Independent Oversight
Inspection of
Emergency Management
at the

Brookhaven Site Office and Brookhaven National Laboratory

September 2008

Office of Emergency Management Oversight
Office of Independent Oversight
Office of Health, Safety and Security
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HSS
Office of Health, Safety and Security

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Abbreviations Used in This Report

ATS	*Action Tracking System*
BHSO	*Brookhaven Site Office*
BNL	*Brookhaven National Laboratory*
BSA	*Brookhaven Science Associates*
CAS	*Central Alarm Station*
CFR	*Code of Federal Regulations*
DOE	*U.S. Department of Energy*
EAL	*Emergency Action Level*
ED	*Emergency Director*
EIC	*Emergency Information Center*
EOC	*Emergency Operations Center*
EPHA	*Emergency Planning Hazards Assessment*
EPI	*Emergency Public Information*
ERAP	*Emergency Readiness Assurance Plan*
ERO	*Emergency Response Organization*
FY	*Fiscal Year*
HF	*Hydrofluoric Acid*
HS-63	*Office of Emergency Management Oversight*
IC	*Incident Commander*
JIC	*Joint Information Center*
LEC	*Local Emergency Coordinator*
LSPT	*Limited-Scope Performance Test*
OEM	*BNL Office of Emergency Management*
PA	*Protective Action*
PIO	*Public Information Officer*
SAE	*Site Area Emergency*
SC-31.1	*DOE Office of Science, Environment, Safety, and Health Division*
TIA	*Timely Initial Assessment*

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1 Introduction

The U.S. Department of Energy (DOE) Office of Independent Oversight inspected the emergency management program at DOE's Brookhaven National Laboratory (BNL) in June/July 2008. The inspection was performed by Independent Oversight's Office of Emergency Management Oversight (HS-63). Independent Oversight reports to the Chief, Health, Safety and Security Officer, who reports directly to the Secretary of Energy.

The DOE Office of Science is the lead program secretarial office for BNL. As such, it has overall Headquarters responsibility for programmatic direction and funding of most activities, as well as emergency management at the site. At the site level, the Brookhaven Site Office (BHSO) has line management responsibility for BNL operations and safety. BNL is managed and operated by Brookhaven Science Associates (BSA), under contract to DOE.[1]

BNL has mission responsibilities in the areas of basic and applied research. Major programs include nuclear and high energy physics, physics and chemistry of materials, environmental and energy research, nonproliferation, neurosciences and medical imaging, and structural biology. BNL activities include operation of advanced high energy and nuclear physics research facilities, research in the chemical sciences, waste management, and environmental restoration. These activities involve relatively small quantities of radiological, chemical, and biological hazardous materials of various forms.

The purpose of this Independent Oversight inspection was to assess the effectiveness of the emergency management program at BNL as implemented by BSA under the direction of BHSO. Independent Oversight used a selective sampling approach to assess a representative sample of facilities and emergency responders at BNL. Specifically, the sampling approach was used to evaluate:

- The effectiveness of the hazards surveys and emergency planning hazards assessments (EPHAs) in serving as an appropriate foundation for the BNL emergency management program.
- The effectiveness of the BHSO and BNL emergency responders in applying their skills, procedures, and training to make appropriate decisions and to properly execute actions to protect emergency responders, workers, and the public. To evaluate response performance, Independent Oversight conducted limited-scope performance tests (LSPTs) for initial responders and decision-makers. The performance tests were designed to evaluate the ability of responders to effectively execute their assigned duties during postulated site-specific emergencies. Independent Oversight used trusted agents from the site to assist in developing and conducting the performance test scenarios and validating the results.

1 Consistent with common practice, the term "BNL" is used to refer to both the physical facility and the onsite contractor management.

These activities, as well as reviews of assessments and corrective actions (developed in response to internally and externally identified weaknesses and areas for improvement), provided insights into the effectiveness of BHSO and BSA feedback and continuous improvement systems, as well as the Office of Science's emergency management oversight and operational awareness activities at BNL.

Section 2 of this report provides an overall discussion of the results of the review of the BNL emergency management program elements that were evaluated. Section 3 provides Independent Oversight's conclusions regarding the overall effectiveness of BHSO and BSA management of the emergency management program. Section 4 presents the ratings assigned as a result of this inspection. Appendix A provides supplemental information, including team composition. Appendix B identifies the findings that require corrective action and follow-up. Appendices C through F detail the results of the reviews of individual emergency management program elements.

2 Results

2.1 Positive Program Attributes

Since Independent Oversight's previous inspection of emergency management at BNL in August 2004, BNL has made significant progress in establishing a hazardous materials emergency management program. Positive attributes of the emergency management program are discussed below.

BNL has developed a site hazards survey and facility EPHAs that are generally consistent with the provisions of the order and associated guide. Methodology documents implemented by BNL provide a technical basis for preparing the hazards survey and EPHAs. The hazards survey includes such appropriate elements as descriptions of emergency events and conditions, external hazards (for example, transportation accidents), and applicable planning and preparedness requirements. The EPHAs consider a wide range of accident scenarios, include the appropriate barrier analyses, and use consistent release fractions for determining estimated source terms. The EPHA analyses are accurate and support the development of emergency action levels (EALs) and protective actions for each analyzed scenario.

The emergency public information (EPI) program is well conceived and implemented by concepts and processes that, with few exceptions, effectively address the elements required by the BHSO and BNL emergency plans. The EPI program is supported by an integrated EPI plan and supporting checklists designed to ensure timely and accurate information will be provided to site workers, the media, and the public in the event of an emergency. EPI training effectively supports the EPI program and adequately prepares the EPI cadre in performing their response functions. In addition, an extensive public education program supports the EPI program, informing the public of emergency plans and protective actions before and during emergencies.

BHSO and BNL have established effective feedback and improvement processes to identify and correct program weaknesses. BHSO personnel meet frequently with the BNL Office of Emergency Management staff to discuss issues and concerns and have established specific emergency management performance measures in the contractor performance evaluation plan. BHSO has also established a generally effective process for performing assessments of the contractor emergency management program and has conducted a meaningful self-assessment of its own emergency response functions and program elements. BNL has established comprehensive processes for conducting self-assessments and managing issues from those assessments. A self-assessment, performed using specific, objective evaluation criteria, resulted in a thorough review of the BNL emergency management program in January 2007. The results of this Independent Oversight inspection are generally consistent with BNL assessments of program strengths and weaknesses. Additionally, the emergency management program is well integrated into the site lessons learned program,

and lessons learned are prepared (as appropriate) for actual responses. However, implementation of these processes has not always resulted in timely and effective corrective actions.

Since the 2004 inspection, BNL has made significant improvements in defining the concepts of emergency operation and in the emergency operations center (EOC) capabilities. The BNL emergency plan includes thorough descriptions of the emergency management program functional areas, adequately describes the site's emergency response organization (ERO), clearly explains emergency direction and control, and identifies roles and responsibilities for planning and preparedness. The current EOC is a significant improvement over the facility previously used and is now located and equipped to more safely and effectively respond to site events. The dedicated facility includes adequate working space, communications equipment, maps, computers, and access to real-time meteorological data.

2.2 Program Weaknesses and Items Requiring Attention

Although significant progress has been achieved in establishing a comprehensive set of program requirements commensurate with site hazards, weaknesses were noted in program elements that were not fully implemented in accordance with those requirements. Specific weaknesses are discussed below.

ERO training and drill programs are not fully implemented and, as a result, some BNL and BHSO ERO members are not sufficiently prepared for their assigned response duties. BNL ERO members have received some training, and the development and implementation of a formal training program is included in the Emergency Management Upgrade Project Schedule. However, most of the training modules required by the emergency plan, such as position-specific training and incident command system training, have not been developed. The BHSO ERO training requirements do not include a demonstration of proficiency, before being added to the ERO roster, or annual refresher training. Some training records are not available to determine if BHSO personnel on the roster have completed training. Additionally, the frequency of drills is not sufficient to ensure that all ERO members build and maintain proficiency in their ERO positions, especially considering the recent (April 2008) implementation of a new set of EALs and protective action plans. Weaknesses in the training and drill programs are likely contributors to the performance inconsistencies observed during the LSPTs conducted as part of this inspection.

Although the BNL Emergency Plan provides the framework for an effective emergency management program, implementing procedures have not been established to prescribe those actions necessary for timely and effective protective actions. Procedures do not provide guidance for the use of EALs and formulation of initial and follow-on protective actions using the protective action plans. For example, the EAL tables prescribe actions based on either a one-container release or a known quantity of material (in units of pounds); however, no procedural guidance is provided for different container sizes or multiple containers, which require calculations to determine the weight of the material. In response to the same scenario conditions, the two ERO teams classified the event differently due to difficulty in using EALs. This led to inconsistent protective action formulation and, in one case, resulted in establishing a protective action zone at a far greater distance than necessary. Although the traffic control points and incident command post locations were established in accordance with the protective action plans, specified by the chosen EAL, those locations do not correlate to the calculated isolation zones and result in locations at a much greater distance than required for responder safety, making the control of the event scene more difficult than necessary. Further, the onsite protective action tables are not supported by guidance for determining whether evacuation or shelter in place is more appropriate for buildings that are downwind from the release. Finally, facility-level

plans and procedures do not address the processes for personnel accountability or for securing ventilation to maximize the benefits of sheltering in place.

Although BNL has effectively identified the program areas that need improvement to comply with DOE Order 151.1C, a date for full compliance with the order has not been formally established, numerous actions remain to be completed, and several significant corrective actions are overdue. Although the BNL Emergency Management Upgrade Project Schedule was developed to capture the actions required for compliance, the distinction between order compliance actions and those intended to sustain the emergency management program has become less clear since additional tasks were added and individual tasks are only nominally defined. Due dates are routinely revised, many actions are overdue, and half of the remaining actions are scheduled for completion by September 30, 2008. The schedule has not been finalized, and no firm completion date is established for full compliance with DOE Order 151.1C. Additionally, actions to address some BHSO assessment findings are significantly overdue, and corrective actions completed in response to the findings from the 2004 Independent Oversight inspection did not effectively resolve all underlying issues.

3 Conclusions

During the previous inspection in April 2004, the Independent Oversight team found that risks to site workers and the public had been significantly reduced by minimizing hazardous material inventories, and, with some exceptions, initial decision-makers were aware of their emergency response roles and responsibilities and able to appropriately prioritize emergency response tasks. Nevertheless, a hazards survey and EPHAs, which provide the basis for the emergency management program, were not in place. This 2008 inspection found that hazardous material inventories remain low, and the program has been significantly improved by the issuance of a hazards survey, EPHAs, and revised emergency plan, as well as other upgraded program plans and procedures. Additionally, the EOC is better located and equipped, and an agreement for locating a joint information center offsite has been finalized. However, this inspection also confirmed BNL self-assessment results that indicate that weaknesses remain, most significantly in training and drill programs and the consequence assessment function.

The hazards survey and EPHAs, as well as the EPI program, are notable strengths. Radiological hazardous materials are in non-dispersible forms, and the few remaining hazardous chemicals are relatively small in quantity. Methodology documents were prepared and used to document the location and quantity of hazardous materials, screen them for further analyses, and determine the potential consequences of a release. The resulting hazards survey and EPHAs provide the technical basis for EALs and protective actions. The EPHAs analyze for a wide range of accident scenarios, and include the appropriate barrier analyses and estimated source terms. The EPI program is well integrated between BNL and BHSO public affairs organizations and has been coordinated with the onsite organizations and offsite agencies, such as Suffolk County Department of Fire, Rescue, and Emergency Services. The EPI plan and supporting checklists facilitate providing timely and accurate information to site workers, the media, and the public in the event of an emergency; EPI personnel performed these tasks effectively during the LSPTs.

Another positive program attribute is the revised emergency plan, which is a comprehensive document that indentifies the program structure and requirements for an effective emergency management program; however, the plan is not fully implemented. To implement the emergency plan, BNL has an almost complete set of procedures, and those that have been updated to align with the emergency plan are generally of good quality.

Although BNL has made progress, several significant tasks remain to be completed in order for the program to be fully effective and to comply with DOE Order 151.1C, *Comprehensive Emergency Management Program*. The training and drill programs are the most significant weakness. Effective programs have not been established to prepare the ERO to perform their duties and provide them opportunities to practice and maintain proficiency. This is especially important considering that the EALs and protective action plans, implemented in April 2008, contain relatively new concepts for decision-makers and consequence assessment

teams. Additionally, not all procedures have been revised and, as a result, some inconsistencies exist and some activities are not adequately covered by the existing procedure set. Weaknesses in procedures, training, and drills are considered major contributors to weaknesses in using EALs and performing consequence assessment, observed during LSPTs.

BNL conducted a comprehensive self-assessment in fiscal year 2007 to determine those actions required to fully implement the contractor requirements of DOE Order 151.1C. To manage the numerous corrective actions, BNL developed the Emergency Management Upgrade Project Schedule. The upgrade project represents an accurate assessment of the program strengths and weaknesses as confirmed by this Independent Oversight inspection, but, in addition to updating the status of actions, the schedule has gone through numerous revisions to add routine program activities and revise due dates. Currently, seven percent of the actions are overdue, half of the remaining open actions are due by the end of September 2008, and the individual assigned to a large percentage of these actions has resigned, making further schedule slippages likely.

BHSO and BSA line management attention is necessary to ensure that all requirements of DOE Order 151.1C are implemented in a timely manner. Most significantly, the development and conduct of training and drills using the revised set of implementing procedures should be expedited.

4 Ratings

This inspection focused on a detailed assessment of six emergency management programmatic elements, as well as ERO performance during LSPTs. No overall program rating has been assigned. The individual element ratings reflect the status of each BNL emergency management program element at the time of the inspection. The ratings assigned below to the readiness assurance category are specific to those assessment, corrective action, and performance monitoring mechanisms applicable to the emergency management area.

The ratings for the emergency management elements evaluated during this inspection are:

EMERGENCY PLANNING	
Hazards Survey and EPHAs	EFFECTIVE PERFORMANCE
Program Plans and Procedures	NEEDS IMPROVEMENT

EMERGENCY PREPAREDNESS	
Training and Drills	SIGNIFICANT WEAKNESS
Exercises	NEEDS IMPROVEMENT
Emergency Public Information	EFFECTIVE PERFORMANCE

EMERGENCY RESPONSE	
Incident Command, Emergency Operations Center, and Consequence Assessment	NEEDS IMPROVEMENT

READINESS ASSURANCE	
DOE Line Program Management	NEEDS IMPROVEMENT
Contractor Feedback and Improvement	NEEDS IMPROVEMENT

Ratings Definitions

Independent Oversight uses a three-tier rating system that is intended to provide line management with a tool for determining where resources might be applied toward improving the site's emergency management program. This, and the fact that these reviews use a sampling technique to evaluate program elements, is the primary reason why the Office of Emergency Management Oversight assigns ratings to the supporting elements of a facility's emergency management program rather than providing an overall rating. The ratings are not intended to provide a relative ranking of programs at different sites because of the many

differences in missions, hazards, and facility life cycles. The rating system helps to communicate performance information quickly and simply. Changes in rating colors from previous reviews can be used to recognize relative improvements or to identify deteriorating performance. The three ratings and the associated management responses are:

- **Effective Performance (Green):** An emergency management element being evaluated would normally be rated "Effective Performance" if the emergency management function is effectively implemented. An element would also normally be rated as "Effective Performance" if, for any applicable standards that are not met, other compensatory factors exist that provide equivalent protection to workers and the public, or the impact is minimal and would not significantly degrade the site's response to an emergency. There may be specific issues or deficiencies that require attention and resolution.

- **Needs Improvement (Yellow):** An emergency management element being evaluated would normally be rated "Needs Improvement" if one or more applicable standards are not met, the variances are only partially compensated for by other measures, and the resulting deficiencies in the emergency management function degrade the ability of the emergency responders to protect site workers and the public. Line managers would be expected to substantially increase their attention on the identified areas of weakness. This rating is anticipatory and provides an opportunity for line management to correct and improve performance before it results in a meaningful degradation in the ability of emergency responders to protect site workers and the public.

- **Significant Weakness (Red):** An emergency management element being evaluated would normally be rated "Significant Weakness" if one or more applicable standards are not met, there are no compensating factors, and the resulting deficiencies in the emergency management function seriously degrade the ability of the emergency responders to protect site workers and the public. Line managers would be expected to apply immediate attention, focus, and resources to the deficient program areas, and, in most cases, compensatory measures would be appropriate.

APPENDIX A
Supplemental Information

A.1 Dates of Review

Planning Visit	June 10 – 12, 2008
Onsite Inspection Visit	June 23 – July 2, 2008
Report Validation and Closeout	July 23 – 24, 2008

A.2 Review Team Composition

A.2.1 Management

Glenn S. Podonsky, Chief, Office of Health, Safety and Security
Michael A. Kilpatrick, Deputy Chief for Operations, Office of Health, Safety and Security
William A. Eckroade, Director, Office of Independent Oversight
Steven C. Simonson, Director, Office of Emergency Management Oversight

A.2.2 Quality Review Board

Michael A. Kilpatrick
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Dean C. Hickman
Robert M. Nelson
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A.2.3 Review Team

Jeffrey Robertson (Team Leader)
John Bolling
JR Dillenback
Deborah Johnson
Teri Lachman
David Odland
Thomas Rogers

APPENDIX B
Site-Specific Findings

Table B-1. Site-Specific Findings Requiring Corrective Action Plans

FINDING STATEMENTS	REFER TO PAGES:
1. BNL has not established processes to ensure the hazard survey and EPHA documents are reviewed and updated to incorporate relevant changes in hazardous material inventories, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*.	13
2. BNL EALs and supporting procedures do not ensure that effective PAs will be implemented for all anticipated emergencies, as required by DOE Order 151.1C.	16
3. BNL emergency response procedures do not adequately address the methods for implementing personnel accountability and sheltering during an emergency, as required by DOE Order 151.1C and the BNL Emergency Plan.	16
4. BNL has not fully implemented a training program that adequately prepares emergency responders to perform required response tasks, in accordance with DOE Order 151.1C and the BNL Emergency Plan.	20
5. BNL does not conduct periodic drills for all workers who may be required to evacuate their work area, as required by DOE Order 151.1C and the BNL Emergency Plan.	21
6. BNL has not implemented a comprehensive program of evaluated exercises for the site and its hazardous materials facilities that validates all elements of the emergency management program over a five-year period, as required by DOE Order 151.1C and the BNL Emergency Plan.	22
7. The BHSO ERO training requirements do not ensure that all EOC cadre members are trained in their ERO tasks, receive annual refresher training, or demonstrate their proficiency in all assigned EOC positions, as required by DOE Order 151.1C.	37
8. BNL has not established an implementation date for full DOE Order 151.1C compliance, as required by that order, and, in many instances, corrective actions to achieve compliance are not timely.	39

APPENDIX C
Emergency Planning

C.1 Introduction

Two key elements of emergency planning are the hazards survey and emergency planning hazards assessments (EPHAs) that identify and assess the impact of site- and facility-specific hazards and threats and establish an emergency planning zone. The hazards survey and EPHAs serve as the foundation of the emergency management program; consequently, their rigor and accuracy are keys to developing effective emergency response procedures and other elements of the program. The degree to which the EPHAs effectively serve this function is primarily dependent upon the completeness of the institutional processes for developing the hazards survey and EPHAs, the effectiveness of the screening process by which hazardous materials are initially considered, and the rigor and accuracy of the analyses contained within the EPHAs.

U.S. Department of Energy (DOE) and National Nuclear Security Administration sites and facilities use the results of these assessments to establish emergency management programs that are commensurate with the identified hazards. The site emergency plan defines and conveys the management philosophy, organizational structure, administrative controls, decision-making authorities, and resources necessary to maintain the site's comprehensive emergency management program. Specific implementing procedures are then developed that conform to the plan and provide the necessary detail, including decision-making thresholds, for effectively executing the response to an emergency, irrespective of its magnitude. These plans and procedures must be closely coordinated and integrated with offsite authorities that support the response effort and receive DOE emergency response recommendations.

This evaluation included a review of the Brookhaven National Laboratory (BNL) hazards survey and EPHAs and their treatment of hazards associated with the BNL site. Also reviewed were sitewide and facility-specific emergency plans and associated implementing procedures.

C.2 Status and Results

C.2.1 Hazards Survey and Emergency Planning Hazards Assessments

The April 2004 Independent Oversight inspection found that BNL had implemented an aggressive program to reduce hazards and minimize the inventories of hazardous materials. However, the site had not completed a hazards survey to identify all hazardous materials in facilities and transportation activities. Further, the full spectrum of emergency events had not been identified and assessed, and, as a result, the accuracy and usability of pre-determined protective actions (PAs) and event classification tools and the determination of an emergency planning zone were negatively impacted. This 2008 inspection found that BNL has resolved the issues identified during the 2004 inspection; however, processes do not ensure that any planned increases in hazardous material inventories are evaluated for emergency planning considerations.

BNL has implemented processes for developing the site hazards survey and EPHAs that, with few exceptions, effectively identify requirements and expectations reflected in DOE Order 151.1C and the associated DOE emergency management guide. The processes include detailed instructions on the methodology, content, and format for developing the hazards survey and EPHAs; however, they do not identify contractor and

Brookhaven Site Office (BHSO) roles and responsibilities for reviewing and approving the hazards survey and EPHAs. The processes also do not include mechanisms for facility managers to validate the contents of these documents through a review and approval requirement.

An effective hazardous material identification and screening process that establishes the need for a quantitative EPHA is based on a thorough identification of the hazardous materials present in the facility and relies to a great extent on an accurate site inventory of hazardous materials and appropriate screening thresholds. BNL has implemented processes to notify Office of Emergency Management (OEM) personnel prior to facility and operational changes. Facility managers are required to fill out a *Facility Use Agreement Change Control Form* prior to any changes in operations of a facility and are required to fill out an *ES&H Evaluation – 500A Form* for new projects being proposed or facility structural changes. However, facility managers are not required to use these processes to ensure OEM personnel are notified prior to significant changes in hazardous material inventories. Some facility managers control the quantities of hazardous materials ordered by resident personnel and have implemented a just-in-time ordering system for higher hazard materials (e.g., hydrogen fluoride, hydrochloric acid, etc.). Notwithstanding, facility managers are not procedurally required to establish maximum allowable quantities for their hazardous materials, and planning quantities have not been established for the EPHA facilities.

Finding #1: BNL has not established processes to ensure the hazard survey and EPHA documents are reviewed and updated to incorporate relevant changes in hazardous material inventories, as required by DOE Order 151.1C, *Comprehensive Emergency Management System*.

In response to the 2004 Independent Oversight inspection, OEM developed a hazards survey that, with the exception of one facility, is consistent with the defined provisions of DOE Order 151.1C and the associated DOE emergency management guide. The screening of hazardous materials in the hazards survey goes beyond the order requirements by utilizing a more conservative consequence-based screening approach. For example, sulfuric acid, which would be screened out per the order because of the material's low vapor pressure, was retained for further analysis using this approach. The hazards survey includes such appropriate elements as descriptions of emergency events and conditions, external hazards (for example, transportation accidents), and applicable planning and preparedness requirements. The hazards survey also contains a table of hazardous chemicals for facilities of concern that must be retained for further analyses.

To evaluate the accuracy of the hazardous material inventories identified in the hazards survey and EPHAs, Independent Oversight conducted walk downs of multiple facilities with facility managers and OEM personnel. Actual facility hazardous material inventories were compared to the hazards survey, EPHAs, and current facility hazardous material lists. These walk downs confirmed that the radiological materials are either in a non-dispersible form or maintained in quantities below DOE-STD-1027-92 Hazard Category 3 values, and were appropriately screened from further analyses in an EPHA. However, hydrogen fluoride and hydrochloric acid observed in Building 535 were not identified in the hazards survey. These hazardous chemicals have a health hazard rating of 3, and the quantities of materials exceed the screening criteria of the order. Although the hazards survey did not identify hydrogen fluoride and hydrochloric acid for Building 535, these materials were appropriately included and analyzed in the EPHA.

Stand-alone EPHAs have been developed for each hazardous material facility and are generally consistent with the provisions of the order and the associated DOE emergency management guide. The EPHAs consider a wide range of accident scenarios, include the appropriate barrier analyses, and use consistent release fractions for determining estimated source terms. The EPHA analyses are accurate and support the

development of emergency action levels (EALs) and PAs for each analyzed scenario. However, the analyses for the specific chemicals in the EPHAs are based on generic receptor distances—a range of quantities from the minimum quantity to reach a classifiable emergency (Alert classification) to the maximum quantity that could be released without requiring offsite PAs (Site Area Emergency classification). In the absence of established planning quantities, these maximum quantities may be warranted, but they do not represent expected or historical quantities and result in overly conservative PAs. For example, the EALs associated with the explosive release of hydrogen fluoride from Building 535 use quantities ranging from less than one bottle up to 67 bottles versus the historical maximum of 16 co-located bottles at the facility. PAs for this scenario are based on the analyzed maximum quantities (67 bottles).

EALs are critically important response tools that should be based on the technical analyses contained in the EPHAs. The initial EALs (called inventory-specific EALs in the EPHAs) are based on event consequences of a release from only one container. However, if more than one container is involved in an emergency event, general EALs have been developed for a wide range of inventories (as discussed above). PA plans have been developed in conjunction with the EALs. Although the EPHAs identify dose receptors of interest (facility boundary distance and nearest site boundary distances) for classification purposes, generic receptor distances were used in the development of the PA plan distances. These generic receptor distances do not correlate with the PA zone and isolation zone distances obtained from the consequence analyses in the EPHAs. The use of generic receptor distances in the development of the EALs and PA plans, rather than the analyzed dose receptor distances, resulted in overly conservative PAs, such as those taken during the limited-scope performance tests (LSPTs) conducted during this inspection (see Appendix E).

To summarize, BNL has implemented effective processes for developing hazards surveys and EPHAs that generally meet DOE requirements and expectations. In response to the 2004 inspection, OEM developed a site hazards survey that identifies applicable emergency conditions and, with the non-consequential exceptions noted for Building 535, appropriately screens identified hazardous materials. The EPHAs are comprehensive in considering events and hazards, consistent in development of source terms, and adequate in supporting the development of EALs. Although EALs have been developed for a wide range of hazardous material inventories, these ranges do not correlate with the PA distances analyzed in the EPHAs. The consequence analyses in the EPHAs were based on a range of quantities rather than expected or historical quantities because BNL has not established an effective hazardous material identification process that ensures facility managers and emergency planners can maintain the validity of EPHAs. Overall, the use of a range of inventories rather than planning quantities established with facility representatives results in overly conservative initial site PAs. Although these PAs will protect the onsite population, they are more difficult to implement effectively, as observed during the LSPTs.

C.2.2 Program Plans and Procedures

The 2004 Independent Oversight inspection of the emergency management program did not specifically include evaluation of emergency plans and procedures. During this 2008 inspection, Independent Oversight found that improvements in the plans, procedures, checklists, and tools available to support emergency responders have been made. BNL is in the process of implementing changes to the program based on recently approved hazards assessments and has drafted an Emergency Management Upgrade Project Schedule. The project upgrade includes a number of actions involving plans and procedures, including preparation or revision of several response procedures and development of additional position checklists.

The BNL Emergency Plan provides the basis for an adequate emergency program and response capability at the laboratory, although it is not yet supported by a full set of implementing procedures and checklists. In addition, BHSO has developed a separate emergency plan that appropriately governs its responsibilities for

oversight of both the program and the site's emergency response. The BNL plan includes thorough descriptions of the emergency management program functional areas, including training and drills, exercises, emergency public information, and readiness assurance. Both plans adequately describe the site's emergency response organization, including the facility, incident command, and emergency operations center organizations, and clearly explain emergency direction and control. Roles and responsibilities for planning and preparedness by both BNL and BHSO are also clearly identified in the plans. However, some minor inconsistencies between the BHSO and BNL plans were identified. For example, the BHSO plan indicates that the BHSO team is activated for classified operational emergencies, but not for those that are only categorized (as is the case in the BNL plan), and does not include the BHSO public affairs officer in the initial emergency operations center activation.

BHSO has developed a procedure that adequately addresses its emergency responsibilities, and BNL has instituted a mostly complete set of implementing procedures and a few supporting checklists that provide a generally sound set of response actions. In addition, the fire and security departments each have a mostly thorough set of procedures to support their emergency response. Some, but not all, of the BNL implementing procedures have been updated to reflect changes in the emergency plan. For example, a new procedure reflects the roles, responsibilities, and actions for performing categorization and classification, determining PAs, and making notifications; new checklists provide tools to assist the incident commander and crisis manager. An older, but still active, procedure governing PAs and an associated crisis manager checklist also addresses the roles, responsibilities, and processes for PAs, such as assembly, accountability, sheltering, and evacuation.

Although generally sound, some weaknesses were noted in the consistency and specificity of the currently available procedures. For example, the new procedure for categorization, classification, and PAs does not indicate how to use the new PA plans to formulate onsite PAs; the old procedure for assembly and evacuation (and its associated checklist) does not address the PA plans either. Likewise, the notification procedure does not explicitly address methods for using the tone alert radio system to disseminate the PAs specified in the new PA plans. Although the offsite notification form has most of the information specified in DOE Order 151.1C, it does not include information such as damage, casualties, organizations notified, or level of media interest. In addition, the security procedures include only one standoff distance for bombs (300 ft) and do not reference the Bureau of Alcohol, Tobacco, and Firearms chart that is used by emergency responders for determining safe standoff distances for different bomb sizes. Finally, checklists for a number of other positions are not complete. It is recognized that most of these procedures are scheduled to be revised and improved as part of the Emergency Management Upgrade Project, which is discussed further in Appendix F.

To support emergency response, BNL prepared EAL tables and PA plans for expected events involving hazardous materials at site facilities. The EALs are contained in two tables that use different entry conditions; one table provides actions based on single container data, and the second is a general table designed for events involving multiple containers, based on pounds of material at risk. Selection of an EAL leads to a PA plan that recommends locations for the incident command post and traffic control points, delineates the initial zones to shelter in place (using tone alert radio/pager messages), and leads to further refinement of the onsite PAs. Several important weaknesses in the implementation of the EALs and PA plans were identified. First, although initial training has been conducted on the use of the EAL tables and PA plans, site procedures do not provide adequate guidance for response personnel to determine the appropriate EAL and to formulate initial and follow-on PAs. For example, instructions are unavailable to:

- Aid in determining the quantity of material at risk for utilizing the general table when actual container sizes do not match those in EAL tables or when multiple containers are involved.

- Assist in developing PAs using the onsite PA table to determine whether or not to evacuate buildings that may be downwind from the release point.
- Guide the application of the isolation and PA zones in refining the onsite PAs.

Second, the PA plans specify incident command post and traffic control point locations that do not correlate to the calculated isolation zones, leading to locations that are a greater distance from the scene than required to ensure personnel safety and, as a result, increase the difficulty of the incident commander's responsibility to maintain effective direction and control over on-scene activities. Third, some PA plans omitted an affected zone from the list of zones to receive the initial shelter-in-place message.

Finding #2: BNL EALs and supporting procedures do not ensure that effective PAs will be implemented for all anticipated emergencies, as required by DOE Order 151.1C.

The BNL standards based management system includes requirements for the preparation of local emergency plans and references instructions for the local emergency coordinators (LECs) on shelter in place for its facilities (a corrective action resulting from the last Independent Oversight inspection). Building personnel at a number of facilities have developed local emergency plans that generally provide for effective emergency response at their facilities. Local emergency plans identify the LECs (who are responsible for key emergency actions); include maps of evacuation routes, assembly points, and shelter-in-place locations; and contain clear instructions for expected response by building occupants. During a number of building walkthroughs, LECs demonstrated clear understanding of their roles and responsibilities for assembly, shelter in place, evacuation, and accountability (as outlined in their building emergency plans). LECs have adapted methods for informing personnel within their buildings of the emergency situation based on the available communications equipment in their facility, including sweeps of the building (both formal and informal), initiation of the fire alarm, or public address system announcements.

Nevertheless, not all normally occupied buildings (including one hazardous material facility) have emergency plans, and the plans do not always contain complete directions to accomplish key PAs. For example, responsibility for performing accountability is assigned to LECs and supervisors, but, in most cases, the prescribed method to accomplish accountability is limited to interviewing personnel at the assembly point. No specific actions on the accountability process are described (e.g., primary and back-up personnel responsible for identifying the whereabouts of personnel or for performing area sweeps). Although all but one of the interviewed LECs demonstrated the ability to secure ventilation, facility procedures do not include actions to be taken to improve the effectiveness of the shelter-in-place PA (close windows and doors and/or secure outside ventilation) or provide assistance in locating the ventilation controls. Finally, the plans for hazardous material buildings identify only single outside assembly areas, which may not be appropriate for all wind directions.

Finding #3: BNL emergency response procedures do not adequately address the methods for implementing personnel accountability and sheltering during an emergency, as required by DOE Order 151.1C and the BNL Emergency Plan.

BNL has an adequate process for document control. Approved emergency implementing procedures and checklists are controlled through publication on the emergency operations internal website, the procedures include a note to users to ensure that the procedure in use is the latest available, and users are responsible to ensure that the procedures in their response books are current prior to use. Nevertheless, some out-of-date

documents, such as the notification checklist, incident commander checklist, and evacuation zone maps, were found in the fire department command post vehicle.

To summarize, BNL has an appropriate emergency plan and a mostly complete set of implementing procedures to support response to emergency events. The development and revision of procedures governing both emergency response and administrative functions to fully implement the new emergency plan are included in the ongoing Emergency Management Upgrade Project. Overall, BNL has plans and procedures in place to support the site's response to anticipated events; however, a number of procedures require development or revision in order to ensure timely and effective implementation of PAs. Specifically, EALs and PA plans are not supported by sufficiently detailed implementing instructions, and local facility plans lack detailed directions for achieving sheltering and accountability.

C.3 Ratings

A rating of EFFECTIVE PERFORMANCE is assigned to the area of hazards survey and EPHAs.

A rating of NEEDS IMPROVEMENT is assigned to the area of program plans and procedures.

C.4 Opportunities for Improvement

This Independent Oversight inspection identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management and accepted, rejected, or modified as appropriate, in accordance with site-specific emergency management program objectives and priorities.

Brookhaven Site Office and Brookhaven National Laboratory

- Enhance the usefulness of the site hazards survey and EPHA methodology documents by providing additional specificity to the procedure. Specific actions to consider include:
  - Identify contractor and BHSO roles and responsibilities for reviewing and approving the hazards survey and EPHAs.
  - Include a review and approval requirement for facility managers to validate the contents of the hazards survey and EPHAs.
  - Establish institutional mechanisms to ensure that OEM is notified of changes in facility hazardous material inventory or processes that may trigger additional hazards survey and/or EPHA updates.
- Enhance the quality of the site hazards survey and EPHAs by including additional details and assumptions. Specific actions to consider include:
  - Document all the hazardous materials in the hazards survey and EPHAs that were reviewed against screening criteria.

- Establish planning quantities with hazardous material facility managers and perform consequence assessment analyses for these quantities rather than an extended range of unexpected quantities.

Brookhaven Site Office

- Review the BHSO Emergency Plan and implementing procedure, and eliminate potential inconsistencies with the overall BNL site plan and implementing procedures. Specific actions to consider include:
  - Activate the BHSO emergency response organization coincidentally with activation of the BNL organization, including public affairs personnel.
  - Revise the plan's description of the emergency management team to clearly include the roles and responsibilities of the Director, Operations Management Division.
  - Address training and qualification of the BHSO emergency response organization members in the emergency plan.
  - Reference the emergency response organization recall list in a document that is more easily kept up to date (compared to the emergency plan).
  - Verify that the responsibilities and duties for response personnel described in the implementing procedure coincide with those in the emergency plan (e.g. emergency manager approval of news releases, responsibility for headquarters briefings and situation reports, and activation of the DOE room in the emergency operations center).
  - Reconcile the position titles used in the procedure and the emergency plan (BHSO Communicator in procedure versus Emergency Coordinator in BHSO Emergency Plan).

Brookhaven National Laboratory

- While continuing with improvement to the site's emergency plan implementing procedures, consider the following specific actions:
  - Include detailed instructions on the use of the new EALs and PA plans in the procedure for categorization, classification, and PAs.
  - Eliminate redundancies in procedures and checklists.
  - Integrate the PA plan, shelter-in-place, and onsite PA messages with the notification procedure instructions and the tools used for implementing the tone alert radio and paging system messages (including those available to security personnel).
  - Include categorized operational emergencies for natural events, discovery of contamination from past operations, and classification of onsite transportation accidents that require PAs at greater than 100 meters in generic EALs.

APPENDIX D
Emergency Preparedness

D.1 Introduction

A coordinated program of training, drills, and exercises is necessary to ensure that emergency response personnel and organizations can effectively respond to emergencies impacting a specific facility or the site as a whole. This response includes the ability to make time-urgent decisions and take action to minimize the consequences of the emergency and to protect the health and safety of responders, workers, and the public. To be effective improvement tools, exercises should be used to validate all elements of an emergency management program over a multi-year period using realistic, simulated emergency events and conditions, and to provide emergency response organization (ERO) members an opportunity to practice their skills. An effective emergency public information (EPI) program provides the public, news media, and U.S. Department of Energy (DOE) employees with accurate, timely information during an emergency event. In part, effectiveness is based on having a long-term, documented program in place to educate the public and the media about actions that may be required during an emergency response.

The Office of Independent Oversight team evaluated the training, drill, and exercise program used to support the Brookhaven National Laboratory (BNL) ERO. (Brookhaven Site Office ERO training is discussed in Appendix F.) As part of the programmatic review of the training, drill, and exercise elements, the Independent Oversight team evaluated the plans and procedures that support these elements and reviewed training and proficiency records for key site emergency responders. Drill documentation and exercise reports were also reviewed for indications that they are being used effectively to enhance responder proficiency and evaluate the level of the site's response preparedness. The Office of Independent Oversight team also evaluated EPI plans and applicable processes for an emergency at the BNL site.

D.2 Status and Results

D.2.1 Training, Drill, and Exercise Program

The 2004 Independent Oversight inspection of the emergency management program did not include evaluation of training, drills, and exercises. During this 2008 inspection, Independent Oversight found that key elements of the training, drills, and exercise programs are included in the Emergency Management Upgrade Project Schedule, and some scheduled activities are complete. However, for the most part, training, drills, and exercise programs are not fully implemented.

Training and Drills

The BNL Emergency Plan and draft BNL Emergency Management Training Program Plan define sitewide requirements for the emergency management training program. These plans identify that the Office of Emergency Management has overall responsibility for the emergency management training program, including assignment of individuals to the ERO. Additional support for training is provided by the Human Resources Division, which manages the Brookhaven Training Management System.

BNL uses the institutional computer-based Brookhaven Training Management System to track the status of required training for personnel working at BNL. This management system is administered by a dedicated staff that monitors the completion of training and re-training, and ensures appropriate notifications are sent to individuals when their training is approaching a completion due date or has lapsed. To make this an effective system, all training has to be defined for site workers, and the ERO and records of training completion must be provided to system administrators for status updates. The system reflects the current status of general employee training for site workers; however, the ERO training program requirements are not fully defined for effective tracking. Furthermore, BNL does not update the Brookhaven Training Management System to reflect all ERO training completion records, making it difficult to determine the training status of individuals and ensure each ERO position is staffed with trained personnel.

Records indicate that most ERO members, and other site personnel, have completed some emergency response training in the last few years, and additional training is identified in the BNL Emergency Management Upgrade Project Schedule. Emergency response training is required by the emergency plan for BNL employees and visitors, emergency operations center (EOC) crisis management, EOC support staff, consequence assessment team members, functional work centers, incident command organization, public information and media relations, tactical operations center, building/facility personnel, DOE advisor/oversight, and drill and exercise controllers and evaluators. Additionally, some ERO personnel recently participated in BNL limited-scope performance tests (LSPTs) and tabletop drills to improve their proficiency in ERO tasks.

Nevertheless, the minimum initial and refresher training required by the emergency plan for each ERO member is not specified in the Brookhaven Training Management System. The absence of an annual refresher training requirement is of particular significance. It is noted that EOC Crisis Managers, and a few other ERO staff, did complete the 2008 ERO refresher training; however, not all ERO personnel are required to receive this training. In addition, BNL did not conduct any ERO refresher training in 2007. Furthermore, training on the use of critical decision-making tools was not effective in ensuring consistent results in the use of emergency action levels (EALs), protective action (PA) plans, consequence assessment models, and the timely initial assessment tool. The LSPTs demonstrated that ERO conclusions significantly deviated from one another. Lastly, most of the ERO training modules required by the emergency plan are not developed and implemented. Missing training includes:

- ERO position-specific training, together with job-related qualifications on procedures, tools, and equipment resources.
- Site-specific incident management system training for the EOC Crisis Management Team, the Incident Command Organization, and DOE Advisor/Oversight.
- National Incident Management System training required to augment the BNL incident command system training.

As a result, some ERO members are not prepared to adequately perform their assigned response duties, which is a likely contributing cause to the performance inconsistencies observed during the LSPTs conducted as part of this inspection, as discussed in Appendix E.

Finding #4: BNL has not fully implemented a training program that adequately prepares emergency responders to perform required response tasks, in accordance with DOE Order 151.1C and the BNL Emergency Plan.

Some existing ERO training, such as EPI and Local Emergency Coordinator courses, include an appropriate mix of instructor led classroom training and computer-based training. Additionally, some emergency drills are conducted to provide supervised "hands on" training and to reinforce classroom training. However, drills are not being used to develop and validate some emergency response capabilities. In addition, drills are not being conducted with sufficient frequency to allow for all emergency response teams to participate. Therefore, ERO members are not provided sufficient opportunities to develop and maintain proficiency in their emergency response roles, which is also a likely contributing cause to the performance inconsistencies observed during the LSPTs conducted as part of this inspection and discussed in Appendix E.

Annual facility evacuation drills (or training) are not being conducted for all required facilities. The BNL Emergency Plan requires annual drills involving the evacuation and assembly of personnel for only a small set of the site's facilities, for example, those with 100 or more personnel above or below the ground floor, emergency planning hazards assessment (EPHA) facilities, dormitories, ambulatory patient care facilities, and places of assembly. This requirement does not meet the DOE Order 151.1C requirement for annual evacuation drills. Further, not all the facilities that are required to conduct evacuation drills have done so. In addition to dormitories, preschool and day care facilities, only four of 22 buildings (on the list of required buildings) conducted an evacuation drill in fiscal year (FY) 2007, and, to date, eight buildings are complete for FY 2008. Additionally, most EPHA facilities are not conducting drills to test local emergency plans and integration with the site ERO, and to ensure building occupants are trained and prepared to appropriately respond to potential emergencies.

Finding #5: BNL does not conduct periodic drills for all workers who may be required to evacuate their work area, as required by DOE Order 151.1C and the BNL Emergency Plan.

To summarize, BNL has implemented a sitewide Brookhaven Training Management System to track the status of training completion. Most ERO members have completed some training, and additional training is listed for development in the Emergency Management Upgrade Project Schedule. However, ERO training and drill programs are not fully defined, developed, and implemented. For example, a lack of training in the use of consequence assessment models, the timely initial assessment tool, EALs, and PA plans contributed to ERO performance weaknesses observed during the LSPTs. Additionally, a lack of practice drills contributed to inaccurate and ineffective communications weaknesses observed throughout the LSPTs. Consequently, some ERO members are not sufficiently trained and provided with drill opportunities to practice their assigned response duties. Lastly, facility evacuation drills are not being conducted at the required frequency to ensure that personnel can safely evacuate their workplace.

Exercises

The BNL exercise program is comprehensively defined in the emergency plan and includes a schedule for exercises at most of the significant hazardous material facilities. Exercise objectives are used to establish exercise scope, specify the emergency response functions to be demonstrated, identify the extent of organization and personnel participation, and identify the breadth and depth of exercise activities to be accomplished. The BNL 2007 annual exercise packages are detailed and comprehensive, and the exercise evaluation criteria included in the packages are observable, measurable, and appropriate for the exercise scenario and objectives. Additionally, planning and conduct of the 2007 annual exercise effectively demonstrated exercise program concepts stated in the emergency plan and draft drill and exercise manual. However, some aspects of the exercise program and five-year exercise schedule are not fully implemented in accordance with the emergency plan.

Although the BNL exercise program described in the emergency plan provides for comprehensive testing of the ERO, a few exercise planning weaknesses reduce the usefulness of the exercise component in validating the site's response capability. For example, the five-year exercise plan does not describe how all elements of the emergency management program will participate in a minimum of one exercise (or evaluated drill) annually and does not include provisions for tracking and considering which emergency management response program elements, hazards, facilities, and ERO elements were included in exercises over the previous five years to ensure that all elements are covered. Additionally, annual facility-based exercises are not being performed for each hazardous material facility as required in the emergency plan. As a result, key elements of the operational emergency hazardous material program are not being appropriately validated, including the use of hazardous material facility EALs, PA plans, response plans, and local emergency plans. These weaknesses are primarily attributed to the lack of adherence to a detailed exercise schedule, not the absence of a solid foundation for planning and conducting exercises, as described in the emergency plan and demonstrated during the 2007 annual exercise.

Finding #6: BNL has not implemented a comprehensive program of evaluated exercises for the site and its hazardous materials facilities that validates all elements of the emergency management program over a five-year period, as required by DOE Order 151.1C and the BNL Emergency Plan.

To summarize, BNL has designed and partially implemented a comprehensive exercise program that provides for detailed exercise packages with appropriate evaluation criteria and well-defined processes for conducting and evaluating the exercises. Nevertheless, the current five-year exercise plan does not provide an effective mechanism for identifying the program elements, ERO components, and hazards to be included in each year's exercises.

D.2.2 Emergency Public Information

The 2004 Independent Oversight inspection of the emergency management program did not include evaluation of EPI. During this 2008 inspection, Independent Oversight found that the BNL EPI program is integrated and includes an EPI plan and supporting checklists necessary to ensure timely and accurate information is provided to site workers, the media, and the public in the event of an emergency. The EPI program also includes the elements required for the coordination of information flow, rumor control, and is designed to encompass the components of DOE Order 151.1 C and accompanying guide.

The BNL Community, Education, Government, & Public Affairs Directorate developed the Emergency Communications Plan (EPI plan) in coordination with the Brookhaven Site Office (BHSO); BNL Office of Emergency Management; and Suffolk County Department of Fire, Rescue, and Emergency Services. Cooperatively, these organizations developed an EPI program, plan, and implementing checklists that document well-conceived concepts and processes. With few exceptions, the EPI plan and checklists include appropriate provisions for the development of timely and accurate information and the coordination of information with DOE Headquarters and offsite officials. The plan identifies personnel, resources, facilities, coordination processes, and training requirements, and details the methodology for informing site workers, visitors, and the public of emergency plans and PAs before and during emergencies. It also includes provisions to establish an onsite Emergency Information Center (EIC) that serves as the central onsite point for coordinating and disseminating all public information concerning an emergency at BNL. The tools available to the EIC cadre also provide for their ability to move to another building in case the primary EIC is uninhabitable. While an offsite EIC or joint information center (JIC) is not yet available for use, both the BNL Emergency Plan and the EPI plan checklists describe a path forward to implement their goal to establish an offsite JIC at Dowling College. Toward that goal, BNL executed a memorandum of agreement

with Dowling College on June 6, 2008, that details the terms and use of the new offsite JIC.
In addition to emergency response functions, the EPI program is effectively coordinated with offsite officials and includes an extensive public education component that employs several methods for community interface and communication. As part of the program, BHSO and BNL actively participate with key stakeholders, such as the Community Advisory Committee and the Brookhaven Executive Roundtable to inform the community and officials of site activities, emergency management plans, and PAs. Additionally, the BNL Community, Education, Government, & Public Affairs Directorate and the BNL Office of Emergency Management frequently incorporate BNL emergency awareness sessions through involvement in the town of Brookhaven and Suffolk County emergency management meetings, as well as through Mutual Aid Outreach. BNL also provides an external web page where members of the community can receive up-to-date information during emergencies.

While the EPI plan appropriately addresses the process and implementation for the development of timely and accurate information to the site workers and the public, some planning documents lack implementing mechanisms or require clarification. For example, while news releases are pre-formatted and cover several event-specific scenarios, there is no pre-approved news release template or other mechanism to issue a timely initial news release when the EOC is not operational or during off-hours. Additionally, no document clearly delineates the EPI approval processes, and several planning documents inconsistently define the broadcast e-mail approval process. The inconsistencies include:

- The BNL EPI Plan requires incident commander or crisis manager approval of the broadcast e-mails.
- The EOC public information officer (PIO) checklist requires only authorized derivative classifier approval of the broadcast e-mails.
- The BNL Emergency Plan requires the crisis manager and authorized derivative classifier approvals of the broadcast e-mails.
- The BHSO Manager and PIO checklists require approval by the BHSO emergency manager of the broadcast e-mails.

While these planning documents are inconsistent, and, during the LSPTs, written approvals were not always obtained, the EPI cadre effectively demonstrated the development of timely and accurate news releases and broadcast e-mails.

Finally, Independent Oversight found that, based on the performance during the LSPTs and interviews, EPI training effectively supports the EPI program and adequately prepares the EPI cadre to perform their response functions. Job training analyses determine the training requirements for each EPI cadre role, and qualified EPI instructors teach the modules. The program provides one-on-one initial training to all BNL EPI cadre members and requires completion of training modules that focus on the overall emergency communications plan, position-specific training, an overview of the emergency response plan, and participation in an emergency response drill or exercise. Personnel in lead EPI roles are cross-trained, and all crisis managers and technical briefers receive spokesperson training. Annual refresher training includes an overview of the emergency response support role and position-specific checklist. The BNL Community, Education, Government, & Public Affairs Directorate maintains all BNL training records and enters qualifications in the Brookhaven Training Management System. The BHSO PIO participates in individualized training that includes the radiological assistance program and an overview of the BNL emergency preparedness program. Additionally, the BHSO PIO regularly participates in site exercises. BHSO training records for EPI are being transitioned

to the Brookhaven Training Management System. However, while LSPT performance indicates that the EPI cadre is aware of their roles and responsibilities and function effectively, there is inconsistency between the training the cadre receives and the requirements specified in the BNL Emergency Plan (as discussed in Section 2.1 of this appendix).

To summarize, the EPI program plan and supporting checklists implement well-conceived concepts and processes that effectively address nearly all elements required by their emergency plans. With few exceptions, the EPI plan and checklists include appropriate provisions for the development of timely and accurate information; when fully functional, the offsite JIC will further ensure that the site can provide timely and accurate information during any potential emergency. As designed, the training program effectively prepares the EPI organization to develop timely and accurate information and to operate the EIC. An extensive public education program supports the EPI program, informing the public of emergency plans and PAs before and during emergencies. However, a pre-approved template has not been developed to ensure the timely issue of the initial news release during off hours, and EPI approval processes are not clearly and consistently defined.

D.3 Ratings

A rating of SIGNIFICANT WEAKNESS is assigned to the area of training and drills.

A rating of NEEDS IMPROVEMENT is assigned to the area of exercises.

A rating of EFFECTIVE PERFORMANCE is assigned to the area of emergency public information.

D.4 Opportunities for Improvement

This Independent Oversight inspection identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management and accepted, rejected, or modified as appropriate, in accordance with site-specific emergency management program objectives and priorities.

Brookhaven National Laboratory

- Consider formalizing training requirements and methodologies in the draft Emergency Management Training Program Plan. Specific elements to address include:
  - Specify the minimum number of trained personnel needed per ERO position.
  - Establish a matrix of training requirements for all ERO positions, including initial training requirements, any job-related qualifications, re-training, and remedial training.
  - Clearly define the processes for establishing and maintaining an ERO roster that ensures only personnel up to date in their position training and proficiency demonstrations are assigned. The processes should include a requirement that all responders demonstrate proficiency prior to being added to an ERO roster, and a description of the proficiency demonstrations that can be used; requirements regarding the documentation and retention of proficiency evaluations; and a

provision for removal of individuals from the ERO roster when annual training and proficiency requirements are not satisfied.

- Identify training resources, staff, facilities, and reference material to support training activities.
- Describe the process used to ensure that training materials are up to date prior to use.

- Consider the following when developing and implementing the ERO training program:
  - Use other sites to benchmark the resources needed to develop and maintain the necessary training materials and to deliver the training.
  - Prioritize ERO positions requiring analysis and development of training based on critical tasks.
  - Ensure that the training analysis and design teams include an appropriate mix of training personnel and subject matter experts.
- Consider developing a process and procedure that describes how annual refresher training is developed, delivered, and tracked.
- Enhance the process for scheduling drills and exercises so that it ensures all ERO members are given opportunities to satisfy their participation requirement. Specific actions to consider include:
  - Develop a master schedule of drills and exercises and ensure adherence for both sitewide and facility-level activities.
  - To the maximum extent practicable, ensure that drill and exercise participation is rotated among responders assigned to each response position during the annual drill and exercise cycle.
  - Authorize the use of actual emergency responses, evaluated drills, and exercises to meet the annual demonstration of proficiency requirement.
- Clarify drill and exercise program requirements in a program procedure or the BNL Drill and Exercise Manual (currently in draft form). Specific actions to consider include the following:
  - Expand the diversity of the annual facility-level exercises by involving different facility hazards and response personnel.
  - Expand the pool of drill and exercise controllers and evaluators to include individuals who are experts in the specialized areas of response, to include: facility operations; security; medical; hazardous materials; rescue; firefighting; decontamination; and field monitoring, sampling, and analysis.
  - Require an evaluation of observed performance that links exercise core objectives to the evaluation of the exercise mission and the overall exercise rating.
  - Require the Office of Emergency Management to review all facility and functional response team (e.g. fire and security) drill after-action reports to identify sitewide, cross-cutting issues.

  - Require that participants complete training requirements prior to participating in a scheduled exercise.

- When improving the five-year exercise plan to ensure all elements of the emergency management program are evaluated, consider the following actions.

  - Add information, on the exercises conducted over the previous five years, that specifies the initiating event, facilities, hazards, emergency response program elements, and site-level ERO elements that were included.

  - Develop a strategy for ensuring that all hazard types and a range of facilities are included in the five-year schedule.

- Enhance the offsite interface program by preparing training courseware for offsite personnel who may be requested to respond to an emergency at BNL. Include notification procedures and training on site-specific conditions and hazards. Also, consider expanding the training to include hospital personnel who have agreements with BNL.

- Consider enhancing the EPI cadre training program by formally establishing the training requirements and add a description of the program into the EPI plan.

- To enhance the overall performance of the EPI function, consider instituting a process for the development and approval of emergency information for all phases of an emergency event—before and after the EOC is operational. Assign all tasks to specific ERO positions, and then update the EPI plan, BNL Emergency Plan, BHSO Emergency Plan, and ERO and EPI position checklists accordingly. Specific actions to consider include:

  - Develop and obtain BHSO approval of a pre-scripted news release to enable a news release within one hour of event classification.

  - Define who will be responsible for completing event-specific data entries on the pre-approved initial news release and the releasing authority for times when the EOC is operational and when it is not. Update ERO checklists accordingly.

  - Define who, within BHSO and BNL, is responsible for approving subsequent news releases and broadcast e-mail messages to site workers.

  - Include the responsibility for obtaining approval signatures for subsequent news releases in the appropriate ERO checklists, and ensure that it adequately specifies how to develop, approve, and distribute initial EPI information from outside of the EOC.

  - Update the EPI plan to clearly describe all approval processes.

- When finalizing the plans to prepare a JIC at the Dowling College, consider the following specific actions:

  - Determine and document the equipment, personnel, organizational placements, and overheads/maps required to operate the JIC.

- Provide the equipment and resources to ensure immediate activation of the JIC.
- Define how to transition operations from the initial EPI response team at the EIC to the JIC. Include protocols for declaring the JIC operational and for transferring EIC responsibilities to the JIC.
- Revise the EPI plan to describe the concepts of JIC activation and operation.

Brookhaven Site Office

- To provide a timely initial news release, particularly for off-hour events, approve a pre-scripted news release as described in the BHSO Emergency Plan.

APPENDIX E
Emergency Response

E.1 Introduction

The ultimate objective of emergency planning and preparedness is to prepare emergency responders so that they can apply their skills, procedures, and training to make appropriate decisions and to properly execute actions to protect emergency responders, workers, and the public. Critical elements of the initial response include formulating protective actions (PAs), categorizing and classifying the emergency, and notifying onsite personnel and offsite authorities. Concurrent response actions include re-entry and rescue, provision of medical care, and ongoing assessment of event consequences using additional data and/or field monitoring results.

In the event of an emergency, the Brookhaven National Laboratory (BNL) Fire-Rescue organization or the Police Group, for security threats, provides an incident commander (IC) to lead the on-scene response team and act as the initial Emergency Director (ED). When the emergency operations center (EOC) is operational, the ED function is transferred to the crisis manager, including important responsibilities such as event categorization and classification decision-making and formulation of PAs. Notifications are executed at the Central Alarm Station (CAS) (staffed 24 hours a day), or the EOC, once the EOC is operational. After the EOC is operational, the crisis manager assumes responsibility for overall response while the IC leads the tactical response. Within the EOC, hazardous release dispersion modelers, in the consequence assessment center, support both the IC and the crisis management team by identifying areas that could be affected by the hazardous material release or by bomb blast effects. PA plans are selected using emergency action levels (EALs), and their implementation is managed using 12 site "evacuation" zones.

The information provided in this section is based on observations from two sets of emergency management limited-scope performance tests (LSPTs) evaluated by the Office of Independent Oversight. Each set of LSPTs involved a combined assessment of response activities at the scene, the CAS, the EOC, and, during one day, the emergency information center (EIC). The on-scene response consisted of BNL police department and fire/rescue personnel and, for some scenarios, the local emergency coordinator/building manager for the affected facility. The EOC personnel functions evaluated consisted of a BNL crisis manager, EOC manager, consequence assessment team, Brookhaven Site Office (BHSO) EOC emergency manager, BHSO and BNL public affairs officers, selected EOC support staff, and, during one day, a Tactical Operations Center police representative. Players called upon but not participating were role played by exercise controllers.

Two operational emergency scenarios were developed for the LSPTs: a potential bomb threat near hazardous materials, hydrofluoric acid (HF); and a release of a hazardous material (nitric acid) caused by inclement weather. During the first scenario, it was expected that the event would be categorized as an operational emergency because of the bomb threat and later classified as a site area emergency (SAE) because of the potential release of HF and associated consequences, according to BNL EALs. During the second scenario, it was expected that the event would be classified as an SAE (because the specific hazardous material spilled was not yet known) and kept there after determining that there was no significant airborne hazard, while reducing the area under PAs and proceeding to event termination, again, according to BNL EALs. LSPT scenarios, which were developed by Independent Oversight in conjunction with BNL trusted agents, were

presented to the participants by the BNL trusted agents to ensure scenario validity and delivery of accurate event cues.

E.2 Status and Results

The previous Independent Oversight inspection, performed in 2004, found, during tabletop performance tests, that BNL emergency responders serving in key positions demonstrated the ability to formulate PAs for site workers and responders, and implemented event mitigating tactics using site and offsite assets. However, several key response elements were not demonstrated, including effective actions for shelter in place, accurate application of EALs and event classification, timely completion of notifications, and consistent consequence assessment to ensure an appropriate response. This 2008 inspection revealed that adequate shelter-in-place instructions were provided in site messages, and offsite notifications were timely; however, weaknesses remain in accurately classifying events and in achieving consistently accurate consequence assessment results. Additionally, some weaknesses were observed implementing PAs for onsite personnel.

E.2.1 BNL Incident Commander Organization

ICs demonstrated good command and control and were knowledgeable of their roles, responsibilities, and protocols. ICs understood their ED function, were familiar with incident command system protocols, demonstrated good teamwork with their Fire-Rescue and Police Group counterparts, maintained accountability of responders, made effective use of the command vehicle and associated equipment and tools, and provided periodic briefings to the crisis manager. The ICs used notification forms to collect data and then provided the information to the CAS in a timely manner for offsite notification purposes.

ICs made identifying hazards and implementing PAs a priority and typically understood the extent of the events and selected the appropriate PA plan. During the nitric acid spill scenarios, once the specific material was identified, the ICs quickly recognized that the event represented a "small spill" with low consequences, based on the Department of Transportation Emergency Response Guidebook.

During the bomb/HF scenarios, the ICs quickly determined the backpack was a credible explosive threat near a box containing four bottles of HF and took action to clear responders and evacuate the nearby building. The ICs moved their command post, and traffic control points, to a location farther from the event scene after determining the area that would be potentially affected by the bomb and HF release. These actions ensured the safety of responders but did not always ensure the safety of site workers. Specifically, although the six zones under PAs were given shelter-in-place or evacuation instructions by radios inside their buildings, the remaining personnel onsite were instructed to stay away from the area where emergency responders were located and to follow detour instructions. This information was provided by a broadcast e-mail. Consequently, only personnel who read their e-mail were informed of the event, and a relocation of the emergency responders would not have kept personnel clear of the area, as described in the message. Additionally, while performing the building evacuation, the ICs (on both days) directed evacuees to use a tunnel passage to another building that routed them within 50 feet of the confirmed explosive device, while the bomb standoff distance chart recommended a separation distance of 150 feet.

ICs declared an operational emergency, once the package was confirmed to contain explosives, but did not always further review the building-specific EALs and apply the EAL written for an HF explosion. On one day, the EAL for an HF release from an unknown origin was used. This EAL dictates the use of PA plan 3, with an isolation zone of 2100 ft and a PA zone of 3000 ft, which was established (but the associated

SAE was not declared). On another day, the EAL pertaining to an explosive release of a 5-gallon pail of an unknown material from the nearby 90-day hazardous waste accumulation area was used. This EAL dictates the use of PA plan 4 with no isolation zone and a PA zone of 3220 ft, which was established, but the SAE associated with PA plan 4 was not declared. For the nitric acid release scenario, ICs were not expected to classify and formulate PAs, because the crisis manager had the ED function.

To summarize, ICs demonstrated good command and control and were knowledgeable of their roles, responsibilities, and protocols. They demonstrated appropriate concern for protecting personnel on site by quickly identifying hazards, selecting and implementing PA plans, and making notifications. However, IC selection of EALs for performing event classification and formulation of PAs was not always the most appropriate, and, when evacuating personnel from a building, a location was selected that routed evacuees too close to a confirmed explosive. These performance weaknesses are likely due to the absence of a rigorous training and drill program, as described in Section D.2.1.

E.2.2 Emergency Operations Center Personnel

BNL has made significant improvements in the EOC capabilities since the 2004 inspection, and the emergency response organization (ERO) demonstrated good understanding of the EOC operational concepts. The EOC was equipped with all the tools necessary to safely respond to the presented scenarios. The ERO was effectively activated and demonstrated good protocols for making the EOC operational, transferring the ED function from the IC to the crisis manager, and keeping the EOC cadre informed of the event and responses through periodic briefings. When relocating site workers, the EOC cadre demonstrated safe concepts by maintaining awareness of weather conditions and forecasts to ensure personnel were upwind, using structures as barriers for personnel protection, and using maps to formulate safe routes and instructions.

Notifications to offsite authorities were generally timely and accurate, and follow-up notifications were made as significant information changed or became available. Offsite authorities were also provided contact information to enable them to discuss the event with ERO personnel. Notifications typically provided the correct event information, classification, and PAs. However, meteorological information was sometimes omitted, and in some cases the event classification times were erroneously changed to the current time on follow-up notifications.

Notifications provided to site personnel were generally informative and timely. A representative from the Police Group, in the EOC, prepared tone alert radio messages for transmission by the CAS to selected evacuation zones, giving specific instructions to building residents. The public information officer (PIO) in the EOC prepared and distributed a crisis manager approved e-mail message to site personnel. These processes were generally effective when used, but the e-mail-based system relies on workers promptly reading their e-mail and would not reach all personnel on site. Simulated actuation of shelter-in-place sirens, which would reach all personnel, was demonstrated during the nitric acid scenarios, as well.

EOC personnel demonstrated awareness of EALs for use in determining event categorization and classification. During the nitric acid scenarios, both EOC teams used EALs to properly classify the event as an SAE for an unknown release. However, for the bomb/HF scenarios, decision-makers did not use the applicable EALs to arrive at the accurate event classifications. Specifically, decision-makers on one day used a generic fire/explosion EAL (rather than using it in combination with the building's HF explosion release EAL) that concluded in an Alert classification. For the same scenario, another team in the EOC considered the HF explosion EAL, but decided to keep the event as an Operational Emergency not further classified, unless the bomb exploded. If it exploded, they were prepared to classify the event as an SAE.

EOC personnel used EALs for selecting PA plans and bomb blast standoff charts for establishing safe distances from bombs; however, many inconsistencies existed between the teams in selecting (due to differences in EAL selections previously described) and implementing PA plans. During the nitric acid release scenarios, one day, the EOC decision-making was as expected – selection of PA plan 3 using the EAL for unknown release; later, when it was known that the spill involved a small quantity of nitric acid, PAs were reduced (since no PA criteria were exceeded). On the other day, PA plan 2 was implemented for the same scenario. Later, once the type and amount of release was known and at the recommendation of the consequence assessment team, the EOC directed the implementation of PA plan 4 (a more conservative PA plan that has not been written, and therefore the IC was confused about the actions to take). In this case, the EOC cadre was unable to use the EAL table to determine that the amount of nitric acid released did not exceed PA criteria and no PAs were required. During the bomb/HF scenario, one team selected PA plan 3 and implemented all prescribed PAs; the other team selected PA plan 4 and only partially implemented it – five evacuation zones that were upwind were not given the prescribed tone alert radio message.

Emergency Public Information

EPI personnel were knowledgeable of their procedures and responsibilities and were able to execute tasks effectively. Important tasks, such as the development of news releases and broadcast e-mail messages to site workers, were timely and accurate. Communications between the EOC PIOs and EIC public information personnel were nearly always continuous and accurate. However, differences were observed in the approval processes for the news releases and site worker messages. It was observed that the crisis manager and the DOE emergency manager always reviewed news releases for approval; however, the record of approval was not always provided in writing. The crisis manager and/or emergency manager reviewed the e-mail messages prior to their distribution to site workers, and a record of approval was made for only some of them.

Communications

Communications at all venues were not always precise and effective. Some of the most significant communication weaknesses observed include:

- During one nitric acid release scenario, the fire department representative in the EOC voiced that the nitric acid had only a 150 ft PA zone according to the Emergency Response Guidebook, which was in conflict with the ½ mile PA distance discussed in the EOC at the time. This was not reconciled within the EOC cadre.

- During one nitric acid scenario, the crisis manager directed a shelter in place via sirens, primarily to inform personnel outside of buildings, who were performing damage surveys, to take shelter out of concern for possible nitric acid inhalation and a severe weather advisory in the forecast. However, the CAS used the tone alert radio systems, which cannot be heard by personnel outside.

- During one nitric acid release scenario, the crisis manager continued to brief the EOC cadre that they were implementing PA plan 4, a plan not written like other PA plans (only isolation zones and PA zones for PA plan 4 were provided within the EAL tables). This confused the IC regarding his actions.

- During one HF scenario, the IC believed that the EOC had classified the event as an SAE, when it remained as an operational emergency not further classified.

Records

A chronological log is kept on EOC status boards and later copied (using an electronic status board) or transcribed, by the EOC recorder, to serve as a record of when some event activities occurred. However, the information recorded in the EOC did not reflect many activities, particularly activities performed outside of the EOC, and was sometimes incorrect. For example, during one LSPT, it was recorded that PA plan 4 was implemented, when PA plan 3 was implemented. Additionally, many EOC cadre members did not keep chronological logs of event activities, and most did not use position checklists that could be used as a record. Additionally, as previously mentioned, approval of news releases and prepared messages to site workers was not consistently recorded. Consequently, records would not adequately enable a reconstruction of event activities and chronology.

To summarize, BNL has made significant improvements in the capability of the EOC since the 2004 inspection. The EOC was adequately staffed and equipped to respond to the LSPT scenarios. The EOC cadre was familiar with most of their protocols and assignments for EOC operations and for making notifications to the site workers, the public, and offsite authorities. The most significant exception to an effective EOC performance is in the use of EALs for determining accurate event classifications and formulating PAs. Weaknesses in communications and record keeping were noted, as well. These performance weaknesses are likely due to the absence of an EAL usage procedure and rigorous training and drill programs, as described in Section C.2.2 and Section D.2.1, respectively.

E.2.3 Consequence Assessment Team

The consequence assessment teams demonstrated general awareness of available consequence assessment tools. Both consequence assessment teams used modeling programs (bomb blast effects, EPICode, and/or National Atmospheric Release Advisory Capability) to determine the consequences due to bomb blast effects and the dispersion of nitric acid and HF. However, the level of familiarity with these programs and the consequence assessment conclusions differed significantly between the two consequence assessment teams. One team provided conclusions that were consistent with consequences expected in the scenario planning. The second team arrived at a different conclusion, and the following weaknesses were observed in the performance of consequence assessment functions.

- For the nitric acid spill scenario, although the modeler had correctly calculated a spill of approximately 137 pounds, an airborne release fraction of 1.0 was inappropriately used in the timely initial assessment (TIA) tool. This resulted in the selection of PA plan 4, which, if developed, would represent a spill of over 14,000 pounds of nitric acid. Furthermore, the modeler inappropriately chose hydrochloric acid in the TIA tool and tried to adjust the input data rather than choosing the data associated with nitric acid. Consequently, the conclusion was for a ½ mile PA zone rather than the expected no PA zone.

- A consequent assessment team member incorrectly informed the crisis manager that the quantities of nitric acid spilled had no bearing on the distance to PA criteria – just the release duration - due to constraints of the program.

- Consequence assessment personnel did not verify the use of appropriate EALs for PA decision-making.

To summarize, the consequence assessment team is adequately staffed and equipped to perform its function. The team is equipped with a TIA tool, EALs, emergency planning hazards assessments, and modeling programs for analyzing the consequences from chemical dispersions and bomb blast effects. The consequence

assessment team frequently advised the crisis manager during the LSPTs. However, there was a significant deviation in the validity of conclusions and recommendations made by the two consequence assessment teams participating in the LSPTs, resulting from weaknesses by one team in using the TIA tool and the EALs. These performance weaknesses are likely due to the absence of a rigorous training and drill program, as described in Section D.2.1.

E.3 Rating

A rating of NEEDS IMPROVEMENT is assigned to the area of BNL emergency response.

E.4 Opportunities for Improvement

This Independent Oversight inspection identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management and accepted, rejected, or modified as appropriate, in accordance with site-specific emergency management program objectives and priorities.

Brookhaven National Laboratory

- To provide better control of the scene and a more effective response, consider the following actions.
  - Position responders using "key hole" concepts described in the Emergency Response Guidebook.
  - Make use of site sirens before relocating traffic control points to site perimeter roads.
  - Make use of available buildings for a command post.
  - If the incident command post needs to be farther from the scene than the EOC is, consider sending the IC to the EOC.
- To enhance the operational awareness of response activities, consider tracking assigned tasks via status boards, or assigning an EOC cadre member to keep a separate log of tasks, and keeping a map displayed and updated in the EOC with the following information.
  - Locations of staging areas, traffic control points, and command post
  - Isolation zones and PA zones, including map overlays reflecting PA plans and bomb charts
  - Wind direction
  - Buildings evacuated and evacuee relocation facilities.
- Consider the following to improve record keeping of event activities and conditions.
  - Provide logbooks to the EOC cadre.

  - Provide written expectations on log keeping, such as the need to record times with significant event information, contact information of callers, how to make entry corrections, name and position of person making log entries, etc.

  - Ensure status boards are accurate by having them periodically reviewed by a knowledgeable EOC cadre member.

  - Enforce log keeping practices and records of approval for news releases and site messages during drills.

- Enhance communications during drills and exercises. Specific items to consider include:

  - Ensure accuracy in transmissions and displayed information.

  - Eliminate the use of non-standard nomenclature.

  - Promote the practice of providing repeat backs.

  - Reconcile differences between information provided by responders and other sources.

- To improve event classification, PA decision making, and consequence assessment functions, consider more training and frequent drills that include the following:

  - Identify, define, and document the prerequisite qualifications and training topics for all individuals expected to perform as consequence assessment team members. Ensure training topics include all tools used to perform the consequence assessment function.

  - Perform drills with interfacing team members, such as the consequences assessment team and the EOC cadre.

  - Use scenarios that represent typical operations, such as during hazardous material transportation, delivery, operations, and waste accumulation and disposal.

  - Use scenarios that make use of bomb blast standoff charts for use in selecting safe shelters.

  - Use scenarios that have the potential for a hazardous material release, such as from an explosion or a spreading fire.

APPENDIX F
Readiness Assurance

F.1 Introduction

Emergency management program administration includes elements of readiness assurance, as well as performance of some planning and response functions. Readiness assurance activities ensure that emergency management program plans, procedures, and resources of the Brookhaven Site Office (BHSO) and Brookhaven National Laboratory (BNL) will facilitate an effective response to an emergency at the site. Readiness assurance activities include implementation of a coordinated schedule of program evaluations, appraisals, and assessments. Key elements of the readiness assurance program include the active involvement of Office of Science line organizations in monitoring program effectiveness, implementing self-assessment programs, and ensuring timely corrective actions are taken for identified weaknesses. U.S. Department of Energy (DOE) field elements also have direct responsibility for performing some emergency response activities, including oversight of the site's emergency response, and activities related to the release of emergency public information to site workers and the public.

This inspection examined the processes by which BHSO provides guidance and direction to, and maintains operational awareness of, the BNL emergency management program. The inspection included reviews of BHSO emergency management program assessment processes and BNL emergency management self-assessment and issues management processes.

F.2 Status and Results

F.2.1 DOE Line Program Management

In 2004, Independent Oversight found that BHSO (then the Brookhaven Area Office) was actively involved in maintaining operational awareness of the BNL emergency management program. However, the inspection revealed several weaknesses, including failures to conduct programmatic assessments at the required frequency and to provide appropriate training for BHSO emergency responders. This 2008 inspection found that BHSO remains actively involved in oversight of the BNL emergency management program, including conducting programmatic assessments, and maintains awareness of emergency management issues at all levels of management. However, not all emergency management program elements have been assessed as required, and continuing weaknesses in the training program for BHSO emergency response organization (ERO) members were noted.

The Environment, Safety and Health Division of the Office of Science (SC-31.1) provides oversight of the BHSO and BNL emergency management programs through periodic conference calls with BHSO and review of BHSO assessment reports. SC-31.1 visits to BNL typically include meetings with BHSO and an update on emergency management issues and concerns. In addition, the Office of Science recently developed procedures to standardize emergency operations at their ten site offices. The draft procedures are currently under review by the site offices, with a target date of January 2009 for full implementation.

BHSO has varied and mostly effective processes for routine monitoring of the BNL emergency management program. BHSO holds frequent meetings with BNL to discuss issues and concerns. In addition, BHSO

includes specific emergency management performance measures in the BNL contract, and some improvements in performance have been noted. Furthermore, the emergency readiness assurance plans (ERAPs) accurately describe the BHSO and BNL emergency management programs and identify areas needing improvement. Additionally, BHSO reviewed and approved all key BNL emergency management documents, including the BNL Emergency Plan, emergency planning hazards assessments (EPHAs), and exercise packages. However, a few minor weaknesses were noted in the content of the ERAPs and the process for review and approval of key documents. The ERAPs did not consistently include information, such as assessment and exercise schedules, and, more significantly, did not include the required DOE Order 151.1C implementation schedules. In addition, the BHSO process for review and approval of key emergency management documents is not formalized in a procedure or plan to ensure that reviews include appropriate technical disciplines.

BHSO has implemented an effective, but informal, process for conducting self-assessments. BHSO recently conducted a self-assessment of its emergency management program using the cognizant field element responsibilities, from DOE Order 151.1C, as the evaluation criteria. The self-assessment report contained a brief discussion of how the evaluation criteria were determined to have been met and identified several significant issues where BHSO did not fully meet the responsibilities of the cognizant field element. These issues included the need for additional improvements in the BHSO ERO training program, difficulties in completing all required contractor assessments, and the need to update the BHSO Emergency Plan. Although the assessment was self critical and provided meaningful results, several weaknesses were noted in the self-assessment process and documentation. BHSO does not have a formal process for conducting topical self-assessments, such as the required annual emergency management self-assessment. In addition, the BHSO three-year assessment schedule does not include an emergency management self-assessment in fiscal year (FY) 2009 or FY 2010, as required. Finally, BHSO did not assess some of the evaluation criteria used to determine compliance with DOE Order 151.1C, such as the requirements to perform site office emergency management self-assessments annually, pre-designate BHSO employees to serve as the leads for various national response plans, and review contractor self-assessments annually. BHSO has recognized several of these weaknesses and has corrective actions underway to develop a topical self-assessment procedure and identify all DOE-required self-assessments.

BHSO has established a generally comprehensive process for performing assessments of the BNL emergency management program, and several issues requiring corrective actions have been identified through the assessments. The BHSO contractor assessment procedure provides the basis for conducting assessments and requires that assessments be based on objective evaluation criteria. In addition, the BHSO three-year assessment schedule clearly indicates the BNL emergency management program elements that will be assessed each year. BHSO assessments include a review of BNL program documentation, as well as observations of relevant drills and offsite meetings, to evaluate the adequacy of implementation for selected requirements. Several findings were identified by BHSO during the assessments, and corrective action plans were developed by BNL. However, documentation of the assessments is limited, and not all elements of the BNL emergency management program have been assessed within the last three years, as required. The BHSO assessment reports do not include the specific evaluation criteria that were used or document the determination that the evaluation criteria were met. Additionally, six, of the 15 contractor emergency management program elements, have not been assessed by BHSO within the last three years, including areas identified in the past as requiring attention, such as the hazards survey, EPHAs, and protective actions. While formal assessments were not conducted, BHSO did review and approve the hazards survey and all EPHAs, and BHSO and BNL participated in a joint assessment of the shelter-in-place program. Training, another element not assessed, was recognized, by both BHSO and BNL, as a weakness, and corrective actions had not progressed to the point where a BHSO assessment would provide value.

BHSO has an improving, but not fully developed, process for resolving issues identified during assessments. The BHSO contractor assessment procedure describes the process used to resolve issues identified during assessments that require corrective action by BNL. BHSO began informally tracking both BNL and BHSO corrective actions in a division-level database in FY 2007. However, several significant weaknesses were noted. BHSO does not have a procedure that addresses the processes for resolution of issues requiring BHSO action, tracking of BNL and BHSO corrective actions, or validation that corrective actions have been effective, as required by DOE Order 151.1C. Additionally, several of the initial corrective actions, completed in response to the 2004 Independent Oversight Emergency Management Inspection findings, were closed inappropriately. For example, BHSO closed a corrective action, to review and approve the BNL Emergency Plan, based on the approval of the BNL ERAP rather than approval of the BNL Emergency Plan. In another case, a corrective action, to add the shelter-in-place instruction to the list of BNL self-assessment program requirements, was closed based on an informal commitment from BNL to add the requirement at an unspecified date. Lastly, BHSO closed a corrective action, to develop and implement a BHSO ERO training program, based on the presentation of a single training course. An Independent Oversight Inspection of the environment, safety, and health programs was conducted in November 2007 and included a finding regarding the BHSO issues management and corrective action tracking processes. BHSO developed corrective actions, with an expected completion date of December 2008, that if effectively implemented will address this finding.

The ERO training requirements are documented in a BHSO procedure and contain training and drill/exercise participation requirements; however, the training requirements do not contain all of the required elements, and BHSO does not ensure that all personnel on the ERO roster have completed the required training. The ERO training and drill/exercise participation requirements do not include a demonstration of proficiency before being added to the ERO roster or annual refresher training. Participation in a drill, or exercise, to demonstrate proficiency is required every two years by BHSO, rather than annually, as required by DOE Order 151.1C. In addition, most ERO members are assigned to more than one Emergency Operations Center (EOC) position, but are not required to demonstrate proficiency at each position. Furthermore, one emergency communicator has not completed the required training, but is included on the ERO roster, and training records are incomplete for several other personnel on the ERO roster. The weaknesses in the training program were identified as a finding in the 2004 Independent Oversight emergency management inspection and also identified as a finding by BHSO in their recent self-assessment; however, previously completed corrective actions were not effective, and the newly created corrective actions in response to the self-assessment do not fully address the weaknesses.

Finding #7: The BHSO ERO training requirements do not ensure that all EOC cadre members are trained in their ERO tasks, receive annual refresher training, or demonstrate their proficiency in all assigned EOC positions, as required by DOE Order 151.1C.

To summarize, BHSO has implemented an effective process for oversight of the BNL emergency management program and recently conducted a meaningful self-assessment of the BHSO emergency management program. Additionally, BHSO assessments, of the BNL emergency management program, are scheduled in a three-year assessment plan and are effective in identifying issues. Furthermore, an issues management process is being developed by BHSO, and a database was created in FY 2007 to track corrective actions. However, the ERAPs did not include the required DOE Order 151.1C implementation schedules, and BHSO has not documented several key processes, including conducting topical self-assessments, resolving BHSO issues, or tracking of BNL and BHSO corrective actions. Further, the BHSO assessment plan does not include the required annual emergency management self-assessments, and the BHSO self-assessment did not address some of the evaluation criteria. In addition, a few corrective actions for findings, from the 2004 Independent Oversight Emergency Management Inspection, were closed before the corrective actions were completed.

Finally, BHSO has not established an ERO training program that includes annual refresher training or annual demonstrations of proficiency and does not ensure ERO personnel have completed all required training.

F.2.2 Contractor Feedback and Improvement

The 2004 Independent Oversight inspection of the emergency management program did not include evaluation of BNL feedback and improvement programs. During this 2008 inspection, Independent Oversight found that feedback and improvement programs are well integrated with the site lessons learned program, provide for comprehensive processes for conducting self-assessments and managing issues, and included a systematic review of actions needed to bring BNL into full compliance with DOE Order 151.1C. However, weaknesses were noted in the self-assessment requirements, closure of corrective actions, and implementation schedule for DOE Order 151.1C compliance.

The BNL emergency management program is well integrated into the site lessons learned program. A lessons learned procedure has been established by BNL and includes a process for analyzing lessons learned for applicability and a requirement to formally document lessons learned for dissemination. Lessons learned are prepared for training, drills, and actual responses, and a lessons learned was documented and distributed by the BNL Office of Emergency Management, in FY 2008, regarding the activation of the EOC during a severe weather event at BNL in July 2007.

BNL has established and implemented a comprehensive process for conducting self-assessments. The self-assessment procedures require the use of specific, objective evaluation criteria, and BNL recently revised the contractor assurance system description to add a specific reference to emergency preparedness and emergency response as activities encompassed by the contractor assurance system. A systematic review of the BNL emergency management program, using the DOE Order 151.1C Contractor Requirements Document as the evaluation criteria, was conducted in January 2007. This detailed self-assessment identified the areas that needed improvement in order to fully comply with the order. However, one weakness was noted in the BNL Emergency Plan regarding self-assessments of the emergency management program. The BNL Emergency Plan states that external assessments may be used in lieu of completing self-assessments, for those portions of the emergency management program that were assessed by an external organization, which is contrary to DOE Order 151.1C requirements; however, BNL has not used any external assessments as a substitute for their own self-assessment.

BNL has also established and implemented a comprehensive issues management process. The BNL issues management procedure appropriately includes root cause analysis, consideration of prevention of recurrence during corrective action development, and formal change control for corrective actions. Additionally, corrective actions are entered and tracked in the computerized BNL Action Tracking System (ATS) database, which provides automatic e-mail reminders for overdue and upcoming actions and allows BHSO access so that the status of corrective actions can be reviewed. BNL has developed corrective actions that are responsive to the findings, and issues, identified in BHSO emergency management assessments and a BNL after-action report for a severe weather operational emergency. However, a few weaknesses were noted in the implementation of the issues management process for emergency management corrective actions. Corrective actions are not typically completed by the assigned due dates; several corrective actions are currently overdue by up to 17 months, including development of ERO training packages, completion of National Incident Management System training, and development of a formal drill and exercise program. The BNL issues management procedure states that BHSO approval of the BNL corrective action closure documentation is required before the action can be closed in ATS; however, this has not been implemented for emergency management issues, as corrective actions have been closed by BNL although closure documentation was not received or approved by BHSO. Furthermore, corrective actions, for three of the findings identified during

the 2004 Independent Oversight Inspection, were not fully effective in resolving the underlying issues. These findings were in the areas of establishing effective shelter-in-place protective actions and performing the ERO tasks of classifying events and performing consequence assessment plume modeling. However, additional corrective actions have been identified for these areas and are included in the BNL Emergency Management Upgrade Project Schedule.

The BNL Emergency Management Upgrade Project Schedule was developed to capture the actions identified in the January 2007 BNL self-assessment. The actions were divided into two sections: those actions required to bring the BNL emergency management program into compliance with DOE Order 151.1C, and those actions needed to sustain the emergency management program. This resulted in a project schedule, with over 200 tasks for order compliance, and a due date for full order implementation by February 1, 2008. Additional tasks have been identified and added to the schedule since January 2007, with the current schedule containing over twice the number of tasks as the original schedule. However, the distinction between order compliance actions and programmatic actions has become less clear, as additional tasks were added. For example, program review meetings have been added to the order compliance actions, and establishing training for ERO positions has been added to the programmatic actions. In many cases, the individual task descriptions in the schedule contain minimal details, and, in several cases, duplicate tasks have been entered. The impending departure of the Office of Emergency Management Manager will leave BNL without the historical knowledge about the tasks, and no written source exists to provide additional details regarding the tasks. Moreover, several corrective actions tracked in ATS have also been included in the schedule, but, in a few of those cases, the status of the action in ATS is different from the status in the schedule. Finally, although the schedule was recently revised to change the due dates for several previously overdue corrective actions, numerous actions remain overdue, and approximately half of the remaining open tasks are due by September 30, 2008. The schedule indicates that work has not been initiated on several of these tasks and includes several significant tasks, such as conducting building evacuation drills and development of evacuation, shelter-in-place, and accountability procedures. The schedule remains a draft document, and a date for full compliance with DOE Order 151.1C has not been formally established by BNL.

Finding #8: BNL has not established an implementation date for full DOE Order 151.1C compliance, as required by that order, and, in many instances, corrective actions to achieve compliance are not timely.

To summarize, BNL has implemented an effective lessons learned program and has established a comprehensive process for conducting self-assessments. In addition, a review of the BNL emergency management program versus the DOE Order 151.1C requirements was conducted to determine the areas where improvement was needed, and a project schedule was developed to capture the tasks needed to bring the program into full compliance. Further, BNL has implemented a detailed issues management process and uses a computerized database to track corrective actions to closure. Although BNL has effectively identified the areas of the program that need improvement to comply with DOE Order 151.1C, numerous actions remain to be completed, and several significant corrective actions are overdue, such as development of ERO training and development of a formal drill and exercise program. Furthermore, BNL has not submitted corrective action closure packages to BHSO, as required, and corrective actions for some of the findings from the 2004 Independent Oversight inspection were not effective in preventing recurrence of the issues. Finally, the project schedule does not clearly indicate which tasks are needed for full compliance with the order, contains several duplicate tasks, provides conflicting information regarding completion status, and provides few details regarding the tasks. A large number of tasks remain open, with over half due by the end of FY 2008 although work has not yet been initiated on several key tasks. The schedule has not been formalized, and a date for full compliance with DOE Order 151.1C has not been set.

F.3 Ratings

A rating of NEEDS IMPROVEMENT is assigned to the area of DOE line program management.

A rating of NEEDS IMPROVEMENT is assigned to the area of contractor feedback and improvement.

F.4 Opportunities for Improvement

This Independent Oversight inspection identified the following opportunities for improvement. These potential enhancements are not intended to be prescriptive. Rather, they are offered to the site to be reviewed and evaluated by the responsible line management and accepted, rejected, or modified as appropriate, in accordance with site-specific emergency management program objectives and priorities.

Brookhaven Site Office

- To promote comprehensive reviews and timely approvals of emergency management documents, consider developing written protocols that:
  - Identify the technical disciplines (e.g., safety analysis experts and Facility Representatives) required, within BHSO, for the review of each emergency management document type.
  - Establish an overall timeline and due dates for all reviews.
  - Include checklists and/or procedural guidance to address such review activities as verifying facility material-at-risk quantities, sampling release calculations, reviewing protective action criteria and associated distances, understanding the derivation of emergency action levels and associated protective actions, and reviewing the determination of the emergency planning zone.
  - Incorporate a mechanism that ensures approved documents are sent to DOE Headquarters.
- Consider the following to improve the implementation of the self-assessment program:
  - Develop procedures and processes that specify the expectations for the conduct of self-assessments.
  - Schedule and conduct annual self-assessments that include all functional areas of the BHSO emergency management program.
  - Identify the resources needed to complete the scheduled assessments, and periodically use independent personnel, either internal or external to the department, to plan and conduct the self-assessment.
  - Emphasize the use of performance-based assessments whenever possible.
  - Ensure that Brookhaven Science Associates (BSA) performs the required annual program self-assessments and provides the results to BHSO for review.

- Consider developing a detailed, resource-loaded assessment plan for completing the required contractor program assessments over the three-year cycle to:
  - Identify the assessments needed to address each of the emergency management program functional areas.
  - Identify the resources needed to complete the assessment plan; for activities that require outside expertise, identify how that expertise will be obtained.
  - Expand the use of criteria and checklists to support the conduct of assessments.
  - Balance the assessments of documents with assessments of field implementation of the documents.
- Consider expanding the procedures and processes that specify the expectations for the conduct of the assessments. Specific attributes to consider are:
  - Provide additional written guidance and training to evaluators on the application of inspection criteria, the standards of acceptable performance, and the expected level of detail to be provided in assessment reports.
  - Document, in the assessment reports, the evidence that was used to determine whether evaluation criteria were met or not met.
- To further enhance corrective action processes, consider implementing the following specific actions:
  - Expedite the completion of an issues management procedure.
  - Ensure that corrective actions incorporate activities that validate effectiveness.
  - Emphasize the timely completion of corrective actions.
  - Close corrective actions based only on programs or documents that are approved and implemented.
- Improve the ability of senior BHSO members of the ERO to execute their responsibilities during an emergency. Consider the following actions:
  - Implement a qualification process that verifies that BHSO personnel possess the required knowledge, skills, and abilities for each assigned EOC position prior to being placed on the ERO roster.
  - Conduct performance-based evaluations of the ERO members as part of the initial assignment and annual re-training of the ERO.
  - Implement a process to track initial training, annual refresher training, and annual drill or exercise participation for BHSO personnel.
  - If applicable, Designate BHSO personnel to fill the roles of the on-scene coordinator, senior Federal official, and senior energy official in case an emergency falls within the scope of the National Contingency Plan, National Response Plan, or other Federal plans.

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- To further improve the usefulness of the BHSO and BSA ERAPs, consider adding the following information:
  - BHSO self-assessments, BHSO contractor assessments, and BSA self-assessments completed during the past FY and assessment schedules for next two FYs.
  - Results of BHSO self-assessments, BHSO contractor assessments, and BSA self-assessments completed during the past FY.
  - Exercises completed during the past FY and exercise schedules for the next two FYs.
  - Comparison of actual achievements from the past FY to the goals, milestones, and objectives listed in the previous ERAP.

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- Consider revising the BNL Emergency Plan to clarify that external assessments may not be substituted for the required annual self-assessment of the emergency management program.
- To improve the site's corrective action processes, consider implementing the following actions:
  - Ensure that corrective actions incorporate activities for validating effectiveness.
  - Emphasize the timely completion of corrective actions.
  - Expedite the transmittal of closure packages for completed corrective actions to BHSO.
- Enhance the effectiveness of the BNL Emergency Management Upgrade Project Schedule by considering the following actions:
  - Clarify the distinction between order compliance tasks and programmatic tasks, and rearrange tasks as necessary.
  - Remove duplicate tasks from the schedule.
  - Provide additional details through task descriptions or detailed sub-tasks for individual tasks.
  - Reconcile the status of tasks that are also tracked as corrective actions in ATS.
  - Determine a date for full implementation of DOE Order 151.1C, and assign necessary resources to complete the tasks.