



AMES  
LABORATORY

# SAFETY PERFORMANCE IMPROVEMENT PLAN SEPTEMBER 2015

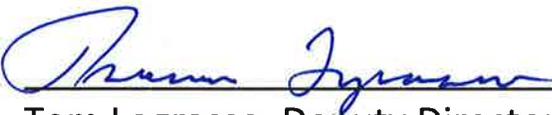
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Sean Whalen, Manager, ESHA

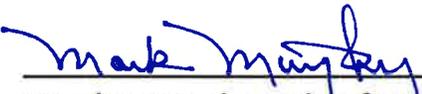
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Kevin Dennis, Chair, Safety Review Committee

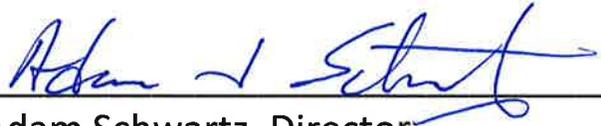
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Tom Lograsso, Deputy Director

9/30/15  
Date

  
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Mark Murphy, Chief Operations Officer

9/30/15  
Date

  
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Adam Schwartz, Director

9-30-15  
Date



Ames Laboratory

*Creating Materials & Energy Solutions*

U.S. DEPARTMENT OF ENERGY

# **Safety Performance Improvement Plan**

**2015 – 2016**

**Plan 10200.043, Revision 0**

**Updated 12/31/15**

**Note: This is the annual document control version, and may not reflect real-time completion status of tasks and actions. The Safety Performance Improvement Plan is a template for safety enhancement, and may change frequently as new actions are identified, resources are allocated, and tasks and goals are met. An updated copy is maintained by ESH&A. Modifications will be incorporated during the annual review process.**

**The review and approval record is maintained as part of the Document Control Process.**

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## 1.0 Vision and Strategy

Ames Laboratory is embarking on Laboratory-wide strategic planning to further integrate science, operations, and safety. This document forms the basis of the Ames Laboratory Safety Performance Improvement Plan (SPIP) as it flows from strategic efforts. Ames Laboratory acknowledges, as a result of past safety performance and recent internal and external assessments, that opportunities exist to improve implementation of the Integrated Safety Management System (ISMS) and strengthen the rigor in our existing safety culture, with the goal of protecting worker health and safety, preventing injuries and accidents, decreasing event incidence rates, and reducing potential severity if an event occurs. In response to these opportunities, Ames Laboratory will develop an Environment, Safety, Health, and Assurance Strategic Plan and supporting documents, including the SPIP. The Safety Performance Improvement Plan defines short-term (0 – 18 months), intermediate-term (12 – 36 months), and long-term (18 – 60 months) actions needed to achieve the goals and objectives of Ames Laboratory to conduct its research mission in a safe, secure, and efficient manner.

The ESH&A strategic plan and the SPIP support Ames Laboratory's strategic vision and mission. The SPIP will address needed improvements in work planning and control, improve contractor assurance, foster engagement with staff, promote expertise and continuing education for subject matter experts, and ensure resources are utilized efficiently and effectively. The SPIP outlines steps to measure program effectiveness throughout the term of the Plan. Metrics will help drive continuous improvement as part of the Laboratory ISMS. These initiatives will strengthen existing systems and build new infrastructure for the safety needs of a growing and vibrant research facility.

### 1.1 Safety Philosophy

Ames Laboratory has a well-established health and safety system as demonstrated by the scope and depth of existing programs, personnel dedicated to health and safety, and excellent management support. The Laboratory defines its safety philosophy through written commitments, concerted actions, and dedication of resources. As stated in the Integrated Safety Management System Policy (Policy 10200.010),

*Ames Laboratory has a strong commitment to the safety and health of each Laboratory employee. The Laboratory is committed to preventing accidental loss of resources and assets and protecting the general public and the environment through the prevention of pollution, property loss, or damage to the environment. Therefore, it is our goal to eliminate foreseeable hazards and maintain a safe and healthful workplace through continual improvement. In addition, complying with applicable Laboratory Contract requirements, Department of Energy Orders, and regulatory standards is a prerequisite for conducting Laboratory business and the responsibility of each employee.*

Actions in support of this philosophy include cooperative engagement at the Contractor (Iowa State University), Director, Deputy Director, Executive Council, Division Director, Group Leader, Department Manager, staff, and student levels through training courses, active participation in Readiness Review, safety walkthroughs, and strong relationships between line management and Environment, Safety, Health and Assurance (ESH&A) subject matter experts.

Ames Laboratory dedicates significant annual resources to achieve the goals stated in the policy, including allocations of funds for safety support staff, personal protective and monitoring equipment, life safety systems, continuing education, and infrastructure.

## **1.2 Ames Laboratory Strategic Planning**

Ames Laboratory conducts strategic planning at the Laboratory level through development and renewal of the Lab Plan, the Scientific Strategic Plan, the Site Sustainability Plan, and multiple area-specific plans. Other strategic initiatives are driven by contract specifications, DOE objectives, and partner goals. Safety and mission security are considered during strategic planning within the context of ISMS.

Other guiding principles include providing modern facilities and infrastructure, a safe and secure work environment, and ensuring good stewardship of our national, DOE, and Contractor resources.

Aligning and leveraging resources is critical to addressing potential changes in mission and adequately responding to unanticipated short-term needs. Timely review of operational readiness, hazard analysis, and risk management requires attention to detail and is time and effort intensive. The pace of research often outstrips the ability of the system to accommodate rapid change. Delays in procedural review may hamper innovation and lead to shortcuts and serious technical oversights. Reinforcing the need for metered and efficient, yet thorough, investigation of activities is crucial, as is providing sufficient human, mechanical, and electronic capital to complete tasks in a timely manner.

Ames Laboratory resource strategies include the following:

- Invest in ESH&A staff (A new Training Coordinator started on 6/27/15), and a new Industrial Hygienist started 11/23/15.)
- Acquire part-time or special assistance from the Contractor as needs are identified
- Receive assistance from DOE, Ames Site Office, Integrated Service Centers, and peer laboratories
- Improve the chemical inventory and management system
- Streamline the use and storage of laboratory documents (SOPS, task specific training records, operating manuals, etc.)
- Increase employee involvement through forums, committee participation, and surveys
- Enhance Laboratory-wide training

## **1.3 ESH&A Strategic Planning**

The mission of Ames Laboratory ESH&A is to protect people, infrastructure, and the environment. To this end we will develop and maintain resources that support our mission and align our strategies with those of the Laboratory, DOE, and our Contractor. Our goals will be specific, measurable, achievable, relevant, and timely. ESH&A will develop a five-year strategic plan based on these criteria. Strategies will focus on improvements in multiple ESH&A program areas such as Safety and Environment, Occupational Medicine, Training and Documentation, and Safeguards and Security. Other strategies will extend to safety improvements across the Laboratory, of which a major component is the SPIP. The remainder of this document outlines the development and implementation of the SPIP.

## **2.0 Safety Performance Improvement Plan**

### **2.1 Statement of Need for Safety Performance Improvement**

As stated in Section 1.0, opportunities exist to improve implementation of the ISMS. Since the beginning of 2014, Ames Laboratory has experienced a series of events and accidents. In addition to unplanned events, there were also a number of internal topical appraisals and external program assessments that generated findings and opportunities for improvement.

In January 2015, a joint team consisting of Ames Laboratory, Office of Science, and Argonne National Laboratory personnel conducted a Work Planning and Control (WP&C) assessment, which identified needed improvements to the Readiness Review (RR) process. In April 2015, the Laboratory submitted an integrated corrective action plan that addressed the findings in the joint WP&C assessment, as well as issues associated with work planning and control processes identified in other assessments. The aim of the WP&C corrective action plan is to improve the rigor and effectiveness of hazard identification, analysis, control, and implementation, as well as line management accountability.

By June 2015, improvements described in the WP&C corrective action plan had been or were being made to the RR process to increase formality, rigor, and change control. Information roll-out and training of management and staff is the next step in implementing these changes. The occurrence of a serious ball mill explosion and the investigative team's (comprised of personnel from the DOE, Oak Ridge National Laboratory, Iowa State University, and Ames Laboratory) Judgements of Need (JON) shed light on additional corrective actions to Ames Laboratory's WP&C. For example, the Laboratory lacked a clear strategy for identifying higher risk activities, for expediting review of changes in activities with higher risks, and adequately allocating resources to expedite this enhanced Readiness Review.

The feedback from the investigative team reinforced the significance the Laboratory placed on the WP&C corrective actions and has helped focus Laboratory improvement efforts in four primary areas: work planning and control; contractor assurance; engagement; and expertise and continuing education. Improvements in these areas will enhance our conduct of research and improve safety throughout the Laboratory.

### **2.2 Safety Performance Improvements Overview**

Safety performance improvement is an iterative and incremental process that benefits from a strategic view, and is the basis for continuous improvement in the ISMS model. Based on information from incidents, assessments, peer discussions, and event investigations, the Laboratory has identified the need for improvement and is developing a comprehensive plan to address these issues. Initial efforts will focus on the functional areas identified in this section. Each functional area includes a statement of need, specific actions, and proposed short, intermediate, and long-term improvement strategies. A matrix of expanded actions is included in Section 3.0 beginning on page 8.

#### **2.2.1 Work Planning and Control**

##### Statement of Need for Work Planning and Control Improvements

As a result of internal and external assessments and recent safety incidents, Ames Laboratory acknowledges that opportunities exist to improve conduct of research and implementation of our ISMS.

#### 2.2.1.a WP&C Short-Term Improvements

The Laboratory will aggressively pursue the following short-term actions with the goal of improving the RR process; ensuring controls are commensurate with hazards and risks; and increasing awareness and training.

- 2.2.1.a.1 - Roll out the revised RR training module to Group Leaders and activity supervisors clarifying changes implemented as a result of the WP&C assessment
- 2.2.1.a.2 - Implement risk analysis methodology and develop prioritized subcategories for RR Type II activities
- 2.2.1.a.3 - Assess current RR packages of high pressure and other high hazard activities for proper hazard management, controls, and documentation to ensure safe operations
- 2.2.1.a.4 - Reevaluate previous WP&C findings and ensure priorities are properly synchronized with items identified during the ball mill investigation and other assessments
- 2.2.1.a.5 - Evaluate and adopt recommendations and guidelines for laboratory safety improvements from groups such as the Chemical Safety Board, American Chemical Society, American Industrial Hygiene Association, or others

#### 2.2.1.b WP&C Intermediate Improvements

The Laboratory will develop intermediate-term actions with the goals of strengthening training programs, providing tools which increase ease of safety implementation, and cultivating a stronger safety culture.

- 2.2.1.b.1 - Incorporate RR improvements into existing training courses as appropriate
- 2.2.1.b.2 - Develop enhanced tools for RR participants such as standardized SOPs, hazard analysis checklists, flow charts, and supportive databases
- 2.2.1.b.3 - Adapt and implement safety behavior modification initiatives based on successful programs such as DuPont STOP (Safety Training Observation Program), Cargill LIFE (Life-altering Injury and Fatality Elimination) or others
- 2.2.1.b.4 - Visit national laboratories and peer institutions to evaluate WP&C programs and conduct of research activities for best practices

#### 2.2.1.c WP&C Long-Term Improvements

Long-term operational improvements will focus on the development of metrics to ensure program effectiveness and the establishment of more rigorous and frequent internal and external assessments, gap analyses, and implementation procedures.

- 2.2.1.c.1 - Measure program effectiveness using tools such as staff surveys, tracking and trending, and calculation of incident rates and causes
- 2.2.1.c.2 - Conduct rigorous and relevant evaluations of work processes through RR and a work observation program. The frequency of review will be commensurate with risk. Track and trend changes and observations

## **2.2.2 Contractor Assurance**

### Statement of Need for Contractor Assurance Improvements

Ames Laboratory operates under contract to Iowa State University (ISU) from DOE. ISU and DOE have a vested interest in the safe operation of Laboratory activities, including research, service, and support. ISU and Ames Laboratory share many resources, including world-leading research personnel, valuable equipment, and academic and experimental facilities. In addition to tangible assets, the entities also share a common scientific mission and vision, and a strong commitment to extension and outreach. Most importantly, DOE, ISU and Ames Laboratory place the highest priority on protecting faculty, staff, students, and the environment. Achieving partnered excellence requires a strong foundation built on trust that each party is making the best effort possible to conduct science in a safe, secure and efficient manner.

### 2.2.2.a Contractor Assurance Short-Term Improvements

ISU has the capability of providing immediate short-term assistance to Ames Laboratory, specifically in hazard analysis, risk management, operational control, and emergency response and reporting. Ames Laboratory will actively pursue opportunities to utilize the Contractor with the goal of receiving additional technical review and guidance. The Ames Site Office will also provide assistance to improve contractor assurance.

- 2.2.2.a.1 - The Laboratory Director will utilize an independent review board to provide consultation during SPIP implementation
- 2.2.2.a.2 - Develop a Contractor and peer laboratory subject matter expert (SME) matrix for areas in which safety processes need improvement and to provide broader expertise during RR
- 2.2.2.a.3 - Develop memorandums of understanding with Contractor SMEs defining roles and responsibilities
- 2.2.2.a.4 – Review emergency agreements and expectations to determine whether opportunities for improvement exist in cross-training, conducting drills, and/or increased integration
- 2.2.2.a.5 – Ames Site Office will hire and locate a Facility Representative at Ames Laboratory to improve operational awareness and oversight of the Laboratory

### 2.2.2.b Contractor Assurance Intermediate and Long-Term Improvements

- 2.2.2.b.1 - The Laboratory will collaborate with ISU to assemble an external review team comprised of Contractor, DOE, and corporate experts, with the purpose of assessing the effectiveness of the SPIP and associated strategic planning

## **2.2.3 Engagement with Ames Laboratory Personnel**

### Statement of Need for Engagement Improvements

Effective communication and frequent interaction among administration, line management, researchers, staff, and students fosters trust and improves safety culture. The Laboratory will actively encourage methods of engagement such as: all-hands, small group, and one-on-one meetings; focused task and system training; mentored work observations; the development of Safety Coordinators and Representatives (aka. Ambassadors) to enhance the message of safety within research groups; print and electronic communications; and periodic safety and health related conferences or seminars.

### 2.2.3.a Engagement Short-Term Improvements

Ames Laboratory will conduct the following short-term actions with the goal of providing information to staff regarding recent events, reinforcing Laboratory safety goals and procedures, and enhancing safety culture.

- 2.2.3.a.1 - Conduct all-hands meetings with a focus on lessons learned from recent events (completed July 22-23, 2015)
- 2.2.3.a.2 - Management, Group Leaders, and ESH&A SMEs will implement a worker observation program
- 2.2.3.a.3 - Conduct round-table discussions between the Directors, Division Leaders, and Group Leaders regarding operational improvements and cultural change, and identify Ames Laboratory personnel who can be engaged as Ambassadors to help spread the message of safety
- 2.2.3.a.4 - Continue and expand the Ames Laboratory Safety Hero Initiative, which utilizes animated videos, posters, and newsletter articles to encourage safe behavior and recognize Laboratory staff who demonstrate safe work practices

### 2.2.3.b Engagement Intermediate-Term Improvements

Intermediate efforts will focus on a variety of actions with the goal of providing relevant, timely, and engaging information and activities to grow and maintain the Laboratory safety culture.

- 2.2.3.b.1 - Modify existing training courses to improve learning delivery, retention of information, and applicability to work practices
- 2.2.3.b.2 - Conduct periodic staff surveys and structured discussions to evaluate engagement and program effectiveness
- 2.2.3.b.3 - Distribute relevant safety and health information through newsletters, posters, and electronic media

### 2.2.3.c Engagement Long-Term Improvements

Engagement with staff is critical to the formation of a cohesive and sustainable safety culture. Long-term success is contingent on maintaining efforts through strategic documents and allocation of resources.

- 2.2.3.c.1 - Specify engagement activities in documents such as strategic plans, Lab Plan, PEMP, executive council agendas, etc.
- 2.2.3.c.2 - Line item engagement activity resources in budget development and submittals

## **2.2.4 Expertise and Continuing Education**

### Statement of Need for Expertise and Continuing Education Improvements

Ames Laboratory's research mission is varied, unique, and encompasses broad and complex areas of biology, chemical engineering, chemistry, materials sciences mechanical engineering, metallurgy, and physics. Operational review traditionally relies on internal expertise from research areas, peer groups, and ESH&A staff. To ensure robust hazard identification and accurate evaluation of hazards, Ames Laboratory will work to strengthen its traditional knowledge base, while actively soliciting expertise from other sources such as the Contractor, peer laboratories, and other mission similar institutions,

corporations engaged in research activities with demonstrated outstanding safety records, and possibly contract with private consultants when expertise is not readily available from other avenues.

#### 2.2.4.a Expertise Short-Term Improvements

Ames Laboratory research staff and ESH&A subject matter experts are highly educated and credentialed personnel. The Laboratory will complete the following short-term actions to improve institutional knowledge with the goal of increasing expertise in hazard analysis, risk identification, and operational review.

- 2.2.4.a.1 - Ames Laboratory will develop in-house educational materials or contract with an experienced provider to refine hazard analysis training for SMEs based on American Chemical Society (ACS) guidelines and industry standards
- 2.2.4.a.2 - Enhance existing hazard identification materials to ensure uniformity of information

#### 2.2.4.b Expertise Intermediate Improvements

Continuing education opportunities are available through mentoring opportunities at peer laboratories, participation in webinars and conferences, and contracting vendors to conduct topical seminars. Ames Laboratory will pursue opportunities as time and resources allow with the goal of increasing subject matter expertise in a variety of safety processes.

- 2.2.4.b.1 - Visit and assess DOE Laboratory, peer research facility, and corporate ES&H programs
- 2.2.4.b.2 - Participate in conferences, webinars, and group discussions

#### 2.2.4.c Expertise Long-Term Improvements

Achieving advanced degrees and earning professional certifications demonstrates personal and institutional commitment to maintaining and advancing essential knowledge, and increases the ability of SMEs to assess hazards and implement corrections. Ames Laboratory will commit resources to encourage personnel to pursue continuing education with the goal of increasing subject expertise, providing additional coverage in the absence of an SME, and improving succession in critical subject areas.

- 2.2.4.c.1 - Enhance cross training efforts between ESH&A SMEs to broaden general knowledge base and to provide coverage of expertise as needed
- 2.2.4.c.2 - Encourage staff to achieve and maintain relevant advanced degrees and/or professional certifications

### 3.0 Safety Performance Improvements Actions

Actions identified in Section 2.0 associated with short, intermediate, and long-term improvements are included in the following matrix. Where applicable, actions are tracked and cross-walked to corrective actions or justification of needs stemming from assessments and/or investigations.

**2.2.1 Work Planning and Control:** Safety performance improvement is an iterative and incremental process that benefits from a strategic view, and is the basis for continuous improvement in the ISMS model. Based on information from incidents, assessments, peer discussions, and event investigations, the Laboratory has identified the need for improvement and is developing a comprehensive plan to address these issues. Initial efforts will focus on the functional areas identified in this section. Improvements will require input and commitment by all Ames Laboratory staff. Efforts will be led by the Deputy Director.

**2.2.1.a The Laboratory will aggressively pursue the following short-term actions with the goal of improving the RR process; ensuring controls are commensurate with hazards and risks; and increasing awareness and training.**

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.1.a.1	ALCATS #411 (JONS-1) #413 (JONS-3)	Roll out the revised RR training module to Group Leaders, Department Managers and activity supervisors clarifying changes implemented as a result of the WP&C assessment	All leaders with RR responsibility will complete training in order to improve uniformity of activity, hazard descriptions, and ability to identify and mitigate risks	Nelson, Morris-Benavidez	9/30/16	Complete	Corrective actions for JONS-1 also references related WP&C ALCATS. Note – all identified participants completed training by 12/31/15
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Develop RR Training		Nelson	8/7/15	Complete	
		Identify participants		Nelson, Lograsso, Division and Group Leaders	8/7/15	Complete	
		Follow-up with non-attendees and ensure		Lograsso,	9/25/15	Complete	E-mail sent to

completion of training	Division and Group Leaders, Nelson				final non-attendees by Lograsso on 9/28/15
Conduct evaluation of training effectiveness by surveying or interviewing selected participants	Nelson, Burns	12/31/15	Complete		Survey completed by 15% of attendees

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.1.a.2	ALCATS #412 (JONS-2)	Implement risk analysis methodology and develop prioritized subcategories for RR Type II activities	Establish cohesive risk analysis in order to quantify elevated hazards and target mitigation efforts	Sager, ESH&A RR leads, and SRC	2/28/16	Active	SRC met and discussed adopting a quantitative as opposed to a qualitative method. Kevin Dennis is working on a draft plan. 12/7.
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Evaluate risk analysis platforms		ESH&A	8/7/15	Completed	Julia Sager compiled a review of risk analysis methods. Preferred method will be presented to SRC on 9/30/15.
		Select and implement risk analysis tool(s)		ESH&A, SRC	1/31/16	Active	Milestone amended to reflect role of SRC

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.1.a.3	ALCATS #412 (JONS-2)	Assess current RR packages of high pressure and other high hazard activities for proper hazard management, controls, and documentation to ensure safe operations	Conduct extent of conditions review using revised RR procedures with new or improved hazard management tools and broad expertise (both internal and Contractor staff) to reassess operational status for the 10% of existing activities that represent the highest risk.	ESH&A, SRC, Division Directors	6/30/16	Active	ESH&A staff and Division Leaders have been polled to determine higher hazard activities. 10 activities will be selected as pilot subjects.
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Select and evaluate pilot RR activity for comprehensive review	Determine vigor of previous review regarding hazard and risk analysis	ESH&A, SRC, and Group Leaders	9/1/15	Complete	10 higher hazard RR activities have been proposed for review (9/28/15)
		Complete 10 Pilot Readiness Review activities using test Hazard Analysis tool.	Evaluate and modify hazard analysis tool if needed.	ESH&A, SRC	12/31/15	Active	Milestone date modified to reflect scheduling with groups
		Conduct hazard ranking on existing Level 2 activities utilizing finalized hazard analysis tool	Segregate activities into High, Medium, and Low hazard categories.	ESH&A, SRC, Readiness Review Leaders	12/31/15	Pending	
		Complete review of 10% of	Introduce	ESH&A Leads,	3/31/16	Pending	

	selected highest hazard activities, including those already completed during pilot review and development of the hazard analysis tool	additional rigor during evaluation of higher hazard activities	RR Leaders			
	Complete additional 40% of higher hazard RR	Same as above	Same as above	6/30/16	Pending	

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.1.a.4	ALCATS #411 (JONS-1)	Reevaluate previous WP&C findings and ensure priorities are properly synchronized with items identified during the ball mill investigation and other assessments	Ensure resources and effort are consistently applied to achieve performance improvement goals	Nelson, Whalen	12/31/15	Active	WP&C ALCATS were evaluated and incorporated into JONS-1

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.1.a.5	N/A	Evaluate and adopt recommendations and guidelines for laboratory safety improvements from groups such as the Chemical Safety Board, American Chemical Society, American Industrial Hygiene Association, or others	Improve conduct of research through adoption of proven methods	ESH&A, SRC	12/31/15	Active	Continuous improvement is contingent on utilizing successful Best Management Practices (BMPs)

**2.2.1.b Over the course of the next several months, the Laboratory will develop intermediate-term actions with the goals of strengthening training programs, providing tools which increase ease of safety implementation, and cultivating a stronger safety culture.**

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.1.b.1	N/A	Incorporate RR improvements into existing training courses as appropriate	Incremental improvement of relevant training courses, along with enhanced message consistency	SMEs and Training Staff	On-going, as training courses are revised	Pending	

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.1.b.2	ALCATS #411 (JONS-1) #415 (JONS-5)	Develop enhanced tools for RR participants such as standardized SOPs, hazard analysis checklists, flow charts, and supportive databases	Improve usability of program to increase efficiency and improve owners ability to modify information	ESH&A, SRC	12/31/16	Active	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Develop fillable Readiness Review forms		Nelson	8/10/15	Completed	Fillable PDFs were created and incorporated into RR Package
		Develop SOP Library		Morris-Benavides	8/10/15 and on-going	Active	A SOP library was placed on the Ames Laboratory web-site.

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.1.b.3	N/A	Adapt and implement safety behavior modification initiatives based on successful programs such as DuPont STOP (Safety Training Observation Program), Cargill LIFE (Life-altering Injury and Fatality Elimination) or others	Improve conduct of research and overall Laboratory safety awareness through adoption of proven methods	ESH&A, Executive Council, Division and Group Leaders	12/31/16	Pending	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Evaluate safety behavior modification initiatives. It is yet to be determined if all, part, or no portion of an existing BMS is suitable for use at Ames Laboratory. ESH&A staff will research programs and conduct interviews with peers at DOE and corporate facilities.		Sager, Bartine	12/31/15	Pending	

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.1.b.4		Visit national Laboratories and peer institutions and specifically evaluate WP&C programs and conduct of research activities for best practices	Increase Ames Laboratory staff knowledge and incorporate successful BMPs	Schwartz, Lograsso, Whalen, other Laboratory staff	12/31/15	Complete	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Visit Idaho National Laboratory		Schwartz, Lograsso	8/7/15	Complete	Visited INL and met with EHS staff and brought back informational

						PPT. A representative from INL visited Ames Laboratory the week of August 24, 2015
	Visit SLAC	Schwartz	9/30/15	Completed		Visited 9/2/15
	Visit Livermore	Schwartz	9/30/15	Completed		Visited 9/16/15
	Visit Berkeley	Schwartz	9/30/15	Completed		Visited 9/17/15
	Visit Princeton and Brookhaven National Laboratories	Schwartz, Lograsso, Whalen	9/30/15	Completed		Visited 10/6 – 10/9/15
	Visit Oakridge National Laboratory	Schwartz, Lograsso, Whalen	9/30/15	Completed		Visited 9/30 – 10/1/15
	Visit Argonne National Laboratory	Lograsso, Whalen	10/31/15	Completed		Visited 10/20 – 10/21/15

**2.2.1.c Long-term operational improvements will focus on the development of metrics to ensure program effectiveness and the establishment of more rigorous and frequent internal and external assessments, gap analysis, and implementation procedures.**

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.1.c.1	N/A	Measure program effectiveness using tools such as staff surveys, tracking and trending, and calculation of incident rates and causes	Continuous improvement is based on the ability to gauge success or modify activities if success is not achieved at the desired rate.	ESH&A, SRC	At least annually	Pending	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Develop staff survey	Provide baseline	Sager, Burns	10/31/15	Active	

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.1.c.2	ALCATS #414 (JONS-4)	Conduct rigorous and more frequent evaluations of work processes through RR and a work observation program. The frequency of review will be commensurate with risk. Track and trend changes and observations	Reduction of injuries, accidents, and events. Continuous improvement.	ESH&A, Division and Group Leaders	On-going	Active	

**2.2.2 – Contractor Assurance** – Ames Laboratory operates under contract to Iowa State University (ISU) from DOE. ISU and DOE have a vested interest in the safe operation of Laboratory activities, including research, service, and support. ISU and Ames Laboratory share many resources, including top-flight research personnel, valuable equipment, and academic and experimental facilities. In addition to tangible assets, the entities also share a common scientific mission and vision, a strong commitment to extension and outreach. Most importantly, DOE, ISU and Ames Laboratory place the highest priority on protecting faculty, staff, students, and the environment. Achieving partnered excellence requires a strong foundation built on trust that each party is making the best effort possible to conduct science in a safe, secure and efficient manner.

**2.2.2.a Contractor Assurance Short-Term Improvements** - ISU has the capability of providing immediate short-term assistance to Ames Laboratory, specifically in areas of hazard analysis, risk management, operational control, and emergency response and reporting. Ames Laboratory will actively pursue opportunities to utilize the Contractor with the goal of receiving additional technical review and guidance. The Ames Site Office will also provide assistance to improve contractor assurance.

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.2.a.1	N/A	The Laboratory Director will utilize an independent review board to provide consultation during SPIP implementation	Quality Assurance	Schwartz, Contractor	9/30/16	Pending	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Establish review board		Schwartz, Lograsso, ISU	3/30/16	Pending	

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.2.a.2	N/A	Develop a Contractor and peer laboratory subject matter expert (SME) matrix for areas in which safety processes need improvement and to provide broader expertise during RR	Increase knowledge base in order to improve ability to properly identify hazards and risks	Whalen, Nelson	9/30/16	Pending	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Identify Ames Laboratory knowledge gaps based on RR assessments		Whalen, Nelson	9/30/16	Pending	
		Identify Contractor and peer laboratory resources		Whalen, Nelson	9/30/16	Pending	

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.2.a.3	N/A	Develop memorandums of understanding with Contractor SMEs defining roles and responsibilities	Establish consistent pathway for sharing of information and expertise	Murphy, Lograsso, Whalen, Hoenig, Nelson	9/30/16	Pending	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Contact ISU-EH&S to formalize agreements with selected SMEs (IH, Environmental, Asbestos, Rad, Bio, Life Safety, etc.)		Whalen, Nelson	9/30/16	Pending	
		Contact ISU-FP&M to formalize agreements with selected SMEs (Engineering, construction, sustainability, emergency response, building repairs, etc.)		Murphy, Hoenig	9/30/16	Pending	
		Contact academic SMEs to formalize agreements in such areas as engineering, chemistry, etc.		Kramer, C. Jenks	9/30/16	Pending	

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.2.a.4	N/A	Review emergency agreements and expectations to determine whether opportunities for improvement exist in cross-training, conducting drills, and increased integration	Strengthen emergency readiness and response	Murphy, Herrman, Bartine, Lograsso	9/30/16	Pending	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Complete a review of emergency response documents, agreements, and previous assessments to determine readiness and areas for improvement.		Herrman	9/30/16	Pending	
		Conduct a round-table discussion with emergency response parties (AL, ISU Police, ISU-EH&S, Ames FD and PD, AMSO, etc.)		Herrman	9/30/16	Pending	
Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.2.a.5	N/A	Ames Site Office will hire and locate a Facility Representative at Ames Laboratory to improve operational awareness and oversight of the Laboratory	Contractor Assurance	Baebler	12/31/15	Complete	Bruce Goplin began at the Lab on 12/28/15
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Hire and train Fac Rep before sending to Ames		Baebler	12/31/15	Complete	

**2.2.2.b Contractor Assurance Intermediate and Long-Term Improvements – Continued collaborative efforts will ensure the Laboratory and Contractor are effectively communicating and best utilizing available resources.**

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.2.b.1	N/A	Post SPIP implementation, the Laboratory will	Third party assessment will	Schwartz, Lograsso,	TBD		

collaborate with ISU to assemble an external review team comprised of Contractor, DOE, and corporate experts, with the purpose of assessing the effectiveness of the SPIP and associated strategic planning	provide independent performance evaluation	Murphy, Contractor
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**2.2.3 – Engagement with Ames Laboratory Personnel** – Effective communication and frequent interaction among administration, line management, researchers, staff, and students fosters trust and improves safety culture. The Laboratory will actively encourage methods of engagement such as: all-hands, small group, and one-on-one meetings; focused task and system training; mentored work observations; the development of Safety Ambassadors to bring the message of safety to research groups; print and electronic communications; and periodic safety and health related conferences or seminars.

**2.2.3.a Engagement Short-Term Improvements - Ames Laboratory will conduct the following short-term actions with the goal of providing information to staff regarding recent events, reinforcing Laboratory safety goals and procedures, and enhancing safety culture.**

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.3.a.1	N/A	Conduct all-hands meetings with a focus on lessons learned from recent events	Inform Ames Laboratory staff regarding ball mill event and reinforce need for safety and adherence to conduct of research protocols	Schwartz, Lograsso, Pecharsky	July 22-23, 2015	Completed	Provided informational all-hands meeting Ames Lab personnel

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.3.a.2	ALCATS	Management, Group	Worker	Lograsso,	6/1/16	Pending	

#414 (JONS-4)	Leaders, and ESH&A SMEs will implement a worker observation program	observation will provide real-time performance guidance to employees, and verify training and SOP effectiveness. Gaps are identified and targeted improvements may be implemented.	Division and Group Leaders, with assistance from ESH&A			
<b>Sub-items</b>	Sub-items description	Staff	Milestone	Current Status	Resolution	
	Develop Worker Observation (WO) procedure with defined standards, expectations, programmatic goals, and feedback loops	Lograsso, Whalen, SRC	3/1/16	Pending		
	Train observers on program requirements	ESH&A	3/1/16 – 6/1/16			

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.3.a.3	N/A	Conduct round-table discussions between the Directors, Division Leaders, and Group Leaders regarding operational improvements and cultural change, and identify Ames Laboratory personnel who can be engaged as safety Ambassadors to help spread the message of safety	Small group meetings allow for staff engagement, brainstorming, and targeted messaging. Individuals may be identified as safety ambassadors.	Schwartz, Lograsso, Johnson, Jenks	3/30/16	Pending	

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.3.a.4	N/A	Continue and expand the Ames Laboratory Safety Hero Initiative, which utilizes animated videos, posters, and newsletter articles to encourage safe behavior and recognize Laboratory staff who demonstrate safe work practices	Provide safety awareness	Karsjen, Whalen	On-going	Initial posters and video created and distributed.	Posters were placed in elevators, hall ways, and other conspicuous locations. Video is on website, YouTube, and plays in first floor lobby.
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Develop next generation of Safety Hero displays.		Same	11/15/15		Milestone not met due to staff departure. Will evaluate if initiative will continue.

**2.2.3.b Engagement Intermediate-Term Improvements - Intermediate efforts will focus on a variety of actions with the goal of providing relevant, timely, and engaging information and activities to grow and maintain the Laboratory safety culture.**

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.3.b.1	N/A	Modify existing training courses to improve learning delivery and retention of information and applicability to work practices	Improvements and corrective actions must be integrated throughout current training courses in order to provide consistency.	Training author, Burns, Granseth	On-going	Pending	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Evaluate and upgrade 5 of the most commonly used or critical training courses		Authors, Burns, Granseth	12/31/15	Pending	

Evaluate and upgrade the next 5 most commonly used or critical training courses	Authors, Burns, Granseth	3/31/16
Complete evaluation and upgrade (if needed) for remaining courses	Authors, Burns, Granseth	6/1/18

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.3.b.2	N/A	Conduct periodic staff surveys and structured discussions to evaluate engagement and program effectiveness	Engage staff and receive feedback	Burns, Sager, Lograsso, Whalen	On-going	Pending	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Develop and complete initial survey based in part on previous survey completed in 2010		Sager, Burns	12/31/15	Under development	

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.3.b.3	N/A	Distribute relevant safety and health information through newsletters, posters, and electronic media	Provide safety information to staff	ESH&A	On-going		
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Develop monthly ESH&A newsletter		Whalen, Burns	Monthly beginning 9/15	Active	Issue #1 was distributed. Further issues are will be sent with Mail-Chimp delivery system
		Continue to include a section on safety in the Ames Laboratory Insider		Gibson, Whalen	Monthly beginning 8/1/15	First inclusion 8/1/15	The Insider is distributed electronically to all Ames Lab staff.
		Continue to include safety topic in Director's		Schwartz	Periodically	Several	

messages	messages have contained safety information
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**2.2.3.c Engagement Long-Term Improvements - Engagement with staff is critical to the formation of a cohesive and sustainable safety culture. Long-term success is contingent on maintaining efforts through strategic documents and allocation of resources.**

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.3.c.1	N/A	Specify engagement activities in documents such as strategic plans, Lab Plan, PEMP, executive council agendas, etc.	Inclusion of engagement activities demonstrates commitment and allows for measurement of performance	Directors, Division Leaders	On-going	Pending	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		SPIP actions are included in 2016 PEMP Notables		Schwartz, Lograsso, Whalen	9/30/15	Complete	SPIP implementation is a PEMP Notable
		Develop engagement activities in ESH&A strategic plan		Whalen, Lograsso	12/31/15	Pending	

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.3.c.2	N/A	Line item engagement activity resources in budget development and submittals	Inclusion of engagement activities demonstrates commitment and allows for allocation of resources	Whalen, Lograsso	On-going	Pending	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution

Develop budget for Fall, 2015 safety day event	Morris-Benavides	10/1/15	Complete Committee established	Completed. Operation Safety conducted 10/22
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2.2.4 – Expertise and Continuing Education – Ames Laboratory’s research mission is varied, unique, and encompasses broad and complex areas of chemistry, metallurgy, and physics. Operational review traditionally relies on internal expertise from research areas, peer groups, and ESH&A staff. In order to ensure robust hazard identification and accurate evaluation of hazards, Ames Laboratory will work to strengthen its traditional knowledge base, while actively soliciting expertise from other sources such as the Contractor, peer laboratories and other mission similar institutions, corporations engaged in research activities with demonstrated outstanding safety records, and possibly contract with private consultants when expertise is not readily available from other avenues.

**2.2.4.a Expertise Short-Term Improvements - Ames Laboratory research staff and ESH&A subject matter experts are highly educated and credentialed personnel. The Laboratory will complete the following short-term actions to improve institutional knowledge with the goal of increasing expertise in hazard analysis, risk identification, and operational review.**

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.4.a.1	ALCATS #412 (JONS-2)	Ames Laboratory will develop in-house educational materials or contract with an experienced provider to refine hazard analysis training for subject matter experts based on ACS guidelines and industry standards	Improve ability to identify and rank hazards	All SMEs – lead by Sager	9/30/16	Active	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.4.a.2		Enhance existing hazard identification materials to	Provide efficiency and ease of use	Sager, ESH&A	9/30/16	Pending	

	ensure uniformity of information	for Group Leaders and RR program				
<b>Sub-items</b>	Sub-items description		Staff	Milestone	Current Status	Resolution

**2.2.4.b Expertise Intermediate-Term Improvements - Various continuing education opportunities are available through mentoring opportunities at peer laboratories, pursuing continuing education through webinars and conferences, and contracting vendors to conduct focused seminars. Ames Laboratory will pursue opportunities as time and resources allow with the goal of increasing subject matter expertise in a variety of safety processes.**

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.4.b.1	N/A	Visit and assess DOE Laboratory, peer research facility, and corporate ES&H programs	Meet peers and evaluate BMPs at peer facilities	Schwartz, Lograsso, Whalen, others as assigned	12/31/16	Active	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Assess Idaho NL safety program		Schwartz, Lograsso	8/31/15	Completed	The Directors visited INL on 08/04 – 05/2015 and met with ES&H staff. An INL staff member visited AL on 8/26/15 and conducted several learning sessions
		Visit SLAC		Schwartz		Completed	Visited 9/2/15
		Visit Livermore		Schwartz		Completed	Visited 9/16/15
		Visit Berkeley		Schwartz		Completed	Visited 9/17/15
		Visit Princeton and Brookhaven		Schwartz, Lograsso, Whalen	10/14/15	Completed	Visited 10/6 – 10/9/15
		Visit Oak Ridge		Schwartz,	10/14/15	Completed	Visited 9/30 –

				Lograsso, Whalen			10/1/15
	Visit Argonne			Lograsso, Whalen	10/30/15	Completed	Visited 10/20 – 10/21/15

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.4.b.2	N/A	Participate in conferences, webinars, and group discussions	Gain external experience and continuing education	ESH&A	On-going	On-going	See record
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		ESH&A staff will develop a rolling three year CE plan		ESH&A	8/1/15	Active	Excel travel/ CE spreadsheets were developed for ESH&A staff to aid in planning and budgeting

**2.2.4.c Expertise Long-Term Improvements - Achieving advanced degrees and earning professional certifications demonstrates personal and institutional commitment to maintaining and advancing essential knowledge, and increases the ability of SMEs to assess hazards and implement corrections. Ames Laboratory will commit resources to encourage personnel to pursue continuing education with the goal of increasing subject expertise, providing additional coverage in the absence of an SME, and improving succession in critical subject areas.**

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.4.c.1	N/A	Enhance cross training efforts between ESH&A SMEs to broaden general knowledge base and to provide coverage of expertise as needed	Deepen bench	Whalen, ESH&A	3/1/16	Pending	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Restructure ESH&A to align personnel in functional groups and provide supervisory		Whalen	8/1/15	Completed	Org chart was restructured and

experience				approved. Each functional area now has at least two persons assigned.
Identify opportunities for cross training and work observation with ESH&A.	Whalen	12/31/15		
Conduct periodic cross training activities or seminars	Hosted by SME for other staff	10/1/16 and on-going	Pending	

Item#	Tracking	Item Description	Expectation/Goal	Staff	Due dates	Current Status	Resolution
2.2.4.c.2	N/A	Encourage staff to achieve and maintain relevant advanced degrees and/or professional certifications	Increase professional standing and expertise	Various	On-going	Pending	
<b>Sub-items</b>		Sub-items description		Staff	Milestone	Current Status	Resolution
		Identify operational and research staff willing to participate in continuing education (CE).		Line managers	6/1/16		
		Determine and allocate resources to fund CE		Directors	6/1/16		

## 4.0 Performance Measures

Improving safety system performance is dependent on the ability to determine the effectiveness of efforts through benchmarking, defined performance metrics, and gauging employee perceptions of program success. SPIP will include methods for providing feedback and collecting data which will be fed back into the ISMS continuous improvement loop. Ames Laboratory will investigate available performance measurement options and reach out to peer laboratories to determine best practices. Possible data collection opportunities, some of which are already being utilized, include:

- Tracking and trending of events, corrective actions, and employee concerns
- Walkthrough findings
- Training effectiveness through follow-up retention evaluations
- Demonstration of tasks and evaluation of proficiency
- Periodic staff surveys and knowledge assessments
- Documentation of contacts between ESH&A staff and researchers

## Appendix A – Glossary

ALCATS	Ames Lab Corrective Action Tracking System
AMES	Ames Laboratory
AMSO	Ames Site Office
Contractor	Iowa State University
Corrective Action	Requirement imposed per investigation or assessment finding
DOE	United States Department of Energy
ESH&A	Ames Laboratory Environment, Safety, Health & Assurance
ISMS	Integrated Safety Management System
JHA	Job Hazard Analysis
JON	Judgement of Need – corrective action imposed per investigation
MSDS	Material Safety Data Sheet (Now SDS)
Readiness Review	Process by which Ames Laboratory conducts WP&C and ISMS
SDS	Safety Data Sheet
SME	Subject Matter Expert
SOP	Standard Operating Procedure
SPIP	Safety Performance Improvement Plan
WO	Worker Observation
WP&C	Work Planning and Control