

## **Integrated Safety Management – A Tool That Works!**

**George F. Stalnaker  
Safety Manager - Aiken  
Parson Corp.**

**Steven J. Wilson, CSP (Construction Safety)  
Industrial Safety Professional  
Lawrence Livermore National Laboratory**

### **Integrated Safety Management System – What is it?**

ISM is a safety system instated by the Department of Energy for all DOE facilities and contractors doing work for DOE. This was put into place in the late nineties to help integrate safety through out the management system.

The objective of Integrated Safety Management as stated by DOE, “The Department and Contractors must systematically integrate safety into management and work practices at all levels so that missions are accomplished while protecting the public, the worker, and the environment. This is to be accomplished through effective integration of safety management into all facets of work planning and execution. In other words, the overall management of safety functions and activities becomes an integral part of mission accomplishment.”<sup>1</sup>

NIF adopted this model ES&H System implemented by the Lawrence Livermore National Laboratory and embellished it to insure a turn around from their Status Quo Safety Program into one now recognized as a World Class Safety achievement. The NIF Safety process focuses on the Goal of “ZERO”. ISM requires that Line Management (all levels from Project Manager to the First Line Supervisor) emphasize the inclusion of safety planning, and setting safety behavior expectations for carrying out the technical work activities. It sets the roles and responsibilities for safety of all workers.

In 2000 the National Ignition Facility experienced a serious incident that resulted in a permanent disabling injury to a construction worker. Line Management partnered with a Construction Safety Consultant from DuPont to guide them in implementing an immediate safety culture change on the Project. The concept was to use the existing ISMS to achieve this goal.

Over the past four years, the NIF Project at Lawrence Livermore National Laboratory (LLNL) has achieved a World Class Safety record compared to one that exceeded the National Average of 7.3 (BLS 2001)<sup>2</sup> by nearly double. As of December 2004 The NIF

Project reached 4 years without a LWC. The project has accumulated over 4 million safe hours and a Total Recordable Case Rate of 1.2 “Exhibit 1”. NIF’s achievements in safety have been recognized multiple times by the National Safety Council.

NIF has accomplished this outstanding achievement through Project Managements’ aggressive implementation of the five core functions and seven principles of ISM. Project management accepted ownership of health and safety on the project. We want to discuss how ISMS was used to accomplish this tremendous turn around and how you can have like results at your plant, construction site or laboratory.

## Five Functions of ISMS



## Seven Principles of ISM

- Line Management Responsible for Safety
- Clear Roles and Responsibilities
- Competences Commensurate with Responsibility
- Balanced Priorities
- Identification of Safety Standards and Requirements
- Hazard Controls Tailored to the Work Being Performed
- Operations Authorization

## Define the Scope of Work

- Work Scope
- Pre-Phase Planning

The Line Management Responsible Individual (RI) for each work activity identifies and defines the scope of work. This is accomplished by breaking the overall technical job down into major job steps/specific tasks. These steps are then listed in the Integrated Work Sheet/Job Hazard Analysis. The RI must present a clear understanding and well defined scope of the work, from beginning to end in order to prepare a high quality IWS/JHA for use in the field. During the pre-phase planning process and development of the IWS/JHA the Responsible Individual identifies the appropriate management authorization chain. This is the Management that will review the hazard analysis, and authorize the work activity to proceed. They will provide support and oversight for the successful accomplishment of the work activity.

## Analyze Hazards

- Pre-Phase Planning
- Initiate and Develop Integration Work Sheet (IWS)/Job Hazard Analysis (JHA) (Procedures and Operation Safety Procedures (OSPs) – as needed)
- NIF Project Site Safety Program Appendix A, LLNL ES&H Manual, LLNL Policies and Procedures

After the RI has completed defining the work scope the hazards associated with each major job step/specific tasks are analyzed and listed on the IWS/JHA. The RI proactively uses various resources to assist in identifying and addressing the known or potential hazards for each step/task. Resources include the NIF Project Site Safety Program (NPSSP), LLNL's ES&H Manual, Policies and Procedures, Lessons Learned, and LLNL ES&H Team Disciplines (Industrial Safety Professional, Fire Protection Engineer, Industrial Hygienist, and Environmental Analyst).

## Develop and Implement Controls

- Training
- IWS/JHA, Work Authorization Procedure (WAP), Management Pre-Start Review (MPR) (Procedures)
- Work Authorization
- Safe Plan of Action (SPA) (Procedure)
- NIF Project Site Safety Program (NPSSP)
- LLNL ES&H Manual, LLNL Policies & Procedures
- Contractor's Safety Plans

The Responsible Individual is responsible to verify that all workers assigned to the work team are trained and qualified to perform the tasks for which they are assigned. All workers (Laboratory Employees, Subcontractor's, Vendors and Students) are required to complete Basic Site Safety NPSSP Orientation, NIF Safety Management Work Authorization, NIF Oxygen Deficiency & Argon Awareness, NIF Safety Interlock Systems and Alarms, and Clean Construction Protocol (CCP Level 1&2) before beginning work on the Project. Senior NIF Site Management leads off the NIF Site Safety Orientations for contractors and express:

- NIF's core safety values,
- Our goal is "zero",
- That all incidents are preventable,
- If we fail as individuals we fail as a team - if we succeed as a team we succeed as individuals.

NIF Work activities are accomplished by Work Teams making it imperative to the success of the NIF Project that members of these teams attend the NIF Work Team Safety Management course within 6 months of assignment to the NIF Project.

The Work Authorization Process requires Management Pre-Start Reviews to ensure that all potential hazards have been identified and their controls are available or in place. Once all safety documents (IWS/JHA, Safe Plan of Action, other permits) are in place and it has been determined that the work activity can be safely carried out with the implemented controls, a Line Manger authorizes the work activity. The Work Control Officer then reviews the authorized scope of work in conjunction with other work activities that are occurring. The Work Control Officer is responsible for the “big picture” work coordination. Daily work coordination meetings are conducted where Area Integration Managers, Facility Area Managers, Responsible Individuals and Daily Work Team Leaders are in attendance. The Responsible Individual or Daily Work Team Leader (Team Supervisor) then coordinates work activities with co-occupants at the job site. The Daily Work Team Leader conducts the Daily Work Team Meeting with their team at the job site.

The Daily Work Team meeting (Safety Briefing) is conducted at the work area. It’s where the Daily Work Team Leader communicates their safety related and technical expectations to the team for the days work activities, hazards, and mitigation measures. The team leader fosters the development of team spirit among team members. All members share a model of the Team’s safety and technical goals. The team member’s input is solicited and encouraged during the daily work team meeting. All NIF Team members are empowered to “Stop Work” whenever they perceive a safety issue.

## **Perform Work**

- Audits, Observations, Incident Reporting, Independent Assessments

When the Daily Work Team Leader has completed communicating the daily safety and technical expectations to their team and confirmed the team member’s understanding of their roles and responsibilities (and that they can perform the tasks safely) the notice to proceed is given by the Daily Work Team Leader. The Daily Work Team Leader and Team Members then sign the Safe Plan of Action acknowledging their understanding of their roles, responsibilities and that they can perform their work safely within the established safety envelope. The Daily Work Team Leader is the supervisor that oversees the work activity throughout the work shift. They observe the work activity and ensure it meets safety, technical and quality expectations. The Safe Plan of Action is a dynamic tool that is updated as necessary throughout the work shift.

Line Management is out in the field daily making safety observations and pro actively implementing controls and mitigating safety issues. These Line Managers consist of the NIF Site Operations Manager responsible for the entire project site, Area Integration Managers that are responsible for particular areas within the site, and Facility Area Managers that are responsible for assisting the area managers for the particular area assigned. The Facility Area managers and Area Integration Managers review and approve all work permits for work activities that take place within their areas of responsibility. At NIF these areas are Laser Bays 1 & 2, Switchyards 1 & 2, Target Bay, Diagnostic Building, Optics Assembly Building, and Capacitor Bays 1, 2, 3, & 4.

Line Management Safety Audits are conducted weekly. Participants on these audits are NIF Line Managers, Contractor Line Managers, and Safety Team members. These audits

are a snap shot in time of how safe work practices are being implemented on the project in the performance of daily work activities.

A major emphasis in the turn around of the Safety Culture is related to the reporting of injuries. Prior to implementing the ISMS Functions and Principles at the NIF Project, workers had access to first aid kits in the work areas and this practice resulted in a low number of first aid cases being reported. The first aid kits were removed from the work areas, and a central first aid station was established for contractor personnel. The aggressive establishment of this station resulted in Project Management ensuring that injured personnel were provided the prompt and appropriate level of medical care. The number of first aid cases reported increased but, they resulted in lower numbers of cases developing into more serious potential Lost or Restricted Work Day Cases “Exhibit 2”. The NIF Project also provided a return to work program that had been lacking prior to 2000.

Independent assessments of the various safety programs are conducted to ensure adequate implementation (i.e. fall protection, lock out tag out (LOTO), training). The findings from the weekly audits are entered into Locations, Components and States (LoCoS) Safety Log for corrective action tracking to closure. All items are entered with recommended corrective measures and assigned to a specific Line Manager who is responsible for ensuring the corrective action is taken. When entered and saved the system sends an e-mail notification to the assigned Line Manager for action. Action items from incident analyses are also entered and tracked in LoCoS, Incident Analyses are conducted immediately to identify corrective actions and areas for improvement to prevent re-occurrence. All incidents and lessons learned are discussed at the NIF Site Weekly Safety All-Hands meetings. This is a forum where safety issues of concern are shared with all workers. Management also solicits feedback from the workers on safety issues and concerns.

## **Feedback and Improve**

- Audits, Observations, Incident Reporting, Independent Assessments
- Problem Identification and Correction System
- (LOCOS)
- Management Walkabouts
- Incident Analysis
- Response to findings, Lessons Learned

“Feedback and Improve,” the fifth function of ISMS was, at best lacking. Prior to the culture change, steps were taken to develop the NIF Incident Reporting procedure that requires all incidents resulting in injury to workers, near misses or property damage be appropriately identified and reported to management. Keeping in line with the ISMS principle of “Line management is responsible for safety” NIF line managers were designated in the procedure as the Chairperson of the investigating team. The Chairperson is responsible to put together an investigating team and to have the written investigation report published within a seven (7) day period. The purpose of the Incident Review is to determine the root cause(s), contributing causes, and the direct cause to prevent re-

occurrence and develop appropriate lessons learned. It is not fault finding or done to place blame. This tool has proven to be a valuable asset to the project in its drive to “zero” injuries.

The proactive, effective implementation of the Integrated Safety Management System on the National Ignition Facility Project has resulted in workers compensation premiums being maintained today at the 1999 rates. This has resulted in been an extreme cost savings for the Project, especially since California rates have increased tremendously over this period of time.

The Goal of “0” is and has been achievable at NIF. Since January 2001 NIF has had 25 out of 50 months with “0” recordable cases. There have been no cases resulting in days away from work.

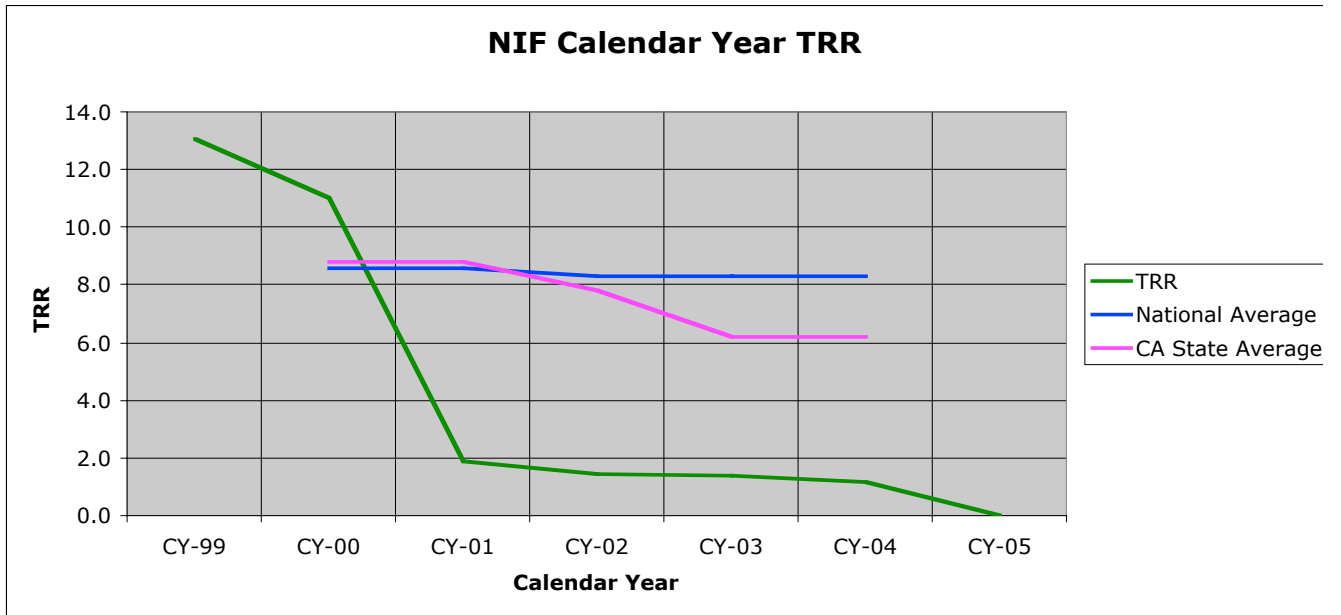
Continuous improvement in safe work performance has been realized at NIF using the Integrated Safety Management System tool. The improvement towards “Zero” continues. Through February 2005, The NIF Project has a TRR of 0.0 and a record of 4,182,600 hours without a LWC.

NIF Project Management provides quarterly totems barbecues for each major project milestones and each quarter with a TRR below 2.0. NIF Safety achievements have been featured in numerous LLNL Newsline Articles.

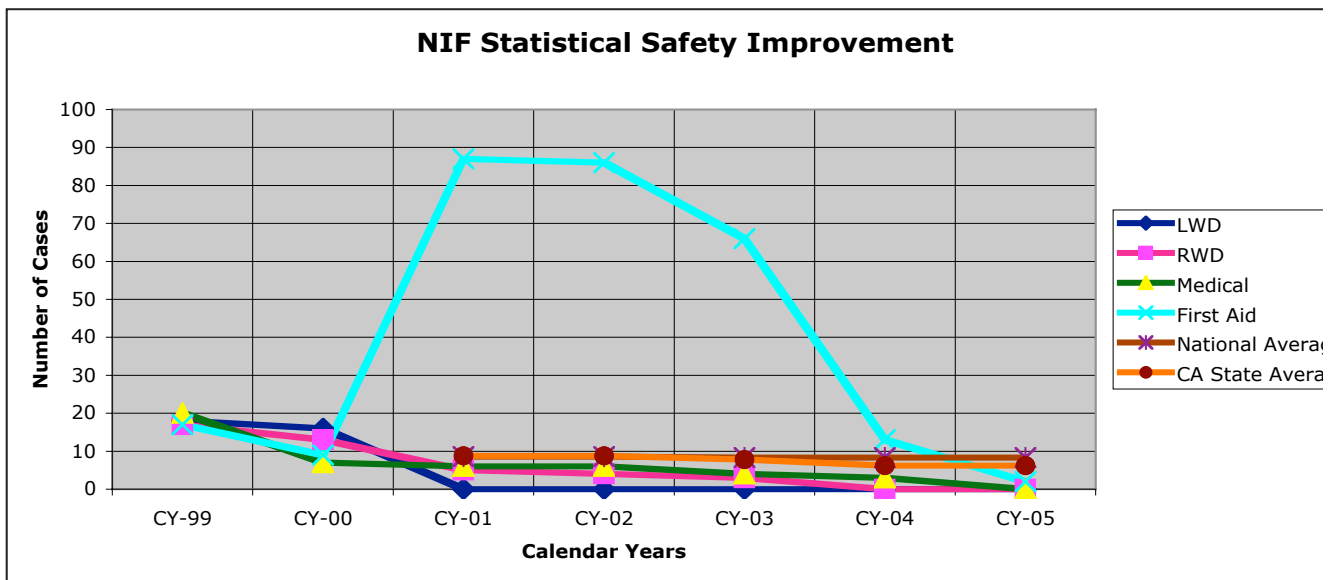
## **Summary**

There are many other safety processes that maybe used on a project, in a laboratory setting, or manufacturing facility. ISMS worked very well for NIF and we are sure if adopted at your facility you would have similar results. There are several organizations at LLNL that have incorporated NIF’s ISMS into their program and have had similar success. Just remember line management responsibility coupled with accountability is the key.

## Illustrations



“Exhibit 1. NIF Total Recordable Rate (TRR) CY-99 to CY-05.”



“Exhibit 2. Number of cases by types for CY-99 to CY-05.”

## References

1. US Department of Energy. *“Safety Management System Policy”*. DOE P 450.4, October 15, 1996.
2. Bureau of Labor Statistics, *“Incidence Rates of Nonfatal Occupational Injuries and Illnesses by Industry and Selected Case Types”*, December 18, 2001