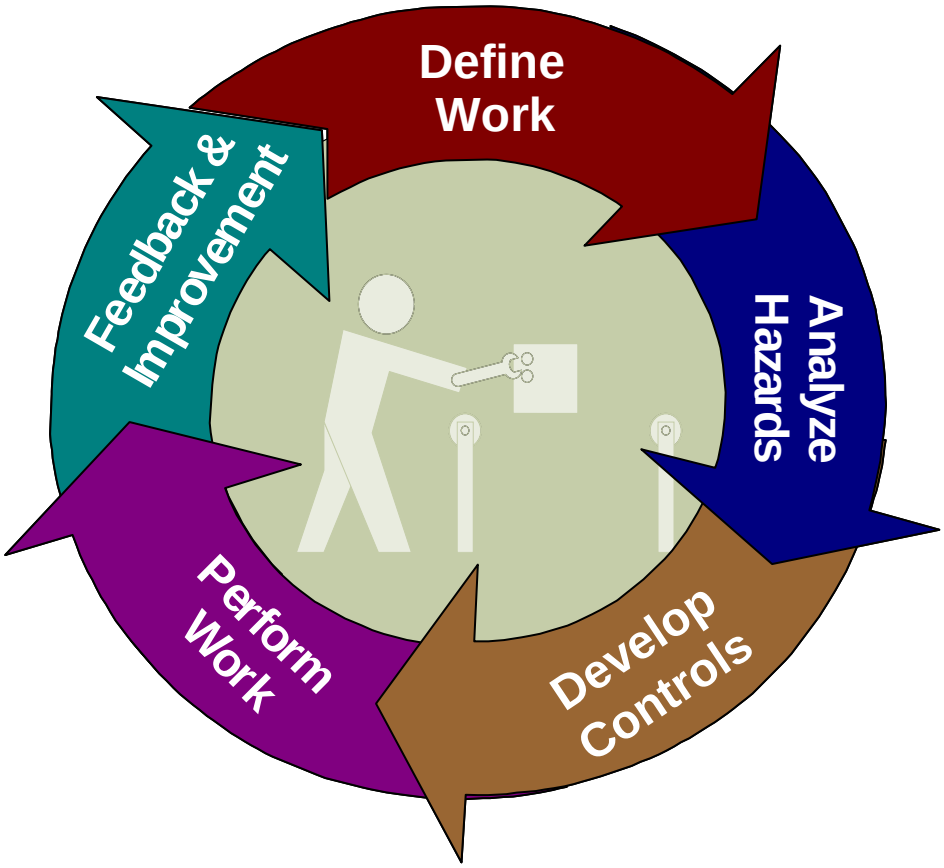
Jefferson Laboratory

Experimental Nuclear Physics and Free Electron Laser

Independent ISM Assessment Report

(IA-2008-13)



2 April 2008

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1.0 Introduction and Purpose of the Assessment

1.1 Background

The U.S. Department of Energy (DOE) Office of Independent Oversight, within the Office of Health, Safety and Security (HSS) is tasked with performing appraisals of the Environmental, Safety and Health (ES&H) programs at DOE sites. The HSS Team will evaluate the effectiveness of the Thomas Jefferson National Accelerator Facility (JLab) ES&H program and its implementation during an inspection in June 2008. This will include an evaluation of the effectiveness and understanding by JLab personnel of the Integrated Safety Management (ISM) System (ISMS). In preparation for the DOE evaluation, JLab is conducting an independent assessment of the implementation of its safety program.

Current information indicates that the HSS Team will include a Team Leader, two Subject Matter Experts on feedback and improvement, and 2 - 3 additional members with various areas of expertise. The team will focus on JLab's feedback and continuous improvement system, how research is planned, authorized and conducted, as well as work authorization processes across the lab.

1.2 Purpose of the Independent Assessment

The purpose of this Independent Assessment is to evaluate the current condition of the ISM program and its implementation at JLab in the Experimental Nuclear Physics Division (Physics) and the Free Electron Laser (FEL) Division, and recommend upgrades to improve the ISM System and its implementation. In so doing, JLab will be better prepared to interact with the HSS assessment team.

This report documents the results of the JLab ISM System Independent Assessment performed between February 25, 2007 and February 27, 2008. The assessment was performed by a multi-disciplined ISM Assessment Team, directed by a Team Leader from CALIBRE, and comprised of members from the Argonne National Laboratory and the Brookhaven National Laboratory, and was supported by other subject matter experts from JLab and CALIBRE. Resumes for the Assessment Team members are provided in Appendix F. This report serves as the Independent Assessment Report required by the JLab Independent Assessment Procedure.

2.0 Assessment Methodology

2.1 Scope of the Assessment

The scope of this effort was to evaluate activities occurring within both the Experimental Nuclear Physics Division (Physics) and Free Electron Laser (FEL) Division at JLab with a focus on how the organization's ES&H processes, including procedures and work practices, address the five core functions of ISM. In addition, the Assessment Team reviewed ES&H conditions in the divisions' facilities. Two areas of emphasis for the assessment were:

1) Work Planning and Control Implementation, and

2) Feedback and Continuous Improvement

These areas of emphasis were chosen for three reasons; (1) JLab management perceives weaknesses in the programmatic infrastructure and execution of these areas, (2) HSS has indicated that their inspection team will focus on these areas, and (3) the availability of the Independent Assessment Team required a focused assessment scope. The Feedback and Continuous Improvement results are discussed in this report under Core Function #5, Feedback and Improvement.

2.2 Approach

The independent assessment was conducted consistent with the JLab Independent Assessment Procedure, dated November 16, 2007. The assessment activities included:

- Interviews of JLab Directors, Managers, Supervisors, and Workers
- Reviews of documents and records
- Tours of buildings and work spaces
- Observations of pre-evolutionary planning and work activities

The DOE Criteria and Review Approach Documents (CRAD) used in the Assessment are included as Appendix E of this report.

The assessment activities associated with the four operational areas (FEL, and Physics Halls A, B, and C) were conducted in similar fashion:

A. Where possible, scheduled work activities were identified ahead of time and work planning and control documentation was collected and reviewed by the Independent Assessment Team. A list of the documents reviewed appears in Appendix D.
B. Supervisors directly responsible for work planning and control, and safety program implementation were interviewed. A list of all personnel interviewed appears in Appendix B.
C. Escorted tours of the work areas were conducted, observations related to the specific work activities as well as the general safety environment were made, and when possible, workers and users were interviewed with respect to their specific activities.

The programmatic policies, procedures and other documents supporting specific activities were reviewed to assess the technical content, the linkage to higher level programmatic infrastructure, configuration control, etc.

Generally speaking, the assessment was conducted using DOE CRAD lines of inquiry and criteria contained in the following documents:

- HSS CRAD 64-10, Work Planning and Control Implementation Inspection Criteria, Approach, and Lines of Inquiry, 11/26/07
- HSS CRAD 64-20, Feedback and Continuous Improvement Inspection Criteria and Approach – Contractor, 12/4/07

The CRADs served to focus the Team in the conduct of its assessment. Results were also noted with regard to other requirements contained in JLab's programmatic infrastructure (such as the ES&H Manual), National Fire Protection Code, and OSHA requirements.

2.3 Assessment Activities and Schedule

The assessment activities and schedule are provided below:

- 15 February – Independent Assessment Plan (draft) submitted to FEL, Physics, ESH&Q, and Independent Assessment Team for review.

- 25 February – Independent Assessment Team:
  - conducted an in brief with JLab senior management including the organizations to be assessed
  - conducted interviews with ESH&Q, FEL and Hall A staff
  - conducted work observations in Hall A
  - a daily out brief to JLab senior management including the assessed organizations

- 26 February – Independent Assessment Team:
  - attended the AOD daily meeting
  - conducted interviews with Hall B and C staff
  - observed general conditions in Hall B
  - observed work in Hall C
  - provided a daily out brief with senior JLab management and the assessed organizations

- 27 February – Independent Assessment Team:
  - attended the FEL daily meeting
  - conducted interviews with FEL staff
  - observed minor work activities and general conditions
  - provided a daily out brief (including overall assessment out brief)

2.4 Feedback

The Assessment Team conducted daily out briefings to provide JLab senior and line management with a summary of preliminary results of the assessment, including observed noteworthy practices and opportunities for improvement. This real-time feedback was provided to assist JLab management in understanding the identified noteworthy practices and weaknesses in the JLab ISM implementation, and to obtain information for areas warranting additional review. This Independent ISM Assessment Final Report was revised to address comments received from the assessed organizations, as outlined in JLab's Independent Assessment Procedure.

3.0 Assessment Results

3.1 Summary Results

At JLab, the ES&H Manual sets the requirements on how hazard analysis, and hazard control development and implementation are to be completed. These procedures are unambiguous and well written. The following procedures directly apply to the proper implementation of ISM Core Functions #2 and #3:

3120 "CEBAF Experiment Review Process"
3130 "FEL Experiment Review Process"
3210 "Hazard ID and Characterization"
3310 "SOPs and OSPs"
3320 "Temporary Work Permits"

The JLab ES&H Manual is well-written and comprehensive. However, it appears that at the activity level the workforce is not consistently implementing the elements in these institutional level requirements. The requirements in the ES&H Manual should be clearly communicated to the workforce, including that compliance with these requirements is required. The following is a summary of result of the ISM assessment.

The Independent ISM Assessment Team identified a number of good practices in the way that JLab implements Integrated Safety Management (ISM). However, the Team also identified several areas for improvement in the overall ISM System at JLab. In many cases, these areas for improvement are based on leveraging good practices that exist in one JLab area or organization, for consistent implementation throughout. These areas for improvement include both short term improvements that will have an immediate impact to ISM implementation, and improvements that will require longer term attention leading to lasting improvements.

Appendix A is a dashboard providing an overall view of the assessment results.

Work Planning and Control Implementation

ISM Core Function #1 (Define the Scope of Work)

At JLab, the term work activity encompasses accelerator, FEL and detector operations; experiments, including set-up and clean-up; maintenance; plant operations; construction; and administrative tasks. The breadth of the definition of work activity should be captured in the ISM Program description.

Implementation of this core function requires a clear and consistent method for identifying and/or listing all work activities to be completed; writing a work-scope for each activity (or confirming no specific or documented scope is needed, as for most administrative work and some skill-of-the-craft work); identifying associated hazards and involving workers in that process; and evaluating the activity for need, priority, and schedule.

Based on that general expectation, Hall B and the FEL were deemed to have acceptably

implemented this core function for the work and activities evaluated. Hall A and C were viewed as partially implementing the core function. For Hall A, it was not clear that a proper work scope was established for the drilling of holes in the observed activity. For Hall C, it was not clear that the workers involved in the lift activity had been engaged and properly briefed prior to starting the work.

This evaluation is predicated on the assumption that JLab will continue to implement formality in their document control processes, that the formality will have positive impacts on further improving the implementation, and that Hall B and the FEL will keep apace with that progress. It should be stressed that any review is a snapshot in time. Appropriate planning for other Hall A and C activities might have been completed, but such was not readily apparent during this assessment.

The requirements for work planning are covered in JLab-wide documents, including the ISM Program Description, the QA Plan, and ES&H Manual Chapters on Assessments of New Facility Plans (ESH Manual - 3110), CEBAF Experiment Review Process (3120), and FEL Experiment Review Process (3130). It was not clear that there was a lab-wide requirements document to cover maintenance or other construction activities, such as the types of activities observed in the Halls, but those may exist elsewhere. It is assumed that any experiments conducted at JLab are either reviewed according to ESH 3120 or ESH 3130.

Activities are identified through various means including maintenance schedules, experimental requests and associated needs, corrective actions, improvements identified during previous runs, etc. Some of these means are more formal than others. For Physics, the experiments are approved by PAC, and then scheduled through a twice-a-year joint effort of the Accelerator and Physics Divisions that looks forward about 18 months. Based on that approval a list of equipment or configuration changes is generated, and EH&S reviews are performed appropriate for the nature of the changes. This process is documented in the EH&S manual, and a signed set of documents certifying readiness is available for all experiments run at Jefferson Lab. For the FEL, an activity is first discussed informally with the management team to determine if the activity can be performed at the present time and/or under the current configuration. For maintenance, some activities are based on long-term routine maintenance plans.

Depending on the scale of the activity, the impact to or involvement by other groups or divisions at JLab, the complexity, the associated hazards, etc., the activity is either listed on ATLis (the site-wide accelerator task list) or kept on a local list of activities (A List or C List). One criterion for including on ATLis is the need for site ES&H support, e.g., radiation control support. Both the site-wide and local systems incorporate hazard analyses or trigger a more formal Task Hazard Analysis. The local lists are used for disseminating work to the technicians and operators and generally follow the same format as the ATLis (i.e., Hall A List is a customized version of ATLis that adds some functionality desired by Hall A personnel). Hall B did not have a "B List," but were in the process of evaluating the need for such an instrument. The FEL maintains the FEList, which is analogous to ATLis.

There was not a clear one-to-one correspondence between a listed activity and the presence of a work package, which is acceptable if there are defined criteria for when a work package must be

developed and when it is optional (or unnecessary). It was not clear that such criteria exist. Some activities have such a package that incorporates very detailed procedures, with pictures and other aids. Some activities utilize an existing procedure (e.g., one defined for and posted on a specific piece of equipment). For some activities, work planning is based on skill-of-the-craft and the identification of a drawing or rudimentary instructions. At the FEL, it was stated that all activities are covered by documentation, either a standing, existing procedure for a given piece of equipment, an operations procedure for the LASER, or a specifically prepared document. The documentation reviewed by the Assessment Team was inconsistent in its formality. While not everything needs to be written (e.g., skill-of-the-craft activities), if it is written, it should follow a consistent format.

After an activity is listed and analyzed, it is scheduled either informally or through the use of a formal scheduling tool. Several areas (Hall A, B, and C) indicated that MS Project was used to schedule and approve work, however the formality of its use was inconsistent and the need for such scheduling / planning did not appear to be universally accepted. In one case, one manager indicated that he did not always have sufficient time to always formally schedule work. Once scheduled and approved, notification is made to the assignee.

For the FEL, the Operations Coordinator schedules time for experiments after assuring that the Experiment Safety Assessment Form (ESAF) is completed by the User and approved. Similarly, the Operations Coordinator schedules/prioritizes other work activities. Authorization to proceed with an activity signifies readiness to be conducted, concurrence of hazard analysis / mitigation and appropriateness of machine configuration and schedule. When an activity is authorized, an e-mail is sent to the requester. The Laser Operating Plan (LOP) invokes the Standard Operating Procedures (SOPs) for operating individual pieces of equipment. The operating plan is specific for a User, and typically valid for no more than a week. While there may be several Users at the same time, there is always a principal User who controls the beam allocation and the characteristics of the beam.

Core Function #2 (Analyze the Hazards):

At JLab, work systems and procedures are typically developed and implemented to assure that hazards are identified and analyzed for the work to be performed. Division safety wardens and officers confirmed that the hazard analyses were updated as the work scope changed and for the significance of the hazards. In most cases, worker involvement is evident in the hazard analysis process. All personnel that were interviewed stated that the hazard analysis would not take place without the input of the worker.

Institutional level ES&H procedures effectively address the hazard analysis process, but institutional procedures were not observed to be fully implemented at the activity level in Hall A and Hall B. Division safety wardens and officers perform task hazard analyses for all tasks performed in their areas. The EH&S manual and typical practice in the halls set the threshold at Risk Code of 3 or above as requiring formal written review and procedures. Such reviews include Subject Matter Experts. The Laboratory should consider including ES&H Division subject matter expert involvement throughout the hazard analysis process, not only in the formal reviews at Risk Code 3 and above. It was not clear that all division safety wardens had

completed required safety training, and not all demonstrated an appropriate understanding of the importance of integrating safety into the way work is planned and conducted. This inconsistent approach to safety training and ES&H Division involvement creates a variation in the quality of the task hazard analyses between divisions and even with groups within the same division. In addition, the requirements in the JLab ES&H Manual procedure **3210 "Hazard ID and Characterization"** for identifying risks before controls are established are not consistently followed in the Halls.

Core Function #3 (Develop and Implement Controls):

Based on the work observed, management systems for work control are developed and implemented for work activities to assure that work can and is performed safely. The JLab safety record supports this observation. As identified through the personnel interview process, it appears that the skill and ability of the worker is taken into consideration when work is assigned. For example, only seasoned workers were authorized to perform high risk lifts in Hall C. Stop work authority is well defined and understood by all staff interviewed. However, in Hall A, it was not clear that documentation existed to assure that workers were trained and qualified to perform activities assigned.

Workers are typically involved in the development of controls during the work planning process, although the Assessment Team did observe one work activity in Hall C where worker involvement was not sufficiently obtained in advance of the activity. Work reviewed in Hall A required Lock Out Tag Out (LOTO) to be performed before barriers were removed and electrical conductors were exposed. The LOTO was performed properly when checked during the work observation. Hazardous high risk operations are typically assessed, and failure consequences captured, on the hazard analysis worksheet in the before mitigation risk column and after the risk is mitigated. However, in some cases the risk of work activities is not documented before the risk mitigation is developed. This appears to be inconsistent with JLab ES&H Manual procedure **3210 "Hazard ID and Characterization."** We understand that, subsequent to the assessment, all Halls now implement a consistent approach to developing and documenting task hazard analyses (THAs) in MS Project.

For most groups, work is adequately planned through MS Project software. However, the inconsistency in proper planning for work in Hall A and Hall C has caused a less than adequate hazard mitigation process in these areas. Facility procedures are adequate in hazard identification and systematic instructions. However, a formal document control program is not in effect at the facility and activity level. For certain work process documents considered to be "living documents" (continually updated) it was not clear when the procedure expired, who prepared and approved it, and whether or not the document was the most current version. For many of the procedures reviewed, there was no revision number assigned or status of review documentation. In some cases, workers were performing work using procedures that were marked "Draft." In addition, there was inconsistent implementation of the requirements in the JLab ES&H Manual procedures **3310 "SOPs and OSPs" and 3320 "Temporary Work Permits."**

ISM Core Function #4 (Conduct Work)

Implementation of this core function requires mechanisms for authorizing and scheduling work to confirm that a facility or work activity, as well as selected hazards controls, are in an adequate state of readiness; that the work force can safely perform the work; work packages (or purposely assuring that such a package is not needed, as in administrative work or skill-of-the-craft activities) identify prerequisites for protective equipment or actions, other jobs that must be completed, etc. to qualified workers; acknowledgement / review of work planning documents by the workers; conduct of the work in accordance with defined requirements; and periodic reviews by the supervisor and others as to the adequacy of the work conduct and implementation.

Based on the above expectations, Halls A and B, and FEL were deemed to have acceptably implemented this core function for the work and activities assessed. Hall C was viewed as partially implementing the core function. For Hall C, there were several issues regarding the conduct of the hoisting / lifting activities observed.

After activities are scheduled and assigned, they are discussed at various daily or weekly meetings. The meetings are an effective tool to discuss planned evolutions and activities among all interested parties, provide another chance to identify snags or other issues, and provide an opportunity for brief safety or general operations reminders, both of which were observed. Representatives from the different areas attend the daily accelerator briefing at the Machine Control Center to understand the activities planned for the accelerator. The organizations assessed conduct weekly engineering meetings for discussion of activities with the chief engineer, ES&H personnel, technicians, designers, and other interested parties.

Subsequent to the daily Accelerator meeting, all areas have their own daily meeting, with varying degrees of formality. Typically in the halls these are referred to as “Tool Box” meetings in preparation for conduct of different steps along the procedure. Depending on the activity, there may be multiple Tool Box meetings, particularly as the hazard analyses change.

The FEL has a formal sit-down meeting comparable to the Accelerator meeting. The activities planned are discussed at the daily briefing meeting, attended by FEL management, group representatives and other impacted groups (e.g., engineering organization representatives). For example, at the meeting attended, one person mentioned installing a magnet, and that allowed for confirmation that other activities are not planned that would preclude this activity from proceeding.

Except for a couple of workers interviewed in Hall C, all others indicated that they had been involved in preparing the work scope and / or procedures and had been briefed on the activity that morning or at a prior meeting (if the activity had been routinely performed over more than one day). The work plans or procedures, as available, were present at the work-site. In the FEL, the procedures for a given piece of equipment are maintained on that equipment, and the worker simply removes the procedure when conducting the activity. Several activities observed were being performed as skill-of-the-craft (e.g., pulling electronics or drilling holes in a magnet).

As activities are performed, the workers have the right and authority to stop / cease the work if there is a belief that the activity is unsafe, the hazards have changed, the controls are inappropriate, etc. All workers interviewed knew about the stop work authority and recounted stories of where it had been used.

There is management presence "on the floor" during the day as work activities are being conducted. This was confirmed for all the halls and the FEL. There are routine "walk-arounds," formal, documented walk-throughs, and targeted visits to the floor if a particularly hazardous or complex activity is planned or an issue is identified. The supervisors are typically working supervisors, so they are routinely involved in the work as it is being done. The FEL Safety Coordinator walks around JLab daily, stops and talks with the workers, periodically observes work, etc. In addition to observing the workers, the FEL Safety Coordinator reported observing people doing formal work observations that are documented through the ESH web-page (JLab implementation of Dupont STOP program).

ISM Core Function #5 (Feedback and Improvement)

JLab is in the process of revising its lessons learned and feedback program. Previously, the program was documented in the ES&H Manual, but was implemented in various ways. The new approach is to inculcate the lessons learned and improvement process within the Divisions. ES&H Manual 5200 provides an effective approach to report events, identify lessons learned implications, and report results. In response to DOE Order 210.2 (Corporate Operating Experience Program), JLab has developed a more comprehensive process for identifying, analyzing and sharing lessons learned generated from both outside and inside the organization. The expectations for the use of this process should be communicated to supervisors and workers. In addition, Lessons Learned Coordinators should be trained and identified to workers. The process requires that Division Lessons Learned Coordinators take an active role in collecting feedback from within the organization, and that they forward the feedback to a central Lessons Learned Coordinator for analysis and communication across JLab. In addition, information from other laboratories will also be communicated across JLab. While formal follow-up is not consistently conducted, this will be an expectation of the new program.

In addition to the formal lessons learned program, the JLab contract requires that managers perform periodic work observations, noting ES&H issues. These observations are generally conducted, however they are not routinely entered into the established electronic system, nor are the entries routinely analyzed and lessons learned communicated. Some organizations use the eLog system to document worker feedback; others use the STOP Observation System. It was the understanding of the Assessment Team that the STOP System was the JLab standard for reporting feedback and observations. In general, the CATS System is consistently and effectively used to document items above Category 2 requiring action.

3.2 Noteworthy Practices

1. The ES&H Manual provides clear expectations, laid out in a logical manner.
2. The Dupont STOP Training was a step in improving safety awareness. Implementation should be reviewed to obtain maximum benefit of the program.

3. In Halls A and B, risk is identified both before and after hazard controls are established (consistent with ES&H Manual 3210).
4. The Hall B Safety Warden provided copies of the JLab ISM webpage to and discussed the expectations of ISM with Hall B workers, to improve the awareness and appreciation of the role of ISM in how work is planned and conducted.
5. Safety oversight by ES&H experts is expected and provided all Halls. In Hall B this safety oversight appears to be more widespread for all work activities.
6. Individual training plans are developed (verified in Hall B) that identify functions that individuals are qualified to be perform. These training plans may be, and should be, developed across all organizations.
7. The Hall B Safety Warden was well versed on ISM principles and value, and demonstrated a focus on continuous improvement (specifically requested safety improvements be identified and communicated).
8. Physics Division training/qualifications process was clearly communicated.
9. Daily planning meetings were well attended and included effective discussions of work control issues, safety, and lessons learned. A safety minute is routinely provided during the daily planning meetings.
10. Lessons learned documentation is now a requirement for all FEList entries.
11. All FEList entries are provided to ESH&Q for review. FEL has instituted a division-wide policy requiring lessons learned to be documented following all activities.

3.3 Opportunities for Improvement

1. The tenets of ISM (Plan & Control Work) are not always implemented in the way work is conducted. Safety is not consistently integrated into the way work is performed.
2. While lessons learned information is communicated within organizations, the Lab-wide lessons learned process needs improvement. Line management should be responsible for identifying and sharing information across organizations, with analysis provided by ES&H.
3. Document formality, configuration control and strict compliance are inconsistent. The document hierarchy and control are not always clear (revision tracking, author, dates, etc.).
4. Multiple OSHA-type hazards and several incidents of poor housekeeping were noted throughout the tours of Hall A, B, C and FEL.
5. Consistent with ISM Guiding Principle #4, Balanced Priorities, Work Coordinator / Safety Warden responsibilities should be reviewed to assure that ISM expectations are met. This is especially important in Hall C.
6. "Skill of the worker" is not adequately defined within the observed divisions. A duplication of effort was observed during this assessment. The laboratory level procedures require that a task hazard analysis be performed for all activities. This may lead to duplication of effort for similar standard work activities. Instead, it would be more efficient to define a set of skills that workers are qualified to perform, and then authorize them to perform these tasks through a set of task hazard analyses. After these lists of worker qualifications and task hazard analyses are

generated, they should only be changed as conditions change and new hazards are introduced to the work area. Work that falls out of the "Skill of the Worker" envelope should be covered by formal procedures or a comprehensive hazard analysis with ES&H involvement.

7. During the interview process, safety wardens and safety officers confirmed that job walk downs occurred prior to performing the work. However, it was not clear why these walk downs did not identify several safety hazards observed by the Assessment Team. In many work areas (except in Hall B) hazards were not identified or adequately controlled.
8. A conflict of interest may appear to exist with the safety warden role and the work coordinator role at the activity level, as these two functions are performed by the same individual. This need not be a conflict, and indeed may be a best practice, if the individual implements ISM guiding principle # 4, Balanced Priorities. Line management should be involved in the hazard analysis and control process, but must balance priorities such that accomplishing the work is not given a higher priority than performing the work safely. Including ES&H professionals, working with the Physics and FEL staff at the activity level, to assist with the planning, design, and oversight of work should also be considered.
9. There exists a non-standard approach to hazard control development across the physics division halls. For example, both Hall A and Hall C have a task hazard analysis for moving 10 ton shielding blocks. The Hall C hazard analysis had 5 sequences listed with 9 potential hazards identified. The Hall A analysis listed 1 sequence with 4 potential hazards. On the Hall C analysis, the personal protective equipment was individually identified (i.e. safety shoes, hardhat, gloves), opposed to the Hall A analysis that listed the words "proper PPE," without supplying a list of the proper PPE.
10. Training requirements are not always incorporated into hazard assessments. In one case, it was observed that the status of worker's training qualification was not verified and documented prior to starting a job.
11. Controls listed on the hazard analysis worksheet are not always followed. Controls established to prevent workers from entering under rigging lifts were not implemented during an observed lift in Hall C. Barricades were not used during a lift to keep unqualified personnel out of the area, and the crane was moved over the heads of workers who were not wearing hardhats. During the same lift, workers placed their hands under a load to position wood blocks. This was a clear violation of the controls listed on the worksheet (i.e., crush hazard: keep all body parts from beneath load).
12. There was no observed mechanism in place to assure that workers were aware of controls, and there is no confirmation to assure that all controls are in place prior to starting a job. An employee sign in sheet on the task hazard analysis should be developed to document that a worker read and understands the work control requirements. In addition, a sign off line should be added to the hazard control document to assure that all hazard control prerequisites are in place prior to starting the work; an individual responsible for the job should complete documentation.

3.4 Findings

1. It appears that several staff responsible for conducting and approving task hazard analysis have not been trained on the process (GP#3 – Competence Commensurate with Responsibilities)
2. Not all Safety Wardens have completed Safety Warden Training (GP#3). The Laboratory should review the training and the requirements for the training, and implement consistently.

4.0 Recommendations

Considered in a holistic manner, the recommendations fall into one of three categories:

- People (Leadership ISM vision / expectations, training, ISM awareness)
- Plant (Safe work places and housekeeping of the physical plant and equipment)
- Processes / Procedures (ISM programs, procedure control / consistency)

1. PEOPLE: JLab leadership should establish and communicate an ISM vision and expectations for the Laboratory. The vision and expectations should be communicated frequently, at all management and staff levels, through ISM orientations, formal safety program training, ISM documentation aids, and preparation sessions for the HSS inspection. As a first step in this effort, JLab should conduct an off-site teambuilding session, with Senior Management (LD, ADs, Deputy ADs, C-level), to allow an open discussion of safety issues and expectations, to establish and document the ISM vision and expectations for JLab, and to assure that every member of the Leadership team understands and commits to the established ISM vision and expectations. They need to understand that the ISM is not a separate program, but is the integrated system that controls how work is accomplished (work planning, hazards identification and control, performing work safely, obtaining feedback and lessons learned). As part of this ISM orientation, prepare a tri-fold that summarizes how JLab implements the ISM core functions in a consistent manner, customized for each of the different parts of Lab (e.g., FEL uses FEList, while Hall B uses Hall B List, but they both satisfy the same parts of the cycle). Include other information about ISM implementation, such as the lab-wide requirements for documenting work observations, and other expectations for ISM implementation.

   General ISM awareness training is needed for all levels of JLab personnel, to improve the consistency with which safety is integrated into how work is planned and executed. Hazards appear to be adequately analyzed by safety officers and safety wardens, but the expertise in hazard recognition is inconsistent across the laboratory organizations assessed. A standardized approach should be developed to incorporate the ES&H Division Subject Matter Experts into all task hazard analyses. This will allow the hazard analysis process to be more consistent across the divisions. With respect to formality of work planning and control, an envelope of the tasks that fall into "Skill of the Worker" should be developed. Once this envelope is established, workers would be free to

perform work within this envelope without additional hazard analysis, unless the work scope changes or a new hazard is introduced.

For a relatively small Laboratory, with only a few programs, JLab appears to have a great deal of complexity in the titles that are used. The working supervisor can at the same time be the work coordinator, the lead technician, the group leader, the safety warden, the landlord of the facility or the building manager. JLab should evaluate titles and terms for operations of the various facilities, and seek appropriate consistency across organizations. The use of different names and terms in different areas may result in unnecessary confusion to a subcontractor who comes on-site to conduct maintenance in one hall and returns later to a different hall, having to learn a new terminology to implement the same set of requirements. The ES&H Manual and the ISM Description should provide the commonality. The ISM Description could be used to create an overlay or index to simplify the titles and terms. Similarly, a number of different approaches are used to conducting and documenting hazards analyses, and reporting lessons learned feedback.

Orientation for New Employees, Users and Visitors (4100) covers the basics for the major categories of people conducting work at JLab. We recommend that the orientation be organized in terms of the ISM core functions to emphasize the policy that safety is integrated into how work is conducted at JLab.

2. PLANT: Assign a "fix-it" team to sweep through JLab facilities and correct the outstanding safety hazards and housekeeping items that exist. This should be performed now, and again about two weeks before the DOE team shows up. This team should be knowledgeable of OSHA, can have access to all areas (or at least know who to call to get escorted into all areas), and be able to fix (not simply identify) the identified items (e.g., put up signage, remove procedures that are not controlled, store ladders safely, pick up and/or throw away tripping hazards, etc.). We understand this is the responsibility of the safety wardens. If so, all Safety Wardens should complete Safety Warden training and then assign them to implement these "fixes" in an area that is NOT their own.

3. PROCESSES : Establish a consistent Lab-wide approach that defines the format and content of JLab approved procedures, what should be in division level procedures, and what can be in work instructions or operator aids (which should not be called procedures since they do not require strict compliance). Nominally, such a procedure should be part of or referenced by the JLab Quality Assurance Program. Each should have a standard header / format (e.g., prepared by, reviewed by, applicable date and version, expiration date, revision log). Require that all procedures in the halls, FEL and other organizations follow this format. Remove ALL other documents that are not following the format.

   Document control requires improvement. No standard format is used for procedures across the Laboratory; one format exists for the ES&H Manual, and separate formats are used for other manuals and other procedures. JLab should consider establishing a clear system with policies at the highest level (all following a consistent format), process requirements documents (e.g., HR Manual and ESH Manual requirements), procedures (requirements for using equipment or conducting a certain activity), and perhaps even

work instructions (that help tie together procedures and evolutions during a days/weeks activity). These should have a consistent format, with "N/A" or "None" if a certain section is not necessary or needed for the given process, procedure or activity. This assures that the person developing, reviewing or approving a given document went through the thought process.

In Hall A, the assessment included a review of a document termed a "Procedure Procedure," which is a task specific document that might otherwise be termed a roadmap (something that routes a task from machine to machine or lab to lab). This appeared to be a great tool that could be improved if formatted per the ISM core functions and used more consistently. With regard to formatting, it would be helpful if the Define Scope ("Summary of Job" and "Affected Systems") were in Section 1, the Risk Controls (e.g., List of PPE, Identify danger zones, Training Required, perhaps Prerequisites, etc.) were in Section 3, the Work Conduct items (e.g., List of Materials, List of People Needed, Procedure, Cleanup and Waste Handling, and Post Job Briefing as the sub-sections) were in Section 4. As appropriate, there should be very clear references to existing drawings and procedures, or noting skill of the craft, as appropriate. The documents should be dated and signed / approved. The new template in the ESH Manual (3310) provides the appropriate items to be addressed, and perhaps that can be used as a template.

Additional, specific, document and procedural recommendations include the following:

- ESH 3120 – Title is "The CEBAF Experiment Review Process" while the header is "Experimental Review." This difference is probably an artifact from when the FEL did not exist and the only experiments were CEBAF experiments.
- ESH 3330 - Stop-Work Orders should mention other categories (e.g., visitors) to include something along the lines of "….other visitors and guests are escorted, and if they observe anything they feel poses a similar risk, they should notify their escort immediately, and the escort will take the appropriate actions or address the concern…"
- Create an "overlay" chapter / procedure that describes the conduct of work at JLab. ESH 5100, "Internal Inspections," may provide a model. That chapter could define the basic process and refer people to the right specific chapters as appropriate, and it can provide a "Program Summary" to give the overview of planning work, etc.
- A procedure entitled "Opening / closing SOS Shield House Door" was posted on an electrical panel (that did not have 36" clearance). The procedure was not dated or approved.

The presence of signs that are not clear or necessary and the absence of needed signs are possible symptoms of a lack of formality in operations. These are often small items, but are expectations that DOE-HSS integrates into a larger story. A few examples were noted during the assessment. In Room L207 of the administrative building, there is a sign "Not an Exit" on a door that goes to the auditorium. If there was an emergency in the room, that door could actually provide an alternate exit, and yet it is marked "Not an Exit" (probably to prevent people from routinely and inadvertently entering the auditorium while an event is on-going). Perhaps better wording could be "Exit Thru Auditorium" or "Emergency Exit Only" or other similar phrase.

Appendix A – Summary Results Dashboard

	FEL	Hall A	Hall B	Hall C
Work Planning and Control Implementation Inspection Criteria, Approach, and Lines of Inquiry				
Core Function #1: Define the Scope of Work				
Inspection Criteria: Line management ensures that the site office, contractors, and subcontractors utilize systematic mechanisms to define the scope and schedule of work and identify associated risks and hazards so that the plan at each successively lower tier reflects an increasingly detailed description of the work to be performed.				
Inspection Criteria: Work control systems and procedures that address definition of work scope are developed for all types of work activities and are effectively implemented. These processes ensure that the scope of all work is clearly defined, communicated, and bounded such that activities necessary to control hazards to workers, the public, and the environment are identified.				
Core Function #2: Analyze the Hazards				
Inspection Criteria: Work systems and procedures are developed and effectively implemented that ensure hazards for all work are identified and appropriately analyzed based on the significance of the hazards. Prior to the initiation of work, line management identifies, analyzes, and categorizes the hazards associated with the work activity so that the hazards are eliminated or appropriate administrative and engineering controls can be put in place to prevent or mitigate those hazards.				
Core Function #3: Develop and Implement Controls				
Inspection Criteria: Management systems for work control are developed and effectively implemented for work activities that ensure development of adequate hazard controls for performing the work safely and mitigating environmental impact.				
Inspection Criteria: Line management has established processes for identifying and tailoring controls for hazards associated with all facilities, operations, and work activities.				
Inspection Criteria: Hazard controls are established based on an analysis of hazards, vulnerabilities, and risks in the work environment (e.g., radiological, chemical. industrial, physical, and natural phenomena).				

	FEL	Hall A	Hall B	Hall C
Core Function #4: Perform Work Within Controls				
Inspection Criteria: Line management ensures that work is safely performed and managed in accordance with requirements and safety management performance expectations. Contractors and subcontractors execute defined requirements such that employees are protected from adverse consequences.				
Inspection Criteria: Line management has established and implemented processes to confirm that a facility or work activity, as well as the work force and selected hazard controls, are in an adequate state of readiness before authorizing the performance of work.				
Inspection Criteria: Line management has the responsibility for ensuring that all operations are authorized at a level commensurate with the hazards, and has established work authorization processes for site, facility, and activity-level operations.				
Core Function #5: Feedback and Improvement				
Inspection Criteria: Line management has effectively developed and implemented a feedback and improvement process at the work activity level.				

 **Red** = Finding (non-compliance with a requirement)

 Yellow = Observation/Opportunity for Improvement (deviation from best management practices or minor deviation from procedural requirements that are isolated and considered to be a quick fix)

 **Green** = Noteworthy Practice (positive aspects of a program that could be used as a model for similar programs across the Lab)

Appendix A – Summary Results Dashboard (Continued)

	FEL	Hall A	Hall B	Hall C
Feedback and Continuous Improvement Contractor Inspection Criteria, Activities and Lines of Inquiry				
Contractor Assurance System – Not Assessed				
Inspection Criteria –- Contractor management has established a comprehensive and integrated contractor assurance system for ensuring the protection of the public, workers, environment and national security assets through continuous improvement for environment, safety, and health; safeguards and security; cyber security; and emergency management. The contractor's assurance system programs and processes are in accordance with the policy and key elements outlined in DOE Policy 226.1, Department of Energy Oversight Policy, DOE Order 226.1 A, Implementation of Department of Energy Oversight Policy, Attachment 1, quality assurance requirements (as stated in 10 CFR 830, Subpart A, DOE Order 4 14.1 C, Quality Assurance, or other applicable regulations), other applicable DOE directives, and contract terms and conditions.				
Inspection Criteria –- A program description document that fully details the programs and processes that comprise the contractor assurance system has been developed, approved by contractor management, and forwarded to DOE for review and approval. The program description is reviewed and updated annually and forwarded to DOE for review and approval.				
Inspection Criteria –- The contractor assurance system includes assessment activities (self-assessments, management assessments, and internal independent assessments as defined by laws, regulations, and DOE directives such as quality assurance program requirements) and other structured operational awareness activities; incident/event reporting processes, including occupational injury and illness and operational accident investigations; worker feedback mechanisms; issues management; lessons-learned programs; and performance indicators/measures.				
Inspection Criteria –- The contractor's assurance system monitors and evaluates all work performed under their contract, including the work of subcontractors.				
Inspection Criteria –- Contractor assurance system data is formally documented and available to DOE line management. Results of assurance processes are periodically analyzed, compiled, and reported to DOE line management as part of formal contract performance evaluation.				
Inspection Criteria –- Contractors have established and implemented sufficient processes (e.g., self-assessments, corporate audits, third-party certifications or external reviews, performance indicators) for measuring the effectiveness of contractor assurance system elements.				

	FEL	Hall A	Hall B	Hall C
Inspection Criteria –- Requirements and formal processes have been established and implemented that ensure personnel responsible for managing and performing assurance activities possess appropriate experience, knowledge, skills, and abilities commensurate with their responsibilities.				
Contractor Assessment and Performance Measurement				
Inspection Criteria –- Contractor management has established a rigorous and credible assessment program that evaluates the adequacy of programs, processes, and performance on a recurring basis. Formal mechanisms and processes have been established for collecting both qualitative and quantitative information on performance, and this information is effectively used as the basis for informed management decisions to improve performance. The contractor's assessment and performance measurement programs and processes are in accordance with the policy and key elements outlined in DOE Order 226.1 A, Implementation of Department of Energy, Oversight Policy, Attachment 1; quality assurance requirements (as stated in 10 CFR 830, Subpart A, and DOE Order 414. lC, Quality Assurance, and other applicable regulations or DOE directives); and contract terms and conditions.				
Inspection Criteria –- Line management has established and implemented a rigorous assessment program for performing comprehensive evaluations of all functional areas, programs, facilities, and organizational elements, including subcontractors, with a frequency, scope and rigor based on appropriate analysis of risks. The scope and frequency of assessments are defined in site plans and program documents, include assessments of processes and performance-based observation of activities and evaluation of cross-cutting issues and programs, and meet or exceed requirements of applicable DOE directives.				
Inspection Criteria –- Rigorous self-assessments are identified, planned, and performed at all levels periodically to determine the effectiveness of policies, requirements, and standards and the implementation status.				
Inspection Criteria –- Appropriate independent internal assessments are identified, planned, and performed by contractor organizations or personnel having the authority and independence from line management to support unbiased evaluations.				
Inspection Criteria –- Line managers have established programs and processes to routinely identify, gather, verify, analyze, trend, disseminate, and make use of performance measures that provide contractor and DOE management with indicators of overall performance, the effectiveness of assurance system elements, and identification of specific positive or negative trends. Approved performance measures provide information that indicates how work is being performed and are clearly linked to performance objectives and expectations established by management.				
Inspection Criteria –- Line managers effectively utilize performance measures to demonstrate performance improvement or deterioration relative to identified goals, in allocating resources and establishing performance goals, in development of timely compensatory measures and corrective				

	FEL	Hall A	Hall B	Hall C
actions for adverse trends, and in sharing good practices and lessons learned.				
Contractor Event Reporting				
Inspection Criteria –- Contractor management has implemented formal programs to identify issues and report, analyze, and address operational events, accidents and injuries.				
Inspection Criteria –- Formal programs and processes have been established to identify issues and report, analyze, and address operational events, accidents, and injuries. Events, accidents, and injuries are promptly and thoroughly reported and investigated, including the identification and resolution of root causes and management and programmatic weaknesses, and distribution of lessons learned in accordance with applicable DOE directives (e.g., Manual 23 1.1-2, Occurrence Reporting and Processing of Operations Information; Manual 23 1.1 -1A, Environment, Safety and Health Reporting Manual; Order 225.1 A, Accident Investigations; and Order 5480.19, Conduct of Operations Requirements for DOE Facilities).				
Inspection Criteria –- Reporting of operational events, accidents, and injuries are conducted in accordance with applicable nuclear, security, environment, occupational safety and health, and quality assurance requirements, applicable DOE directives, and contract terms and conditions. Trending analysis of events, accidents, and injuries are performed in accordance with structured/formal processes and applicable DOE directives (e.g., Manual 23 1.1-2).				
Contractor Operating Experience/Lessons Learned				
Inspection Criteria –- Contractor management has established formal programs to communicate operating experience/lessons learned during work activities, process reviews, and incident/event analyses to potential users and applied to future work activities (in accordance with DOE 0 226.1A and DOE 0 21 0.2).				
Inspection Criteria –- Formal processes are in place to identify applicable lessons learned from external and internal sources and any necessary corrective and preventive actions, disseminate lessons learned to targeted audiences, and ensure that lessons learned are understood and applied.				
Inspection Criteria –- Formal programs and processes have been established and implemented to solicit feedback from workers and work activities on the effectiveness of work definition, hazard analyses and controls, and implementation for all types of work activities, and to apply lessons learned.				
Inspection Criteria –- Line managers effectively identify, apply, and exchange lessons learned with the rest of the DOE complex. Lessons learned identified by other DOE organizations and external sources are reviewed and applied by line management to prevent similar incidents/events.				

	FEL	Hall A	Hall B	Hall C
Contractor Issues Management				
Inspection Criteria –- Contractor management has established a comprehensive, structured issues management system that provides for the timely and effective resolution of deficiencies and meets the requirements of DOE Order 226.1 and DOE Order 414.lC.				
Inspection Criteria –- Program and performance deficiencies, regardless of their source, are captured in a system or systems that provide(s) for effective analysis, resolution, and tracking. Issues management system elements include structured processes for determination of risk, significance, and priority of deficiencies; evaluation of scope and extent of condition; determination of reportability under applicable requirements; identification of root causes; identification and documentation of corrective actions and recurrence controls to prevent recurrence; identification of individuals/organizations responsible for corrective action implementation; establishment of milestones based on significance and risk for completion of corrective actions; tracking progress; verification of corrective action completion; and validation of corrective action implementation and effectiveness.				
Inspection Criteria –- Issues management processes include mechanisms to promptly identify the potential impact of a deficiency and take timely actions to address conditions of immediate concern, including stopping work, system shutdown, emergency response, reporting to management, and compensatory measures pending formal documentation and resolution of the issue.				
Inspection Criteria –- Processes for analyzing deficiencies, individually and collectively, have been established that are designed to effectively identify programmatic or systemic issues. Line management effectively monitors progress and optimizes the allocation of assessment resources in addressing known systemic issues.				
Inspection Criteria –- Processes for communicating issues up the management chain to senior management have been established and based on a graded approach that considers hazards and risks. Line management receives periodic information on the status of identified deficiencies and corrective actions and holds organizations and individuals accountable for timely and effective completion of actions. Line management has executed graded mechanisms such as independent verification and performance-based evaluation to ensure that corrective action and recurrence controls are timely, complete, and effective. Closure of corrective actions and deficiencies are based on objective, technically sound, and verified evidence. The effectiveness of corrective actions is determined on a graded basis and additional actions are completed as necessary.				

	FEL	Hall A	Hall B	Hall C
Contractor Worker Feedback				
Inspection Criteria –- Contractor management has established a comprehensive, structured issues management system that provides for the timely and effective resolution of employee concerns and feedback on safety performance from workers that meets the requirements of DOE Order 226.1 A and DOE Order 442.1 A, Department of Energy Employee Concerns Program. Additionally, an effective differing professional opinion process or program has been established and implemented in accordance with the Contractor Requirements Document associated with DOE M 442.1 - 1, Differing Professional Opinions Manual.				
 **Red** = Finding (non-compliance with a requirement)				
Yellow = Observation/Opportunity for Improvement (deviation from best management practices or minor deviation from procedural requirements that are isolated and considered to be a quick fix)				
 **Green** = Noteworthy Practice (positive aspects of a program that could be used as a model for similar programs across the Lab)				

Appendix B – Interviews Conducted

Interviews Conducted:

- Carter Ficklen, Team Facilitator, ESH&Q (ES&H Reporting Manager, Lessons Learned Coordinator)
- Richard Walker, Free Electron Laser Work Coordinator
- Ed Folts, Hall A Work Coordinator / Safety Warden
- Dennis Skopik, Division Safety Officer, Experimental Nuclear Physics
- Doug Tilles, Hall B Work Coordinator / Safety Warden
- Charles Hightower, Experimental Nuclear Physics
- Walter Kellner, Hall C Work Coordinator / Safety Warden
- Andy Kenyon, Hall C Deputy Work Coordinator
- Gwyn Williams, Division Safety Officer, Free Electron Laser
- Kevin Jordan, Free Electron Laser User Lab Lead
- Bob May, Acting Director ESH&Q

Appendix C – Observations Performed

Work Observations:

- Hall A
  - Installation of Big Bite Magnet
  - Electronic component removal
  - General safety conditions
- Hall B, visited but no work observed
  - Hazards well marked an no unsafe conditions identified
- Hall C, multiple crane lifts and trailer loading

Appendix D – Documents Reviewed

Documents Reviewed:

- ES&H Manual
- ISM Program Description
- QA Plan
- Hall B work planning & control docs and task hazard analysis
- Hall C work planning & control docs and task hazard analysis
- Detailed review of ES&H Manual Chapter 3210 (Hazard ID)
- FEL Maintenance and Safety SOPs
- FEL Gun Test Stand OSP
- Control Room Operating Procedures

Appendix E – Assessment Criteria

HSS CRAD 64-10 Rev 0 (11/26/2007)
Work Planning and Control Implementation
Inspection Criteria, Approach, and Lines of Inquiry

The following provides an overview of the typical activities that will be performed to collect information to evaluate the core functions and implementation of integrated safety management. Several terms used throughout this document are defined as follows:

- The term "work activities" encompasses various types of projects including restoration, maintenance, operations, R&D and other work activities that could expose the workers, public, or environment to hazards.

- The term "hazard analysis" includes consideration of radiation safety, nuclear safety, human factors, industrial safety, industrial hygiene, occupational safety, fire protection, and environmental impact.

Core Function #1
Define the Scope of Work

Inspection Criteria: Line management ensures that the site office, contractors, and subcontractors utilize systematic mechanisms to define the scope and schedule of work and identify associated risks and hazards so that the plan at each successively lower tier reflects an increasingly detailed description of the work to be performed.

Inspection Activity: Through interviews and document reviews, evaluate the involvement of site office managers, planners, and subject matter experts in the planning, review, and approval of work definition for projects for site, facility, and building work activities.

Inspection Criteria: Work control systems and procedures that address definition of work scope are developed for all types of work activities and are effectively implemented. These processes ensure that the scope of all work is clearly defined, communicated, and bounded such that activities necessary to control hazards to workers, the public, and the environment are identified.

Inspection Activity: Review contractor requirements, implementing procedures, guidance, and facility specific procedures governing work control processes. Review planned and in-progress work and corresponding technical work documents. Interview managers, facility representatives, subject matter experts, work package and procedure writers, workers and researchers, and work planning personnel.

Inspection Lines of Inquiry:

- Are Department of Energy (DOE)/contractor/subcontractor managers and subject matter experts' managers actively involved in the definition of projects to ensure allocation of resources can be addressed?

- Is the DOE oversight of project and work definition commensurate with the level of complexity and hazards?

- Do project documents, safety envelopes, and permits adequately bound the scope of work defined in work orders, procedures, and/or instructions? Does the work definition process include a screening against the safety envelope and/or permits?

- Is the work observed adequately bounded by approved work packages, procedures, and permits?

- Have higher-level work documents, such as project plans, been translated into discrete work packages and procedures with well-defined boundaries and interfaces?

- Is work defined at the task level such that workers, supervisors, planners, and appropriate environment, safety, and health (ES&H) personnel can readily identify the hazards and risks associated with both the work activities and the environment/location in which it is performed?

- Are work activities properly prioritized to allow adequate allocation of resources and scheduling based on the importance of the work, safety impact, and risk?

- Have adequate personnel and equipment resources been identified for the performance of work, including operations, maintenance, and ES&H support?

- Do work-planning processes provide for early involvement of workers and ES&H staff to fully define the work and allow effective identification of hazards? Are specific thresholds identified for involvement of ES&H personnel in the hazard analysis process?

- Are tasks for minimizing waste generation and controlling the release of effluents to the environment adequately defined during work planning?

- Are work packages sufficiently detailed, based on work activity and degree of hazard, to establish a clear understanding of the work to be performed and how safety should be integrated into that work?

- Is worker input integrated into planning activities?

Core Function #2
Analyze the Hazards

Inspection Criteria: Work systems and procedures are developed and effectively implemented that ensure hazards for all work are identified and appropriately analyzed based on the significance of the hazards. Prior to the initiation of work, line management identifies, analyzes, and categorizes the hazards associated with the work activity so that the hazards are eliminated or appropriate administrative and engineering controls can be put in place to prevent or mitigate those hazards.

Inspection Activity: Review work planning and control processes and implementing procedures. Interview personnel including work planners and subject matter experts. Review project work packages, procedures, and corresponding hazard identification and analysis documents such as hazard analysis reports, safety plans, job safety analyses, activity hazard analyses, health and safety

plans, radiological work permits, as low as reasonably achievable reviews, and other safety and health and/or environmental permits. Review workplace hazard baseline surveys, personnel exposure assessments, and environmental monitoring data.

Inspection Activity: Perform facility/building walk downs and inspections, and observe selected work activities, such as restoration activities, research and development, operations, and maintenance.

Inspection Lines of Inquiry:

- Do institutional level ES&H procedures effectively address the hazard analysis process at the working level and are the procedures properly implemented?
- Are the responsibilities for environment, safety and health subject matter experts and reviewers for hazard analyses established and understood?
- Are standardized hazard assessment processes developed and appropriately graded in their approach based on the complexity of the activity/work, performance frequency, and initial or previous hazard screenings or analysis of the activity?
- Are thresholds identified within the hazard analysis process to trigger appropriate involvement of ES&H professionals?
- Do the hazard analysis processes address all types of work activities to be performed including skill of the craft or skill of the performer?
- Do formal procedures guide the development of activity-level hazard analyses and ensure the hazard analyses are tailored to the specific work being performed?
- When work scope and technical work document tasks are changed, are the hazard assessments reviewed for impact?
- Do planners, workers, environment, safety and health and waste management staff, and facility management personnel walk down work sites to identify activity-related hazards and co-located hazards based on the risk associated with the activity?
- Are resident area hazards and potential for additive or synergistic effects properly considered for the introduction of additional hazardous, materials, or activities?
- When conditions change, are new potential hazards analyzed?
- Are accident scenarios related to hazardous work analyzed and properly considered to mitigate potential occurrence and severity?
- Are workers involved in the hazard analysis process?

Core Function #3
Develop and Implement Controls

Inspection Criteria: Management systems for work control are developed and effectively implemented for work activities that ensure development of adequate hazard controls for performing the work safely and mitigating environmental impact.

Inspection Criteria: Line management has established processes for identifying and tailoring controls for hazards associated with all facilities, operations, and work activities.

Inspection Criteria: Hazard controls are established based on an analysis of hazards, vulnerabilities, and risks in the work environment (e.g., radiological, chemical, industrial, physical, and natural phenomena).

Inspection Activity: Review work planning and control processes and procedures. Interview personnel including facility representatives, project personnel, group leaders, subject matter experts, managers, work control managers, foremen, supervisors, environmental, safety and health support personnel, and operations/technician personnel.

Inspection Activity: Review selected safety requirements, hazard control plans, sampling results, permits (radiological work permits, industrial hygiene/industrial safety), work documents, procedures, pollution prevention opportunity assessments, and monitoring protocols.
Observe work activities.

Inspection Activity: Interview facility representatives, facility managers, project leaders/supervisors, workers, and ES&H personnel.

Inspection Lines of Inquiry:

- Are standardized hazard controls developed and used in an appropriately graded approach based on project/work complexity and risk, performance frequency, and hazard analysis results?
- Do controls encompass each phase of work performance and all aspects of the work, including potentially abnormal or emergency situations?
- Are the knowledge, skills, and abilities of the work force considered when selecting the form of controls?
- Are the types of controls (engineering, administrative, and personal protection equipment) applied in the correct sequence and with an appropriate technical basis?
- Are the hazard controls comprehensive and adequate for maintaining planning efficiency while ensuring acceptable hazard mitigation or elimination?
- Are corresponding training requirements incorporated into controls and hazard assessments?
- Are thresholds identified for involvement of ES&H personnel in the tailoring or implementation of hazard controls?

- Are workers/supervisors stop work authorities and responsibilities clearly defined for unexpected hazards or safety concerns?
- Do procedures address liaisons and interfaces between organizations to ensure conflicts and overlapping work activities are properly coordinated and resolved?
- Are control sets sufficiently analyzed to ensure they do not conflict or introduce additional hazards?
- Do controls sufficiently provide notification and afford protection to co-located workers who may either be present or traverse the areas potentially impacted by the activity?
- Is independent safety review of the adequacy of controls provided for higher hazard activities?
- Are workers involved in the development of controls?
- Are parameters clearly defined and established in appropriate facility procedures? Are hazard controls sufficient to ensure that facility and other operating limits are not exceeded?
- Have facility safety requirements been clearly translated into facility, building, system, and equipment specific information that are available and usable by workers within the facility?
- Are appropriate hazard controls from hazard analyses and permits included in approved work documents and are they adequately implemented?
- Are standardized hazard controls developed and used in an appropriately graded approach that considers work complexity, performance frequency, and magnitude of the risks?
- Are work documents complete with adequate procedures, instructions, and/or drawings, and are bounding conditions and limitations clearly specified?
- Are permits appropriately tailored, specified and integrated into the work package (e.g., Lockout/Tagout, radiological work, confined space, hot work, energized electrical, elevated work, and asbestos abatement)?
- Is the reliability of hazard controls for higher risk activities assessed and failure consequences determined and considered?
- When project/work scope and tasks are changed, are the hazard controls reviewed for impacts?
- Are training requirements for personnel needed to perform the work in accordance with established controls clearly defined, specified and implemented?
- Are appropriate analytical parameters and data quality objectives included in sampling and analysis programs?

- Are the required administrative and engineering controls in place at locations where waste is generated and stored (for example, signs identifying less-than-90-day storage areas) per internal and external requirements?

- Are signs and postings clear and current with regard to hazards and entry requirements?

- Is there appropriate linkage between tasks, hazards, and hazard controls in work control documents?

- Are workers and appropriate environment, safety, and health professionals included on planning teams and involved in hazard control development? Are minimum thresholds identified, based on the hazards and risks, which require the involvement of ES&H and waste management personnel and subject matter experts when developing work packages and during work activities?

- Do environmental, waste management, radiological, health, safety, and operations personnel have an adequate understanding of each other's requirements and processes to minimize environmental impacts and meet regulator requirements?

- Are the roles and responsibilities for facility representatives, ES&H subject matter experts, and reviewers well documented, and are development and implementation or controls established and understood?

Core Function #4
Perform Work Within Controls

Inspection Criteria: Line management ensures that work is safely performed and managed in accordance with requirements and safety management performance expectations. Contractors and subcontractors execute defined requirements such that employees are protected from adverse consequences.

Inspection Criteria: Line management has established and implemented processes to confirm that a facility or work activity, as well as the work force and selected hazard controls, are in an adequate state of readiness before authorizing the performance of work.

Inspection Criteria: Line management has the responsibility for ensuring that all operations are authorized at a level commensurate with the hazards, and has established work authorization processes for site, facility, and activity-level operations.

Inspection Activity: Review, observe, and evaluate processes for authorization of work, including written plans of the day/week, scheduling meetings, morning meetings, readiness reviews, work schedules, experiment review committees, and other mechanisms used to approve, authorize, and release work.

Inspection Activity: Observe sampling of work activities. Emphasis will be placed on watching workers perform work using approved work packages and procedures. Evaluators will strive, to the extent possible, to sample a variety of authorized work activities that are available during the data collection schedule.

Inspection Activity: Through interviews, document review and work observation, evaluate the site office oversight of work performance.

Inspection Lines of Inquiry:

- Are work activities formally scheduled on the plan of the day, or equivalent mechanisms, to facilitate notification to affected personnel, resolution of scheduling conflicts, identification of resources and support required, prioritization with other work, and availability of required facilities and systems?

- Are pre-job briefings appropriately performed and effective in communicating work scope, prerequisites (including training), hazard control requirements, and permit requirements to all workers? Are job specific and area hazards adequately communicated to all workers before the start of work?

- Is there an effective process that defines the interface requirements between the facility managers, operations, support organizations, and the maintenance organization to ensure that defined work does not overlap and cause conflicts?

- Does the work approval and authorization process define appropriate mechanisms to address significant changes in work scope or method of work completion once initial approval is obtained?

- Have work activities and projects been properly planned, reviewed, and authorized? Are methods for authorizing work and verifying the readiness to perform work formal and documented?

- Is proper authorization obtained to perform the work (e.g., project work or work package approval) and immediately prior to start of work (work release – facility/building conditions adequate to start work)?

- Is the work performed in a manner consistent with the defined work scope and limitations?

- Are all precautions and prerequisites met including facility/system configurations, hazard controls, and other conditions?

- Are training requirements and pre-job briefings completed and adequate for the authorized work activity?

- Are personnel qualified and trained to perform the work in accordance with established controls?

- Is there periodic and adequate supervision of activities based on the risk of the work activity?

- Is the supervisor's span of control adequate based on the complexity of the work, the hazards, and the number of concurrent jobs being supervised?

- Do personnel adhere to postings, work control documents, procedures, and permits, including working within defined scopes, instructions and hazard controls, and completing required documentation?

- Are quality control/quality assurance provisions accurately and adequately followed during performance of the work?

- Are workers knowledgeable of activity/project level instructions and are they competent so the work is performed as described in the work documents?

- Is equipment placed in a safe condition at the end of the work activity or work shift, and properly turned over to the next shift?

- Do workers/supervisors stop activities and/or correct deficiencies when tasks cannot be performed as prescribed by work control documents or when safety concerns are encountered? Do workers understand their stop work authority and responsibility?

- Are mission/production pressures appropriately balanced with the requirements to work safely during the observation of work? Do these pressures have the potential to lead to unsafe practices or failure to follow required controls?

- Are ongoing surveys or other analyses conducted to ensure work hazards are not changing and work controls remain effective?

- Do all personnel comply with established controls including procedure requirements, postings, barriers, limits, sampling and monitoring requirements, stop work limits, and personal protective equipment requirements?

- Are waste generation and storage requirements at the point of generation being performed (for example, hazardous waste containers are labeled and kept closed) within requirements?

- Are hazard controls effective in their ability to maintain releases to the environment as low as reasonably achievable?

- Do workers properly segregate the wastes generated to facilitate the waste management requirements and enhance the pollution prevention opportunities?

- Are the environmental impacts of operations and activities properly managed in accordance with requirements?

- Has the DOE site office established a systematic approach to authorizing work, including projects, startup of processes and facilities, and operations?

- Are there formal procedures and criteria to address site office involvement in work authorization (such as readiness reviews and operations startup), and are the criteria appropriately based on the hazards and risk of the activity?

- Does the site office process ensure readiness is adequately verified and documented prior to authorizing new work or significant changes to ongoing work?

- Are ES&H and facility representatives actively involved in the observation of work activities?

Core Function #5
Feedback and Improvement

Inspection Criteria: Line management has effectively developed and implemented a feedback and improvement process at the work activity level.

Inspection Activity: Interview Facility Representatives, facility managers, project managers, and facility organizations, workers, ES&H or other appropriate personnel.

Inspection Activity: Review work planning and control processes and procedures, work packages, and assessment/oversight/feedback activity documentation. Interview personnel including project personnel, subject matter experts, managers, work control managers, foremen, supervisors, environment, safety, and health support personnel, and operations/technician personnel.

Inspection Activity: Observe work, including pre- and post-activity briefs and reviews. Review evidence of feedback and improvement such as post job reviews and other correspondence used to elicit feedback and improve performance.

Inspection Lines of Inquiry:

- Are formal post-activity review processes (e.g., post-job reviews, operations reviews) established and effectively used?
- Do facility representatives, subject matter experts, workers, supervisors, and line managers recognize, report, evaluate, and address accidents, incidents, near misses, injuries, illnesses, exposures and opportunities for improvement in a timely manner and in accordance with established procedures?
- Is feedback from workers effectively solicited and used during work planning, execution, and closeout?
- Is worker participation in safety programs (e.g., behavior based safety, safety committees) encouraged and effective?
- Are lessons learned identified and incorporated into the work planning and authorization process?
- Do assessment activities by line oversight (contractor and DOE) include observation of work activities by facility representatives, managers, supervisors, and subject matter experts?
- Are deficiencies and weaknesses identified during work activities appropriately documented and managed in accordance with site issues management processes? Are associated corrective actions developed and implemented as required?
- Have findings related to work planning and control from previous Independent Oversight assessments been effectively corrected?

- For issues identified by the current inspection, what prevented contractor or DOE line oversight activities from identifying and correcting the problems?

HSS CRAD 64-20 Rev 0 (12/04/2007)
Feedback and Continuous Improvement
Inspection Criteria and Approach - Contractor

1.0 PURPOSE
Within the Office of Independent Oversight, the Office of Environment, Safety and Health (ES&H) Evaluations' mission is to assess the effectiveness of those environment, safety, and health systems and practices used by field organizations in implementing Integrated Safety Management and to provide clear, concise, and independent evaluations of performance in protecting our workers, the public, and the environment from the hazards associated with Department of Energy (DOE) activities and sites. A key to success is the rigor and comprehensivess of our process; and as with any process, we continually strive to improve and provide additional value and insight to field operations. Integral to this is our commitment to enhance our program. Therefore, we have revised our Inspection Criteria, Approach, and Lines of Inquiry for internal use and also we are making them available for use by DOE line and contractor assessment personnel in developing and implementing effective DOE oversight and contractor self-assessment and corrective action processes on this WEB page.

2.0 APPLICABILITY
The following Inspection Criteria document is approved for use by the Office of ES&H Evaluations.

3.0 FEEDBACK
Comments and suggestions for improvements on these Inspection Criteria, Approach, and Lines of Inquiry can be directed to the Director of the Office of ES&H Evaluations on (301) 903-5392.

Feedback and Continuous Improvement
Contractor
Inspection Criteria, Activities and Lines of Inquiry

Contractor Assurance System Inspection Criteria - Contractor management has established a comprehensive and integrated contractor assurance system for ensuring the protection of the public, workers, environment and national security assets through continuous improvement for environment, safety, and health; safeguards and security; cyber security; and emergency management. The contractor's assurance system programs and processes are in accordance with the policy and key elements outlined in DOE Policy 226.1, *Department of Energy Oversight Policy,* DOE Order 226.1 A, *Implementation of Department of Energy Oversight Policy,* Attachment 1, quality assurance requirements (as stated in 10 CFR 830, Subpart A, DOE Order 4 14.1 C, *Quality Assurance,* or other applicable regulations), other applicable DOE directives, and contract terms and conditions.

1. A program description document that fully entails the programs and processes that comprise the contractor assurance system has been developed, approved by contractor management, and forwarded to DOE for review and approval. The program description is reviewed and updated annually and forwarded to DOE for review and approval.

2. The contractor assurance system includes assessment activities (self-assessments, management assessments, and internal independent assessments as defined by laws, regulations, and DOE directives such as quality assurance program requirements) and other structured operational awareness activities; incident/event reporting processes, including occupational injury and illness and operational accident investigations; worker feedback mechanisms; issues management; lessons-learned programs; and performance indicators/measures.

3. The contractor's assurance system monitors and evaluates all work performed under their contract, including the work of subcontractors.

4. Contractor assurance system data is formally documented and available to DOE line management. Results of assurance processes are periodically analyzed, compiled, and reported to DOE line management as part of formal contract performance evaluation.

5. Contractors have established and implemented sufficient processes (e.g., self-assessments, corporate audits, third-party certifications or external reviews, performance indicators) for measuring the effectiveness of contractor assurance system elements.

6. Requirements and formal processes have been established and implemented that ensure personnel responsible for managing and performing assurance activities possess appropriate experience, knowledge, skills, and abilities commensurate with their responsibilities.

Contractor Assessment and Performance Measurement Inspection Criteria – Contractor management has established a rigorous and credible assessment program that evaluates the adequacy of programs, processes, and performance on a recurring basis. Formal mechanisms and processes have been established for collecting both qualitative and quantitative information on performance, and this information is effectively used as the basis for informed management decisions to improve performance. The contractor's assessment and performance measurement programs and processes are in accordance with the policy and key elements outlined in DOE Order 226.1 A, *Implementation of Department of Energy, Oversight Policy,* Attachment 1; quality assurance requirements (as stated in 10 CFR 830, Subpart A, and DOE Order 414. lC, *Quality Assurance,* and other applicable regulations or DOE directives); and contract terms and conditions.

1. Line management has established and implemented a rigorous assessment program for performing comprehensive evaluations of all functional areas, programs, facilities, and organizational elements, including subcontractors, with a frequency, scope and rigor based on appropriate analysis of risks. The scope and frequency of assessments are defined in site plans and program documents, include assessments of processes and performance-based observation of activities and evaluation of cross-cutting issues and programs, and meet or exceed requirements of applicable DOE directives.

2. Rigorous self-assessments are identified, planned, and performed at all levels periodically to determine the effectiveness of policies, requirements, and standards and the implementation status.

3. Appropriate independent internal assessments are identified, planned, and performed by contractor organizations or personnel having the authority and independence from line management to support unbiased evaluations.

4. Line managers have established programs and processes to routinely identify, gather, verify, analyze, trend, disseminate, and make use of performance measures that provide contractor and DOE management with indicators of overall performance, the effectiveness of assurance system elements, and identification of specific positive or negative trends. Approved performance measures provide information that indicates how work is being performed and are clearly linked to performance objectives and expectations established by management.

5. Line managers effectively utilize performance measures to demonstrate performance improvement or deterioration relative to identified goals, in allocating resources and establishing performance goals, in development of timely compensatory measures and corrective actions for adverse trends, and in sharing good practices and lessons learned.

Contractor Event Reporting Inspection Criteria - Contractor management has implemented formal programs to identify issues and report, analyze, and address operational events, accidents and injuries.

1. Formal programs and processes have been established to identify issues and report, analyze, and address operational events, accidents, and injuries. Events, accidents, and injuries are promptly and thoroughly reported and investigated, including the identification and resolution of root causes and management and programmatic weaknesses, and distribution of lessons learned in accordance with applicable DOE directives (e.g., Manual 23 1.1-2, *Occurrence Reporting and Processing of Operations Information;* Manual 23 1.1 -1A, *Environment, Safety and Health Reporting Manual;* Order 225.1 A, *Accident Investigations;* and Order 5480.19, *Conduct of Operations Requirements for DOE Facilities).*

2. Reporting of operational events, accidents, and injuries are conducted in accordance with applicable nuclear, security, environment, occupational safety and health, and quality assurance requirements, applicable DOE directives, and contract terms and conditions. Trending analysis of events, accidents, and injuries are performed in accordance with stmctured1foma1 processes and applicable DOE directives (e.g., Manual 23 1.1-2).

Contractor Operating Experience/Lessons Learned Inspection Criteria – Contractor management has established formal programs to communicate operating experience/lessons learned during work activities, process reviews, and incident/event analyses to potential users and applied to future work activities (in accordance with DOE 0 226.1A and DOE 0 21 0.2).

1. Formal processes are in place to identify applicable lessons learned from external and internal sources and any necessary corrective and preventive actions, disseminate lessons learned to targeted audiences, and ensure that lessons learned are understood and applied.

2. Formal programs and processes have been established and implemented to solicit feedback from workers and work activities on the effectiveness of work definition, hazard analyses and controls, and implementation for all types of work activities, and to apply lessons learned.

3. Line managers effectively identify, apply, and exchange lessons learned with the rest of the DOE complex. Lessons learned identified by other DOE organizations and external sources are reviewed and applied by line management to prevent similar incidents/events.

Contractor Issues Management Inspection Criteria - Contractor management has established a comprehensive, structured issues management system that provides for the timely and effective resolution of deficiencies and meets the requirements of DOE Order 226.1 and DOE Order 414.lC.

1. Program and performance deficiencies, regardless of their source, are captured in a system or systems that provide(s) for effective analysis, resolution, and tracking. Issues management system elements include structured processes for determination of risk, significance, and priority of deficiencies; evaluation of scope and extent of condition; determination of reportability under applicable requirements; identification of root causes; identification and documentation of corrective actions and recurrence controls to prevent recurrence; identification of individuals/organizations responsible for corrective action implementation; establishment of milestones based on significance and risk for completion of corrective actions; tracking progress; verification of corrective action completion; and validation of corrective action implementation and effectiveness.

2. Issues management processes include mechanisms to promptly identify the potential impact of a deficiency and take timely actions to address conditions of immediate concern, including stopping work, system shutdown, emergency response, reporting to management, and compensatory measures pending formal documentation and resolution of the issue.

3. Processes for analyzing deficiencies, individually and collectively, have been established that are designed to effectively identify programmatic or systemic issues. Line management effectively monitors progress and optimizes the allocation of assessment resources in addressing known systemic issues.

4. Processes for communicating issues up the management chain to senior management have been established and based on a graded approach that considers hazards and risks. Line management receives periodic information on the status of identified deficiencies and corrective actions and holds organizations and individuals accountable for timely and effective completion of actions. Line management has executed graded mechanisms such as independent verification and performance-based evaluation to ensure that corrective action and recurrence controls are timely, complete, and effective. Closure of corrective actions and deficiencies are based on objective, technically sound, and verified evidence. The effectiveness of corrective actions is determined on a graded basis and additional actions are completed as necessary.

Contractor Worker Feedback Inspection Criteria - Contractor management has established a comprehensive, structured issues management system that provides for the timely and effective resolution of employee concerns and feedback on safety performance from workers that meets the requirements of DOE Order 226.1 A and DOE Order 442.1 A, *Department of Energy Employee Concerns Program.* Additionally, an effective differing professional opinion process or program has been established and implemented in accordance with the Contractor Requirements Document associated with DOE M 442.1 - 1, *Differing Professional Opinions Manual.*

Contractor Review Approach - Review appropriate contractor directives, policies, program descriptions, procedures, instructions, guidance, and contractual requirements. Review assessment activity schedules for independent, management, and other self-assessments and external reviews/inspections. Review assessment reports for adequacy. Interview contractor and subcontractor managers and staff to determine how assessments are planned and performed and how they are used to improve performance. Interview operating experience/lessons learned coordinators, work planners,

and training personnel and evaluate operating experience/lessons learned program documentation, including procedures and records, to determine the adequacy of implementation of these programs. Review documentation related to deficiencies (e.g., procedures, completed assessments, employee concern case files, occupational injury and illness reports, operational incident/event reports (e.g., critique minutes and occurrence reports), deficiency reports, causal analyses and corrective action plans, verification/validation records, and effectiveness determinations). Review trend analysis and performance indicator reports and evaluate the analyses, conclusions, and any related corrective actions.

Contractor Inspection Lines of Inquiry

Contractor Assurance System/Oversight Program Lines of Inquiry

1. Processes - Are the processes that constitute the Contractor Assurance System formal and documented and, when taken together, meet the requirements of DOE 0 226.1 A?

a. Does the contractor assurance system program description document (or equivalent) require and adequately describe a comprehensive and integrated set of processes and activities to identify and address program and performance deficiencies, and opportunities for improvement; provide the means and requirements to report deficiencies to the responsible managers and authorities; establish and effectively implement corrective and preventive actions; and share lessons learned across all aspects of operations as specified in DOE 0 226.1 A, Attachment l?

b. Does the contractor assurance system include self-evaluations of compliance with applicable laws, regulations, national standards, DOE directives, and DOE-approved plans and program documents, site-specific procedures/manuals, criteria review and approach documents, contractual performance objectives, and other contractually mandated requirements?

c. Does the contractor assurance system require monitoring and evaluation of all work performed under their contracts, including subcontractors?

d. Has the contractor established processes and mechanisms, such as use of corporate audits, third party certifications, or other external reviews in designing and implementing the contractor's assurance system for measuring the effectiveness of program elements?

e. Has the contractor defined their processes for review and communication to DOE management problems identified with DOE directives or site-specific requirements that conflict, are unclear, or are incomplete?

f. Has the program description document been approved by contractor management and DOE?

2. Training and Qualification - Are personnel implementing Contractor Assurance System processes adequately trained and qualified to perform assigned oversight activities (in accordance with DOE 0 226.1 A, DOE M 360.1-1 B, and DOE M 426.1-1 A)?

a. Has the contractor defined the requirements for experience, knowledge, skills and abilities for personnel implementing the assurance system elements?

b. Has the contractor established, maintained, and implemented appropriate qualification standards for personnel with oversight responsibilities?

c. Has the contractor provided and ensured completion of appropriate training for personnel who manage and perform assurance functions, in that they must possess experience, knowledge, skills, and abilities commensurate with their responsibilities?

3. Implementation of Program Responsibilities - Are Contractor Assurance System responsibilities appropriately implemented?

a. Has the contractor monitored and evaluated all work performed under their contracts, including subcontractors?

b. Is DOE line management provided with unfettered access to facilities and contractor activities and to contractor assurance system data?

c. Does the contractor submit to DOE for annual review and approval a revised contractor assurance system program description document (or equivalent).

4. Assurance System Oversight Results and Corrective Action Process - Are the results of Contractor Assurance System activities appropriately validated, documented, communicated, classified, evaluated, tracked and resolved?

a. Are deficiencies in programs or performance identified during assessment activities communicated to appropriate management for resolution through a structured issues management process that identifies causes and provides effective recurrence controls?

b. Are the results of assurance system processes periodically analyzed and reported to DOE in support of formal contract evaluations?

Contractor Assessment and Performance Measurement Program Lines of Inquiry

1. Process - Are the processes for assessment and performance measurement formal and documented and, when taken together, meet the requirements of DOE Order 226.1 and DOE Order 414.lC?

a. Has the contractor established appropriate, formal processes and procedures for conducting self-assessments and internal independent assessments of all programs, processes, and performance of facilities, systems, and organizational elements, including subcontractors?

b. Do these processes and procedures adequately detail the requirements for all types of assessment and performance measurement activities, such as management walkthroughs, surveillance and inspection activities, formal assessments and reviews, and post-job reviews?

c. Have guidance and support tools such as checklists, templates, and databases been provided?

d. Has the contractor established appropriate and formal processes and procedures for identifying, monitoring, analyzing data measuring the performance of facilities, programs, and

organizations and for identifying and implementing needed actions and opportunities for performance improvement?

e. Do self-assessment processes encourage and facilitate the involvement of workers, supervisors, and managers to develop assessment skills and abilities?

f. Have adequate processes, procedures, and guidance been developed to ensure an effective performance indicator program?

g. Have the appropriate performance indicators and parameters been selected to effectively measure performance and identify adverse trends in a timely manner to ensure prompt mitigation and corrective actions?

h. Do assessment and performance measurement program procedures provide appropriate linkages to the issues management, corrective action, and reporting processes?

2. Training & Qualification - Are personnel implementing the assessment and performance measurement program processes adequately trained and qualified to perform assigned oversight activities?

a. Has the contractor defined the requirements for experience, knowledge, skills and abilities for personnel implementing assessment and performance measurement activities?

b. Has the contractor provided and ensured completion of appropriate training for personnel implementing assessment and performance measurement activities?

3. Implementation of Program Responsibilities - Are assessment and performance measurement program responsibilities appropriately implemented?

a. Does line management routinely monitor and observe the activities of their workforce to ensure activity, facility, and institutional requirements and management expectations are met?

b. Are formal, rigorous, effective self-assessments conducted at all levels and in all organizations to determine the adequacy of programs and performance and identify deficiencies needing correction and areas and means for performance improvement?

c. Are institutional programs periodically evaluated for adequacy, including assessment of implementation by line and support organizations?

d. Are appropriate and effective independent assessments performed, including evaluations of assurance system effectiveness?

e. Is the subject, scope, and frequency of self- and independent assessments based on a formal analysis that addresses elements such as risk; regulatory or standards based requirements; type and complexity of work activities, facilities, and conditions; past performance; trend analyses; or management concerns?

f. Are planned assessments documented on an appropriate schedule that is maintained to reflect pertinent information and status (e.g., additions, completions, cancellations, and substitutions)?
g. Have subcontractors implemented appropriate and effective self-assessment programs, and is the contractor's subcontractor oversight program effectively evaluating performance, providing feedback to subcontractors, and ensuring correction of process and performance deficiencies?

h. Are assessment activities sufficiently performance-based, including an appropriate focus on observation of work, inspection of field conditions, review of evidence of compliant and effective performance, and effectiveness of corrective actions for previously identified deficient conditions?

i. Is the performance indicator program periodically reviewed to ensure the most appropriate sets of data and data analysis parameters are being employed?

j. 1s performance data being sufficiently analyzed, with conclusions drawn and presented to management, and needed actions identified and taken?

k. Are the processes and performance of assessment and performance measurement programs evaluated for effectiveness on an appropriate frequency?

Contractor Event Reporting Lines of Inquiry

1. Oversight Program - Are the processes for event identification, reporting and investigation formal and documented and meet the requirements of DOE directives?

a. Have appropriate, formal processes and procedures been established to detail the requirement for the identification, documentation, investigation, analysis, reporting, and management of issues for operational events (including non-reportable incidents), accidents, occupational injuries and illnesses, and quality assurance and nuclear safety issues?

b. Do processes require timely and appropriate identification, documentation, and local notification of operational events, incidents, accidents, occupational injuries and illnesses and nuclear safety issues?

2. Training & Qualification - Are personnel implementing event identification, reporting, and investigation processes adequately trained and qualified to perform assigned oversight activities (in accordance with DOE *0* 226.1 A, DOE M 360.1 - I B, and DOE M 426.1 - 1 A)?

a. Has the contractor defined the requirements for experience, knowledge, skills and abilities for personnel implementing event identification, reporting, and investigation activities?

b. Has the contractor provided and ensured completion of appropriate training for personnel implementing event, accident, occupational injury and illness, and nuclear safety issue management activities?

3. Implementation of Program Responsibilities - Are event identification, reporting and investigation responsibilities appropriately validated, documented, communicated, classified, evaluated, tracked and resolved?

a. Is reporting of operational events, accidents, occupational injuries and illnesses, and nuclear safety issues conducted in accordance with applicable nuclear, security, environment, occupational safety and health, and quality assurance requirements, applicable DOE directives, and contract terms and conditions?

b. Are immediate and compensatory measures to operational events, accidents, occupational injuries and illnesses and nuclear safety issues sufficiently defined and taken as part of line management initial response to operational events, in the development of follow-on corrective action plans?

c. Are operational events, accidents, occupational injuries and illnesses and nuclear safety issues promptly and rigorously reported to management, documented, and investigated in accordance with formal issues management processes that identify causes and recurrence controls, management and programmatic weaknesses, and the need to communicate lessons learned?

d. Are corrective and preventive actions resulting from investigation of events, accidents, and occupational injuries and illnesses formally managed to completion and effective in preventing recurrence?

e. Are events, accidents, occupational injuries and illnesses, and nuclear safety issues reported to DOE and other regulatory entities in a timely and thorough manner as required by directives and regulations?

f. Are operations and engineering organizations, including support organizations, appropriately involved in the identification, assessment, and development of corrective action plans of reportable events, accidents, and occupational injuries and illnesses?

g. Are trending analyses of events (including non-reportable incidents), accidents, and occupational injuries and illnesses performed in accordance with structured/formal processes and applicable DOE directives?

h. Are the processes and performance of event, accident, occupational injury and illness, and nuclear safety issue management properly evaluated for effectiveness on an appropriate frequency?

Contractor Operating Experience/Lessons Learned Lines of Inquiry

1. Oversight Program - Are the processes which constitute the operating experience/lessons learned program formal and documented and, when taken together, meet the requirements of DOE Order 226.1A and DOE Order 2 10.2, DOE Corporate Operating Experience Program?

a. Has the contractor established and implemented a formal program that screens lessons learned from external sources for local applicability and evaluates site conditions and processes to determine if actions are needed to apply applicable lessons learned and ensure that actions deemed necessary are implemented?

b. Has the contractor identified an institutional program coordinator and contacts/coordinators in line and support organizations?

c. Has the contractor established and implemented processes that identify, document, disseminate and apply lessons learned from investigations of incidents/accidents and occupational injuries, including near misses, and from work activities that warrant communication to other organizations?

d. Has the contractor established tools and services to encourage and facilitate the documentation and communication of lessons learned such as templates, guidance documents, and subject matter expert assistance?

e. Do work planning and training for design, construction, research, operations, and maintenance processes include triggers to prompt or record the research and application of potentially applicable lessons learned?

f. Has the contractor established tools that encourage and facilitate the research of lessons learned, such as a searchable database and links to external source sites?

2. Training & Qualification - Are personnel implementing operating experience/lessons learned processes adequately trained and qualified to perform assigned oversight activities (in accordance with DOE 0 226.1 A, DOE M 360.1 - 1 B, and DOE M 426.1 -1 A)?

a. Has the contractor provided and ensured completion of appropriate training on the expectations, requirements, and processes for the development, identification, sharing, and application of lessons learned?

3. Implementation of Program Responsibilities - Are operating experience/lessons learned program responsibilities appropriately implemented?

a. Are appropriate sources of lessons learned being regularly and rigorously screened by the coordinator(s) and/or subject matter experts and line organizations for applicability and the need for action?

b. Have work planners, supervisors, managers, subject matter experts, and training staff subscribed to the DOE lessons learned database?

c. Are screening and technical review activities and results documented and tracked to demonstrate and manage program implementation?

d. Is the disposition of process and performance deficiencies identified through lessons learned processes managed in accordance with the formal issues management and corrective action tracking system process(es)?

e. Is lessons learned information readily available to potential users?

f. Are innovative, successful practices shared as well as negative lessons learned?

g. Are internally generated lessons learned evaluated for their potential value to other DOE facilities and shared with the DOE complex as appropriate?

h. Are lessons from experiences within and outside the contractor organization effectively communicated and used in work planning and training?

i. Do safety committees or other boards provide effective feedback, including reviewing performance, analyzing data for lessons learned, and assigning and formally tracking action items for improvement?

j. 1s contractor facility management collecting and disseminating to their staff both lessons learned and good practices from operational events related to their facilities and similar DOE facilities?

k. Are internally identified lessons learned being reported to the DOE operating experience program for sharing with the DOE complex when appropriate?

l. Have metrics to measure program performance, use, and effectiveness been established?

m. Has the adequacy of the operating experience/lessons learned program been adequately assessed by the contractor on an appropriate frequency?

Contractor Issues Management Lines of Inquiry

1. Oversight Program - Are the processes that constitute the Contractor issues management program formal and documented and meet the requirements of DOE 0 226.1 A?

a. Have comprehensive processes and procedures been established and implemented that provide for the consistent, timely, and effective collection, analysis, and resolution of process and performance deficiencies and other issues, regardless of their source? Are separate processes and tracking tools compatible and sufficiently integrated to facilitate consistent implementation, trending, and performance measurement?

b. Does the issues management program include processes (including Occurrence Reporting and Processing System and Price-Anderson Amendments Act [PAAA]) and tools that address the following essential elements:

i . Determining risk, significance and priority?

ii. Evaluating the scope and extent of condition or deficiency?

iii. Determining and ensuring reportability in accordance with DOE or regulatory requirements?

iv. Analyzing for root and contributing causes using a graded approach?

v. Development of effective corrective action plans that include recurrence controls that address identified root and contributing causes?

vi. Assigning and changing ownership of issues, action plan development and corrective action implementation?

vii. Milestones for completion of corrective/preventive actions and requirements for revisions of milestone dates?

viii. Tracking of progress of actions?

ix. Verification that actions are complete?

x. Validation of the effectiveness of corrective/preventive actions using a graded approach?

xi. Ensuring that the status of issues management is communicated to management and individuals and organizations are held accountable for performing their assigned responsibilities for managing issues?

c. Have formal policies and processes been established arid communicated for rapidly determining if deficiencies or conditions pose immediate and/or significant risk of harm to workers, the public, or the environment and provide for interim actions such as stopping work, system shutdown, or other compensatory measures pending formal processing of the issue?

2. Training & Qualification - Are personnel implementing contractor issues management processes adequately trained and qualified to perform assigned oversight activities (in accordance with DOE 0 226.1 A, DOE M 360.1-1 B, and DOE M 426.1 - 1 A)?

a. Has the contractor defined the requirements for experience, knowledge, skills and abilities for personnel implementing issues management activities?

b. Has the contractor provided and ensured completion of appropriate training for personnel implementing issues management activities?

3. Implementation of Program Responsibilities - Are contractor issues management program responsibilities appropriately implemented?

a. Are issues (including lower level deficiencies) periodically formally analyzed collectively to identify adverse trends or areas of weakness that require corrective or preventive actions?

b. Arc adverse trends and needed corrective actions formally documented and addressed using the formal issues management process?

c. Are the processes and performance for the issues management program properly evaluated for effectiveness on an appropriate frequency?

4. Program Effectiveness - Are the contractor issues management processes effective in ensuring that site operations are performed safely, securely, and in compliance with applicable requirements?

a. Are the above issues management program elements being effectively implemented?

Contractor Worker Feedback Lines of Inquiry

1. Oversight Program - Are the processes which constitute the contractor worker feedback programs formal and documented and, when taken together, meet the requirements of DOE directives?

a. Has an effective employee concerns program been established and implemented that encourages the reporting of employee concerns and provides thorough, documented investigations, with timely and effective corrective actions and recurrence controls that are tracked to completion?

b. Are confidentiality and anonymity protections and rights to appeal clearly communicated to employees and effectively implemented during the resolution of concerns?

c. Do site processes require/encourage formal reviews or documented feedback from performers and supervision after completion of maintenance, experimental activities, or operational evolutions?

d. Has an effective differing professional opinion process or program been established and implemented, in accordance with the Contractor Requirements Document associated with DOE M 442.1 - 1, *Differing Professional Opinions Manual*? Were DPOs appropriately supported?

2. Training & Qualification - Are personnel implementing Contractor Worker Feedback program processes adequately trained and qualified to perform assigned oversight activities (in accordance with DOE 0 226.1 A, DOE M 360. I - 1 B, and DOE M 426.1-1 A)?

a. Has the contractor defined the requirements for experience, knowledge, skills and abilities for personnel implementing employee concerns and worker feedback activities?

b. Has the contractor provided and ensured completion of appropriate training for personnel implementing employee concerns, differing professional opinions, and worker feedback activities?

3. Implementation of Program Responsibilities - Are contractor employee concerns and worker feedback responsibilities appropriately implemented?

a. Are the mechanisms and processes for employees to (1) report and get resolution to safety concerns; and (2) report a differing professional opinion clearly communicated to employees through vehicles such as new employee and refresher training, posters, intranet sites?

b. Are worker feedback information, differing professional opinions, and safety concerns expressed by employees and the activities and supporting information for disposition of feedback and concerns formally documented/logged?

c. Are investigations of employee concerns, differing professional opinions, and feedback information thoroughly performed without conflict of interest and with the involvement of technical expertise as appropriate?

d. Is employee confidentiality maintained as requested and as detailed in program documents?

e. Are corrective/preventive actions taken as a result of investigating employee concerns, differing professional opinions, and feedback processes appropriate and managed in a formal manner in accordance with contractor procedures?

f. Are the resolutions of employee concerns and differing professional opinions communicated to concerned individuals with a solicitation of concurrence and identification of appeal mechanisms?

g. Are the processes and performance for the employee concerns, differing professional opinions, and worker feedback programs formally and adequately evaluated for effectiveness on an appropriate frequency?

Appendix F – Assessment Team Members

Team Members

Mr. Joseph Martore (Team Lead); CALIBRE

Mr. John Aloi; Brookhaven National Laboratory

Dr. Adam Cohen, Argonne National Laboratory

Mr. Carter Ficklen, EHS&Q, Jefferson Lab subject matter expert

Mr. Bert Manziak, ESH&Q, Jefferson Lab subject matter expert

Mr. William Rainey (Team Support); CALIBRE

The Assessment Team was also assigned technical liaisons within the ESH&Q, FEL and ENF divisions to facilitate access to documents, information, personnel and work spaces.

Joseph A. Martore

Education:
George Washington University, MBA, 1981, Finance
Massachusetts Institute of Technology, MS, 1976, Civil Engineering
Massachusetts Institute of Technology, BS, 1975, Civil Engineering

Experience:
Jul 1997 - Present
CALIBRE, Executive Vice President & Chief Operations Officer; Mar 2005 - Present. Vice President, ESRM; Mar 2004 - Feb 2005. Strategic Management Initiatives, Inc. (SMI); President; Jul 1997 - Feb 2004 (SMI merger with CALIBRE Mar 2004)

As Executive Vice President & Chief Operations Officer, Mr. Martore provides leadership on the sales and delivery plans and business functions of CALIBRE's operational elements, including seven domains and one wholly owned subsidiary. The operational elements include: installation and land management; resource and force management; environmental programs and services; logistics management; financial and cost management; legacy infrastructure transformation; risk management and acquisition support; and Cizer - A CALIBRE Company, which offers business intelligence analytics to government and businesses. Mr. Martore also provides senior management consulting services to the Federal government and Fortune 500 companies, primarily in the areas of business performance systems and improvement, integrated safety management, management assessments and performance measurement, and environmental program compliance and remediation. He has provided executive-level assessments and support in developing Integrated Safety Management Systems at Fermilab, Hanford and Rocky Flats; and developed strategies associated with nuclear facilities and nuclear safety basis documentation. As a principal consultant to the Department of the Army, he supports development of policies and strategies for implementing Base Realignment and Closure (BRAC), including communication strategies and real property transformation. He has developed strategic plans and business performance measures for the Army, U.S. Department of Energy (DOE), and commercial utility organizations, and directed the strategic business process re-engineering of the DOE Rocky Flats Field Office, including recommendations on Federal staff functions, organizational structure and skills needed to accomplish future missions. He has also supported the Army and DOE in meeting planning, budgeting and reporting objectives consistent with the Government Performance and Results Act (GPRA). Mr. Martore is a member of the Massachusetts Institute of Technology's Engineering Systems Division Alumni Advisory Council and currently holds a secret clearance with the Department of Defense.

Jan 1992 - Jul 1997
Management Strategies, Inc.
Principal

Provided senior management consulting services to DOE and its operating contractors, primarily in the areas of cost-effective programs and business practices to achieve improved performance, and devising strategies to promote improved environment, safety

and health performance under increasing regulatory oversight. Assisted DOE in establishing a complex-wide planning process to integrate environment, safety and health requirements into overall program activities, including use of risk-based assessment and resource allocation techniques. Provided senior-level management support for the integration of management processes into existing business operations, and conducted senior management performance assessments.

Mar 1981 - Jan 1992
TENERA, L.P.
Senior Vice President

Provided management consulting, engineering and technical support, operations improvement programs, and safety assessments for commercial nuclear utilities, the Federal government and its operating contractors. Served as engagement manager for a triennial performance assessment for Kaiser Hanford. Provided expert analysis in support of nuclear power plant rate case and prudence hearings for Pacific Gas & Electric Company, Washington Public Power Supply System, and Houston Lighting & Power Company. Developed and implemented risk-based prioritization programs in use at several nuclear facilities and served as the founding Chairman of the Rocky Flats Issue Evaluation Team that performed risk evaluations of operational impacts of plutonium safety issues. Provided senior level support for the development of strategies to address licensing issues related to advanced reactor concepts. Responsible for developing programs to support nuclear utility senior management in response to technical, operational and regulatory issues. These programs included both regulatory and operational effectiveness support and combined computer assisted programs for regulatory commitment management with senior-level technical expertise. Served as program manager supporting restart program initiatives for Philadelphia Electric Company and Niagara Mohawk, including development of regulatory position papers and performance of operational readiness reviews. Managed and implemented engineering services on a wide range of nuclear regulatory, licensing and technical safety issues. Topics included structural design and heavy load drop analysis, emergency preparedness, operational issues, safeguards and security evaluations and computer-assisted regulatory requirements management programs.

Feb 1979 - Mar 1981
Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission
Technical Assistant to the Director

Provided technical analysis and advice for the regulation of nuclear reactor licensing and operations, including Systematic Assessments of Licensee Performance (SALP) and conduct of research programs at DOE National Laboratories. As Licensing Project Manager, managed and participated in the safety and environmental evaluations of applications for commercial nuclear plant operating licenses. Structural Engineer responsible for the analysis and evaluation of safety issues for commercial nuclear and research facilities, and acted as a principal witness for the Nuclear Regulatory Commission (NRC) on these issues at public hearings and before the Advisory Committee on Reactor Safeguards.

Mar 1976 - Feb 1979
Stone and Webster Corporation
Structural Engineer

Responsible for the analysis and design of nuclear power plant structures, systems and components. Areas of emphasis included safety analysis documentation, soil structure interaction, seismic engineering and design of safety related structures for extreme loadings

Jul 1974 - Feb 1976
North East Post-tensioning Consultants, Inc.
Field Engineer

Responsible for structural design and construction management of engineered facilities.

John Aloi, CSP, CHMM
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PROFILE

- **Twenty years experience developing and managing Environmental, Safety and Health (ES&H) programs**
- **MS Degree** *in Occupational Safety and Health/Environmental Management*
- **CSP** - *Board Certified Safety Professional #16092 (Comprehensive Practice; Jan. 2000)*
- **CHMM** - *Board Certified Hazardous Materials Manager #10838 (Master Level; May 2001)*
- **ISO 14000 -** *Internal Auditor (Sep. 1999)*
- **HAZWOPER Certified-** *40 Hour & First Responder Operations Level (current)*
- **OSHA Training** - *30 Hr General Industry (Nov. 2003) and 30 Hr Construction Safety (Feb. 2004)*
- **Fall Protection Competent Person Certified**
- **Brookhaven National Laboratory Supervisor Certificate**
- **American Society of Safety Engineers Accident Investigation Certificate**

PROFESSIONAL EXPERIENCE

Safety Officer
Brookhaven National Laboratory (BNL): National Synchrotron Light Source Department (NSLS)
November 2006 to Present

- ***Manage accelerator and facility ES&H issues:***
  - Provide staff with technical advice and guidance to ensure compliance with federal, state, and local ES&H regulations.
  - Identify and evaluate risks associated with operating and maintaining the accelerator.
  - Develop and implement ES&H polices and procedures to assure proper management of ES&H risks and regulatory compliance responsibilities.
  - Apply Integrated Safety Management (ISM) principles to work planning and scientific work proposals.
  - Participate in the development and deployment of the BNL Environmental Management System (EMS) ISO 14001 and the Occupational Health and Safety Management System (OHSAS) ISO 18001.

- ***NSLS Electrical Safety Officer:***
  - Provide staff with technical advice and guidance to ensure compliance with NFPA 70 and 70E requirements.
  - Develop and implement NSLS electrical safety procedures.
  - Review and approve energized work permits.
  - Perform electrical PPE safety training.
  - Complete electrical safety inspections and track findings to completion.
  - Manage the NSLS Lock Out / Tag Out program.
  - Authority having jurisdiction for electrical equipment inspections and approvals.

- ***Laser Safety Coordinator:***
  - Point of contact for all NSLS laser safety matters.
  - Monitor and evaluate laser hazards and assist the owner of laser systems in developing safe laser use procedures.

- ***Radiation Safety Coordinator:***
  - Ensure radiation shielding configuration control is maintained.
  - Establish, implement, and maintain a radiation safety control and assessment program in conjunction with the BNL Radiation Control Division personnel.

- ***Manage the following personnel:***
  - NSLS Deputy Safety Officer
  - NSLS Safety Engineer
  - Radiation Control Division Representative and Technician
  - Industrial Hygienist Representative
  - Environmental Compliance Representative

ES&H Specialist
BNL: NSLS
October 1995 to November 2006

- ***Direct the NSLS Waste Management Program:***
  - Maintain compliance with RCRA hazardous waste regulations through management of the 90-day area and 22 satellite accumulation areas.
  - Act as technical resource to management and staff concerning waste management regulations.
  - Perform hazardous waste management training.
  - Analyze waste generation trends, write reports, and submit pollution prevention/waste minimization funding proposals to the BNL P2 Committee.

- ***Manage the NSLS ES&H Inspection Program:***
  - Perform ES&H audits; identify potential personnel hazards and environmental concerns.
  - Identify appropriate controls for risk minimization and regulatory compliance.
  - Developed the NSLS ES&H inspection database to track findings and generate trending reports for management.

- ***Administer the NSLS Chemical Management and Pollution Prevention Programs:***
  - Assure proper storage of hazardous materials.
  - Minimize hazardous material storage.
  - Conduct chemical inventory audits.

Operations Coordinator
BNL: NSLS
October 1993 to October 1995

- ***Coordinate the safe operations of accelerator and experiment beam lines:***
  - Monitor the safe operation of 53 x-ray and 13 vacuum ultra-violet beam lines.
  - Assure accelerator and beam line shielding configuration control.
  - Respond to hazardous chemical spills, radiation issues, vacuum system problems, fire alarms, and water leaks.
  - Conduct regular safety tours of the facility.
  - Provide support and monitoring for the Liquid Hydrogen Target Facility.
  - Trained as accelerator operator.

Health Physics/Industrial Hygiene Technician
BNL: Reactor Division, Physics Department, & NSLS
April 1987 to October 1993

- ***Provide Health Physics Technician support:***
  - Perform and document radiological surveys.
  - Analyze samples for contamination and evaluate the need for personal protective equipment.
  - Assure compliance with BNL radiation protection requirements.
  - Process radiation work permits.
  - Analyze personnel monitoring data and perform exposure investigations.

- ***Provide Industrial Hygiene Technician support:***

- Collect industrial hygiene samples for laboratory analysis.
- Assist the department with the interpretation of sample results.
- Perform and document industrial hygiene surveys for asbestos, noise, chemical exposure, and magnetic field exposure.
- Assure adherence to industrial safety practices required by ES&H regulations.

EDUCATION

MS - ***Occupational Safety & Health/ Environmental Mgmt.***, Columbia Southern University, Orange Beach, AL
BS - ***Computer Information Systems***, University of the State of New York, Albany, NY
AS - ***Engineering Science (Electrical)***, Suffolk County Community College

ADAM COHEN
Argonne National Laboratory
(630) 252-3504
acohen@anl.gov

Career Highlights: Over 20 years in strategic planning and management at Argonne National Laboratory, the nuclear industry, and the U.S. Navy.

Relevant Positions Held

Senior Advisor to DOE Under Secretary for Science (Dr. Raymond Orbach) for nuclear energy programs
Chief Operations Officer (Argonne), with a workforce of 1,000 and annual budget of $100M
Argonne Integrated Safety Management ALD, with a staff of 80 and annual budget of $8M
Manager/Principal Investigator, Alpha-Gamma Hot Cell Facility (DOE Category 2, nonreactor nuclear facility), with a staff of 10 and an annual budget of $2M
Manufacturing Engineer, Naval Nuclear Fuel Division, Babcock & Wilcox
Submarine Officer, U.S. Navy, with a workforce of up to 10

Education:

PhD (with distinction), Materials Science and Engineering, 1997, Northwestern University
MBA (with honors), 2000, University of Chicago
BS (with honors), Metallurgy, 1985, Columbia University

Security Clearance: Department of Energy (DOE) Q

Publications: Authored/co-authored over 15 journal articles, conference papers and presentations in nuclear/materials research, safety implementation, and operation.

Argonne Deputy Associate Laboratory Director for Physical Sciences, 10/2006-Present - Responsible for planning, coordination, and management of Argonne basic research program in Nuclear Physics, High Energy Physics, Chemistry, Materials Science, Nano-scale Materials, and Education Programs. Detailed to DOE as a senior advisor to the Under Secretary for Science (Dr. Raymond Orbach) to provide assistance in developing the nuclear energy programs and coordinating the interface between DOE/NE and the Office of Science.

Major Accomplishments

Primary interface between DOE's Office of Science and DOE's Office of Nuclear Energy on the Global Nuclear Energy Partnership (GNEP) program. Helped define the research portion of the program.

Argonne Chief Operations Officer, 5/2004-9/2006 - Responsible for planning, coordination, and management of Argonne project management and plant operations involving 100 buildings (4.6 million sq.ft.), utilities, construction, and Laboratory support services including finance, human resources, security, and technical services. Manage compliance with ESH&Q regulations, oversight of 15 major subcontractors, and an annual budget of $100M. Prime interface with DOE Site Office for all Laboratory operations. Also interface with DOE HQ, Argonne Board of Governors, counterparts at other national laboratories, Energy Facilities Contractors Group (EFCOG), and National Laboratory Improvement Council (NLIC).

Major Accomplishments

Lead for preparing business operations sections of proposal and for preparing all key personnel for the University of Chicago's Argonne Management and Operating (M&O) Contract re-bid effort. Worked on the University of Chicago proposal for the Fermi National Accelerator Laboratory contract. Both proposals were awarded to the team led by the University of Chicago.
Reorganized and streamlined operations, eliminating levels of management and duplication of effort in various divisions, resulting in a 15% reduction in annual budget.
Established and staffed the Project Management and Engineering Division.
Led the development of the first 10-year Site Plan.
Led the effort to re-bid Argonne medical and dental contracts, reducing costs by $13M over 3 years.
Led the effort to increase plant reinvestment and maintenance from 1.4% to 2% of replacement value.

Management lead in achieving ISO 9001 certification of engineering group.
Reduced the TRC for overall operations from 3.75 to 1.7 and for plant facilities from 6.0 to 1.9.
Achieved "Outstanding" performance ratings from DOE in all 13 mission critical and general operations areas in 2005.

Argonne Integrated Safety Management Assistant Laboratory Director, 12/1999-5/2004 - Planned, coordinated, and had management oversight of Argonne's ISM, ESH&Q, and emergency management programs. Provided ESH&Q services to operating units, including industrial safety, industrial hygiene, assessments, PAAA evaluations, corrective actions, environmental monitoring, environmental compliance, radiological assistance, and training. Served as PAAA Coordinator for the Laboratory.

Major Accomplishments

Led Argonne through DOE Integrated Safety Management (ISM) verification, Environmental Management System Approval, and Emergency Management Program development.
Led Argonne to first "Outstanding Rating" ever in Integrated Safety Management.

Argonne Manager/Principal Investigator, 2/1991-12/1999 - Managed the operation and maintenance of the Alpha-Gamma Hot Cell Facility, a DOE nonreactor nuclear facility, and ensured compliance with ESH&Q requirements and 10 CFR regulations. Performed research on nuclear fuels and irradiated materials, including simulation of Loss of Coolant Accident (LOCA) on high burn-up Light Water Reactor (LWR) cladding specimens, corrosion of irradiated aluminum, fission gas release from aluminum dispersion fuels, compatibility between metal fuel and stainless steel cladding for Fast Breeder Reactors, and irradiation effects on fuel structure. Also served as principal investigator performing failure analyses of nuclear components for utility companies.

Major Accomplishments

Led the Alpha-Gamma Hot Cell Facility through the first PAAA program review and the Tiger Team review.
Key contributor to winning proposal for NRC high burn-up program.
Wrote Safety Analysis Report IAW DOE Order 5480-23 requirements (now 10 CFR 830) that was recognized by DOE as a model for other facilities.

Babcock & Wilcox, Naval Nuclear Fuel Division, Manufacturing Engineer, 7/1988-9/1989 - Lead engineer in job shop environment, producing nuclear fuel elements for test and research reactors (aluminum clad and roll-bonded fuel elements).

Major Accomplishments

Developed and manufactured several new fuel plate types for unique research reactors.
Successfully completed 4 Advanced Test Reactor fuel element campaigns.
Conducted 62 presentations to United Way groups from 10 to 300 people.

U.S. Navy, Assistant Operations Officer/Reactor Controls Assistant, 6/1984-6/1988 - Responsible for reactor controls and related electronics and radiological control. Also responsible for submarine deployment planning.