Jefferson Lab
Thomas Jefferson National Accelerator Facility
Exploring the Nature of Matter

September 30, 2009

Mr. James A. Turi, Manager
Thomas Jefferson Site Office
12000 Jefferson Avenue, Suite 14
Newport News, Virginia 23606

Dear Mr. Turi:

Subject: Annual Integrated Safety Management (ISM) Expectations and Declaration

Section I.100 (e) of the contract between DOE and Jefferson Science Associates for the operations of Thomas Jefferson National Accelerator Facility (TJNAF) requires an annual effectiveness review of TJNAF's Integrated Safety Management System (ISMS). The review is attached for your information. The review was based upon the numerous assessments conducted throughout the past 12 months.

Based upon our past and continued success in meeting the safety and health measures established in the PEMP, the FY2008 ES&H score JSA received from you, and the results of this effectiveness review, we have concluded that the TJNAF ISM system is effective and only minor, administrative changes to the TJNAF ISM Program Description are needed at this time.

We continue to monitor and measure our ISM implementation through a variety of means including PEMP measures, issues management, and work observation tracking and trending. JLab remains committed to ISM implementation and in FY10 we expect to:

- continue our implementation of the actions in response to the June 2008 DOE-HSS review;
- continue reinforcement of ISM principles and core functions with our employees and management; and
- continued monitoring of the performance of our construction safety program.

Sincerely,

COO

Hugh Montgomery
JSA President and Laboratory Director

Enclosures:
(A) Jefferson Laboratory 2009 Integrated Safety Management System Effectiveness Review (MSA-2010-01)
(B) Independent Assessment Report; Integrated Safety Management System Effectiveness Review (IA-2009-09)

cc w/ enclosure:

Michael Dallas
Mary Logue

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Jefferson Lab Thomas Jefferson National Accelerator Facility	TITLE:	MANAGEMENT SELF-ASSESSMENT REPORT	
	ASSESSMENT # (obtained from QA/CI)	MSA-2010-01	Page 1
ASSESSMENT TITLE	Jefferson Laboratory 2009 Integrated Safety Management System Effectiveness Review	DATE	09/30/09

Purpose & Scope:
See attached: *Jefferson Laboratory 2009 Integrated Safety Management System (ISMS) Effectiveness Review*
Summary of Assessment:
See attached: *Jefferson Laboratory 2009 Integrated Safety Management System Effectiveness Review*
Results:
See attached: *Jefferson Laboratory 2009 Integrated Safety Management System Effectiveness Review*
Effectiveness Evaluation:
See attached: *Jefferson Laboratory 2009 Integrated Safety Management System Effectiveness Review*

Performed by: _____ **Date:** 9/30/09
Lead Assessor

Reviewed by: _____ **Date:** 9/30/09
Manager, QA/CI

Reviewed by: Mary Wayne **Date:** 9/30/09
Associate Director

Approved by: _____ **Date:** 9/30/09
Chief Operating Officer or Chief Scientist

Introduction

Jefferson Laboratory's (JLab) Integrated Safety Management System (ISMS) Program Description (PD), Section 6.2 describes the factors to consider during this review and this report is organized around these subjects:

- Mission or operational changes
- Organizational changes
- Environmental, Safety and Health (ES&H) trends
- Assessment results
- Lessons learned
- Safety measures and goals
- Best practices

An additional section, titled **2009 ISMS Areas of Emphasis,** has been added to address important issues not specifically called out in the ISMS PD.

To assure the appropriate level of rigor for the 2009 effectiveness review, a team was formed and charged to determine the extent and effectiveness of the integration of safety, health, and environmental protection into all management and work practices. This team issued its results in Attachment B of this package, *Independent Assessment Report; Integrated Safety Management System Effectiveness Review* (IA-2009-09, September 22, 2009).

The conclusions of this report, as well as other relevant reports and observations, were considered during the preparation of this Attachment.

Mission and Operational Changes

With the start of Experimental Hall D and Central Helium Liquefier (CHL) construction in 2009, the expansion of JLab's mission took on a physical presence. This active construction, to be followed by similar activities such as the Technology and Engineering Development Facility (TEDF) project, present challenges to JLab's ISMS that are different from normal operations. Consequently, system analysis and modification (when necessary) occurred to assure the Lab's ISMS met these changing conditions.

Feedback on this operational element was collected during a 2009 management self assessment titled *Construction Safety Assessment* (MSA-2009-02). This assessment evaluated previous revisions to the Subcontracting Officers Representative (SOTR) program and training requirements. In addition, ES&H Manual Chapters 3410 and 3420 were reviewed and revised into a singular document. It incorporates the ISM core functions as they are flowed down to subcontractors.

Overall mission and operational changes were also evaluated from an ISMS perspective during IA-2009-09. The evaluation focused on the planning and execution of the Hall D and CHL construction projects, and interviews were held with Jefferson Science Associate's (JSA) Project Manager and Project Safety Manager. The general conclusion of the review team was *"Mission and operational changes are being properly evaluated and addressed within the ISMS."*

The team did identify a relevant opportunity for improvement related to this area: "*Given the ramp-up in construction activities, an area for attention appears to be clarification of the ESH standards and requirements as they apply to construction subs specifically where those standards and requirements differ from normal lab procedure."* This opportunity for improvement will be vetted and follow on actions will be tracked in JLab's Corrective Action Tracking System (CATS).

The ISMS is implemented within the Lab's construction activities as follows:

Core Function #1 – Define the Scope of Work

The Department of Energy's (DOE) project management process requires that ESH&Q planning is incorporated from project inception. In the case of the Hall D, CHL, and TEDF projects, ESH&Q subject matter experts reviewed and provided input to the project architect and engineer (A&E) at the earliest design stages. JLab's Project Safety Manager was on the Source Selection Board for general contractor and a best value contract allowed for incorporation of safety performance in selection process.

Project performance to date indicates that the scope of work was adequately defined from a health and safety perspective.

Core Function #2 – Analyze the Hazards

ES&H Manual Chapter 3410, *ES&H Aspects of Procurements*, requires that each construction project undergoes a hazard analysis (per ES&H Manual Chapter 3210, *Hazard Identification and Characterization*). Appendix T2 of that procedure includes a checklist that dictates the level of ES&H planning necessary for various project levels. The analysis conducted for the project Safety Plan is further supported by pre-job Activity Hazard Analyses (evaluated jointly by the general contractor (GC), Construction Safety Representative, SOTR, and Project Safety Manager). The 2009 construction activities utilized this process.

Core Function #3 – Develop and Implement Hazard Controls

Safety and environmental requirements were incorporated into Division 1 Master Specifications and a Subcontractor Safety Plan and Environmental Protection Plan was required of the 12 GeV Upgrade Project general contractor. The plans were reviewed and commented on by ESH&Q before acceptance. With a few exceptions, hazard controls have been successfully implemented on these construction projects.

Core Function #4 – Perform Work Within Controls

On current construction projects, the Subcontractor Safety Plan and the Environmental Protection Plan are utilized to implement operational control from an ISMS perspective. The construction schedule and supporting pre-job Activity Hazard Analysis are communicated to the construction staff and JLab representatives. Work observations, conducted by the general contractor, JLab personnel and representatives, and DOE's Thomas Jefferson Site Office (TJSO) are routine. With a few exceptions, work has been performed within controls.

Core Function #5 – Feedback and Continuous Improvement

In addition to the work observations and resulting feedback, there are numerous additional feedback loops including daily, weekly, monthly project meetings; DOE's "Lehman" reviews; incident reports, and interface with the JLab corporate operating experience system.

Organizational Changes

There were no major organizational changes in 2009. The addition of Dr. Hugh Montgomery as the new Laboratory Director resulted in minor revisions to the Lab's ESH&Q policy. This revised policy has been communicated throughout the lab and will be included in the next revision to the ISMS Program Description.

ES&H Trends

JLab's 2009 trend analysis efforts were refocused on key two areas: data organization and communication. Safety data, collected across multiple sources, was collated and reorganized to show 12 month rolling averages. This new presentation method allowed the Lab to quickly identify and communicate trends. Additionally, the trend analysis results are now being presented to the Workers Safety Committee, Safety Wardens, and Director's Safety Council.

2009 trend analysis supported a site wide, preventative approach to safety issues. Following the implementation of a site wide medical reporting emphasis campaign in November 2008, medical reporting increased almost 400% over a one year period, while DART and TRC rates remained comparable to previous years. This increased level of data allowed JLab to identify two significant trends: slips, trips and falls, and hand injuries. These trends were then analyzed for prevention of recurrence.

Via JLab's Issues Management System, a site wide survey was conducted for placement of non-skid in high risk areas; implementation has occurred throughout the year. Since implementation, there have been no slip, trip or fall incidents. Hand and finger injuries were addressed via the assignment of an ESH&Q liaison to each JLab division. These liaisons worked with each Division Safety Officer to evaluate and provide tailored solutions for division-specific injuries. Efficacy of hand and finger solutions is still being evaluated.

Planned trend analysis program improvements include more targeted analysis for high risk activities, similar to our efforts with hand and finger injuries, as well as deeper penetration of trending information to the supervisory workforce. We believe these improvements, when combined, will result in work process improvements and provide an added level of Safety awareness throughout the site.

Assessment Results

There were a total of 13 ISMS related formal assessments in 2009. Internal assessments were also conducted to identify and close data gaps to assure program compliance with:

- DOE O 226.1, Contractor Assurance
- DOE O 210.2, Corporate Operating Experience
- DOE O 414.1C, Quality Assurance
- DOE O 450.1A, Environmental Protection Program

Other key assessments conducted in 2009 include those necessary to update the Final Safety Assessment Document (FSAD), Accelerator Safety Envelope (ASE) and the Emergency Management Plan.

Floor level assessments, with real time feedback, are also a routine part of ISMS implementation. Safety observations, using JLab's version of the DuPont STOP method, were conducted 969 times in 2009. 154 of these observations led to the correction of a safety issue. JLab's Safety Wardens are also an active component of the assessment program, completing 895 inspections across the entire lab footprint. 273 of these inspections resulted in the identification of safety improvements.

Actions in response to the June 2008 ES&H inspection by DOE's Office of Health Safety and Security (HSS) were executed as planned. The joint JSA/TJSO project team coordinated action scoping, review, and approval activities leading to the on-time (in some cases early) closure of all 16 actions scheduled for FY09. In addition, a disposition record was created for all Opportunities for Improvement cited in the 2008 HSS report resulting in 13 CATS actions. Of these 13, 8 were completed, on or ahead of schedule, in FY09.

The IA-2009-09 review team concluded "*Records indicate that the Lab has made significant investment in the ISMS over the past several years including numerous reviews of system components. Presentations by Quality Assurance/Continuous Improvement (QACI) staff revealed numerous executed and planned reviews, perhaps too many."* Balancing the total number of annual reviews against the rigor of both execution and recovery is a recognized challenge – especially given current and expected resource constraints. Efforts began in 2009 to analyze the assessment workload from a risk perspective to assure that high risk program elements received priority when scheduling future assessments.

Despite this conflict, the assessments and corrective/preventive actions completed in 2009 yielded tangible ISMS improvements:

- Consolidation of the Lab's Work Planning, Control, and Authorization process with the Activity Hazard Analysis (consistency of these tools will continue to be a focus area)
- Improvements to the Lab's Issues Management and Event Investigation and Reporting programs
- Evolution of the Lab's forklift operations, maintenance, and training program
- Development of an Executable Plan for achievement of energy and transportation efficiencies
- Revision to the processes to evaluate and document the Lab's Significant Environmental Aspects, and Environmental Management System (EMS) Objectives & Targets to better align with ISO 14001
- Revision to the planning of the Assessment Program to actively seek and use Divisional input of Self Assessment topics
- Integration of the features of the Computer Sciences Corporation's AQIS system into JLab CATS
- Implementation of Real Time Safety Metric Meters

Lessons Learned

Although lessons learned have always been collected and shared within every organization at JLab, an effort has been made over the past 24 months to share these lessons across the organizations. The Lab's corporate operating experience program was successful in both collecting and sharing information within and outside the Lab in 2009.

JLab has made nine inputs to the DOE Operational Experience (OPEX) site over the past 12 months with topics including personnel safety, equipment safety, and process efficiencies. 58 entries have been made into the JLab database over the past 12 months. 22 of those entries came from external sources, including other DOE Complex sites, the US Chemical Safety Board and local newspapers.

An example of the positive impact of this system includes the handling of information from an electrical near miss at Oak Ridge. The JSA Lessons Learned Coordinator arranged for photos of similar JLab equipment to be photographed and attached to the lessons learned entry. The Electrical Safety Committee then reviewed this item (CATS number IA-2008-19) to ensure that any similar issues were identified and addressed.

Participation within the lab has also improved with seven of the nine divisional coordinators contributing lessons learned for the consideration of the larger lab population. Quarterly hits to the JLab corporate operating experience site have averaged about 600 over the last two quarters, and feedback from the site is that the Lessons Learned information is being used for work planning. Planned improvements to this system includes more detailed metrics to measure the extent to which lessons learned are benefiting work planning activities.

The IA-2009-09 review team concluded "*The Operating Experience program is operating as designed and JLab is a full participant when sharing outside lessons.*" An independent effectiveness review conducted in July 2009 reached a similar conclusion (IA-2009-07).

Safety Measures and Goals

JLab performs to both internal and external ES&H measures and goals. A safety measure was developed in 2009 to track medical reporting, with the goal of increasing reporting so leading indicators could be established. This goal was met, with an increase of 400% over the previous period. Another internal measure was the number of safety observations conducted by each organization – again the goal was met.

The Lab was also successful in meeting the goals established in partnership with TJSO. As mentioned earlier, both TRC and DART metrics exceed the goals by a significant margin. The Lab also met its goals related to the lessons learned program, work observations, performance on corrective action plans, meeting the deliverables associated with the 2008 inspection of JLab's ESH&Q programs by DOE's Office of Health, Safety, and Security (HSS), performance of the Environmental Management System, performance of effectiveness reviews, and goals associated with the Emergency Management Program.

Best Practices

There was a continual, active search for ISMS best practices throughout 2009. JLab staff participated in various meetings and conferences hosted by DOE, Energy Facility Contractors Group, Society of American Value Engineers, Advancements in Nuclear Instrumentation, Measurement Methods and their Applications (ANIMMA). Focused programmatic benchmarking activities also occurred related to ESH&Q communications practices, EMS processes, event investigation and reporting, and readiness reviews.

Benchmarking was a critical component of JLab's Independent Assessment *Integrated Safety Management System Effectiveness Review* (IA-2009-09); accomplished through the inclusion of team members from Princeton Plasma Physics Laboratory and DOE's Strategic Petroleum Reserve.

2009 ISMS Areas of Emphasis

The 2008 ISMS Effectiveness Review and related dialog identified 6 specific areas for possible program improvement in 2009. A seventh area was added based on subsequent discussions.

FIRE PROTECTION – As discussed above, an Implementation Plan was developed to assure program effectiveness and compliance with DOE O 420.2B. In February 2008, a Fire Protection Program Assessment was conducted which identified, among other things that "Programmatic Discipline" was misaligned. Additionally the need for an Exemption Request for Experimental Halls was identified. This has been completed and JLab is currently seeking to hire additional staff.

A Baseline Needs Assessment (BNA) was completed. The BNA determined that the off site emergency response organizations have sufficient resources to respond to an emergency at JLab. A contract technical writer was brought on board to assist the Facilities and Logistics Management organization in bringing their program documentation into compliance with DOE Order 420.1B

MATERIAL HANDLING – Corrective actions stemming from the HSS ES&H Inspection (June 2008) were completed in 2009 and resulted in significant improvement to the way the Lab manages forklifts and forklift attachments, inspects the equipment, and trains operators.

ACCELERATOR SAFETY - The Final Safety Assessment Document was revised to comply with the Accelerator Safety Order and the resulting Accelerator Safety Envelope was approved by TJSO on April 14, 2009. In support of this effort, the Lab's Unreviewed Safety Issue Procedure was revised and key personnel were trained on all of these systems and processes in 2009. JLab personnel also participated in an Acceleratory Safety Order workshop, hosted by Brookhaven National Laboratory, in 2009.

The FSAD, the ASE, and the USI process were improved throughout 2009 based on external comments and operational experiences. The USI process was utilized in 2009 and resulted in the identification of several administrative ASE violations . The resulting analysis identified necessary changes to the FSAD

related to definitions and language associated with credited controls. These changes will be reflected in the next revision. Additional FSAD related analysis was conducted by the Safety Concerns Management Board which convened and analyzed concerns with a potential excavation activity. The board developed corrective actions which were implemented.

EVENT INVESTIGATION - Corrective actions stemming from the HSS ES&H Inspection (June 2008) occurred or were completed in 2009. Improvements included benchmarking activities and revision of program processes to clarify roles & responsibilities, and improve consistency and rigor of investigations and reports. These and other program improvements will continue in 2010.

There were several off-normal events in 2009, grouped in two major classifications; (1) configuration control, and (2) buried utility identification. In all cases, appropriate investigation and follow-up occurred in accordance with JLab procedures. Program improvements, such as the formation of the Configuration Management / Configuration Control Team, will continue to be identified and developed.

Two events provide examples of configuration control issues. In February 2009, a refrigeration system failure caused the system temperatures, and thus pressures to increase on a module undergoing test in the Cryomodule Test Facility (CMTF). The imposed pressure caused the supply u-tube to slip out of its mating bayonet, which created a significant leak path and potential oxygen deficiency hazard to personnel and possible equipment damage (Notable Event Report ACC-09-0210). In July 2009, test personnel found that the FEL Radio Frequency (RF) zone 3 waveguide pressure interlock installation was non-standard. This condition resulted in multiple failure modes such that it would not have tripped if a waveguide were open (Notable Event Report ENG-09-0274).

There were also several off-normal events associated with buried utilities. In March2009, workers cut one of three previously unknown insulated electrical conductors during excavation behind Building 28. The cabling had not been identified during previous utility identification by a subcontract utility location service (Notable Event Report FML-09-0401). In July 2009, a buried energized electrical conduit was damaged by a backhoe working inside the Accelerator fence. Event investigation noted that the soils pile from the excavation was placed too close to the trench, despite repeated cautioning by oversight personnel, and had significantly obscured the survey markings indicating the location of the buried power line (Notable Event Report FML-09-0727).

ISSUES MANAGEMENT - Corrective actions stemming from the HSS ES&H Inspection (June 2008) occurred or were completed in 2009. Improvements included the linking of disparate data sources so more data could be analyzed. A CATS Users Group was formed to get floor-level feedback on system improvements. Program documents have been reviewed and revised to clarify requirements, roles and responsibilities. Programming efforts to coordinate information between CATS and Maximo have resulted in more efficient methods to enter work orders for ES&H concerns.

Data indicates that employees are demonstrating an increased willingness to report, not just concerns, but solutions. Continued areas for improvement include clarification of the reporting mechanism(s) and establishing an agreed timeline regarding incident related communication with TJSO.

TRAINING AND QUALIFICATIONS – Although the various reviews and assessments seem to agree that JLab employees are properly trained, several noted disjointed documentation of training requirements and status. In response, JLab has developed a web-based Employee Job Task Analysis (EJTA) process that facilitates employee – supervisor interaction to analyze position-specific hazards and establish and track required training. The IA-2009-09 review team concluded *"The EJTA tool demonstrated to the team is a best management practice."* Implementation is expected in early FY10.

ENVIRONMENTAL MANAGEMENT SYSTEM

JLab invested significant resources into the EMS during 2009. This investment was aimed towards (a) improving the systems' processes and products to better support management decisions; and (b) bringing the system more in line with International Organization for Standardization (ISO) standards.

Improvement activities were identified through two major sources:

1. Implementation Plan for DOE O 450.1A – the requirements analysis and resulting implementation plan identified data gaps between the previous environmental protection system and the revised order. Overall, 25 EMS-related procedures were reviewed and modified where necessary.
2. Validation of Thomas Jefferson National Accelerator Facility (TJNAF) EMS Report - In April 2009, TJSO led an audit to determine the level of JLab's EMS conformance with DOE O 450.1A, *Environmental Protection Programs*. Although the EMS was declared in conformance, there were several findings and opportunities for improvement that are currently being resolved through an approved Corrective Action Plan.

As a result of both of these reviews, as well as staff and management observations, EMS processes were revised to improve the:

- Identification of significant environmental aspects
- Identification and implementation of EMS objectives
- Lab-wide understanding of the workings of the EMS and how all workers, users, and contractors should be involved

2010 focus will be on refining the revised processes, establishing and implementing appropriate improvement targets, communicating key EMS information to staff, users, and contractors, and improved integration of EMS elements into existing ISMS programs.

Conclusion

Information generated internally and from external sources support a conclusion that JLab's ISMS has attained the rating of "Effective Performance – ISM is being effectively implemented" (DOE M 450.4-1).

2009 programmatic improvements were numerous and included the following:

- The construction safety system was analyzed, improved, and continually monitored in recognition of this operational change
- 2009 trend analysis supported a site wide, preventative approach to safety issues
- Evolution of the Lab's forklift operations, maintenance, and training program
- The Final Safety Assessment Document was revised to comply with the Accelerator Safety Order and the resulting Accelerator Safety Envelope was approved by TJSO on April 14, 2009.
- Development of an Executable Plan for achievement of energy and transportation efficiencies
- Revision to the processes to evaluate and document the Lab's Significant Environmental Aspects, and EMS Objectives & Targets to better align with ISO 14001

Future opportunities for improvement were identified and are scheduled:

- Planned trend analysis program improvements will include more targeted analysis for high risk activities, similar to our efforts with hand and finger injuries, as well as deeper penetration of trending information to the supervisory workforce
- Establishing metrics to measure the extent to which lessons learned are benefiting work planning activities
- Continued development of the Employee Job Task Analysis process to facilitate employee – supervisor interaction to analyze position-specific hazards and establish and track required training
- Clarification and communication of the issues reporting mechanism(s) and establishing an agreed timeline regarding incident related communication with TJSO
- EMS improvements will continue to be a focus area, with an emphasis on refining the revised processes, establishing and implementing appropriate improvement targets, communicating key EMS information to staff, users, and contractors, and improved integration of EMS elements into existing ISMS programs

This overall rating of effective performance is supported by the conclusion of the independent assessment team convened in late 2009: *"The team's overall conclusion is that the ISMS is in place and operating effectively. This conclusion is based on the following key results:*

- *Lab leadership has inspired, built, and upholds a penetrating culture which nurtures positive ESH behaviors and practices;*
- *Management demonstrates a strong, genuine, continuous and personnel commitment to ISMS elements;*
- *The workforce believe that the Lab is a safe place to work and they are responsible for their safety and those around them;*
- *Performance is being measured and trended consistently and leading to system improvements;*
- *Mission and operational changes are being properly evaluated and addressed within the ISMS."*