

Environment, Safety and Health Plan
for the
NSLS-II Experimental Tools (NEXT) Project

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ENVIRONMENT, SAFETY & HEALTH PLAN

for the

NSLS-II EXPERIMENTAL TOOLS (NEXT) Project

APPROVALS

12/10/2013

Submitted

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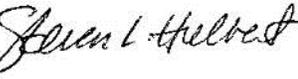


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NEXT PROJECT

ENVIRONMENT, SAFETY, & HEALTH PLAN

1 NEXT ENVIRONMENTAL, SAFETY, AND HEALTH POLICY

A strong Environment, Safety, and Health program is essential to the successful completion of the NEXT project at Brookhaven National Laboratory. We are committed to ensuring a safe work environment for NEXT workers and BNL site-wide workers and to protecting the public from hazards associated with construction and operation of NEXT. In addition, all work related to construction and operation of NEXT insertion devices, front ends, and beamlines will be performed in a manner that preserves the quality of the environment and prevents property damage. Accidents and injuries are preventable and it is important that we work together to establish an injury free work place.

We comply with the BNL ESSH (Environment, Safety, Security, and Health) policy and all applicable safety, health, and environmental requirements and commit to enforcing these requirements in all our work. We will ensure that procedures are established to support the following NEXT ESH policy statements:

- Line managers are responsible for environmental stewardship and personal safety at the NEXT project site.
- Line managers will provide consistent guidance and enforcement of the ESH program that governs the activities of workers at the site.
- Incidents, whether they involve personal injuries or other losses, can be prevented through proper planning. All NEXT project work is planned.
- Workers are involved in the work planning process and continuous improvement, including the identification of hazards and controls.
- Working safely and in compliance with requirements is vital to a safe work environment - line managers will enforce disciplinary policies for violations of safety rules.
- Each of us is responsible for our own safety, and for that of our co-workers. Together we create a safe work environment.
- A strong program of independent audits, self-assessments and surveillance will be employed to periodically evaluate the effectiveness of the ESH program.
- Any incidents that result or could have resulted in personal injury or illness, significant damage to buildings or equipment, or impact of the environment, will be investigated to determine corrective actions and lessons that can be applied to prevent recurrence. We encourage open reporting of errors and events.

To achieve the culture and safety performance required for this project, it is essential that ESH be fully integrated into the project and be managed as tightly as quality, cost, and schedule. We will develop and implement an Integrated Safety Management System consistent with the requirements of DOE Policy 450.4 as a means of achieving this vision.

2 BNL ENVIRONMENTAL, SAFETY, SECURITY, AND HEALTH POLICY

The BNL Director has issued an ESSH Policy that applies to all work performed by employees, contractors, and guests while working at BNL. All workers are expected to take personal responsibility to adhere to these principles. Accordingly, NEXT will be designed, constructed, and operated in a manner consistent with these values:

- **Environment:** We protect the environment, conserve resources, and prevent pollution.
- **Safety:** We maintain a safe workplace and we plan our work and perform it safely. We take responsibility for the safety of ourselves, coworkers, and guests.
- **Security:** We protect people, property, information, computing systems, and facilities.
- **Health:** We protect human health within our boundaries and in the surrounding community.
- **Compliance:** We achieve and maintain compliance with applicable ESSH requirements.
- **Community:** We maintain open, proactive and constructive relationships with our employees, neighbors, regulators, DOE, and our other stakeholders.
- **Continual Improvement:** We continually improve ESSH performance.

All parties are invited to provide NEXT management or the BNL Director with input on our performance relative to either the NEXT ESH Policy or the BNL ESSH Policy, or on the policies themselves.

3 PURPOSE AND SCOPE

This plan establishes the framework and expectations for the ESH program for the NEXT project. It is based on the premise that a strong ESH program is essential to the successful completion of the NEXT project. We believe that accidents and injuries are preventable and that an injury free work place can be achieved through implementation of the program described in this document.

This plan may be supplemented by additional documents that provide more detailed ESH program requirements if needed, and will apply to all work carried out by project staff and contractors. NEXT Project Construction ESH will follow this ESH Plan to guide workers and contractors in the program requirements.

4 INTEGRATED SAFETY MANAGEMENT SYSTEM

The Project utilizes the concept of an Integrated Safety Management System (ISMS) as its overarching philosophy and approach to integrating safety systematically into work activities. An ISMS is an organized process whereby work is planned, performed, assessed, and systematically improved to promote the safe conduct of work. These concepts will be described as they apply to this project in the balance of this section.

4.1 Principles of Integrated Safety Management

The fundamental principles described in DOE P 450.4A are incorporated into NEXT Project processes to ensure that all work is planned and conducted safely. The project is committed to conducting our work our work efficiently and in a manner that ensures protection of workers, the public, and the environment.

4.1.1 Worker and Line Management Responsibility for Safety

Line management is responsible and accountable for establishing a safe working environment. Management expectations are to be clearly communicated to all personnel. Management is responsible for assuring that the tools necessary to perform work safely are provided and to solicit feedback to continuously improve the safe execution of work.

Line managers are responsible for training, motivating, and enabling their workers to understand and comply with the Project's commitment to safety as expressed in this plan. They are also to ensure that work is executed as defined in relevant work planning documents and in compliance with ESH requirements. Line managers are also responsible, by personal example and by involving their workers, for providing a working environment in which everyone is involved in meeting the Project's commitment to safety. It is equally important for managers and supervisors to ensure that guests or visitors are properly trained and understand their personal responsibility for safety

All workers within the project facilities or at the NEXT construction site are expected to plan their work in compliance with ESH requirements. It is very important for each worker to:

1. Take personal responsibility for his/her own safety and that of co-workers while performing work.
2. Follow established procedures for safe work practices
3. Conduct work as trained and as authorized by his/her supervisor.
4. Be thoughtful at all times and maintain vigilance even when performing simple and routine tasks.
5. Re-evaluate controls and discuss with supervisors or other knowledgeable persons when conditions change or are not found to be as expected.
6. Provide feed-back to supervisors regarding work experiences in an effort to continuously improve safety and performance.
7. Workers and supervisors are accountable for the implementation of their responsibilities.

4.1.2 Clear Roles and Responsibilities

The project organizational breakdown structure defines reporting lines within the project. Clear and unambiguous roles and lines of responsibility, authority, and accountability at all organizational levels will be established through the development of individual R2A2s for all project staff. ESH responsibility will be integrated into the project work activities, and interfaces for processes and organizations will be clearly established during work planning to provide for clear understanding and communication.

4.1.3 Personnel Experience, Knowledge & Skill

Each individual associated with the project shall possess the experience, knowledge, skills, and abilities necessary to discharge his or her responsibilities effectively and safely. Line managers must ensure that their workers are competent and trained to safely accomplish their work. A Job Training Assessment will be conducted for all project members and applicable training requirements established based on job duties. Line management is responsible to ensure that training and qualification requirements are established for their personnel, and workers are responsible to maintain training current as defined by BNL and project requirements.

Each Contractor and Subcontractor working at the project Site will also be required as a part of their ESH Plan to provide a competent workforce on the project that has the ability to do work safely and efficiently.

4.1.4 Balanced Priorities

A strong ESH program is essential to the successful completion of the NEXT project. We will allocate sufficient time and resources to ensure that work is performed safely. All staff and contractors must take the time to complete training, plan work properly and conduct their work in a manner which adequately controls hazards. It is essential that ESH be fully integrated into the project and be treated with the same priority as cost and schedule. Safety may not be compromised because of cost or schedule pressures.

Every employee and sub-contractor has the responsibility and authority to stop work when he or she believes the activity in which they are involved, or which they observe, is unsafe.

4.1.5 Safety Standards and Requirements

Before work is performed, hazards associated with the activity are evaluated and an agreed-upon set of controls is established, which, if properly implemented, provides adequate assurance that the workers, the public, the environment and property are protected from adverse consequences. For the NEXT project, these controls will be established based upon the requirements established in the BNL SBMS Subject Areas, supplemented by NEXT specific requirements developed as needed.

4.1.6 Hazard Controls Tailored to Work Being Performed

Engineering controls and administrative controls are established to address hazards of the work. Wherever feasible, preference should be given to engineered controls; administrative controls are used to supplement engineered controls as appropriate. These controls are established through the work planning process for on-going work or through review for the evolving design of the new facility. It is important that the controls are tailored appropriately to match the hazard and associated risk using a graded approach.

4.1.7 Authorization Agreement

The conditions and requirements necessary for operations to be initiated and conducted are clearly established and agreed upon by the responsible line managers and workers prior to start of work. In its simplest form, this may consist of a simple discussion at the work site between supervisor and worker but more complex agreements will be implemented when appropriate.

4.2 Core Functions of an Integrated Safety Management System

DOE P 450.4A describes the core functions of an Integrated Safety Management System. The five core functions provide a necessary structure for any work activity that may affect the worker, the public or the environment. The functions form a continuous cycle which is not necessarily sequential. Rather, the functions 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 core functions that constitute the work planning process are: Define the Scope of Work, Identify and Analyze Hazards, Develop and Implement Hazard Controls, Perform Work within Controls, and Provide Feedback and Continuous Improvement. It is important to apply this process to all work that is performed, but it should be understood that the method of planning and its degree of rigor and formality depends upon the hazards and complexity of the work being discussed. Some work will require extensive work planning documents and a formal work permit. Other work may be addressed through standing job risk assessments conducted by supervisor, workers, and ESH staff.

4.2.1 Define the Scope of the Work

Defining the scope of work entails identifying and describing all the steps needed to complete a particular job safely. Defining the scope of work is a critical element of the work planning process, since it sets the stage for the scope and depth of hazard identification and analysis.

4.2.2 Identify and Analyze Hazards associated with the Work

Hazard identification requires a definition of the hazards which will be encountered during the course of performing a particular task, as well as those that are introduced from other work in progress. A Job Risk Analysis (JRA) shall be performed for each work activity to identify such hazards. There is the potential that unexpected hazards may be encountered or the nature of the known hazards might change as work activities proceed. Should this occur the JRA shall be amended to incorporate the new conditions.

4.2.3 Develop and Implement Hazard Controls

The development and implementation of hazard controls require the identification of those controls to prevent and mitigate hazards and establishing safe work limits. It is important that the controls and their application be fully understood by all workers who are involved in the work.

4.2.4 Confirm Readiness and Perform Work within Controls

Confirmation of readiness is the process of verifying that safety controls that have been identified have been implemented before starting work. Performing work within controls entails adherence to the established requirements such that activities remain within the safety envelope. Readiness assessments may entail a wide range of complexity ranging from as simple as a pre-job review by a worker that conditions and controls are as expected, to as complicated as an extensive and lengthy review conducted by BNL and DOE management prior to the start of an accelerator and beamlines for the first time.

4.2.5 Provide Feedback and Seek Continuous Improvement

Feedback on the adequacy of controls and the work planning process is vital to continuous improvement. Such feedback may be collected from several sources; it is particularly important to get feedback from workers performing the task, but information collected from oversight provided by management or independent organizations is also an essential source of feedback. It is important that feedback information be assessed and opportunities for improvement be identified and implemented.

4.3 Roles and Responsibilities for ISM Implementation

4.3.1 Senior Management

The NEXT Project Manager is responsible for overall successful execution of the NEXT Project and has overall responsibility for ESH performance for the duration of the project. The Level 2 managers within the project are responsible to ensure implementation of ESH requirements applicable to the activities within their groups.

4.3.2 Line Managers

Line managers provide the primary operating interface with employees, as well as with guests, visitors and contractor/vendors. Within the framework of the ISMS, line managers are expected to contribute to work planning, pre-job communication of hazards and controls, work monitoring, and evaluation of results.

Effective integration of support from ESH 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 ESH discipline involved.

4.3.3 NEXT ESH Manager

The NEXT ESH Manager is responsible for providing overall policy and guidance on ESH issues, and for working with the line organizations to make available necessary input from ESH professionals and other support. BNL ESH personnel will be enlisted to assist the project in ensuring the standards, requirements, and ESH policies are effectively translated into suitable controls for work activities.

The NEXT ESH Manager will also regularly assess the effectiveness with which ISMS is being applied, and will coordinate the ESH assessments conducted by others.

The ESH Manager is responsible for safety analyses, determining hazard classification, generating safety assessment documents as defined in Sections 5.3 and 5.4 below, and obtaining appropriate approvals.

4.3.4 NEXT Staff

All NEXT personnel are responsible to uphold the NEXT ESH and BNL ESSH policies. All personnel are expected to conduct their work in compliance with ESH requirements applicable to their work, including prescribed safety and health equipment, reporting unsafe conditions/activities, preventing avoidable accidents, and working in a safe manner.

All staff are responsible for becoming knowledgeable of and maintaining awareness of the hazards associated with their work, for contributing to the formulation of hazard controls, for conducting their work safely in accordance with those controls, 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 or property.

All staff are responsible to identify ESH issues in their workplace and to work with their management to identify improvements and to resolve concerns.

4.3.5 Contractors and Subcontractors

NEXT contractors are expected to incorporate safety into the planning of each task, assure the safety of their personnel, provide all personal protective equipment necessary for their employees, establish a safe and drug free work environment, and confirm that their equipment meets the applicable safety standards. NEXT contractors are responsible for any actions of their personnel that may endanger or otherwise expose other participants to potential hazards on the project.

NEXT contractors will submit a written Health and Safety Plan for review and approval by NEXT ESH management. Contractor Health & Safety Plans will meet or exceed all applicable project safety requirements defined in the NSLS-II Project Construction ESH Plan, must comprehensively address all anticipated hazards for executing the construction, and must identify the appropriate protective measures that will be used to mitigate the hazards. All sub-contractors to any prime contractor must follow the requirements in the prime's Health & Safety Plan.

5 ESH PROGRAM ELEMENTS

5.1 Introduction

All work associated with this project will be conducted in a manner that ensures protection of the workers, the public, and the environment. Implementing procedures and additional guidance to ensure accomplishment of these expectations will be established and communicated to all staff, contractors, and vendors. At the conclusion of the construction of NEXT and the commencement of routine operations, the NEXT ESH program will transition to the appropriate BNL institutional programs covering ESH.

5.2 Program Expectations

The NEXT Project shall address its ESH responsibility by:

1. Establishing an Integrated Safety Management System as defined above that implements the DOE Policy, DOE P 450.4A, *Safety Management System Policy*, the BNL SBMS subject areas, and the requirements of the DOE Accelerator Safety Order, DOE O 420.2C, *Safety of Accelerator Facilities*. The program shall protect the environment and the safety of workers and the general public by assuring that:
 - a. Facilities, systems, and components needed to meet mission requirements are fully defined and are designed, constructed, and operated in accordance with applicable BNL and DOE requirements;
 - b. Potential hazards to personnel associated with all NEXT systems, structures, and components are identified and controlled through the timely preparation of safety assessment documents;
 - c. Potential risks to the environment are addressed through the timely and comprehensive preparation of appropriate National Environmental Protection Act documentation;
 - d. ISO 14001 and OHSAS 18001 criteria are implemented to assure that all ESH risks are identified and addressed;
 - e. Requirements in 10 CFR Part 835, Part 850, and Part 851 are fully implemented to protect worker safety and health;
 - f. Research and development activities and all other project work are conducted in accordance with BNL work planning requirements to ensure control of hazards and proper authorization of work;
 - g. ESH program performance is monitored and assessed to evaluate effectiveness and to identify opportunities for improvement.
2. Implementing a QA program that follows DOE Order 414.1-2B, *Quality Assurance Program Guide* and incorporates quality requirements from BNL's Standards Based Management System (SBMS) on Quality Management and the SBMS subject area on Graded Approach for Quality Requirements. The NEXT quality assurance program is documented in the NEXT QA Plan.
3. Implementing an effective construction safety program to ensure worker safety on the NEXT site during construction. All work performed on the NEXT site will be conducted in accordance with the NEXT Project Environment, Safety, and Health Plan.
4. Performing independent design reviews on systems, structures, and components designated as safety significant in the Safety Assessment Document or as defined through QA classifications described in the NEXT QA Plan.

5. Providing appropriate training to ensure that project staff is adequately trained and qualified to perform their assigned work safely. Job Training Assessments will be conducted for all staff to ensure knowledge of job-related hazards and their controls. All project staff are responsible for ensuring that their training and qualification requirements are fulfilled, including continuing training to maintain proficiency and qualifications.
6. Developing and implementing operating procedures to control work on NEXT technical systems and to implement requirements of the ESH and work planning program
7. Performing and documenting safety inspections of all project facilities and work areas, and ensuring prompt correction of any issues identified in the inspection.
8. Reporting and investigating occurrences in accordance with the BNL Occurrence Reporting Processing System as defined in the BNL SBMS. Any incident, accident or other abnormal event will be properly communicated and investigated via established BNL procedures.

5.3 Safety Assessments for Hazard Identification and Control

NEXT structures, systems, components, operations and work processes will be analyzed to ensure proper identification and control of hazards. To accomplish this requirement, a series of hazard analyses will be prepared as design advances to ensure a systematic identification and control of hazards. Hazards and potential accidents will be analyzed in progressively more detail in each stage of design. Safety personnel will work closely with project engineers to develop a common understanding of the facility, systems, and processes, possible hazards including hazardous materials, and the envisioned operation of the facility. These documents will define requirements and standards for incorporation into the project design. It is vital that designers know how to control the hazards posed by the systems, structures and components within their scope of work.

5.3.1 Preliminary Hazards Analysis

A Preliminary Hazards Analysis Report (PHAR) has been prepared during the conceptual design phase of the project. The PHAR identifies all hazards anticipated with the construction and operation of NEXT and the mitigating controls that will be employed to eliminate or reduce risk of the hazards to manageable levels. The fire hazard analysis section of the PHAR reviews fire hazards associated with the construction and operation of NEXT and identifies building and facility fire protection criteria that are needed to reduce the risk of harm to workers and to minimize the potential of property loss due to fire. The PHAR will be updated as design evolves and will be used in conjunction with and integrated into the Final Safety Assessment Documents for the facility.

5.3.2 Hazard Analysis Report

The Hazard Analysis Report (HAR) is a continuation of the analysis initiated with the PHAR. The HAR is prepared as a tool to identify issues that must be addressed during final design relating to construction, commissioning, operation, and decommissioning. Careful control and oversight will be required for those tasks that have an unmitigated risk rating of High or Moderate in the Hazard Analysis Report. The HAR was completed and approved prior to the award of CD-2.

5.3.3 Final Safety Assessment Document

The purpose of the Final Safety Assessment Document (FSAD) is to describe in sufficient detail all significant hazards presented by the facility and its operations, and the controls by which these hazards will be managed. The objective of the safety analysis is to identify hazards, credible impacting events, initiators of events, assumptions used in estimating impacts and consequences of an event, controls required to reduce risks, and in some cases, the acceptability of risk to workers, the public and the environment. The FSAD will define the controls and standards that must be incorporated into the facility

design and operating procedures. A complete facility FSAD must be completed and approved prior to the award of CD-4. All hazards and mitigations identified during the NEXT design will be incorporated into the FSAD for the NSLS-II facility.

5.3.4 Beneficial Occupancy

During the latter portions of the fabrication/construction phase of the project, there will be a transition to installation, assembly, testing and eventual operation of the beamline systems.. Readiness evaluations will be performed to verify that personnel, hardware, administrative requirements, and procedures are ready to permit the activity to be undertaken in a safe and environmentally sound manner.

5.3.5 Commissioning and Beamline Readiness Reviews

A Commissioning Program Plan of Action will be developed to describe the objectives of each phase of beamline commissioning. All beamline commissioning activities will be conducted as prescribed in the Commissioning Plan.

Instrument Readiness Reviews (IRR) must be performed before approval for beamline commissioning and routine operation or as directed by the Project or DOE management. A IRR is conducted to verify the necessary safeguards and procedures are in place to permit safe operation of the facility or sub-facilities.

5.3.6 Work Performed During Construction, R&D, and Commissioning Activities

Each contractor will be required to prepare a Health and Safety Plan (HASP) addressing their phase of the work. Each contractor's HASP will be reviewed and approved by NEXT management and will be subject to enforcement during work by contractor, Project, and BNL safety personnel.

All routine non-administrative work conducted by NEXT staff shall be evaluated using a Job Risk Analysis (JRA). The JRA shall identify the work to be performed, the hazards anticipated, and the actions to be taken to address the hazards. The JRA shall be prepared with participation of worker(s) performing the tasks. When work changes or unanticipated conditions are encountered, the JRA shall be revisited and revised as necessary.

All work activities with significant environmental aspects will be evaluated through process reviews as a part of the ISO 14001 program, and are subject to additional work planning prior to authorization for work.

All routine work is subject to BNL work planning requirements and must be performed by workers who are trained and qualified and authorized by their supervisor to carry out the work.

5.4 NEPA Compliance

A National Environmental Protection Act (NEPA) review of the NEXT project concluded that the project falls within the existing NSLS-II 2006 Environmental Assessment (EA) and no other NEPA documentation is required. The DOE Brookhaven Site Office (BHSO) Site Manager approved a Finding of No Significant Impact (FONSI) that includes all potential environmental impacts of the NEXT project. Design, procurement, installation, and testing of the beamlines will be covered under the BNL's existing Integrated Safety Management (ISM) program and no additional ISM policies or procedures needs to be developed.

ACRONYMS GLOSSARY

ACGIH	American Conf. of Govt. Industrial Hygienists
AE	Architect/Engineer
ALARA	As Low As Reasonably Achievable
ARR	Accelerator Readiness Review
BES	Basic Energy Sciences
BHSO	Brookhaven Site Office
BNL	Brookhaven National Laboratory
BORE	Beneficial Operational Readiness Evaluation
BSA	Brookhaven Science Associates
CDR	Conceptual Design Report
CFR	Code of Federal Regulations
CM	Construction Manager
D&D	Decommissioning & Decontamination
DART	Days Away, Restricted, or Transfer
DOE	Department of Energy
EA	Environmental Assessment
EPA	Environmental Protection Agency
ESH	Environment, Safety, and Health
ESSH	Environment, Safety, Security, and Health
FONSI	Finding of No Significant Impact
FSAD	Final Safety Assessment Document
HAR	Hazards Analysis Report
HASP	Health and Safety Plan
HQ	Headquarters
IRR	Instrument Readiness Review
ISMS	Integrated Safety Management System
ISO	International Standards Organization
JRA	Job Risk Analysis
NEPA	National Environmental Policy Act
NEXT	NSLS-II Experimental Tools
NFPA	National Fire Protection Association
NSLS	National Synchrotron Light Source
NSLS-II	National Synchrotron Light Source-II
OHSAS	Occupation Health and Safety Assessment Series
OSHA	Occupational Safety & Health Administration

PEP	Project Execution Plan
PHAR	Preliminary Hazards Analysis Report
QA	Quality Assurance
R&D	Research and Development
R2A2	Roles, Responsibilities, Accountabilities, & Authorities
RF	Radio Frequency
SAD	Safety Assessment Document
SBMS	Standards Based Management System
SC	Office of Science