, to be certain it is safe to operate. Make sure of the following:
  - a. All tools and other items have been removed.
  - b. All machine guards are returned to their proper position.
  - c. All electric, hydraulic, pneumatic or other systems are properly reconnected.
  - d. All employees are clear of equipment.

Many of the lock-out/tag-out procedures appear to be common sense, and they are. Following them will ensure safe operation calibration, maintenance and repair of equipment and/or processes, without dangerous surprises or injury.

### **WORKING ON OR NEAR ENERGIZED CIRCUITS**

- It is the policy of (insert company name) that, except under extreme circumstances, work shall not be done on energized circuits.
- Justification must be made to the NSLS-II ES&H Manager, the BSA Construction Inspector and the BSA Construction Safety Engineer of the need to work on energized circuits.
- Work with voltages less than 50 volts (in BSA Range "A") is not considered working on or near energized conductors. Energized parts that operate at less than 50 V to ground are not required to be de-energized if there must be no increased exposure to electrical burns or to explosion due to electric arcs. BSA will issue energized work permits.
- Energized work permits shall address, as a minimum, the following elements:
  - 1) A description of the circuit and equipment to be worked on and their location;
  - 2) Justification for why the work must be performed in an energized condition;
  - 3) A description of the safe work practices to be employed;
  - 4) Results of the shock hazard analysis;
  - 5) Determination of shock protection boundaries;
  - 6) Results of the flash hazard analysis;
  - 7) The Flash Protection Boundary;
  - 8) The necessary personal protective equipment to safely perform the assigned task;
  - 9) Means employed to restrict access of unqualified persons from the work area;
  - 10) Evidence of completion of a job briefing, including a discussion of any job-specific hazards (Include in Phase Hazard Analysis);

- 11) Energized work approval signature as indicated above
- For all energized work, regardless of the voltages, the appropriate personal protective equipment must be worn.
- Work performed on or near energized circuits performed by qualified persons related to testing, troubleshooting, voltage measuring, etc., is permitted without an energized work permit, provided appropriate safe work practices and personal protective equipment in accordance with NFPA 70-E is used.

### **EDUCATION AND DISCIPLINE**

The key to worker safety is education. The purpose of this document is to ensure that everyone understands the importance of lock-out/tag-out and how to recognize when it is in use. These elements shall be covered during initial contractor/vendor orientation and during the pre-job and periodic “tool-box” talks. By educating all employees to the importance of following proper safety procedures, a safer working environment can be ensured.

As with all safety procedures, a fair uniform enforcement of discipline must be in place. Employees are responsible for their own safety, the safety of their fellow employees and the safety of the facility. Violating lock-out/tag-out procedures is a major safety violation and will subject the employee to immediate discipline.

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## **APPENDIX K**

### **ENERGIZED ELECTRICAL PERMIT**

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Department Code \_\_\_\_\_ **ENERGIZED ELECTRICAL WORK PERMIT** Permit # \_\_\_\_\_ Procedure # \_\_\_\_\_  
 Job/Work Order Number \_\_\_\_\_

**PART I: TO BE COMPLETED BY THE REQUESTER:**

- (1) Description of circuit/equipment/job location: \_\_\_\_\_  
 \_\_\_\_\_
- (2) Description of work to be done: \_\_\_\_\_  
 \_\_\_\_\_
- (3) Justification of why the circuit/equipment cannot be de-energized or the work deferred until the next scheduled outage: \_\_\_\_\_  
 \_\_\_\_\_
- Start Date: \_\_\_\_\_ Expire Date: \_\_\_\_\_
- Requester/Title \_\_\_\_\_ Date \_\_\_\_\_

**PART II: TO BE COMPLETED BY THE ELECTRICALLY QUALIFIED PERSONS DOING THE WORK:**

- (1) Detailed job description procedure to be used in performing the above detailed work including hazards, conditions, mechanical, environmental, space obstructions, other voltages: \_\_\_\_\_  
 \_\_\_\_\_
- (2) Description of the Safe Work Practices: ☐ LOTO ☐ Two Workers ☐ Safety Watch ☐ Notify affected workers ☐ \_\_\_\_\_  
 Reason not to LOTO \_\_\_\_\_  
 Restart Checks Required: \_\_\_\_\_
- (3)
- |  |  |                      |  |                      |  |
|--|--|----------------------|--|----------------------|--|
| Flash Hazard (-1 to 4)                 |  | Shock Hazard (max V) |  | Working Distance     |  |
| Flash Boundary                         |  | Limited Approach     |  | Glove Class, minimum |  |
| Incident Energy (cal/cm <sup>2</sup> ) |  | Restricted Approach  |  |                      |  |
|  |  | Prohibited Approach  |  |                      |  |
- (4) Protective Equipment
- |   |   |   |  |
|---|---|---|--|
| <input type="checkbox"/> Natural Fiber Clothing | <input type="checkbox"/> Safety Glasses/Goggles | <input type="checkbox"/> Ear Plugs            | <input type="checkbox"/> Leather Shoes       |
| <input type="checkbox"/> FR Clothing            | <input type="checkbox"/> Face Shield            | <input type="checkbox"/> Leather Gloves       | <input type="checkbox"/> Voltage-rated Shoes |
| <input type="checkbox"/> Voltage-rated Tools    | <input type="checkbox"/> Balaclava Hood         | <input type="checkbox"/> Voltage-rated Gloves | <input type="checkbox"/> Hard Hat            |
| <input type="checkbox"/> Category III Meter     | <input type="checkbox"/> 2 Layer Switching Hood | <input type="checkbox"/> Flashsuit            | <input type="checkbox"/> Other               |
- Other \_\_\_\_\_
- (5) Means employed to restrict the access of unqualified persons from the work area: \_\_\_\_\_
- (6)
- | Authorized Workers | Life # | Authorized Workers | Life # |
|--------------------|--------|--------------------|--------|
| _____              | _____  | _____              | _____  |
| _____              | _____  | _____              | _____  |
| _____              | _____  | _____              | _____  |

**PART III: APPROVAL(S) TO PERFORM THE WORK WHILE ELECTRICALLY ENERGIZED:**

NSLS-II ESH Manager (or designee) \_\_\_\_\_ Date \_\_\_\_\_ Electrically Knowledgeable Person/ Engineer \_\_\_\_\_ Date \_\_\_\_\_  
 Independent Reviewer (Range D only) \_\_\_\_\_ Date \_\_\_\_\_

**PART IV: WORK**

Evidence of completion of Job Briefing including discussion of any job-related hazards: \_\_\_\_\_  
 \_\_\_\_\_

**PART V: POST WORK-FEEDBACK \_\_\_\_\_ (Worker Initials)**

NSLS-II ESH Manager \_\_\_\_\_ Close-out Date \_\_\_\_\_  
 Return to: NSLS-II ESH Manager

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**APPENDIX L**  
**EXAMPLE OF HAZCOM TRAINING PROGRAM**

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## HAZARD COMMUNICATION TRAINING PROGRAM

### 1. Initial Assignment Information and Training

- a) The **(insert job title)** shall train new employees in hazard communication and protection procedures as part of their general orientation before the new employees begin work.
- b) The **(insert job title)** is responsible for training affected employees whenever new hazardous chemicals are introduced into the workplace. This responsibility extends to provide additional training, as required, for existing employees reassigned into new positions.
- c) All current employees shall be trained in the elements of **(Insert Company Name)** hazard communication program by **(insert contract start date)**.

### 2. Curriculum

- a) All employees shall be provided with the following information:
  - 1) Employees shall be informed that **(insert company name)** is required by law to have a chemical hazard communication program.
  - 2) Employees shall be informed of the details of **(Insert Company Name)** chemical hazard communication program including:
    - The location and ready availability of a list of all hazardous chemicals used by the company
    - A list of all hazardous chemicals known to be present in the work area is kept at **(insert location)** and is available for review by employees during each work shift
    - The location and ready availability of Material Safety Data Sheets (MSDS) for hazardous chemicals used within the company
    - Specific operations or tasks in the employees' work area that use hazardous chemicals
- b) All employees shall receive training as follows:
  - 3) Employees shall be trained in methods and observations to detect the presence of hazardous chemicals.
  - 4) Employees shall be trained regarding the specific physical and health hazards of known hazardous chemicals in the employees' work area.
  - 5) Employees shall be trained in protective measures including the use of personal protective equipment and protective measures implemented by **(Insert Company Name)**, including work procedures.
  - 6) Employees shall be trained in understanding, interpreting and using hazard information provided on labels and in the MSDS.

### 3. Training Program Completion

All ***(insert company name)*** employees are required to successfully complete the ***(Insert Company Name)*** hazard-communications training program. Employees are required to follow safe and healthy work practices as a condition of employment.

### 4. Non-Routine Tasks

Training for hazard protection during non-routine tasks is the responsibility of the ***(insert supervisor or other job title)*** and shall be provided as needed.

### 5. Foreseeable Emergencies

Training for hazard protection during foreseeable emergencies (such as fires, floods, spills, etc.) shall be provided to all affected employees as part of their general safety training.

### 6. Sub-Contractor Employees

The employer of sub-contractors required to work on this project shall be informed of the hazard communication program. While the sub-contractor is responsible for their own employees' training, ***(Insert Company Name)*** shall attempt to answer sub-contractor employees' questions about workplace hazards.

The MSDS and list of hazardous materials shall be available to sub-contractor employees as well.



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**APPENDIX M**  
**CRITICAL LIFT EVALUATION FORM**

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**CRITICAL LIFT EVALUATION FORM (CLEF)**

- ☐ CRITICAL LIFT  
☐ PRE-ENGINEERED LIFT

**PERSON REQUESTING THE LIFT**

PRINT NAME \_\_\_\_\_ DEPT/DIV. \_\_\_\_\_ DATE \_\_\_\_\_

**PERSON IN CHARGE (PIC)**

Print Name \_\_\_\_\_

PIC must be present during the entire CRITICAL LIFT and be QUALIFIED to resolve any question or problems that might arise during the lifting operation.

**DETERMINING FACTOR FOR CRITICAL LIFT**

- \_\_\_\_ Load is greater than 85% of mobile crane rated capacity, or greater than 90% of rated fixed crane capacity (excluding proof tests of 100 to 125% rated capacity) , or greater than 50 tons.  
\_\_\_\_ Two or more cranes/booms are required or special hoisting/rigging equipment will be used.  
\_\_\_\_ Potential for release of radioactive/hazardous materials due to collision, or upset of load.  
\_\_\_\_ Damage that would result in more than 3 weeks or 30% delay to schedule, or monetary value damages of \$250,000 or greater.

**OPERATING EQUIPMENT (mobile crane)**

Type of Crane \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Model No. \_\_\_\_\_ Serial No. \_\_\_\_\_  
Manufacturer Restriction for WIND SPEED \_\_\_\_\_ (no lifts at wind speeds of 25 mph or greater)  
Crane Equipped with Anemometer (Y/N) \_\_\_\_\_ (If not, use BNL Weather Station.)  
Copies of Latest Annual Inspection \_\_\_\_\_ Latest Calibration Date of Instruments \_\_\_\_\_  
Operator Licensed for Equipment \_\_\_\_\_ Expiration Date \_\_\_\_\_

**OPERATING EQUIPMENT (overhead cranes)**

Type of Crane \_\_\_\_\_ Manufacturer \_\_\_\_\_  
Capacity \_\_\_\_\_ Latest Calibration Date of Instruments \_\_\_\_\_  
Date of Latest Annual Inspection \_\_\_\_\_ Operator's SAC Expiration Date \_\_\_\_\_

**DESCRIPTION OF ITEMS TO BE LIFTED**

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(Continued next page)

**HOW WEIGHT OF OBJECT OBTAINED**

- A. Certified Weight Scale \_\_\_\_\_ Ticket # \_\_\_\_\_
- B. Calculated independently by more than one source:
1. Source \_\_\_\_\_ Weight \_\_\_\_\_
  2. Source \_\_\_\_\_ Weight \_\_\_\_\_
- C. If lift is an existing item (being removed or demolished), the weight must be recalculated, taking into account all modifications, including internal, as well as an allowance for scale, sediment, sludge, and insulation. Calculation worksheets shall be included in the Lift Plan and have a PE stamp or be signed off by a qualified person. **Note:** When weights are calculated, a 10% tolerance margin shall be added. This value may be increased at the discretion of the Lifting Safety Committee.
- D. Shipping Manifests Weight \_\_\_\_\_ Manufacturer Data Weight \_\_\_\_\_

**CENTER OF GRAVITY (CG)**

CG will be marked onto load, and a drawing included showing how it was determined.

**25.0 DESCRIPTION & WEIGHT OF ALL RIGGING EQUIPMENT & CRANE ATTACHMENTS**

Type	Rated Capacity	Weight
Slings (type):		
Shackles		
Lifting rings/ eyebolts		
Rigging hooks		
Load block/jib		
Spreader bars/below the hook lifting devices <b>NOTE:</b> Must comply with ASME B30.20 Standard for Design, Testing, and Appropriate Markings. 200% test documentation for below the hook rigging: _____		

**WEIGHT OF OBJECT, RIGGING EQUIPMENT, & CRANE ATTACHMENTS**

Source \_\_\_\_\_ Total Weight \_\_\_\_\_

*(Continued next page)*

**EQUIPMENT AND LIFT RELATIONSHIP**

- A. Maximum Operating Radius: \_\_\_\_\_
- B. Planned Operating Radius: \_\_\_\_\_
- C. Allowable load at maximum lift radius anticipated (from Load Chart): \_\_\_\_\_
- D. Ratio of Lift to Allowable Load: \_\_\_\_\_
- E. Clearance between Boom & Lift: \_\_\_\_\_
- F. Clearance to Surrounding Facilities/Utilities: \_\_\_\_\_
- G. Clear Path for Load Movement: \_\_\_\_\_

**STABILITY OF GROUND AREA**

- A. Soil Bearing Capacity: \_\_\_\_\_ Source: \_\_\_\_\_
- B. Mats Required: \_\_\_\_\_ Size & Number: \_\_\_\_\_
- C. Underground Utilities Location: \_\_\_\_\_
- D. Ratio of Soil Bearing Capacity to Actual: \_\_\_\_\_

**LIFTING OPERATION**

A detailed drawing, to scale, MUST be included showing the Set-up Area, Lifting Area, Load Placement Area, and Sling Attachment Points w/sling angle reduction factor. A documented Critical Lift Plan or Pre-engineered Lift Procedure, as applicable, shall be included.

**26.0 INSPECTION OF CONTRACTORS EQUIPMENT**

All contractors' Lifting and Rigging Equipment must be inspected before being brought onto the BNL Site by BSA Hoisting & Rigging Inspector. Contact: John Hynan: (631) 344-5456

**27.0 LIFT APPROVAL SIGNATURES**

Professional Engineer/ Qualified Person: \_\_\_\_\_

Person in Charge (PIC) (Critical Lift): \_\_\_\_\_

Operator of Equipment (Critical Lift): \_\_\_\_\_

Responsible Manager or Designee: \_\_\_\_\_

Lifting Safety Committee Recommendation: Approve: \_\_\_\_\_ Disapprove: \_\_\_\_\_

LSC Committee Chair: \_\_\_\_\_

**FINAL APPROVAL SIGNATURE:**

NSLS-II Conventional Facilities, Division Director \_\_\_\_\_

**28.0 PRE-LIFT MEETING**

Date: \_\_\_\_\_ Time: \_\_\_\_\_ Location: \_\_\_\_\_

**29.0 LIST OF ALL ATTACHMENTS**

**32.0 GENERIC LIFT PLAN (EXAMPLE)**Building #: **735**Project Title: **CFN/NANO**Location: **CFN/NANO Site****Generic Lifting for General Deliveries**

Material to be removed from delivery truck and placed into building by use of delivery trucks boom.  
(w/capacities of 3 Tons or less)

Qualified Person(s):

Material to be lifted: \_\_\_\_\_ Weight: \_\_\_\_\_ CG: \_\_\_\_\_

**Note:** All lifting operations shall be conducted in accordance with applicable ANSI standards and OSHA requirements.

Equipment List	Type	Qty.	Dimensions	Capacity	Configuration	Load
30.0 SLINGS	As req'd					< 3 T
Shackles	As req'd					< 3 T
Roller/Skates	N/A					
Jacks	N/A					
Cribbing/Shoring	As req'd					
Hoist	N/A					
Lifting Vehicles	Delivery boom truck					
PPE/HAZMAT	Hard hats, safety shoes, safety glasses, reflective vest					
Transport Vehicles	N/A					
Restricted area below lift	As Req'd					

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**APPENDIX O**  
**CONTRACTOR'S CERTIFICATION LETTER**

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## COMPANY LETTERHEAD

Date: \_\_\_\_\_  
Brookhaven National Laboratory  
Bldg. 817  
Upton, N.Y. 11973  
Attn: Mr. Martin Fallier  
NSLS-II Conventional Facilities, Division Director

Re: Contract No \_\_\_\_\_  
Job Title: NSLS-II Ring Building Conventional Construction  
Job No: \_\_\_\_\_  
Bldg. No: \_\_\_\_\_

Dear Mr. Fallier:

In conformance with the requirements of the construction documents for the above project, the following information is submitted on our company's construction safety program:

- Copy of the company's record of injuries and accidents (OSHA 300 logs for 2004-2006)
- Insurance experience modification rate for 2004-2007
- Environmental compliance records (if applicable) for past five years, including fines, Administrative Consent Orders, and Notices of Violations.
- The attached Construction Environment, Safety and Health Plan

We understand that Brookhaven National Laboratory is an ISO 14001 Registered Organization. All construction and environmental work shall conform to the applicable requirements of this program. **(Insert Name of the NSLS-II General Construction Contractor)** its employees and subcontractors shall follow the BSA requirements listed in its Standards Based Management System (SBMS) <https://sbms.bnl.gov/> pertaining to: Work Planning and Control for Operations, Emergency Response/Spill Response, Waste Management (radiological, hazardous, mixed, medical, industrial), Chemical Handling and Use (RCRA, OSHA), Land Use Restrictions (Wetlands, Pine Barrens, Endangered Species), Liquid Effluents.

**(Insert Name of the NSLS-II General Construction Contractor)** its employees and subcontractors shall comply with the applicable requirements established in the SBMS <https://sbms.bnl.gov/> and the attached Environment, Safety and Health Plan, Environment, Safety and Health Standards of the SBMS are located at: <https://sbms.bnl.gov/SBMSearch/LD/ld08/ld08t011.htm> for review and use. Where the requirements specified in the SBMS exceed the requirements of the OSHA standards, the BSA requirements shall take precedence.

BSA shall provide all appropriate permits required by these standards. **(Insert Name of the NSLS-II General Construction Contractor)** shall verify that these permits are current for the scope of work and updated, with appropriate approvals, to reflect any changes to the scope of work, and shall abide by the requirements of the permit.

This letter also certifies that **(Insert Name of the NSLS-II General Construction Contractor)** is aware of, understands and shall comply with the safety regulations of the OSHA Standard 29 CFR 1926 and 29 CFR 1910 and Department of Energy Standard 10 CFR 851.

In addition, **(Insert Name of the NSLS-II General Construction Contractor)** understands that the BSA Standards Based Management System (SBMS) is available, on line, for our review and use and we shall comply with applicable safety requirements for this project.

Yours truly,

\_\_\_\_\_  
Title:

**National Synchrotron Light Source II  
Construction Environment, Safety and Health Plan for the  
Conventional Construction of the Ring Building**

**APPROVALS**

**Submitted:**

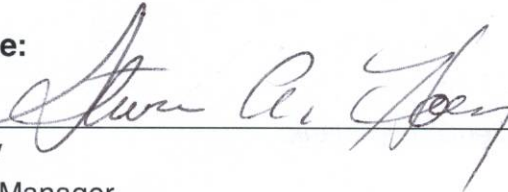


Ken Krasner

Safety and Health Services Division Construction Safety Engineer  
Brookhaven National Laboratory

4/20/09  
Date

**Concurrence:**

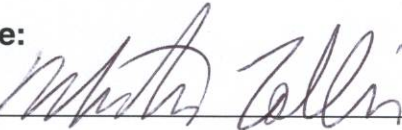


Steven Hoey

NSLS-II ESH Manager  
Brookhaven National Laboratory

4/20/09  
Date

**Concurrence:**

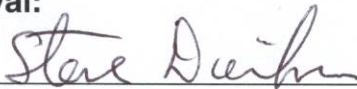


Marty Fallier

NSLS-II Conventional Facilities Division Manager  
Brookhaven National Laboratory

4/24/09  
Date

**Approval:**



Steve Dierker

NSLS-II Project Director  
Associate laboratory Director for Light Sources  
Brookhaven National Laboratory

4/30/09  
Date