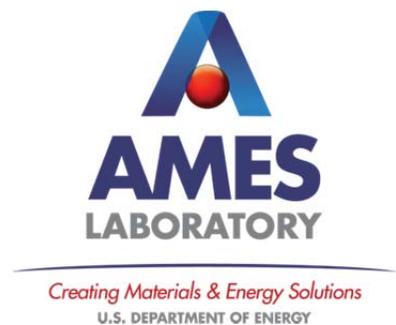


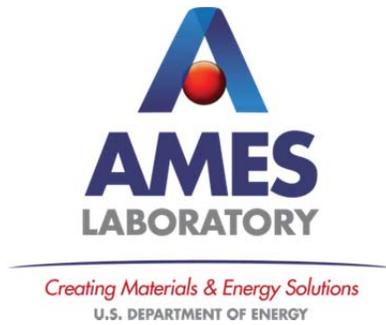


THE AMES  
LABORATORY

## 2015 TREND ANALYSIS

April 2016





## **2015 Trend Analysis**

### **DOE Order 232.2**

## **Occurrence Reporting and Processing of Operations Information**

**April, 2016**

## Fiscal Year 2015 Trend Analysis

The trend analysis is completed to meet the requirements DOE Order 232.2, Occurrence Reporting and Processing of Operations Information. Within the Order, a trend analysis is to be performed to look for trends and determine if occurrences are recurring within the previous 12-months. The results of the trend analysis are used to determine common occurrences or prevailing events that should be addressed with additional inspections, training, reviews, policies, procedures, lessons learned, etc. Per the Order, the analyses results must be reported to line management. This trend analysis is not limited to just non-reportable and reportable occurrences entered into the Occurrence Reporting system. To look for trends more broadly, this report has been expanded to include the Employee Safety and Security Concerns, Walk-Through Findings, and Discrepancies. The following sources of information were reviewed for trend analysis from FY2010 to FY2015:

- 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, DOE / External Reviews, etc.)

### Summary Statement

Compared to the 5-year averages, the trend analysis determined there were increases in Employee Safety and Security Concerns, an increase in Independent Walk-Through Findings, a decrease in Walk-About Findings, an increase in Discrepancy Reports, a decrease in total number of Injuries/Illnesses reported to Occupational Medicine and a decrease in OSHA Recordable (CAIRS) injuries, a decrease in total number of events Categorized for potential reporting as Occurrences, and a decrease in the actual Occurrences reported to DOE. Each of these sources of information will be further discussed below. Although increases/decreases may appear dramatic by percentage, the change in numbers is statistically low. Overall there are no overarching trends or recurrences that need be further evaluated for reporting as **“Recurring”** into the Occurrence Reporting System (ORPS).

### Employee Safety and Security Concerns

It is encouraging to note that Employee Safety and Security Concerns reports increased by 75%. Some of the concerns were as a result of the Director and Deputy Director meetings with individual groups discussing safety. The increase indicates engagement by the scientists and staff to ask questions, be aware of their surroundings, identify concerns, and communicating concerns for evaluation and resolution. Some of the concerns (i.e., water leaks in leased spaces) are repeats of the same problem in different locations within the same building. Nonetheless, these types of concerns should be voiced, tracked and trended. Table 1 lists the total number and types of Employee Safety and Security Concerns. The Ames Laboratory actively encourages employees to communicate employee safety and security concerns to ESH&A. All concerns are 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” concerns compared to the 5-year average, the numbers are the same in 2014 and 2015.

All but one employee concerns have been addressed or communicated to ISU Facilities Planning and Management (e.g., concerns in Zaffarano) for resolution. The one employee concern remaining open is the poor audible quality of the public address system (speakers) for which a corrective action plan has been developed.

The following is a list of concerns that were investigated and resolved to the extent possible:

- Window contractor working in lab without first notifying /communicating with the Group Leader or group members.
- Expansion joint in tunnel between Spedding and Wilhelm is heaving creating a tripping hazard and a hazard for equipment moves (i.e., Dewars, compressed gas cylinders, carts, etc.).
- A concern the Directors Pancake Breakfast was not reviewed for safety prior to event; it was reviewed by ESH&A.
- Older fiberglass filters were being installed in Zaffarano HVAC system. Filters were evaluated and employee informed that they are a quality product and fiberglass is not releasing into the rooms.
- Numerous used purple nitrile gloves are scattered along Pammel Drive. The gloves did not belong to Ames Lab. It is believe they came out of an ISU garbage disposal vehicle. ESH&A gathered the gloves and disposed.
- Asbestos abatement contractor working in Zaffarano was not being performed safely and not communicating to occupants.
- Exhaust ventilation in Zaffarano is not working properly and potentially generating an oxygen deficient atmosphere.
- Custodians observed and communicated charred floor tiles in Spedding. A refractory tray containing research samples broke while being removed from high temperature furnace.
- There is a lack of general use phones (landline) in buildings to call in an emergency.
- ISU subcontractors cutting concrete sidewalks without respiratory protection and hearing protection.
- Four (4) separate water leak concerns in Zaffarano.
- Condensation on floor at east Spedding entrance creating a slip-trip-fall hazard.
- 301 Spedding Auditorium being overcrowded creating safe egress concerns during Director’s All Hands Meetings (anonymous).
- Hydraulic closures for dumpster lid at Warehouse are broken and as a result allow lid to close too fast (potentially smashing hands).
- Director concerned about not having exits at end of Spedding hallways meeting code requirements.
- Director received concerns from employees that Public Address system is not effective.
- Director receives concern of what to do during a tornado drill (watch vs. warning).
- Drainage grate at entrance to TASF first floor was warping creating a tripping/falling hazard.
- Vehicle traffic vs. pedestrian traffic concern at Pammel Drive and Morrill Road.

| <b>Table 1 - Employee Safety and Security Concerns</b> |             |             |             |             |             |                       |             |
|--|-------------|-------------|-------------|-------------|-------------|-----------------------|-------------|
| <b>Category</b>  | <b>FY10</b> | <b>FY11</b> | <b>FY12</b> | <b>FY13</b> | <b>FY14</b> | <b>5-Year Average</b> | <b>FY15</b> |
| Administrative   | 3           | 1           | 1           | 0           | 1           | 1.2                   | 0           |
| Chemical Spills  | 0           | 0           | 0           | 0           | 0           | 0                     | 0           |
| Fire Safety  | 0           | 2           | 0           | 0           | 0           | 0.4                   | 2           |
| General Safety   | 6           | 2           | 2           | 8           | 15          | 6.6                   | 15          |
| Industrial Hygiene                                     | 3           | 0           | 0           | 0           | 1           | 0.8                   | 3           |
| Environmental  | 2           | 0           | 0           | 0           | 0           | 0.4                   | 0           |
| Security   | 0           | 1           | 1           | 0           | 1           | 0.6                   | 0           |
| Radiological   | 0           | 1           | 1           | 0           | 1           | 0.6                   | 0           |

|                       |           |          |          |          |           |           |           |
|-----------------------|-----------|----------|----------|----------|-----------|-----------|-----------|
| Traffic Safety        | 0         | 0        | 0        | 0        | 0         | 0         | 1         |
| Property Management   | 1         | 0        | 1        | 1        | 1         | .8        | 0         |
| Other (non-safety)    | 0         | 0        | 0        | 0        | 1         | 0.2       | 0         |
| Odors                 | 0         | 0        | 0        | 0        | 2         | 0.4       | 0         |
| <b>Total Concerns</b> | <b>15</b> | <b>7</b> | <b>6</b> | <b>9</b> | <b>23</b> | <b>12</b> | <b>21</b> |

### Independent Walk-Through Findings

The increase in independent walk-through findings is partially due to an increase in the number of specialist participating. No high hazard findings were identified. All findings are tracked and corrected within a pre-established time period. All findings were corrected on time.

FY15 had a 13% increase in total findings compared to the previous 5-year average.

Industrial Hygiene findings increased. The majority of these findings are related to a lack of chemical labeling of secondary containers (i.e., sample vials, beakers, etc.) in laboratories or incomplete labeling (no hazard warning such as flammable, toxic, carcinogen, etc.). This continues to be a challenge for researchers labeling the many samples generated and stored.

As in years past, some findings would not be cited by OSHA, EPA, and Fire Marshal. This is due to Ames Laboratory aiming higher than 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 to group members, tracked, and corrected. The methodology is that small concerns can lead to more severe problems if not addressed. The severity of the findings overall has been minimal. No High Hazard Findings have been identified since June 2003.

There was one 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 AMSO interim Site Representatives (now permanent on-site Site Representative), members of the Executive Council, and an ISU Environmental, Health, & Safety Representative continues to be high and consistent.

Additionally, the Manager (or delegate) of Purchasing and Property Services participates in the Independent Walk-Through biennially (per Order 580.1A CRD, Personal Property Order). This existing walk-through format is an effective and efficient method for Property Management to join as it minimizes additional interruption of researchers and operations by avoiding the need to schedule separate walk-throughs.

The Laboratory Director has made it a priority to participate in walk-throughs when available. This is a tremendous strength of the Independent Walk-Through Program. It shows top management support for safety and protection of the environment to all employees and demonstrates openness to the Ames Site Office. Additionally, it provides the Director an opportunity to observe what is happening throughout the Laboratory.

Having various entities work together avoids additional interruption of science, duplicating walk-throughs, and lends additional perspectives (e.g., ISU side of operations).

Although there have been increases in some categories of findings, the actual findings in those specific categories are relatively small and is rated as low risk. The Independent Walk-Through Program has proven to be an effective tool to engage staff in their places of work, communicate and educate requirements, promote expectations, and measure compliance within Ames Laboratory. No major concerns are apparent. The findings are below:

| <b>Categories</b>    | <b>FY10</b> | <b>FY11</b> | <b>FY12</b> | <b>FY 13</b> | <b>FY14</b> | <b>5-Year Average</b> | <b>FY15</b> |
|----------------------|-------------|-------------|-------------|--------------|-------------|-----------------------|-------------|
| Admin. Controls      | 0           | 2           | 2           | 1            | 2           | 1.2                   | 2           |
| Comp. Gases          | 5           | 5           | 6           | 9            | 11          | 7.2                   | 5           |
| Confined Space Entry | 0           | 0           | 0           | 0            | 0           | 0                     | 0           |
| Electrical Safety    | 45          | 39          | 55          | 39           | 43          | 44.2                  | 35          |
| Emergency Planning   | 1           | 2           | 2           | 4            | 5           | 2.8                   | 0           |
| Environmental        | 15          | 6           | 11          | 12           | 10          | 10.8                  | 21          |
| Fire Safety          | 11          | 1           | 9           | 10           | 7           | 7                     | 13          |
| General Safety       | 29          | 37          | 50          | 34           | 31          | 35.8                  | 37          |
| Hoisting & Rigging   | 0           | 0           | 0           | 0            | 0           | 0                     | 0           |
| Industrial Hygiene   | 37          | 22          | 45          | 43           | 28          | 33.8                  | 58          |
| Infrastructure       | 0           | 1           | 0           | 1            | 2           | 0.8                   | 0           |
| Ladder Safety        | 2           | 0           | 1           | 0            | 1           | 0.8                   | 2           |
| Laser Safety         | 1           | 0           | 0           | 0            | 2           | 0.6                   | 1           |
| Lockout/Tagout       | 0           | 0           | 1           | 0            | 0           | 0.2                   | 0           |
| Machine Guarding     | 1           | 1           | 2           | 3            | 3           | 2                     | 5           |
| PPE                  | 4           | 5           | 2           | 10           | 4           | 5                     | 3           |
| Property Management  | 3           | 13          | 5           | 11           | 6           | 7.6                   | 2           |
| Radiation            | 0           | 0           | 0           | 0            | 1           | 0.4                   | 2           |
| Respiratory          | 3           | 1           | 8           | 8            | 6           | 5.2                   | 4           |
| <b>Totals</b>        | <b>157</b>  | <b>135</b>  | <b>199</b>  | <b>185</b>   | <b>162</b>  | <b>167.6</b>          | <b>190</b>  |
| Noteworthy Practices | 0           | 0           | 3           | 4            | 0           | 1.4                   | 1           |

### **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 of findings observed continues to be “Electrical” and the second largest was “General Safety”. The electrical concerns are typically electrical cords that are wearing out over time or exposed to damage from use. The concerns are identified and corrected. There was 100% participation with all programs and departments reporting their findings. No concerns are apparent.

## Walk-About (Walk-Through exterior to buildings) Findings

Walkabouts (i.e., inspections of building roofs, yards, sidewalks, exterior doors and windows) have been performed annually since 2005. The walk-about findings decreased in FY15. Often, findings do not have a direct safety nexus but it is a good method to communicate issues to Facilities and Engineering Services and document concerns that could become hazards if they worsen (e.g., cracking concrete that could create a tripping hazard). The goal of the Walk-About is to identify potential safety hazards and violations that are not identified during the Independent Walk-Through Program. There was a noticeable increase in the number of Ground Fault Circuit Interrupters (GFCI) not tripping when tested compared to previous years. It is common to replace GFCIs over time as they are exposed to weather elements even though they have covers. These will be monitored going forward. No high hazard findings have been identified to date. The Ames Site Office Interim Site Representative participated on the Walk-About. All findings except number 10 below have been corrected.

| <b>Year</b> | <b>Concerns</b> |
|-------------|-----------------|
| 2009        | 5               |
| 2010        | 9               |
| 2011        | 6               |
| 2012        | 7               |
| 2013        | 7               |
| 2014        | 16              |
| 2015        | 11              |

Findings this year include the following:

1. SPD roof has a Ground Fault Circuit Interrupter (GFCI) with an open ground.
2. TASF roof west side guardrail is currently at the proper 42" height. The railing will need to be raised 1.5 inches to accommodate the new roof (additional insulation).
3. TASF ground floor has a GFCI with an open ground.
4. HWH south side, center east GFCI does not trip when tested.
5. HWH north center, west GFCI does not trip when tested.
6. HWH roof southwest GFCI has a wasp nest inside cover.
7. HWH north vent runway support has a wasps nest.
8. MD north entrance has damaged concrete; monitor it.
9. MD north, center, west GFCI does not trip when tested.
10. MD south face, west side upper bricks are starting to bulge from the building. Monitor and repair if needed.
11. MD southwest roof lightning rod is broken.

As with the Independent Walk-Throughs, some of the findings would not be cited by OSHA and are categorized as best management practices. The Walk-About provides a great opportunity to identify other areas of concern including deteriorating infrastructure such as dried or missing caulking on windows, ground erosion, removal/trimming of bushes and trees, etc. The cooperation of Facilities and Engineering Services as well as ISU Facilities Planning and Management continues to be outstanding. No concerns are apparent.

## Discrepancy Reports

Discrepancy reports are issued by the Plant Protection staff during facility tours performed on weekends and off hours. Although there was a 25% increase in discrepancies reported by Plant Protection compared to the 5-year average, numbers for the previous two years were lower. This increase may be attributed to new guards identifying more discrepancies with a fresh set of eyes and increase rigor.

The organization(s) responsible for the discrepancies is 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.

The main categories of note were "Unsecured Doors" with a 36% increase and "Equipment Malfunction" with a 116% increase. Most unsecured doors are those internal within buildings that are to be normally closed during

off-hours and weekends unless someone is actively working in those spaces. There are occasions that external doors kite/hang open (typically in spring and fall when HVAC systems change). These doors are alarmed during off hours and weekends on the CCURE access control system, which is monitored by the guards, and corrected immediately. It is anticipated the internal “unsecured doors” category will decrease as groups become educated to the expectation.

Equipment malfunction are expected to fluctuate over time. Many pieces of equipment (i.e., furnaces and pumps) operate over extended periods of time and in an unattended mode during off hours and weekends. Having the guards perform tours during off hours and weekends have been a valuable resource to prevent more severe results (e.g., greater equipment damage, potential fires from over heating equipment, spills, etc.). None of the discrepancies were of high risk and the guards are performing the tasks asked of them. All discrepancies have been addressed. No concerns are apparent. The discrepancies are represented below:

| <b>Category</b>                 | <b>FY10</b> | <b>FY11</b> | <b>FY12</b> | <b>FY13</b> | <b>FY14</b> | <b>5-Year Average</b> | <b>FY15</b> |
|---------------------------------|-------------|-------------|-------------|-------------|-------------|-----------------------|-------------|
| Coffee Pots On & Hot            | 49          | 24          | 8           | 7           | 3           | 18.2                  | 9           |
| Soldering Pen/Iron on & hot     | 6           | 2           | 1           | 0           | 0           | 1.8                   | 0           |
| Unsecured Gas Cylinder          | 21          | 13          | 12          | 2           | 7           | 11                    | 3           |
| Natural Gas Valve On            | 8           | 7           | 15          | 4           | 1           | 7                     | 1           |
| Main Cylinder Valve Open        | 16          | 5           | 3           | 2           | 0           | 5.2                   | 1           |
| Uncapped Cylinder               | 8           | 8           | 11          | 9           | 10          | 9.2                   | 11          |
| Unattended Flame                | 1           | 1           | 1           | 0           | 0           | 0.6                   | 0           |
| Obstructed Hallway / Door       | 15          | 12          | 3           | 2           | 14          | 9.2                   | 12          |
| Unsecured Door                  | 84          | 54          | 63          | 51          | 24          | 55.2                  | 75          |
| Hood Sash / Set Back            | 105         | 95          | 127         | 66          | 77          | 94                    | 83          |
| Improper / Incompatible Storage | 2           | 6           | 1           | 0           | 2           | 2.2                   | 13          |
| Equipment Malfunction           | 7           | 4           | 5           | 4           | 24          | 8.8                   | 19          |
| Window Open                     | 6           | 3           | 6           | 2           | 0           | 3.4                   | 1           |
| Obstructed Fire Extinguisher    | 0           | 0           | 0           | 0           | 10          | 2                     | 12          |
| Miscellaneous                   | 32          | 24          | 16          | 21          | 55          | 29.6                  | 82          |
| <b>Total Discrepancies</b>      | <b>360</b>  | <b>258</b>  | <b>272</b>  | <b>170</b>  | <b>227</b>  | <b>257.4</b>          | <b>322</b>  |

### **Injury and Illness Data**

There was a 38% reduction in OSHA Recordable cases, a 10% reduction in first-aid cases and a 100% reduction in DART (Days Away, Restricted, or Transferred) cases. DART cases are a common measure of severity of injuries. There were eleven (11) incidents reported to Occupational Medicine. Two (2) incidents met the threshold of OSHA Recordable (medical treatment beyond first aid) and hence reportable into DOE CAIRS (Computerized Accident/Injury Reporting System). Neither of the OSHA Recordable Cases resulted in a DART case. Seven (7) incidents were first-aid cases. One incident was determined to not be Ames Laboratory related (#2 below). Another incident was an employee that reported for evaluation as a precautionary measure; no treatment was provided (#4 below). The Laboratory encourages all incidents including first-aid cases be reported to ensure first aid is administered appropriately, cases are monitored so as to not become worse, and to make certain accident investigations are performed to develop corrective actions to prevent recurrence. All

corrective actions (if applicable) have been completed. The following are the incidents reported to Occupational Medicine in FY15:

1. Laceration to thumb when preparing quartz ampoule.
2. *Wasp entered student's shirt in Gilman Hall restroom (not Ames Lab related).*
3. Chemical skin exposure. While opening digestion vials, the third vial was pressurized releasing a small acid mist on wrist.
4. *Sewage exposure (skin). While performing plumbing work at HWH first floor, the sump pump in the basement initiated pumping water/sewage on employee (precautionary visit - no injury-no treatment).*
5. Wrist sprain resulting from fall due to ice in parking lot when exiting personal vehicle.
6. Contusion to right knee resulting from fall due to ice in parking walking to personal vehicle.
7. **Laceration to right index finger resulting in 5 sutures. Employee was using right angle grinder to score wall tile in Spedding. OSHA Recordable. No lost or restricted work days.**
8. Shoulder strain resulting from fall due to ice on Spedding loading dock.
9. **Standard Threshold Shift (hearing loss) determined during annual audiometric evaluation. OSHA Recordable.**
10. Laceration to thumb nail and adjacent skin while using hack saw to cut conduit.
11. Chemical skin exposure. While pouring acetone splashed some on lab coat resulting in minor skin irritation.

The Laboratory continues to stress safety/accident prevention through Directors Messages, initial and refresher training, hosting of Safety Day, ESH&A Newsletter, and line management support.

The National Safety Council (NSC) awarded Ames Laboratory with the Perfect Record Certificate. This award is for organizations that achieve 12 months or more without an injury resulting in a Days Away, Restricted, or Transferred (DART) case. As of April 2016, one (1) year and eight (8) months has elapsed without a DART case.

| Type of Injury / Illness                             | FY10     | FY11      | FY12     | FY13     | FY14      | 4-Year Average | FY15     |
|--|----------|-----------|----------|----------|-----------|----------------|----------|
| Contusion / Abrasions                                | 1        | 2         | 1        | 3        | 3         | 2              | 1        |
| Burns  | 1        | 2         | 0        | 2        | 1(1)      | 1.2(0.5)       | 0        |
| Chemical/Skin Exposure                               | 0        | 2         | 2        | 0        | 5         | 1.8            | 2        |
| Fracture   | 0        | 1 (1)     | 0        | 0        | 1(1)      | 0.4 (0.4)      | 0        |
| Laceration   | 0        | 3 (3)     | 3        | 0        | 1         | 1.4 (0.6)      | 3(1)     |
| Puncture   | 0        | 0         | 0        | 0        | 1         | 0.2            | 0        |
| Acute Musculoskeletal Injury (i.e., sprains/strains) | 2 (1)    | 1 (1)     | 0        | 1(1)     | 2(1)      | 1.2 (0.8)      | 2        |
| Miscellaneous:                                       |          |           |          |          |           |                |          |
| Hematoma   | 0        | 1 (1)     | 0        | 0        | 0         | 0.2 (0.2)      | 0        |
| Standard Threshold Shift (Hearing Loss)              | 0        | 0         | 0        | 1(1)     | 0         | .2(.2)         | 1(1)     |
| Splinter   | 1        | 0         | 0        | 1(1)     | 2         | 0.8 (0.2)      | 0        |
| Dislocated Finger                                    | 0        | 0         | 0        | 1(1)     | 0         | 0.2 (0.2)      | 0        |
| Latex Allergy (hands)                                | 0        | 0         | 0        | 0        | 1(1)      | 0.2 (0.2)      | 0        |
| Electric Shock                                       | 0        | 0         | 0        | 0        | 1         | 0.2            | 0        |
| <b>Total</b>   | <b>5</b> | <b>12</b> | <b>6</b> | <b>9</b> | <b>18</b> | <b>10</b>      | <b>9</b> |
| <b>OSHA Recordable</b>                               | <b>2</b> | <b>6</b>  | <b>0</b> | <b>4</b> | <b>4</b>  | <b>3.2</b>     | <b>2</b> |
| Non-OSHA Recordable                                  | 3        | 6         | 6        | 5        | 14        | 6.8            | 7        |
| Lost Work Days –LWD                                  | 0        | 28        | 0        | 9        | 53        | 18             | 0        |
| Restricted Work Days – RWD                           | 12       | 6         | 0        | 44       | 88        | 30             | 0        |

| <b>Table 5 - Injury and Illness Data</b> |             |             |             |             |             |                       |             |
|--|-------------|-------------|-------------|-------------|-------------|-----------------------|-------------|
| <b>Type of Injury / Illness</b>          | <b>FY10</b> | <b>FY11</b> | <b>FY12</b> | <b>FY13</b> | <b>FY14</b> | <b>4-Year Average</b> | <b>FY15</b> |
| <b>DART Case Rate</b>                    | .22         | .45         | 0           | .24         | .73         | 0.372                 | 0           |
| Total Recordable Case Rate (TRCR)        | .44         | 1.34        | 0           | .94         | .94         | 0.732                 | 0           |

( ) indicates OSHA Recordable Injury

DART indicates Days Away, Restricted, and/or Transferred

### Event Categorizations

The total number of categorized events decreased by 23% compared to the 5-year average and the number of those reported as Occurrences decreased by 64%. As indicated in Table 6, there was one (1) incident reported to the Occurrence Reporting Processing System (ORPS) and two (2) injuries reported to the Computerized Accident Incident Reporting System (CAIRS). In total there were 55 event categorizations.

The Laboratory utilizes information from a broad variety of sources 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 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, Radiation Safety Officer, Environmental Specialist, Facilities and Engineering Services Engineer, Materials and Transportation Supervisor, and a Systems Analyst. The 64% decrease compared to the 5-year average in submitted Occurrences and the 23% decrease in total events screened are encouraging that activities are being performed safely. No negative concerns or trends are discernable.

| <b>Table 6 - Event Reporting Summary</b> |             |             |             |             |             |                       |             |
|--|-------------|-------------|-------------|-------------|-------------|-----------------------|-------------|
| <b>Categories</b>                        | <b>FY10</b> | <b>FY11</b> | <b>FY12</b> | <b>FY13</b> | <b>FY14</b> | <b>5-Year Average</b> | <b>FY15</b> |
| Occurrence Reports (ORPS)                | 4 (*)       | 3 (*)       | 2           | 1           | 4(*1)       | 2.8                   | 1           |
| Noncompliance Tracking System (NTS)      | 0           | 0           | 1           | 0           | 1(#1)       | 0.2                   | 0           |
| Incidents of Security Concern (ISC)      | 0           | 0           | 0           | 0           | 0           | 0                     | 0           |
| Accident and Injury (CAIRS)              | 2 (*)       | 6 (*)       | 0           | 4           | 4(*1)(#1)   | 3.2                   | 2           |
| Ames Local (AL)                          | 64          | 55          | 45          | 36          | 61          | 52.2                  | 51          |
| Other (below reporting threshold)        | 13          | 18          | 17          | 8           | 7           | 12.6                  | 1           |
| Total Events Screened                    | 83          | 82          | 65          | 49          | 77          | 71.2                  | 55          |

(\* = Combination ORPS / CAIRS)

(# = Combination CAIRS/ORPS/NTS)

The following are the events that were categorized in FY15:

| <b>Table 7 – Event Categorizations in FY 2015</b> |                |                |  |  |
|---|----------------|----------------|--|--|
|   | <b>Cat. #</b>  | <b>Date</b>    | <b>Title</b>   | <b>Conclusion</b>                                  |
| 1.  | E14-060        | 10/6/2014      | Laceration of Left Thumb   | Ames Local-CAIRS                                   |
| 2.  | E14-063        | 10/10/2014     | Student Stung by Wasp in Gilman Hall Restroom                      | Not Reportable<br>(ORPS, NTS, ISC, CAIRS or Local) |
| 3.  | E14-064        | 10/20/2014     | Chemical skin exposure   | Ames Local-CAIRS                                   |
| 4.  | E14-065        | 10/24/2014     | False Fire Alarm   | Ames Local-ORPS                                    |
| 5.  | E14-066        | 10/28/2014     | Suspicious Letter  | Ames Local-ISC                                     |
| 6.  | E14-067        | 11/6/14        | Cyber Security Program Review                                      | Ames Local – ORPS                                  |
| 7.  | E14-068        | 11/11/14       | Possible Sewage spill during pipe clean out                        | Ames Local – ORPS                                  |
| 8.  | E14-069        | 11/20/14       | Damage to contractor van   | Ames Local – ORPS                                  |
| 9.  | E14-070        | 11/26/14       | Wrist Sprain   | Ames Local – CAIRS                                 |
| 10.   | E14-071        | 11/26/14       | Knee Contusion   | Ames Local – CAIRS                                 |
| 11.   | E15-001        | 1/12/15        | Powder found on floor  | Ames Local – ORPS                                  |
| <b>12.</b>  | <b>E15-002</b> | <b>1/20/15</b> | <b>Finger Laceration – 5 Sutures</b>                               | <b>CAIRS</b>                                       |
| 13.   | E15-003        | 1/27/15        | Topical Appraisal –<br>Rad Limits to Embryo / Fetus                | Ames Local - NTS                                   |
| 14.   | E15-004        | 1/15/15        | Topical Appraisal- Environmental<br>Management System (EMS) Review | Ames Local - ORPS                                  |
| 15.   | E15-005        | 1/29/15        | Failed Patchwork the Exterior of SPH                               | Ames Local - ORPS                                  |
| 16.   | E15-006        | 1/27/15        | Work Planning & Control AMSO<br>Review January 6-9, 2015           | Ames Local - ORPS                                  |
| 17.   | E15-007        | 2/24/15        | Vehicle Collision in Wilhelm Parking Lot                           | Ames Local - ORPS                                  |
| 18.   | E15-008        | 2/24/15        | Subcontractor Fight at<br>Sensitive Instrument Facility (SIF)      | Ames Local - ORPS                                  |
| 19.   | E15-009        | 2/26/15        | Emergency Management Triennial Assessment                          | Ames Local - ORPS                                  |
| 20.   | E15-010        | 3/5/15         | Employee Fall due to Ice on Dock                                   | Ames Local - CAIRS                                 |
| 21.   | E15-011        | 3/9/15         | Environmental Management System (EMS)<br>Assessment by AMSO        | Ames Local - ORPS                                  |
| 22.   | E15-012        | 3/11/15        | Topical Appraisal –<br>Rad Posting and Labeling                    | Ames Local – NTS                                   |
| 23.   | E15-013        | 3-12-15        | Improper Entry into Confined Space                                 | Ames Local - ORPS                                  |
| 24.   | E15-014        | 4-1-15         | Low Oxygen Alarm   | Ames Local - ORPS                                  |
| <b>25.</b>  | <b>E15-015</b> | <b>4/20/15</b> | <b>Standard Threshold Shift<br/>(Hearing Loss)</b>                 | <b>CAIRS</b>                                       |
| 26.   | E15-016        | 4/27/15        | Topical Appraisal –<br>Rad Sealed Radiological Sources             | Ames Local – NTS                                   |
| 27.   | E15-017        | 5-4-15         | Water Leak 113 Zaffarano   | Ames Local - ORPS                                  |
| 28.   | E15-018        | 5-4-15         | Missed Transportation Compliance Triennial<br>Assessment in 102    | Ames Local - ORPS                                  |
| 29.   | E15-019        | 6-11-15        | False HF Alarm   | Ames Local - ORPS                                  |
| 30.   | E15-020        | 6-18-15        | False Fire Alarm   | Ames Local - ORPS                                  |
| <b>31.</b>  | <b>E15-021</b> | <b>6-18-15</b> | <b>Ball Mill Rupture</b>   | <b>ORPS</b>  |
| 32.   | E15-022        | 6-19-15        | Thumb Laceration   | Ames Local - CAIRS                                 |
| 33.   | E15-023        | 6-26-15        | CCURE Communications Problem                                       | Ames Local - ORPS                                  |
| 34.   | E15-024        | 6-30-15        | Aerodag G Aerosol Can Rupture                                      | Ames Local - ORPS                                  |
| 35.   | E15-025        | 6/27/15        | Plugged Water Drain 24 SPH   | Ames Local – ORPS                                  |
| 36.   | E15-026        | 6-30-15        | Student Employee with Skin Irritation                              | Ames Local – ORPS                                  |
| 37.   | E15-027        | 7/9/15         | Fire in a Fume Hood, 2311 Hach Hall                                | NA   |
| 38.   | E15-028        | 11/6/14        | Cyber Security Review  | Ames Local - ORPS                                  |
| 39.   | E15-029        | 7/13/15        | Suspicious Letter to 311 TASF                                      | Ames Local – ORPS                                  |

| <b>Table 7 – Event Categorizations in FY 2015</b> |               |             |  |                   |
|---|---------------|-------------|--|-------------------|
|   | <b>Cat. #</b> | <b>Date</b> | <b>Title</b>   | <b>Conclusion</b> |
| 40.   | E15-030       | 7/31/15     | Auto Collision   | Ames Local - ORPS |
| 41.   | E15-031       | 8/13/15     | Independent Review of the Ames Laboratory Compensation System by DOE | Ames Local – ORPS |
| 42.   | E15-032       | 8/12/15     | Topical Appraisal – Rad Controls and Work Planning                   | Ames Local - ORPS |
| 43.   | E15-033       | 8/28/15     | Transportation Compliance Assistance Program (TCAP) Assessment       | Ames Local – ORPS |
| 44.   | E15-034       | 9/3/15      | Spedding Fire Alarm  | Ames Local – ORPS |
| 45.   | E15-035       | 9/10/15     | Spedding Fire Alarm  | Ames Local – ORPS |
| 46.   | E15-036       | 9-15-15     | Metals Development Fire Alarm  | Ames Local - ORPS |
| 47.   | E15-037       | 9/27/15     | Topical Appraisal – Rad External Dosimetry                           | Ames Local – ORPS |
| 48.   | E15-038       | 9-22-15     | Topical Appraisal – Rad Internal Dosimetry                           | Ames Local – ORPS |
| 49.   | E15-043       | 5-28-15     | Topical Appraisal – Rad Entry and Exit Control                       | Ames Local – ORPS |
| 50.   | E15-044       | 9-30-15     | Topical Appraisal – Hot Work Permit Program                          | Ames Local – ORPS |
| 51.   | E15-045       | 5-11-15     | Property Management Assessment                                       | Ames Local – ORPS |
| 52.   | E15-046       | 9-11-15     | Topical Appraisal – Rad Work Planning – Radiation Generating         | Ames Local – ORPS |
| 53.   | E15-047       | 9-18-15     | DOE Surveillance Visit – DOE Fume Hood Use                           | Ames Local - ORPS |
| 54.   | E15-048       | 9-25-15     | DOE Surveillance Visit – Electrical Walk-Through                     | Ames Local – ORPS |
| 55.   | E15-049       | 9-25-15     | Fire Protection Program Review                                       | Ames Local - ORPS |

**Table 8** below provides the specific details on reportable events over the last 10 years. This information is provided entirely for historical purposes.

| <b>Table 8 - Reportable Events (FY)</b> |             |                                   |             |   |  |
|---|-------------|-----------------------------------|-------------|---|--|
| <b>Year</b>                             | <b>Type</b> | <b>Identification</b>             | <b>Date</b> | <b>Title</b>                              | <b>Description</b>   |
| FY 2005                                 | ORPS        | 2004-0002                         | 12-20-04    | Suspect / Counterfeit Bolts               | While performing a Readiness Review, suspect / counterfeit bolts (non-load bearing) were 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.   |

**Table 8 - Reportable Events (FY)**

| Year    | Type         | Identification | Date     | Title  | Description  |
|---------|--------------|----------------|----------|--|--|
| 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 Deviation                          | A larger cylinder of Hydrofluoric Acid was purchased & installed contrary to the Safety Analysis Document 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-Ames Lab 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), 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 acquired a 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 failed and causing a fire and evacuating of 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        | 2013-005       | 6-12-13  | Standard Threshold Shift (STS)                                     | Hearing loss over time.  |
|         | CAIRS        | 2013-009       | 9-9-13   | Lumbar Strain  | Moving filing cabinet improperly.  |
|         | CAIRS        | 2013-052       | 9-15-13  | Metal Sliver in Finger   | Metal splinter in finger requiring Lidocaine to numb finger and scalpel to open wound.   |

| Year    | Type               | Identification | Date     | Title  | Description  |
|---------|--------------------|----------------|----------|--|--|
|         | ORPS               | 2014-009       | 10-31-13 | Iron/Arsenic Breach  | Work was performed outside the scope of the activities approved in the Readiness Review  |
| FY 2014 | CAIRS              | 2014-012       | 2-17-14  | Rash on Hands  | Suspected latex allergy. Individual was not working with irritants; when switched to Nitrile gloves and symptoms went away.                          |
|         | ORPS               | 2014-013       | 2-25-14  | Improper Shipment of Chemical, Contaminated Materials & Compressed Gases | A scientist loaded equipment and materials from the Synchrotron Radiation Center at University of Wisconsin and delivered it to Ames Lab.            |
|         | ORPS(R)            | 2014-022       | 4-15-14  | Improper shipment of Mercury Chloride                                    | Scientist ships quantity of mercury chloride in personal vehicle greater than that allowed by DOT from Ames Lab to Argonne.                          |
|         | CAIRS              | 2014-041       | 7-8-14   | Fall from Rental Truck   | Employee exiting passenger side of truck misses step and falls to parking lot resulting in broken hip.   |
|         | CAIRS, ORPS, & NTS | 2014-043       | 7-21-14  | Skin Burn from Torch   | Employee using torch to heat copper rod does not inspect equipment, does not use gloves, and process unnecessary.                                    |
|         | CAIRS              | 2014-047       | 7-29-14  | Shoulder strain  | Employee moving records boxes strains shoulder. Sent off-site for evaluation and doctor prescribes muscle relaxer.                                   |
| FY 2015 | CAIRS              | 2015-002       | 1-20-15  | Finger Laceration  | Small portable grinder used to score the wall tile. The blade caught, jerked out of cut, and lacerated through leather glove resulting in 5 sutures. |
|         | ORPS               | 2015-021       | 6-18-15  | Ball Mill Rupture  | An exothermic chemical reaction rapidly increasing the temperature and pressure inside the vessel  |
|         | CAIRS              | 2015-015       | 4-27-15  | Standard Threshold Shift (STS)   | Hearing loss over time. Employee wears hearing protection.   |

### TapRoot Root Cause Analysis

TapRoot analysis is performed on Reportable Events. TapRoot is a formal (standardized) method used at Ames Laboratory to investigate causal factors to determine causal analysis 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 Laboratories. The use of TapRoot at Ames Laboratory began in 2004 for Reportable Events (i.e., CAIRS, ORPS, NTS [Noncompliance Tracking System] and ISC [Incidents of Security Concern]). Table 9 lists the causal analysis associated with each reportable event. Although there are similar causal analyses, they are different issues, activities, and results. DOE Order 232.2 defines the time period for Recurring (R) to those events that happen within a 12 month period. No trends are warranting a Recurring (R) ORPS be submitted to DOE. Below are the Causal Analysis results over the last 10 years.

| Event Number              | ORPS Description                                | Causal Analysis                   |
|---------------------------|---|-----------------------------------|
| 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)<br>#51451 | Condensed Matter Physics SSH Incident           | A4 – Management Problem           |
| ORPS 2007 - 0001          | Smoke – Smoldering Event in Graphics Renovation | A2 – Equipment Problem            |

**Table 9 - TapRoot Analysis of Reportable Events**

| <b>Event Number</b>                               | <b>ORPS Description</b>   | <b>Causal Analysis</b>                       |
|---|---|--|
| 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 and CAIRS                        | Elbow Injury (Fracture)   | NA - None Deemed Appropriate – Legacy Injury |
| 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            |
| 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                      |
| ORPS 2011 - 0001 and 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 2013-0001                                    | Six ratchet strap assemblies were found to have SC/I bolts installed                          | A2- Equipment / Material Problem             |
| CAIRS 2013-005                                    | Standard Threshold Shift (STS) – Hearing Loss   | A1 - Design/Equipment Problem                |
| CAIRS 2013-007                                    | Dislocated Finger - An additional railing, although not required by Code, would be desirable. | A1 - Design/Equipment Problem                |
| CAIRS 2013-009                                    | Lumbar Strain - Use proper lifting equipment instead of lifting.                              | A3 - Human Performance                       |
| CAIRS 2013-052                                    | Metal Sliver in Finger  | A3 - Human Performance                       |
| ORPS 2014-0001                                    | Iron / Arsenic Breach   | A3 - Human Performance                       |
| CAIRS 2014-007                                    | Latex Allergy   | A3 - Human Performance                       |
| ORPS 2014-0002                                    | Improper shipment of chemicals, contaminated materials, and compressed gas                    | A4 – Management Problem                      |
| ORPS 2014-0003 (R)                                | Improper shipment of Mercury Chloride   | A4 – Management Problem                      |
| CAIRS 2014-013                                    | Employee fall from rental truck – broken hip  | A3 - Human Performance                       |
| CAIRS 2014-015<br>ORPS 2014-0005<br>NTS 2014-0001 | Burn from torch   | A4 – Management Problem                      |
| CAIRS 2014-016                                    | Shoulder strain   | A4 – Management Problem                      |
| CAIRS 2015-001                                    | Finger laceration   | A1 – Design Problem                          |
| ORPS 2015-0001                                    | Ball mill rupture   | A4 – Management Problem                      |
| CAIRS 2015-003                                    | Standard Threshold Shift (STS) – Hearing Loss   | A1 – Design Problem                          |