

Approved by:

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Physics Department Chair

Date

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Date

Physics Department, BNL

ESSH Self-Evaluation

Department Summary

Fiscal Year 2012

Self-Evaluation - Overview

The Physics Department's Self-Evaluation for FY 2012 assesses the Department's performance against the Laboratory's contractual Goals and Targets. Each of these has a number of objectives and performance measures linked to those objectives. The Department assesses the elements that are relevant to its internal strategic plans, operations, and objectives, with the goal of enhancing the performance of the Physics Department and contributing to meeting or exceeding its part for the Critical Outcomes of the Laboratory.

At the heart of this strong program of self-evaluation is the strong management commitment to ESSH, our Tier I Program, Work Planning and Control, Environmental Management System, and our proactive ESSH Committee.

Performance Measures for Brookhaven National Laboratory as established between the Department of Energy (DOE) and Brookhaven Science Associates (BSA)

There are eight performance measures that have been established. The Physics Department helps the Laboratory achieve its institutional goals by contributing at the departmental level to those measures that are applicable to the Department. Some performance goals are truly institutional and are not evaluated at the Department level.

Performance Measure 1.0 – Provide for Efficient and Effective Mission Accomplishment

The Physics Department continues to do its part in achieving 'World Class Science'. Our discoveries and publications, recognition of our excellent scientists through awards and support, continues to bring recognition to BNL.

Physics Department scientists are internationally recognized leaders in their fields. They participate in developing new science initiatives at BNL and also participate in scientific endeavors at other facilities world-wide and in establishing direction with their global counterparts for the next generation of initiatives and research tools.

Performance Measure 2.0 – Provide for Efficient and Effective Design, Fabrication, Construction and Operations of Research Facilities

The Physics Department provides the expertise for design, fabrication, and construction of the major detectors for RHIC. These plans are reviewed at the laboratory level and with the DOE to ensure their effectiveness and efficiency. The funding received to accomplish these reflects the confidence of the DOE developed through the past projects we have been successful with.

The Physics Department operates the Accelerator Test Facility (ATF), a proposal-driven Program-Committee-reviewed Users'-Facility dedicated for long-term R&D in Physics of Beams. ATF users, from universities, national labs and industries, are carrying out R&D on Advanced Accelerator Physics and are studying the interactions of high power electromagnetic radiation and high brightness electron beams, including laser acceleration of electrons and Free-Electron Lasers. Other topics include the development of electron beams with extremely high brightness, photo-injectors, electron beam and radiation diagnostics and computer controls.

Operations at the ATF are reviewed annually by the Department and the DOE. DOE and Laboratory approvals for the upgrades, operations, and new capabilities demonstrate continued commitment to this facility for its remarkable achievements.

Performance Measure 3.0 – Provide Effective and Efficient Science and Technology Program Management

The Physics Department accomplishes this in partnership with the Laboratory management. The Laboratory Director, Deputy Director for Science and Technology, Deputy Director for Operations, the Associate Director for Nuclear and Particle Physics, the Associate Director for Policy and Strategic Planning work with the Physics Department Chair and Associate Chairs to achieve this measure.

The Department works with Laboratory Management to develop new programs aligned with the DOE Mission and the scientific strengths of the Laboratory and participates in major projects at other laboratories world-wide. These programs are always well received by our scientific partners and reviewers, globally, demonstrating the excellence of our personnel and programs. The ability to get funding for some of these underscores their relevance to both the scientific community and the DOE.

Projects that have been previously approved and funded in prior years receive continued funding attesting to their effectiveness and efficiency. These projects undergo rigorous annual reviews internally and externally.

Performance Measure 4.0 – Provide Sound and Competent Leadership and Stewardship of the Laboratory

The Physics Department's Chair, Deputy Chair, and Associate Chair assist the laboratory in achieving this measure by ensuring that Group Leaders and scientists are globally recognized as leaders in their fields. Additionally, the support personnel are chosen and retained for their demonstration of their quality of performance in supporting their leaders and commitment to excellence in stewardship of the Departments programs and assets.

Performance Measure 5.0 – Sustain Excellence and Enhance Effectiveness of Integrated Safety, Health, and Environment Protection

The Physics Department continues to provide a work environment that protects workers and the environment. The Department strives to keep its DART rate below the Laboratory average and below the DOE Office of Science expectation of 0.25 cases per 200,000 hours worked. We also work to keep our OSHA total recordable case rate below the laboratory average and below the Office of Science interim goal of 0.65 cases per 200,000 hours worked.

The Physics Department integrates ESSH into its policies and procedures providing a management system that enhances the safety and well-being of our personnel and the environment. We meet all the requirements established by the Laboratory and in addition have instituted proactive measures to control or eliminate risks. By measuring our own performance and soliciting feedback through our Group Safety Coordinators and Department members we can continuously improve that performance.

The Department is participating in the Laboratory's Human Performance initiative and has already implemented some elements into our programs. The Physics Department will ensure worker, scientist and technician participation in hazards assessment, evaluation and mitigation at the "task level." Job Risk Assessments will be reviewed and updated as deemed appropriate.

The Physics Department has developed an accident/incident management program where all incidents and accidents including first aid cases are investigated. First aid cases are reviewed by the Physics Department's Manager of ESSH&T Programs to determine the level of the investigation. The Group Leader owning the accident or incident has the responsibility to perform the initial investigation. The ESSH Committee reviews and provides further investigation, if necessary, develops corrective actions and lessons learned which are subsequently shared with Group Safety Coordinators and the entire Department at an 'all-hands' meeting.

The Physics Department effectively manages its waste effectively and efficiently and participates in identifying 'Pollution Prevention' projects and 'Safety Solutions' projects. The Department has had success in attempts to find funding within these Laboratory programs but will also fund others on its own.

The Department maintains its ISO 14001 and OHSAS 18001 registration.

Performance Measure 6.0 – Deliver Efficient, Effective, and Responsive Business Systems and Resources that Enable the Successful Achievement of Laboratory Missions

The Physics Department performs its part in helping the Laboratory achieve this measure through its participation in acquiring and developing the Laboratory business systems that meet its needs and by providing feedback to the business division for the programs in place.

The Department has set up an efficient means of reviewing acquisitions and maintaining its property that meets all laboratory requirements and incorporates additional reviews for safety and management.

Personnel in the Physics Department are our most valuable resource. Much time is devoted to recruiting and hiring excellent people, and to mentoring and assisting them in their development, both professionally and personally. The Physics Department strives to enhance its diverse population

in its hiring practices to ensure global participation in creating new ideas and tools that serve the needs of researchers world-wide.

The Physics Department invites external review from subject matter experts from Laboratory and DOE resources at BNL and participates openly in reviews from external agencies. The Department values these audits as validation of our excellent programs using any corrective actions or recommendations to provide the safest and healthiest working environment in the Laboratory and DOE complex.

Performance Measure 7.0 – Sustain Excellence in Operating, Maintaining, and Renewing the Facility and Infrastructure Portfolio to Meet Laboratory Needs

The Physics Department uses its resources in a most efficient and effective manner to maintain its infrastructure. We are involved in working with Laboratory Management to keep our operations in a safe and reliable condition. Our Tier I program includes inspection of infrastructure, developing any corrective actions, and relaying our needs to management.

Performance Measure 8.0 – Sustain and Enhance the Effectiveness of Integrated Safeguards and Security Management (ISSM) and Emergency Management Systems

The Physics Department participates in preparations for emergencies in concert with the Emergency Services Division. We keep them informed of our hazards and emergency needs for our people and equipment. Hazard placards are well maintained and people are trained as local emergency coordinators to assist as necessary. Experimental Safety Reviews require the principal investigator to list any emergency preparations or responses required for their work.

DOE property and equipment are properly managed. The Department also complies with all cyber security requirements. While the Department is not directly involved with classified or sensitive information, we strive to keep all our information and materials as secure as is reasonable. The Department has appointed its Manager of ESSH&T Programs as the ISSM point of contact to ensure effectiveness of this program.

ESSH Areas Assessed

This year a comprehensive review was undertaken in the following areas: Communications, Training, Leadership, Tier I Inspection Program, Industrial Hygiene Monitoring, ESSH Committee and Work Planning, Security, Cyber Security, Accident and Incident Management, Emergency Management, Corrective Action Management, Accelerator Test Facility (ATF) issues, Memoranda of Understanding (MOUs), Group Safety Coordinator (GSC) Program, Environmental Performance, Summer Student Monitoring Program, and Safety Observations. Additionally, we work with the Condensed Matter Physics and Materials Science Department of the BES Directorate to assess our performance in handling many of their ESSH functions as outlined in MOUs established last year.

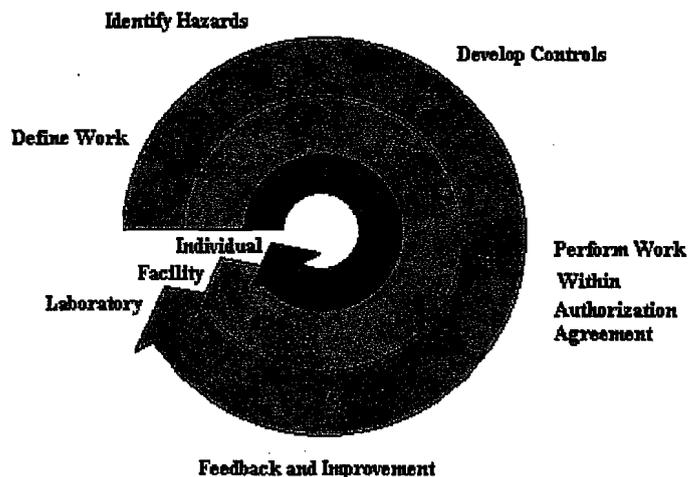
Overall ESSH Performance

The Physics Department's performance with respect to ESSH in FY 12 has been excellent. There was an enormous amount of effort put in by our management and safety personnel to keep us all safe throughout the relocation of many of our offices and labs for the reconstruction of the 3-story wing. Tons of old equipment and paper have been removed, every vacated lab sampled for lead, beryllium, chromium, and cadmium with very good results. In addition, we have done extremely well keeping ourselves in compliance as evidenced by our performance with all the Departmental, BNL, and external audits. Tier I findings have been reduced mostly from the attention given by our Facility Project Managers and Facility Complex Manager. Our goals and objectives have been accomplished with two incidents, not ORPS reportable, but reported as SCBNL Management Concerns, for the fiscal year. There were no PAAA violations.

There was 1 DOE (OSHA) recordable case, a DART rate of 0.33 (number of cases/200,000 hours worked), a TRC rate of 0.33 (number of cases/200,000 hours worked) and 2 first aid case (non-sport related).

Integrated Safety Management

The Physics Department has embraced the core functions of Integrated Safety Management (ISM) in its conduct of work planning and control for operations and experiments. The Experimental Safety Review Form is organized into sections that are aligned with the 5 core functions – Define the scope of the Work, Identify the Hazards, Develop Controls for the Hazards, Work within the Approved Safety Envelope, and Provide Feedback to improve or fine tune the processes.



As a Department, we continue to assess and improve the process in response to the feedback received from the Laboratory, assessments and audits, incorporation of OHSAS, Group Safety Coordinators, and from the workers. The Physics Department has assessed how we are doing with conformance to the Seven Guiding Principles of Integrated Safety Management. These are presented below. In summary, we believe we have fully integrated ISM in our Department and are looking to continuously assessing what we are doing and to continuously improve.

7 GUIDING PRINCIPLES OF INTEGRATED SAFETY MANAGEMENT ...AND HOW THE PHYSICS DEPARTMENT IMPLEMENTS THEM

Line Management Responsibility for ESSH.

Responsibilities are well documented (Physics Department Policies, SBMS, etc.)

Weekly Management discussion of safety as first item

Group Leader involvement in any incident/accident investigation

Department Management and Group Leader participation in Tier I Inspections

Department Line Management participation in Safety Observations

Department Chair directs Group Leaders to appoint a Group Safety Coordinator, and Group Leaders allow that person to spend time on ESSH issues

Clear Roles and Responsibilities

All employees have R2A2s

Safety Responsibilities well defined by Department Policies

JTAs reviewed annually or as jobs change

MOUs for interdepartmental work

Competence Commensurate with Responsibilities

Authorized Worker Lists

Users receive hands-on training (where applicable)

Workers are required to read and sign ESR or Work Permit

Balanced Priorities: on the grand scale, are the hazards being appropriately addressed?

The Department does address the hazards associated with work and recognizes its need to allocate resources to address safety, through its programs and operations.

Job Risk Assessments are used to evaluate hazards or risks

Identification of ESH Standards and Requirements

The Department follows the SBMS for all the standards and requirements it operates under.

Hazard Controls Tailored to Work Being Performed

The Department has comprehensive SOPs and ESRs that list and describe all the hazards and provide controls for each. This is a dynamic system that changes with feedback or as experiments evolve.

Operations Authorization

For the User

Comprehensive Check-in procedures and forms

Site specific training by PIs (or his designee) is an individual training providing an excellent platform for interaction and evaluation of competence.

Authorized User Lists (Electrical Workers, LO/TO, Laser Operators, ATF Linac Operators, Modulator Operators, Machine Shops, Material Handlers)

For the Experimental Laboratory

ESR or Work Permit that is comprehensive

For the ATF

ATF Specific training, SAD, ASE, COO, ATF Procedures

Details of the Assessment

The Physics Department's Safety & Training Office performed the initial assessment. Input was solicited from Group Leaders and members of the Department, statistics were generated by the ESH Coordinators and the report written by the Manager of ESSH&T Programs. The draft was distributed to the ESSH Committee, Group Safety Coordinators, and Line Management for comment. The results are as follows.

Communications

There is a strong Line Management Commitment to safety through the discussion and review of ESSH topics at each Department Management Meeting (usually weekly), Department Group Leader Meetings, Department Group Meetings, and at Department "All Hands" Meetings. These meetings have been enhanced with an increased safety focus, with a goal of reaching every employee. The meetings included safety issues as a principal component of discussion, usually first.

The Physics Department Chair has mandated that all Physics personnel receive the "Weekly Injuries and Events" email sent out by the Laboratory's ALD for ESH. This keeps our people informed of the injuries, incidents, and areas of concern the Laboratory wants people to focus on.

Group Leaders remain committed to providing their personnel a safe working environment and encourage communication in their group meetings. Groups meet at different frequencies depending on the nature of their work. The following have been reported by Group Leaders for this self-evaluation.

The Electronic Detector Group has weekly meetings with safety as a regular agenda item. They discuss ORPS reports, ESRs and observations from their everyday work experience.

The PHENIX Group has group meetings the first and third Thursdays of the month for scientific staff where safety is always a topic on the agenda. The PHENIX technical support team has weekly meetings to discuss safety, work planning, and jobs for the upcoming week. This includes all technicians, engineers, scientific associates, and PHENIX physicists involved in operations. In addition, the engineers and techs on PHENIX discuss the work plan in 1008 at the beginning of each working day. This involves CA-D engineers and safety personnel before the start of all major tasks and scheduling the necessary safety reviews with the various safety review committees when appropriate.

The Physics Applications Software Group holds weekly meetings where safety is discussed as relevant to computer engineers and scientists.

The RHIC and ATLAS Computing Facility Group holds weekly group meetings where safety and cyber security matters are discussed.

The Accelerator Test Facility Group has engineering meetings each Monday morning to discuss safety related to the ATF (any corrective actions related to ATF, interlock work, documentation, rack grounding, etc.), and Friday meetings where safety is also discussed.

In the STAR Group there are three primary vehicles for communication:

Regular group meetings at which safety is a recurring item for discussion; regular (weekly during the Shutdown) Scheduling and Coordination meetings to review tasks planned to be carried out in the STAR experimental hall and associated buildings, in which work planning is one of the objectives; STAR Skill of the Craft Training.

The first item above is targeted to maintain high awareness on the part of BNL employees who work on STAR that safety is integral to every task they perform and that it has first priority. Ten to fifteen minutes is spent at each group meeting (approximately 1 per month) discussing an aspect of safety (e.g. work planning), reviewing the lessons learned from incidents that have occurred, etc.

The second vehicle above is intended to insure that all work performed at the STAR site by BNL employees and non-BNL guests and visitors goes through the appropriate work planning process before work begins.

The third item is the way in which STAR visitors, collaborators, and guests are informed about their responsibilities related to work planning while working at the STAR site. All STAR Collaborators are further required to take and pass C-AD user training before going to the STAR hall. This training they are aware of the potential hazards they may encounter while at RHIC/STAR, what their response should be if they do encounter such hazards, and what their rights and responsibilities are regarding safe conduct of operations at the STAR hall.

The **Advanced Accelerator Group** has roughly 2 group meetings per year where safety is discussed. Most of the group's work is computer based.

The **OMEGA Group** is a diverse group working in physics analysis, software development, computing, detector construction and operation, and research and development in labs. Regular work planning meetings are held for different areas of work and safety is discussed. As needed, lessons learned discussions take place along with follow-ups to our tier 1 inspections. When work planning involves working at other locations (CERN, Fermilab etc.) the staff is required to conform to the safety policies of the locations in addition to the policies instituted by Brookhaven

The **RHIC Spin Group** encompasses three working sub-groups: STAR, PHENIX, Polarimetry. The STAR subgroup discusses safety regularly in its weekly work planning meetings. The Polarimetry subgroup meets weekly during the running of RHIC and as needed during the other periods. Safety is an integrated part of the meetings and included in the work planning. The PHENIX subgroup includes safety discussions and training in preparation for shift duties.

The **High Energy Theory Group** has weekly group meetings along with lunch seminars. Safety and Cyber security issues are discussed and dealt with as needed.

The **RIKEN BNL Research Center ("RBRC")** has weekly group lunch seminars and experimental meetings. Safety pertinent issues such as safety are discussed and dealt with as needed. RBRC has had a perfect safety record since its inception in 1997.

The Department's ESSH Committee reviewed our ESRs electronically not requiring meetings since much of the work is on-going from year to year.

There was one Group Safety Coordinator Meeting to focus on groups' safety and provide valuable worker feedback on safety to Line Management. These discussions are very productive and help to round out the ISM cycle. Additionally, regular communication is maintained with the GSCs conveying safety bulletins and alerts, lessons learned, and soliciting input on various policies and issues.

There are good lines of communications between the ATF and the Physics Department's ESSH personnel. The ATF ESH Officer is the Group Safety Coordinator for the Accelerator Test Facility Group and is a member of the ESSH Committee. This ensures ATF representation in all ESSH activities in the Department. The ATF Group Leader includes the Manager of ESSH&T Programs on the distribution list for the weekly Engineering Meeting notes.

The Physics Department continues to disseminate information on accidents, recalls of products, timely safety messages, and lessons learned to its personnel.

Training

The Physics Department maintained a level of 99% of required training completed for employees and 89% for guests as of 9/30/12.

All employees and long term guests received and reviewed their JTAs.

The ATF ESH Officer performs monthly training database and ESR audits of all ATF staff and experimenters. He also gives the Department specific training in addition to the ATF Facility training.

Leadership

The Department ensures it has representation on all the SBMS Subject Area Development Groups for those areas affecting the Department. The Manager of ESSH&T Programs is the SBMS POC (Point of Contact) to ensure all relevant changes to existing Subject Areas or the development of new ones are properly reviewed and/or passed to appropriate Department members for their review.

Members of Physics Department who are involved in departmental and laboratory safety committees or SBMS Subject Areas:

Marcus Babzien

- **Laser Safety Committee**

Dana Beavis

- **Chair, C-AD Radiation Safety Committee,**
- **C-AD Legacy Committee,**
- **C-AD Experimental Safety Committee,**
- **Laboratory ES&H Committee**

Bill Christie

- **RHIC Experimental Safety Committee,**
- **HP Advocate,**
- **NPP Safety Council**

Ron Gill

- **ESH Coordinator,**
- **PO Source Custodian**
- **Working with Chemicals Working Group,**
- **Small Science Working Group,**
- **Physics Department ESSH Committee,**
- **Experimental Safety Review Coordinator,**
- **HP Advocate,**
- **Group Safety Coordinator,**
- **Electronic ESR Development Team,**
- **Daya Bay Safety Officer,**
- **LBNE-WCD Safety Officer**

Brant Johnson

- **ESSH Committee Chair,**
- **BNL Director's Safety Committee,**
- **PAAA Committee,**
- **NPP Safety Council**

Karl Kusche

- **ESSH Officer at the ATF,**
- **Public Access AED SBMS Subject Area,**
- **Group Safety Coordinator,**
- **Physics Department ESSH Committee**

Mike Zarcone

- **Training & Qualifications Steering Committee,**
- **Operations Management Forum,**
- **Radiation Protection Committee,**
- **Causal Analysis and Corrective Management Team Member (PPE Assessment)**
- **NPP Safety Council,**
- **Physics Department's ESSH Committee,**
- **Radiation Generating Devices Custodian,**
- **Work Control Manager,**
- **Integrated Safety & Security Management Representative,**
- **EEO Representative,**
- **Diversity Committee,**
- **HP Advocate,**
- **Physics Department's Spotlight Nomination Review Committee,**
- **Conduct of Operations Planning Team,**
- **Conduct of Operations Review Board,**
- **'Bates Commission – Healthy Workplace Working Group,**
- **Integrated Quality Information Systems CIP Team.**

The Physics department recognized its Group Safety Coordinators with a 'Thank You Luncheon' again this year for the leadership they provide do in bringing safety issues to their groups and group safety issues to management. Additionally, those who are recognized for their safety performance are invited.

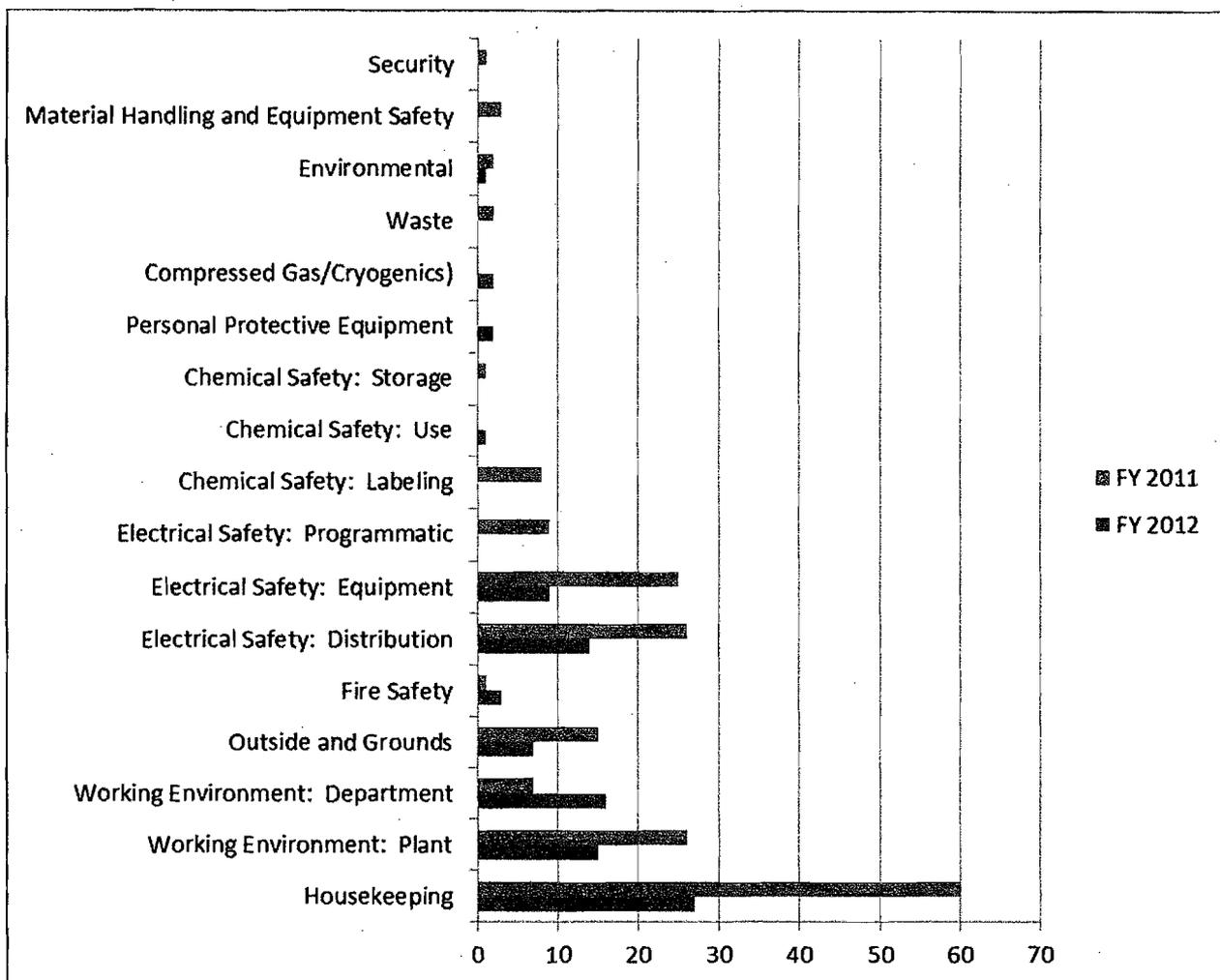
Cyber security issues are included in our weekly Management Meeting with one or both of our two Cyber security representatives, Brett Viren and Tom Throwe attending and giving weekly updates. The Department demonstrates leadership as Tom Throwe was the former head and Martin Purschke is the current head of CSAC (Cyber Security Advisory Council). The Department has a total of seven representatives in CSAC.

Tier I Program

The Tier 1 program worked very well this year as the number of findings fell by about 50% from last year. This is mostly attributed to the attention given the infrastructure by the IFM Team. No situations involving 'imminent danger' were discovered. As can be seen from the data and the chart below, Housekeeping, Working Environment & Electrical Safety (daisy chaining, blocked breaker panels, bad cords) make up 90% of the issues, same as last year. Corrective Actions are assigned and tracked to completion. Participation was good with Department Chair, Associate Chairs, ESSH Committee Chair and members, PIs, Group Leaders, and Group Safety Coordinator participation.

Cat. #	Code	Category	1 st Qtr	2 nd Qtr	3 rd Qtr	4 rd Qtr	Total Findings 2012	Total Findings 2011
1	HK	Housekeeping	4	12	8	3	27	60
2	WEP	Working Environment: Plant	3	2	5	5	15	26
3	WED	Working Environment: Department	0	7	3	6	16	7
4	OG	Outside and Grounds	0	1	1	5	7	15
5	FS	Fire Safety	3	0	0	0	3	1
6	ESD	Electrical Safety: Distribution	1	5	5	3	14	26
7	ESE	Electrical Safety: Equipment	0	2	7	0	9	25
8	ESP	Electrical Safety: Programmatic	0	0	0	0	0	9
9	CSL	Chemical Safety: Labeling	0	0	0	0	0	8
10	CSU	Chemical Safety: Use	0	0	0	1	1	0
11	CSS	Chemical Safety: Storage	0	0	0	0	0	1
12	PPE	Personal Protective Equipment	0	1	1	0	2	0
13	CG	Compressed Gas/Cryogenics)	0	0	0	2	2	0
14	BH	Biohazards	0	0	0	0	0	0
15	RS	Radiation Safety	0	0	0	0	0	0
16	WT	Waste	0	0	0	0	0	2
17	EM	Environmental	1	0	0	0	1	2
18	MS	Machine Shop Safety	0	0	0	0	0	0
19	MH	Material Handling and Equipment Safety	0	0	0	0	0	3
20	IH	Industrial Hygiene Issues	0	0	0	0	0	0
21	SEC	Security	0	0	0	0	0	1
22	UP	Unsafe Practices	0	0	0	0	0	0
23	OT	Other	0	0	0	0	0	0
		Total	12	30	30	25	97	186

Table 1: Tier I Findings 2011 & 2012



Graph 1: Tier I Findings 2011 & 2012

Industrial Hygiene Monitoring

The Physics Department has continued its use of our Industrial Hygienist this year with sampling (lead, cadmium, chromium, beryllium, etc.), reviews of flammable cabinets and chemical storage areas for incompatibles and compliance, and sampling for legacy contaminants (radiation & chemicals) in a deceased retirees office in building 901.

ESSH Committee & Work Planning

The ESSH Committee consists of a Department of Energy Facility Representative, a member of the Physics Department's Management (a scientist), a Radiological Controls Division Technician, our Department's Environmental Compliance Representative, two ESH Coordinators, an engineer and ESH Officer from the ATF, and the Building Manager. Additionally, the Department Chair, the Deputy Chair, Associate Chair, Training Coordinator, and a Radiological Controls Division Representative are informed of all issues. Finally, subject area experts and other laboratory personnel are invited as needed.

The Committee reviewed and approved all ESRs that were brought to it this year. Work Permits have been updated in the Department for Machine Shops, computer room, and the routine work performed by staff at the ATF.

All Department Policies were reviewed and some reissued.

The ATF ESH Officer reviews all ESRs, ensures compliance with the Generic Work Permits for day-to-day ATF maintenance, machine shops, and operations. The ATF has its own Work Control Coordinator and generates job specific work permits as needed. Much of the operational procedures are governed by the Conduct of Operations, ATF Handbook, Accelerator Safety Envelope, and ATF task-specific procedures. ATF personnel consistently work within their approved work authorization.

ALARA - Dose Rates

Whole body exposures continue to be very low with a total cumulative exposure of 20 mRem for the entire year. This has been the case for the last 5 years where the annual exposures in mRem were 54, 28, 22, 28, and 24 for the calendar years 2011, 2010, 2009, 2008, and 2007 respectively. Doses at the ATF for the complex continue to remain below 100 mRem in all areas except one which was upgraded to a Controlled Area as a precaution even though it is in an unoccupied area.

The storage and radiological footprint for several laboratories where students occupy desks in the lab for long periods of time was reviewed and rearranged. None of the students from the Medical Department, doing work in our labs had received a dose for 2012.

Our source inventory was reviewed and 20 sources were disposed of to ensure we are not keeping sources that we have no use for in the Department or show damage as a prelude to future leakage.

Security

Security issues and information are presented at All Hands meetings. The Physics Department is in compliance with SECON security requirements. In particular, all laboratory and office doors are locked outside of working hours. Noncompliance reports (doors left open) have been given to the Department Chair and Group Leaders of the responsible individuals.

The Manager of ESH&T (Integrated Safety and Security Management Point of Contact) discusses the security ramifications of unlocked doors with the individuals whose doors were found open. In a number of cases the occupants were working after hours but were out of their offices at the time of the security walk-throughs.

Cyber Security

Cyber security receives a great amount of emphasis each year and the Physics Department has done its part to satisfy the concerns of the DOE. Cyber security issues are included in our weekly Management Meeting with at least one of our two Cyber security representatives attending.

The Laboratory succeeded in renewing its Authority to Operate (ATO) in July of 2011 and members of the Physics Department played major roles in updating the documentation required for the process. In addition, there was an audit encompassing Cyber Security by the DOE Chicago Office in September of 2011 and the Laboratory again received the highest "satisfactory" rating as in the 2009 audit. The smooth renewal of the ATO and the successful outcome of the audit were due, in part, to the great amount of emphasis cyber security is given by the Laboratory as a whole and by the Physics Department in particular. The Department's management and individual members continue to take the cyber security concerns of the DOE seriously.

All computers in the Department continue to have password protected screensavers activated, and DOE login banners installed. All computers running Windows based operating systems are part of the BNL Domain and all those running a form of UNIX have the Ordo host-based scanner installed. The Department continues to respond to potential findings from both the full quarterly network-

based scans and the targeted continuous network-based scans. An in-house developed application gives weekly notice of any systems that are out of compliance. Typically there are on order of or less than 0.1% of the department machines with any findings.

ITD has rolled out a project to centralize the administration of user accounts and system configuration management. The Physics Department has completed this on all existing machines and continues to bring new machines into compliance as they arrive.

Though not strictly a cyber-security issues, the NUHEP computing resources formerly located in Room 2-201 of the Physics Building have been moved to the renovated Room 1-89. In the process of moving the department servers, they have been consolidated and upgraded allowing for easier management and better control over security issues.

The Physics Department continues to provide leadership in CSAC (Cyber Security Advisory Council) along with timely input by the department's members of CSAC aimed at minimizing the impact of cyber security on the ability of the members of the department to do their research while maintaining a high level of cyber security.

Accident and Incident Management

There were two incidents, not ORPS reportable, but reported as SCBNL Management Concerns, for the fiscal year. There were no PAAA violations.

One incident resulted from the inability to locate proper A-1 bulk shielding drawings for the Accelerator Test Facility (discussed in the **ATF Issues** section). The other incident was due to heavy metal contamination and legacy radioactive materials found in a deceased retiree's office. This was shared with all Physics personnel at a Department All Hands meeting.

Retiree Incident

At the request of a Physics Department employee, two steel storage cabinets were inspected and found to contain bare lead and other suspect materials. The cabinets belonged to a retiree who was still active in research projects. Our IH person was called in to sample shelves in the cabinet and the retiree's office nearby. In the interim the Physics Department's ESSH Coordinators went through the retiree's office and confiscated samples and other materials, some marked with the yellow and magenta tri-foil indicating radioactive material, placing them in the Physics Department's radioactive materials area.

Upon examination, a number of chemicals and hazardous materials were found as were samples and materials that contained considerable amounts of C14. Although the room had previously been gone through with radiation detectors, we had not opened the sample containers which masked the beta radiation.

Unfortunately, the retiree passed away and the history and knowledge of the materials was lost.

The IH survey found lead and cadmium contamination throughout the office and storage cabinets and some beryllium in a file cabinet drawer.

All chemicals and research materials in the room were disposed of. Shelves filled with periodicals were recycled and his research notes boxed. The room's surfaces are being

cleaned for the contaminants and his research notes will go to the Records Department. All remaining office materials will be disposed of except for the fixed shelving.

The Physics Department performed an extent of condition, searching other retiree's areas to determine if other legacy materials existed. The review resulted in additional materials being sent out through hazardous waste.

There was 1 DOE (OSHA) recordable case, a DART rate of 0.33 (number of cases/200,000 hours worked), a TRC rate of 0.33 (number of cases/200,000 hours worked) and 1 first aid case (non-sport related).

- Severely Sprained Ankle – DART 10/11
- Strontium Source Found to be Leaking 10/11
- Broken Valve Releases LN₂ to Outdoors 11/11
- Asbestos Alarm in RSL-2 Area 1/12
 - Alarm due to improper pressure differential
 - No asbestos exposed at the time
- Finger Laceration, first aid 1/12
- Scalp Laceration. First aid 3/12
- ATF Laser Interlock Relay Failure 5/12
 - Laser could not be started – safety feature of interlock
 - Relay was identified and replaced
- Radioactive Materials in Retiree's Office 7/12
 - Legacy materials from past experiments
 - Heavy metal (Pb, Cd) contamination
 - Cleanup started, finished in FY13
- RSL-2 Workers Improper Handling of Gas Cylinders 7/12
 - Manager discussed safety issues with workers
- False Fire Alarms in 510 8/12
 - Related to RSL-2 work
- ATF Shielding Drawings 8/12 –SCBNL – Management Concern
 - A1 drawings for shielding missing
 - New drawings and calculations begun to address issues
 - Completion expected in FY13

Corrective Action Management

This year we reviewed some of the corrective actions that were generated in the past as part of the ATF fire. The actions were found to be in place and effective. In particular, the procedures were updated, more robust capacitors, and the installation of view port.

Accelerator Test Facility Issues

The Accelerator Test Facility (ATF) has operated since 1989. Initial design and operations of ATF were conducted and managed by the National Synchrotron Light Source (NSLS). The ATF was transferred to the Physics Department in May 2002. The Safety Assessment Document (SAD) and Accelerator Safety Envelope (ASE) that were approved in October 2004 incorporated these changes and an updated version was approved in 2010 as part of the five year review cycle.

Potentially weak areas were recently noted in the bulk shielding of the ATF experimental area. When the shielding prints were sought to more carefully examine the potential concerns it was discovered that the approved prints were not retrievable. It is not clear if the prints were misplaced

as part of the transfer process between departments or never existed. Additionally, it was discovered that analyses for important items were not retrievable. Either they were lost in the transfer or never existed. These include analysis of the movable W-plug, the high energy beam slits, the beam dumps in the experimental area, and modifications to the beam dumps in the experimental area.

An effort to retrieve the original drawings and analysis was not successful. Original drawings exist in the NSLS archives, but are not properly signed and reviewed as would be required for A-1 drawings. The original Safety Analysis Report and Safety Assessment Documents could not be found at the NSLS, ALD for ESH&Q's offices, or the Department of Energy. These documents may have contained analysis for the penetrations and some of the other components.

The Linac tunnel shielding has been physically inspected. The dimensions have been compared to the physical dimensions on the existing drawings. No significant differences were found in regards to the potential dose to workers outside the Linac tunnel shielding. Calculations were done using worst case scenarios showing the adequacy of the shielding. Fault studies were conducted (in FY 2013) that verify the adequacy.

The dose to the area monitors was reviewed quarterly. It is noted that all TLDs of personnel at the ATF have no recorded dose.

The new laser interlock system continues to function well. The testing procedure continues to be updated with small refinements.

Memoranda of Understanding

The Memoranda of Understanding were reviewed, or updated. These MOU establish the responsibilities for Work Planning and Control of Experiments and Tier I Inspections. They are:

- MOU with C-AD for Physics Personnel working in C-AD space
- MOUs (2) with C-AD for Configuration Management of Shielding and Interlocks
- MOUs (2) with ITD for our use of Building 515
- MOUs (2) with the CMPMS Department for their use of Building 510 space
- MOUs (2) with the Photon Sciences Directorate for their use of Building 820 space
- MOUs (2) with the Medical Sciences Department for our use of Building 901 space
- MOU with the Biology Department for our use of Building 463 space

GSC Program

The GSCs were again involved as members of our safety teams. Safety information (recalls, lessons learned, etc.) is 'funneled' to groups in this way. GSCs are responsive and feedback information to the Safety & Training Office. A 'Thank-You' luncheon and meeting was held in October. Nicole Kelly, Ken Asselta, Marcy Chaloupka, Joseph Cracco, Susan Duffin, Ron Gill, Harold Kirk, Karl Kusche, Richard Hogue, Sean Stoll, and our colleagues from the CMPMS Department - Robert Konik, Al Langhorn, Fran Loeb, Bill Schoenig, and Ed Stein.

The discussions and interaction of this group remain productive each year. The group is instrumental in bringing safety issues to management and bringing back information to their groups.

Many of the GSCs are now part of our Emergency Response Program. They have 'sweep' routes and accountability responsibilities. They work with the Group Leaders and the LEC and have greatly improved our compliance.

Environmental Performance

Physics has an outstanding record with regard to protecting the environment. Over the past few years, the waste generated has been below the projections Waste Management has provided for the Physics Department. The Department has increased awareness for proper waste disposal which has nearly eliminated personal waste (trash and items brought from home) and improper disposal of items (computer monitors, etc). More lead bricks in building 510 have been recycled and more at the ATF have been replaced with painted ones. Some vacuum pumps that contain oil have been replaced with dry pumps reducing the oil waste generated. We have reduced the number of chemicals and sources in the building.

Summer Student Monitoring Program

The Physics Department recognizes the additional risk posed by inexperienced people working in areas where hazards are present. In an effort to manage this, the Physics Department's Safety & Training Office maintained a list of summer students. The Department Chair and the ESH Coordinator met with the students as a group when they arrived. The ESH Coordinators and Building Manager specifically looked for students working in laboratories throughout the summer to make sure they were working safely. Students were reminded to wear bicycle helmets.

The ATF does host students throughout the year. The students receive a comprehensive orientation and are monitored at all times. Their ability to work independently is governed by their achievements in their areas of expertise and demonstrated record of compliance.

Physics Department & Condensed Matter Physics / Materials Science Department

In two MOUs established last year, the Physics Department provides safety services for the CMPMS Department. Specifically, responsibilities for ESRs, Work Permits, Authorized User Lists, Web request approvals for chemicals and hazardous equipment, Radiation Generating Devices, LO/TO, FUAs, waste, training, audits, Accident/Incident Investigation, EMS, OHSAS, Self-Assessment and Evaluation, Points of Contacts, and Tier I Inspections are covered in these agreements.

This arrangement will continue until the Interdisciplinary Science Building is built and the CMPMS group moves into it.

Safety Observations

The Physics Department Chair, Associate Chair, Deputy Chair, and Manager of ESSH&T Programs participate with the ALD of NPP, Managers and Chairs from the C-A Department and others to perform monthly safety observation walkthroughs in the NPP Directorate. These have proved to be fruitful. A number of corrective and follow-up actions have resulted from these observations. Each member completed the required 12 observations. Observations were undertaken in the Physics Department, Phenix & STAR Experimental Halls this past year. No unsafe acts were observed.

Additionally, our DOE Facility Representative and the Manager of ESSH&T Programs also make unannounced visits to areas of the Department. During these visits, workers have an opportunity to bring safety issues to the attention of our DOE Representative who has followed up on issues to the benefit of the Department, the work area, and the morale of employees.

Audits

External

- EMS-OHSAS Audit – 6/11
- IH Surveillance Audit – 10/11
- IH Assessment 2/12
- BHSO Assessment of Area Based PPE – 5/12

- BHSO Facility Rep Walkthroughs
- BHSO Property Walkthrough Inspection – 9/11

BNL Internal

- Nessus Daily scans for cyber security high vulnerability
- Nessus Full Scans – Quarterly
- Sealed Source Safety Analysis
 - Inventory of all sources (already in place)
 - Linked inventory to photos and safety analysis
 - Assigned Recommended Working Lifetime (RWL) to all sources
 - Disposed of leaking sources
 - Established use restrictions where applicable (bench top use in normal laboratory environment)
- Transfer of Sealed Sources Onsite/Offsite– 10/11
- IH Surveillance Audit – 10/11
- ERE 2nd and 3rd Floors of 3-story wing – 11/11
- Emergency Drill, Building 355 – 11/11
- ORE for Computer Room 12/11
- Emergency Drill, Building 510 – 12/11
- Facility Radiological Hazard Categorization 1/12
- Lead Inventory 2/12
- Injury/Illness Effectiveness Review – 2/12
- EMS OHSAS – 3/12
- Configuration Management Audit – 4/12
- Building 355 Fire Drill – 5/12
- Work Planning and Control, Prescribed Work – 5/12
- D. Gibbs Walk-through of 510 PO Area-Based PPE – 7/12
- Hazardous Materials On-site Transfer 7/12
- RGD Training Assessment – 7/12
- Work Planning and Control, Worker Planned & Permitted Work – 9/12
- Laser Tier I – 9/12
- Legacy Beryllium Survey 9/12 (ongoing)
- Gap Analysis for Work Planning Subject Area Implementation
- Performed as collaboration with other departments

Physics Assessments

- Tier 1 Inspections
- Management Work Observations
- Quarterly Reviews of ATF Area Dose Rates
- Required Annual Reviews
- Individual Dose Rate including cross-departmental workers
- Annual Policy & Procedure Reviews
- Annual Hazard Placard Reviews
- Annual LO/TO Review
- Some Ergonomic Evaluations
- ESR Read & Sign Audit 11/11
- Work observations found workers who never heard of ESRs
- Found poor compliance (42%) with requirement to read & sign
- Sent instructions to all personnel listed on ESRs
- Compliance initially rose to ~75%
- Compliance now about 56%, but many are visitors not here to sign

- Physics Department FY12 Self Evaluation – 1/12
- Chemical Inventory Reconciliation 3/12
- JRA Review 8/12
- Machine Shop Inspection – 5/12
- Machine Guarding Evaluation 8/12
 - Designed/constructed drill press guards
 - Purchased lead-screw guard – found that it didn't work
- Deceased/Retired/Terminated Former Personnel Items Reviewed for Records – 9/12
- Legacy Basement Items Review/Purge – 9/12
- BOREs (RSL-2) 9/12
 - Clean room
 - Large Seminar Room

Completion of Recommendations/Goals for FY 2012

1. Inspect battery area weekly - **Complete**
2. Roll out the new emergency management plans to occupants of 510, 901, and 355 and have drills to practice them. - **Complete**
3. Review and remove radioactive sealed sources and materials that are non-standard, are types known to leak, or have no path forward at this time or the near future. - **Complete**
4. Look for any safety issues associated with personnel in new environments due to the RSL-II project. - **Complete**
5. Improve compliance with the new area based PPE. - **Complete**
6. Review the corrective actions associated with the 2009 fire at the ATF to assess their effectiveness. - **Complete**
7. Monitor the interface between the construction activities and physics personnel to ensure adherence to the posted rules. - **Complete**

Recommendations/Goals for FY 2013

1. Make improvements in the Physics Department's Configuration Management Program
 - a. Hired a QA person to conduct reviews
 - i. Department Policies
 - ii. ATF Procedures
 - iii. Legacy stored materials from former personnel
 - iv. Drawings
 - v. Update R2A2s for responsible people
2. Make improvements in the Physics Department's Work Control Program
3. Facilitate the move of CMPMS Department personnel out of 510 without injuries or incidents
4. Work with the C-A Department to pave the way for the ATF organizational change
5. Procure and add the e-stops to all 120 VAC machine tools in the Machine Shop
6. Get rid of more legacy waste – oven in High Bay, materials in storage cages in basement, unused rad materials (thorium disks, gold strips, etc.)
7. Maintain good safety record, no injuries, no incidents

Acronyms

ALARA	As Low As Reasonably Achievable
ALD	Associate Laboratory Director
ASE	Accelerator Safety Envelope
ATF	Accelerator Test Facility
ATS	Action Tracking System
BES	Basic Energy Sciences
BNL	Brookhaven National Laboratory
BSA	Brookhaven Science Associates
BTMS	Brookhaven Training Management System
BURF	Beryllium Use Review Form
C-AD	Collider-Accelerator Department
CA	Corrective Action
CFN	Center for Functional Nanomaterials
CMP	Condensed Matter Physics
CMPMS	Condensed Matter Physics & Materials Science
CMPMSD	Condensed Matter Physics & Materials Science Department
COO	Conduct of Operations
DART	Days Away, Restricted, or Transferred
DEC	Department of Environmental Compliance
DER	Department EMS Representative (R. Gill)
DOE	Department of Energy
DOE-BHSO	Department of Energy-Brookhaven Site Office
EAC	Environmental Assessment Committee (R. Gill and F. Craner)
ECR	Environmental Compliance Representative (F. Craner)
EMS	Environmental Management System
ESH (ES&H)	Environment, Safety, and Health
ESH&Q	Environment, Safety, Health & Quality
ESR	Experimental Safety Review
ESRC	Experimental Safety Review Coordinator
ESSH	Environment, Safety, Security, and Health
ESSH&T	Environment, Safety, Security, Health, and Training
EWMSD	Environmental & Waste Management Services Division
FCM	Facility Complex Manager
FPM	Facility Project Manager
FY	Fiscal Year
GSC	Group Safety Coordinator (See <u>GSC list</u>)
IA&O	Internal Audit and Oversight
ISM	Integrated Safety Management
ISSM	Integrated Safeguards and Security Management
ISO	Independent Standards Organization
ITD	Information Technology Division
JTA	Job Training Assessment
LOTO	Lock Out Tag Out
LSO	Laser Safety Officer
MOU	Memorandum of Understanding
MPMS	Magnetic Properties Measurement System
NFPA	National Fire Protection Act
NPP	Nuclear and Particle Physics
NRTL	Nationally Recognized Testing Laboratory

NSLS	National Synchrotron Light Source
NYSDEC	New York State Department of Environmental Compliance
OHSAS	Occupational Health & Safety Assessment Series
OPSEC	Operations Security
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
PAAA	Price-Anderson Amendment Act
PI	Principal Investigator
POC	Point of Contact
R2A2	Roles, Responsibilities, Authorities, and Accountabilities
R&D	Research and Development
RCD	Radiological Controls Division
RCRA	Resource Conservation and Recovery Act
RF	Radio Frequency
RGD	Radiation Generating Device
RHIC	Relativistic Heavy Ion Collider
SAP	Self Assessment Plan
SBMS	Standards Based Management System
SECON	Security Conditions
SOP	Standard Operating Procedures
TLD	Thermoluminescent Dosimeter