If you are using a printed copy of this procedure, and not the on-screen version, then you MUST make sure the dates at the bottom of the printed copy and the on-screen version match. The on-screen version of the Collider-Accelerator Department Procedure is the Official Version. Hard copies of all signed, official, C-A Operating Procedures are available by contacting the ESSHQ Procedures Coordinator, Bldg. 911A

C-A OPERATIONS PROCEDURES MANUAL

1.10.4 OSH Management System Program Description for Collider-Accelerator Department and Superconducting Magnet Division

Text Pages 2 through 23

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HPC No.	Date	Page Nos.	Initials

Approved: _____***Signature on File***_____ _____
Collider-Accelerator Department Chairman Date

Approved: _____***Signatureo n File***_____ _____
Superconducting Magnet Division Head Date

E. Lessard, R. Karol

1.10.4 OSH Management System Program Description

1. Description of the Collider Accelerator Department (C-AD) and Superconducting Magnet Division (SMD)

1.1. Mission

1.1.1 In support of Brookhaven National Laboratory's broad mission of providing excellent science and advanced technology in a safe, environmentally responsible manner, the Collider-Accelerator Department is committed to the following:

- ❖ The development, improvement, and operation of the suite of proton/heavy ion accelerators used to carry out the program of accelerator-based experiments at BNL.
- ❖ The support of the experimental program including design, construction, and operation of the beam transports to the experiments and partial support of detector and research needs in the experiments.
- ❖ The design and construction of new accelerator facilities.
- ❖ Excellence in safety and environmental responsibility in all C-A Department operations.

1.1.2 The Superconducting Magnet Division mission is to be a leader in R&D, design, fabrication, and testing of superconducting magnets as well as the development and testing of superconducting materials needed to support these activities. The SMD is also a resource for troubleshooting and repairing existing superconducting magnets and associated cryogenic systems. This is done while ensuring excellence in safety and environmental protection.

To achieve this, the SMD aims to maintain a balance between magnet production, superconductor development, and magnet R&D. The Magnet Division collaborates with other U.S. HEP (High Energy Physics) laboratories as well as other major international research organizations in programs of mutual benefit. The BNL Magnet Division is one of only a handful of facilities in the world who possess these kinds of skills and equipment and represents a significant capital investment of behalf of the DOE over several decades. Potential future research facilities and the utilization of new technologies define the overall goals of the R&D program.

Magnet production is generally restricted to low volume, more complex, devices. The Division collaborates with U.S. industries where possible in the high volume production of magnets, and materials vendors for superconducting wire and cables. The cable test facility is unique and provides a national role in supporting many diverse U.S. programs, not only those in the HEP community. The expertise in the construction of superconducting magnets and operation of cryogenic systems enables the SMD to assist other organizations in maximizing efficiencies and operations of superconducting magnets and the associated cryogenic systems.

1.2. Facility Description

The C-A Department has a nuclear physics program, the focus of which is the Relativistic Heavy Ion Collider (RHIC) that operates to study nuclear phenomena in heavy ion collisions. The Collider and the experimental facilities are the terminus of a complex of other accelerators and beam transfer equipment. In addition to the RHIC program, a high-energy physics program to look for physics beyond the Standard Model may be conducted at the Alternating Gradient Synchrotron (AGS). In the area of health effects, ions of the type encountered in space travel are studied at the NASA Space Radiation Laboratory (NSRL) in support of future manned space missions.

The operational accelerators are the two (2) Tandem Van De Graaffs, the Linac, the Booster synchrotron, the AGS, and the two (2) RHIC rings. Two experimental areas extend off the Tandems and one experimental area extends off the Booster, which is the NSRL. Two major experimental areas extend off the AGS: the slow-extracted-beam (SEB) experimental area, and the fast-extracted-beam (FEB) experimental area. The RHIC has six major RHIC experimental areas, two of which are currently in use: PHENIX and STAR/PP2PP.

The important features of the Superconducting Magnet Division operation in providing its output include:

- A Superconductor Wire and Cable Test Facility.
- A Large Cryogenic Plant.
- In-House Magnet Production Facilities and Tooling.
- Magnet Test and Field Measuring Capabilities.
- Magnet Design and Analysis Capability.

The Superconducting Magnet Division is responsible for the activities located in buildings 899, 902, 903, 904, 905, 924, and 943, 944, 948.

1.3. Significant Hazards

To provide excellent science and advanced technology in a safe and environmentally responsible manner C-AD and SMD have, over the past 15 years, continuously reviewed the hazards of their operations in an effort to identify and accomplish injury and illness prevention opportunities. In 2004, this effort resulted in a further formalization of their processes under the guidelines of OHSAS 18001:1999, Occupational Health and Safety Management Systems – Specification. The current program has now been updated to the revised version – BS OHSAS 18001:2007, Occupational Health and Safety Management Systems – Requirements.

The definitions of hazard and ill health are taken from BS OHSAS 18001, 3.6 and 3.8: a hazard is a “source, situation or act with a potential for harm in terms of human injury, or ill health, or a combination of these.” Ill health is an “identifiable, adverse physical or

mental condition arising from and/or made worse by a work activity and/or work related situation." The following hazards are significant to the C-AD and/or SMD activities:

- Ionizing and Non-Ionizing Radiation
- Hazardous or Toxic Materials
- Radioactive Materials
- Electrical Energy
- Explosive Gases and Liquids
- Oxygen Deficiency
- Confined Spaces
- Noise
- Kinetic Energy
- Potential Energy
- Magnetic Fields
- Thermal Energy
- Cryogenic Temperatures
- Outdoor Hazards

The C-AD and SMD are committed to identifying hazards during the planning phase of their operations. This is accomplished through implementation of the following operational procedures: C-A-OPM 2.28, C-A Procedure for Work Planning and Control for Operations; C-A-OPM 2.29, C-A Procedure for Enhanced Work Planning for Experimenters; SMD 2.12, Work Planning and Control System; C-A-OPM 9.1.12, Procedure for Review of C-A Shielding Design; C-A-OPM 9.1.15, Radiological Review Criteria for Collider-Accelerator Experiments and Procedures; C-A-OPM 9.2.1, Procedure for Reviewing Environmental, Health and Safety Aspects of an Experiment; and C-A-OPM 9.3.1, Procedure for Reviewing Conventional Safety Aspects of a C-A System.

As determined by the C-A and SMD OSH Management Representative, processes that introduce new hazards that are identified through planning and reviews are also reviewed by members of the Worker Occupational Safety and Health (WOSH) Committee in order to obtain worker input. Workers from both C-AD and SMD are members of the WOSH Committee.

The C-AD Safety Assessment Document, Facility and Area Risk Assessments and Job Risk Assessments served as the technical baseline through which hazards have been identified by the C-AD and SMD scientists and professionals. Documents that rely on worker input in the area of occupational safety and health are the Facility and Area Risk Assessments and Job Risk Assessments, and they are reviewed and updated every 3 years (1/3 per year), or as required by significant process change. Evidence of review will either be actual assessment revision or a memo on file in the C-AD QA Office stating that the risk assessment has been reviewed and there are no revisions required. Verification that these reviews are accomplished is a normal part of the assessment process conducted by the C-A Quality Group (see C-A- OPM 13.10.1 "Independent Assessment").

2. OSH Implementation Plan

In 2004, the Implementation Plan originally described C-AD's and SMD's establishment and maintenance of an OSH program as prescribed by BS OHSAS 18001 2004 specifications. That program embodied the requirements BNL's Integrated Safety Management System (ISM) and DOE Order 450.4, Safety Management System Policy.

That plan specified the requirements and scope of the C-AD/SMD program so that we controlled OSH risks, continually improved OSH performance over time, and maintained conformity with BS OHSAS 18001 specifications in order to maintain our registration. That program addressed OSH at the workplace and was not intended to address employee well-being/wellness, although BNL has such programs for their employees.

Currently, C-AD and SMD maintains the OSH management system with the new requirements outlined in BS OHSA 18001:2007 Standards. This new set of standards embodies the old set of "specifications" in BS OHSAS 18001 2004, plus it includes:

- OSH policy requirement to commit to preventing injuries and ill health
- Requirements to establish, maintain and implement procedures
- Expanded coverage to persons "working under control of C-AD and SMD"
- Explicit requirements for Management of Change

3. OSH Management Representative

The C-AD ESSHQ Associate Chair is the OSH Management Representative for C-AD and SMD and has responsibility, accountability and authority for the development, implementation, periodic review and evaluation of the OSH Management System. The ESSHQ Associate Chair has responsibility for periodic reporting to the senior management on the performance of the OSH management system, and promoting the participation of all employees, guests and Users at C-AD and SMD.

4. Collider-Accelerator Department and Superconducting Magnet Division OSH Management System Requirements (BS OHSAS 18001 Clause 4)

4.1. General Requirements (BS OHSAS 18001 Clause 4.1)

OSH program is based on the Plan-Do-Check-Act (PDAC) methodology:

- **Plan**: establish the objectives and processes necessary to deliver results in accordance with OSH management policy
- **Do**: implement the processes
- **Check**: monitor and measure processes against the OSH policy, objectives, legal and other requirements, and report the results
- **Act**: take actions to continually improve OSH performance

This method is consistent with the BNL Integrated Safety Management (ISM) program.

4.2. OH&S Policy (BS OHSAS 18001 Clause 4.2)

The environmental, safety and health policy for the C-AD and SMD flows down from the BNL Environmental, Safety, Security and Health Policy and the BNL OSH Vision Statement. It is documented at the C-A Department and SMD Division level in C-A-OPM 1.10, C-A Environmental, Safety and Health Policy, and SMD-OPM 2.2, Operation of the ESH&Q Office for SMD. The specific occupational safety and health policy for both organizations is documented in this section of C-A-OPM 1.10.4, OSH Management System Program Description. C-AD and SMD OSH policy is as follows:

C-AD and SMD are committed to protecting the safety and health of all **employees, users, contractors and guests** by:

- Basing the OSH management system on the nature and scale of the activities at C-AD and SMD and the identified risks
- Preventing work-related injuries, ill health and incidents, and minimizing or eliminating OSH risks that may be associated with research and operations
- Complying with DOE and Occupational Safety and Health Administration (OSHA) regulations and BNL Standards Based Management System (SBMS) requirements
- Annually setting and reviewing the OSH objectives with input from BNL, C-AD and SMD managements and workers
- Documenting, implementing and maintaining OSH practices and programs
- Ensuring that workers, contractors and guests are informed of facility hazards and are informed of their individual OSH obligations and consulted and encouraged to participate actively in all elements of the OSH management system
- Working with our stakeholders to help them understand our OSH programs, and openly communicating with stakeholders our OSH performance
- Continually reviewing the OSH management system to remain relevant and appropriate to C-AD and SMD, and in particular, ensuring the C-AD/SMD OSH management system is integrated with other C-AD/SMD management systems

4.3. Planning (BS OHSAS 18001 Clause 4.3)

4.3.1. Hazard Identification, Risk Assessment and Determining Controls (BS OHSAS 18001 Clause 4.3.1)

The C-AD's existing OSH management system was evaluated by conducting an initial review. The initial review was carried out by the C-AD ESSHQ Division and C-AD Supervisors, in consultation with workers, as appropriate. The initial review identified and assessed:

- the current applicable laws and regulations, national guidelines, tailored guidelines, voluntary programs and SBMS requirements
- hazards and risks to safety and health arising from the existing or proposed work environment and work organization

- whether planned or existing controls were adequate to eliminate hazards or control risks
- the data provided from workers' injury reports and health surveillance

The result of the initial review was documented in the Initial Workplace Hazard Analyses and Risk Assessments. Follow-up reviews for C-AD and reviews for SMD are documented in Facility and Area Risk Assessments (FRAs) and Job Risk Assessments (JRAs). These assessments are required by the OSH management program as per the BNL SBMS. The facility and area risk assessments include the risks from the facility infrastructure, machinery/equipment and materials in the workplace. The assessments are the basis for making decisions regarding the implementation of the OSH management system, and they are updated every 3 years (1/3 per year). They provide a baseline from which continual improvement of C-AD/SMD's OSH management system can be measured.

The procedure for hazard identification and risk assessment is from SBMS, and is based on the elements in Clause 4.3.1 of BS OHSAS 18001.

The following hierarchy of controls is used to control existing, new or revised work-related risks at C-AD/SMD:

- elimination
- substitution
- engineering controls
- signage/warnings and/or administrative controls
- personal protective equipment (PPE)

Results of risk assessments are web-based documents known as JRAs and FRAs.

Management of Change - The impact on OSH of internal changes such as those in staffing or due to new processes, assembly procedures, routine and non-routine working procedures, organizational structures and of external changes such as amendments of regulations is evaluated and appropriate preventive steps taken, including work planning and controls prior to the introduction of changes. The Facility and Area Risk Assessments and Job Risk Assessments are carried out or updated before any modification or introduction of new work methods, materials, processes or machinery. Such assessment is done in consultation with the workers, where appropriate.

Additions and/or changes to accelerators and experiments are reviewed by various safety committees for occupational safety and health issues at the design stage. Procedures governing these reviews are OPM 9.2.1 Procedure for Reviewing Environmental, Health and Safety Aspects of an Experiment and OPM 9.3.1 Procedure for Reviewing Conventional Safety Aspects of a C-A System. Changes to cryogenic and pressure systems at C-AD or SMD are reviewed by the Laboratory Cryogenic Safety and Pressure Safety Sub-Committee. A Hazard Assessment Tool is used to guide personnel in assessing the OSH requirements, legal and other, associated with new experiments or changes to the accelerator facilities. This Tool is located at http://www.rhichome.bnl.gov/AGS/Accel/SND/C-AHazardTool/screen.html.

The design of work areas, processes, installations, machinery/equipment, procedures, activities and work planning, including human performance and capabilities are included in proactive engineering and safety committee reviews and in reactive incident investigations. See for example C-AD OPM 13.6.1.a, Design Review Questionnaire; C-A-OPM 9.2.1, Procedure for Reviewing Environmental, Health and Safety Aspects of an Experiment; C-A-OPM 9.3.1, Procedure for Reviewing Conventional Safety Aspects of a C-A System; C-A-OPM 1.4.3, Procedure for Implementing New or Revised Permanent Procedures, or Canceling Permanent Procedures; and C-A-OPM 10.1, Occurrence Reporting and Processing of Significant Operations Information. These reviews are conducted with hazard identification and risk assessment in mind. The expertise of the engineering, scientific, technical and safety staff allow for the identification and prioritization of risks to be addressed and the timely application of controls as appropriate.

Changes in the organization's staff are controlled by clear definitions of the job requirements, clear R2A2s for the position and a robust interview process to proactively control the impacts of staff changes. See for example job postings on the BNL Human Resources and Occupational Medicine website and C-A-OPM 1.28, Collider-Accelerator Department Policy and Procedure for Hiring New Employees.

4.3.2. Legal and Other Requirements (BS OHSAS 18001 Clause 4.3.2)

The C-AD/SMD OSH management system supports compliance with laws and regulations. The BNL method to ensure that legal and other OSH requirements are communicated in a timely manner to staff is the BNL SBMS. Appropriate knowledgeable C-AD/SMD staff participates with BNL subject matter experts in the development and revision of the SBMS requirements. Legal and other requirements are communicated to persons working under the control of C-AD and SMD via training, daily meetings and email notifications.

4.3.3. Objectives and Programs (BS OHSAS 18001 Clause 4.3.3)

Consistent with the OSH policy and based on the initial or subsequent reviews, measurable and documented OSH objectives are established annually and are:

- specific to C-AD and SMD, and appropriate to and according to its size and nature of activities
- measurable, practicable, and consistent with OSH policy
- consistent with the relevant and applicable laws and regulations, and the technical and business obligations with regard to OSH
- focused towards continually improving workers' OSH protection to achieve the best OSH performance considering technological options, business requirements and the views of relevant interested parties

C-A Department and SM Division have established a program for achieving objectives. The OSH Management Plan for C-AD and SMD is used and is the primary mechanism in

identifying objectives and targets and responsibility and due dates for achieving objectives.
Objectives are reviewed annually at the Management Reviews to ensure the objectives are achieved.

4.4. Implementation and Operation (BS OHSAS 18001 Clause 4.4)

4.4.1. Resources, Roles, Responsibility, Accountability and Authority (BS OHSAS 18001 Clause 4.4.1)

C-AD/SMD management has overall responsibility for the protection of workers' safety and health, and provides leadership for OSH activities in the organization. C-AD/SMD management allocates resources, roles, responsibility, accountability and authority for the development, implementation and performance of the OSH management system and the achievement of the relevant OSH objectives. This includes staff, individuals with specialized skills (e.g., external consultants, etc.), technology and financial resources.

General responsibilities for environmental, safety and health for the C-A Department and SM Division are documented in C-A-OPM 1.10, C-A Environmental, Safety and Health Policy, SMD-OPM 2.2, Operation of the ESH&Q Office for Superconducting Magnet Division and this procedure. Specific contacts for the specific occupational safety and health elements described in Section 3.0 of this procedure are provided in OPM 1.10.4.a, Collider-Accelerator Department and Superconducting Magnet Division OSH Document Flow Down Matrix and in the SMD Contacts List.

The C-A Department functional relationships and responsibilities for OSH are outlined in C-A-OPM 13.1.1, Quality, OSH and Environmental Management Systems. The C-A Department Chairman and SM Division Head is responsible for implementation of OSH within the C-A Department and SM Division and appoints an OSH Management Representative (C-AD ESSHQ Associate Chair) to ensure that the OSH system requirements are established, implemented and maintained. The OSH Management Representative maintains an open-door policy. Other specific OSH roles and responsibilities are further defined through Roles, Responsibilities, Accountabilities and Authorities (R2A2s) documents generated for each member of C-AD and SMD. Examples of OSH responsibilities are listed as follows:

- Ensure that OSH is a line-management responsibility which is known and accepted at all levels
- Define and communicate the responsibility, accountability and authority of persons who identify, evaluate or control OSH hazards and risks
- Provide effective supervision, as necessary, to ensure the protection of workers‘ safety and health
- Promote cooperation and communication among workers to implement the elements of the C-AD/SMD OSH management system
- Fulfill the requirements in OSH-related requirements contained in SBMS
- Establish and implement a clear OSH policy and measurable objectives

- Establish effective arrangements to identify and eliminate or control work-related hazards and risks, and promote health at work
- Establish prevention and health promotion programs
- Ensure effective arrangements for the full participation of workers in the fulfillment of the OSH policy
- Provide appropriate resources to ensure that persons responsible for OSH, including ESH Committees, can perform their functions properly
- Ensure effective arrangements for the full participation of workers from C-AD and SMD in the WOSH Committee

Management demonstrates their commitment to continually improve OSH performance by participating in Manager Work Observations where they observe and interact with workers, contractors and Users. These observations give them first hand knowledge to ensure that workers adhere to OSH requirements.

4.4.2. Competence, Training and Awareness (BS OHSAS 18001 Clause 4.4.2)

The training program for the C-A Department is described in C-A-OPM 1.12, Conduct of Training Policy, and for the SM Division in SMD-OPM 2.1, Training and Qualification. Formal training and qualification programs for the operation of equipment, processes and procedures that could have a significant impact on personal safety or health are documented. Job specific training is developed for C-AD/SMD processes that involve significant hazards. Employees, contractors and Users that have interaction in these processes are required to go through training. Competency requirements are specified and can be attained through testing or the read and acknowledgement form.

Specific OSH competence and training, within the C-AD and SMD consists of the following:

- All C-AD employees, contractors and users are given appropriate facility specific access training.
- All new C-AD and SMD employees are hired based on their appropriate education, training and experience. For example, hiring practices at C-AD are specified in C-A-OPM 1.28.
- All new C-AD and SMD employees complete training assigned to their individual Job Training Assessments (JTA) jointly developed by their Supervisor and the appropriate Training Manager. This includes web based courses, classroom courses, and OJT. BNL's BTMS is the location where individual's JTA records are maintained.
- Job specific training has been developed for processes that involve significant hazards. This training addresses process-specific conformance, safety and health risks, benefits of improved performance, each person's role and responsibility including emergency preparedness, the consequences of nonconformance and the appropriate actions to be taken in an emergency.

In general, OSH related training programs:

- Cover all employees, guests, contractors and Users
- Are conducted by competent persons
- Provide effective and timely initial and refresher training at appropriate intervals
- Are reviewed periodically. The reviewers include the WOSH Committee, the Training Manager and the Supervisor and the training programs are modified as necessary to ensure their relevance and effectiveness
- Are documented, as appropriate and according to the size and nature of activity
- Are provided to all participants at no cost and generally take place during working hours
- Include training related to industry standards or regulations such as NEC, ASME and OSHA
- Includes Human Performance training which makes participants aware of how their behavior and personal performance affects the prevention, control and mitigation of workplace hazards

The necessary OSH competence requirements are defined in BTMS and maintained to ensure that all persons are competent to carry out the safety and health aspects of their duties and responsibilities. C-AD and SMD have access to sufficient OSH competence to identify and eliminate or control work-related hazards and risks, and to implement the OSH management system.

The training program recognizes the capabilities of each trainee; including language skills and literacy (see OPM 1.12, Training and Qualification Plan).

4.4.3. Communication, Participation and Consultation (BS OHSAS 18001 Clause 4.4.3)

4.4.3.1. Communication (BS OHSAS 18001 Clause 4.4.3.1)

Arrangements and procedures are established and maintained 1) for receiving, documenting and responding appropriately to internal and external communications related to OSH, 2) for ensuring the internal communication of OSH information between relevant levels and functions of the C-AD and SMD, and 3) for ensuring that the concerns, ideas and inputs of workers and their representatives on OSH matters are received, considered and responded to. Specifically, they are as follows:

Normal communication practices during operations are described in C-A-OPM 2.12, Communications Practices.

Internal communication of significant hazards and OSH protection strategies require mechanisms for information to flow from top-down and bottom-up. The primary means for this communication within the C-AD and SMD occurs through a schedule of weekly (minimum) planning meetings. During these structured meetings, involving appropriate personnel, work is planned and evaluated, concerns of safety, equipment, hazards, and

environment are addressed, and resources are allocated. A table and flow diagrams of weekly C-AD meetings can be found in C-A-OPM-ATT 2.28.a.

Various Groups within the C-AD and SMD communicate OSH information through their group's Web page. Access to technical and non-technical information from these groups can be found through the C-A Web page: http://www.bnl.gov/cad/ or SMD Web Page: http://www.bnl.gov/magnets/.

Memos and e-mail are used to communicate tasks that require action by employees. Effective communication requires that all employees assure that the communication is understandable and clearly communicates the tasks that need to be accomplished, as well as the means (as required) and time frame in which they are to be accomplished.

Effective external communications regarding OSH issues are essential to assure that the policies of the Laboratory as well as those of the Department/Division are maintained to the highest standard. External communications may include correspondence with the following: regulators, DOE, suppliers, customers, civic groups, elected officials, general public, and the media. The primary means for official communications to these groups is through the Laboratory's Correspondence and Commitment Tracking System (CCTS). The Chairman of the C-AD and the Division Head of SMD appoints an individual responsible for the maintenance of CCTS within the Department/Division.

C-A-OPM 1.10.3 Guidance on Community Involvement is used by the Department in the community involvement process. It is used to identify whether or not an issue may need community involvement. It is noted that most C-AD and SMD OSH issues will have no need for community involvement.

External communications regarding OSH, which are informational in nature, may be posted on the C-A Web site: http://www.bnl.gov/cad/ or SMD Web Site: http://www.bnl.gov/magnets/.

The C-AD/SMD Worker Occupational Safety and Health Committee (see C-A-OPM 9.8.1) ensures arrangements and procedures are established and maintained for receiving, documenting and responding appropriately to worker communications related to OSH and that the concerns, ideas and inputs of workers and their representatives on OSH matters are received, considered and responded to.

4.4.3.2. Participation and Consultation (BS OHSAS 18001 Clause 4.4.3.2)

Workers including contractors, guests and Users are consulted, informed and trained on all aspects of OSH associated with their work via the use of Job Training Assessments (JTAs) described in C-A-OPM 1.12 Training and Qualification Plan and SMD-OPM 2.1 Training and Qualification, and through the work planning process documented in C-A-OPM 2.28, C-A-OPM 2.29 and SMD-OPM 2.12. Qualifications to perform tasks are established by the appearance of an individuals name on the BTMS JTAs. For specific OSH requirements associated with specific jobs, workers individually sign off on the

medium and high hazard Enhanced Work Permits. For example, see the Enhanced Work Permits. Individual worker sign-off is also required for Radiation Work Permits.

Workers are given the time and resources to actively participate in the processes of organizing, planning and implementing, evaluating, and improving the OSH management system and to be involved in incident investigations. This is accomplished through the establishment and efficient functioning of an OSH committee with worker representation from both C-AD and SMD. See C-A-OPM 9.8.1, Worker Occupational Safety and Health Committee (OSH) Policy and Requirements and Committees List.

Individual self-evaluation is considered a vital element in C-AD and SMD's ongoing effort to improve performance safety continuously. A self-critical attitude throughout the Department/Division from workers to senior management, using an open-door policy, provides the basis for correcting weaknesses as well as promoting best practices. C-A-OPM 9.4.2, C-A Self Evaluation, is a procedure that applies this concept of continual improvement to individual workers, supervisors and management at C-AD/SMD.

Workers are also involved in the Facility and Area Risk Assessments and Job Risk Assessments. This allows for open communication on the need for improved hazard controls to improve our safe working environment.

4.4.4. Documentation (BS OHSAS 18001 Clause 4.4.4)

The C-AD and SMD OSH management system documentation includes:

- OSH policy and objectives
- Description of the scope of the OSH management system
- Description of the main elements of the OSH management system and their interaction and reference to related standards
- Documents, including records, required by the BS OHSAS 18001:2007 standard
- Documents, including records, determined by C-AD or SMD to be necessary to ensure effective planning, operation and control of processes that relate to the management of OSH risks

4.4.5. Control of Documents (BS OHSAS 18001 Clause 4.4.5)

The C-AD and SMD document control systems are developed in compliance with Laboratory requirements in the Internal Controlled Documents Subject Area. The following C-AD and SMD procedures detail the generation, review, approval, and maintenance of all documentation:

- C-A OPM 1.1 Authorization
- C-A OPM 1.2 C-A Documents
- SMD-OPM 1.2 Procedures
- C-A OPM 1.4 Document Control "Series" OPM's
- C-A OPM 13.4.1 Records Management Section

The core elements of the C-AD/SMD OSH Management System and its implementation are described in this procedure. In addition, C-A-OPM Attachment 1.10.4.a, Collider-Accelerator Department and Superconducting Magnet Division OSH Document Flow-down Matrix details department-level documents and records and their relation to Laboratory-level documents and the relevant BS OHSAS 18001 element.

C-AD/SMD OSH management system documentation is identified, maintained and controlled and covers:

- OSH policy and objectives (See Section 3.1 and C-A-OPM 14.30, OSH Management Plan for C-AD and SMD Accelerators, Experimental Areas, Shops and/or Offices)
- Key OSH management roles and responsibilities for the implementation of the OSH management system (See Section 3.3 and individual manager R2A2s)
- Significant OSH hazards/risks arising from C-AD/SMD activities, and the arrangements for their prevention and control (See Initial Workplace Hazard Analyses and Risk Assessments, Facility and Area Risk Assessments and Job Risk Assessments)
- OPM procedures, instructions or other internal documents used within the framework of the OSH management system (e.g., Operational Controls)
- External documents (e.g. vendor manuals) that are needed for the safe planning of work and safe operation of the facility

OSH management system documentation is:

- Clearly written and presented in a way that is understood by those who have to use it (See C-A-OPM 1.4, Collider-Accelerator Department Plans, Policies, and Operating Procedures and SMD-OPM 1.2 Procedures)
- Periodically reviewed, revised as necessary, communicated and readily accessible to all appropriate or affected persons. Review of OSH documentation is accomplished in accordance with the requirements of OHSAS-18001. Review cycles are performed in accordance with C-A-OPM 1.4 and SMD-OPM 1.2.

4.4.6. Operational Control (BS OHSAS 18001 Clause 4.4.6)

Hazards and risks to workers' safety and health are identified and assessed on an ongoing basis via the Enhanced Work Planning Program, which are C-A-OPM 2.28 and SMD-OPM 2.12 for workers and OPM 2.29 for Users.

Hazard prevention and control procedures or arrangements are established through the administration of OSH Operational Control Form. It is the responsibility of the C-AD OSH Management Representative to establish and maintain OSH Operational Control Forms so that they accurately reflect regulatory requirements and to ensure that processes, associated plans and controls are updated periodically. Operational controls are implemented by responsible persons as identified on the form. Verification of implementation of controls and maintenance of OSH Operational Control Forms is performed by C-AD and SMD Quality Assurance annually through its assessment of the

C-AD/SMD OSH Management Program per requirements in C-A-OPM 13.10.1, Independent Assessment.

Procedures are established such that compliance with safety and health requirements is identified, evaluated and incorporated into purchasing and leasing specifications, laws and regulations and SBMS requirements are identified prior to the procurement of goods and services, and arrangements are made to achieve conformance to the requirements prior to their use. For example, C-AD procurement policies and procedures are found in OPM Chapter 13, Quality Assurance.

Contractors, suppliers, and Users fall under the C-AD/SMD OSH training requirements when it is determined that their work within the facility could cause a significant impact on safety or health.

Arrangements are established and maintained for ensuring that the C-AD and SMD safety and health requirements, or at least the equivalent, are applied to contractors and their workers. See C-A-OPM 1.12, Training and Qualification Plan, SMD-OPM-2.1, Training and Qualification and SBMS Subject Area - Construction Safety. Arrangements for contractors working on site include:

- OSH criteria in SBMS Subject Area - Construction Safety for evaluating and selecting contractors
- effective ongoing communication and coordination between appropriate levels of BNL and the contractor prior to commencing work; this includes provisions for communicating hazards and the measures to prevent and control them
- relevant workplace safety and health hazard awareness and training to contractors or their workers prior to commencing work and as work progresses, as necessary
- regularly monitoring OSH performance of contractor activities on site in order to ensure that on-site OSH procedures and arrangements are followed by contractors

Regular monitoring of OSH performance is done by a designated contractor employee who has been trained and qualified in the appropriate 10-hour or 30-hour OSHA training course. If no contractor employee is available, then a trained and qualified C-AD liaison engineer or C-AD ESSHQ Division member regularly monitors OSH performance of contractor activities in order to ensure that OSH procedures and arrangements are followed. SMD assures all contractor safety within their facilities through controls provided by BNL Plant Engineering Division.

Various institutional-level Subject Areas and procedures have been developed to identify legal and other requirements. See OHSAS 18001 on SBMS. The C-AD and SMD have three primary means to become aware of changes in these requirements. First, the C-AD and SMD actively participate in Subject Area development to assure that Laboratory and Department/Division goals are achieved and are in accordance with all applicable requirements. Secondly, the SBMS Subscription Service is used by the C-AD and SMD ESSHQ staff for notification of changes to Laboratory documents. Lastly, C-AD and SMD routinely use Subject Matter Experts from the SHSD in the evaluation and determination of legal and other requirements on existing work and in the review of experiments to be held within the complex. These three means to become aware of

changes ensures that all affected members of C-AD and SMD are properly informed and trained.

4.4.7. Emergency Preparedness and Response (BS OHSAS 18001 Clause 4.4.7)

Emergency preparedness and response arrangements are established and maintained by C-AD and SMD. The emergency responses are detailed in the C-A-OPM Chapter 3 "Series" of procedures and are intended to provide general guidance for use in responding to most incidents which may arise at the C-A Complex. The Local Emergency Plan for the SMD is contained in SMD-OPM 3.0. These procedures identify the potential for accidents and emergency situations, expected responses, and address the prevention of OSH risks associated with them.

Emergency procedures are prepared according to the size and nature of activity and:

- ensure that the necessary information, internal communication and coordination are provided to protect all people in the event of an emergency at the worksite
- provide information to, and communication with, the relevant competent authorities and interested parties, and the emergency response services
- address first-aid and medical assistance, firefighting and evacuation of all people at the worksite
- provide relevant information and training to all members of C-AD and SMD, at all levels

Emergency prevention, preparedness and response arrangements are established in cooperation with the BNL Emergency Services Division. The C-AD and SMD emergency preparedness and response program (C-A-OPM 3.0, Local Emergency Plan and SMD-OPM 3.0, Local Emergency Plan for the Superconducting Magnet Division) supplements the Laboratory Plan found in the Emergency Preparedness Subject Area, and makes provisions for emergency situations that are unique to the C-AD and SMD Complex. In addition to the Local Emergency Plan, specific procedural requirements for reporting OSH impacts can be found in C-A-OPM 10.1, Occurrence Reporting and Processing of Significant Operations Information. The C-AD and SMD participate in annual required emergency response drills. At a minimum the Local Emergency Plans are reviewed annually and after each drill or actual emergency.

4.5. Checking

4.5.1. Performance Measurement and Monitoring (BS OHSAS 18001 Clause 4.5.1)

Procedures to monitor, measure and record OSH performances on a regular basis have been developed, established and are periodically reviewed. Collider-Accelerator OSH performance monitoring is achieved through several programs. C-A-OPM 13.10.1, Independent Assessment describes the overall monitoring of the C-AD and SMD OSH program. Specific monitoring of OSH hazards is listed in OSH Operational Control Forms and as specified in the associated OPMs (where applicable) listed on the Form. A listing of OPM procedures associated with Performance Monitoring and Measurement

can be found in OPM Attachment 1.10.4.a, C-A/SMD OSH Document Flow Down Matrix.

Responsibility, accountability and authority for monitoring at different levels in the management structure are allocated. Individual responsibilities are listed in procedures in the C-AD Operations Procedure Manual, the SMD Operation Procedures Manual and the SMD Magnet Assembly Procedures.

The selection of performance indicators is according to the size and nature of activities and the OSH objectives. Both qualitative and quantitative measures appropriate to the needs of C-AD and SMD are considered. The performance indicators are based on identified hazards and risks. Review of the performance indicators that support OSH objectives is part of Management Review.

Performance monitoring and measurement is used as a means of determining the extent to which OSH policy and objectives are being implemented and risks are controlled. It includes both active and reactive monitoring, and is not based only upon work related injury, ill health, disease and incident statistics.

Active monitoring such as C-A-OPM 9.4.1, Procedure for Conducting Safety Inspections, SMD-OPM 2.2, Operation of the ESH&Q Office for the Superconducting Magnet Division, C-A-OPM 13.10.1, Independent Assessments, and SMD Self-Assessments provide feedback on OSH performance, information to determine whether the day-to-day arrangements for hazard and risk identification, prevention and control are in place and operating effectively. Monitoring is the basis for decisions about improvement in hazard identification and risk control, and the OSH management system. Monitoring for compliance with applicable laws and regulations, collective agreements and other commitments on OSH to which C-AD subscribes is also covered in C-A-OPM 9.4.1 and C-A-OPM 13.10.1.

Active monitoring such as the annual Management Review includes monitoring of the achievement of specific plans, established performance criteria and objectives. Active monitoring such as described in C-A-OPM 9.4.1, Safety Inspections and SMD-OPM 2.2, Operation of the ESH&Q Office for the Superconducting Magnet Division, is performed for the systematic inspection of work systems, premises, plant and equipment. C-A-OPM 9.4.2, Self-Evaluation, C-A-OPM 9.8.1, Worker OSH Committee, C-A-OPM 13.10.1, Independent Assessments and SMD Self-Assessments are used by management to survey the working environment, including work organization. C-A-OPM 1.17, Hearing Conservation Program or C-A-OPM 8.24, Use of Beryllium are examples of procedures used to survey workers' health, where appropriate, through suitable medical monitoring or follow-up of workers for early detection of signs and symptoms of harm to health in order to determine the effectiveness of prevention and control measures.

Active monitoring also includes regular walk-through of work areas by managers and supervisors. Safety issues are corrected immediately or, if necessary, entered into the C-AD or SMD Family ATS for closure at a practicable date.

Reactive monitoring includes: 1) the identification, reporting and investigation of work-related injuries (see for example C-A-OPM 9.4.5, C-A Accident/Incident Investigation), and 2) monitoring of aggregate injury and disease incidents, and other losses such as damage to property, deficient safety and health performance and OSH management system failures (see for example C-A-OPM 10.1, Occurrence Reporting and Processing of Significant Operations Information).

4.5.2. Evaluation of Compliance (BS OHSAS 18001 Clause 4.5.2)

C-AD and SMD periodically evaluate compliance with applicable legal (e.g. OSHA, 10CFR851, 10CFR835, etc) and other (e.g., SBMS, C-AD/SMD OPMs, etc.) requirements. Examples of these evaluations are Tier 1 Safety Inspections for OSHA compliance; Independent Assessment of compliance with 10CFR851, 10CFR835, and operating procedures; and Management Observations to see if workers are following work planning and PPE requirements. Preventive and corrective actions are assigned to specific individuals with due dates in the C-AD family ATS.

4.5.3. Incident Investigation, Nonconformity, Corrective Action and Preventive Action (BS OHSAS 18001 Clause 4.5.3)

4.5.3.1. Incident Investigation (BS OHSAS 18001 Clause 4.5.3.1)

Investigations of the origin and underlying causes of work-related injuries, ill health, diseases and incidents identify failures in the OSH management system and are documented. See C-A-OPM 9.4.5, C-A Accident/Incident Investigation and C-A-OPM 10.1, Occurrence Reporting and Processing of Significant Operations Information. Investigations are carried out by trained, competent persons with the appropriate participation of workers. The results of such investigations are communicated to the WOSH Committee, and the Committee may also make appropriate recommendations. The results of investigations, in addition to any preventive/corrective action recommendations from the WOSH Committee, are communicated to appropriate persons for corrective action via the C-AD or SMD Family ATS, included in the Management Review and considered for continual improvement activities.

4.5.3.2. Nonconformity, Corrective Action and Preventive Action (BS OHSAS 18001 Clause 4.5.3.2)

The corrective actions resulting from investigations are implemented in order to avoid repetition of work-related injuries, ill health, diseases and incidents. Reports produced by external investigative agencies are acted upon in the same manner as internal investigations. External investigation corrective and preventive actions are tracked in the BNL ATS.

Arrangements are established and maintained for preventive and corrective action resulting from OSH management system performance monitoring and measurement. OSH management system performance monitoring and measurement includes:

- identifying and analyzing the root causes of any non-conformances with relevant OSH regulations and/or OSH management system procedures
- initiating, planning, implementing and documenting corrective and preventive action, including changes to the OSH management system itself

When the evaluation of the OSH management system shows that preventive and protective measures for hazards and risks are inadequate or likely to become inadequate, the measures are addressed according to the recognized hierarchy of prevention and control measures, and completed and documented, as appropriate and in a timely manner.

OSH non-conformances may be documented through three mechanisms. The primary means for documenting OSH nonconformance's is through OPM 9.4.1, Procedure for Conducting Safety Inspections. The Family ATS is used to document corrective and preventive actions and to track the closure of corrective actions at C-AD and SMD. DOE reportable OSH non-conformances are reported via the DOE Occurrence Reporting and Processing of Operations Information system. OPM 10.0 series of procedures and the SBMS Subject Area on Occurrence Reporting and Processing System (ORPS) detail the reporting, investigating, and closing of ORPS reportable events. The ORPS Final Report, submitted to the DOE, includes root cause analysis. Non-ORPS reportable events are documented using the SBMS Subject Area on Events/Issues Management or through the Subject Area, Nonconformances. Incident critiques may become part of a formal investigation of accidents/incidents and as such are reviewed against the DOE Occurrence Reporting and Processing System (ORPS) Subject Area, for potential DOE occurrence reporting.

4.5.4. Control of Records (BS OHSAS 18001 Clause 4.5.4)

Identification, storage, protection, retrieval and retention of records are established by Departmental procedures and SBMS Subject Areas.

OSH records, a subset of documents, are managed and maintained according to the needs of the C-AD/SMD. OSH records are maintained legible, protected, identifiable and traceable, and their retention times are specified. Workers have the right to access records relevant to their working environment and health, while respecting the need for confidentiality. OSH records include:

- Records arising from the implementation of the OSH management system
- Records of work-related injuries, ill health, diseases and incidents
- Records arising from laws or regulations dealing with OSH
- Records of workers' exposures, surveillance of the working environment and workers' health
- Results of both active and reactive monitoring

Some records are managed by the C-AD/SMD through the implementation of the Laboratory's Records Management Subject Area. Some records, such as records of work-related injuries, are managed by BNL and C-AD/SMD maintains copies only for convenience. The C-AD and SMD Quality Assurance Group has further defined the Subject Area through C-A-OPM 13.4.1, Records Management. In addition, the C-AD and SMD have identified all significant operational, environmental safety & health, training, and quality records in C-A-OPM 13.4.2, Records Index. Specifically see OPM 13.4.2.c, List of OSH Records.

4.5.5. Internal Audit (BS OHSAS 18001 Clause 4.5.5)

Arrangements to conduct periodic audits are established at C-AD/SMD in order to determine whether the OSH management system and its elements are in place, adequate, and effective in protecting the safety and health of workers and preventing incidents. An audit policy and program was developed, which includes a designation of auditor competency, the audit scope, the frequency of audits, audit methodology and reporting. Audits are used as the basis for examining, identifying and correcting weaknesses within the C-A OSH program to facilitate improved performance and compliance. The C-A Department's audit process is defined in C-A-OPM 13.10.1, Independent Assessment and the SMD process is defined in SMD Self-Assessments.

The OSH audit includes an evaluation of C-AD/SMD's OSH management system elements or a subset of these, as appropriate and covers:

1. general requirements
2. OS&H policy
3. hazard identification, risk assessments and determining controls
4. legal and other requirements
5. objectives and program
6. worker participation and consultation
7. resources, roles, responsibility, accountability and authority
8. competence, training and awareness
9. OSH management system documentation, documentation control and records
10. operational controls
11. communication
12. system planning, development and implementation
13. evaluation of compliance
14. nonconformity, corrective action and preventive action
15. management of change
16. emergency preparedness and response
17. procurement
18. contracting
19. performance measurement and monitoring
20. investigation of work-related injuries, ill health, diseases and incidents, and their impact on safety and health performance
21. audit
22. management review

23. continual improvement

The audit conclusion determines whether the implemented OSH management system elements or a subset of these:

- are effective in meeting C-AD/SMD's OSH policy and objectives
- are effective in promoting full worker participation
- respond to the results of OSH performance evaluation and previous audits
- enable C-AD and SMD to achieve compliance with relevant laws and regulations
- fulfill the goals of continual improvement and best OSH practice

Audits are conducted by competent persons internal or external to C-AD/SMD who are independent of the activity being audited. The audit results and audit conclusions are communicated to those responsible for corrective action. Consultation on selection of the auditor and all stages of the workplace audit, including analysis of results, are subject to worker participation, as appropriate.

OSH management system audits are scheduled, performed and tracked through the C-AD and SMD Family Assessments and Tracking System. C-AD/SMD OSH audits are conducted, at a minimum, annually. More frequent assessments may be performed on the basis of audit results, corrective action follow-up, as determined by criticality, process change, or as determined by C-AD/SMD management.

4.6. Management Review (BS OHSAS 18001 Clause 4.6)

Management Reviews at C-AD/SMD evaluate the overall strategy of the OSH management system to determine whether it meets planned performance objectives. The Management Reviews evaluate the OSH management system's ability to meet the overall needs of C-AD/SMD and its stakeholders, including its workers and the regulatory authorities. The Review evaluates the need for changes to the OSH management system, including OSH policy and objectives, and identifies what action is necessary to remedy any deficiencies in a timely manner, including adaptations of other aspects of C-AD/SMD's management structure and performance measurement.

The Management Review provides the feedback direction, including the determination of priorities, for meaningful planning and continual improvement. Senior managers evaluate progress towards C-AD/SMD's OSH objectives and corrective action activities and evaluate the effectiveness of follow-up actions from earlier Management Reviews.

The frequency and scope of periodic reviews of the OSH management system is defined according to C-AD/SMD's needs and conditions. The Management Review is normally performed annually and normally considers:

- the results, causes and status of corrective and preventive actions of work-related injuries, ill health, diseases and incident investigations
- OSH performance monitoring and measurement and audit activities
- additional internal and external inputs, communications and complaints, as well as changes, including organizational changes, that could affect the OSH management system

- the extent to which OSH objectives have been met
- a summary of the participation by workers, contractors, guests and Users in the OSH, management program including participation in the FRA. ARA and JRA program, in incident investigations, and involvement in the OSH policy and objectives

The findings of the Management Review are recorded, posted on the web and formally communicated to the persons responsible for the relevant elements of the OSH management system so that they may take appropriate action, and communicated to the WOSH committee.

The C-AD and SMD, as a routine part of its operations and processes, conducts various reviews at the senior management level. In the spirit of adapting other aspects of C-AD/SMD's management structure and performance measurement system, C-AD/SMD has opted to combine their OSH Management Review with EMS and Self-Assessment Management Review. Annually, the C-A OSH Management Representative schedules a review of the C-A OSH Program with senior management. The agenda of the Management Review reflects the full scope of the presentation, which in this case includes OSH, EMS and Self-Assessment issues. This integrated Management Review is accomplished in accordance with the provisions of the Subject Area, Environmental Assessments and ESH Management Review. In addition, handouts specifically address the OSH issues and copies of these handouts are filed on the C-AD ESSHQ web.

The output of the Management Reviews foster continual improvement of the OSH program; makes conclusions on OSH performance; suggests program changes to the OSH policy and objectives; and recommends required resources to achieve objectives.

5. References

BS OHSAS 18001:2007, Occupational Health and Safety Management Systems – Requirements, July 2007. Available from the British Standards website at
BSI Group

DOE Order 450.4, Safety Management System Policy