

Environment, Safety, Health, and Assurance (ESH&A) Fiscal Year 2013 Trend Analysis

An annual trend analysis is performed to determine common occurrences or prevailing events that should be addressed with additional inspections, training, reviews, policies, lessons learned, etc. The following sources of information were reviewed for trend analysis from FY2009 to FY2013:

- Employee Safety and Security Concerns
- Independent Walk-Through Findings
- Program / Department Walk-Through Findings
- Walk-About (walk-throughs exterior to buildings) Findings
- Plant Protection Discrepancy Reports
- Injury and Illness Data
- Event Reporting (including potentially reportable events, Topical Appraisals and Issues, DOE / External Reviews, etc.)
- Causal Factors of Ames Local Events

Summary Statement

The trend analysis determined there were increases in specific Safety and Security Concerns, Walk-Through Findings, Discrepancy Reports, Injuries/Illnesses, and Causal Factors. With the exception of injuries, the increases were negligible or the findings were insignificant (low risk or other than serious in terms of compliance). In some cases, specific issues increased but the overall number of issues decreased. Regardless, all issues are evaluated and corrective actions implemented when warranted. The trend that is of concern is the four (4) OSHA recordable injuries compared to zero (0) for the previous year. Although there was an increase, the types of injuries are not trending nor are how or where they occurred. If one looks at the number of OSHA recordable injuries beyond last year, four is not out of line. However, zero is always the goal/expectation. There were also positive results with the trend analysis; the number of “Noteworthy Practices” in the Independent Walk-Through Program has increased. The numbers of Occurrence Reports to DOE, Ames Local Events and total number of categorized events have all decreased.

Employee Safety and Security Concerns

Table 1 lists the total number and types of Employee Safety and Security Concerns. The Ames Laboratory actively promotes that employee safety and security concerns be brought to the attention of ESH&A. All of the concerns were investigated, evaluated, brought to a reasonable resolution, and communicated back to the person who voiced the concern. Although there was an increase in “General Safety”, the total number of concerns was negligible. The types of concerns recorded in FY2013 include:

- Icy sidewalks not addressed until after many employees already arrived to work.
- Unable to hear Public Address System in office area.
- Damage flag pole, possibly from snow removal equipment.
- Employee used cell phone to call 911 to report an employee having a seizure. As a result, the call went to Story County Dispatch, not ISU Department of Public Safety. Employee inquired what would be best course of action if another situation should occur.
- A door leading to the stair tower at the first floor of TASF was difficult to open.
- Housekeeping concern in chemistry laboratory.
- Soil erosion at corner of parking and sidewalk.
- Facilities and Engineering Services Craftsmen entering labs without prior notice/approval by Group Leader.

- Phones not operating in Zaffarano and Physics.

Category	FY 2009	FY 2010	FY 2011	FY 2012	4-Year Average	FY 2013	% Change from 4-Year Average
Administrative	0	3	1	1	1.25	0	Decrease
Chemical Spills	0	0	0	0	0	0	None
Fire Safety	1	0	2	0	.75	0	Decrease
General Safety	1	6	2	2	2.75	8	191% Increase
Industrial Hygiene	1	3	0	0	1	0	Decrease
Environmental	0	2	0	0	.50	0	Decrease
Security	1	0	1	1	.75	0	Decrease
Radiological	0	0	1	1	.50	0	Decrease
Traffic Safety	0	0	0	0	0	0	None
Property Management	0	1	0	1	.50	1	100% Increase
Other (non-safety)	0	0	0	0	0	0	None
Odors	0	0	0	0	0	0	None
Total Concerns	4	15	7	6	8	9	12.5% Increase

Independent Walk-Through Findings

FY13 had an 11% increase in findings compared to the 4-year average.

As with last year, there continues to be an increase (41%) in the category of Industrial Hygiene. This is due in part to having the new Industrial Hygienist (IH) participating on all walk-throughs. Labeling of chemical containers also continues to be a problem in some areas.

As in years past, some of the findings would not be cited by OSHA or EPA. This is due to Ames Laboratory aiming higher than just meeting the minimum standards. The OSHA and EPA regulations are intended to be a basic minimum for compliance and the expectation of Ames Laboratory and the Walk-Through Team is to be best in class. Frequently the Walk-Through Team will identify Level 3 Findings (best management practices) and elevate them to Level 2 Finding - Moderate Significance to ensure they are communicated, tracked, and corrected. The severity of the findings overall has been minimal. No High Hazard Findings have been identified since June 2003.

There were four (4) Noteworthy Practices identified. Noteworthy Practices are conditions, which, in the judgment of the walk-through specialists, are examples of excellence and have application to other areas of the Laboratory.

There continues to be a high level of participation with the Ames Site Office Representative, a member of the Executive Council, Purchasing and Property Services Manager, and an ISU Environment, Health, & Safety Representative. This is a tremendous strength of the Independent Walk-Through Program. It shows top management support to workers, demonstrates openness to the Site Office, avoids duplicating walk-throughs, and lends additional perspectives from the ISU side of operations.

Although there have been large increases in some categories of findings (e.g., Emergency Planning) by percentage, the actual total number of findings in those specific categories is not of major concern. The

Independent Walk-Through Program has proven to be an effective tool to communicate, educate, promote, and measure compliance within Ames Laboratory.

Table 2 - Independent Walk-Through Findings							
Categories	FY 2009	FY 2010	FY 2011	FY 2012	4-Year Average	FY 2013	% Change from 4-Year Average
Admin. Controls	1	0	2	2	1.25	1	20% Decrease
Comp. Gases	10	5	5	6	6.5	9	38% Decrease
Confined Space Entry	0	0	0	0	0	0	None
Electrical Safety	54	45	39	55	48.25	39	19% Decrease
Emergency Planning	2	1	2	2	1.75	4	128% Increase
Environmental	11	15	6	11	10.75	12	12% Increase
Fire Safety	6	9	1	8	6	10	67% Increase
General Safety	46	29	35	50	40	34	15% Decrease
Hoisting & Rigging	0	0	0	0	0	0	None
Hazard Communication	2	1	1	3	1.75	0	Decrease
Industrial Hygiene	23	36	21	42	30.5	43	41% Increase
Infrastructure	0	0	1	0	.25	1	300% Increase
Ladder Safety	1	2	0	1	.25	0	Decrease
Laser Safety	0	1	0	0	.25	0	Decrease
Life Safety Code	5	2	2	1	2.5	0	Decrease
Lockout/Tagout	0	0	0	1	.25	0	Decrease
Machine Guarding	5	1	1	2	2.25	3	33% Increase
PPE	6	4	5	2	4.25	10	135% Increase
Plumbing	0	0	0	0	0	0	None
Procedural	1	0	0	0	.25	0	Decrease
Property Management	1	3	13	5	5.5	11	100% Increase
Radiation	0	0	0	0	0	0	None
Respiratory	1	3	1	8	3.25	8	146 % Increase
Training	0	0	0	0	0	0	None
Totals	175	157	135	199	166.5	185	11% Increase
Noteworthy Practices	0	0	0	3	.75	4	433% Increase

Program / Department Walk-Through Findings

The information collected from the program/department walk-throughs is requested in percentage (not the total number of findings). Specific comparisons (number of findings), cannot be made to the Independent Walk-Through Findings, but general observations on the type of concerns identified can be ascertained. The largest category observed was “General Safety” and the second largest category was “Electrical” concerns. This is consistent with years past and the Independent Walk-Through Program. No major concerns are apparent. There was 100% participation with all programs and departments reporting their findings.

Walkabout (Walk-Through exterior to buildings) Findings

Walkabouts (i.e., building roofs, yards, sidewalks, exterior doors and windows) have been performed annually since 2005. The goal of the Walk-About is to identify potential safety hazards and violations that are not identified during the Independent Walk-Through Program. No High Hazard Findings have been identified to date. The findings this year include two railings that were loose, a GFCI did not trip when tested, a pneumatic line was routed through a fixed ladder, a lightning rod was broken, washout from a fire sprinkler drain line, and slip resistant tape on a fixed ladder was coming off. As with the Independent Walk-Throughs, some of the findings would not be cited by OSHA and are categorized as best management practices. The Walkabout provides a great opportunity to identify other areas of concern including deteriorating infrastructure such as dried or missing caulking on windows, ground erosion, removal of unplanned bushes and trees, concerns to be monitored for future walkabouts, etc.

Year	Concerns
2009	5
2010	9
2011	6
2012	7
2013	7

Discrepancy Reports

Discrepancy reports are issued by the Plant Protection staff during facility tours. The total discrepancies continue to decrease. There was a 38% decrease in FY12 and a 53% decrease for FY13 from the previous 4-year averages.

The organization(s) responsible for the discrepancies are notified via Plant Protection / ESH&A for follow-up and correction. The Industrial Safety Specialist, who manages Plant Protection, also reviews the discrepancies on a monthly basis.

For two years in a row, the most notable decrease is “Coffee Pots On and Hot”. This decrease is due, in part, to coffee pots being an emphasis and asking owners of coffee pots to replace their units with the type that turn off automatically after a set time period. This has helped tremendously avoiding coffee from boiling/evaporating out. Last year, there was an 85% decrease in this category and this year there was an 81% decrease. This has proven to be very effective.

Category	FY 2009	FY 2010	FY 2011	FY 2012	4-Year Average	FY 2013	% Change from 4-Year Average
Coffee Pots On & Hot	68	49	24	8	37.25	7	81% Decrease
Soldering Pen/Iron on & hot	10	6	2	1	4.75	0	Decrease
Unsecured Gas Cylinder	11	21	13	12	14.25	2	86% Decrease
Natural Gas Valve On	9	8	7	15	9.75	4	59% Decrease
Main Cylinder Valve Open	14	16	5	3	9.5	2	79% Decrease
Uncapped Cylinder	16	8	8	11	10.75	9	16% Decrease
Unattended Flame	1	1	1	1	1	0	Decrease
Obstructed Hallway / Door	12	15	12	3	10.5	2	81% Decrease
Unsecured Door	96	84	54	63	74.25	51	31% Decrease
Hood Sash / Set Back (New Category -2007 Emphasis)	249	105	95	127	144	66	54% Decrease
Improper / Incompatible Storage	7	2	6	1	4	0	Decrease
Obvious Equipment	19	7	4	5	8.75	4	54% Decrease

Malfunction							
Window Open	8	6	3	6	5.75	2	65% Decrease
Miscellaneous	46	32	24	16	29.5	21	29% Decrease
Total Discrepancies	567	360	258	272	364	170	53% Decrease

Fume hood sash height and being in setback has been an emphasis for the last two years and those discrepancies have been falling consistently. In FY12 there was a 25% decrease and in FY13 there was a 54% decrease for the 4-year averages. Users are more aware of energy conservation and costs of using the fume hoods properly. By placing the fume hood in setback and lowering the sash, Facilities and Engineering Services estimates that simple action could save up to \$1,100 per hood in energy savings.

No concerns are apparent.

Injury and Illness Data

There were eight (9) total injuries in FY13 with four (4) meeting the threshold of OSHA Recordable (medical treatment beyond first aid). The injuries include:

1. Finger burn from flame when sealing a quartz tube.
2. Contusion to face from hand rail when employee slipped while descending stairs.
3. Standard Threshold Shift (hearing loss) determined during annual audiometric evaluation. OSHA Recordable.
4. Finger burn when employee picked up hot quartz tube.
5. Fractured finger when employee slipped descending stairs. OSHA Recordable.
6. Contusion to hip when employee fell out of chair reaching for something on the floor.
7. Back strain (lumbar) when employee lifted a filing cabinet; did not use appropriate moving equipment. OSHA Recordable, Lost Work Days, and Restricted Work Days.
8. Contusion and abrasions when employee tripped and fell from uneven sidewalk.
9. Metal sliver to finger when employee picked up a metal bar. Lidocaine was used to numb the finger and a scalpel was used to open up the wound. OSHA Recordable

The Laboratory continues to stress safety/accident prevention in General Employee Training (GET) for new hires, topic specific training, refresher training, line management responsibility for safety, distribution of lessons learned, circulation of safety guides, use of personal protective equipment, etc. In addition, the Laboratory Director continues to send Laboratory-wide safety messages stressing the importance of safety and the expectation for all employees to maintain a safe and healthful workplace.

Type of Injury / Illness	FY 2009	FY 2010	FY 2011	FY 2012	4-Year Average	FY 2013	% Change from 4-Year Average
Contusion / Abrasions	1	1	2	1	1.25	3	140% Increase
Burns	0	1	2	0	.75	2	167% Increase
Chemical Exposure	0	0	2	2	1	0	Decrease
Eye Injury	1	0	0	0	.25	0	Decrease
Fracture	1 (1)	0	1 (1)	0	.5 (.5)	0	Decrease
Laceration	4 (2)	0	3 (3)	3	2.5 (1.25)	0	Decrease
Acute Musculoskeletal Injury	0	2 (1)	1 (1)	0	.75 (.5)	1(1)	33% Increase 100% () Increase
Miscellaneous:							
Hematoma	0	0	1 (1)	0	.25 (.25)	0	Decrease
Standard Threshold Shift	0	0	0	0	0	1(1)	Increase

Table 5 - Injury and Illness Data

Type of Injury / Illness	FY 2009	FY 2010	FY 2011	FY 2012	4-Year Average	FY 2013	% Change from 4-Year Average
(Hearing Loss)							
Avulsion (toenail)	1	0	0	0	.25	0	Decrease
Bee Sting	1	0	0	0	.25	0	Decrease
Splinter	0	1	0	0	.25	1(1)	300% increase
Dislocated Finger	0	0	0	0	0	1(1)	Increase
Total	9	5	12	6	8	9	12% Increase
OSHA Recordable	3	2	6	0	2.75	4	45% Increase
Non-OSHA Recordable	6	3	6	6	5.25	5	5% Decrease
Lost Work Days –LWD	2	0	28	0	7.5	9	33% Decrease
Restricted Work Days – RWD	0	12	6	0	9	44	Increase
Total of LWD and RWD	2	12	34	0	17	53	Increase
DART Case Rate	.2	.22	.45	0	0.22	.24	9% Increase
Total Recordable Case Rate (TRCR)	.68	.44	1.34	0	.62	.94	52% Increase

() indicates OSHA Recordable Injury
DART = Days Away, Restricted, and/or Transferred

Event Categorizations (FY)

The Laboratory utilizes information from a broad variety of sources to determine events which are reviewed against external and local reporting criteria. The sources include employee safety and security concerns, injuries and illnesses, assessment results, and operational data. Monthly a reminder is sent to the Event Screening Team asking if there was anything out of the normal that should be investigated. The Screening Team is comprised of a member of the Executive Council, Industrial Safety Specialist, Industrial Hygienist, Plant Protection Manager, Radiations Safety Officer, Environmental Specialist, Facilities and Engineering Services Engineer, Materials and Transportation Supervisor, and a Systems Analyst. Event reporting information is presented in Tables 6-8: Event Reporting Summary, Reportable Events, and Ames Local Events. The following are the events categorized in FY 2013:

Table 6 – Event Categorizations

Cat. #	Date	Title	Conclusion
E12-054	10-11-12	Hood/Shroud Exhaust Flow Reduced	Ames Local-ORPS
E12-055	10-12-12	Possible Skin Exposure Employee with Itchy Hand	Not Reportable (ORPS, NTS, ISC or Local)
E12-056	10-24-12	Suspicious Person Outside Spedding	Not Reportable (ORPS, NTS, ISC or Local)
E12-057	11-10-12	Sprinkler Flow, Sensor Malfunction	Ames Local-ORPS
E12-058	11-15-12	Possible Standard Threshold Shift	Not Reportable (ORPS, NTS, ISC or Local)
E12-059	11-30-12	Official Use Only Document on Docstoc	Ames Local - ISC
E12-060	12-04-12	Broken Fan Belts on Cooling Unit at 209 Spedding	Ames Local – ORPS
E12-061	12-11-12	Laps of CDL Hazmat Endorsement	Ames Local - ORPS
E12-062	12-13-12	Bullet Casings Observed by Custodian	Not Reportable (ORPS, NTS, ISC or Local)
E13-001	1-3-13	Suspect/Counterfeit Defective Items Discovery	ORPS
E13-002	1-11-13	Finger Burn	Ames Local – CAIRS
E13-003	1-22-13	Hot Plate Fire	Ames Local – ORPS
E13-004	1-22-13	Suspect Counterfeit and Defective Items Discovery	Ames Local - ORPS
E13-005	1-24-13	Hoist Failure	Ames Local - ORPS
E13-006	2-1-13	Knee Injury – Fall	Not Reportable (ORPS, NTS, ISC or Local)
E13-007	2-1-13	Employee Fall in Metals Development Stairwell	Ames Local – CAIRS

Table 6 – Event Categorizations

Cat. #	Date	Title	Conclusion
E13-008	3-14-13	Disgruntled Applicant	Not Reportable (ORPS, NTS, ISC or Local)
E13-009	3-18-13	System for Award Management (SAM) Security Event	Not Reportable (ORPS, NTS, ISC or Local)
E13-010	3-18-13	Occupational Medicine Program Review	Ames Local - ORPS
E13-011	4-22-13	Suspicious Drums between Zaffarano and Wilhelm Hall	Not Reportable (ORPS, NTS, ISC or Local)
E13-012	5-10-13	Ducane All Page System Failure	Ames Local - ORPS
E13-013	5-20-13	Conflict of Interest on Equipment Purchase	Not Reportable (ORPS, NTS, ISC or Local)
E13-014	5-23-13	Dumpster Fire (Warehouse)	Ames Local - ORPS
E13-015	6-07-13	Repeated Inquiries / Accusations of Inactive Waste Sites	Ames Local - ISC
E13-016	6-11-13	Counterfeit Bolts– Non Safety System	Ames Local - ORPS
E13-017	6-11-13	Fall Out of Chair	Not Reportable (ORPS, NTS, ISC or Local)
E13-018	6-19-13	Department of Public Safety (ISU) Response to Escalating Tension	Ames Local -ISC
E13-019	6-24-13	Seizure – Not Work Related	Not Reportable (ORPS, NTS, ISC or Local)
E13-020	6-21-13	Standard Threshold Shift (Hearing Loss)	CAIRS & OSHA Recordable
E13-021	7-8-13	Fuel Leak from Automobile	Ames Local - ORPS
E13-022	7-15-13	Nitrogen Tank Release	Ames Local - ORPS
E13-023	7-15-13	55 Gallon Drum and Inner Liner Leak	Ames Local - ORPS
E13-024	7-16-13	First Degree Burn to Thumb	Ames Local - CARIS
E13-025	7-22-13	Odor Call-Acid Spill from Back Up Generator	Ames Local - ORPS
E13-026	8-2-13	Dislocated Finger – From Fall	CAIRS & OSHA Recordable
E13-027	8-1-13	Annual Materials Control and Accountability (MC&A) Review	Ames Local - NTS
E13-028	8-2-13	Annual Hydrofluoric Acid Activity Review – Topical Appraisal	Ames Local - ORPS
E13-029	8-13-13	Medical Surveillance -Topical Appraisal	Ames Local - NTS
E13-030	8-13-13	Compliance of SF6 Inventory – Topical Appraisal	Ames Local - ORPS
E13-031	7-29-13	Foreign Visits and Assignments (FV&A) – Topical Appraisal	Not Reportable (ORPS, NTS, ISC or Local)
E13-032	5-6-13	Waste Management for Asbestos and Beryllium – Topical Appraisal	Ames Local - ORPS
E13-033	8-15-13	Safeguards and Security Survey - DOE	Ames Local - NTS
E13-034	8-13-13	Sealed Radioactive Sources - Topical Appraisal	Not Reportable (ORPS, NTS, ISC or Local)
E13-035	8-29-13	Safety for On-Site Subcontractors - Internal Auditors	Ames Local – ORPS
E13-036	9-6-13	Harassment Claim	Not Reportable (ORPS, NTS, ISC or Local)
E13-037	9-5-13	Unauthorized Use of Ames Lab Space	Ames Local - ISC
E13-038	9-6-13	Fall Out of Chair	Not Reportable (ORPS, NTS, ISC or Local)
E13-039	9-11-13	Confined Space Entry - Topical Appraisal	Ames Local – ORPS
E13-040	9-9-13	Back Lumbar Strain	CAIRS and OSHA Recordable
E13-041	9-25-13	Fume Hood Fire (Second fire in 1 year)	Ames Local – ORPS
E13-042	9-23-13	Trip and Fall on Sidewalk	Ames Local – CAIRS
E13-043	9-27-13	Quality Assurance Review –DOE <i>Feedback and Improvement Activities</i>	Ames Local-ORPS
E13-044	9-27-13	Ladders and Portable Stairs - Topical Appraisal	Not Reportable (ORPS, NTS, ISC or Local)
E13-045	9-30-13	Health Physics Oversight of Maintenance Activities – Topical Appraisal	Ames Local-ORPS
E13-046	9-30-13	Chemical Hygiene Plan - Topical Appraisal	Ames Local-ORPS
E13-047	9-30-13	McAfee Firewall Implementation - Topical Appraisal	Ames Local-ORPS
E13-048	9-30-13	Hearing Conservation Program - Topical Appraisal	Ames Local-ORPS
E13-049	9-30-13	Occupational Health Manager - Topical Appraisal	Ames Local-ORPS
E13-052	9-15-13	Metal Sliver in Finger	CAIRS and OSHA Recordable

Event Reporting

As indicated in Table 7, there was one (1) incident reported to the Occurrence Reporting Processing System (ORPS) and four (4) injuries reported to the Computerized Accident / Incident Reporting System (CAIRS). There were no events reported to Incidents of Security Concern (ISC) or Noncompliance Tracking System (NTS).

Categories	2009	2010	2011	2012	4-Year Average	2013	% Change from 4-Year Average
Occurrence Reports (ORPS)	3 (*)	4 (*)	3 (*)	2	3	1	67% Decrease
Noncompliance Tracking System (NTS)	1	0	0	1	.5	0	Decrease
Incidents of Security Concern (ISC)	0	0	0	0	0	0	None
Ames Local (AL)	54	64	55	45	54.5	36	34% Decrease
Accident and Injury (CAIRS/OSHA)	3 (*) (#)	2 (*)	6 (*)	0	2.75	4	45% Increase
Other (below Ames Lab reporting threshold)	20	13	18	17	17	8	53% Decrease
Total Events Screened	79	83	81	65	77	55	28% Decrease

(* = Combination ORPS / CAIRS)

(# = Combination CAIRS/NTS)

The Reportable Events, Table 8, provides specific details on the reportable events since FY2004.

Year	Type	Identification	Date	Title	Description
FY 2004	ORPS	2004-0001	1-29-04	Electrical Contact	Researcher contacts 110 VAC when trying to reduce the clicking noise of an electrical contact / relay within the interlock box.
FY 2005	ORPS	2004-0002	12-20-04	Suspect / Counterfeit Bolts	While performing a Readiness Review, suspect / counterfeit bolts (non load bearing) was discovered.
	ORPS	2005-0001	2-1-05	Potential High Voltage Exposure	A visiting scientist (not supported by SC Funding) assembled a prototype research system before seeking Readiness Review.
	ORPS	2005-0002	4-20-05	Flash Hazard Analysis Accuracy Questioned	During the SC Electrical Safety Review, the consultant questioned the accuracy of the analysis.
	ORPS	2005-0003	8-10-05	Software Issue Found in Fire Alarm System	A smoke detector in building alarmed at the fire panel and central station but did not activate the alarms.
FY 2006	ISC	ISC – IMI 3(#19) Incident # 51451	2-17-06	System Intrusion	An intruder allegedly from force.coe.neu.edu used a real username/password to access gateway.cmpgroup.ameslab.gov.
FY 2007	ORPS	2007-0001	12-29-06	Smolder /Smoke in Renovation Area	A small crack in the concrete floor between two buildings allowed a spark from plasma-arc cutting to reach expansion joint material.
	ORPS	2007-0002	7-27-07	Electrical Conduit Penetration	Conduit penetrated by screw during roofing operations.
FY 2008	ORPS	2007-0003	10-4-07	Switch Failure – Fire Alarm System	During annual fire alarm system test and fire drill, the Wilhelm Hall over-ride switch failed.
	ORPS	2008-0001	4-23-08	Suspect /Counterfeit Bolts	After review of a lessons learned, the man-lifts were reviewed with one having suspect/counterfeit bolts.
	ORPS	2008-0002	5-16-08	Hydrofluoric Acid SAD Procedure	A larger cylinder of Hydrofluoric Acid was purchased & installed contrary to the Safety Analysis Document

Table 8 - Reportable Events (FY)

Year	Type	Identification	Date	Title	Description
				Deviation	and Standard Operating Procedure.
	ORPS	2008-0003	7-3-08	HVAC Vent Unexpectedly Drops	HVAC Upgrade Project a wall vent was not verified that it was removed before removing supply duct.
FY 2009	ORPS & CAIRS	2008-0004	10-24-08	Elbow Injury (Fracture)	An Engineer while applying pressure on opposing wrenches dislodged a bone in the elbow from a previous non-work related injury.
	ORPS & NTS	2009-0001	5-18-09	Beryllium Contamination Found	As a result of performing wipe sampling in preparation for a fume hood exhaust stack lining project, beryllium was discovered above the DOE Limits
	ORPS	2009-0002	9-25-09	Water Service Impairment (Fire Safety) at Service Buildings (ARRA)	ARRA funds stimulus money was appropriated to remodel a portion of the Campus warehouse to provide needed space for the storage of record. Subcontractor determined that the 4 inch water service was inadequate for the sprinkler system.
FY 2010	ORPS	2009-0003	10-7-09	Electric Shock	While assembling components of the biomass auger reactor, the student received an electric shock. Activity in space leased by Ames Lab by non employee.
	ORPS	2009-0004	12-1-09	Fire of UPS	Fire was detected involving a UPS System for the Scalable Computing Lab.
	ORPS & CAIRS	2010-0001	6-8-10	Dropped UPS on Dock	Delivering a (UPS) unit to loading dock, employees dropped it on its side. As the unit fell, one employee jumped out of the way resulting in neck strain that required prescription muscle relaxer and restricted work duty.
	ORPS	2010-0002	6-18-10	Rad and BE Discovery	Elevated radiological readings were discovered in recessed area at the tops of some doors.
	CAIRS	2010-0002	8-27-10	ARRA Contractor Injury (hernia)	While lifting a door frame into place, contractor pain in his groin. Determined to be hernia requiring surgery.
FY 2011	ORPS & CAIRS	2011-0001	1-3-11	Broken Arm & Ankle and Dislocated Elbow	Employee fell downstairs at ISU Library. Steps in good condition.
	ORPS	2011-0002(R)	1-6-11	Recurring Injuries	Custodians falling during floor stripping and waxing activities.
	ORPS	2011-0003	9-12-11	Cut Conduit	Contractor performing demolition cut into a concealed conduit with 110 VAC.
FY 2012	ORPS	2012-0001	2-16-12	Suspect/Counterfeit and Defective Parts	Three ratchet strap assemblies were found to have S/CI bolts installed and a suspect bolt on a platform lift was found the same day during inspections
	ORPS	2012-0002	6-29-12	Switchgear Fire	Electrical switchgear in 244 Metals Development failed and caused a fire and evacuating the building for the day. The fire was quenched using a CO2 extinguisher.
	NTS	2012-0001	8-22-12	Lapse of Registered Nurse License	Supervising nurse reported that license had expired December 15, 2011.
FY 2013	ORPS	2013-0001	1-3-13	Suspect/Counterfeit Defective Items	Six ratchet strap assemblies were found to have SC/I bolts installed
	CAIRS	13-005	6-12-13	Standard Threshold Shift (STS)	Hearing loss over time.
	CAIRS	13-007	8-13-13	Dislocated Finger	Fall down stairs.
	CAIRS	13-009	9-9-13	Lumbar Strain	Moving filing cabinet improperly.
	CAIRS	13-052	9-15-13	Metal Sliver in Finger	Metal splinter in finger requiring Lidocaine to numb finger and scalpel to open wound.

Root Cause Analysis

As detailed in the tables 9 and 10, TapRoot analysis is performed on Reportable Events and causal analysis is performed on Ames Local Events (events below reporting threshold). The results TapRoot and causal analysis is used to identify trends which would be used to determine if additional efforts are needed towards problems with Design/Engineering, Equipment/Material, Human Performance, Management, Communications, and Training. The results of this analysis are also used to develop appropriate corrective actions. The definition of Root Cause Analysis is “The search for the best practices and/or missing knowledge that will keep a problem from recurring.

TapRoot Root Cause Analysis

TapRoot is a formal (standardized) method used at Ames Laboratory to investigate and determine causal factors for significant events (those beyond Ames Local Events). TapRoot was chosen because it was suggested by the Ames Site Office and it is also used by other DOE National Laboratories. The use of TapRoot at Ames Laboratory began in 2004 for Reportable Events (Occurrences (ORPS), Non Compliance Tracking System (NTS) and Incidents of Security Concern (ISC). Table 9 lists the causal analysis associated with each reportable event. Although there are similar causal analyses, they are different groups, issues, and results. No trends are apparent.

Table 9 - TapRoot Analysis of Reportable Events		
Event Number	ORPS Description	Causal Analysis
ORPS 2004 - 001	Electrical Shock - Group Leader not authorized to remove cover.	A5 – Communication
ORPS 2004 - 002	Suspect Bolts - Equipment sent from Manufacturer with suspect bolts	A1 – Design / Engineering Problem
ORPS 2005 - 001	Potential High Voltage Exposure	A3 – Human Performance
ORPS 2005 - 002	Accuracy of Flash Analysis Questioned	A1 - Design / Equipment Problem
ORPS 2005 - 003	Fire Alarm Annunciation Failed to Activate	A2 – Equipment / Material Problem
ISC- IMI-3(#19) #51451	Condensed Matter Physics SSH Incident	A4 – Management Problem
ORPS 2007 - 0001	Smoke – Smoldering Event in Graphics Renovation	A2 – Equipment Problem
ORPS 2007- 0002	Electrical Conduit Penetration at Warehouse	A3 – Human Performance
ORPS 2007 – 0003	Wilhelm Hall Annunciators Did Not Activate During Fire Drill	A2 - Equipment / Material Problem
ORPS 2008 - 0001	Suspect / Counterfeit Parts on Man-lift	A2 - Equipment / Material Problem
ORPS 2008 - 0002	Hydrofluoric Acid Procedure Deviation	A3 - Human Performance
ORPS 2008 - 0003	HVAC Upgrade Project – Wall Vent Fell Onto Desk	A4- Management Problem
ORPS 2008 - 0004 & CAIRS	Elbow Injury (Fracture)	None Deemed Appropriate – Legacy Injury
ORPS 2009 - 0001 & NTS	Beryllium Contamination Found	A7 - Other Problem
ORPS 2009 - 0002	Water Service Impairment (Fire Safety) at Service Buildings	A2 - Equipment / Material Problem
ORPS 2009 - 0003	Electric Shock (non-Ames Lab employee in leased space)	A4 - Management Problem
ORPS 2009 - 0004	Fire in UPS Unit	A2- Equipment / Material Problem
ORPS 2010 - 0001 and CAIRS	Dropped UPS Unit	A4- Management Problem
ORPS 2010 - 0002	Rad Beryllium Discovery in Tops of Doors	A4 - Management Problem

Table 9 - TapRoot Analysis of Reportable Events

Event Number	ORPS Description	Causal Analysis
ORPS 2011 - 0001 & CAIRS	Broken Ankle, Broken Arm, Dislocated Elbow at ISU Library	A3 - Human Performance
ORPS 2011 -0002 (R)	Floor Maintenance Injuries (Recurring)	A4 - Management Problem
ORPS 2011 - 0003	Energized 110 Volt Conduit Cut	A3 - Human Performance
ORPS 2012-0001	Suspect/Counterfeit and Defective Parts	A2 - Equipment / Material Problem
ORPS 2012-0002	Switchgear Fire	A2 - Equipment / Material Problem
NTS 2012-0001	Lapse of Registered Nurse License	A3 - Human Performance
ORPS 13-0001	Six ratchet strap assemblies were found to have SC/I bolts installed	A2- Equipment / Material Problem
CAIRS 13-005	Standard Threshold Shift (STS) – Hearing Loss	A1 - Design/Equipment Problem
CAIRS 13-007	Dislocated Finger - An additional railing, although not required by Code, would be desirable.	A1 - Design/Equipment Problem
CAIRS 13-009	Lumbar Strain - Use proper lifting equipment instead of lifting.	A3 - Human Performance
CAIRS 13-052	Metal Sliver in Finger	A3 Human Performance

Causal Analysis of Ames Local Events

Causal Analysis is condensed version of TapRoot. Causal Analysis of Ames Local Events started in May of 2004. An Ames Local Event is one which does not meet the threshold of reportability to DOE or OSHA, but warrants further investigation and potentially the development of corrective actions. The Laboratory also includes non-recordable injuries and illnesses (Ames Local-CAIRS) as an opportunity to ensure injuries/illnesses are investigated, evaluated, and potential corrective actions are documented and tracked. Furthermore, Ames Local Events are evaluated for recurrence (trending). Ames Laboratory views the causal analysis (investigation and analysis) program as a proactive opportunity to address concerns and develop corrective actions to prevent minor concerns which could be a precursor to more severe events and injuries.

Table 10 lists the causal factors identified for Ames Local events for FY2009 through FY2013. The predominant causal factor identified is “A3-Human Performance Less Than Adequate” from DOE Guide 232.2. Causal factor A3 is generally consistent with the numbers generated annually since 2004.

Table 10 - Causal Factors of Ames Local Events

Causal Factor	FY09	FY10	FY11	FY12	4-Year Average	FY13	% Change from 4-Yr Average
A1- Design/Engineering Problem	2	3	1	0	1.5	1	33 %Decrease
A2- Equipment/Material Problem	6	15	7	9	9.25	8	14% Decrease
A3- Human Performance Less Than Adequate	30	14	14	13	17.75	14	21% Decrease
A4- Management Problem	11	4	10	7	8	2	75% Decrease
A5- Communications	6	4	2	2	3.5	2	43% Decrease

Table 10 - Causal Factors of Ames Local Events

Causal Factor	FY09	FY10	FY11	FY12	4-Year Average	FY13	% Change from 4-Yr Average
Less Than Adequate							
A6- Training Deficiency	0	0	2	0	.5	0	Decrease
A7- Other Problem (External Phenomena, Radiation/Hazardous Material Problem)	2	2	1	2	1.75	1	43% Decrease