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

1.10.2 Environmental Management Program Description
Collider-Accelerator Department and Superconducting Magnet Division

Text Pages 2 through 18

Attachments

Hand Processed Changes

HPC No.	Date	Page Nos.	Initials

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

Approved: _____***Signature on File***_____ _____
Superconducting Magnet Division Head Date

M. Van Essendelft

1.10.2 Environmental Management Program Description

1.0 Description of Collider Accelerator Department and Superconducting Magnet Division

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Attachment 1.10.2.b: EMS Contacts and Responsibilities
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1.0 Description of the Collider Accelerator Department and Superconducting Magnet Division

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 (C-AD) is committed to the following:

- ❖ Excellence in environmental responsibility and safety in all C-A Department operations.
- ❖ 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.

Equally supporting Brookhaven National Laboratory's broad mission of providing excellent science and advanced technology in a safe, environmentally responsible manner, the Superconducting Magnet Division (SMD) is committed to the following:

- ❖ Excellence in environmental responsibility and safety in all SMD operations.
- ❖ 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 development and production of superconducting magnets for use in particle accelerators and experimental facilities within the U.S. HENP community on future facilities and technologies.
- ❖ The collaboration with other science institutions world wide to both provide and develop superconducting technologies.
- ❖ To the support of the ongoing Brookhaven research program with emphasis on the RHIC complex.

The SMD mission is accomplish through excellence in the following areas:

- ❖ Superconductor materials development/test facility
- ❖ Magnetic structure design
- ❖ Superconducting magnet fabrication
- ❖ Vertical and horizontal cryogenic testing
- ❖ Magnetic field measurements

1.2 Facility Description

1.2.1 Collider Accelerator Department

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 experimental facilities are the terminus of a complex of other existing accelerators and beam transfer equipment. A high-energy physics program to look for physics beyond the Standard Model was conducted at the AGS. Future experiments, similar in nature, will be conducted at the AGS when funding is approved. In the area of health effects, heavy ions of the type encountered in space travel are also studied at AGS.

The operational complex is made up of the Tandem Van De Graaff, the Linac, the Booster synchrotron, the AGS, and the RHIC. 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 two major RHIC experimental areas: PHENIX, and STAR/PP2PP.

The Linac is a linear accelerator and it accelerates H^- ions to 200 MeV. The BNL Medical Department uses most of the Linac beam in its Brookhaven Linac Isotopes Producer (BLIP) for the production of radiopharmaceuticals. A small fraction of the total Linac beam is sent to the Booster synchrotron. At the Booster, electrons are stripped off and the proton beam is accelerated to about 1.9 GeV. It is injected into the AGS where acceleration up to 30 GeV occurs. At this time, the output from AGS is $6x10^{13}$ protons every 2 to 3 seconds at 24 GeV. The proton output is sent to the SEB and FEB experimental areas.

The AGS accelerates heavy ions at the intensity of about 10^{11} nucleons every 3 seconds. The ions reaching the AGS start at the Tandem van De Graaff where they reach about 1 MeV per nucleon. These heavy ions are injected into the Booster synchrotron, and then AGS. The final heavy-ion energy is about 11 GeV per nucleon for Au ions.

Five slow-extracted-beam targets and one fast-extracted-beam target are available to receive from $5x10^{18}$ to $5x10^{19}$ protons y^{-1} at 24 GeV from AGS. The BLIP uses $3x10^{21}$ protons y^{-1} at 200 MeV. The RHIC is designed to have a Au ion population of 2.3×10^{11} ions or a proton population of $2.3x10^{13}$ protons, which is to be re-filled every 5 to 10 hours.

Beams are transported through many hundreds of meters of tunnel and accelerators. This transport system is shielded with up to 7-m thick earth-roofs and 20-m thick earth-sides. Most accelerated particles end at targets inside heavily shielded target-caves with 3-m thick high-density-concrete walls.

The target cave is the terminus of the primary beam transport at AGS facilities. About half the proton beam interacts in a target, with the remainder going to the next target downstream or directly to a beam stop. Target caves are located in a large 5-acre building

in the SEB experimental area. Beam is transported through a series of magnets providing control of the size of the beam and the beam direction. Beam interactions, remote from the production target, are minimized by confining the beam to a pipe evacuated of air. This beam pipe runs the entire length of the accelerator complex, through magnets and beam-line equipment.

Target caves are constructed of heavy concrete and steel shielding with labyrinthine entry passages, with elaborate security circuitry and procedures to prevent personal exposure.

The target areas in FEB are external to buildings. Roof structures over target caves are designed to shed rainwater to the paved areas that surround the experimental areas. The rainwater flows to storm sewers located in paved areas and then into the recharge basin.

The RHIC Complex is a 2.5-mile circumference particle collider located in the north central portion of BNL. The RHIC utilizes superconducting magnets to bend and focus the beam. The magnets are cooled to 4.6K supercritical helium gas. At cryogenic temperature, the magnets acquire superconducting properties, thereby greatly reducing the amount of electricity that must be supplied to generate the magnetic field. Accelerated particles from counter rotating beams in separate rings are then steered into collision within a detector system. The detectors analyze and categorize the secondary particles resulting from the collision. Two major detector facilities, STAR and PHENIX, have been constructed at the 6 and 8 o'clock locations, respectively. Smaller "AGS class" experiments have been installed at the 2 and 10 o'clock locations. The 4 and 12 o'clock locations remain for future development. The Collider beam stops are located in the Collider tunnel on either side of the 10 o'clock region.

The C-A Department, through funding from the National Aeronautics and Space Administration, has constructed the NASA Space Radiation Laboratory (previously called the Booster Applications Facility, BAF). The NASA Space Radiation Laboratory is a national facility for research in the diverse field of biological effects of high-proton number, high-energy particles. The facility is capable of answering the most basic question in this field, which is quantifying the risk to humans in different shielding environments from exposure to ionizing particles in galactic cosmic rays.

The NASA Space Radiation Laboratory (NSRL) is essentially an extraction system in the Booster ring followed by a beam line, target area and beam stop, with adjacent experimental and utility support buildings. With regard to environmental impacts at NSRL, the effluent hazards include generation of H^3 and Na^{22} in the earth shielding, which could potentially contaminate the ground water, and generation of short-lived radioactive gases in the air in the tunnel and Target Room. Both of these have been addressed and the associated hazards have been eliminated or controlled by design. Even though tritium levels in cooling water are less than the Drinking Water Standard, the intent of Suffolk County Article 12 Code was followed in the design of cooling water systems and piping that contain trace amounts of tritium.

1.2.2 Superconducting Magnet Division

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. To achieve this, the Magnet Division 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 facilities in the world that 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 Superconducting Magnet Division supplied 1740 magnetic elements, in 888 cryostats, for the RHIC facility at BNL (http://www.bnl.gov/rhic/). Of these, 780 magnetic elements were manufactured by Northrop-Grumman (Bethpage, NY) and 360 were made by Everson Electric (Bethlehem, PA). The magnets made in industry used designs developed at BNL. The first cool down of the magnets for the RHIC engineering run was in 1999. Since then, the magnets have operated very reliably.

The Superconducting Magnet Division has built a number of dipole magnets for the Large Hadron Collider (LHC), which is now under construction at CERN in Geneva, Switzerland. Scheduled to begin operation in 2008, this machine will collide beams of protons with the unprecedented energy of 7 TeV per beam to explore the nature of matter at its most basic level (RHIC can collide beams of protons with energies of 0.25 TeV, but is mostly used to collide heavy ions with energies of 0.1 TeV per nucleon). The magnets were built as part of the US program, recommended by the High Energy Physics Advisory Panel (HEPAP) and approved by Congress, to contribute to the construction and, later, use of that frontier machine by the US high energy physics community. Fermi National Accelerator Laboratory (FNAL) and Lawrence National Laboratory are also participants in this program, which has its headquarters at FNAL. The US role is to supply the lattice magnets and other equipment for the LHC's Intersection Regions.
Having developed the main ring dipole magnets for the Superconducting Super Collider in the 1980's and early 1990's as well as all the superconducting magnets for RHIC, the Magnet Division was ideally suited to develop some of the dipole magnets for the LHC.
Brookhaven's task was to provide the magnets that will bring the LHC beams into collision at four interaction points, and to also provide magnets that will separate the beams at one point where space is needed for accelerating cavities. The magnets, some 20 in all, are large: the largest have two, 10 meter long beam pipes with 80 millimeter apertures in a single iron yoke and weigh some 25 tons. The coils for all the magnets being built by

Brookhaven are the same as those used for the main RHIC bending magnets, but the yokes and containment vessels are new. The magnets have been designed and engineered at Brookhaven, and are being assembled here with components made by Central Shops and purchased from outside vendors. Cryogenic testing has shown that the magnets built to date are functioning well and can be shipped to CERN. Shipping these massive objects has required the engineering and construction of special fixturing that will ensure a safe arrival at CERN.

Since the completion of these two major projects the Superconducting Magnet Division has transitioned from a production mode to an R&D facility involved in the following projects:

- High Field Magnet R&D
- Linear Collider Final Focus
- GSI Rapid Cycling Magnets
- BEPC II IR Quadrupoles
- Correctors for J-PARC
- LARP
- Helical Magnets

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. Within these buildings the Superconducting Magnet Division designs, fabricates, and tests superconducting magnets as well as develops and tests superconducting materials needed to support various activities. The Division is organized into four functions responsible for magnet design and testing, magnet production, electrical engineering support and cryogenic support. An R&D program seeks to establish concepts and technologies for future Projects. The primary output of the Superconducting Magnet Division is:
Innovative magnets for use in both particle accelerators and experimental facilities.
Superconducting Materials suitable for use in this and other magnet programs.

In the operation and maintenance of the Collider-Accelerator Department and Superconducting Magnet Division facilities there are activities that can impact the environment. The Collider-Accelerator Department and Superconducting Magnet Division, along with all other Lab-wide organizations, have implemented a program that places safety and environmental responsibility in the forefront of all its activities. The environmental portion of this program, detailed below, captures the intent of ISO 14001 and conforms to Brookhaven National Laboratory's ISO 14001 "Plus" Environmental Management System Manual.

2.0 Significant Aspects

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 aspects of its operations in an effort to identify and accomplish waste minimization and pollution prevention opportunities. This process began in 1988 with the development of Formal Environmental Design Guides and a Design Review Process. More recently, this effort has resulted in a further formalization of its processes under the guidelines of ISO 14001, the BNL ISO14001 "Plus" Environmental Management System Manual, and SBMS subject areas governing ISO 14001 implementation.

Integral to the RHIC project in the production and inspection of its magnets the Superconducting Magnet Division participated in the original registration group to the ISO 14001 standard. Upon completion of the RHIC project and with the reorganization of facilities and Departments, the Superconducting Magnet Division was chosen as the keeper of the original registration certificate for the RHIC project on behalf of the Laboratory. Its system, therefore, has also been formalized based on the guidelines of ISO 14001 as found in the BNL ISO14001 "Plus" Environmental Management System Manual.

Based on the aspect identification and analysis process in the Subject Area, Identification of Significant Environmental Aspects and Impacts, the following aspects are significant to the Collider Accelerator Department activities, and those denoted with an asterisk are significant to the Superconducting Magnet Division as well:

- Regulated Industrial Waste*
- Hazardous Waste*
- Radioactive Waste*
- Mixed Waste*
- Atmospheric Discharge*
- Liquid Effluents
- Storage/Use Of Chemicals* or Radioactive Material
- Soil Activation
- PCB's
- Water Consumption
- Power Consumption
- Environmental Noise
- Sensitive/Endangered Species and Sensitive Habitats
- Historical Contamination

3.0 Collider-Accelerator Department and Superconducting Magnet Division EMS Implementation Plan

3.1 General Requirements

The Implementation Plan, as listed below, describes the C-A Department and Superconducting Magnet Division's establishment and maintenance of an EMS program as prescribed by ISO 14001.

3.2 Environmental Policy

The Brookhaven National Laboratory ESSH Policy includes environmental commitments that form the basis on which the C-AD and SMD EMS program is established. The communication of this policy is accomplished as outlined in the BNL ISO 14001 "Plus" Environmental Management System Manual. The C-A-OPM 1.10, C-A Environmental, Safety and Health Policy, and the SMD-OPM 2.2, Operation of the ESHQ Office for the Superconducting Magnet Division both ensure implementation of the ESSH policy through formal programs.

3.3 Planning

3.3.1 Environmental Aspects and Impacts

The C-AD and SMD are committed to identifying environmental aspects during the planning phase of operations. C-AD accomplishes this through implementation of the following operational procedures: C-A-OPM 2.28, C-A Procedure for Work Planning and Control of Operations; 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 Radiation Review Criteria for C-A Experiments; C-A-OPM 9.2.1, Reviewing Environmental, Health, and Safety Aspects of an Experiment; and C-A-OPM 9.3.1, Reviewing Conventional Safety Aspects of an Accelerator System. SMD accomplishes the identification of environmental aspects through the implementation of SMD-OPM 2.12, Work Planning and Control, through magnet production engineering design reviews and through the development of specific Magnet Assembly Procedures. On an annual basis, or as determined by the EMS Management Representative, aspects that are identified through planning and reviews shall be documented through the implementation of the BNL SBMS Subject Area - Identification of Significant Environmental Aspects and Impacts.

The Facility Review Project and The Phase II Process Evaluations have served as the technical baseline through which the aspects have been identified. The Process evaluations will be reviewed and updated annually or as required by significant process change. Evidence of review will either be actual procedure

revision by the process owner or a memo on file (in the current Environmental Program Support File) stating that the procedure has been reviewed and there are no revisions required. Verification of this annual review will be accomplished as a normal part of the C-A and SMD assessment process or as part of the internal EMS audit process. Concurrent with these assessments will be a review of the aspects analysis and an update of the C-AD and SMD significant aspects. Records of the aspects analysis are maintained in the Environmental Program Support File, which can be found in the office of the Environmental Management System Representative, or his delegate. A list of the significant aspects related to the C-AD and SMD activities are as found in section 2.0 of this document.

3.3.2 System for Determining Legal and Other Requirements

Various institutional-level Subject Areas have been developed to identify legal and other requirements. The C-A Department and the SM Division have three primary means of access to these requirements. First, both organizations actively participate in Subject Area development to assure that Laboratory and Department goals are achieved and are in accordance with all applicable requirements. Secondly, C-AD and SMD ESHQ staff use the SBMS Subscription Service for notification of changes to Laboratory documents. Lastly, C-AD and SMD routinely utilize their common Environmental Compliance Representative and the Environmental Compliance Subject Matter experts in the evaluation and determination of legal and other requirements on existing work and future review of experiments to be held within the complex.

3.3.3 System for Defining Objectives, Targets, and Programs

Objectives and targets are documented in the C-AD and SMD using several formal methods. The Environmental Management Program Form is used in accordance with the Subject Area, Identification of Significant Environmental Aspects and Impacts and it is the primary mechanism in identifying objectives and targets. Responsibility for achieving the goals of this action plan are documented and assigned to cognizant individuals throughout both organizations. Objectives and targets are developed as a result of BNL Contract requirements, governmental regulatory requirements, changes in the BNL Critical Outcomes/ Objectives/ Performance Measures, the Environmental and Waste Management Services Division's Environmental Priorities, and C-AD and SMD Management Reviews of the EMS Program. These requirements are documented in the EMS program documents and in the Self Assessment Plans that are developed annually. Additional objectives and targets may result from Management Reviews of the EMS Program. Due to the nature and scope of Collider-Accelerator Department operations, in addition to other objectives, there are two ongoing objectives found in the EMS Program. The first objective is the prevention of groundwater contamination from activated soils. The second objective is the reduction of legacy materials that have been produced by various experiments and facilities. The Objective and Targets may be listed in the

following two areas: the Environmental Management Program, or the Self Assessment Plan.

The Environmental Management Program is implemented and assured through a documented program of safety reviews and work planning. The Environmental Compliance Representative serves on both the Experimental Safety Review Committee (ESRC) and the Accelerator Systems Safety Review Committee (ASSRC) in the C-A Department and is the focal point, in both C-AD and SMD for documenting environmental issues for inclusion in the C-AD and SMD Environmental Management Program. All EMS 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 ECR to review activities brought before the committees for implementation of environmental controls and to add or revise the C-AD/SMD Environmental Aspects as required to accomplish the integration. Identified EMS action items are then incorporated, as appropriate, through the work planning process. The C-A Department documents this process in C-A-OPM 2.28 and C-A-OPM 2.29, and through actions incorporated and closed out in the experiment or accelerator-modification approval process documented in C-A-OPM 9.2.1 and C-A-OPM 9.3.1. The Superconducting Magnet Division documents this process in SMD-OPM 2.12.

In addition to these controls there are specific tasks listed within Section 10 of the Environmental Management Program form, which are derived from each organization's objectives and targets. These tasks are a result of the processes as described in Section 3.3 of this document but tasks may be added as a result of the safety reviews and work planning.

3.4 Implementation and Operation

3.4.1 Resources, Roles, Responsibility, and Authority

The C-A Department functional relationships and responsibilities for EMS are outlined in C-A OPM 1.10, Environmental Safety & Health policy and in C-A OPM 13.1.1, Quality, OSH and Environmental Management System. The Superconducting Magnet Division has outlined its functional relationships and responsibilities for EMS in SMD-OPM 2.2, Operation of the ESH&Q Office for Superconducting Magnet Division. The C-A Department Chairman and the Superconducting Magnet Division Head are responsible for implementation of EMS within their organizations and appoints an EMS Management Representative (the C-AD ESHQ Associate Chair) to ensure that the EMS system requirements are established, implemented and maintained. Other specific EMS roles and responsibilities are further defined through Roles, Responsibilities, Accountabilities and Authorities (R2A2's) documents generated for each member of the respective organization.

3.4.2 Competence, Training, and Awareness

The training program within the C-A Department is as outlined in C-A-OPM 1.12, Conduct of Training Policy. The training program within the Superconducting Magnet Division is as outlined 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 the environment are documented. Job specific training is developed for environmental processes that involve significant aspects. Employees that have interaction in these processes are required to go through training. Contractors, suppliers, and users fall under the C-AD and SMD EMS training requirements when it is determined that their work within the facility could cause a significant impact to the environment. Competency requirements are specified and can be attained through testing or the read and acknowledgement form.

Specific Environmental Training, within the C-AD and SMD, consists of the following:

- All employees are given the facility specific Introduction to EMS.
- All employees complete the web based GE-ENV-GET, Environmental Protection for General Employees.
- Job specific training has been developed for environmental processes that involve significant aspects. This training addresses process-specific conformance, environmental impacts, benefits of improved performance, each person's role and responsibility, the consequences of nonconformance and the appropriate actions to be taken.
- SMD Technical Supervisors and identified C-AD staff take Hazardous waste generator Training (HP-RCRIGEN3); and 90-Day Area Coordinators take RCRA 90-Day Area Manager training (HP-90 Day).
- Users (C-AD only) are introduced to C-AD EMS in Users Training programs.

3.4.3 Communication

Internal communication of significant aspects and EMS strategies require mechanisms for information to flow from top-down and bottom-up. The primary means for this communication within the C-A Department and SM Division 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. The C-A Department has formalized their approach to weekly meetings and a table and flow diagrams of weekly meetings can be found in C-A-OPM-ATT 2.28.a.

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

Employees use memos and E-mail to communicate tasks that require action. 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 C-AD/SMD EMS issues are essential to assure that the policies of the Laboratory as well as those of the Departments are maintained to the highest standard. External communications may include correspondence with the following: regulators, DOE-BHSO, 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 each organization appoints an individual responsible for the maintenance of CCTS within the department.

Due to the nature of its operations and the possible impact on the public the C-A Department has formalized guidelines for C-A Managers in OPM-1.10.3, Guidance on Community Involvement. Identifying whether or not an issue may need community involvement includes nine steps. C-AD managers should complete the process for all issues and decisions that have any potential for interest or concern in the community.

External communications regarding EMS, which are informational in nature, may be posted on the C-AD Web site: http://www.rhichome.bnl.gov/ and on the SMD Web site: http://www.bnl.gov/magnets/.

3.4.4 Environmental Management System Documentation

The core elements of this Environmental Management System and their implementation are described in this Program Description. In addition, Attachment 1.10.2.c, C-AD and SMD EMS Document Flow-down Matrix details department level documents and records and their relation to Laboratory level documentation and the associated ISO requirement.

3.4.5 Control of Documents

The C-AD and SMD document control system is developed in compliance with Laboratory requirements in the Internal Controlled Documents Subject Area.

The following C-AD procedures detail the generation, review, approval, and maintenance of all C-AD 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 SMD procedure that details the generation, review, approval and maintenance of SMD documentation is: SMD-OPM 1.2, Procedures.

Review of EMS documentation is accomplished in accordance with the requirements of ISO 14001. Where review cycle of specific documentation is not specified in this standard, it is performed in accordance with C-A-OPM 1.1, and SMD-OPM 1.2 and SMD-OPM 2.2.

3.4.6 Operational Control

Operational Control requirements are satisfied through the administration of the Environmental Management Plan and Operational Control Forms as specified in the SBMS procedure, Identification of Significant Aspects and Impacts, or through the C-AD/SMD Environmental Management Matrix of Objectives and Targets for Significant Aspects. It is the responsibility of the C-A/SMD Environmental Compliance Representative to establish and maintain Operational Control Forms so that they accurately reflect regulatory requirements and to ensure that processes, associated plans and controls are updated to satisfy the requirements of ISO 14001. Responsible persons as identified on the form implement Operational Controls. C-AD and SMD Quality Assurance perform verification of implementation of controls and maintenance of EMS forms annually through its assessment of the C-AD/SMD Environmental Management Program and by implementation of C-A OPM 13.10.1, Independent Assessment.

3.4.7 Emergency Preparedness and Response

The Collider Accelerator Department has an established emergency preparedness and response program. This plan is detailed in the OPM 3.0 "Series" of procedures and is intended to provide general guidance for use in responding to most incidents that may arise at the C-AD Complex. The Superconducting Magnet Division has established its emergency preparedness and response program through, SMD OPM 3.0, Local Emergency Plan For The Superconducting Magnet Division. These Local Emergency Plans supplement the Laboratory Plan found in the Emergency Preparedness Subject Area, and make provisions for emergency situations that are unique to each organization. In addition to the Local Emergency Plan, C-AD has implemented specific procedural requirements for reporting and mitigating environmental impacts.

These are found in C-A-OPM 10.1, Occurrence Reporting and Processing of Operations Information, and C-A-OPM 10.2, Response to Tritiated Water Spills.

The C-A Department, due to its size and complexity has elected to perform its own emergency response drill and the Superconducting Magnet Division has elected to participate in the Laboratory's annual emergency response drill. At a minimum, both of the Local Emergency Plans are reviewed annually.

3.5 Checking

3.5.1 Monitoring and Measurement

Environmental performance monitoring is achieved through several programs within the Collider-Accelerator Department and the Superconducting Magnet Division. The C-A-OPM 13.10.1, Independent Assessment and the SMD OPM 2.2, Operation of the ESH&Q Office for Superconducting Magnet Division describes the overall monitoring of the C-AD/SMD EMS program. Specific monitoring of environmental aspects is as outlined in the Operational Control Forms, and as specified in the associated C-AD and SMD OPM's (where applicable) listed on the Operational Control Form. A listing of OPM procedures associated with Monitoring and Measurement can be found in Attachment 1.10.2.c.

3.5.2 Evaluation of Compliance

The Environmental Compliance Representative (ECR) plays the key role in evaluating and assuring Environmental Compliance with the Collider Accelerator Department and the Superconducting Magnet Division. The ECR serves as a core team member in the evaluation of regulatory compliance on environmental issues. It is the responsibility of the ECR to be knowledgeable on federal, state and local regulations that impact the environment and to insure that the departments are aware of the impact of the requirements on operations as well as the actions needed to comply. The ECR acts as a liaison between the Laboratory-level Environmental Services subject matter experts and the departments in translating, facilitating, and assuring regulatory requirement implementation. As a core team member the ECR participates in C-AD and SMD compliance evaluation through the following programs:

Tier I Inspections:
On a weekly basis Tier I inspections are performed in both organizations. These periodic self-inspections of departmental work areas are performed in accordance with the Environment, Safety, Health and Quality (Tier I) Inspections subject area.

Work Planning Reviews:

Compliance evaluations are also performed during the work planning process as a part of the job review as documented under the Environmental Concerns section of the Work Permit. The Work Permit process is covered in C-A-OPM-2.28, C-A-OPM 2.29, and SMD-OPM 2.12. These procedures have been developed in accordance with the Work Planning and Control For Experiments and Operations subject area.

Experimental reviews and Accelerator reviews are performed in a formal way at the C-A Department. During these reviews it is the ECR's specific responsibility to review regulatory compliance in experiments and in accelerator modifications. The C-AD has formalized the experimental review process in C-A-OPM 9.2.1 and the accelerator review process in C-A OPM-9.3.1.

EWMS Targeted Compliance Assessments

On an annual basis the Environmental and Waste Management Services Division targets regulatory compliance assessments to be performed across the laboratory. These regulatory assessments coincide with the laboratory's environmental regulatory requirements as specified in various SBMS subject areas. The C-AD/SMD ECR facilitates these audits and in most cases performs these audits in conjunction with the subject matter expert. The audits are performed in accordance with the Environmental Assessments subject area.

Compliance is also evaluated at the laboratory and organizational level through assessment by outside Regulatory agencies, Department of Energy Representatives, and through the Laboratory's Independent Oversight organization.

3.5.3 Nonconformity, Corrective Action, and Preventive Action

The Collider-Accelerator Department and the Superconducting Magnet Division document their environmental nonconformances, corrective, and preventive actions through several mechanisms. One means for documenting environmental nonconformances is through the Occurrence Reporting and Processing of Operations Information system. The SBMS Subject Area on Occurrence Reporting and Processing System (ORPS), details the reporting, investigation, and closure of ORPS reportable events. The Final Report, submitted to the DOE, includes root cause analysis, corrective and preventive action. The C-A Department has documented its system of responding to the ORPS Subject Area in the OPM 10.0 series of procedures. All environmental nonconformances, which are non-ORPS reportable occurrences, are documented, in a like manner, through the Nonconformances, Identifying and Reporting, and the Event/Issues Management Subject Areas or through a formal critique performed by the Department.

As part of the Corrective action process the Laboratory has developed the Assessment Tracking System (ATS). Through this system, identified corrective actions are logged, assigned, and tracked to closure. At the department level, a parallel system – the Family Assessment Tracking System (FATS), is used to log, assign, and track assessment actions to closure.

3.5.4 Control of Records

The C-A Department and Superconducting Magnet Division manage records through the implementation of the Laboratory's Records Management Subject Area. The C-AD 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.

3.5.5 Internal Audit

As part of the BNL Integrated Assessment Program the C-A Self Assessment Plan and the Superconducting Magnet Division Self Assessment Plan both details each organization's response to the Laboratory's Critical Outcomes and the Environmental and Waste Management Services Division's Environmental Priorities. The Self Assessment Process encompasses planned assessments and compliance audits of the EMS Program. Assessments and audits are used as the basis for examining, identifying strengths, and correcting weaknesses within the EMS program to facilitate improved performance and compliance. Both CA-D and SMD participate in the Laboratory-level audit of the EMS program which follows the Environmental Assessments Subject Area. In addition, C-AD and SMD schedule a readiness assessment to examine any elements requiring additional surveillance or follow-up prior to the external EMS audit. The C-A Department's assessment process is defined in C-A-OPM 13.10.1, Independent Assessment and supplements the Environmental Assessments Subject Area.

Environmental Management System Assessments are scheduled, performed and tracked through the Q.A. Assessments and Tracking Database. The EMS assessment is conducted, at a minimum, annually. More frequent assessments may be performed on the basis of assessment results, corrective action follow-up, as determined by criticality, process change, or as determined by C-AD and SMD Management. Included as part of the Environmental Management System assessment will be an evaluation of regulatory compliance as reviewed through the targeted assessments explained in section 3.5.2, Evaluation of Compliance.

The scope of the annual EMS readiness assessment performed within the C-A Department and the SM Division shall be determined in conjunction with the scope of the Laboratory Level internal audit.

3.6 Management Review

The Collider Accelerator Department and the Superconducting Magnet Division, as a routine part of their operations, conducts various reviews at the senior management level. These meetings are held both weekly and monthly. C-AD meetings are reflected in the flow diagrams and table found in C-A-OPM-ATT 2.28.a. Annually, and prior to ISO-14001 re-registration, the C-AD/SMD Environmental Management Representative shall schedule a review of the C-AD/SMD EMS Program with senior management as part of that month's senior management meeting. The agenda will accurately reflect the scope of the presentation. The management review will be accomplished in accordance with the provisions of the Subject Area, Preparing and Conducting Environmental Management Reviews. In addition, handouts will specifically address the environmental issues and copies of these handouts will be filed in the quality office. A formal Record of Decision will be documented and approved as a result of the Management Review. As appropriate, these documented decisions will be formally included in the EMS program for action.