

OVERSIGHT

Focused Safety Management Evaluation of the Brookhaven National Laboratory

June 1999



Office of Oversight

Environment
Safety
Health
Safeguards
Security

A map of the United States with state boundaries, colored in yellow and blue.

Office of Environment, Safety and Health

Executive Summary

EVALUATION: Office of Oversight Evaluation
of Integrated Safety
Management

SITE: Brookhaven National
Laboratory

DATES: May - June 1999

Scope

The Department of Energy (DOE) Office of Oversight, within the Office of Environment, Safety and Health, evaluated the safety management program at Brookhaven National Laboratory (BNL) as implemented by the DOE Headquarters lead program secretarial office—the Office of Science (SC); the DOE Chicago Operations Office (CH); the Brookhaven Group (BHG); the prime contractor—Brookhaven Science Associates (BSA); and selected subcontractors. The evaluation focused on the adequacy of the current

integrated safety management systems and the adequacy of efforts to develop safety management systems that meet the requirements of the DOE integrated safety management (ISM) policy. This evaluation also provides a perspective on the status of improvements since the identification of significant safety management weaknesses in 1997.

Background

The January 1997 discovery of tritium contamination of the groundwater under the High Flux Beam Reactor has been the catalyst for significant changes in DOE's approach to safety management and environmental protection at BNL. Various evaluations, including an Office of Oversight review of the tritium contamination (January-February 1997) and an Oversight safety management evaluation (March-April 1997), highlighted significant weaknesses in the BNL safety management systems. While some progress was noted, continued safety weaknesses were identified in an August 1998 follow-up review. Some of the issues identified in the 1997 reviews included poorly defined responsibilities, lack of line management accountability for safety performance, and an imbalance between safety and science priorities. Such weaknesses contributed to delays in identifying the tritium groundwater contamination and numerous other safety-related deficiencies (e.g., inadequate work planning processes). The realization that contamination of groundwater was a symptom of a weak environment, safety, and health (ES&H) management system, compounded by a loss of public trust, prompted aggressive and unprecedented actions by BNL, DOE Headquarters, and external regulators. The initial response included an extensive program for monitoring and containing groundwater contamination. Subsequently, the then-Secretary of Energy made the unprecedented decision to replace the BNL contractor (the contractor transition occurred in March 1998) and realign DOE responsibilities such that BHG reported, until recently, directly to SC.

Results

SC and BHG, in cooperation with the new contractor, BSA, have taken action to strengthen ES&H programs. BNL is developing a systematic approach, referred to as the standards-based management system (SBMS), for integrating safety into operations and experiments in accordance with the DOE ISM policy and requirements. In addition, under an agreement with the U.S. Environmental Protection Agency, an Environmental Management System (EMS) is being developed to better control the impact of BNL activities.

In accordance with the Secretary's direction in 1997, SC established a DOE Action Plan for Improved Management of BNL to clarify and communicate roles and responsibilities for ES&H. In general, the

commitments identified in the Action Plan were effectively implemented and contributed to improvements in DOE's management and direction of the BNL contractor. BHG has improved its ability to provide management and oversight of BNL through the acquisition of a number of highly qualified technical employees. BHG and BNL have been effective in establishing elements of an institutional framework for safety management systems that, if sustained, will drive improvements in BNL ES&H programs.

Over the past two years, line management at all levels has embraced safety and environmental protection as integral to the BNL mission. BHG and BNL leadership has improved, has clearly communicated safety policy and expectations, and is establishing processes to ensure that organizations and individuals are accountable for safety performance. Examples of accomplishments and initiatives include:

- BHG and BNL have greatly enhanced the community communication processes and effectiveness in the past year. In addition, BHG and BNL leadership has significantly enhanced mechanisms for community communications to regain and maintain public trust.
- BNL has established acceptance of safety provisions as a condition of employment that is signed by all BNL personnel as part of an aggressive approach to address weaknesses in the radiological protection program.
- BHG and BNL have established a new "Stop Work" policy and incorporated safety goals and performance measures (referred to as critical outcomes at BNL) into the BNL contract.
- BNL has implemented an institutional work planning and control process.
- BNL committed to a policy of environmental stewardship to integrate pollution prevention, waste minimization, resource conservation, and compliance into planning and decision-making.
- The BNL assessment processes are maturing and are generally effective in the ES&H and Environmental Management organizations where they have been implemented and supported by line management.
- The SBMS, which is the new BNL business framework, addresses the full implementation of ISM via a comprehensive and well-designed method.

SBMS is still in development and the early stage of implementation, and some initiatives are not yet achieving their objectives. For example, efforts to link BNL management accountability to critical outcomes have experienced startup difficulties and vary in effectiveness across BNL. Continued attention and additional operational experience are needed to ensure that organizational and individual accountability mechanisms are working as intended. Continued attention is also needed to address "site culture" issues, such as a level of facility autonomy that is not conducive to rigorous implementation of consistently effective work control processes and ISM. The degree of implementation varies considerably throughout the BNL organization, and implementation is not consistently effective. While some organizations have had considerable success, other organizations have not devoted sufficient attention to implementation of safety management initiatives. As identified in previous evaluations, SC has not established a Functions, Responsibilities, and Authorities Manual as required by DOE Policy 411.1 to formally establish responsibilities and authorities within the line organization in implementing safety management responsibilities.

SC, BHG, and BNL management have provided strategic leadership and are committed to ISM. However, additional attention and further improvements are needed in day-to-day management of ES&H programs and safety issues. Uncorrected weaknesses persist in some ES&H programs, such as chemical safety and emergency management. In addition, attention is needed to ensure that historically inadequate safety manuals, standards, and procedures are updated in a timely manner to reflect improved practices and address the highest-risk activities. In some cases, SBMS protocols have hindered needed changes and updates of procedures or standards.

Feedback and continuous improvement systems are not yet effective in some organizations, and assessment processes have not fully identified and corrected weaknesses in important programs. The BNL processes for communicating, prioritizing, and correcting deficiencies during the transition to SBMS have not yet addressed more current concerns, such as emergency management and industrial safety vulnerabilities. Some ES&H-related projects, such as final safety analysis report upgrades for the BNL nuclear reactors (i.e., the High Flux Beam Reactor and the Brookhaven Medical Research Reactor) and upgrades to the site infrastructure, have been delayed because of resource allocation issues. Increased management attention is needed to ensure that assessment programs are fully implemented and effective.

Conclusions

SC, BHG, and BNL have demonstrated their commitment to implementing ISM and have made significant improvements in safety management systems. BNL is establishing the management framework to drive further improvements. Improvements are particularly apparent in areas such as BHG and BNL clarification of roles, responsibilities, and accountability; balanced priorities through resource investments and program planning and budgeting systems; BHG oversight capabilities; and efforts to enhance public outreach.

Many of the ongoing initiatives, however, are not fully implemented and are not yet achieving their objectives. Additional attention is needed to improve certain ES&H programs as the commitment for meeting ISM implementation draws closer. BHG and BNL clearly understand that much work remains to implement ISM in accordance with the schedule established by the Secretary and reflected in the contract (i.e., by October 2000).

SC, BHG, and BNL understand the need to sustain attention and momentum to ensure that milestones are met, that ongoing and planned initiatives achieve their objectives, and that ISM is fully and effectively implemented as an ongoing management system for continuous improvement. BHG and BNL need to devote particular attention to ensuring that progress continues while SC and CH realign their responsibilities in accordance with the Secretary of Energy's recent direction. Although development of ISM is not yet complete, BNL is working successfully to meet a challenging schedule, has made a number of important accomplishments, and has a clear goal for establishing a comprehensive ISM system to effectively manage and safely conduct world-class research.

ISSUES FOR FOLLOW-UP AND CORRECTIVE ACTION

In accordance with the DOE Implementation Plan for DNFSB Recommendation 98-1, DOE has established a process for recording, tracking, addressing, and resolving issues identified by independent oversight evaluations. SC, as the DOE lead program secretarial office, is required to develop a corrective action plan to address the issues identified on this Oversight evaluation, as well as a separate plan to address “legacy” issues from previous evaluations. The issues presented below complement, but do not duplicate or supersede, the legacy issues. The Office of Oversight recognizes that some corrective actions may address elements of multiple issues.

1. SC has not established clear roles and responsibilities and accountability mechanisms for its managers and staff as committed to in the 1997 DOE Action Plan for Improved Management of BNL and required by DOE Policy 411.1, and BHG has not completed the development of a Functions, Responsibilities, and Authorities Manual.
2. BHG has not institutionalized a structured process for review and approval of the authorization basis for accelerator facilities.
3. SC, BHG, and BNL have not ensured that the emergency management program meets requirements of DOE Order 151.1 and that BNL personnel are fully trained and prepared to respond to an onsite emergency.
4. BHG does not have formal procedures for managing DOE requirements in the BSA contract or a formal process for managing non-DOE requirements that may impact Laboratory operations.
5. BNL institutional-level documents that promulgate requirements and expectations for ES&H have not been updated to reflect current requirements, and BHG and BNL have not prioritized efforts to upgrade institutional-level requirement documents based on the potential hazards and risks.
6. BNL has not ensured that subcontracts contain applicable requirements (i.e., DEAR clause on Integration of Environment, Safety, and Health into Work Planning and Execution as required by Article 72 of the BSA contract).
7. BNL’s training program is not consistently applied within organizations to ensure that training needs are based on a thorough analysis of employee job activities and associated hazards, as required by the BNL training policy.

The Office of Oversight conducted a focused safety management evaluation at Brookhaven National Laboratory (BNL).

The U.S. Department of Energy (DOE) Office of Oversight, within the Office of Environment, Safety and Health, conducted an independent oversight evaluation of safety management from May through June 1999 at Brookhaven National Laboratory (BNL). The purposes of the evaluation were to determine how effectively DOE and contractor line management have implemented integrated safety management (ISM) at BNL and to assess the adequacy of efforts to develop safety management systems that meet the requirements of the DOE ISM policy. This Oversight evaluation also provides a perspective on the status of improvements since the identification of significant safety management weaknesses in 1997.

BNL receives direction from the DOE Office of Science (SC) through the Chicago Operations Office (CH) Brookhaven Group (BHG).

Established in 1947, BNL performs basic and applied research in energy, life, and environmental science. BNL receives direction from the Brookhaven Group (BHG), which is part of the DOE Chicago Operation Office (CH). In accordance with the organizational changes announced by the Secretary of Energy on April 21, 1999, CH now reports directly to the DOE Office of Science (SC), which has been designated as the lead program secretarial office for CH. The management and operating contractor for BNL is Brookhaven Science Associates (BSA). BSA assumed responsibility for operating BNL on March 1, 1998.

Figure 1 shows a simplified view of the DOE and contractor organizations that have key roles in managing activities at BNL. Figure 2 shows simplified versions of the BHG and BNL organizational structures.

TERMINOLOGY

Safety management refers to those systems required to ensure that an acceptable level of protection of the public, workers, and environment is maintained throughout the life of a facility or operation. The term “safety,” when used in the context of safety management or the safety management program, specifically includes all aspects of environment, safety, and health.

Line management refers to the chain of command that extends from the Secretary of Energy through the Deputy Secretary or Under Secretary to the cognizant secretarial officers, DOE field office managers, and contractors. Line management consists of DOE and contractor personnel organizationally or contractually responsible for work or job tasks (see Figures 1 and 2).

Integrated safety management system refers to a comprehensive and coordinated program of ES&H expectations and activities. DOE Policy 450.4, *Safety Management System*, defines six components of an integrated safety management program: 1) the objective, 2) guiding principles, 3) core functions, 4) mechanisms, 5) responsibilities, and 6) implementation. These components (see Figure 3) provide the framework for the Office of Oversight’s evaluation of safety management programs.

Line Management:

DOE line management is responsible for providing direction to the contractors that operate DOE facilities and monitoring and assessing contractor performance. The contractor line organizations are responsible for operating facilities and achieving DOE's mission objectives.

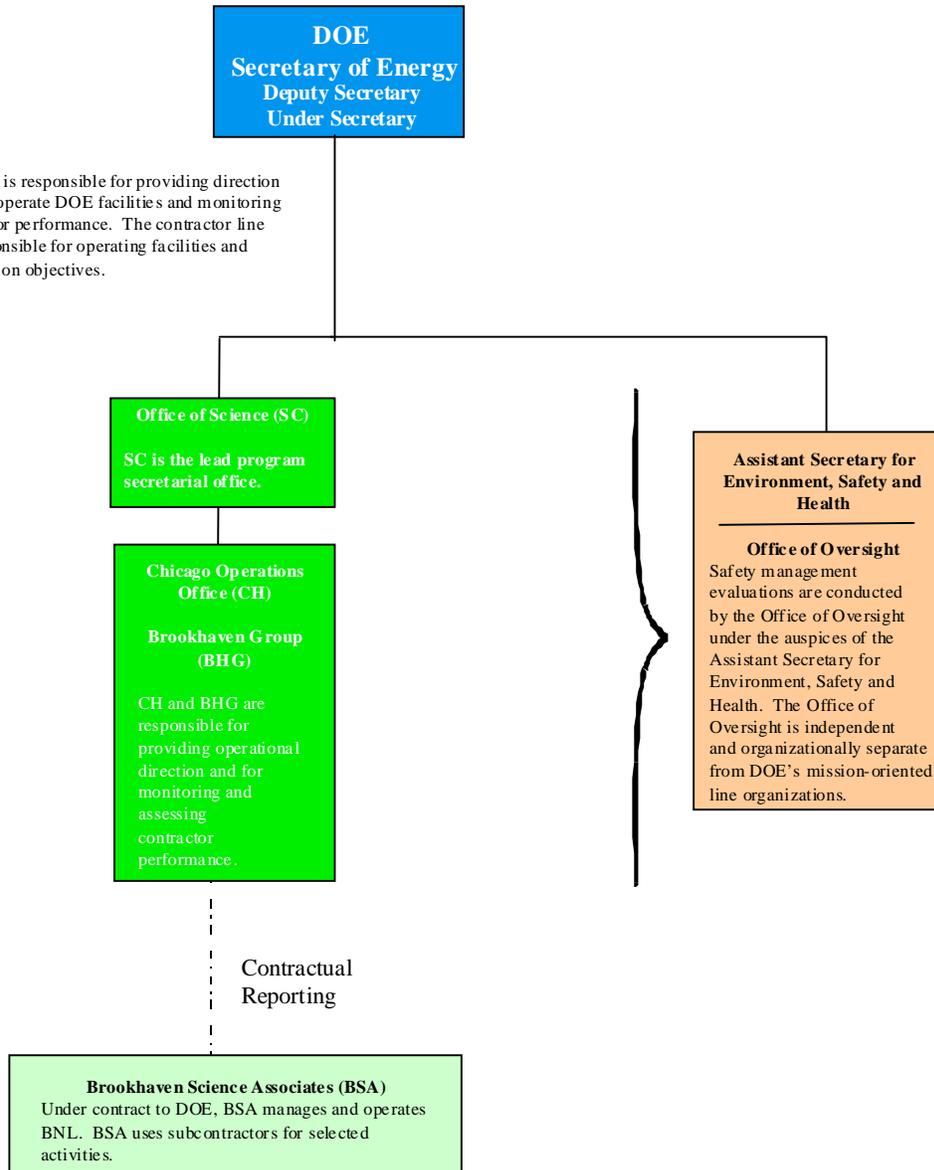


Figure 1. Organizations with Responsibility at BNL

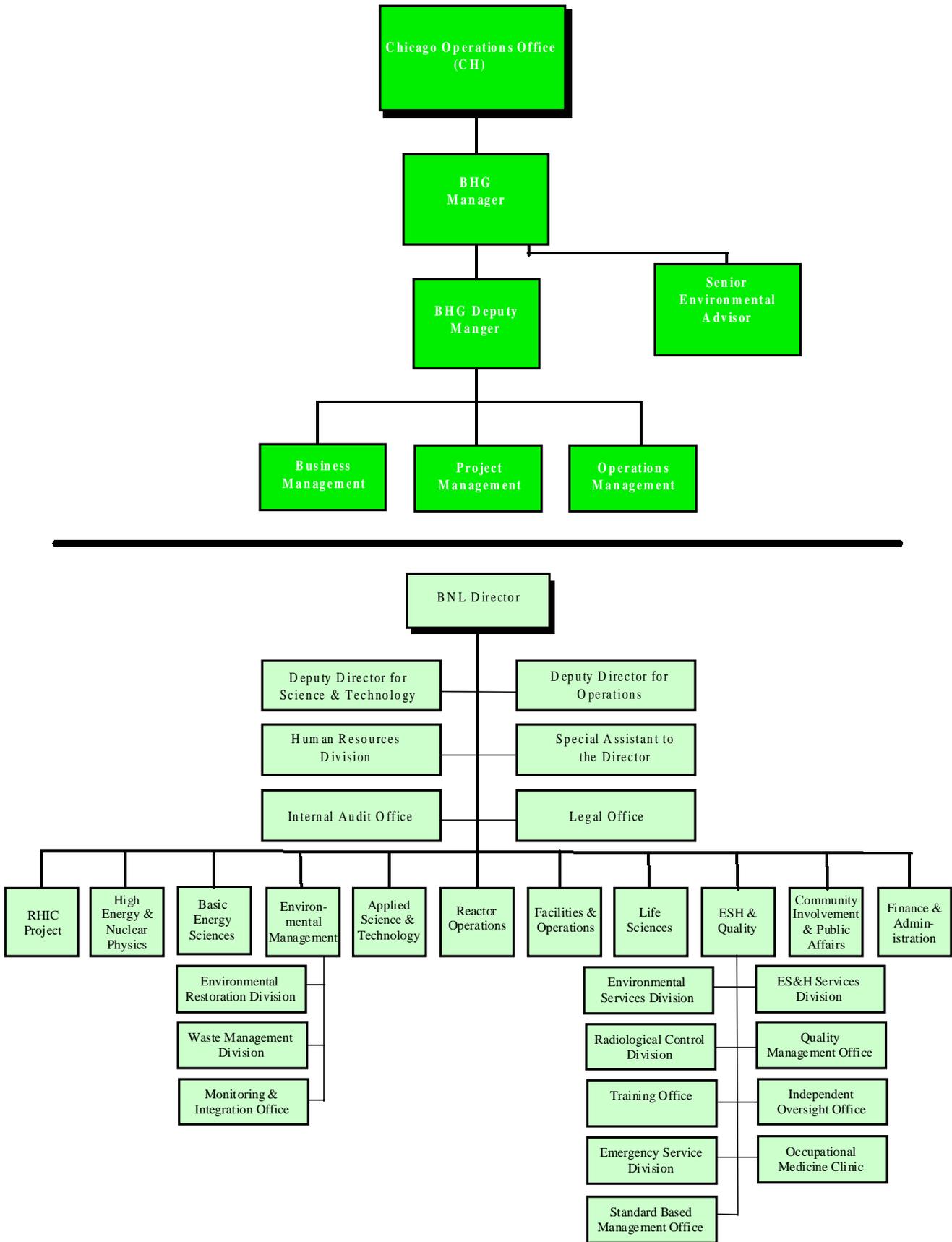


Figure 2. Simplified Organizational Charts for BHG and BNL

ORGANIZATIONS RESPONSIBLE FOR BROOKHAVEN NATIONAL LABORATORY OPERATIONS

RECENT CHANGES IN THE DOE MANAGEMENT STRUCTURE: The Secretary of Energy directed certain changes in the DOE management structure, which were announced in an April 21, 1999, memorandum. The organizational changes are intended to clarify DOE roles and responsibilities, authorities, accountability, and reporting. In accordance with the Secretary's direction, DOE is adopting a lead program secretarial office concept. The lead program secretarial offices are responsible and accountable for landlord activities at their sites; overall site integration and operations; long-term planning; sitewide environment, safety, and health programs; and safeguards and security. In addition, each DOE operations office and field office will now report directly to one of the lead program secretarial offices. Previously, field organizations reported to the Office of Field Management.

HEADQUARTERS: The lead program secretarial office is the DOE Office of Science (SC). In this role, SC serves as the landlord for BNL and has overall accountability for environment, safety, and health. The DOE Headquarters Office of Environmental Management (EM) is responsible for managing various environmental restoration and waste management programs at BNL. In addition, various DOE program offices fund programs at BNL and provide technical direction on project matters through BHG. In addition to SC and EM, the DOE Headquarters program offices that have ongoing projects at BNL include the Office of Nuclear Energy, Science and Technology (NE), the Office of Nonproliferation and National Security (NN), the Office of Energy Efficiency and Renewable Energy (EE), the Office of Defense Programs (DP), the Office of Fossil Energy (FE), and the Office of Environment, Safety and Health (EH).

DOE FIELD OFFICE: The Chicago Operations Office (CH) is the DOE operations office with responsibility for BNL. CH has delegated most responsibilities for operational direction and performance monitoring to the CH Brookhaven Group (BHG). CH provides support to BHG in some areas such as legal services, human relations, and contracting. BHG has a full time staff of 37 Federal employees and seven clerical and computer contracted support employees and is located on the BNL site. As a part of the CH organization, BHG historically reported to CH. From early 1997 until recently, BHG reported directly to SC as a result of Secretarial direction to ensure that weaknesses in safety management at BNL received Headquarters attention. BHG is again reporting to CH.

CONTRACTORS: BNL facilities and equipment are owned by the U.S. Government and operated by contractor employees under a contract between DOE and Brookhaven Science Associates (BSA), which is the managing and operating contractor for BNL. BSA is a partnership between Battelle Memorial Institute and The Research Foundation of the State University of New York (SUNY) on behalf of SUNY-Stony Brook (USB). BSA uses subcontractors for various projects, such as environmental restoration activities and construction. BSA was awarded the contract in November 1997 and took over operation of BNL in March 1998. The previous contractor had operated BNL from its establishment in 1947 until 1997, when the then Secretary of Energy terminated the contract because of an erosion in public trust and identified weaknesses in safety management.

Since its establishment in 1994, the Office of Oversight has performed integrated safety management evaluations at BNL and other major DOE sites. As summarized in the text box on page 10, Oversight has performed several reviews at BNL.



The evaluation focused on implementation of integrated safety management (ISM) by Brookhaven Science Associates (BSA) and safety management system effectiveness at all levels.

This safety management evaluation of BNL focused on the effectiveness of the DOE Headquarters lead program secretarial office (SC), CH, BHG, BSA, and selected subcontractors in implementing the objectives, principles, and core functions of an integrated safety management system. The review focused on specific facilities and work activities, which were selected to allow an evaluation of the application of ISM as actually implemented in various BNL facilities and projects.

As shown in Figure 1, the integrated safety management evaluation is a "top to bottom" review of

environment, safety, and health (ES&H) management. This review encompasses the organizations responsible for BNL, from the lead program secretarial office to the DOE operations office, the operating contractor and its subcontractors, site users, and ultimately to the workers at selected facilities. The evaluation also samples the effectiveness of ES&H programs, from the identification of applicable policies to their implementation by workers on the “shop floor.” The Office of Oversight evaluates site performance against the objective, principles, and functions for integrated safety management systems described in DOE Policy

450.4, *Safety Management System Policy*. Figure 3 shows these components.

The effectiveness of BNL in implementing the guiding principles is discussed in Section 2. BNL effectiveness in implementing the core functions is also summarized in Section 2. Section 3 discusses the overall effectiveness of the core functions and guiding principles in meeting the safety management objective and presents the ratings. Section 4 presents opportunities for improvement. Appendix A summarizes issues for corrective action and follow-up and observations about the effectiveness of actions regarding legacy issues. Appendix B describes the evaluation process and Oversight team composition.

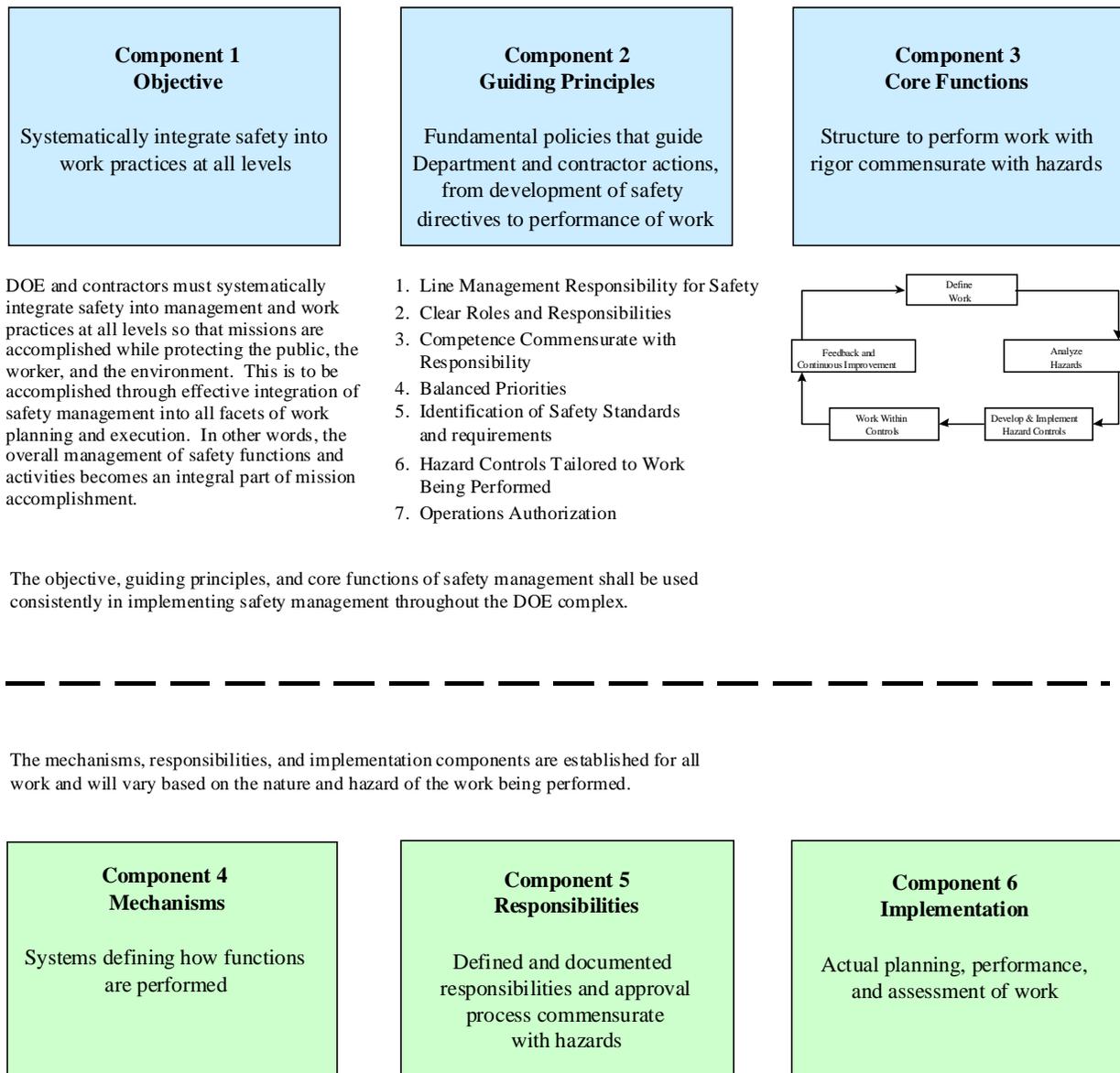


Figure 3. Components of DOE’s Integrated Safety Management System

SUMMARY OF RESULTS OF PREVIOUS OVERSIGHT EVALUATIONS AT BNL

Office of Oversight Interim Report on Groundwater Tritium Plume Recovery Activities, February 1997. In January 1997, groundwater samples taken from recently installed monitoring wells south of the High Flux Beam Reactor (HFBR) at BNL indicated a “plume” of tritium in concentrations exceeding the Environmental Protection Agency’s limits for drinking water. The reactor was shut down pending identification and mitigation of the tritium source. The tritium plume did not pose an immediate threat to drinking water, workers, or the public. However, BNL is located on Long Island, a densely populated area, and all local water supplies, including public supplies, are from a sole-source aquifer. Although the site’s initial response to the issue was not well coordinated, subsequent BNL and DOE actions were aggressive and appropriate. Efforts to determine the extent of the plume and groundwater flows were effective. However, the interim evaluation revealed significant problems with the BNL approach to safety management. For example, beginning in 1992, BNL had a number of indications that monitoring wells were necessary down-gradient of the HFBR to protect the groundwater and sole-source aquifer, but no actions were taken, and commitments made to the Suffolk County Department of Health Services were not met.

Integrated Safety Management Evaluation of BNL, April 1997. The evaluation determined that, despite some Laboratory initiatives to improve ES&H performance, BNL had not kept pace with contemporary expectations for protection of the workers, the public, and the environment. Performance was lagging in such areas as a disciplined approach to site activities, systematic hazard analysis and work planning, radiation protection, and monitoring of the environment. These issues constituted a significant barrier to improving ES&H performance and contributed to a situation where improvements in one facility or program were rarely extended to other facilities or programs that had similar problems.

Independent Oversight Follow-up Review of the Status of Groundwater Tritium Plume Recovery Activities at BNL, October 1997. This DOE Office of Oversight follow-up review focused exclusively on the effectiveness of DOE and BNL efforts to identify and eliminate the source of the tritium leak and mitigate the tritium groundwater plume at the Laboratory’s HFBR. The review determined that significant progress had been made toward characterizing and remediating the tritium plume. For example, three of four HFBR spent fuel shipments had been completed; these shipments were a prerequisite to emptying the fuel canal, which was necessary to eliminate continued leakage. In addition, all fuel had been removed from the reactor vessel. Further, the leading edge of the tritium plume was being pumped to the recharge basin, and volatile organic compounds were being removed. Additional wells had been installed to profile and monitor the tritium plume, and the conceptual design had been completed for a stainless steel liner and leak detection system for the HFBR fuel canal. Management of the BNL tritium remediation project was found to be effective, and progress was substantial. Continued attention was considered necessary to ensure that ongoing activities would be completed on schedule in the face of a number of upcoming challenges, such as potential funding and staff reductions, the upcoming transition of contractors, and the need to devote resources to issues identified by the environmental vulnerability assessment and other groundwater contamination discoveries.

Independent Oversight Follow-up Review of BNL, August 1998. This follow-up review focused on areas identified during the 1997 integrated safety management evaluation as having significant weaknesses. BNL had made significant progress in work planning and control initiatives and in groundwater protection and restoration activities. However, there had been only limited improvements in the BNL radiological control program since the 1997 Oversight evaluation. BNL had not yet demonstrated the basic program infrastructure and leadership needed to ensure that appropriate radiological controls were established and properly implemented. BNL management reacted to individual incidents and events and had not effectively implemented corrective actions addressing the fundamental program and performance deficiencies repeatedly identified by incidents and assessments. BHG undertook a number of positive initiatives to improve their oversight and assessment program after the 1997 evaluation. ES&H and operational documents were formalized to define the BHG oversight strategy and clarify roles and responsibilities. BHG had increased their presence and involvement in monitoring operations and conducted formal assessments of BNL.

OVERVIEW OF BNL

MISSION: BNL was established in 1947 to bring the resources of American academia and government together to create an institution that could pursue research and build facilities that would be beyond the scope of any single university. The current BNL mission is to conceive of, design, build, and operate large, complex research facilities and to carry out basic and applied research in energy-related, physical, life, and environmental sciences. BNL also emphasizes science education and technology transfer. More recently, the mission has been expanded to address environmental restoration and facility decontamination and decommissioning.

ACTIVITIES: BNL operates a nuclear reactor for experiments and medical diagnosis and treatment purposes. BNL constructs and operates particle accelerator facilities, which are used for high-energy physics, chemistry, biology, and materials research. Experiments are performed in a wide range of areas, such as high-energy collisions, radiobiology, photochemistry, and trace chemical composition. Many of the research activities at BNL are designed and conducted by university and industry users, with BNL maintaining the facilities and ensuring that provisions are in place to perform activities safely. BNL also performs environmental remediation activities under the National Priorities List (Superfund), working in accordance with an interagency agreement involving DOE, the U. S. Environmental Protection Agency, and the state of New York.

LOCATION: BNL is located in Suffolk County on Long Island, about 60 miles east of New York City, New York. The site occupies about 5,300 acres.

STAFFING AND BUDGET: BHG has about 44 people on site and BNL has a full-time staff of about 3050. In addition, about 4000 people, primarily visiting scientists and facility users, work at BNL each year on a temporary basis while participating in research projects and experiments. Annual funding for the site is about \$415 million. The DOE Office of Science provides about 85 percent of the BNL budget.

MAJOR FACILITIES: Major BNL facilities include a shutdown Category A nuclear reactor (the High Flux Beam Reactor), a Category B nuclear reactor (the Brookhaven Medical Research Reactor), several particle accelerators (also referred to as synchrotrons), facilities for hazardous waste processing (the Hazardous Waste Management Facility), and various research laboratories and support facilities. The High Flux Beam Reactor has been shut down since 1997, when the tritium contamination was discovered. Spent fuel has been removed from the High Flux Beam Reactor. The large accelerator facilities include the Alternating Gradient Synchrotron (AGS) complex, the National Synchrotron Light Source, and the Relativistic Heavy Ion Collider.

HAZARDS: A variety of hazards exists at BNL. The Brookhaven Medical Research Reactor, with intermittent operations up to 3 MWt, and activities involving spent reactor fuel, the AGS, and radioactive and mixed waste create potential radiation hazards. The dynamic experimental processes evolving at BNL involve significant quantities of hazardous chemicals and materials, including acids, caustics, solvents, heavy metals, organic chemicals, toxic chemicals, oxidizers, carcinogens, compressed gases, asbestos, and oils contaminated with polychlorinated biphenyls (PCBs). Biohazards may also be associated with research activities. Other potential hazards associated with experiments, routine operations, construction, and decontamination and decommissioning include electrical hazards, cryogenic systems, magnetic fields, temperature extremes, lasers, radiofrequency, confined spaces, hazardous noise, heavy equipment operation, pressurized systems, large vacuum vessels, moving mechanical parts, and ergonomic considerations.

2.0 Results

The overall effectiveness of ISM relies on sound institutional processes and effective implementation at the facility and work activity level. This section discusses each of the seven guiding principles of safety management, focusing primarily on organizational and institutional-level processes. This section also includes a summary-level description of the evaluation of the core functions of safety management.

Line Management Responsibility for Safety

Guiding Principle #1: Line management is directly responsible for the protection of the public, the workers, and the environment.

Organizations that have effective safety management programs place responsibility for safety with line management. Accordingly, line management must ensure that the safety management program includes safety policies and goals that are clearly articulated and communicated, and that workers are fully involved in safety issues and take appropriate action in the face of hazards encountered during normal and emergency conditions.

As stated by BSA, “the Laboratory’s broad mission is to produce excellent science in a safe and environmentally benign manner with the cooperation, support and appropriate involvement of our many communities.” With this mission in mind and strong Congressional and Departmental incentives for improving safety management of BNL, DOE and BNL have demonstrated clear leadership, planning, oversight, and resource commitment to establishing an effective integrated safety management system with universal acceptance of safety responsibility. Although much work remains, the significant progress demonstrated since the April 1997 Oversight evaluation in aligning and clarifying expectations, enhancing accountability, developing and integrating new safety and environmental management systems, substantially improving

community communications and involvement, and appropriately expanding employee empowerment are clear evidence of significant improvement in leadership and management of BNL.

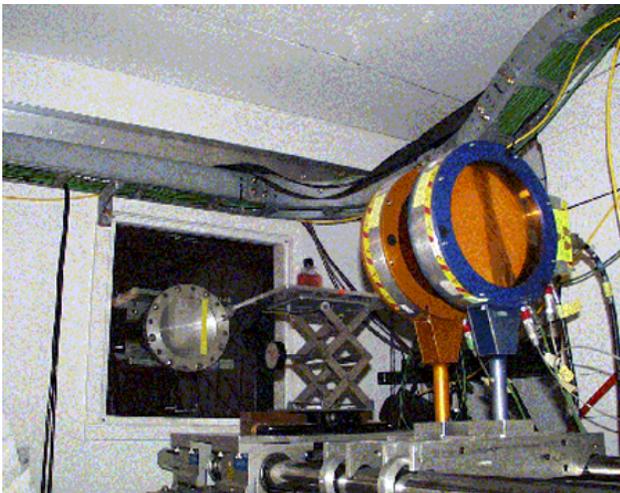
Policy and Expectations

SC is the “landlord” and lead program secretarial office for BNL and is therefore responsible for institutional oversight, coordination, and sitewide ES&H and infrastructure. Recognizing that clear communication of program expectations is a fundamental principle of effective line management, SC established high-level performance expectations for BNL and their other Laboratories in six critical areas: Science, Leadership, ES&H, Infrastructure, Business Operations, and Stakeholder Relations. These expectations were supplemented by the DOE Office of Nuclear Energy, Science and Technology (NE) with specific guidance for BNL reactor facilities and by the DOE Office of Environmental Management (EM) for waste management and environmental remediation activities. CH, in close coordination with SC and BHG, developed a performance-based contract with BSA that clearly establishes expectations and requirements. Of particular note is Contract Appendix B, which sets forth a performance evaluation system and criteria for determining the overall performance of BSA and establishes clear incentives for ES&H excellence. BSA and BHG also jointly partnered a BSA Management Plan setting forth detailed plans for addressing issues from the 1997 Oversight evaluations, meeting expectations, and satisfying requirements. The BSA Management Plan also assembles individual contract requirements and performance expectations into projects and includes additional BHG/BSA expectations and performance measures. Line management responsibility and accountability for establishment of ISM, the adequacy of ES&H performance, the effective

management of remediation activities, and improvement in community involvement and support are clearly established in the BSA Management Plan, Contract, and Contract Appendix.

Brookhaven Group (BHG) and BNL management have demonstrated effective leadership and support for ISM.

BHG and BNL management have demonstrated strong and effective leadership for the establishment of ISM. ISM is being developed and implemented in stages, with participation by impacted workers and supervisors. Significant core elements are already established or initiated. Laboratory Standard 1.3.5, Planning and Control of Experiments, and Laboratory Standard 1.3.6, Work Planning and Control for Operations, were developed with “grass roots” involvement and establish systematic, enhanced processes for work planning at the activity level. Facility Use Agreements (FUAs) were piloted at the Alternating Gradient Synchrotron (AGS) and are now being developed elsewhere to describe facility-level capabilities and support assumptions needed for planning activity-level work. FUAs, executed between facility occupants/operators and the Deputy Director for Operations, set conditions that must be met by occupants/operators and users to ensure safety and compliance with current requirements. The ISM description, scheduled for delivery to reviewers in October 1999, will define the plans and basis for integration of BNL programs at the institutional level to ensure a consistent and safety-



Target Station at AGS

balanced approach to planning and decision-making at all levels of BNL. Individual roles, responsibilities, authorities, and accountabilities documents (R2A2s) have been established for all BNL employees to ensure that the duties of managers and staff are consistent with internal and external requirements and expectations. Goal setting and performance evaluation criteria have been initiated for “exempt employees” (as defined by the Fair Labor Standards Act) to clearly align expectations and incentives of individuals with the DOE/BSA contract and Management Plan critical outcomes, goals, objectives, and performance measures. Although development of ISM is not complete, BNL is working to meet a challenging schedule with a number of important accomplishments and a clear goal of establishing a comprehensive ISM system to effectively manage and safely conduct world-class research.

Senior BNL management visibly displays support for safety management.

The BNL Director ensures effective communication of his expectations for ES&H excellence through delivery of a consistent message in quarterly all-hands meetings, frequent dialogue with smaller groups, a bi-weekly management letter, media interviews, community presentations and question-and-answer-sessions, and guidance and direction to his supporting managers. Everyone interviewed was aware that the Director had stated his expectation that safety was a condition of employment. With the recent publication of BNL’s Disciplinary Policy, the graded approach to dealing with safety infractions has been formally established. Discussion with BNL managers and staff regarding their responsibility for safety invariably led to discussion of their individual R2A2s, which were frequently posted on the wall of their workspace. These discussions also demonstrated that BNL management had effectively established an expectation that each and every employee is responsible for safety. The acknowledgement of this fact starts at the top of the line organization with the BNL Director. Line managers acknowledge their responsibility for their personal safety, the safety of the public, the protection of the environment, and the safety of the organizations and workers that report to them. Line managers also indicated that they hold their subordinates accountable for an identical expectation. Line managers also acknowledged the support role of

the ES&H staff, but made it clear that such support did not diminish their responsibility for ensuring the protection of the environment and the health and safety of the public and workers.

In January 1999, BHG published a revised ES&H Management Plan. As office policy, BHG accepts line management responsibility for all ES&H matters at BNL. This responsibility includes ensuring that the prime contract is managed so that safety is integrated into all work activities at BNL, and that operations are conducted safely, with minimal impact on the environment, and in compliance with state and Federal statutes and DOE requirements. BHG acknowledges their responsibility to effectively monitor BNL's ES&H performance against expectations and to direct corrective action where appropriate. BHG discharges this responsibility through implementation of their operational awareness program, created in April 1998 following the 1997 Oversight evaluation. Interviews of BHG line managers and staff demonstrated, without exception, their personal acceptance of responsibility and accountability for safety performance at BNL.

However, BHG has not yet incorporated specific accountability for BNL ES&H performance into annual individual performance evaluation plans. Further, as discussed later in several sections of this report, neither BHG nor BNL is yet in full compliance with applicable DOE requirements. Examples include:

- BHG has not completed the development of a Functions, Responsibilities, and Authorities Manual (FRAM) (Policy 411.1) and generally does not use individual development plans (IDPs) as required by DOE Order 360.1.
- BNL has not updated the emergency management hazards assessment (DOE Order 151.1) and the High Flux Beam Reactor (HFBR) safety analysis (DOE Order 5480.23).
- The emergency management program at BNL does not meet the requirements of DOE orders or the Secretarial-level direction issued in 1997.

SC, NE, CH, BHG, and BNL need to ensure that these non-compliances are resolved in a timely manner and that factors preventing timely resolution (e.g., allocation of resources) are addressed.

The 1997 Oversight evaluations determined that few effective mechanisms existed to ensure proper accountability for ES&H performance. Although not all elements of corrective action for this finding are in place and their effectiveness is yet to be demonstrated, the improvements in the FY 1999 DOE/BSA

Performance Based Contract, R2A2s, individual goal setting, and compensation incentive program demonstrate significant effort in resolving this concern.

In November 1998, BNL established their Environmental Stewardship Policy, stating that it was BNL policy to integrate environmental stewardship into all facets of the BNL mission and manage BNL programs in a manner that protects the environment and public health. BNL further committed to achieving compliance with applicable environmental requirements; integrating pollution prevention/waste minimization, resource conservation, and compliance into all BNL planning and decision-making; adopting cost-effective practices that eliminate, minimize, or mitigate environmental impacts; defining, prioritizing, and aggressively correcting and cleaning up existing environmental problems; working to continually improve the environmental management system and performance; establishing appropriate environmental objectives and performance indicators to guide these efforts and measure progress; maintaining a positive, proactive, and constructive relationship with BNL neighbors in the community, regulators, DOE, and other stakeholders; and openly communicating with stakeholders on BNL progress and performance.

BNL senior management has demonstrated strong commitment to implementing an effective environmental management system.

BNL has demonstrated strong senior management commitment to implementing an effective environmental management system (EMS), as required by the DOE/BSA contract and the March 1998 voluntary memorandum of agreement between DOE and the U.S. Environmental Protection Agency (EPA). BNL intends to base the EMS on International Standards Organization (ISO) 14001 (Environmental Management Systems – Specification with Guidance for Use) with enhanced compliance, community outreach, and pollution prevention within an ISM framework. An EMS Project Management Plan has been developed, milestones have been established, and significant organizational and programmatic achievements have been reached. Environmental Services and Waste Management staff have been elevated to Division status; environmental compliance and waste management representatives have been assigned to key facilities; R2A2s have been established; EMS procedures and guidance have been developed and are being piloted; and extensive



An Environmental Restoration Project in Progress



View of the Same Area after Completion of the Environmental Restoration Project

EMS and environmental training and briefings are being provided. Although significant progress has been made, particularly since an earlier DOE audit found implementation lagging, significant work remains and an aggressive schedule has been established.

Recognizing the importance of feedback in ensuring continuous improvement in BNL performance, BNL developed an integrated assessment program involving self-assessments and assessments by the BNL Independent Oversight Office (an office internal to BNL, but “independent” of the BNL organizational elements that have responsibilities for implementing ES&H programs). The BNL self-assessment program was established as the principal vehicle for driving needed changes and ensuring stakeholder support for identified improvement opportunities. The BNL independent oversight program provides oversight for the BNL self-assessment program

and supplements its results through independent investigations for line management, management of the BNL Price-Anderson Amendment Act (PAAA) program, and management of the BNL lessons-learned program. Assessment training has been provided; Department/Division, Directorate and Laboratory level self-assessments for 1998 have been completed; and plans and schedules for 1999 have been developed. The effectiveness of the BNL integrated assessment program in sustaining and improving performance remains to be demonstrated, but the essential elements for providing necessary performance feedback and stakeholder support for needed change are in place.

Although improvements in attitude toward safety are evident, continued effort is needed to fully integrate safety into operations.

Improvements in attitude toward safety and the effort and resources devoted to its maintenance are clear; however, as anticipated by BNL and discussed later in this report, inconsistencies in the requirements and degree of implementation of the various facility safety management programs persist. Continued effort is needed and planned to effectively integrate a consistent view of and process for safety into all BNL management programs and processes; ensure understanding, acceptance, and participation in ISM at all levels of the organization; and maintain the current momentum for positive change in safety performance at BNL.

External Stakeholder Involvement

Significant improvement in BNL community outreach, communications, response to inquiries, and openness to participation in ES&H decision-making was routinely acknowledged by interviewed community representatives. Leadership, participation, and openness to discussion of community concerns by the BNL Director, BHG Manager, and senior representatives of both staffs were frequently cited as evidence of a different and improved approach to community involvement. Proactive leadership and senior management commitment have contributed to these improvements in the relatively short period of time since the new contractor team and BHG manager have been in place.



BNL developed comprehensive community communications and involvement plans.

To achieve and sustain these results, BNL developed and is in the process of fully implementing a comprehensive Community Involvement Plan that emphasizes proactive communications and early community involvement in BNL's decision-making process on issues of potential interest or concern to community stakeholders. The Plan has been developed and refined with considerable stakeholder input. Community involvement is further facilitated by a Strategic Communications Plan, which stresses the role of senior line management involvement and leadership, the expanded functionality and role of the BNL Community Relations staff, and expectations of the new Correspondence Commitment Tracking system. The Strategic Communications Plan makes use of an array of communication channels, including employee social and professional contacts, trained and prepared speakers, the Internet, advertisement, mailings, periodic newsletters, surveys, open houses, round table discussions, educational programs, and an annual environmental fair.

BNL conducted an external stakeholder survey in autumn 1998 to determine the opinions of the community and to establish a baseline against which progress in communications and trust could be assessed. In general, the survey determined that while BNL is important to the economy of Long Island, it was viewed as not doing a good job of keeping the community informed or explaining what it does and is seen as a significant contributor to environmental problems (particularly groundwater contamination due to past problems). To regain trust and support for the mission, BHG and BNL must keep the community informed, supply timely and candid communications, explain the basis for their decisions, and clean up the environment (particularly the aquifer). The Strategic Communications Plan, the Community Involvement Plan, and the environmental remediation programs were designed to address these needs.

Prominent activities for community communications and involvement include the Brookhaven Executive Roundtable (BER), the Community Advisory Council (CAC), the Speakers Bureau, the Visitors Program, the Envoy Program, the Ambassador Program, and communication and involvement activities required by the National Environmental Policy Act (NEPA) and the Interagency Agreement between DOE, EPA, and the New York State Department of Environmental

Conservation (NYSDEC). For example, the CAC was created as a key mechanism for providing early representative community input into the BNL decision making process on issues of importance to community stakeholders. As such, the CAC receives presentations on developing issues and requested information, and makes recommendations to the BNL Director. A review of recent community involvement and outreach activities demonstrates a high level of activity and commitment by BHG and BNL.

To gauge current perceptions of the effectiveness of BNL and BHG efforts in enhancing communications and building trust, interviews were conducted with thirteen stakeholders, representing NYSDEC, Suffolk County Legislative District 7, Suffolk County Department of Health Services, Suffolk County Fire/Rescue and Emergency Services, Long Island Builders Institute, Standing for Truth About Radiation, Citizens Campaign for the Environment, Environmental Defense Fund, Long Island Progressive Coalition, and the Pine Barrens Commission. Those interviewed indicated that both BNL and BHG had significantly improved openness to discussions with external stakeholders of plans and strategies for resolving environmental protection, remediation, and public health and safety issues. The BNL Director and BHG Manager were viewed as leaders of the positive changes observed in attitudes toward openness and community involvement. BHG and BNL were also credited with significant improvements in accessibility and responsiveness to questions and requests for information, and with generally proactive fulfillment of information needs of the community and government officials.



Although improvements in community communications and involvement are evident, some individual stakeholders expressed concerns.

Although real improvements in community communications and involvement have been realized, some concerns were expressed by individual stakeholders:

- Some decisions were made without expected coordination.
- Some solicited comments and recommendations were perceived to have been ignored or not given proper weight.

- BNL personnel sometimes appeared defensive and less open to discussion of options when final resolution had not been decided.
- Remedial action decisions and activities are not timely.
- Data provided to support some decision-making was either inconsistent or insufficient.
- Some commitments may not be as firm as originally presented or perceived.
- The BNL community involvement programs are more public relations than stakeholder empowerment.
- BNL did not do enough to advertise the importance of their work and the successes achieved.

These individual stakeholder concerns represent the continuing challenges facing efforts to build and maintain community trust. Although several individual stakeholders had one or more concerns, in all cases the stakeholders expressed their general impression of improvement in BHG and BNL external stakeholder communications and involvement. Overall, there was strong consensus for the need to expedite cleanup of legacy environmental problems and to prevent future similar problems at BNL.

Worker Empowerment

Communications between BNL management and staff have been enhanced.

BNL and BHG senior managers maintain an open door policy. Communications between BNL managers and staff have been enhanced by increasing management’s presence and visibility in the workplace, quarterly all-hands meetings, frequent Department and Division meetings, an enhanced e-mail system, the “Monday Memo,” the “Ask One/Write One” program, and other such efforts. BNL also conducts a large number of planning meetings to facilitate staff understanding of scheduled activities and hazards and to elicit staff concerns, potential conflicts, and solutions. Interviewed workers were generally satisfied with their ability to get answers to questions, to be kept informed, and to participate in problem identification, policy recommendation, work planning, hazard mitigation, and lessons-learned development. BNL also has a large number of safety committees that involve

staff with appropriate knowledge and experience to maintain and improve safety of the diverse set of activities and hazards on site.

BNL has established a strong stop-work policy for imminent hazards and developed supporting procedures and training. The policy assigns responsibility and authority to every employee and visitor to stop work in the face of imminent danger. Employee awareness of stop-work authority has increased significantly due to training, stop-work brochures, and BNL bulletins. However, procedures for stop-work are still in need of improvement.

Both BHG and BNL have employee concerns programs in place.

BNL and BHG implement separate employee concerns programs (ECPs) to receive, investigate, and resolve employee concerns. BNL established a multi-tiered process for handling employee concerns that appears to be successful in resolving most issues before they rise to the level of their ECP counselor, as evidenced by the low number of employee concerns received by the BNL ECP coordinator (three in 1998 and none to date in 1999).

BHG is the point of contact for DOE’s ECP, while CH carries overall responsibility for program implementation. BNL works with BHG on those concerns referred for their investigation and disposition, including providing the basis upon which BNL believes closure is warranted. BHG bases their ECP activities on DOE Order 442.1, but does not have a separate formal procedure clearly defining their processes. Also, the BHG point of contact for the ECP does not have a copy of CH’s procedure. BHG stores ECP files in locked storage as appropriate, but does not sanitize complainant records to remove identifying information. BHG ECP files do not always show or discuss complainant authorization for giving the concern to the employee’s organization for evaluation and disposition, and closed files do not always show evidence of a basis for closure. CH does not perform periodic audits of BHG’s ECP activities, but discussions with the CH ECP Manager demonstrate that BHG keeps CH informed as to the status of concerns. Employee concerns program posters are generally displayed sitewide and clearly communicate the expected sequence employees should pursue to resolve concerns, telephone numbers for BNL and DOE Employee Concerns representatives, and a reminder

that employees always have the right to go to DOE directly. The current rate of concerns received by BHG is also low (eight in 1998 and only one to date in 1999). Although the BHG ECP is generally adequate for the current rate of concerns being received, the formality of the processes and procedures needs to be enhanced to ensure that BHG is prepared to handle increases in the rate or complexity of employee concerns, if such a situation develops.

Bargaining unit representatives indicated that employee involvement in environment, safety, and health (ES&H) has improved.

In interviews, representatives of the International Brotherhood of Electrical Workers Union (IBEW); the Paper, Allied Industries, Chemical and Energy Union (PACE); and the Suffolk County Security Police Association, representing BNL's uniformed officers, were generally satisfied with the opportunities for worker involvement in ES&H decisions and noted improvement in the level of solicited participation. The bargaining units participate in safety committees, are generally kept well informed, find senior management accessible, and generally rely on the union grievance process to resolve employee concerns. All concluded that employee involvement and participation in BNL issue identification, decisions, and resolution have improved.

Summary

Line managers of BNL and BHG accept responsibility for assuring the protection of the public, workers, and the environment. Safety policies and goals are clearly documented and communicated, and are consistent with DOE expectations. Efforts to develop and establish an effective integrated safety management system continue on schedule, with critical core elements established or recently implemented. Senior BNL and BHG management continue to demonstrate strong leadership and a consistent message for improving ES&H performance at BNL. Improvements in the attitude toward safety and the effort and resources devoted to its maintenance are evident, although inconsistencies in the requirements and degree of implementation of the various facility safety management programs persist. Senior management recognizes and continues to provide the needed leadership, oversight, and focused resources to assure

understanding, acceptance, and participation in ISM at all levels of the organization, and to maintain the current momentum for positive change in safety performance at BNL. To ensure that longstanding issues will be resolved, DOE (SC, NE, CH, and BHG) and BNL need to continue to review DOE requirements, determine the state of compliance, and take appropriate action to ensure that requirements are met. Such actions need to address factors that are hindering full compliance (e.g., funding issues, need for modification of requirements, and differing views within DOE on the appropriateness of exemptions to the orders as a resolution).

External stakeholders recognize improvements in information flow, communications, response to inquiries, accessibility, community involvement, and openness to participation in ES&H decision-making. However, some stakeholders expressed individual concerns with the timeliness, assigned priority, accuracy of supporting information, or appropriateness of proposed environmental remediation decisions and activities. Employees are generally satisfied with their ability to effect positive and reasonable changes in ES&H policies, programs, and issues involving BNL facilities, staff, and work activities.

Clear Roles and Responsibilities

Guiding Principle #2: Clear lines of authority and responsibility for ensuring safety shall be established and maintained at all organizational levels within the Department and its contractors.

Organizations that have effective safety management programs place responsibility, authority, and accountability for safety with line managers. Accordingly, line management must ensure that the program includes well-defined roles, responsibilities, and processes for ensuring that management is accountable for safety performance.

In 1997, DOE took action to address poorly-defined responsibilities, including having BHG report to DOE Headquarters.

The 1997 Oversight evaluation identified poorly-defined roles and responsibilities and ineffective measures for ensuring organizational and individual accountability as significant areas of weakness. Shortly

after the Oversight evaluation, the then Secretary of Energy directed that actions be taken to change the reporting relationships for BHG. Specifically, BHG was directed to report directly to the Office of the Secretary of Energy to ensure that the environmental and safety management issues received high levels of attention. Subsequently, SC (which was then called the Office of Energy Research) was assigned the responsibility to provide management oversight and direction to BHG. In this process, CH was temporarily relieved of line management responsibilities for most operations and research activities at BNL. CH maintained responsibility for environmental management programs at BNL and provided support to BHG in some areas, such as legal support and certain technical disciplines, in accordance with a memorandum of agreement among SC, CH, and BHG.

As discussed in Section 1, the BHG reporting relationship has recently undergone another significant change in accordance with the current Secretary of Energy's April 21, 1999, announcement of changes in the DOE organizational reporting structure. These changes, which became effective on May 1, 1999, establish SC as the lead program secretarial office for CH and reestablished BHG as a direct report to CH. As these recent changes are implemented, CH will again have additional line management responsibilities for activities at BNL.

Recent changes in the DOE reporting relationships will require updating the responsibilities of BHG, the Chicago Operations Office (CH), and the DOE Office of Science (SC).

Although in effect as of May 1, 1999, the changes directed by the Secretary are too recent to have been fully implemented at the time of this Oversight evaluation. The change in reporting relationships for the DOE organizational element responsible for BNL will require corresponding changes in the established roles and responsibilities for BHG, CH, and SC. The discussion below focuses on the roles, responsibilities, authorities, and accountabilities of SC, BHG, and the BNL contractor as they have been implemented for the past two years. The Office of Oversight will examine the effectiveness of the recent transition of responsibilities in future independent oversight evaluations and follow-up reviews.

DOE Headquarters Office of Science

The DOE Action Plan contributed to improvements in DOE's management and direction of the BNL contractor.

In accordance with the then Secretary's direction in 1997, a DOE Action Plan for Improved Management of BNL was established by SC. The Action Plan identified several actions for clarifying and communicating roles and responsibilities for ES&H. In general, the commitments identified in the Action Plan were effectively implemented and contributed to improvements in DOE's management and direction of the BNL contractor:

- SC, CH, and BHG established a memorandum of agreement that defined the responsibilities of each organization for management of activities at BNL.
- A Headquarters-based Brookhaven Management Council was established to coordinate the DOE's ES&H and infrastructure management of BNL among various DOE elements. The Council is composed of senior level managers from the DOE Headquarters program offices that sponsor work at BNL, including SC, EM, and NE. The Council has been very active in monitoring BNL activities and has contributed to improvements in management and resolution of issues affecting multiple program offices. For example, the Council was instrumental in developing the recent memorandum of agreement for the transfer of the Brookhaven Graphite Research Reactor from SC to EM, which was done to facilitate the decontamination and decommissioning of the reactor and support facilities.
- The Brookhaven Management Council facilitated the development of a memorandum of agreement that defines responsibilities between the BNL landlord organization (i.e., SC) and the tenant organizations (i.e., NE and EM, which have line management responsibilities for facilities and activities that they sponsor).
- SC created an Associate Director for Laboratory Operations and ES&H (SC-80), which provides SC

with a corporate focus on ES&H and infrastructure. SC-80 is the center of leadership for ISM implementation within SC.

Weaknesses are evident in SC roles, responsibilities, and accountability.

Although significant actions were taken at DOE Headquarters, there continue to be weaknesses in the current definition and understanding of safety-related roles and responsibilities within SC. In some cases, SC has not been timely in completing activities and initiatives. The items below delineate some of the weaknesses and failures to complete initiatives:

- **SC has not established a FRAM.** DOE Policy 411.1 requires each DOE organization to complete a FRAM that formally establishes responsibilities and authorities within the line organization in implementing safety management responsibilities. SC has been working on a FRAM for the last several years. However, the SC FRAM has not been a high priority and has never been finalized.
- **Responsibilities of the organizations below the level of the SC Director have not been formally defined.** The 1997 memorandum of agreement among SC, EM, and NE defines and assigns programmatic landlord responsibilities for BNL to the SC Director but does not clearly define the responsibilities of subordinate SC organizations. The need for clarification of landlord responsibilities was recognized in the benchmarking workgroup report, which was communicated to SC management in May 1998, and actions are being taken to better define and communicate landlord responsibilities.
- **The SC Customer Service Representative initiative has not been clearly communicated and effectively implemented.** In March 1998, SC-80 announced an initiative for establishment of Customer Service Representatives for each DOE laboratory site office, including BHG. Customer Service Representatives are intended to facilitate resolution of issues that require Headquarters involvement in the areas of ES&H, infrastructure, construction management, and operational reviews. Some SC and BHG managers were not familiar

with the Customer Service Representatives initiative, and responsibilities were not well defined.

In addition, SC did not effectively implement commitments to improve accountability for safety performance within the SC organization. In the 1997 DOE Action Plan for Improved Management of BNL, the Director of SC (then Energy Research) committed to provide each Associate Director in the SC organization with clear expectations and responsibilities for ES&H performance and to use the annual performance appraisal to hold them accountable. Additionally, each Associate Director was to provide program staff with clear roles and responsibilities and similarly high expectations for integration of ES&H into program activities. This commitment has not been fulfilled. For example, performance plans do not contain clear ES&H expectations for performance for SC personnel with key line management responsibilities.

DOE Brookhaven Group

The role of BHG and the organizations assigned responsibilities for the management of BNL are formally defined in a January 1998 memorandum of agreement between SC, CH, and BHG. BHG has line management responsibilities for all aspects of BNL operations, including business management, ES&H, safeguards and security, and contract administration.

BHG has established and communicated roles and responsibilities for its staff regarding oversight and ES&H.

Although a FRAM that encompasses BHG has not yet been completed, BHG has established and articulated the roles and responsibilities of its staff in performing key ES&H management and oversight functions through other mechanisms. The BHG ES&H Management Plan effectively documents the roles and responsibilities of BHG managers and staff in fulfilling established line responsibilities. The Plan sets clear responsibilities on how each organization works as part of a team to set expectations for BNL, monitor performance, and communicate results, both to the Laboratory and other DOE organizations. One of the most significant ES&H responsibilities of BHG is to monitor Laboratory operations and ES&H performance. BHG has

established an Operational Awareness Plan that provides clear roles and responsibilities for this function.

Within BHG, safety management responsibilities are clearly communicated and understood. Most of BHG's ES&H responsibilities are assigned to the BHG Operational Management Division (OMD) and the BHG Project Management Division (PMD). The OMD is responsible for coordinating BHG's operational awareness program, championing ISM, and monitoring ISM implementation. OMD has Facility Representatives and ES&H technical specialists who monitor facility operations and conduct oversight of BNL ES&H performance. The Facility Representatives and technical specialists demonstrated their understanding and acceptance of their responsibilities during interviews and facility walk-downs.

PMD is responsible for managing programs associated with the environmental management and nuclear program-related missions and major construction projects at BNL, such as the construction of the Relativistic Heavy Ion Collider (RHIC). PMD staff are responsible for ensuring that ES&H considerations are integrated in the planning and execution of projects. The roles and responsibilities of PMD staff are well documented in manuals and individual position descriptions. Project managers demonstrated a good understanding of these responsibilities. Although PMD roles and responsibilities are generally clear, PMD administrative procedures, which provide specific instructions for certain tasks, are significantly outdated and have not been updated to reflect the new organizational alignment within BHG.



Reconfiguration of Piping as Part of the HFBR Transition Project Activities

Although responsibilities are well defined, BHG has not established effective mechanisms to hold most BHG organizations and individuals accountable for safety performance.

Although roles and responsibilities are well defined and understood, BHG has not yet established effective formal mechanisms to hold most BHG managers and individuals accountable for safety performance. The performance plan for the BHG Manager for 1999 includes measures for stakeholder interfaces, facility safety, and ISM implementation. However, there are weaknesses in the methods for holding other BHG managers and staff accountable. The BHG employee performance measures are based primarily upon generic "quality" criteria. There is little reference to ES&H performance in the criteria contained in the 1998 employee performance plans. In the few cases where an ES&H element was included, it focused on ensuring the safety of the employee's workspace, not on the broader responsibilities of the employee for effectively performing safety management responsibilities. Performance plans for 1999 have not been established. BHG indicated that it has initiated efforts to modify the performance management system to better incorporate ES&H considerations.

ISSUE: SC has not established clear roles and responsibilities and accountability mechanisms for its managers and staff as committed to in the 1997 DOE Action Plan for Improved Management of BNL and required by DOE Policy 411.1, and BHG has not completed the development of a FRAM.

Significant improvements have been made in the use of the contract for holding BNL contractors accountable for ES&H performance.

BHG, in coordination with CH and DOE Headquarters, has made significant improvements in the use of the contract to establish BNL contractor accountability for ES&H performance. The contract integrates expected ES&H performance within the contractual work scope. The contract includes the Department of Energy Acquisition Regulation (DEAR) clause on ISM and an "off-ramp" provision tied to major

enhancements to safety management. Additionally, contractual performance measures included in Appendix B of the contract link the payment of award fees to clear and measurable objectives for ES&H-related performance and management system development. The verification of BNL's implementation of ISM is clearly embodied in the performance measures and off-ramp provisions of the contract.

Brookhaven National Laboratory

Since 1997, BNL has implemented several initiatives to improve the clarity and understanding of roles, responsibilities, authorities, and accountability. The most comprehensive initiative is a systematic approach, referred to as the standards-based management system (SBMS), for integrating safety into operations and experiments in accordance with DOE ISM policy and requirements. Other important initiatives include R2A2, work control standards, a Laboratory building manager program, efforts to link accountability to critical outcomes, and efforts to enhance subcontractor accountability. As discussed below, these initiatives are in various stages of implementation. While the initiatives have achieved substantial improvements, some are not yet fully implemented and some have not been fully effective.



BNL has established responsibilities for the development of the standards-based management system.

BNL has established an infrastructure, with clearly defined responsibilities, for the development of the SBMS. The development and implementation of ISM, which is a major component of the BNL SBMS, is a contractual requirement and a key priority of BNL. The BNL Integration Council has been established to sponsor the development of SBMS. The Council is responsible for appointing an SBMS Steering Committee, providing necessary resources, and reviewing and approving standards. The Steering Committee is responsible for chartering the development of management systems, policies, standards, and subject areas necessary for providing an integrated management system capable of achieving ISM verification in FY 2000. For each management system, a steward is assigned to coordinate and lead the development of required products. Additionally, an SBMS project manager is responsible for project coordination, technical direction, and

coordination of the delivery of the SBMS infrastructure from Pacific Northwest National Laboratory.



BNL has initiated a comprehensive effort to define safety-related roles and responsibilities.

BNL has initiated a comprehensive effort to improve the definition and understanding of safety-related roles and responsibilities. BNL has committed to develop and document R2A2s for each manager and employee at the Laboratory as part of a performance-based management initiative. This effort was initiated Laboratory-wide during summer 1998. This initiative was implemented by establishing model R2A2s for common managerial and staff functional positions across BNL. The model R2A2s were then tailored by employees and supervisors to reflect specific duties of the employees. This system has significantly raised employees' awareness of their assigned responsibilities and their accountability for performing work safely and in accordance with ES&H standards.

A review of R2A2 documents for a variety of positions and organizations within BNL indicate that clear expectations for ES&H performance are incorporated into the documents. However, some of the R2A2s consisted of generic statements of responsibilities, authorities, and accountabilities, and were not clearly tailored to individual positions. The development of BNL's SBMS is in the formative stages, and additional roles and responsibilities will be established for managers and staff as part of the SBMS standards development effort. Changes to R2A2s will be needed to keep them current and reflective of organizational changes. For example, recently-created functional positions, such as work control managers, work control coordinators, and building managers, have not been fully integrated into employee R2A2s. A process for periodic review and approval of R2A2s has been conceptualized but has not been institutionalized.

Recently, BNL has made significant enhancements in the definition and understanding of roles and responsibility for managing work through the establishment of Laboratory-wide work control standards. Laboratory Standard 1.3.6, Work Planning and Control for Operations, and Laboratory Standard 1.3.5, Planning and Control of Experiments, establish requirements for BNL organizations that perform maintenance, modification, setup, and construction work, including work performed by non-BNL

employees. Standard 1.3.6 establishes clear responsibilities for initiating work requests, screening work, analyzing hazards, and establishing work controls. The standard also requires BNL organizations to establish work control managers and work control coordinators and to identify responsibilities for key aspects of the work control system. Overall, work activities at all BNL organizations reviewed were effectively planned and controlled, and employees had a good understanding of their work control system responsibilities.

 **BNL has recently finalized a Laboratory building manager program.**

BNL has recently finalized a Laboratory building manager program. The program is documented in Standard Practice Instruction 5-13, which became effective on April 1, 1999. The instruction defines the responsibilities of building managers for coordinating work activities within their assigned buildings. However, the standard does not adequately address the roles, responsibilities, and interfaces for emergency situations (e.g., sheltering or evacuation). In addition, not all building managers demonstrated a clear understanding of their responsibilities for maintaining building reference material documenting the various functions, agreements, and conditions of assigned buildings.

To address significant weaknesses in accountability identified during the 1997 Oversight evaluation, BNL has developed a strategy to implement a comprehensive system for establishing specific ES&H goals and objectives, tied to the critical outcomes established in Appendix B of the contract, for each manager and staff member. The performance of managers and staff against these goals, and against the duties assigned in R2A2s, would be measured in annual performance reviews and used in making compensation decisions. This performance-based management initiative is scheduled to be completed for Level 1 and 2 managers during FY 1999. The system is subsequently scheduled to encompass all subordinate managers and staff in FY 2000.

 **BNL's initiative to link performance to critical outcomes has significant potential, but implementation varies in effectiveness.**

The goals of the BNL accountability initiative have significant merit, and the performance-based management system was effectively implemented in some organizations—that is, the Environmental Management organization and Environment, Safety, Health, and Quality (ESH&Q). However, the initiative has not been fully effective in some other organizations, contributing to continued weaknesses in the BNL ES&H accountability system:

- Performance plans with specific, measurable objectives were not established for the Laboratory Director, Deputy Directors, and several Associate Laboratory Directors and their subordinate Level 2 managers.
- Performance plans established for two other Associate Laboratory Directors and their subordinate Level 2 managers did not include clear ES&H objectives consistent with Appendix B critical outcomes.
- Most FY 1999 performance plans reviewed for selected Level 3 managers and lower-level staff within the AGS Department and in Plant Engineering do not include ES&H-related criteria. Separately, AGS management has provided direction to supervisors to consider safety criteria in performance appraisals.

BNL has established a number of methods for holding subcontractors accountable for established ES&H performance requirements. This area has received significant Plant Engineering management attention following the 1997 Oversight evaluation and several events involving subcontractors. For construction subcontracts, BNL uses periodic inspections of contractor work to document performance levels. In addition, performance evaluations, including safety elements, are conducted for all subcontracts, including tasks issued against Basic Ordering Agreements. Further, BNL evaluates the safety record of past performance into subcontractor award decisions, as demonstrated by the current efforts to establish construction and radiological construction subcontractor Basic Ordering Agreements.

Summary

DOE Headquarters, BHG, and BNL have made significant improvements in the definition and communication of roles and responsibilities and in

processes for holding individuals and organizations accountable for performance. Headquarters commitments identified in the Action Plan were effectively implemented and resulted in improvements in DOE's management and direction of the BNL contractor. BHG safety management responsibilities are clearly communicated and understood. BHG, in coordination with CH and DOE Headquarters, has made significant improvements in the use of the contract to establish BNL contractor accountability for ES&H performance. Since 1997, BNL contractors have implemented several initiatives to improve the clarity and understanding of roles, responsibilities, authorities, and accountability, including SBMS, R2A2, work control standards, a Laboratory building manager program, efforts to link accountability to critical outcomes, and efforts to enhance subcontractor accountability.

Although significant progress has been made, there continue to be weaknesses in the current definition and understanding of safety-related roles and responsibilities and in systems for holding individuals and organizations accountable. In some cases, SC has not been timely in completing activities and initiatives, such as FRAMs, and SC did not effectively implement commitments to improve accountability for safety performance within the SC organization. BHG has not established effective formal mechanisms to hold most BHG organizations and individuals accountable for safety performance. The BNL initiatives are in various stages of implementation and some have not been fully effective, contributing to continued weaknesses in safety management.

Competence Commensurate with Responsibility

Guiding Principle #3: Personnel shall possess the experience, knowledge, skills, and abilities that are necessary to discharge their responsibilities.

A fully functioning safety management system has workers and managers who are technically competent to perform their jobs and who are appropriately educated and knowledgeable of the hazards associated with site operations. Management must assure that effective training programs are in place and that sufficient qualified staff are available. Workers must have the technical capability to respond to workplace hazards.

DOE Office of Science

SC personnel are responsible for directing complex research-related programs within its research program organizations. To provide technical direction, SC maintains a cadre of technical specialists on its staff. These specialists have scientific expertise that does not exist in other elements of the DOE line management organization for Brookhaven. Consequently, SC program staff interact directly with BNL researchers on matters relating to scientific research.



SC has a technically-competent ES&H organization that supports line management.

To provide support to line managers on ES&H matters, SC has established ES&H coordinator positions within each Associate Director organization. Additionally, SC maintains a small, technically-competent organization of ES&H professionals within the Associate Director for Laboratory Operations and ES&H to manage SC ES&H-related programs and provide technical support to the SC line organizations as needed. For example, a pollution prevention coordinator provides support in establishing SC initiatives and supports program and field offices in implementing the initiative.

DOE Brookhaven Group

Managers and staff within BHG have technical competence commensurate with their ES&H responsibilities. BHG has made significant enhancements in technical and managerial competence since 1997. SC has successfully recruited a new BHG Manager, who has been on the job for the past year. The new BHG Manager has broad experience in the commercial nuclear industry, and significant technical and managerial skills and abilities. BHG also has a highly qualified Deputy Director, who is also experienced in the commercial nuclear industry and who provides additional focus on site operational issues.



BHG has added staff with needed technical expertise.

BHG has been able to supplement its technical capabilities over the past two years through recruitment efforts, despite an overall decline in Federal staffing associated with DOE's strategic realignment initiative. BHG has significantly expanded and upgraded technical staff, including Facility Representatives and technical support specialists. Personnel with significant technical capabilities were added in the areas of radiological protection and industrial hygiene/safety. BHG also added professional environmental project expertise within the PMD Environmental Management Team. Additionally, to address an identified shortage within OMD of staff resources for environmental compliance oversight, a memorandum of agreement was established to matrix, on a part-time basis, a qualified employee who is located within the PMD Environmental Management Team.

BHG has enhanced its Facility Representative program.

To enhance its oversight and operational awareness capabilities, BHG has developed a formal Facility Representative qualification program. An administrative procedure that documents program requirements was recently completed. Facility Representatives demonstrated a high degree of technical competence and capabilities during interviews and facility walkdowns. However, none of the six Facility Representatives have been formally qualified against established qualification standards. Two Facility Representatives have completed formal qualification activities and are awaiting oral boards, three are in the qualification processes, and one was recently hired and has not yet initiated formal qualifications.

There has been little progress in implementing a formal training and qualification program for BHG staff.

BHG has made little progress in implementing a formal training and qualification program for its staff. At the time of the 1997 Oversight evaluation, BHG had committed to implement the DOE technical qualification program for certain technical areas. The DOE technical qualification program was established for Federal employees who manage or oversee defense nuclear facilities as part of the DOE implementation plan for DNFSB Recommendation 93-3. BHG subsequently dropped efforts to implement a

qualification program. In addition, although the BHG ES&H Management Plan states that personnel supporting the operational awareness program will participate in formal qualification programs, BHG has made little progress on developing such a program. Further, although BHG technical employees periodically request and receive training, BHG does not use annual individual development planning to support staff training and development as required by DOE Order 360.1. The individual development plan process is intended to facilitate a systematic and coordinated approach to training, based upon institutional and individual needs.

Brookhaven National Laboratory

Staffing and Technical Competence. BSA has a management team at BNL that has appropriate technical capabilities for meeting the high ES&H objectives established for BNL. The top levels of management, including the Director and the two Deputies, demonstrated a good understanding and appreciation of ES&H requirements and expectations and their applicability to the BNL mission. BNL has also assembled a well-qualified management team within the ESH&Q organization, including personnel with the technical competence, management experience, and credentials to significantly influence the policies and performance of BNL.

With a few exceptions, BNL has adequate numbers of competent ES&H personnel.

Overall staffing resources and technical competence of ES&H employees within the Laboratory are adequate to effectively implement the Laboratory's ES&H responsibilities. Managers have been able to obtain support for new positions or obtain contractor support resources to support critical hires, address identified problems, and support safety initiatives. For example, the Radiological Control Manager recently brought additional technical resources on site to address weaknesses in the internal dosimetry program identified by a BHG assessment. In the areas of environmental performance, BNL has begun to deploy professionally-trained Environmental Compliance Representatives and Waste Management Representatives to support BNL research organizations in ensuring that regulatory requirements are met and performance expectations are satisfied.



Replacement of Piping as Part of an Environmental Restoration Project

Although BNL has adequate technical staffing in most areas, there are shortages or resource deployment imbalances in a few areas. BNL does not have sufficient industrial hygiene personnel, or is not deploying sufficient existing staff, to perform needed industrial hygiene functions. This is illustrated by the significant weaknesses recently identified in the BNL chemical management program. A resource baseline analysis is currently being undertaken. A similar effort performed for the radiological protection staff in 1998 was effective in documenting the level of resources needed to adequately support Department/Division needs. In addition, a significant number of vacancies are associated with environmental positions. There are four open positions in the Environmental Services Division. Currently, two of the planned six Waste Management Representative positions have been filled.

BNL is emphasizing professional development of ES&H personnel.

The BNL ESH&Q organization is increasing its focus on the need to promote professional development of its employees. This initiative is frequently reflected in managers' performance goals and R2A2s. For example, modification of the compensation program is being proposed for radiological protection personnel to provide incentive for technical professional development. In this proposal, promotions would be accelerated based upon acquired credentials/training.

BNL Divisions/Departments are using ES&H coordinators effectively to perform support and coordination functions. ES&H coordinators have significant experience in performing research and

development activities within the Departments. While ES&H coordinators are generally not ES&H professionals, they have a good general knowledge of operations and significant safety training and experience in the hazards associated with their facilities. They provide a good linkage between scientific and professional ES&H personnel.

Some implementation weaknesses in environmental management and emergency management stem from weaknesses in training and qualification.

In a few areas, weaknesses were identified in the competence of some BNL employees to effectively perform assigned duties. Some work permits prepared under the new work planning and control standard had incomplete environmental concerns sections. For example, several work permits associated with activities that would generate waste streams were marked to indicate that there were no environmental concerns.

Technical competence weaknesses were particularly evident in the area of emergency management. Notwithstanding Secretarial direction to the field in 1997 to strengthen emergency management, technical inadequacies persist in emergency plans and procedures, including authorities and responsibilities and classification and protective action decision-making. Some initial emergency response members lack proficiency in executing responsibilities and authorities. Performance-based tabletop exercises indicated that initial decision makers did not use applicable procedures effectively to ensure that critical response activities were completed in a timely manner. During the two months preceding this evaluation, training of emergency response organization personnel has been relatively intense in preparation for a full-scale exercise; thus, proficiency should have been high. Technical competence concerns are partially attributable to weaknesses in qualifications and training of BNL personnel.

BNL has not effectively responded to DOE-wide lessons learned in the area of emergency management, including weaknesses identified in the 1998 Office of Oversight evaluation of emergency management. Although identified as a significant weakness in the 1998 Oversight evaluation and one of the issues raised in the Secretary's direction to the field in 1997, some BNL emergency response personnel did not demonstrate

adequate ability to respond to simulated emergencies in tabletop exercises during this Oversight evaluation.

ISSUE: SC, BHG, and BNL have not ensured that the emergency management program meets requirements of DOE Order 151.1 and that BNL personnel are fully trained and prepared to respond to an onsite emergency.

Training. The review of BNL training programs focused on the corporate training program and training programs established by BNL organizations that perform work in non-nuclear facilities. The 1997 Oversight evaluation results indicated that training programs at BNL nuclear facilities met established Departmental standards.

BNL has several ongoing efforts to enhance the ES&H training and qualification program.

BNL is currently undertaking significant efforts to enhance the ES&H training and qualification program at BNL. Initiatives include development of a training and qualification management system description pursuant to the SBMS for employees, establishing the Brookhaven Training Management System (BTMS) as the sole BNL training database, increasing the completion of required training, and improving the documentation and tracking of training requirements for Laboratory visitors. Specific performance measures have been established in Appendix B of the contract for these initiatives.

BNL management has demonstrated strong support for training. BNL transferred the corporate training and qualification program to ESH&Q and appointed a qualified and capable manager to run the office. Further, additional structure and rigor of the BNL training and qualification program are planned through the development of specific subject areas. Some of the strengths identified in BNL training and qualification programs include:

- BNL has initiated a significant outreach and awareness effort to support the development and deployment of the EMS. This early effort is intended to assist in providing a smoother transition to full implementation of the EMS.

- At AGS, an evaluation of training requirements is included in the publication or review of all new and modified procedures that govern work planning and control.
- Plant Engineering has established an effective training program. Job training assessments have been conducted that identify training needs based upon the hazards encountered by craft employees. Plant Engineering also has an effective mechanism for tracking training requirements against accomplishments and providing supervisors the information necessary to make informed job assignments.
- Within AGS, the National Synchrotron Light Source (NSLS), the Medical Department, and the Chemistry Department, the experimental review process is being used as the foundation for identifying the training requirements for personnel assigned to work on each experiment. Individuals are required to read and sign the experimental review package, which includes acknowledging the training requirements.

Although many aspects are effective, there continue to be weaknesses in BNL training programs.

Most BNL employees have received significant ES&H training commensurate with their positions. Supervisors, employees, and training coordinators have worked to identify the jobs employees perform, identify applicable job task analyses (JTAs), and institutionalize training requirements in the corporate training database. Although many aspects of training are effective, there continue to be weaknesses in the BNL corporate training program and some elements of facility-specific and technical training programs (see text box on page 28).

In general, the effectiveness of training and the level of analysis of the duties and hazards in JTAs varied considerably across various BNL departments. Some organizations, such as Plant Engineering, had made significant improvements. Several of the research organizations were not rigorous in their implementation of BNL training program requirements. For example, some JTAs did not include a rigorous analysis of tasks and duties, did not identify all hazards, and did not establish training requirements for hazards that were identified.

TRAINING WEAKNESSES AT BNL

- Several of the research organizations were not rigorous in their implementation of BNL training program requirements.
- In some organizations, not all employees have been assigned all necessary JTAs as part of their employee profile.
- Maintenance of JTAs has been inconsistent. Some Departmental training coordinators did not update JTAs to address changing work activities or changes in corporate training expectations. Some JTAs at AGS and Medical had not been updated recently.
- JTAs for building managers, ES&H coordinators, work control managers, work control coordinators, and experimental safety review coordinators have not been established in some organizations.
- There are currently no formal mechanisms to facilitate periodic review of employee training profiles to reflect changes in duties or changes in corporate training requirements.
- Incorporation of lessons learned into training courses has not been systematic. For example, a 1998 BHG assessment found that students in radiological courses were not required to perform practical demonstrations as required. During this Oversight evaluation, similar weaknesses were identified (i.e., a lack of practical demonstrations of capabilities in respirator training classes).
- There are no Laboratory-wide requirements regarding on-the-job training (OJT). An OJT program is planned as a subject area under the SBMS.
- The level of use of BTMS and participation in ensuring the quality and timeliness of data varies across BNL Departments, even though line organizations require this information to effectively management their training responsibilities.

ISSUE: BNL's training program is not consistently applied within organizations to ensure that training needs are based on a thorough analysis of employee job activities and associated hazards, as required by the BNL training policy.

Subcontractor qualifications and training requirements for construction projects are well controlled through contractual specifications established by Plant Engineering and are based upon the hazards and complexity of the proposed work. These qualification and training specifications are included as a part of the request for proposal. Subcontractors are required to factor these requirements into their bids and are held accountable for meeting the requirements through evaluation of training records and site access requirements.

Summary

BHG has significantly strengthened their technical capabilities to monitor BNL performance through recruitment of experienced technical staff. BNL has assembled a seasoned management team with extensive managerial and technical experience and capabilities. Staffing resources within the Laboratory were judged to be adequate in all but a few cases, and actions to identify staffing needs or fill identified vacancies are ongoing.

In the emergency management area, weaknesses in technical competence were identified for some personnel with important emergency management responsibilities. In addition, BHG has not established a technical qualification program for all staff and does not meet the requirement of DOE Order 360.1 for

staff development planning. Within BNL, weaknesses were identified in the consistency of analysis of training needs based upon job hazards, maintenance of JTAs based upon changes in work, and incorporation of operational performance issues and lessons learned into training programs.

Although weaknesses were evident, most DOE line management and BNL have the necessary staff resources and technical competence to effectively manage their ES&H responsibilities. The recent additions to the BHG and the team of experienced managers from BSA strengthen the capabilities of an experienced workforce.

Balanced Priorities

Guiding Principle #4: Resources shall be effectively allocated to address safety, programmatic, and operational considerations. Protecting the public, the workers, and the environment shall be a priority whenever activities are planned and performed.

A well-performing organization has a management system that identifies, analyzes, and prioritizes risks posed by the hazards inherent in the work to be performed. The system must also establish priorities to mitigate those risks. The priorities are used to request, allocate, and apply resources to meet safety goals, program goals and objectives, and operational needs.

The 1997 Oversight evaluation identified the balanced priorities principle as one of the most significant areas of weakness. At that time, the resource allocation process was not effective in ensuring that ES&H issues received adequate priority, and ES&H issues were not effectively integrated into the information flow, decision-making processes, or mission objectives. Further, processes for allocating funding from various DOE program offices were not sufficient to ensure that infrastructure and environmental issues, such as monitoring wells, were given appropriate priority and adequate funding.

Progress has been made in some areas of balanced priorities, but some previously identified weaknesses are still evident.

As discussed below, SC, other DOE program offices, CH, BHG, and BNL have made many significant improvements in some areas related to balanced priorities since 1997. They have defined and improved mechanisms for establishing expectations and priorities to BNL and allocating and prioritizing resources. However, in some areas, such as issues management, progress has been limited and some of the same weaknesses identified in 1997 are still evident.

Establishing and Communicating Expectations and Priorities

SC, CH, and BHG have demonstrated support for integration of ES&H into the business systems used to plan, prioritize, and allocate resources at BNL. In coordination with CH and SC, BHG has developed and implemented contract reforms that incorporate ES&H performance metrics and Department of Energy Acquisition Rules (48 CFR 970.5204-2) into the BSA prime contract.

The process for developing and measuring critical outcomes is having a positive impact on safety management performance.

The BHG and BNL process for developing and measuring critical outcomes is having a positive impact on safety management performance. The critical outcomes define BNL's broad work assignments and support the priorities and desired outputs described in the SC and CH strategic plans. The commitments and expectations for a given fiscal year are then derived from the critical outcomes. As part of the critical outcome processes, BHG and BNL have established aggressive ES&H improvement goals in various areas, including radiological protection (including goals related to re-engineering projects and radiation protection working groups), conduct of operations, work planning and control, and environmental stewardship. For FY 1998 and FY 1999, BHG and BNL have institutionalized a process for revising and developing the critical outcomes used to evaluate contractor performance. BHG and BNL have realized that communicating and understanding the expectations for the contractor organization is a key component of continuous improvement and enhancing the safety culture at BNL.

BHG and BNL coordinate with SC, NE, EM, and CH during the development of the critical outcomes and collect and improve the critical outcome and contract performance evaluation processes. For example, BHG and BNL developed a set of lessons learned, which were shared with SC, CH, NE, and EM, that addressed issues such as stakeholder participation, feedback, culture change, fee determination, and use of critical outcomes.



There has been limited progress in establishing a sitewide issues management system.

However, limited progress has been made in establishing an issues management system that is sufficient to enable managers to address resource allocation and infrastructure issues and establish priorities from a sitewide perspective. As detailed in the 1997 Oversight evaluation report, BHG and BNL did not have a comprehensive issues management system for trending and analyzing ES&H issues. Although BNL has an action tracking system (the Commitment and Corrective Action Tracking System), it does not provide the Laboratory organizations or BHG an effective means for prioritizing, tracking, trending, and analyzing ES&H issues. In the absence of a BNL-wide system, some BNL facilities, such as AGS and NSLS, have proactively developed facility-specific issue tracking and trending systems that allow them to analyze and focus their resources in a manner that provides the greatest safety benefit. Although the individual systems are useful within the facilities, they are fragmented and do not enable BNL as a whole to track, trend, and analyze systemic issues (e.g., lockout/tagout, industrial hygiene, and emergency management). In addition, individual issues are often prioritized within projects or by safety committees, but BNL does not have an effective process for analyzing and prioritizing the cumulative effect of ES&H issues across BNL.

Resource Prioritization and Allocation Processes

Various DOE Headquarters program offices, including SC, EM, NE, the Office of Defense Programs (DP), and the Office of Environment, Safety and Health (EH), provide funding for BNL research programs and environmental management efforts. SC provides over

90 percent of the total BNL funding, including support for many research projects (e.g., accelerators), sitewide ES&H programs, and maintenance of the BNL infrastructure. As the site landlord, SC is responsible and accountable for ES&H and for coordinating activities among the multiple program offices. EM provides programmatic direction and funding for environmental restoration and waste management activities. NE provides direction for operation of research reactors.



Processes for prioritizing and allocating resources have improved since 1997.

SC, BHG, and BNL have worked to improve processes for prioritizing and allocating resources since 1997. Under the multi-program arrangement, most ES&H infrastructure requirements are captured in the Environment, Safety and Health and Infrastructure Plan. Activities such as routine environmental protection, maintenance, fire protection, and facility and system upgrades are prioritized and funded through the Project Planning, Programming and Budgeting Process (PPPBP). The BNL PPPBP is fully implemented and provides a systematic approach for involving multi-disciplinary teams composed of stakeholders and subject matter experts, including safety and health professionals, in the review, prioritization, and planning of general plant projects (GPP), special maintenance, line items, and accelerator improvement projects on an annual basis. In accordance with the FY 2000 Budget Formulation Handbook, BNL has submitted ES&H commitment affirmation letters to SC documenting the expenditures and accomplishments associated with ES&H commitments and priorities established through the PPPBP for each fiscal year. The BNL PPPBP is an effective process for balancing priorities and limiting the negative ES&H impact of resource reductions and unanticipated resource reallocations.

Although effective, the PPPBP is used only for certain types of projects, including construction projects (including general plant projects, accelerator improvement projects, and multi-program energy laboratory facilities support) and special maintenance projects. However, the process is not used for other activities funded from other means, such as indirect funds or EM efforts. In response, BNL has established a Budget Policy Advisory Committee to evaluate the policies and processes governing prioritization



Drilling a Groundwater Monitoring Well

of indirect funds. The Committee is playing an increasingly important role as BNL works to improve its management of indirect costs.

BNL has expanded a process (locally referred to as “recharging”) that is intended to strengthen radiological, industrial hygiene, environmental compliance, and waste management presence within line organizations. In the recharging process, BNL allocates costs to the various line programs for the services and support of safety and health professionals, including Waste Management Representatives and Facility Safety and Support Technicians. BNL also plans to implement a recharge mechanism for the Environmental Compliance Representatives in FY 2000. The implementation of the recharge process is still in the early stages, and BNL is formalizing its systems and processes for recharging. BNL understands that, for the recharge process to be successful, BNL managers must ensure that the Environmental Compliance Representatives, Waste Management Representatives, and Facility Safety and Support Technicians are involved in operational processes (e.g., work planning and baseline change control) that impact safety and recognize their responsibilities for ensuring regulatory compliance.

BNL systems for developing the work breakdown structures (WBSs) for research and development and project-oriented activities effectively incorporate safety and health in fiscal year planning and budgeting. BHG and BNL coordinate to formally establish and clearly define the work to be performed and expectations for completion. The level of detail required in a given scope of work is commensurate with the importance, complexity, and potential risk of the associated hazards. BHG and BNL rely on WBSs to break the work down into discrete elements. The WBSs for the AGS, HFBR, and NSLS provide a definitive breakdown of tasks and define discrete work elements, which are used for resource

allocation and budgeting. The processes associated with managing the WBSs and ensuring their accuracy are in place and fully implemented. The Laboratory Director uses a compilation of all of the WBSs to capture all of the work elements and activities occurring across BNL. The document identifies necessary resources and personnel accountable for each work activity.

Some projects with ES&H ramifications have been delayed by resource allocation decisions.

Although BHG and BNL have made progress toward integrating safety into BNL business processes and have placed a high priority on ES&H issues, there are some examples of cases where projects or initiatives have been delayed because of resource allocation decisions.

- **Some required safety analysis documentation has not been updated to meet current requirements, and efforts to complete them have been delayed because of resource allocation decisions.** As discussed under Guiding Principle #7, the HFBR and Brookhaven Medical Research Reactor (BMRR) safety analyses are not complete or have not been updated to meet current requirements and reflect the current facility status.
- **BHG and BNL have not allocated the resources necessary to maintain the condition assessment surveys (CASs).** The CASs are intended to provide specific details regarding equipment and asset conditions, existing facility utility, mission resource projections, and planning analyses for addressing facility safety deficiencies. BNL has not allocated sufficient resources to the CAS effort to ensure timely completion and updating of facility CASs. As a result, BNL has continued to use outdated condition assessment surveys during the PPPBP process to plan and prioritize for infrastructure improvement projects, which could result in a failure to identify and properly prioritize degrading facility conditions or potential safety impacts in resource allocation decisions. To compensate for the outdated CAS information, BNL relies on input from a wide range of sources, including special engineering studies, budget calls, facility walk-through inspections, and customer and field ES&H and maintenance personnel, to provide facility condition information. For example, the corroding

air handling system and the legacy mercury and cobalt-60 contamination in Building 555 were identified through separate processes and are not captured in the CAS data.

In some of these examples, the delays resulted in a failure to meet certain requirements and could impact ES&H performance.

SC, NE, and BHG have provided BNL limited resources during FY 1999 to support safety analysis report (SAR) activities. These resources are being used for continuing the efforts on the HFBR SAR. However, the HFBR is shut down and the spent fuel is removed while a decision is being made about its future operations or disposition, and thus the risks associated with the HFBR are minimal at this time. DOE has been directed through legislation not to use funds for efforts to restart the HFBR. Therefore, current HFBR analysis efforts have been managed under the Transition Project Execution Plan and are focused on bringing the HFBR SAR into compliance with DOE Order 5480.23. Concurrently, work on the SAR upgrade for the BMRR, which is an operating reactor, has ceased because funds have been depleted and work on the HFBR SAR is considered a higher priority by SC, NE, BHG, and BNL. However, the HFBR, in its shutdown state, does not currently represent a risk to the safety and health of the public and the radiation hazards to workers are limited to residual contamination.

SC, BHG, and BNL have not effectively managed the backlog (maintenance, equipment replacement, systems upgrades, roof replacement, etc.) for the balance of plant in accordance with DOE Order 430.1A, *Life Cycle Asset Management*. During FY 1998, BHG did not develop or incorporate a critical outcome into the BSA contract associated with management and prioritization of maintenance backlogs in accordance with DOE Order 430.1A. Although BNL has established mature and effective preventive and predictive maintenance programs, line management (including SC) has not developed a systematic approach for planning and allocating resources to closing items on the backlog or establishing a process for prioritizing efforts based on potential safety and health risks.

SC recognizes that resources for infrastructure improvements and functions such as safety analysis are limited, and that ES&H priorities must be balanced against research programs in the competition for funds. SC plans a new initiative to conduct a comprehensive review at BNL to: (1) characterize the magnitude of infrastructure and maintenance backlogs, (2) analyze the risk

assumptions associated with unfunded projects potentially impacting safety on the backlog, and (3) characterizing and improving how funding sources (e.g., general plant projects, accelerator improvement projects, overhead, and line items) are used to support maintenance and infrastructure projects. This effort is a significant improvement in SC's acceptance of its landlord responsibilities.

Continued attention is needed to ensure coordination between program offices related to characterizing an aquifer.

Although improvements have been made in the interfaces among program offices (see Guiding Principles #1 and #2), continued attention is needed to ensure adequate coordination among the various program offices. As discussed in the 1997 Oversight evaluation, delays in installing monitoring wells for the HFBR were partially attributable to uncertainty about the funding mechanism (i.e., which program office would fund such wells) and slow communication between program offices.

Currently, some issues have emerged that could involve a need for effective and timely coordination between SC and EM related to funding and communications with stakeholders. For example, efforts on data quality objectives have not been allocated funds at this time. BNL has written a justification and submitted a request for funding to BHG for developing data quality objectives associated with the Groundwater Protection Implementation and Integration Plan (GPIIP). Although this is a critical milestone, this effort to develop guidelines for a technical basis and establish the criteria for selecting a technically sound alternative for managing the long-term groundwater monitoring system operations (SC-supported activities) as well as other related remedial activities (EM-funded) currently under way has not yet been funded.

Although BHG has improved their ability to perform operational awareness activities (as discussed under Guiding Principles #1 and #2), BHG does not have clear processes for ensuring that they are cognizant of potential safety impacts resulting from BNL resource, scope, and schedule decisions. BHG project execution plans need to meet the intent of DOE Order 412.1 (formerly DOE Order 5700.7C). In some cases (e.g., indirect funds), threshold criteria have not been established for involving BHG in the review of baseline

change control proposals that may have a safety and health impact. For direct funds, some programs, such as the HFBR, have formal baseline change procedures but BHG does not become involved in resource decisions unless the total funding level supporting the project is affected. Conversely, the draft Environmental Management procedure calls for BHG involvement if the change is greater than a \$200K threshold. In addition, BHG failed to follow the procedures outlined in the draft HFBR Project Execution Plan when it approved a Level 1 baseline change proposal (requiring NE-40 approval) without written authorization from NE. This change involved an increase in scope (e.g., changes in fuel pool liner scope); schedule (e.g., six-month extension of environmental impact statement schedule); and costs (e.g., increase in the cost of concrete and piping work, reviews of piping and fuel pool liner designs, and reactor division resources).

Summary

In summary, SC, CH, BHG, and BNL have made many significant improvements in some aspects of balanced priorities since 1997. The mechanisms for establishing expectations and priorities have been improved through contract reforms and critical outcome processes. Such initiatives as the PPPBP provide a systematic method for analyzing priorities and have been effective where they have been applied.

However, limited progress has been made in establishing an issues management system that is sufficient to allow managers to address issues and establish priorities from a sitewide perspective. In addition, several projects or initiatives, such as safety analyses and condition assessment surveys, have been delayed because of resource allocation decisions, resulting in a failure to meet certain requirements and having potential impact on ES&H performance.

SC recognizes that a comprehensive review at BNL is needed to assess such resource allocation issues; this represents a significant improvement in SC's acceptance of its landlord responsibilities. Continued attention is needed to ensure adequate coordination among the various program offices for some resource allocation issues, such as threshold criteria for BHG involvement in change control processes.

Identification of Safety Standards and Requirements

Guiding Principle #5: Before work is performed, the associated hazards shall be evaluated and an agreed-upon

set of safety standards and requirements shall be established which, if properly implemented, will provide adequate assurance that the public, the workers, and the environment are protected from adverse consequences.

An effective safety management system must include processes to identify, communicate, execute, and monitor all applicable DOE requirements and Federal, state, and local regulations. In addition, processes that provide change control and maintenance mechanisms for a given set of baseline requirements must be in place. Translating these requirements into policies, programs, and procedures; tailoring them to specific work activities; and effectively implementing them so as to protect workers, the public, and the environment are a necessary and integral part of an effective safety management system.

BHG Requirements Management

The responsibility and authority for identifying standards and requirements and incorporating them into the BNL contract resides with the BHG Manager. These directives are identified in Appendix I of the BSA contract. Despite the weaknesses described below, the list of directives in the BSA contract has been kept current and has generally been managed effectively. The contract is modified on a quarterly basis whenever new or revised directives are ready for incorporation.

BHG's process for managing directives is not institutionalized.

BHG has established an informal process for identifying and evaluating DOE directives for possible inclusion in the BSA contract. CH formally notifies BHG of any new or revised directives that might apply to BNL. An individual in the BHG Business Management Division then determines whether the directive is forwarded to BNL for "action and implementation" or "information and use" only. This decision is loosely based on whether or not there is a Contractor Requirements Document associated with the directive. The decision does not necessarily include a review by BHG subject matter experts, unless Business Management Division personnel have questions about the requirements. BHG then transmits the directive to the BNL Assistant Laboratory Director for Finance and Administration. Although the transmittal letter does not explicitly indicate BHG's intention to add the directive

WEAKNESSES IN DIRECTIVES MANAGEMENT

- A December 1998 memorandum to BHG stated that BNL is in compliance with the requirements of DOE Order 420.2, *Safety of Accelerator Facilities*, with the exception that the NSLS did not have an accelerator safety envelope as a document separate from the safety assessment document, as required by BHG. BHG accepted this determination but did not require an implementation plan or compliance action plan with a formal commitment from BNL for meeting this requirement. To date, the NSLS accelerator safety envelope document developed to meet this requirement has not yet been approved by BNL or submitted to BHG.
- In January 1999, BNL formally notified BHG that the Laboratory is not in compliance with the requirements of DOE Order 414.1, *Quality Assurance*. BHG has not responded to this notification, nor has it acted to add the directive to the contract during the last two contract updates.
- In December 1998, BNL formally notified BHG of concerns with the revised DOE Order 430.1A, *Life Cycle Asset Management*, and requested assistance from BHG to collectively determine a path forward for implementing the requirements. BHG has not responded to this request.
- When a directive is received from BNL with comments, questions, or a compliance action plan, it is informally forwarded to a BHG subject matter expert for resolution. In three cases reviewed, these subject matter experts were not aware that they had been informally assigned a directive or that the Business Management Division expected them to follow up directives issues to closure.
- At least four exemptions from DOE Order 5480.20 were granted by BHG in April 1995. It cannot readily be determined whether these exemptions are still in effect under the newer DOE order (DOE Order 5480.20A) because the file for this directive has been archived by BHG and there is no listing of exemptions that are currently or were previously in effect.
- BHG did not initially submit a response to the August 1997 Secretarial directives concerning emergency management as required. The February 1998 response submitted by BNL was not adequately reviewed by BHG to ensure that it accurately reflected the status of the BNL emergency management program.

to the contract or provide a response deadline to BNL, there is a tacit agreement between BHG and BNL that the contractor will respond to the letter within 30 days indicating whether or not the directive is applicable to BNL, their compliance status, and whether there is cost associated with implementing the new requirements. BHG does not have internal guidance and does not provide formal direction to BNL on the need for an implementation or compliance action plan for a DOE directive. In addition, BHG does not have instructions for processing exemptions or deviations to directives that may be requested by BNL.

As a result of the lack of formality in the BHG directives handling process, some directives have not been evaluated and processed by BHG in a timely manner. In addition, BHG has not adequately tracked BNL's compliance status for directives to ensure that implementation commitments are achieved, as evidenced by the examples shown in the text box above. Furthermore, BHG does not have a formal process for managing non-DOE requirements, which was a weakness identified in the 1997 Oversight evaluations and contributed to the failure to install HFBR wells in a timely manner in accordance with commitments to Suffolk County.

BHG processes do not adequately document the basis for exemptions.

In some cases, BHG processes do not adequately document the basis for deviations, variances, and/or exemptions. Deviations from a few DOE requirements that have been approved by BHG are identified in the directives listing in Appendix I of the contract. For example, BHG has approved deviations from some requirements in DOE Order 231.1, *Occurrence Reporting and Processing of Operations Information*, that pertain to suspect/counterfeit parts reporting. BHG also approved deviations from DOE Notice 441.1, "Radiological Protection for DOE Activities," that allow the Laboratory to use less conservative radioactivity values to determine whether sealed radioactive sources are required to be routinely inventoried and monitored for integrity. Although numerous discussions apparently took place between BHG and Laboratory personnel regarding the radioactivity values, the technical basis for accepting the limits, which were less conservative than alternative limits that had originally been rejected by BHG, was not adequately documented. The BHG contracting

officer considers these changes in DOE expectations to be “clarifications” rather than exemptions, deviations, or waivers from requirements. Since they are not considered exemptions, BHG does not notify SC or the directive office of primary interest of these deviations. Compounding this situation, neither DOE Order 251.1A, *Directives System*, nor its associated manual provides a definition for “exemptions,” and they do not identify when a compliance action plan or directives implementation plan may be required.

ISSUE: BHG does not have formal procedures for managing DOE requirements in the BSA contract or a formal process for managing non-DOE requirements that may impact Laboratory operations.

BHG processes do not provide for adequate verification that DOE expectations have been implemented.

Because of weaknesses in the BHG requirements management process, BHG is formally notifying the contractor that they agree with contractor’s assessment regarding compliance with requirements before they have verified compliance. With the current processes, when BNL officially notifies BHG of their compliance status relative to a directive, the BHG contracting officer is requested to sign the letter indicating that BHG agrees with the Laboratory’s determination of their compliance status. However, BHG does not perform a comprehensive assessment of compliance with a directive before adding it to the contract. Therefore, BHG may be prematurely agreeing that the contractor is in compliance and thus may have difficulty holding the contractor accountable if compliance issues are subsequently identified through BHG’s operational awareness activities. Further, the BHG contracting officer has signed such acknowledgments even when the Laboratory is clearly not in full compliance with requirements, as in the case of the accelerator order. Also, BHG does not provide BNL with the minimum 30-day notice before revising Appendix I as required by Article 80 of the contract.

Since the 1998 Oversight follow-up review, BHG has revised and reissued many of its office operating procedures. However, since September 1998, little progress has been made to complete these revisions and to develop new procedures that BHG determined are needed. As a result, procedures for critical activities,

such as measuring contractor performance via the Appendix B contract measures, have not been developed. The revised procedure addressing the BHG Federal Employee Occupational Safety and Health (FEOSH) program is weak, while others, such as procedures for BHG training and nuclear facility restart, have not been revised. The FEOSH procedure does not provide policy, goals, and objectives for the worker protection program as required by DOE Order 440.1A and does not identify how BHG ensures that its workers are adequately monitored and protected from potential exposures to hazards when entering BNL facilities.

BNL Requirements Management

BNL has established a formal process for managing the Appendix I contract directives. New or revised DOE directives received by the Assistant Laboratory Director for Finance and Administration are first distributed to the Laboratory Counsel for an applicability determination, and then to one or more formally designated “functional leads” depending upon the subject matter of the directive. The functional lead is responsible for soliciting comments from departments and divisions that will assist in implementing any new or changed requirements and compiling comments to provide the official BNL response about applicability, impact, and resources needed to implement the requirements. The procedure governing this process also indicates that a risk assessment or compliance action plan may be needed to accompany the BNL response but does not provide any criteria or guidance regarding when such additional information should or must be developed. As a result, the responses to BHG vary widely in scope and content. Most of the responses provide adequate information regarding BNL’s compliance status.

BNL has established a new requirements management process.

BNL has also established the requirements management module of the BNL Standards Based Management System (SBMS), which will go into effect Laboratory-wide in July 1999 and will replace the existing BNL procedure. The module provides greater formality and more detailed instructions for processing and evaluating requirements, and elevates responsibility and authority for reviewing and approving BNL applicability and implementation determinations



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to the BNL directorate level. Successful implementation of this module should provide better linkage between the institutional processes and lower-tier mechanisms such as the reactor division procedure for “Controlling Compliance with Code of Federal Regulations, DOE Orders, and BNL ES&H Policy,” which is not linked to the current site-level process.

BNL has made improvements in the experimental and operational work control programs, but other weaknesses are still evident in the flowdown of requirements to the working level.

The 1997 Office of Oversight integrated safety management evaluation of BNL identified numerous weaknesses in the flowdown of institutional requirements to the facility and activity levels. BNL has made improvements in the experimental and operational work control programs. However, most of the other weaknesses are still evident. Although the environmental management procedures have been revised as part of the SBMS and ISO 14001 implementation effort, only one safety and health related standard has been revised to reflect current DOE requirements, Federal laws, and industry accepted practices and approved by BNL management. In addition, procedures contained in the BNL Safety and Environmental Administrative Policy and Procedures Manual (SEAPPM), many of which conflicted with Laboratory standards and facility-level procedures, have not been updated or deleted, and line organizations are still expected follow them. BNL senior managers have focused on developing and populating the SBMS computer based system; this effort has taken precedence

over efforts to update and reissue the ES&H Standards. For example, the Laboratory standards for lockout/tagout and construction safety have been revised several times in the past year to clarify expectations for line management performance in these areas. These procedures have been reviewed and approved by the appropriate ES&H committees, which include line organization representation, but they have not been issued. BNL does not currently plan to implement any revised standards during the transition to the SBMS. As a result, some subject matter experts are encouraging line personnel to follow draft procedures that are not consistent with the approved published or electronic versions.

Progress has been made on developing a comprehensive standards-based management system.

When fully implemented, the SBMS will become the electronic repository for all BNL requirements documents and implementing procedures that affect the line organizations. The first large section of this system that covers the BNL environmental management program is scheduled to be operational in July 1999. The level of effort needed to complete these procedures reflects BNL management’s strong commitment to implementing the ISO 14001 standard. Additional subject area procedures will be added to the system as they become available and are approved by the BNL Director. BNL expects working copies of all SBMS components to be operational by October 1999, with full implementation scheduled by October 2000. This is a major undertaking that is designed to produce clearer expectations for line ES&H performance and consistent instructions for implementing ES&H requirements. The SBMS project manager has requested that each management system owner provide a prioritized list of subject areas (procedures) that need to be developed for the system. The project manager intends to compile these lists into a comprehensive prioritized list for the SBMS effort. This prioritization effort will be a critical step in ensuring that performance expectations related to the most significant risks to workers, the public, and the environment are addressed first.

BNL has expended significant resources within the past year to address deficiencies in the Laboratory’s radiation protection and work control programs, including weaknesses in managing and flowing down program requirements. The outcome of a lengthy

consensus-building process is expected to become more evident in the near future with the issuance of several new Laboratory-wide radiological control procedures. On the other hand, a March 1999 assessment of the BNL chemical safety program performed by BHG identified numerous and widespread failures to implement industrial hygiene and chemical safety requirements. Activities observed during this Oversight evaluation, such as planning to lift both a man and a welding machine in a basket attached to the tines of a forklift, indicate that, in some cases and facilities, weaknesses in industrial safety and hygiene present much more serious risks to workers than the radiation hazards. BNL managers have not yet performed a collective evaluation of site incidents and the status of site programs to determine the greatest risk to workers and where to focus the initial efforts of the SBMS implementation process.

ISSUE: BNL institutional-level documents that promulgate requirements and expectations for ES&H have not been updated to reflect current requirements, and BHG and BNL have not prioritized efforts to upgrade institutional-level requirement documents based on the potential hazards and risks.

There are further indications that the longstanding consensus-building process for defining and implementing ES&H requirements at BNL is continuing to adversely impact the requirements management process under BNL. For example, a Laboratory standard for managing accident investigations has never been issued due to an inability to reach agreement on the content of the procedure. In order to reach consensus, the stop-work procedure that was issued in January removed several prudent implementing requirements that were included in a draft procedure that was based on the Plant Engineering stop-work procedure. The Environmental Stewardship Policy that is needed to meet the requirements of ISO 14001 was approved by the Integration Council without going through the established consensus-building process because the process was seen as an obstacle that would delay issuance of the policy while adding little value. Finally, the experimental work control and building manager procedures, which had been in various stages of development for several years, were not issued and expected to be fully implemented until March and April of this year. In part as a result of these difficulties, the initial development of the SBMS includes the legacy manuals that contain outdated ES&H expectations,

including the highest-level ES&H policy established by the previous Laboratory director, and responsibilities and authorities for safety that do not reflect the current BNL organization. The inherently cumbersome nature of this process does not provide much assurance that the existing weaknesses in ES&H procedures will be addressed in a timely manner. While line management and worker involvement can add value to and promote acceptance of procedures, BNL management needs to ensure that changes in requirements are made in a timely manner so that hazard controls are not compromised.

The SBMS is divided into 33 “management systems,” such as work planning and control, facility safety, environmental management, and training and qualifications, for initially administering the transition to the electronic system. Each management system “steward” is required to develop a Management System Description identifying all requirements external to the Laboratory that apply to work at BNL. As of May 1999, 15 of the descriptions were available electronically as draft documents. The Environmental Management System portion of the SBMS effort has been a positive step toward compiling a listing all of the Federal, state, and county environmental regulations applicable to the Laboratory in a single document and provides a means for monitoring future changes in requirements. However, several draft management descriptions contained references to directives that have not been incorporated into the BNL contract or have been deleted from the contract, and many requirements listings contained guidance documents. Although the developing system descriptions will undergo an iterative process as well as a “record of decision” determination process before being finalized, the draft descriptions demonstrate a lack of line management awareness of applicable requirements.

The process for identifying and evaluating non-DOE requirements is generally effective but has not been formally documented.

The process for identifying and evaluating non-DOE requirements, such as Federal, state, and local laws that could impact Laboratory operations is generally effective but has not been formally documented. For non-DOE Federal requirements (such as environmental and Occupational Safety and Health Administration regulations), an individual within the ESH&Q Directorate routinely reviews the Federal Register. When new or revised regulations that could impact the Laboratory

are identified, this individual distributes the information to the appropriate subject matter experts and sometimes requires a formal response. Although this process is not formally defined and the responsibility for executing it has not been formally established, the process has been effective in identifying and evaluating the impact of new requirements.

The lack of formality, however, contributes to situations where identified deficiencies in BNL standards and procedures are not fully addressed or mitigated. For example, BNL industrial hygienists performed a review of the impact of the Occupational Safety and Health Administration (OSHA) Respiratory Protection Standard, which was issued as a final rule in January 1998. This BNL review, conducted in February 1998, noted that the Laboratory standard on Respiratory Protection needed to be updated in at least three areas to clarify program requirements. The review also determined that formal designation of authorized breathing air system fittings is needed to ensure that breathing air systems will not accidentally be connected to outlets for non-respirable air or other gas systems. Although all of the existing systems have been refitted, the Laboratory standard has not yet been revised and a BNL policy on eliminating or properly controlling incompatible breathing air system fittings has not been developed to ensure that new or modified systems remain compatible in the future. This Oversight evaluation identified additional areas where BNL may not be complying with the OSHA respiratory protection requirements and deficiencies in respiratory protection training may compromise safety.

Subcontractor Requirements Management

BNL has made steady progress in continuously improving the flowdown of ES&H requirements to subcontracts. The Plant Engineering Division, which administers and oversees the majority of BNL subcontracts, has established comprehensive general conditions that are included with every Plant Engineering subcontract and extensive supplementary conditions that pertain to certain subcontracts depending upon the type of work to be performed. As part of the general conditions and as discussed during pre-construction meetings, the subcontractor is required to submit a project-specific health and safety plan. Plant Engineering submits these health and safety plans to a construction safety subject matter expert who performs a rigorous review of the plans. In many cases, these plans were rejected and the subcontractors were required

to revise and resubmit them. Subcontract work is not authorized to begin until the health and safety plan has been approved by BNL. The Environmental Restoration Division also uses the Plant Engineering contract provisions and subject matter expert reviews of health and safety plans for any work involving construction-related activities or remediation. In a few cases, the subcontracts that were reviewed did not adequately specify the interface and respective responsibilities between BNL and the contractor for safety-related functions such as lockout/tagout and hazardous waste handling.



Although progress has been made, BNL procedures for subcontracts have some deficiencies.

The BNL Division of Contracts and Procurement has developed a draft procedure that provides guidance for incorporating the appropriate terms and conditions into all BNL subcontracts and purchase orders. This procedure references the standard terms and conditions that have been established for the eight different types of Laboratory subcontracts. However, the procedure does not reference or identify additional contract terms and conditions specifications that have been established and are required by other BNL organizations. For example, the BNL Environmental Restoration Division uses its own set of contractor general conditions to supplement those developed by the Division of Contracts and Procurement.

BNL subcontracts and subcontract terms and conditions also do not contain the DEAR clause entitled “Integration of Environment, Safety, and Health into Work Planning and Execution,” as required by Article 72 of the BSA contract for complex and hazardous work performed by subcontractors. This clause requires that DOE contractors and subcontractors adhere to the tenets of ISM and is fundamental to communicating DOE’s expectations for performing work safely. The draft contracts and procurement procedure indicates that this clause may be applicable under “special circumstances” and attempts to provide guidance as to when the clause should be incorporated into subcontracts. However, the procedure does not identify what constitutes “complex and hazardous work” that would require inclusion of the clause, and does not identify that such subcontracts shall include a clause “substantially the same” as the DEAR clause.

ISSUE: BNL has not ensured that subcontracts contain applicable requirements (i.e., DEAR clause on Integration of Environment, Safety, and Health into Work Planning and Execution as required by Article 72 of the BSA contract).

Summary

BHG has not established a formal requirements management process that ensures that DOE expectations for ES&H performance are clearly communicated to the contractor and tracked to ensure that implementation commitments are completed and are effective. In addition, BHG internal procedures are not yet sufficiently developed to ensure that mechanisms for managing the BSA contract are clearly documented and understood by affected BHG staff. However, BNL has a firmly established and well-managed process for handling DOE directives. The BNL process has compensated for the many weaknesses in the BHG requirements management process.

BNL is committed to implementing a comprehensive management system designed to ensure that ES&H expectations for performing work are clearly communicated and consistently executed across the Laboratory. However, few changes in institutional requirements and flowdown to the facilities have been finalized and implemented since the 1997 safety management evaluation. The SBMS system is in the early stages of development and, with the exception of work control programs, has not yet impacted facility-level mechanisms for identifying, applying, and adhering to ES&H requirements. In some cases, however, facilities have developed facility-level mechanisms to compensate for weaknesses in the institutional-level programs. SBMS development and implementation is rapidly moving forward. However, in the interim, BNL management must ensure that the requirements and expectations for controlling the most significant ES&H hazards are receiving adequate attention and control commensurate with the risks to workers, the public, and the environment.

Flowdown of ES&H requirements to subcontracts and monitoring of subcontractor ES&H performance have continuously improved since the 1997 evaluation. Despite these improvements, BNL has not adequately communicated expectations for performing subcontracted work in accordance with ISM principles and the established BNL work control and work permitting processes.

Hazard Controls Tailored to Work Being Performed

Guiding Principle #6: Administrative and engineering controls to prevent and mitigate hazards shall be tailored to the work being performed and associated hazards.

To conduct work safely, line management must ensure that structured processes exist and are implemented sitewide to identify and analyze work hazards consistent with the complexity of the work activity and the significance of the risk. The appropriate engineering and administrative controls and personal protective equipment must then be established and properly implemented to prevent or mitigate those hazards and ensure protection of the public, workers, and the environment.

The wide range of hazards at the BNL site includes fissile materials, radioactive materials, cryogenic systems, high-temperature and high-pressure systems, flammable gases and liquids, earthquakes, toxic and hazardous chemicals, biohazards, confined spaces, inert atmospheres, and other industrial hazards. Key facilities at the site include nuclear reactors, accelerators, and radioactive waste management facilities. The reactors and waste facilities have been classified as Safety Category 1, 2, and 3 pursuant to DOE Order 5480.23.

 **BNL has developed an appropriate environmental management system.**

BNL has developed an appropriate EMS based on ISO 14001, “Environmental Management Systems-Specification with Guidance for Use,” for addressing environmental hazards associated with BNL industrial processes. As part of this effort, BNL has completed, on schedule, an evaluation of the environmental hazards for nearly 100 high-priority work processes across the site. Procedures and guidance have been developed for addressing environmental aspects of BNL operations, including provisions for controlling hazards identified during the sitewide process evaluations. Implementation of these procedures and guidance has been limited to pilot efforts at selected facilities. Implementation at other facilities is planned as part of SBMS implementation.



Groundwater Pumping Equipment

DOE and BNL have taken appropriate steps to characterize and remediate the hazards associated with the tritium contamination of groundwater in the upper glacial aquifer beneath the BNL site. Following the detection of tritium contamination in excess of drinking water standards in early 1997, DOE and BNL took prompt steps to notify regulatory agencies and the public, characterize the extent of contamination, identify and eliminate the source of contamination, and install a remediation system to limit the spread of contamination. Current analysis indicates that the concentration of tritium in this plume does not and will not exceed drinking water standards beyond the site boundary. As discussed under Guiding Principle #4, although not presenting immediate risks, the extent of contamination in the Magothy aquifer has not been fully characterized.

Processes for analyzing and controlling the hazards associated with operations and experiments have been improved.

Effective processes have been developed and implemented for analyzing and controlling the hazards associated with operations and experiments. Sitewide standards and facility-level implementing procedures are providing a degree of rigor in work planning and control that did not exist when the Office of Oversight reviewed this area in 1997 and 1998. These standards and procedures provide a graded approach for tailoring controls to the work being performed consistent with DOE Policy 450.4, *Safety Management System Policy*.

For operations and maintenance work, BNL Laboratory Standard 1.3.6 and procedures contain risk- and hazard-screening guidelines for classifying work as low-, moderate- or high-hazard and procedural

requirements dictating a level of planning and control commensurate with the severity of the hazards to be encountered. A work permit process provides a mechanism for ensuring that hazard screening and job safety analysis are performed and appropriate hazard controls are established. The standard does not provide sufficient guidance for analysis or control of environmental hazards. Hazard screening guidelines addressing pollutants are included in the standard for the planning of maintenance and operations work, but pollution prevention measures are not adequately addressed. Consequently, procedures based on this standard lack adequate provisions for pollution prevention.

The standard and procedures for planning experiments include appropriate provisions for safety reviews.

The standard and procedures for planning experiments include appropriate provisions for tailoring the level of independent review, documentation, and approval based upon potential safety hazards and environmental impact. In general, the procedures for hazard analysis have been followed, potential hazards have been identified during planning, and appropriate controls have been prescribed. The process for assessing the environmental impact of planned experiments at AGS is based on reviewing potential impacts against an environmental assessment that envelops the environmental impact of most AGS experiments. A Laboratory standard and implementing procedure for planning and control of experiments provides guidance for assessing the potential environmental impact of each proposed experiment. An Experimental Safety Review Committee, which includes an environmental professional, reviews the potential environmental impacts of each proposed experiment to ensure that the potential impacts are within the scope of the environmental assessment and that appropriate environmental controls are applied.

Written criteria have been established to define the scope of committee review. These criteria are appropriate except that they do not specifically require the review of planned activities against the environmental assessments for experiments or the accelerator safety envelope. Nonetheless, committee reviews have been effective in ensuring that planned activities remain within analyzed safety and environmental envelopes and that environmental controls are applied to experiments.

Controls have been established to confirm that appropriate environmental reviews are completed before work is accomplished. The BNL Plant Engineering organization has established procedural requirements to ensure that an environmental review is completed before the start of detailed design work for any construction project or special maintenance. In addition, BHG has established and implemented a process to verify that NEPA reviews have been completed, when required, before funds are provided for projects, work-for-others, and work performed under cooperative research and development agreements.

Sitewide procedures are being developed by BNL to address performance inconsistencies and deficiencies in many areas.

Although progress has been made, BNL does not have adequate sitewide procedures in many areas. Such procedures are being developed to address performance inconsistencies and deficiencies. For example, in the area of industrial hygiene, procedures for safely handling lead are being developed independently by different site facilities in the absence of an institutional lead-handling program. In the area of industrial safety, a pending revision to the BNL standard for lockout/tagout has been delayed for more than a year despite performance problems in this area. And, as discussed above, in the area of environmental management, EMS procedures have been developed but implementation is currently limited to designated EMS pilot facilities.

Inadequate hazard analyses have resulted from deficiencies in process implementation.

Although BNL has established appropriate processes for hazard analysis and control, and has identified and controlled some significant hazards, several deficiencies in the implementation of hazard analysis processes and controls were identified at the site, facility, and activity level. Emergency management hazard assessments, required by DOE Order 151.1, that form the technical basis for emergency actions to protect workers, the environment, and the public are

inaccurate and out of date. Significant deficiencies were identified by BHG in the BNL chemical management program, such as unanalyzed chemical operations, lack of chemical carcinogen procedures, stockpiling hazardous chemical, and others. Facility baseline industrial hygiene assessments that are required by DOE Order 440.1 and OSHA have not been conducted to assess hazards in all BNL facilities and workspaces. These assessments provide the foundation for the development of a knowledge base of existing hazards and promote the effective development and implementation of hazard control measures. BNL is addressing hazards assessments in the Chemical Safety Program Improvement Plan. Non-approved manufactured or acquired electrical equipment does not have documented Underwriters Laboratory (UL) or a National Recognized Testing Laboratory (NRTL) equivalent safety reviews required by the National Electrical Code. BNL evaluates non-approved manufactured or acquired electrical equipment through the Experimental Review process (Laboratory Standard 1.3.5) and/or the Design Criteria for Electrical Equipment review process (Laboratory Standard 1.5.2), which directs the reviewers to focus on specific minimum design criteria for electrical equipment. This process, however, does not require the marking or specific documentation to be maintained on each piece of equipment. This lack of marking and documentation could lead to equipment not receiving adequate review and, in turn, could allow unrecognized electrical safety hazards in the workplace. In the environmental area, some work permits did not address potential impacts on endangered species and habitats, wetlands, and waste streams. Additionally, potential hazards from storage of gas cylinders in Building 555 and venting of high-pressure helium at RHIC were not recognized or appropriately controlled.

Summary

Processes have been developed and implemented for analyzing and controlling the hazards associated with operations and experiments. The processes are generally effective and provide a degree of rigor to work activities that previously did not exist. With a few exceptions (e.g., inadequate provision for pollution prevention in the standard for operating and maintenance work), appropriate processes have also been established for assessing the environmental impact of planned activities. Sitewide procedures, revision of outdated manuals, and improved compliance with existing requirements are still needed to address performance inconsistencies and deficiencies in some areas. BNL is

systematically addressing many of the documentation deficiencies through implementation of a DOE-approved SBMS Project Plan. DOE and BNL have taken appropriate steps to characterize and remediate the hazards associated with the tritium contamination of groundwater in the upper glacial aquifer beneath the BNL site. Procedures have been established by BNL to ensure that changes to procedures and facilities remain within analyzed safety envelopes.

Although much progress has been made, additional attention is needed to ensure fully effective implementation. BHG and BNL recognize the need to improve performance in this area. While the institutional processes are generally effective, they have not consistently been implemented effectively, contributing to continued weaknesses in hazard control that have the potential to place workers at risk.

Operations Authorization

Guiding Principle #7: The conditions and requirements to be satisfied for operations to be initiated and conducted shall be clearly established and agreed upon.

Line management must ensure that operations are approved and authorized using established mechanisms for developing and maintaining authorization basis documentation that clearly delineates the terms and conditions for authorizing site, facility, or activity operations. DOE has the ultimate responsibility for ensuring that all operations at DOE facilities are reviewed and authorized at a level commensurate with the hazards and that work authorization processes are established by the contractor. DOE and the contractor must confirm readiness to implement safety controls before starting work.

BNL has strengthened processes for authorizing work at the facility and activity levels.

In the area of experiments, maintenance, and operations, the BNL processes have been strengthened to ensure that hazards are analyzed and controls are in place before work is authorized. Previous reviews by Oversight noted significant deficiencies in processes for authorization and control of experiments and other work. These processes have been significantly strengthened and now provide mechanisms for

ensuring that controls are in place before work is authorized. Facility use agreements are being developed by BNL to define facility operational boundaries, limit facility use, and assign responsibilities for facility maintenance. Such agreements have been successfully piloted at AGS and are being developed for other site facilities. Laboratory standards have been established at the institutional level for authorizing work and experiments. These standards, which apply to all experiments and to most operations and maintenance, include provisions to ensure that hazards are analyzed and controls are established before experiments and work begin. For example, Laboratory Standard 1.3.5 requires prior approval of new and modified experiments by the Experiment Safety Review Committee based upon a review of safety analysis and controls, and Laboratory Standard 1.3.6 requires analysis of hazards and establishment of controls prior to approval of work authorization. Appropriate procedures have been issued to implement these standards at the facility level. Compliance with these procedures is, with some exceptions, generally good.

DOE authorizes the operation of reactors and accelerators based, in part, on the review and approval of documented safety analyses prepared by contractors seeking approval to operate these facilities. Detailed requirements for the preparation, review and approval of such safety analyses are defined by DOE orders. In the case of the RHIC, which is currently in a pre-operations phase, SC, BHG, and BNL are implementing these requirements effectively. A “Process for Project Acceptance” has been established that defines the approach to be used and the requirements to be met for obtaining DOE approval to operate. The process, which includes BHG review of a safety analysis document (SAD), BHG approval of an accelerator safety envelope (ASE), and an accelerator readiness review (ARR), meets the requirements of DOE Order 420.2. The scope of DOE review appears to be sufficient to support an informed decision regarding authorization to operate. However, as discussed in the following paragraphs, DOE order requirements have not been met at BNL for several major facilities.

The High Flux Beam Reactor safety analysis has not been upgraded as required.

The documented safety analysis for HFBR has not been upgraded as required and as committed to following the 1997 Oversight evaluation. DOE Order 5480.23, *Nuclear Safety Analysis Report*, which has been in effect since April 1992, includes requirements for documenting safety analyses of reactors in SARs. The order requires BNL to upgrade SARs to address institutional and human factor safety while maintaining emphasis on the analysis of design and hardware. The current HFBR SAR does not contain all of the information required by this order. Safety system descriptions and accident analyses are included and have been maintained current. However, descriptions of some support systems and administrative controls, which are important to safety, are out of date and descriptions of some institutional requirements are incomplete. Although adequate administrative controls have been established in most cases, these controls have not been included in the HFBR final SAR. DOE Order 5480.30, *Nuclear Reactor Safety Design Criteria*, in effect since January 1993, provides design criteria that must be met for new DOE reactors and for existing reactors. It requires that “the safety basis in the upgraded SAR shall demonstrate that the appropriate provisions of this order are compared and evaluated against the current safety design bases.” This order establishes a graded approach for evaluating the need for design changes based on the required review. These required comparisons and evaluations are being accomplished as part of the HFBR SAR upgrade.

A plan to upgrade the HFBR SAR, including a justification for continued operation while the upgrade is in progress, was approved by BHG (then the Brookhaven Area Office) in November 1995. Implementation of this plan was delayed because funding was not allocated. Implementation did not begin until after HFBR was shut down in December 1996. The planned SAR upgrade is now in progress, with submittal of a final draft to BHG scheduled for December 31, 1999. The scope of reanalysis performed by BNL as part of this upgrade, and the extent of review by DOE, have met the requirements of DOE Order 5480.23. The HFBR SAR has been kept current through change campaigns reviewed and approved by NE. HFBR SAR deficiencies are not a current reactor safety concern because the HFBR has remained shut down since December 1996, and fuel has been removed from the reactor vessel. Project Management and Project Execution Plans have been developed to manage the transition of the facility. These plans assign responsibilities and provide authorization controls to assure satisfactory



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accomplishment of important transition project activities such as DOE review and approval of the upgraded SAR and preparation of an environmental impact statement to assess restart and decommissioning alternatives.

The Brookhaven Medical Research Reactor does not have a final safety analysis report, and efforts to complete one have been delayed.

A SAR has not been developed to support safe operation of the BMRR. BMRR is authorized to operate, and does so intermittently, at power levels of up to three megawatts for medical research and patient treatment. Current safety analyses for this facility are documented in BMRR technical safety requirements (TSRs) and memoranda referenced by this TSR. DOE has approved this TSR and referenced memoranda, but these documents do not include detailed descriptions of safety systems or other information required by DOE Order 5480.23, nor are these documents based on the design basis comparisons and evaluations as required by DOE Order 5480.30. Safety system descriptions, and much of the other information required to be included in authorization basis documents, are contained in documents maintained by the BNL Reactor Division. These documents have not been considered to be part of the authorization basis for the BMRR and thus, many have not been reviewed by DOE.

A revised implementation plan for developing a SAR for the BMRR was approved by DOE in November 1996. The plan includes a documented basis for continued operation during the upgrade project based upon application of existing procedures, programs, and technical specification requirements. The plan does

not include a date for completing the upgrade project. Work on the project is incomplete and is currently suspended, due to resource limitations, pending completion of the HFBR SAR upgrade. The most recent BNL hazards assessment states that there would not be significant offsite consequences for a worst-case postulated accident. The basis for continued operation is reasonable based upon this hazard assessment, the safety record of the facility, and the current TSR and procedures. However, authorization of continued operation for an indefinite period of time without a DOE-approved SAR does not meet the intent of DOE Order 5480.23.

 **Implementation of processes to ensure that changes to procedures and facilities remain within analyzed safety envelopes has not been fully effective for reactors.**

Processes have been established by BNL to ensure that changes to procedures and facilities remain within analyzed safety envelopes. However, implementation of these processes has not been fully effective for reactors. The procedure established for reactors requires evaluation of proposed changes to facilities and procedures against SARs to determine whether unreviewed safety questions exist. This process is required by DOE Order 5480.21, *Unreviewed Safety Questions*. The process is sound but implementation has not been fully effective because SARs, which provide the basis for unreviewed safety question determinations, have not been maintained current and are incomplete.

NE (which has responsibility for operation and maintenance of BNL reactors) and BHG have not taken timely action to address deficiencies in authorization basis documentation that have been evident for several years. The need to upgrade HFBR and BMRR SARs to comply with the requirements of DOE Order 5480.23 has been apparent since that order was issued in 1992. BNL submitted plans for the upgrade of both SARs to the Brookhaven Area Office in September 1992 addressing the cost, scope, and schedule of needed changes. These plans were not approved because funds for the projects were not available. Proposed exemption requests, which were submitted approximately one year later, were also not approved. Revised implementation plans for BMRR and HFBR SAR upgrades were subsequently submitted and approved in 1995 and

1996 respectively but no funds were provided for implementation. Work began but progress was slow due to limited resources. In November 1998, the BNL Reactor Division advised BHG that work on the BMRR SAR had ceased because of lack of resources and the higher priority placed, by both BNL Reactor Division management and BHG, on completion of the HFBR SAR upgrade. The Office of Oversight noted deficiencies in both reactor and accelerator authorization basis documentation during a safety management evaluation in 1997. In response to these findings, BHG made commitments for comprehensive reviews and upgrades. These commitments were not met.

 **The basis for DOE approval of safety envelopes for BNL accelerators is not clear.**

The basis for DOE approval of the NSLS ASE is not clear. Operational safety limits (which BHG and BNL regard as equivalent to an ASE) were included in a SAD attached to a 1994 implementation plan for DOE Order 5480.23. Although CH approved that plan, the 1997 Oversight evaluation noted that the NSLS ASE had not been formally approved and that DOE reviews of implementation plans were not thorough. In response to this finding, and at the request of BHG, BNL began developing an ASE for the NSLS but this ASE has not yet been submitted to DOE for approval. BHG and CH have subsequently concluded that DOE reviews of implementation plans were sufficiently thorough and that DOE approval of these plans constituted ASE approval. The basis for this determination is not clear and is not documented. The results of the determination had not been communicated to BNL, and BNL was continuing to develop a revised ASE for DOE approval. The requirement for DOE approval of ASEs was included in DOE Order 5480.25, *Safety of Accelerator Facilities*, from 1992 until that order was superseded by DOE Order 420.2, *Safety of Accelerator Facilities*, in November 1998. DOE Order 420.2 did not require DOE approval of ASEs for low-hazard accelerators, such as those at BNL, until it was revised on May 26, 1999.

Administrative aspects of the SAD for the AGS have not been maintained current. The safety analysis for the AGS is documented in a SAR that has been accepted by BHG as equivalent to a SAD. The AGS SAD has not been updated since 1993 and administrative aspects are not current.

ISSUE: BHG has not institutionalized a structured process for review and approval of the authorization basis for accelerator facilities.

Summary

Processes for authorizing experiments, operations, and maintenance have been significantly strengthened and now provide effective mechanisms for assuring that appropriate controls are in place before work is authorized. Appropriate standards have been developed and procedures have been issued to implement these standards at the facility level. Compliance with these procedures, with some exceptions, is generally good. Processes to authorize initial operation of the RHIC accelerator and restart of the HFBR provide for appropriate involvement and control by DOE.

The documentation upon which NE has based authorizations to operate reactors at BNL does not meet the requirements of DOE orders. Deficiencies in HFBR authorization basis documentation are not currently of safety significance because that reactor is shut down and the deficiencies will be corrected prior to restart, if restart is authorized. There is no SAR for the BMRR, and sufficient resources have not been allocated to provide timely development of this authorization basis document. Although an adequate safety basis was developed to justify continued operation during SAR development, SAR development has been suspended because of resources issues and no definitive completion date has been established.

At the time of this safety management evaluation, DOE Order 420.2 did not require DOE approval of ASEs. The order was revised on May 26, 1999, to include this requirement.

The current weaknesses in authorization basis documents reflect the low priority historically afforded to DOE requirements for maintaining current safety analysis documents. Improvements have been made in some areas, as evidenced by the process being used to authorize startup of the RHIC. However, DOE and BNL have not followed through on plans and commitments in some areas, such as the completion of the BMRR safety analysis and updates to accelerator safety analyses.

Summary Evaluation of the Core Functions

DOE Policy 450.4, *Safety Management System Policy*, defines five core safety management functions that provide the necessary structure for any work activity

that could affect the safety and health of the public, the workers, or the environment. The functions are applied as a continuous cycle, as shown in Figure 4, to systematically integrate safety into the management of work practices at the institutional, facility, project, and activity level for all work.

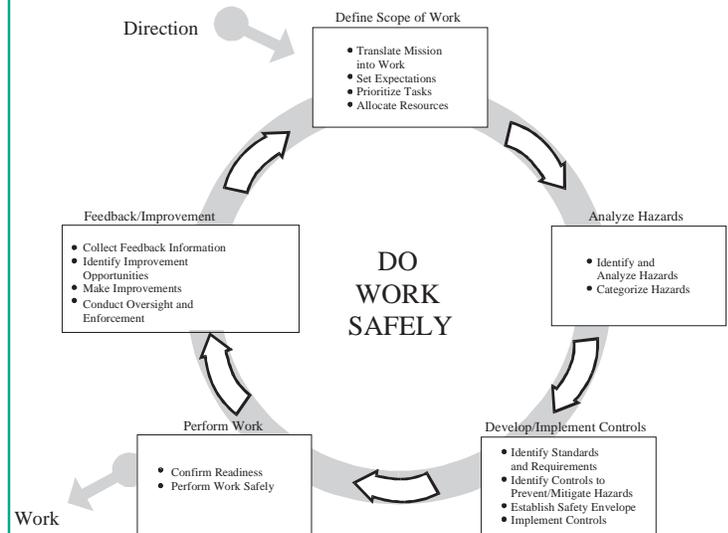


Figure 4. Core Functions of Safety Management

Because of the close relationship between the guiding principles and the core functions, many of the BHG and BNL institutional processes for implementing the core functions have been discussed under the applicable guiding principles. Within the framework of the core functions, this Oversight evaluation of safety management at BNL focuses on the application of the core functions at the facility, project, and activity levels. The following paragraphs provide a summary of BNL performance with respect to the five core functions.

Define the Scope of Work. Work scopes for projects, environmental work, experiments, maintenance, and routine day-to-day operations are generally well defined and documented. Work definitions and work controls adequately define system boundaries, prerequisites, and required initial facility conditions. Appropriate environmental, safety, and radioactive control disciplines are involved in proposals and activities associated with defining work. Other than minor exceptions in some communications expectations, work permit definitions, and pollution prevention responsibilities, work activities are sufficiently defined to allow adequate hazard analysis.

Analyze the Hazards. The new work planning and control standard and the revised experimental control standard and associated facility implementing procedures provide a methodical and graded approach

to apply hazard analysis for work activities at BNL. Implementation of these processes has resulted in substantial improvement and added rigor to the work control process. However, numerous deficiencies were identified with the hazard screening process and operational awareness of hazards within the facilities evaluated. Deficiencies with the hazard identification and analysis process in the areas of waste management, pollution prevention, industrial hygiene, and industrial safety require continued management attention for resolution.

Develop and Implement Hazard Controls. Work controls, processes, and procedures have markedly improved with the implementation of the revised BNL standard for experiments and the new BNL standard for work planning and control. There has been improvement in the integration of environmental considerations into experimental and routine work activities through the use of the experimental review process and the site work permit form. Facility management and work control managers have accepted the process and are committed to implementing the program in a consistent manner. The Chemistry Department, AGS, NSLS, Plant Engineering, and HFBR have implemented the BNL requirements into facility-specific work planning and control procedures and assigned work control managers. The BNL work planning and control standard requirements are generally implemented properly but with some deficiencies. Some deficiencies were identified in implementing work control, such as not identifying the controls for all hazards, authorizing the start of work before all workers had signed the permit, and not specifying waste streams. Weaknesses in institutional programs upon which safe work depends place an additional burden on line management to implement compensatory measures. BNL also identified similar deficiencies in work control implementation. Actions are being taken to address these deficiencies; however, continued supervisory and management attention is needed to ensure effective implementation.

Perform Work Within Controls. There have been significant improvements in most aspects of work performance in all departments at BNL. The understanding of integrated safety management and the need to perform work using the five core functions is well understood at all levels within the organization. Work previously performed that was minimally documented under varying informal processes is now being performed and documented using the more rigorous Laboratory standards and implementing procedures. The conduct of experiments is more rigorous. There is also significant progress in performing

environmental work associated with groundwater, waste generation and remediation, and pollution prevention. Most experimental and facility work observed was appropriately performed in accordance with procedures and specified controls. Work performed using the newly implemented Laboratory experiments and work planning standards controls has substantially improved; however, more definitive thresholds and a more uniform application of those thresholds is needed to ensure that all activities fall under those controls. Work performance deficiencies indicate that continued management attention is needed to ensure that work is safely performed within appropriate controls.

Performance Feedback and Continuous Improvement. SC has not fully implemented improvement initiatives established following the 1997 Oversight evaluation. BHG and BNL have pursued corrective actions to address the performance feedback and continuous improvement weaknesses identified in 1997 Oversight evaluation and the August 1998 Oversight follow-up evaluation. The Facility Representative program is much stronger with the implementation of the operational awareness program. BHG has enhanced periodic communications with BNL to identify issues and concerns and to identify responsible individuals for program improvements. Self-assessments at both the worker/supervisor and management level within the line organizations have improved, but not all organizations have effectively implemented programs that are consistent with Laboratory expectations. Corporate oversight and lessons-learned programs are beginning to function, creating value-added results to line organizations, but will require continued management attention to ensure full implementation. Management processes to capture, prioritize, and track ES&H issues within BNL require substantial improvement.

Overall Assessment of the Core Functions. As a result of BNL's proactive groundwater, environmental, and work control initiatives, there has been significant progress and improvement in all core functional areas. The SBMS, though not complete, is driving needed improvements in institutional processes. BNL has committed to implement the EMS, based on the BNL-enhanced ISO 14001 standard, as a subset of ISM. EMS is being piloted at selected facilities and divisions. Environmental work, such as the installation of monitoring wells, remediation activities, and integration of environmental considerations into routine work activities, minimizes environmental risks from site operations. Continued progress in implementing the revised experimental and new work planning Laboratory standards has substantially

improved the consistency of processes for planning work, establishing controls, and performing and documenting work activities. These improvements were apparent during observation of work activities. BNL has improved work coordination by assigning dedicated work control managers at each facility as a single point of contact for work affecting the facility. Implementation deficiencies in various areas (e.g., completing work permit forms, capturing all hazards, and ensuring that

appropriate controls are in place and properly documented) indicate that a more rigorous review is needed prior to authorizing work. Program requirements, such as stop work, lockout/tagout, chemical safety, industrial hygiene, and environmental management require attention to ensure that they are current and properly integrated into the new work control system.

Overall Assessment and Ratings of Integrated Safety Management

Objective of Integrated Safety Management: DOE and contractors must systematically integrate safety into management and work practices at all levels so that missions are accomplished while protecting the public, the worker, and the environment. This is to be accomplished through effective integration of safety management into all facets of work planning and execution. In other words, the overall management of safety functions and activities becomes an integral part of mission accomplishment.

The seven guiding principles and five core functions are interrelated and must be considered collectively with respect to their overall impact on integrated safety management. This section presents the ratings and discusses how the results of the individual elements “roll up” into the overall assessment of line management’s effectiveness in establishing an integrated safety management system. In evaluating the overall effectiveness of the safety management system, the guiding principles provide the institutional framework for ISM and the core functions provide an indication of whether the institutional processes are effective. Consequently, the overall rating reflects the evaluation of both the core functions and the guiding principles.

When viewed individually, two of the guiding principles (line management responsibility for safety and competence commensurate with responsibility) were evaluated as having effective performance (GREEN). Two of the guiding principles (balanced priorities and hazard analysis and controls) were evaluated as having effective performance in some areas while needing improvement in others (GREEN/YELLOW). Three guiding principles (clear roles, responsibilities, and accountability; identification of safety standards and requirements; and operations authorization) need improvement and significant management attention (YELLOW).

The evaluation of the five core functions indicates that two of the core functions (define work and perform work within controls) have effective performance (GREEN). One of the

core functions (develop and implement hazard controls) was evaluated as having effective performance in some areas while needing improvement in others (GREEN/YELLOW). Two of the core functions (identify and analyze hazards, and feedback and continuous improvement) need improvement and significant management attention (YELLOW).

Although additional improvements are needed in some areas, safety management at BNL has improved significantly since 1997 when significant weaknesses were evident in many aspects of safety management systems. Much of the improvement can be attributed to BHG and BNL efforts to implement ISM principles at BNL and to the greater level of DOE Headquarters involvement. BHG and BNL have ensured that line management understands that they are responsible and accountable for safety. BNL has generally been effective in establishing and communicating clear roles and responsibilities, and ensuring that individuals are accountable for performance. In the past two years, BNL has made substantial progress on important initiatives, such as SBMS and R2A2.

Although significant progress has been made, many aspects of ISM and BNL initiatives are in the early stages of implementation and are not yet achieving their objectives. The results of this Oversight evaluation indicate that safety management performance varies considerably across the various BNL organizational elements and across various programs. In some cases, efforts to improve have not been effectively implemented at the working level, as evidenced by continued weaknesses in hazard analysis and controls in certain facilities and work activities. In other cases, initiatives have not achieved their objectives because they were not given sufficient priority and management attention, such as the failure to establish an effective emergency management program. In many cases, however, the identified weaknesses persist because ISM elements have not been in place long enough to ensure that they are identified and corrected

through ongoing BHG and BNL assessments and continuous improvement programs. SC, BHG, and BNL recognize that variations in safety management performance will occur because of the aggressive ISM implementation schedule and the rapid cultural changes. They also recognize that sustained attention is needed to ensure that all BNL organizations make the needed improvements and effectively implement ISM.

With some exceptions, BHG and BNL management have a good appreciation of the remaining weaknesses and the efforts needed to address them. Although improvements are needed with respect to several of the guiding principles, BHG and BNL have established a generally effective management framework for making the needed additional improvements, including mechanisms for measuring performance (e.g., the audits performed by the BNL Independent Oversight Office) and holding individuals and organizations accountable for performance. Initiatives such as SBMS are promising and, if fully and effectively implemented, are designed to address many of the identified weaknesses. BHG and BNL have recognized that

continued attention is needed to address historical BNL site culture, including the organizational elements and individuals that continue to resist adoption of a rigorous approach to standards-based safety management, which is contributing to problems and delays in implementing the R2A2 initiative.

Overall, SC, BHG, and BNL have demonstrated their commitment to implementing ISM and have made substantial progress. Although additional improvements are needed, the results of this Oversight evaluation indicate that BHG and BNL have established many of the management system elements needed to achieve continued improvement. SC, CH, BHG, and BNL clearly understand that much work remains to fully implement ISM in accordance with the aggressive schedule established in the contract (i.e., by October 2000). BHG and BNL need to sustain their attention to ensure that the ongoing and planned initiatives achieve their objectives and that ISM is fully and effectively implemented.

The ratings are summarized in Figure 5.

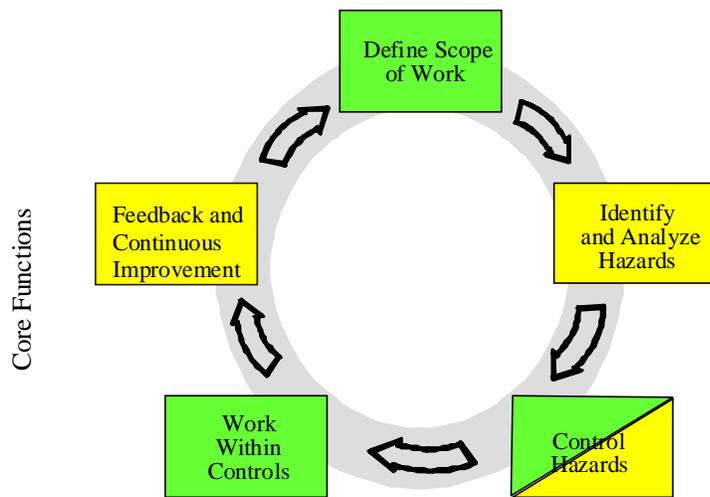
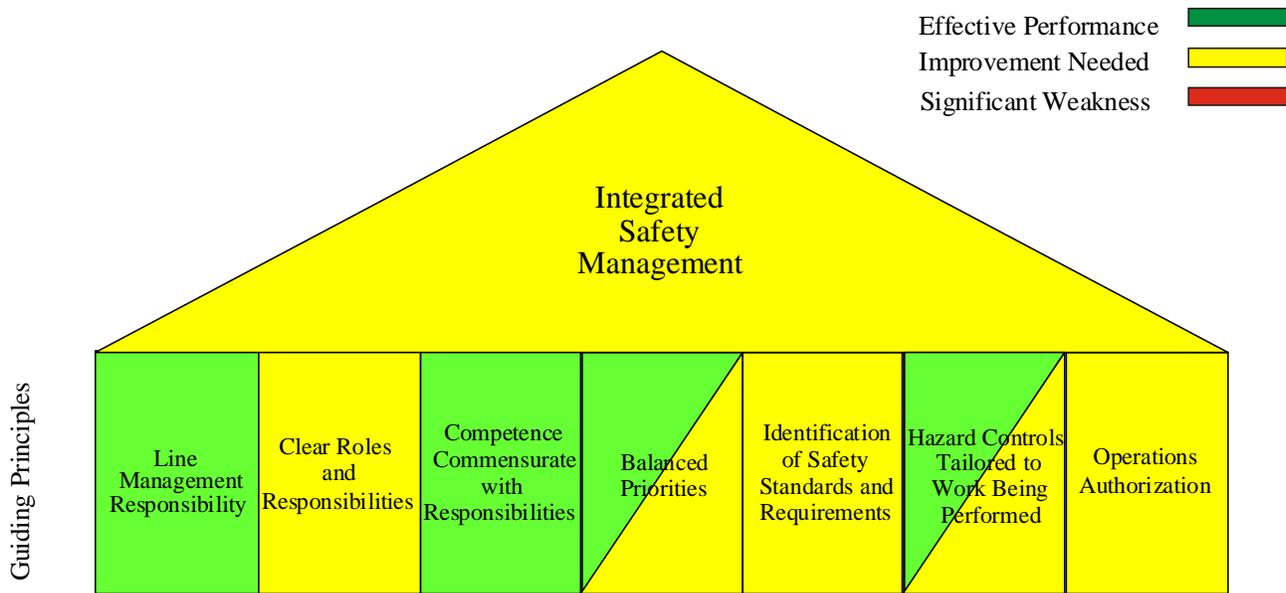


Figure 5. Ratings

4.0 Opportunities for Improvement

The safety management evaluation conducted by the Office of Oversight identified several opportunities for improvement. The purpose of opportunities for improvement is to provide line management with feedback that may help to address identified issues and identify actions that should be considered. The opportunities for improvement are intended to assist line management in identifying options and potential solutions. The responsible DOE and contractor line management should review and evaluate the opportunities for improvement enumerated below as well as the specific suggested actions listed under each item. However, the opportunities for improvement and suggested action are not intended to limit the initiatives and good judgment of line managers. Line management is ultimately responsible for safety and should use their experience and judgment in developing corrective actions, in accordance with site-specific programmatic and ES&H objectives.

As discussed in Appendix A, line management is specifically responsible for developing a corrective action plan for addressing the issues identified in this report. The corrective action plan is to be developed in accordance with the DOE implementation plan for DNFSB Recommendation 98-1, and the issues and corrective actions will be tracked by the Office of Oversight. While the opportunities for improvement in this section may provide line management with insights about potential corrective actions, the site may identify other mechanisms for addressing identified issues.

Principle #1: Line Management Responsibility for Safety

DOE: Continue to strengthen SC, CH, and BHG leadership in implementation of ISM at BNL including:

- Continue the existing working group interfaces within SC and other responsible Headquarters

elements, including EM and NE, to ensure that directions to CH and BNL are coordinated and not conflicting.

- Strengthen the evolving CH and BHG line management roles for BNL, including CH and BHG involvement in science-related communications between SC and BNL, to better integrate site management.
- Continue to strengthen BHG oversight of contractor implementation of ISM, including review and approval of deviations; involvement in change control processes; and development of, and adherence to, procedures.

BNL: Sustain aggressive efforts to change the site culture to one that embraces ISM and ensures that ES&H is an integral and inseparable element of every operation and activity:

- Provide significant management field presence to train, coach, and encourage employees implementing ISM, and to provide feedback on performance on an organizational and individual basis.
- Conduct benchmarking with other laboratories and sites and import successes and lessons learned in ISM, emergency management, and issue management. Consider exporting BNL successes such as occupational medicine, SBMS, and community outreach.
- Publicly recognize and reward organizational or individual successes in the implementation of ISM or ES&H performance.

Principle #2: Clear Roles and Responsibilities

DOE: Increase efforts to document the evolving ES&H roles and responsibilities for SC,

CH, and BHG and to establish effective accountability for performance in accordance with 1997 DOE action plan and the shift of line management responsibility to CH:

- Define and communicate the roles and responsibilities of program and support-function organizations and management below the level of the SC Director for line responsibilities at BNL.
- Revise SC and BHG management and technical staff performance evaluation plans to establish clear and measurable accountability criteria for ISM implementation, ES&H projects and performance, and contractor oversight.
- Establish/revise the SC, CH, and BNL FRAMs to clearly define the transitioning roles and responsibilities for line management of BNL.

BNL: Strengthen accountability for ES&H performance of managers and staff by enhancing efforts to implement the performance-based management system:

- Provide additional guidance to BNL managers on the performance management system expectations through the sharing of successes achieved within the Environmental Management and ESH&Q organizations.
- Provide additional senior management review of performance goals established by BNL research and support managers.
- Implement a systematic process for Departmental/Division management review of the flowdown of established ES&H-related goals and objectives through appropriate managers and staff within their organizations.
- Ensure clear and visible expectations associated with accountability for policy, order, and requirements compliance within BNL.
- Ensure continued usefulness of the R2A2 initiative by establishing an institutionalized system to capture and document changing roles and responsibility for safety management. Enhance management review of R2A2s for appropriate tailoring to specific job requirements and consistency within the Department/Division and the Laboratory.

Principle #3: Competence Commensurate with Responsibility

DOE/BNL: Strengthen BNL competencies and capabilities to respond to potential site emergencies, including classification, notifications, emergency actions, and formulation of protective actions:

- Conduct a BHG baseline assessment of current BNL emergency preparedness and management capabilities including mechanisms such as walk-throughs, tabletops, and drills or exercises as appropriate.
- Develop and implement a performance-based training program for the emergency response organization, including a task analysis and consideration of transportation hazards.
- Consider the benefits and challenges associated with implementing a unified incident command system that integrates security and fire response assets. In such a system, formally assign incident command based upon the primary threat, and assign decision-making related to hazardous materials release to units trained in assessment of release consequences.

BNL: Improve training mechanisms to ensure that appropriate ES&H training requirements are established, documented, and tracked for all Laboratory employees:

- Integrate within a single system the tools used within BNL to comprehensively identify individual employee/visitor training requirements, such as job training assessments, experimental safety reviews, visitor/vendor training evaluations, and work permits.
- Establish a mechanism to provide a systematic review of the quality of JTAs established by Departments/Divisions to ensure adequate identification of training requirements based upon job hazards and knowledge requirements.
- Utilize the emerging BNL lessons-learned program to identify appropriate opportunities to use training to enhance management and employee ES&H performance.

Principle #4: Balanced Priorities

DOE/BNL: Strengthen processes for issues management to maintain an appropriate balance between ES&H and mission priorities and resources allocated from a sitewide perspective:

- Ensure that, during the transition to ISM and SBMS, there are adequate priorities and actions taken to compensate for current deficiencies in existing BNL standards and procedures.
- Reassess priorities related to updating and maintaining the authorization bases for BNL nuclear and accelerator facilities.
- Coordinate approaches for establishing and communicating environmental restoration and decontamination and decommissioning priorities and activities between DOE, BNL, and the community.
- Strengthen communications and interfaces between BHG operational awareness and project/program management functions to assist in maintaining an overall perspective on sitewide ES&H priorities and needs, and to enable BHG to function as an advocate for these needs and priorities with CH and SC.

Principle #5: Identification of Safety Requirements and Standards

DOE: Improve weaknesses in important directives that are important to safety management:

- The DOE Office of Management and Administration and DOE Office of Environment, Safety and Health need to revise DOE Order or Manual 251.1, Directives System, to better define what constitutes an “exemption” from DOE directives and to provide guidance as to when a compliance action may be required.
- SC needs to review and revise, as needed, DOE orders governing authorization basis for accelerators to reflect DOE expectations and ensure appropriate levels of DOE approval. At a minimum, revise DOE Order 420.2, *Safety of Accelerator Facilities* (paragraph 5.b), to clarify expectations for DOE approval of an ASE as a condition for operation of an accelerator, and to clarify that this requirement also applies to an ASE change. Issue definitive guidance for DOE expectations for implementing

DOE requirements related to accelerator authorization basis.

BHG: Clarify and formalize the interfaces with BNL regarding requirements management to assure continuing and effective implementation of and compliance with all applicable DOE directives:

- Establish mechanisms to ensure that BHG personnel are held accountable for resolving concerns with directives in a timely manner.
- Define the process for administering deviations from requirements to ensure that they are approved at the appropriate management level and are supported by an appropriate technical basis.
- Establish a BHG process for formally documenting, tracking, and monitoring non-compliance with DOE directives to ensure that BNL compliance commitments are met or compensatory measures are identified, approved, and implemented commensurate with potential ES&H risk.
- Revise wording used to acknowledge receipt of directives applicability and impact evaluations from BNL to ensure that BHG is not agreeing with the contractor’s indicated compliance status without reasonable verification.
- Continue efforts to develop and upgrade office-specific implementing procedures for managing the BSA contract, project management, and overseeing contractor ES&H performance.

BNL: Enhance systems for requirements management within the Laboratory during the SBMS transition and for subcontractors performing work at the Laboratory:

- Establish a clear mechanism and expectations for BNL managers and staff to identify necessary changes in Laboratory standards that are important to ensuring adequate performance during the SBMS development and implementation period.
- Ensure that subcontracts clearly convey requirements and expectations for performing work in accordance with integrated safety

management principles and BNL work control and permitting processes.

Principle #6: Hazard Controls Tailored to Work Being Performed

DOE/BNL: Improve systems and capabilities to analyze and control potential environmental hazards and impacts in the planning and controlling of work:

- Revise Laboratory Standard 1.3.6 and implementing procedures to provide additional guidance and direction for the analysis and control of environmental hazards.
- Establish requirements for the AGS Experimental Safety Review Committee to review proposed experiments against the AGS environmental assessment and ASE that envelope analyzed environmental impacts and safety hazards.
- Reassess the need for sitewide procedures for identification and control of hazards and ensure that this need is appropriately addressed by the SBMS.

BHG/BNL: Enhance the knowledge and ability of BNL management to effectively manage ES&H hazards and vulnerabilities:

- Complete the update of the emergency management hazards assessment to ensure an adequate technical basis for emergency actions.

- Complete baseline industrial hygiene surveys to establish an adequate level of knowledge of existing hazards at all BNL facilities and workplaces.
- Establish mechanisms to collect and analyze the wide variety of qualitative and quantitative ES&H-related information to assure that positive and negative trends in safety performance can be identified and addressed as needed commensurate with risk.

Principle #7: Operations Authorization

DOE/BNL: Increase the rate of progress in the development of the authorization basis of BNL reactor and accelerator facilities:

- Clearly identify the documents that are the formal authorization basis documents for BNL reactors and accelerators. Ensure that DOE requirements for approval of these documents and changes to them are clearly defined, communicated, and understood.
- In concert with SC, establish a plan and milestones for a timely completion of authorization basis documents for the BMRR SAR and accelerator facilities. The plan and schedule should include BHG review and approval of the ASE for each BNL accelerator for which DOE has not previously approved the current ASE.
- Identify options for streamlining the authorization basis documents and processes to facilitate future updates and revisions.

APPENDIX A

ISSUES FOR CORRECTIVE ACTION AND FOLLOW-UP

Line management is responsible for correcting deficiencies and addressing weaknesses identified during Office of Oversight safety management evaluations. Following each evaluation, line management prepares a corrective action plan. The Office of Oversight follows up on significant issues as part of a multifaceted follow-up program that involves follow-up reviews, EH Resident reviews, site profile updates, tracking of individual issues, and analysis of findings.

Table A-1 summarizes the significant issues identified in this report of the integrated safety management evaluation of BNL. The issues identified in this table will be formally tracked in accordance with the recently approved DOE plan developed in response to Defense Nuclear Facilities Safety Board Recommendation 98-1, which addresses follow-up of independent oversight findings. SC, BHG, and BSA need to specifically address these issues in the corrective action plan for BNL.

In addition to the issues that are formally tracked, the Office of Oversight team identifies less-significant weaknesses and/or minor deficiencies in otherwise effective programs. Although the site needs to correct such weaknesses and deficiencies, the Office of Oversight does not necessarily include every identified weakness in the formal tracking system. However, all

weaknesses and deficiencies are considered as part of the multifaceted Office of Oversight follow-up program when evaluating safety management performance and planning and prioritizing future Oversight evaluation and follow-up activities.

As part of the Implementation Plan, a set of previously identified issues was compiled and issued. The DOE lead program secretarial office is required to develop a corrective action plan to address these legacy issues, which will be evaluated, corrected, and closed in accordance with the process identified in the DOE Implementation Plan. The issues presented in Table A-1 complement, but do not duplicate or supersede, the legacy issues. In some cases, the issues identified during this Oversight evaluation may address weaknesses that are similar in nature to one or more legacy issues. However, the new issues are intended to reflect deficiencies identified in this Oversight evaluation that need to be addressed in the corrective action plan for this Oversight evaluation. It is recognized, however, that the corrective actions developed by SC to address the legacy issues may, in some cases, be sufficiently comprehensive to address some of the new issues as well as the legacy issues. The reported status of the legacy issues as of July 6, 1999, from SC (the DOE lead program secretarial office for BNL) is shown in Table A-2.

Table A-1. Issues Identified During the Current Evaluation

IDENTIFIER	ISSUE STATEMENT	REFER TO PAGES (VOLUME 1):
CH-BNL SME-99-1	SC has not established clear roles and responsibilities and accountability mechanisms for its managers and staff as committed to in the 1997 DOE Action Plan for Improved Management of BNL and required by DOE Policy 411.1, and BHG has not completed the development of a Functions, Responsibilities, and Authorities Manual.	14, 20, 21
CH-BNL SME-99-2	BHG has not institutionalized a structured process for review and approval of the authorization basis for accelerator facilities.	34, 44, 45
CH-BNL SME-99-3	SC, BHG, and BNL have not ensured that the emergency management program meets requirements of DOE Order 151.1 and that BNL personnel are fully trained and prepared to respond to an onsite emergency.	26-27
CH-BNL SME-99-4	BHG does not have formal procedures for managing DOE requirements in the BSA contract or a formal process for managing non-DOE requirements that may impact Laboratory operations.	33-35
CH-BNL SME-99-5	BNL institutional-level documents that promulgate requirements and expectations for ES&H have not been updated to reflect current requirements, and BHG and BNL have not prioritized efforts to upgrade institutional-level requirement documents based on the potential hazards and risks.	36, 37
CH-BNL SME-99-6	BNL has not ensured that subcontracts contain applicable requirements (i.e., DEAR clause on Integration of Environment, Safety, and Health into Work Planning and Execution as required by Article 72 of the BSA contract).	38-39
CH-BNL SME-99-7	BNL's training program is not consistently applied within organizations to ensure that training needs are based on a thorough analysis of employee job activities and associated hazards, as required by the BNL training policy.	27-28, 29

Table A-2. Status of Legacy Issues

IDENTIFIER	LEGACY ISSUE
<p>BNL-04/01/1997-0001-I</p>	<p>DOE and BNL management have not been effective in achieving a proper balance between ES&H and mission-related priorities. ES&H has not been made an integral part of all site activities and instead is often viewed as competition for research funding. The issue of balance in priorities often extends down into field activities, including operations, maintenance, and research, where there is perceived tension between the freedom and creativity essential to scientific inquiry and the level of discipline necessary to control hazards and ensure safety.</p> <p>SC reports that the majority of actions necessary to address this issue have been completed. Action remaining was to complete performance goals and measures for Level 1 and Level 2 managers at BNL by July 15, 1999. When complete, these goals along with other action already completed will demonstrate the establishment of mechanisms to ensure an appropriate balance between ES&H and science priorities at BNL.</p> <p>This Oversight evaluation determined that SC, CH, BHG, and BNL have made many significant improvements in some aspects of balanced priorities since 1997. The mechanisms for establishing expectations and priorities have been improved through contract reforms and critical outcome processes. Initiatives, such as the Project, Planning, Programming and Budgeting Process, provide a systematic method for analyzing priorities and have been effective where they have been applied. Therefore, the few aforementioned remaining minor actions are necessary to completely address this issue.</p>
<p>BNL-04/01/1997-0002-I</p>	<p>Few effective mechanisms exist to ensure proper accountability for ES&H performance. The AUI contract did not contain adequate incentives and penalties to promote accountability in a not-for-profit setting. Measurable ES&H performance elements were not incorporated into BNL managers' annual performance appraisals. There was no BNL policy for applying sanctions to subcontractors for non-compliance with ES&H requirements. Weaknesses and deficiencies in BHG and BNL management systems and processes for identifying roles, responsibilities, and authorities made it difficult to trace ownership for specific decisions.</p> <p>SC reports that all CH corrective actions are completed. All corrective actions at BHG have been completed except for development of a Functions, Responsibilities, and Authorities Manual (FRAM). BNL has completed all actions except that not all managers' goals and measures have been approved.</p> <p>This Oversight evaluation determined that DOE Headquarters, BHG, and BNL have made significant improvements in the definition and communication of roles and responsibilities and in processes for holding individuals and organizations accountable for performance. Headquarters commitments identified in the Action Plan were effectively implemented and resulted in improvements in DOE's management and direction of the BNL contractor. BHG safety management responsibilities are clearly communicated and understood. BHG, in coordination with CH and DOE Headquarters, has made significant improvements in the use of the contract to establish BNL contractor accountability for ES&H performance.</p> <p>Although significant progress has been made, there continue to be weaknesses in the current definition and understanding of safety-related roles and responsibilities and in systems for holding individuals and organizations accountable. In some cases, SC has not been timely in completing activities and initiatives, such as FRAMs, and SC did not effectively implement commitments to improve accountability for safety performance within the SC organization. BHG has not established effective formal mechanisms to hold most BHG organizations and individuals accountable for safety performance. The BNL initiatives are in various stages of implementation, and some have not been fully effective, contributing to continued weaknesses in safety management. Therefore, new issue CH-BNL-SME-99-1 was identified.</p>

Table A-2. Status of Legacy Issues (continued)

IDENTIFIER	LEGACY ISSUE
<p>BNL-04/01/1997-0003-I</p>	<p>Inadequate management processes exist at BHG and BNL to ensure that ES&H issues are properly captured, prioritized, tracked, corrected, completed as scheduled, and verified in a timely manner. Corrective action processes do not adequately address the extent of condition, root cause, and actions to prevent recurrence. Many of the weaknesses and concerns identified in the Office of Oversight integrated safety management evaluation and in recent BNL and BHG appraisals were identified in previous assessments and either remain open items or were not effectively resolved prior to closure. Lesson learned for events and accidents within BNL and throughout the DOE complex are not communicated on a timely basis across the entire site or formally reviewed so that appropriate corrective actions can be taken.</p> <p>SC reports that all corrective actions at CH and BHG have been completed. All BNL corrective actions completed except for commitment and corrective action tracking program.</p> <p>This Oversight evaluation identified that SC has not fully implemented improvement initiatives established following the 1997 safety management evaluation. BHG and BNL have pursued corrective actions to address the performance feedback and continuous improvement weaknesses identified in 1997 Oversight evaluation and the August 1998 Oversight follow-up evaluation. BHG has enhanced periodic communications with BNL to identify issues and concerns and to identify responsible individuals for program improvements. Corporate oversight and lessons-learned programs are beginning to function, creating value-added results to line organizations, but will require continued management attention to ensure full implementation. Management processes to capture, prioritize, and track ES&H issues within BNL require improvement. The remaining open corrective action needs to be completed, and Oversight will continue to evaluate the effectiveness of the corrective actions already implemented.</p>
<p>BNL-04/01/1997-0004-I</p>	<p>DOE has not established and implemented a structured, effective oversight program sufficient to ensure that ES&H requirements are met. The roles, responsibilities, and authorities for assuring protection of workers and the environment in the operation of BNL for DOE Headquarters (the Offices of Science; Nuclear Energy, Science and Technology; and Environmental Management), CH, and BHG are not clear. BHG line management oversight practices are not structured, comprehensive, or sufficient to effectively assess the BNL weaknesses in safety management and work controls identified in the February-April integrated safety management evaluation.</p> <p>SC reports that all corrective actions have been completed and this issue is closed.</p> <p>The 1997 Oversight evaluation identified poorly defined roles and responsibilities and ineffective measures for ensuring organizational and individual accountability as one of the most significant areas of weakness. Shortly after the Oversight evaluation, the then Secretary of Energy directed that actions be taken to change the reporting relationships for BHG. Specifically, BHG was directed to report directly to the Office of the Secretary of Energy to ensure that the environmental and safety management issues received high levels of attention. Subsequently, SC (which was then called the Office of Energy Research) was assigned the responsibility to provide management oversight and direction to BHG. The BHG reporting relationship has recently undergone another significant change in accordance with the current Secretary of Energy's April 21, 1999, announcement of changes in the DOE organizational reporting structure. These changes, which became effective on May 1, 1999, establish SC as the lead program secretarial office for CH and reestablished BHG as a direct report to CH. As these recent changes are implemented, CH will again have additional line management responsibilities for activities at BNL. Although in effect as of May 1, 1999, the changes directed by the Secretary are too recent to have been fully implemented at the time of this Oversight evaluation.</p>

Table A-2. Status of Legacy Issues (continued)

IDENTIFIER	LEGACY ISSUE
<p>BNL-04/01/1997-0004-I (Continued)</p>	<p>Although a FRAM that encompasses BHG has not yet been completed, BHG has established and articulated the roles and responsibilities of its staff in performing key ES&H management and oversight functions through other mechanisms. The BHG ES&H Management Plan effectively documents the roles and responsibilities of BHG managers and staff in fulfilling established line responsibilities. The Plan sets clear responsibilities on how each organization works as part of a team to set expectations for BNL, monitor performance, and communicate results, both to the Laboratory and other DOE organizations. One of the most significant ES&H responsibilities of BHG is to monitor Laboratory operations and ES&H performance. BHG has established an Operational Awareness Plan that provides clear roles and responsibilities for this function. The Facility Representative program is much stronger with the implementation of the operational awareness program.</p> <p>Oversight concludes that these actions are appropriate. Oversight will continue to evaluate effectiveness as the May 1, 1999, changes are implemented.</p>
<p>BNL-04/01/1997-0005-I</p>	<p>BNL has not established an effective work planning and control system to ensure that hazards associated with site activities, including some aspects of research and maintenance, are properly identified and integrated. Although the analysis of work hazards and controls for routine activities at reactor facilities is performed with formality and rigor, the approach at non-reactor facilities varies widely and is much less structured and formal, particularly for “in-house” maintenance and for small experiments or projects. Much of the work is conducted under verbal directions from managers and supervisors, with great reliance on the worker’s ability to recognize and control hazards.</p> <p>SC reports that all corrective actions have been completed and this issue is closed.</p> <p>This Oversight evaluation determined that work controls, processes, and procedures have markedly improved with the implementation of the revised BNL standard for experiments and the new BNL standard for work planning and control. There has been improvement in the integration of environmental considerations into experimental and routine work activities through the use of the experimental review process and the site work permit form. Facility management and work control managers have accepted the process and are committed to implementing the program in a consistent manner. The Chemistry Department, AGS, NSLS, and HFBR have implemented the BNL requirements into facility-specific work planning and control procedures and assigned work control managers. The BNL work planning and control standard requirements are generally implemented properly, but with some deficiencies. Some deficiencies were identified in implementing work control, such as not identifying the controls for all hazards, authorizing the start of work before all workers had signed the permit, and not specifying waste streams. Weaknesses in institutional programs upon which safe work depends place an additional burden on line management to implement compensatory measures. BNL also identified similar deficiencies in work control implementation. Oversight concludes that the actions appropriately address the issue. However, continued supervisory and management attention is needed to ensure effective implementation.</p>
<p>BNL-04/01/1997-0006-I</p>	<p>Sitewide ES&H standards for several hazards or activities are incomplete or not maintained current with external requirements. Department/division-level ES&H standards and procedures are sometimes inconsistent with sitewide standards or are incomplete. Work control processes do not have criteria or thresholds for when to include ES&H staff in review of work. There are no ES&H standards for experimental review processes, accident investigations, asbestos, ergonomics, magnetic fields, indoor air quality, or lead handling. No institutional criteria exist for initiating safety review of work activities.</p> <p>SC reports that BNL plans to issue procedures for top priority subject areas via the Standards Based Management System (SBMS) by November 30, 1999.</p>

Table A-2. Status of Legacy Issues (continued)

IDENTIFIER	LEGACY ISSUE
<p>BNL-04/01/1997-0006-I (Continued)</p>	<p>This Oversight evaluation concluded that BNL is committed to implementing a comprehensive management system designed to ensure that ES&H expectations for performing work are clearly communicated and consistently executed across the Laboratory. However, few changes in institutional requirements and flowdown to the facilities have been finalized and implemented since the 1997 safety management evaluation. The SBMS system is in the early stages of development and, with the exception of work control programs, has not yet impacted facility-level mechanisms for identifying, applying, and adhering to ES&H requirements. In some cases, however, facilities have developed facility-level mechanisms to compensate for weaknesses in the institutional level programs. SBMS development and implementation are rapidly moving forward. Therefore, Oversight concludes that the actions to address this issue are adequate.</p> <p>However, in the interim, BNL management must ensure that the requirements and expectations for controlling the most significant ES&H hazards are receiving adequate attention and control commensurate with the risks to workers, the public, and the environment. In addition, BNL managers have not yet performed a collective evaluation of site incidents and the status of site programs to determine the greatest risk to workers and where to focus the initial efforts of the SBMS implementation process. This has resulted in a new issue CH-BNL-99-5.</p>
<p>BNL-04/01/1997-0007-I</p>	<p>Implementation of the radiological control program is inconsistent among facilities, and program effectiveness largely depends on individual initiative. There is heavy reliance on line managers to directly implement facility radiological controls, with little guidance from the sitewide radiological control organization. There is poor flowdown of upper tier ES&H policies and standards, with examples of conflicting radiation safety requirements. Radiation work permits contain only a broad description of the work activities to be performed and few limiting conditions, such as exposure rates or contamination levels, that would cause a suspension of work activities. As of March 1, 1997, approximately 25 percent of the BNL radiological control technicians (RCTs) were not qualified in accordance with the site training and qualification program and were performing tasks for which they were not qualified. Neither BHG nor BNL has implemented effective radiological assessment programs.</p> <p>SC reports that BNL has identified corrective actions, in their Final Project Plan for the Re-engineering of the Radiation Protection Program, to be completed July 3, 1999. These are to be verified by BHG. Additional corrective actions have been identified as related issues in the BHG RCT assessment. These items are to be completed October 1, 1999, and then verified by BHG.</p> <p>This Oversight evaluation identified the following actions taken to address this issue. BHG has hired additional health physics personnel and has instituted a high quality assessment and operational awareness program for radiation protection. BNL has expended significant resources within the past year to address deficiencies in the Laboratory's radiation protection program, including weaknesses in managing and flowing down program requirements.</p> <p>However, none of the institutional-level radiological control implementing procedures had been approved and issued as of May 19, 1999, although several were due to be approved imminently. Two completely new procedures have been issued, but one of those is still in the pilot implementation stage. The lengthy consensus building process that is required to implement revised procedures does not provide assurance that the remaining procedures will be revised, approved, and implemented in the near term to improve radiological control performance. Flowdown of radiological control program requirements to the facility level is not yet evident. A weakness in the proficiency of a non-RCT qualified individual performing radiological surveys was also identified.</p> <p>Oversight concludes that the actions are appropriate and will continue to monitor the progress in addressing this issue.</p>

Table A-2. Status of Legacy Issues (continued)

IDENTIFIER	LEGACY ISSUE
<p>BNL-04/01/1997-0008-I</p>	<p>The BNL groundwater protection program does not ensure compliance with DOE Order 5400.1. The BNL Groundwater Protection Management Program Plan does not establish management elements necessary for a comprehensive groundwater protection program required by DOE Order 5400.1. The plan does not specify a method for identifying inadequacies in the existing well network, a mechanism or schedule for expanding the monitoring network, or a funding source or budget to accomplish this work. Legacy organic chemical soil contamination at some BNL facilities has migrated into the sole source aquifer for Long Island. In January 1997, tritium contamination from the HFBR was also discovered in the groundwater.</p> <p>SC reports that all corrective actions have been completed and this issue is closed. Although this Oversight evaluation determined that significant progress has been made for groundwater remedial and monitoring activities, the initiatives established by the Groundwater Protection Management Plan only partially meet the requirements of DOE Order 5400.1. In a May 20, 1999, memorandum from BHG to BNL it was noted that the plan needed to include additional requirements to support resource management and compliance with all environmental laws and regulations. There were also some modifications that would need to be made to more adequately address a Detailed Decision Process (Data Quality Objectives) relative to evaluating monitoring results and corrective actions. Additionally, the March 5, 1999, Groundwater Protection Implementation and Integration Plan was revised on April 30, 1999. These plans were under regulatory review and their final status was unknown at the conclusion of the focused evaluation. Since some of these initiatives are relatively new and not fully designed or implemented, actions are under way to address these weaknesses. There needs to be continued emphasis on the coordination of the data gathered and activities conducted between the Environmental Restoration Division and the Environmental Services Division to ensure complete and effective implementation of the plans. Therefore, Oversight concludes the items already identified by BHG need to be fully implemented to adequately address this issue.</p>

APPENDIX B

EVALUATION PROCESS AND TEAM COMPOSITION

The evaluation was conducted according to formal protocols and procedures, including an Appraisal Process Guide, which provides the general procedures used by the Office of Oversight program for conducting inspections and reviews, and the Focused Integrated Safety Management Evaluation Plan, which outlines the scope and conduct of the evaluation process. Planning sessions were conducted to ensure that all team members were informed of the evaluation objectives, procedures, and methods. The planning process considered previously-identified weaknesses, current BNL activities, and DOE and contractor management initiatives. The evaluation team collected data through interviews, document reviews, walkdowns, observation of activities, and performance testing. Interviews were conducted with DOE Headquarters, CH, BHG, and contractor managers, technical staff, hourly workers, and union representatives.

Scope

The Office of Oversight is enhancing its safety management evaluation processes to be more effective and efficient. Correspondingly, recent and planned safety management evaluations, including this evaluation of BNL, will focus on determining the site status with regard to ISM and site-specific plans for fully implementing the DOE ISM policy. The Oversight teams will examine performance with regard to the guiding principles of safety management and application of the core functions of ISM at a selected sample of facilities and work activities. These evaluations, referred to as focused integrated safety management evaluations, will generally be conducted with smaller teams and less time on site, and with less impact on site operations. However, the focused integrated safety management evaluations will take advantage of site-specific information available from previous Oversight assessments and other sources to enhance the planning process.

The focused integrated safety management evaluation is a “top to bottom” review of ES&H management; it encompasses the organization responsible for BNL from the program offices to CH, to BHG, to the contractor and subcontractors, and

ultimately to the workers at selected facilities. The evaluation samples the effectiveness of ES&H programs from identification of applicable policies to their implementation by the worker on the “shop floor.”

The bases for this evaluation are the objectives, principles, and functions for integrated safety management systems described in DOE Policy 450,4, *Safety Management System*. This approach is based on the fundamental premise that line managers are responsible and accountable for managing ES&H through proper work planning, hazard analyses, hazard control, and ongoing self-assessments of the efficacy of implemented controls. This approach can accommodate the wide range of operations, hazards, and management styles at DOE facilities.

The components of the integrated safety management program, as defined in the October 1996 policy, are essential elements of any ES&H program, and each DOE site should currently have most of the elements in place. The Office of Oversight recognizes that full integration of the elements of safety management into a comprehensive system will take some time. Key elements of integrated safety management, including the guiding principles and core functions, were examined to evaluate which elements are functioning effectively and to identify which areas need improvement and management attention.

The evaluation focused on selected facilities and programs.

To determine BNL’s effectiveness in implementing the guiding principles and core functions of safety management, the Oversight team evaluated work activities in four general categories:

- Science and technology programs and experiments
- Science and technology facility and equipment maintenance
- Infrastructure operations and maintenance
- Environmental protection and restoration.

The Oversight team evaluated specific work activities in selected facilities, including:

- National Aeronautics and Space Administration/ Alternating Gradient Synchrotron Heavy Ion Experiment E898
- High Flux Beam Reactor plumbing/piping upgrades
- Environmental Restoration work in Operable Units 3 and 4
- National Synchrotron Light Source experimental processes and maintenance activities
- Chemistry Department experimental processes and building reconditioning.

Within this scope, the Oversight evaluation examined selected ES&H programs, such as conduct of operations, radiological protection, industrial hygiene, groundwater protection, and pollution prevention. These categories of work, facilities, specific activities, and ES&H programs were selected to provide a broad perspective of the safety management program at BNL.

This Oversight evaluation and report is organized

to provide perspectives on the seven guiding principles of a safety management system:

1. Line Management Responsibility for Safety
2. Clear Roles, Responsibilities, and Accountability
3. Competence Commensurate with Responsibility
4. Balanced Priorities
5. Identification of Safety Standards and Requirements
6. Hazard Analysis and Controls
7. Operations Authorization.

The Oversight evaluation and report also provides perspectives on the five core functions of the integrated safety program, which are essential to effective work planning:

1. Define Work
2. Analyze Hazards
3. Develop and Implement Controls
4. Perform Work Within Controls
5. Feedback and Continuous Improvement.

Team Composition

The team membership, composition, and responsibilities are as follows:

Deputy Assistant Secretary for Oversight

Glenn Podonsky

Associate Deputy Assistant Secretary for Oversight

S. David Stadler - Operations
Neal Goldenberg - Technical

Director, Office of ES&H Evaluations

Michael Kilpatrick
Patricia Worthington, Deputy Director

Team Leader

Charles Lewis

Safety Management Systems

William Eckroade
Adrian Gardner
Kathy McCarty
Vic Crawford
Al Gibson
Mark Good
Tim Martin
Dave Schultz

Technical Specialists

Ching-San Huang
Joe Lischinsky
Ed Stafford
Frank Schwartz
Josephine Stegall
Arlene Weiner

Administrative Support

Mary Anne Sirk
Tara M. Wertz
Thomas Davis

Quality Review Board

S. David Stadler
Michael Kilpatrick
Patricia Worthington
Ray Hardwick
Frank Russo
Dean Hickman
Robert Nelson