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C-A OPERATIONS PROCEDURES MANUAL

1.10.4 OSH Management System Program Description

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Collider-Accelerator Department Chairman Date

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1. Description of the Collider Accelerator Department

1.1. Mission

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 in support of the BNL and National Missions.
- ❖ Excellence in environmental responsibility and safety in all C-A Department operations.

1.2. Facility Description

At this time, 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 existing accelerators and beam transfer equipment. In addition to the RHIC program, a high-energy physics program to look for physics beyond the Standard Model is conducted at the AGS. In the area of health effects, heavy ions of the type encountered in space travel are studied at the NASA Space Radiation Laboratory (NSRL).

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 and 4 are currently in use: PHENIX, PHOBOS, STAR and BRAHMS/PP2PP. A picture of the facilities is at <http://www.cadops.bnl.gov/AGS/Accel/SND/ring.gif>.

1.3. Significant Hazards

To provide excellent science and advanced technology in a safe and environmentally responsible manner the Collider-Accelerator has, over the past decade, continuously reviewed the hazards of its operations in an effort to identify and accomplish injury and illness prevention opportunities. This effort has resulted in a further formalization of its processes under the guidelines of ILO-OSH-2001, Guidelines on Occupational Safety

and Health Management Systems and OHSAS 18001, Occupational Health and Safety Management Systems – Specification. According to OHSAS 18002:2000 – Amendment 1:2002, Annex B, “no areas of significant difference have been identified” between OHSAS 18001, OHSAS 18002 and ILO-OSH:2000.

The definition of hazard is taken from OHSAS 18001, 3.4: “source or situation with a potential for harm in terms of injury to health, damage to property, damage to workplace environment, or a combination of these.” The following hazards are significant to the Collider Accelerator Department activities:

- Ionizing Radiation
- Hazardous or Toxic Materials
- Radioactive Materials
- Electrical Energy
- Explosive Gases and Liquids
- Oxygen Deficiency
- Kinetic Energy
- Potential Energy
- Thermal Energy
- Cryogenic Temperatures

The C-A Department is committed to identifying hazards during the planning phase of its operations. This is accomplished through implementation of the following operational procedures: [C-A-OPM 2.28](#), C-A Procedure for Enhanced Work Planning; [C-A-OPM 2.29](#), C-A Procedure for Enhanced Work Planning for Experimenters; [C-A-OPM 9.1.12](#), Review of C-A Shielding Design; [C-A-OPM 9.1.15](#), Guideline for Review Criteria for C-A Experiments; [C-A-OPM 9.2.1](#), Reviewing Conventional Safety Aspects of an Experiment; and [C-A-OPM 9.3.1](#), Reviewing Conventional Safety Aspects of an Accelerator System.

As determined by the C-A 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.

The [AGS Low Hazard Class Determination](#), [Workplace Hazard Analyses and Risk Assessments](#), [Facility and Area Risk Assessments](#) and [Job Risk Assessments](#) serve as the technical baseline through which hazards have been identified. [Facility and Area Risk Assessments](#) and [Job Risk Assessments](#) are reviewed and updated annually 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 procedure has been reviewed and there are no revisions required. Verification of this annual review is accomplished as a normal part of the assessment process conducted by the C-A Quality Group (see [Section 3.13 Audit](#)).

2.OSH Management System Elements and General Requirements (OHSAS 18001 Clauses 4 and 4.1 and ILO-OSH-2001 Clause 3.0)

The Implementation Plan, as listed in Section 3.0, describes the C-A Department's establishment and maintenance of an OSH program as prescribed by ILO-OSH-2001, and [OHSAS 18001](#). This program also embodies the requirements BNL's [Integrated Safety Management System](#) (ISM) and DOE Order 450.4, Safety Management System Policy.

2.1.OSH Management Representative

The C-AD ESHQ Associate Chair is the OSH Management Representative and has responsibility, accountability and authority for the development, implementation, periodic review and evaluation of the OSH management system. The ESHQ 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.

3.Collider-Accelerator OSH Implementation Plan (OHSAS 18001 Clause 4.4)

3.1.Occupational Safety and Health Policy (OHSAS 18001 Clause 4 and ILO-OSH-2001 Clause 3.0)

General environmental, safety and health policy for the C-A Department is flowed down from the [BNL Environmental, Safety Security and Health Policy](#) and the [BNL OSH Vision Statement](#). It is documented at the Department level in [OPM 1.10, C-A Environmental, Safety and Health Policy](#), and the specific occupational safety and health policy is documented in this section of OPM 1.10.4, OSH Management System Program Description. The C-AD OSH policy is as follows:

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

- Preventing work-related injuries, ill health and incidents
- Complying with OSHA regulations and SBMS requirements
- Ensuring that workers, contractors and guests are consulted and encouraged to participate actively in all elements of the OSH management system
- Minimizing or eliminating OSH risks that may be associated with our research and operations
- Working with our stakeholders to help them address their OSH needs, and openly communicating with stakeholders on our progress and performance
- Participating in community and government OSH initiatives by defining, prioritizing, and aggressively preventing and/or correcting occupational safety and health problems
- Improving the performance of the OSH management system continually
- Ensuring the C-AD OSH management system is integrated with the C-AD EMS and Self-Assessment management systems

The C-A OSH Management Program is assured through a documented program of safety reviews and work planning. OSH subject matter experts from the BNL Safety and Health Services Division (SHSD) serve on both the C-AD Experimental Safety Review Committee (ESRC) and the C-AD Accelerator Systems Safety Review Committee (ASSRC) and are the focal point for documenting safety issues for inclusion in the C-AD OSH Management Program. All OSH issues identified as part of ESRC and ASSRC reviews are documented as part of the normal operations of the committees. It is the responsibility of the subject matter experts from SHSD to help review activities brought before the committees for implementation of OSH controls. Identified OSH action items are then incorporated, as appropriate, through the work planning process documented in [C-A-OPM 2.28](#) and [C-A-OPM 2.29](#), or closed out in the ESRC or ASSRC approval process documented in [C-A-OPM 9.2.1](#) and [C-A-OPM 9.3.1](#).

3.2.Worker Participation (OHSAS 18001 Clause 4.4.2 and ILO-OSH-2001 Clauses 3.2 and 3.4)

Workers are consulted, informed and trained on all aspects of OSH associated with their work via the use of Job Training Assessments (JTAs) described in [OPM 1.12 Training and Qualification Plan](#), and through the work planning process documented in [C-A-OPM 2.28](#) and [C-A-OPM 2.29](#). Qualifications to perform tasks are established by the appearance of an individual's name on the [BTMS](#) JTAs. For specific OSH requirements associated with specific jobs, workers individually sign off on the Enhanced Work Permits. For example, see the [Enhanced Work Permits](#). Individual worker sign-off is also required for [Radiation Work Permits](#).

Workers have the time and resources to participate actively in the processes of organizing, planning and implementing, evaluating and improving the OSH management system. This is accomplished through the establishment and efficient functioning of an OSH committee with worker representation. See [OPM 9.8.1, Worker Occupational Safety and Health Committee \(OSH\) Policy and Requirements](#).

Individual self-evaluation is considered a vital element in C-A Department's ongoing effort to improve performance safety continuously. A self-critical attitude throughout the Department from workers to senior management provides the basis for correcting weaknesses as well as promoting best practices. [OPM 9.4.2, C-A Self Evaluation](#), is a procedure that applies this concept of continual improvement to individual workers, supervisors and management.

3.3.Responsibility and Accountability (OHSAS 18001 Clause 4.4.1 and ILO-OSH-2001 Clause 3.3)

C-AD management has overall responsibility for the protection of workers' safety and health, and provides leadership for OSH activities in the organization. C-AD management allocates responsibility, accountability and authority for the development, implementation and performance of the OSH management system and the achievement of the relevant OSH objectives.

General responsibilities for environmental, safety and health for the C-A Department is documented in [OPM 1.10, C-A Environmental, Safety and Health Policy](#), 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 OSH Document Flow Down Matrix](#).

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 is responsible for implementation of OSH within the C-A Department and appoints an OSH Management Representative (ESHQ Associate Chair) to ensure that the OSH system requirements are established, implemented and maintained. Other specific OSH roles and responsibilities are further defined through Roles, Responsibilities, Accountabilities and Authorities (R2A2s) documents generated for each member of the C-A Department. 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 OSH management system
- Fulfill the requirements in OSH-related Subject Areas 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 in the WOSH Committee

3.4.Competence and Training (OHSAS 18001 Clause 4.4.2 and ILO-OSH-2001 Clause 3.4)

The training program within the C-A Department is described in [C-A-OPM 1.12](#), Conduct of Training Policy. 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 processes that involve significant hazards. Employees 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-A Department, consists of the following:

- All C-A employees and users are given the facility specific access training.
- All new C-A employees complete the web based Emergency Planning and Response (GE-EMERGPLAN), Environmental Protection (GE-ENV-GET), and Stop Work Procedure (GE-STOPWORK).
- [Job specific training](#) has been developed for processes that involve significant hazards. This training addresses process-specific conformance, safety and health issues, benefits of improved performance, each person's role and responsibility, 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 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

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 has access to sufficient OSH competence to identify and eliminate or control work-related hazards and risks, and to implement the OSH management system.

3.5.Occupational Safety and Health Management System Documentation (OHSAS 18001 Clauses 4.4.4, 4.4.5 and 4.5.3 and ILO-OSH-2001 Clause 3.5)

The C-A document control system is developed in compliance with Laboratory requirements in the [Internal Controlled Documents](#) Subject Area. The following C-A procedures detail the generation, review, approval, and maintenance of all C-documentation:

- [C-A OPM 1.1 Authorization](#)
- [C-A OPM 1.2 C-A Documents](#)
- [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 OSH Management System and its implementation are described in this procedure. In addition, [C-A OPM Attachment 1.10.4.a](#), Collider-Accelerator OSH Document Flow-down Matrix details department-level documents and

records and their relation to Laboratory-level documents and the relevant ILO–OSH-2001 element.

C-A Department OSH management system documentation is maintained and covers:

- OSH policy and objectives (See Section 3.1 and [Facility Specific OSH Management Plans](#))
- 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 activities, and the arrangements for their prevention and control (See [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., [Facility Specific Operational Controls](#))

OSH management system documentation is:

- Clearly written and presented in a way that is understood by those who have to use it (See [OPM 1.4, Collider-Accelerator Plans, Policies, and Operating 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 ILO-OSH-2001. Where review cycle of specific documentation is not specified in ILO-OSH-2001, it is performed in accordance with [C-A-OPM 1.1](#).

OSH records are managed and maintained according to the needs of the C-AD. OSH records are 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-A Department 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 maintains copies for convenience. The C-A Quality Assurance Group has further defined the Subject Area through [C-A-OPM 13.4.1](#), entitled Records Management. In addition, the C-A Department has 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](#).

3.6.Communication (OHSAS 18001 Clause 4.4.3 and ILO-OSH-2001 Clause 3.6)

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-A Department, 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, Normal 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-A Department occurs through a schedule of weekly 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 meetings can be found in [C-A-OPM-ATT 2.28.a](#).

Various Groups within the C-A Department 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: www.rhichome.bnl.gov.

Memos and e-mail are used to communicate tasks that require action by employees. Effective communication requires that all C-A 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 Collider-Accelerator OSH issues are essential to assure that the policies of the Laboratory as well as those of the Department are maintained to the highest standard. External communications may include correspondence with the following: regulators, DOE-BHG, 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 Collider-Accelerator Department appoints an individual responsible for the maintenance of CCTS within the department.

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 Departmental 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.rhichome.bnl.gov/>.

The C-AD Worker Occupational Safety and Health Committee (see [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.

3.7.Initial Review (OHSAS 18001 Clauses 4.3 and 4.3.2 and ILO-OSH-2001 Clauses 3.7 and 3.7.2)

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

- 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 are adequate to eliminate hazards or control risks
- the data provided from workers' health surveillance

The result of the initial review was documented in the [Workplace Hazard Analyses and Risk Assessments](#). Follow-up reviews are documented in [Facility and Area Risk Assessments](#) and [Job Risk Assessments](#). These assessments are the basis for making decisions regarding the implementation of the OSH management system, and they are updated annually. They provide a baseline from which continual improvement of C-AD's OSH management system can be measured.

3.8.System Planning, Development and Implementation (OHSAS 18001 Clauses 4.3, 4.3.3, 4.3.4, and 4.4.1 and ILO-OSH-2001 Clause 3.8)

The C-AD OSH management system supports compliance with laws and regulations, the individual elements of the management system listed in [Sections 2.0](#) and [3.0](#), and the continual improvement in OSH performance. This OSH management system covers the development and implementation of all the OSH management system elements listed in ILO-OSH-2001 and OSHAS-18001.

OSH planning is based on the results of the initial review, as described in [Section 3.7](#), subsequent reviews or other available data and includes a clear definition, priority setting and quantification, where appropriate of C-AD's OSH objectives. OSH planning requires a plan for achieving each objective, with defined responsibility and clear performance criteria indicating what is to be done by whom and when (see [Facility Specific OSH Management Plans](#)). The selection of measurement criteria for confirming that the objectives are achieved and the provision of adequate resources, including human and financial resources and technical support, as appropriate, are also included in [Facility Specific OSH Management Plans](#).

3.9.Occupational Safety and Health Objectives (OHSAS 18001 Clause 4.3.3 and ILO-OSH-2001 Clause 3.9)

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

- specific to C-AD, and appropriate to and according to its size and nature of activities
- 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
- realistic and achievable
- documented, and communicated to all relevant functions and levels of C-AD
- periodically evaluated and if necessary updated

C-A Department objectives and targets are documented using several formal methods within the Collider-Accelerator Department. The [Facility Specific OSH Management Plans](#) are used and are the primary mechanism in identifying objectives and targets. Responsibility for achieving goals are documented and assigned to cognizant individuals throughout the Department. Objectives and targets are defined as a result of BNL Contract requirements, governmental regulatory requirements, changes in the BNL Critical Outcomes/ Objectives/ Performance Measures, and Management Reviews of the OSH Program. High level requirements are translated down to the C-AD Department through the BNL Critical Outcomes/Objectives/Performance Measures that is developed by BNL and DOE annually. Additional objectives and targets may result from the annual C-A Management Reviews of the OSH Program. In addition to other objectives, there is an ongoing objective in the OSH Program. That objective is the absolute prevention of work incurred injuries or illnesses.

3.10.Hazard Prevention (OHSAS 18001 Clause 4.3.1 and ILO-OSH-2001 Clause 3.10)

3.10.1.Prevention and Control Measures (OHSAS 18001 Clause 4.3.1 and ILO-OSH-2001 Clause 3.10.1)

Hazards and risks to workers' safety and health are identified and assessed on an ongoing basis via the Enhanced Work Planning Program, which are [OPM 2.28](#) for workers and [OPM 2.29](#) for Users. Preventive and protective measures are implemented in the following order of priority:

- eliminate the hazard/risk
- control the hazard/risk at source, through the use of engineering controls or organizational measures
- minimize the hazard/risk by the design of safe work systems, which include administrative control measures

Where residual hazards/risks cannot be controlled by the preceding collective measures, C-AD provides for appropriate personal protective equipment, including clothing, at no cost, and implements measures to ensure its use and maintenance.

Hazard prevention and control procedures or arrangements are:

- adapted to the hazards and risks encountered by C-AD
- reviewed and modified if necessary on a regular basis
- comply with laws and regulations, and reflect good practice
- consider the current state of knowledge, including information or reports from organizations, such as DOE, and BNL's SHSD

Hazard prevention and control procedures or arrangements are established through the administration of [Facility Specific OSH Operational Control Forms](#). It is the responsibility of the C-A OSH Management Representative to establish and maintain [Facility Specific 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 [Facility Specific OSH Operational Control Forms](#) is performed by C-A Quality Assurance annually through its assessment of the C-A OSH Management Program per requirements in [C-A OPM 13.10.1](#), Independent Assessment.

3.10.2. Management of Change (OHSAS 18001 Clauses 4.3.1, 4.4.6 and ILO-OSH-2001 Clause 3.10.2)

The impact on OSH of internal changes such as those in staffing or due to new processes, working procedures, organizational structures and of external changes such as amendments of regulations is evaluated and appropriate preventive steps taken 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.

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](#). 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>.

Various institutional-level Subject Areas and procedures have been developed to identify legal and other requirements. See [OHSAS 18001 Interim Procedures](#). The C-A Department has three primary means to become aware of changes in these requirements. First, the C-A Department actively participates in Subject Area development to assure that Laboratory and Department goals are achieved and are in accordance with all

applicable requirements. Secondly, the SBMS Subscription Service is used by the C-A ESHQ staff for notification of changes to Laboratory documents. Lastly, the Department routinely uses 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 are properly informed and trained.

3.10.3. Emergency Prevention, Preparedness and Response (OHSAS 18001 Clause 4.4.7 and ILO-OSH-2001 Clause 3.10.3)

Emergency prevention, preparedness and response arrangements are established and maintained by C-AD. The emergency responses are detailed in the [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. These procedures identify the potential for accidents and emergency situations, 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 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, at all levels

Emergency prevention, preparedness and response arrangements are established in cooperation with the BNL Emergency Services Division. The Collider Accelerator Department’s emergency preparedness and response program ([C-A OPM 3.0](#), Local Emergency Plan) supplements the Laboratory Plan found in the [Emergency Preparedness](#) Subject Area, and makes provisions for emergency situations that are unique to the Collider Accelerator 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 Operations Information. The C-A Department participates in annual required emergency response drills. At a minimum the Local Emergency Plan is reviewed annually. It is also reviewed after each drill or actual emergency.

3.10.4. Procurement (OHSAS 18001 Clause 4.4.6 and ILO-OSH-2001 Clause 3.10.4)

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. C-AD procurement policies and procedures are found in [OPM Chapter 13, Quality Assurance](#).

3.10.5.Contracting (OHSAS 18001 Clauses 4.3.1 and 4.4.6 and ILO-OSH-2001 Clause 3.10.5)

Contractors, suppliers, and users fall under the C-A 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 safety and health requirements, or at least the equivalent, are applied to contractors and their workers. See [OPM 1.12, Training and Qualification Plan](#) and [ESH Standard 1.3.1, Construction Safety](#). Arrangements for contractors working on site include:

- OSH criteria in [ESH Standard 1.3.1, 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 ESHQ Division member regularly monitors OSH performance of contractor activities in order to ensure that OSH procedures and arrangements are followed.

3.11.Performance Monitoring and Measurement (OHSAS 18001 Clause 4.5.1 and ILO-OSH-2001 Clause 3.11)

Procedures to monitor, measure and record OSH performance 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-A OSH program. Specific monitoring of OSH hazards is listed in [Facility Specific 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 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 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 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 [OPM 9.4.1, Safety Inspections](#) and [OPM 13.10.1, Independent 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 [OPM 9.4.1](#) and [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 [OPM 9.4.1, Safety Inspections](#), is performed for the systematic inspection of work systems, premises, plant and equipment. [OPM 9.4.2, Self-Evaluation](#), [OPM 9.8.1, Worker OSH Committee](#) and [OPM 13.10.1, Independent Assessments](#) are used by management to survey the working environment, including work organization. [OPM 1.17, Hearing Conservation Program](#) or [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 Department's ATS for closure at a practicable date.

Reactive monitoring includes: 1) the identification, reporting and investigation of work-related injuries (see [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 [OPM 10.1, Occurrence Reporting and Processing of Operations Information](#)).

3.12. Investigation of Work Related Injuries, Ill Health, Diseases and Incidents, and Their Impact on Safety and Health Performance (OHSAS 18001 Clause 4.5.2 and ILO-OSH-2001 Clause 3.12)

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 [OPM 9.4.5, C-A Accident/Incident Investigation](#) and [OPM 10.1, Occurrence Reporting and Processing of Operations Information](#). Investigations are carried out by 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 recommendations from the WOSH Committee, are communicated to appropriate persons for corrective action via the C-A Department's Family ATS, included in the [Management Review](#) and considered for continual improvement activities.

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.

3.13. Audit (OHSAS 18001 Clause 4.5.4 and ILO-OSH-2001 Clause 3.13)

Arrangements to conduct periodic audits are established at C-AD 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](#).

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

1. OSH policy
2. worker participation
3. responsibility and accountability
4. competence and training
5. OSH management system documentation
6. communication
7. system planning, development and implementation
8. prevention and control measures
9. management of change
10. emergency prevention, preparedness and response
11. procurement
12. contracting
13. performance monitoring and measurement

14. investigation of work-related injuries, ill health, diseases and incidents, and their impact on safety and health performance
15. audit
16. management review
17. preventive and corrective action
18. continual improvement

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

- are effective in meeting C-AD'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 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 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-A Family Assessments and Tracking System. C-A 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-A management.

3.14. Management Review (OHSAS 18001 Clause 4.6 and ILO-OSH-2001 Clause 3.14)

Management Reviews at C-AD 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 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'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'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's needs and conditions. The Management Review is normally performed annually and normally considers:

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

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 Collider Accelerator Department, as a routine part of its operations, conducts various reviews at the senior management level. In the spirit of adapting other aspects of C-AD's management structure and performance measurement system, C-AD has opted to combine 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, [Preparing and Conducting Environmental Management Reviews](#). In addition, handouts specifically address the OSH issues and copies of these handouts are filed on the C-AD ESHQ web.

3.15.Preventive and Corrective Action (OHSAS 18001 Clause 4.5.2 and ILO-OSH-2001 Clause 3.15)

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 nonconformances 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.

The C-A Department documents its OSH nonconformances through three mechanisms. The primary means for documenting OSH nonconformances is through [OPM 9.4.1, Procedure for Conducting Safety Inspections](#). The [C-A Family ATS](#) is used to document

corrective and preventive actions and to track the closure of corrective actions at C-AD. DOE reportable OSH nonconformances 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 Critiques or through the Subject Area, [Nonconformance & Corrective and Preventive Action](#). 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.

3.16.Continual Improvement (OHSAS 18001 Clause 4.3.3 and ILO-OSH-2001 Clause 3.16)

As described in prior Sections, arrangements are established and maintained for the continual improvement of the relevant elements of the OSH management system and the system as a whole and account for:

- OSH objectives of C-AD
- results of hazard and risk identifications and assessments
- results of performance monitoring and measurements
- investigation of work-related injuries, diseases, ill health and incidents, and the results and recommendations of audits
- outcomes of the Management Review
- recommendations for improvement from all members of C-AD including the WOSH Committee
- changes in laws and regulations, voluntary programs and collective agreements
- new relevant information
- results of health protection and promotion programs

Annually, the safety and health processes and performance of C-AD is compared with other similar organizations in order to improve health and safety performance. Typically, we compare C-AD injury/illness data to the annual average DOE illness/injury data from all DOE contractors. See <http://tis.eh.doe.gov/cairs/> and Appendix B of the DOE BSA Contract.

4.References

ILO-OSH-2001, Guidelines on Occupational Safety and Health Systems, International Labour Office, Geneva, 2001

OHSAS 18001:1999, Occupational Health and Safety Management Systems – Specifications, British Standards Institution, Global Engineering Documents, 15 Inverness Way East, Englewood, Colorado 80112, Amended December 2002.

DOE Order 450.4, Safety Management System Policy