

## Ames Laboratory Environment, Safety, Health, and Assurance (ESH&A)

### Trend Analysis 10-6-09

Trend Analysis is performed to determine common occurrences or prevailing events that should be addressed with additional inspections, training, reviews, policies, etc. The following sources of information were reviewed for trend analysis from FY2005 to FY2009:

- Employee Safety and Security Concerns
- Independent Walk-Through Findings
- Program / Department Walk-Through Findings
- Walk-About (External Walk-Throughs) Findings
- Discrepancy Reports
- Injury and Illness Data
- Event Reporting (including potentially reportable events, Topical Appraisals and Issues and DOE / External Reviews)
- Causal Factors

#### Employee Safety and Security Concerns

As indicated by the following table, there was a 60% decrease in the total number of Employee Safety and Security Concerns from the 4-year average. The Ames Laboratory actively promotes that concerns of all types be brought to the attention of line management and ESH&A. The types of concerns recorded in FY2009 include the deterioration of a partition between ISU and Ames Laboratory in the steam tunnels, a possible exposure to Iron Pentacarbonyl in Zaffarano Hall, vandalism during Veishea (pulled an emergency shower in Zaffarano during off hours) and a concern about the quality and frequency of trash pickup in Zaffarano. No specific trends have been identified and no concerns of major programmatic significance were found.

<b>Employee Safety and Security Concerns</b>							
<b>Category</b>	<b>FY 2005</b>	<b>FY 2006</b>	<b>FY 2007</b>	<b>FY 2008</b>	<b>4-Year Average</b>	<b>FY 2009</b>	<b>% Change from 4-Year Average</b>
Administrative	0	0	0	0	0	0	None
Chemical Spills	2	1	0	1	1	0	Decrease
Fire Safety	0	1	0	0	.25	1	300% Increase
General Safety	1	2	3	2	2	1	50% Decrease
Industrial Hygiene	2	3	2	0	1.75	1	43% Decrease
Environmental	1	5	1	0	1.75	0	Decrease
Security	0	0	1	1	.50	1	100% Increase
Radiological	0	0	0	0	0	0	None
Traffic Safety	1	0	0	0	.25	0	Decrease
Property Management	0	0	0	1	.25	0	Decrease
Other (non-safety)	1	1	0	0	.50	0	Decrease
Odors	2	1	3	1	1.75	0	Decrease
<b>Total Concerns</b>	<b>10</b>	<b>14</b>	<b>10</b>	<b>6</b>	<b>10</b>	<b>4</b>	<b>60% Decrease</b>

## Independent Walk-Through Findings

Ames Laboratory continues to experience a gradual reduction of findings identified during Independent Walk-Throughs (13% decrease from the 4-year average), as indicated in the table below. As in years past, some of the findings most likely would not be cited by an OSHA Inspector. Often times, the Walk-Through Team will identify concerns as a “best management practices” and as such the concern is elevated to a moderate level to ensure it is tracked to closure. The OSHA regulations are intended to be a basic minimum for compliance, and the expectation of the Walk-Through Team often exceeds the requirements of OSHA. The Laboratory is striving to be a “Best in Class” facility and issues are identified and corrected to ensure best practices are promoted.

The addition of an ISU EH&S Representative on the Walk-Through Team continues to add value to the program. This has proven to be beneficial as different ideas and perspectives are shared between both organizations. It has also made Ames Laboratory and ISU safety programs better aligned for staff who conduct research for both organizations. A member of the Executive Council has participated on 100% of the walk-throughs. Although there have been increases in specific categories (by percentage), the total number of findings in many of those specific categories is insignificant. The total number of findings continues to decrease. The three categories, compressed gases, fire safety, and machine guarding showed notable increase in FY2009 when compared to the previous 4 year average. There are other categories that actually have larger increases when looking at the change by percentage, but the actual increase is minor (i.e., Ladder Safety .5 for the 4-year average with 1 finding in 2009).

For compressed gases, the 4-year average was 6.75 and the total number for FY2009 was 10. The total number of findings for compressed gases in FY2008 was also 10. The types of findings for compressed gases were a missing cap when cylinder was in storage, a compressed cylinder was secured at or below the mid-point, a lecture cylinder was stored on its side instead of upright in a bucket or box, a cylinder was not labeled with contents, etc. Given the many compressed gas cylinders used at Ames Laboratory, these are not unexpected.

For fire safety, the 4-year average was 4.75 and the total number for FY2009 was 6. The findings in fire safety include accessibility to sprinkler valves, need to evaluate flammable chemicals for disposal to reduce fire loading, ceiling tiles missing that could delay sprinkler activation in the event of a fire, and materials too close to sprinkler heads.

For machine guarding, the 4-year average was 3 and the total number in 2009 was 5. The findings included a belt guard missing on a vacuum pump, tongue guard out of adjustment on grinder (2), a can roller without a guard, and guarding enhancements to an Abrasion Tester.

The Independent Walk-Through Program has proven to be an effective tool to educate, promote, and measure compliance within the facility.

Independent Walk-Through Findings							
Categories	2005 Totals	2006 Totals	2007 Totals	2008 Totals	4-Year Average	2009 Totals	% Change from 4-Year Average
Admin. Controls	1	0	1	0	.5	1	100% Increase
Comp. Gases	5	8	4	10	6.75	10	48% Increase
Confined Space Entry	0	0	0	0	0	0	None
Electrical Safety	78	50	44	64	59	54	8% Decrease
Emergency Planning	3	2	2	3	2.5	2	20% Decrease
Environmental	16	13	21	15	16.5	11	33% Decrease
Fire Safety	4	5	2	8	4.75	6	26% Increase
General Safety	59	46	68	65	59.5	46	23% Decrease
Hoisting & Rigging	1	0	0	0	.25	0	Decrease

<b>Independent Walk-Through Findings</b>							
<b>Categories</b>	<b>2005 Totals</b>	<b>2006 Totals</b>	<b>2007 Totals</b>	<b>2008 Totals</b>	<b>4-Year Average</b>	<b>2009 Totals</b>	<b>% Change from 4-Year Average</b>
Hazard Communication	0	2	2	3	1.75	2	14% Increase
Industrial Hygiene	41	9	13	10	18.25	23	26% Increase
Infrastructure	0	0	0	0	0	0	None
Ladder Safety	0	0	1	0	.25	1	300% Increase
Laser Safety	0	0	0	0	0	0	None
Life Safety Code	9	6	4	5	6	5	17% Decrease
Lockout/Tagout	0	0	1	0	.25	0	Decrease
Machine Guarding	1	3	6	2	3	5	67% Increase
Other	1	1	2	0	1	0	Decrease
PPE	25	11	3	2	10.25	6	41% Decrease
Plumbing	0	1	1	0	.25	0	Decrease
Procedural	0	0	0	0	0	1	Increase
Property Management	1	2	5	4	3	1	67% Decrease
Radiation	1	5	1	1	2	0	Decrease
Respiratory	6	3	4	5	4.5	1	78% Decrease
Training	0	0	0	0	0	0	None
<b>Totals</b>	<b>252</b>	<b>167</b>	<b>185</b>	<b>197</b>	<b>200.25</b>	<b>175</b>	<b>13% Decrease</b>
Noteworthy Practices	1	0	2	0	.75	0	Decrease

### **Program / Department Walk-Through Findings**

In the past, the Program / Department Walk-Through information has been gathered on a calendar year basis and has not been part of the self assessment trend analysis. The information collected from the programs / departments is requested in percentage (not the total number of findings). Specific comparisons (number of findings), cannot be made to the Independent Walk-Through Concerns, 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 the Independent Walk-Through Program. No major concerns are discernable.

### **Walk-About (External Walk-Through) Findings**

A Walk-About has been performed annually since 2005. The most recent Walk-About was performed September 2009. The goal of the Walk-About is to identify safety hazards and violations that are not identified during the Independent Walk-Through Program. Hazards such as deviations in concrete for walking and working surfaces, proper operation of Ground Fault Circuit Interrupters, handrails on stairs are secured, proper signs are posted for hazards, bushes / trees are not infringing on emergency exits, etc. No High Hazard Findings have been identified to date, in fact, the number of findings

<b>Year</b>	<b>Concerns</b>
2005	28
2006	10
2007	9
2008	7
2009	5

continue to decrease. As with the Independent Walk-Throughs, some of the findings would not be cited by OSHA. But the Walk-About provides a great opportunity to identify other areas of concern such as problems to the infrastructure (deteriorate caulking on windows, broken windows, enhancements to security, etc.) during these Walk-Abouts.

### **Discrepancy Reports**

Discrepancy reports are issued by the Plant Protection staff during facility tours. The organization(s) responsible for the discrepancy are notified via Plant Protection / ESH&A Staff for follow-up and correction of the identified discrepancies. A new category of emphasis “Hood Sash /Set Back” was added the last quarter of FY2007, thus the large increase from FY2007 (64) to FY2008 (232). This was requested by the Energy Management Steering Committee to emphasize this subject for energy conservation. Unfortunately the numbers of discrepancies have remained high. Additional effort was focused on this

issue by program safety coordinators during the midpoint of the year, and significant improvement has been seen. As an example, October 2008 saw fifty-seven (57) occurrences, while six months later, the number had dropped by half. August 2009 recorded seven (7) occurrences.

There was an increase in most of the categories tracked by Plant Protection. It is important to note that occasionally the number of observations may not be newly identified incidents, but rather the same incidents are identified repeatedly until the correction or abatement has been implemented. It should also be noted that increases and decreases in specific categories may be due to changes in the nature of the research in an area (compressed gas cylinders unsecured) or, for that matter, changes in the staff in an area (the coffee drinkers are gone). The increases in the concerns (excluding Hood Sashes) have been evaluated, and no trend towards programmatic weaknesses has been discerned.

<b>Discrepancy Reports</b>							
<b>Category</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>4-Year Average</b>	<b>2009</b>	<b>% Change from 4-Year Average</b>
Coffee Pots On & Hot	53	39	83	72	61.75	68	10% Increase
Soldering Pen/Iron on & hot	9	7	3	9	7	10	43% Increase
Unsecured Gas Cylinder	18	9	18	19	16	11	31% Decrease
Natural Gas Valve On	11	10	19	15	13.75	9	35% Decrease
Main Cylinder Valve	16	13	14	22	16.25	14	14% Decrease
Uncapped Cylinder	21	14	12	25	18	16	11% Decrease
Unattended Flame	1	1	4	3	2.25	1	55% Decrease
Obstructed Hallway / Door	0	0	15	3	4.5	12	167% Increase
Unsecured Door	122	87	87	86	95.5	96	.005% Increase
Hood Sash / Set Back <i>(New Category -2007 Emphasis)</i>	-	-	64	232	148 (2 year average)	249	68% Increase (from previous 2 year average)
Improper / Incompatible Storage	0	0	8	7	3.75	7	87% Increase
Obvious Equipment Malfunction	0	0	13	13	6.5	19	192% Increase
Window Open	0	0	7	5	3	8	167% Increase
Miscellaneous	69	45	54	57	56.25	46	18% Decrease
<b>Total Discrepancies</b>	<b>320</b>	<b>225</b>	<b>401</b>	<b>568</b>	<b>378.5</b>	<b>567</b>	<b>50% Increase</b>

### **Injury and Illness Data**

There has been a 13% increase of total injuries / illnesses and a 9% increase of OSHA Recordable injuries and illnesses (those requiring medical attention beyond first aid). Much effort continues to be targeted towards the reduction / elimination of injuries including lacerations and sprains and strains at the Laboratory, the two leading categories of injuries and OSHA Recordable incidents. In addition, there has been additional effort to have minor injuries reported. During FY 2009, one injury may have not have been OSHA Recordable had proper first aid been performed when the injury occurred. Instead, the wound became infected and the use of antibiotics was required. The Laboratory continues to stress safety at new employee orientations, line management responsibility for safety, distribution of lessons learned, the circulation of Safety Guides, the use of personal protective equipment, and safety training.

There were three OSHA Recordable injuries in FY2009 (one fracture and two lacerations).

1. The first case involved an aggravation of a pre-existing condition. A bone in an engineer's right elbow had been broken and poorly healed, from a much earlier non-work related injury. The separation occurred at work, as the engineer tightened fittings on a device his shop had designed and built. Two lost work days accrued after the surgery to reattach the loose bone.

2. The second case was a laceration experienced by a machinist to his left ring finger, resulting in twelve stitches. The machinist's work processes were reviewed and recommendations were made to reduce the possibility of this event recurring. No lost or restricted work days were accrued.
3. The third case involved an employee working in a glove box. When the employee attempted to install the cap to a 5mm NMR tube, the tube broke, and the attempt caused the broken NMR tube to lance through the butyl rubber glove of the glove box, and pierce his right index finger. The wound was cleaned and band aid applied. Three days later the employee reported to Occupational Medicine when the wound looked red and swollen. He was referred to the Occupational Medicine Department at McFarland Clinic, where a piece of glass was discovered in the wound and removed, and a prescription for antibiotics was written.

The reduction / elimination of lacerations and sprains and strains continue to be an emphasis in General Employee Training which is required for all new Ames Laboratory employees. 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. The Director stresses the importance of supervisors, group leaders and co-workers to provide assistance and oversight of potentially hazardous activities. Because the total number of injuries is low, it is difficult to discern trends. The Laboratory will continue to stress the importance of line management responsibilities for safety, identification and correction of hazards, the use of personal protective equipment and safety training in an effort to further reduce injuries in the workplace.

<b>Injury and Illness Data</b>							
<b>Type of Injury / Illness</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>4-Year Average</b>	<b>2009</b>	<b>% Change from 4-Year Average</b>
Contusion / Abrasions	4 (1)	3	2	0	2.25	1	56% Decrease
Burn	1	2	0	0	.75	0	Decrease
Eye Injury	0	0	0	0	0	1	Increase
Fracture	0	1 (1)	0	0	.25	1 (1)	300% Increase
Laceration	2 (1)	0	6 (2)	2	2.5	4 (2)	60% Increase
Puncture	0	0	1	0	.25	0	Decrease
Acute Musculoskeletal Injury	1 (1)	0	2	1 (1)	1	0	Decrease
Cumulative Trauma Disorder	0	0	0	0	0	0	Decrease
Miscellaneous:							
Otagia (Pain in the ear)	0	1	0	0	.25	0	Decrease
Respiratory Irritant	0	0	1	0	.25	0	Decrease
Twisted Ankle	0	0	0	1	.25	0	Increase
Avulsion (toenail)	0	0	0	0	0	1	Increase
Bee Sting	0	0	0	0	0	1	
<b>Total</b>	<b>8</b>	<b>8</b>	<b>12</b>	<b>4</b>	<b>8</b>	<b>9</b>	<b>13% Increase</b>
OSHA Recordable	3	1	2	1	1.75	3	71% Increase
Non-OSHA Recordable	5	7	10	3	6.25	6	4% Decrease
Lost Work Days –LWD	180	0	0	2	45.5	2	96% Decrease
Restricted Work Days – RWD	0	0	0	18	4.5	0	Decrease
Total of LWD and RWD	180	0	0	20	50	2	96% Decrease
DART Rate	.21	0	0	.23	.11	.2	21% Increase
Total Recordable Case Rate (TRCR)	.62	.24	0.48	.23	.39	.7	79% Increase

( ) indicates OSHA Recordable Injury

DART: Days Away, Restricted, and/or Transferred

## Event Reporting (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 concerns, injuries and illnesses, assessment results and operational data. Event reporting information is presented in the following three tables: Event Reporting Summary, Reportable Events, and Ames Local Events. The following are the events categorized in FY 2009:

<b>Categorization Number</b>	<b>Date</b>	<b>Title</b>	<b>Conclusion</b>
E08-055	10-13-08	Water Leak, 277 DEV	Ames Local-ORPS
E08-056	10-14-08	Internal Audit- Nanoscale Materials Safety	Ames Local-ORPS
E08-057	10-14-08	Anxiety Attack, in front of TASF	Not Reportable (ORPS, NTS, ISC or Local)
E08-058	10-21-08	System Compromise Type 1 Low	Ames Local-ISC
E08-059	10-24-08	Elbow Injury	<b>CAIRS and ORPS Report SC—AMSO-AMES-AMES-2008-0004</b>
E08-060	10-27-08	Broken Chamber Port	Not Reportable (ORPS, NTS, ISC or Local)
<b>E08-061</b>	<b>10-30-08</b>	<b>Finger Injury</b>	<b>CAIRS Report</b>
E08-062	10-30-08	SPH & TASF Roofing w/ISU	Ames Local-ORPS
E08-063	10-30-08	Water Leak – DI Water System	Ames Local-ORPS
E08-064	11-10-08	Newspaper article, Former Worker program	Not Reportable (ORPS, NTS, ISC or Local)
E08-065	11-12-08	System Compromise Type 1 Low	Ames Local-ISC
E08-066	11-18-08	Rad Sample Discovery	Ames Local-ORPS
E08-067	12-11-08	Winter Storm- Icy Conditions	Ames Local-ORPS
E08-068	12-11-08	Mercury Discovery	Ames Local-ORPS
E08-069	12-11-08	Slip/Fall On Ice	Ames Local-ORPS
E08-070	12-23-08	Type 1&2 Intrusion	Ames Local-ISC
E08-071	12-24-08	Missing Person Report	Ames Local-ISC
E08-072	12-24-08	Water leak 120 DEV	Not Reportable (ORPS, NTS, ISC or Local)
E08-073	12-29-08	Hydraulic Oil Leak	Ames Local- ORPS
E09-001	1-12-09	Power Center Spark	Ames Local- ORPS
E09-002	1-14-09	CWH-PAC Water Main Break	Ames Local-ORPS
E09-003	01-19-09	SPH Water Leak	Ames Local-ORPS
E09-004	01-20-09	Possible Eye Injury	Ames Local-CAIRS
E09-005	1-23-09	Thumb Laceration	Ames Local-CAIRS
E09-006	1-23-09	Flood Detection Inadequacy	Ames Local-ORPS
E09-007	1-23-09	Powered Industrial Vehicles Topical	Ames Local-ORPS
E09-008	1-26-09	Unusual Phone Calls	Not Reportable (ORPS, NTS, ISC or Local)
E09-009	1-23-09	Potential Finding of the SPCC Rule	Not Reportable (ORPS, NTS, ISC or Local)
E09-010	1-26-09	Type 1 Low Compromise	Ames Local-ISC
E09-011	1-26-09	Type 1 Low Compromise	Ames Local-ISC
E09-012	1-26-09	Type 1 Low Compromise	Ames Local-ISC
E09-013	1-28-09	Laser Burns on Wall	Ames Local-ORPS
E09-014	02-10-09	Type 1 Low Compromise	Ames Local-ISC

<b>Categorization Number</b>	<b>Date</b>	<b>Title</b>	<b>Conclusion</b>
E09-015	2-18-09	Ambulance Call	Not Reportable (ORPS, NTS, ISC or Local)
E09-016	2-18-09	Asbestos Trailer not licensed	Not Reportable (ORPS, NTS, ISC or Local)
E09-017	2-19-09	Type 1 Low Compromise	Ames Local-ISC
<b>Type 1 Low Compromise Events will continue to be categorized, but corrective actions will be the "remove-image-wipe-restore" procedure and documentation will be abbreviated in each year's Events Folder, as per decision after consultation between Bill Sears, Shawn Nelson, Tom Wessels and G. P. Jones 04-27-09</b>			
E09-018	3-2-09	Type 1 Low Compromise	Ames Local-ISC
E09-019	3-11-09	Finger Laceration	Ames Local-CAIRS
E09-020	3-12-09	EPCRA Exceedance	Ames Local-ORPS
E09-021	4-2-09	Type 1 Low Compromise	Ames Local-ISC
E09-022	4-6-09	Type 1 Low Compromise	Ames Local-ISC
E09-023	4-17-09	Type 1 Low Deviation	Ames Local-ISC
E09-024	4-18-09	Intentional Flooding ZAF	Not Reportable (ORPS, NTS, ISC or Local)
E09-025	4-20-09	Discovery of Rad. Material ZAF	Not Reportable (ORPS, NTS, ISC or Local)
E09-026	4-21-09	Students Observed on Chemistry Stores Building.	Not Reportable (ORPS, NTS, ISC or Local)
E09-027	4-27-09	Missing General RWP	Ames Local - PAAA
E09-028	4-27-09	Type 1 Low Compromise	Not Reportable (ORPS, NTS, ISC or Local)
E09-029	3-19-09	EPCRA Tier II Reporting Topical Appraisal	Ames Local - ORPS
E09-030	4-29-09	Severe Weather Procedures Topical Appraisal	Not Reportable (ORPS, NTS, ISC or Local)
E09-031	4-29-09	Water Leak - Spedding Basement	Ames Local - ORPS
E09-032	4-4-09	Environmental Management System Review 4-9-09 by AMSO	Ames Local - ORPS
E09-033	5-1-09	ISU Laptop Stolen	Ames Local-ISC
E09-034	5-1-09	Students on SPH Dock Roof	Ames Local-ISC
E09-035	5-1-09	Projector Found	Not Reportable (ORPS, NTS, ISC or Local)
<b>E09-036</b>	<b>5-18-09</b>	<b>Beryllium Contamination Found</b>	<b>Ames Local-PAAA, ORPS and NTS</b>
E09-037	5-19-09	Packaging/Transport. Audit by DOE-CH	Ames Local-ORPS
E09-038	5-22-09	Avulsed Toenail	Ames Local-CAIRS
E09-039	5-27-09	Type 1 Low Compromise	Not Reportable (ORPS, NTS, ISC or Local)
E09-040	6-19-09	Minor Steam Leak	Ames Local-ORPS
E09-041	7-07-09	Defeated Door Lock	Ames Local-ISC
E09-042	7-10-09	Small fire, 275 DEV	Ames Local-ORPS
E09-043	7-10-09	Small fire, 2801 GIL	Not Reportable (ORPS, NTS, ISC or Local)
E09-044	7-31-09	MC&A Review	Ames Local-PAAA
<b>E09-045</b>	<b>7-31-09</b>	<b>Finger Laceration</b>	<b>CAIRS Reportable</b>
E09-046	8-6-09	NFPA 14 Topical Appraisal	Ames Local-PAAA
E09-047	8-13-09	Safeguards and Security Survey	Ames Local-ISC
E09-048	8-14-09	Sealed Sources Topical Appraisal	Not Reportable (ORPS, NTS, ISC or Local)

<b>Categorization Number</b>	<b>Date</b>	<b>Title</b>	<b>Conclusion</b>
E09-049	08-20-09	Type 1 Low Compromise	Not Reportable (ORPS, NTS, ISC or Local)
E09-050	8-20-09	Bee Sting	Not Reportable (ORPS, NTS, ISC or Local)
E09-051	8-26-09	Vehicle Collision	Not Reportable (ORPS, NTS, ISC or Local)
E09-052	9-8-09	Foreign Travel Topical Appraisal	Not Reportable (ORPS, NTS, ISC or Local)
E09-053	9-9-09	Large Quantity Generator to Small Quantity Generator Topical Appraisal	Not Reportable (ORPS, NTS, ISC or Local)
E09-054	9-16-09	Incident Response – Cyber Security Topical Appraisal	Ames Local – ORPS
<b>E09-055</b>	<b>9-16-09</b>	<b>Water Service Impairment</b>	<b>ORPS Report SC—AMSO-AMES-AMES-2009-0002</b>
E09-056	9-17-09	Fire Safety Assessment Issues	Waiting on Report
E09-057	9-21-09	Green Tag Program – Topical Appraisal	Ames Local – ORPS
E09-058	9-22-09	Confined Space Entry – Topical Appraisal	Not Reportable (ORPS, NTS, ISC or Local)
E09-059	9-22-09	Perchloric Acid Usage – Topical Appraisal	Not Reportable (ORPS, NTS, ISC or Local)
E09-060	9-28-09	240 SPH Fire Alarm	Ames Local-ORPS
E09-061	09-30-09	Severe Storm- Power Outage	Not Reportable (ORPS, NTS, ISC or Local)

As indicated in the summary tables (below), there were three incidents reported to the Occurrence Reporting Processing System (ORPS), three incidents reported into the Computerized Accident / Incident Reporting System (CAIRS), and one reported Non-Compliance Tracking System (NTS) in FY2009. As required by DOE, some incidences are reported into two tracking systems. As a result, the elbow injury (fracture) was reported as both an ORPS and CAIRS. In addition, the Beryllium event was reported as both an ORPS and an NTS.

<b>Event Reporting Summary (FY)</b>							
<b>Categories</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>4-Year Average</b>	<b>2009</b>	<b>% Change from 4-Year Average</b>
Occurrence Reports (ORPS)	4	0	2	4	2.5	3 (2*)	20% Increase
Noncompliance Tracking System (NTS)	0	0	0	0	0	1	Increase
Incidents of Security Concern (ISC)	0	1	0	0	.25	0	Decrease
Ames Local (AL)	14	33	24	38	27.25	54	98% Increase
Accident and Injury (CAIRS)	3	1	2	1	1.75	3	71% Increase
Other (below reporting threshold)	24	11	13	24	18	20	11% Increase
Total Events Screened	45	46	41	67	49.75	79	59% Increase

(2\* - One is combination ORPS/CAIRS and the other is a combination CAIRS/NTS)



The Reportable Events table below provides further details on the reportable events since FY2004.

<b>Reportable Events (FY)</b>					
<b>Year</b>	<b>Type</b>	<b>Identification</b>	<b>Date</b>	<b>Title</b>	<b>Description</b>
FY 2004	ORPS	CH—AMES – Ames-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	CH—AMES – Ames-2004-0002	12-20-04	Suspect / Counterfeit Bolts	While performing a Readiness Review, suspect / counterfeit bolts (non load bearing) was discovered.
	ORPS	CH—AMES – Ames-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	CH—AMES – Ames-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	CH—AMES – Ames-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	CH- - Ames-Ames-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	CH- - Ames- Ames-2007-0002	7-27-07	Electrical Conduit Penetration	Conduit penetrated by screw during roofing operations.
FY 2008	ORPS	SC - - AMSO- AMES-AMES-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	SC - - AMSO- AMES-Ames-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	SC - - AMSO- AMES-Ames-2008-0002	5-16-08	Hydrofluoric Acid SAD Procedure Deviation	A larger cylinder of Hydrofluoric Acid was purchased & installed contrary to the Safety Analysis Document and Standard Operating Procedure.
	ORPS	SC - - AMSO- AMES-Ames-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	SC - - AMSO- AMES-Ames-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	SC - - AMSO – AMES – Ames – 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	SC - - AMSO- AMES-Ames – 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.

### Causal Factors

As detailed in the following tables and discussion, TapRoot analysis is performed on reportable events and a brief causal analysis process is performed on Ames Local Events.

### TapRoot 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). It is a method that is used by other DOE facilities. 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)). There have been five (5) ORPS and one (1) ISC to date since the adoption of TapRoot. All have undergone TapRoot to determine causal factors. No trends are apparent. Below is a table of the ORPS that received TapRoot analysis.

<b>TapRoot Analysis of Reportable Events</b>		
<b>Event Number</b>	<b>ORPS Description</b>	<b>Causal Analysis</b>
ORPS – 2004 - 001	Electrical Shock –Group Leader not authorized to remove cover.	A5 – Communication LTA
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
ORPS 2009-0001 and NTS	Beryllium Contamination Found	A7 – Other Problem
ORPS 2009-0002	Water Service Impairment (Fire Safety) at Service Buildings	A2 – Equipment / Material Problem

### **Causal Analysis**

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, 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 incidents are 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 even the most minor concerns which could lead to more severe injuries and events.

Below are the results of the causal factors identified from all reportable events for FY2004 through FY2009. The predominant causal factors for Ames Local events are identified as “A3-Human Performance LTA” and “A4-Management Problem” from the DOE Guide 231.1-2. This is consistent with the number generated since the beginning of causal analysis. Corrective actions are designed to appropriately match the identified causal factors. Some of the increases are due to the 59% increase in categorized events over the 4-year average. In the beginning of causal analysis, Ames Laboratory did not include topical appraisals performed in house or assessments performed by outside entities (DOE, Inspector General, Internal Auditor, etc.). Performing causal analysis of topical appraisals and outside assessments provides additional data for further trending.

<b>Causal Factors from Reportable and Ames Local Events</b>							
<b>Causal Factor</b>	<b>FY05 Ames Local Events</b>	<b>FY06 Ames Local Events</b>	<b>FY07 Ames Local Events</b>	<b>FY08 Ames Local Events</b>	<b>4-Year Average</b>	<b>FY09 Ames Local Events</b>	<b>% Change from 4-Yr Average</b>
A1- Design/Engineering Problem	2	4	4	1	2.75	2	27 % Decrease
A2- Equipment/Material Problem	5	5	7	5	5.5	6	9% Increase
A3- Human Performance	9	19	34	11	18.25	33	80%

<b>Causal Factors from Reportable and Ames Local Events</b>							
<b>Causal Factor</b>	<b>FY05 Ames Local Events</b>	<b>FY06 Ames Local Events</b>	<b>FY07 Ames Local Events</b>	<b>FY08 Ames Local Events</b>	<b>4-Year Average</b>	<b>FY09 Ames Local Events</b>	<b>% Change from 4-Yr Average</b>
LTA							Increase
A4- Management Problem	4	9	17	18	12	11	8% Decrease
A5- Communications LTA	0	0	0	2	.5	6	1100% Increase
A6- Training Deficiency	0	2	2	2	2	0	Decrease
A7- Other Problem (External Phenomena, Radiation/Hazardous Material Problem)	0	0	0	0	0	2	Increase
Totals	20	39	64	39	40.5	60	48% Increase

Many of the events categorized are of low significance but because corrective actions were undertaken they were deemed to be “Ames Local Events”. As such, they receive the same rigor of effort for investigation and analysis. The Laboratory continues to categorize events, audits, topical appraisals, etc. to stress the importance of line management responsibilities for environment, safety and health, the identification and correction of hazards, and feedback and improvement. Reportable and Ames Local events requiring corrective actions are tracked in ALCATS, which also receive effectiveness verifications (at 6 month and 12 month intervals) to ensure concerns are addressed adequately. Included in the verification process, Group Leaders / Department Managers and workers are interviewed to determine the results of the implemented corrective actions. For the verifications performed since May 1, 2005 (when process initiated), there have been two (2) events for which the corrective actions were deemed to be “Partially Effective” at the 6 month verification. The first event (E06-001 Data Loss / Partial Recovery) had additional corrections implemented, then at the 12 month verification it was determined to be “Effective”. The second event (E07-014, 2007 Review of Materials Control and Accountability Program) had additional corrections implemented and was also determined to be “Effective” at the 12 month verification.