INL/EXT-14-32137

Idaho National Laboratory Quarterly Performance Analysis

2nd Quarter FY 2014

Lisbeth A. Mitchell

June 2014

The INL is a U.S. Department of Energy National Laboratory
operated by Battelle Energy Alliance

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Quarterly Performance Analysis

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Idaho Falls, Idaho 83415

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Contents

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FY-14 2nd Quarter

This report is published quarterly by the Idaho National Laboratory (INL) Performance Assurance Organization.

The Department of Energy (DOE) Occurrence Reporting and Processing System (ORPS), as prescribed in DOE Order 232.2, "Occurrence Reporting and Processing of Operations Information," requires a quarterly analysis of events, both reportable and not reportable, for the previous 12 months. This report is the analysis of 71 occurrence reports and 38 other issue reports (including not reportable events) identified at INL from April 2013 through March 2014.

Battelle Energy Alliance (BEA) operates the INL under contract DE-AC07-051D14517.

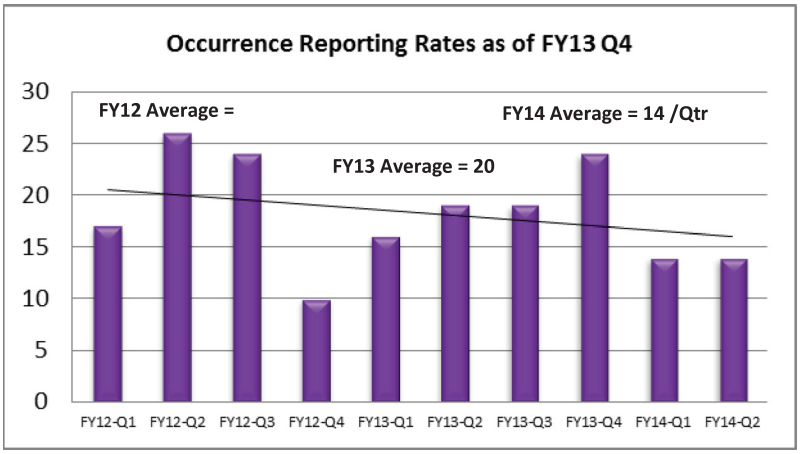
Highlights…

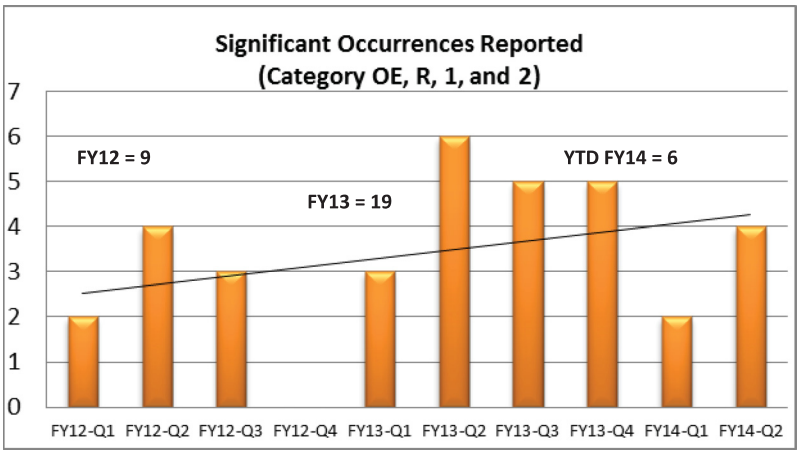
The average number of occurrences reported at the INL each quarter has dropped slightly this fiscal year from an average of 19.5 to 14. The rate of significant events (those reported as Operational Emergencies, Recurring Issues, and/or Significance Categories 1 or 2) trend continues to increase; however, if the monthly average continues, the total number of significant events in FY-14 will be below FY13.

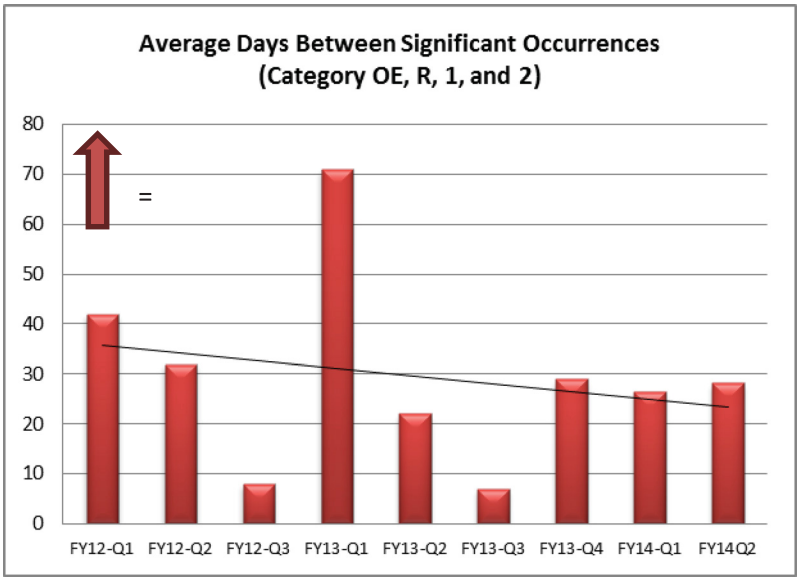
The average number of days between significant occurrences is decreasing showing that significant events are occurring more frequently than in the past.

This quarterly analysis reviews those events that were reportable through ORPS, events that did not meet ORPS reporting thresholds, some deficiencies tracked in LabWay, the causes of reportable events, and trending performed by the INL Operational Performance Analysis Committee (IOPAC) group.

The report also provides a summary of the more significant Lessons Learned issued by INL.







INL Occurrence Trend Snapshots

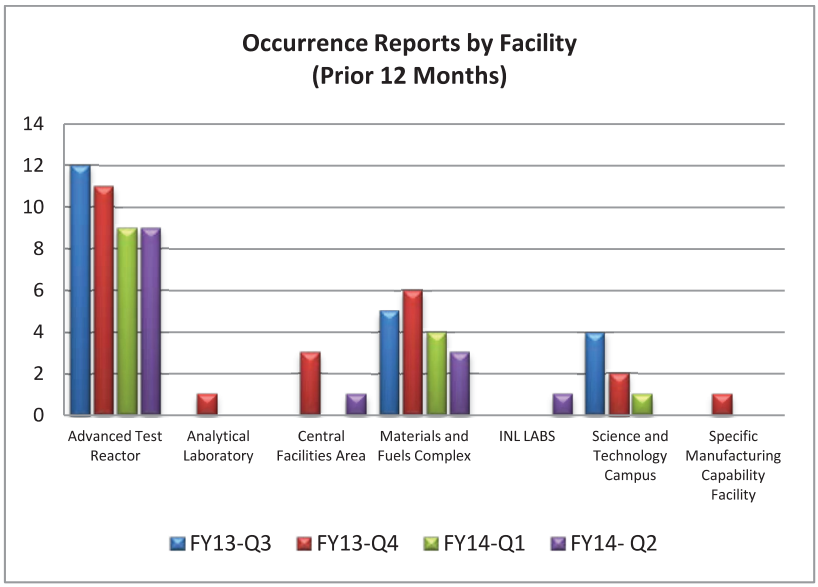
From 01/01/2014 through 03/31//2014, INL reported 14 new events to DOE, in accordance with DOE Order 231.1B. These events are analyzed to determine commonalities related to: Operational Emergencies (Group 1), Personnel Safety and Health (Group 2), Nuclear Safety Basis (Group 3), Facility Status (Group 4), Environmental (Group 5), Contamination and Radiation Control (Group 6), Nuclear Explosive Safety (Group 7), Packaging and Transportation (Group 8), Noncompliance Notifications (Group 9), and Management Concerns (Group 10).

In addition, INL reported 10 events through Initial Notification Reports and our local issues tracking software that did not meet or exceed the ORPS reporting thresholds. These events are also discussed and analyzed within this report.

TREND SNAPSHOT

Occurrences by Facility: The Material and Fuels Complex (MFC) saw a decrease in the number of events reported during the 2nd Qtr FY-14, as compared to the 1st Qtr FY-14, while the Advanced Test Reactor (ATR) complex remained the same as last quarter. However, both are trending downward in the number of reportable occurrences. Because of the nature of work occurring at these facilities, it is not unexpected that they report the most number of events.

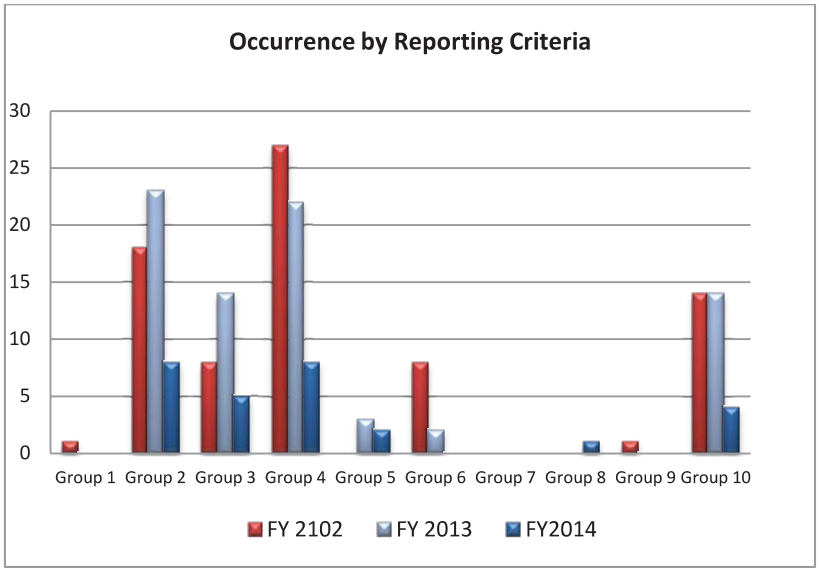
ATR reported 64% and MFC 21% of the events during this reporting quarter. Analysis of the nature and causes of all the reportable events is covered in other sections of this report.



TREND SNAPSHOT

Occurrences by Reporting Criteria:

INL continues to experience the majority of events related to: Group 2, Personnel Safety and Health, which accounts for 46% of events reported since FY2012; Group 4, Facility Status, which accounts for 54% of events reported since FY2012; and, Group 10, Management Concerns, which accounts for 30% of events reported since FY2012. Analysis of all reportable events and any noted trends is covered in other sections of this report.



TREND SNAPSHOT

Lessons Learned Events: For the 2nd Qtr FY-14, the use of Lessons Learned has improved but is still not being used optimally to maintain a high level of awareness regarding behaviors. Key factors in maintaining likelihood of events are for personnel to exercise high standards, with respect to behaviors, that can lead to events, by relating behaviors to actual events. To address this concern, Laboratory Performance will be benchmarking Lessons Learned programs in place throughout the complex and developing actions to improve Lessons Learned utilization across the INL.

The INL Lessons Learned Program is an integral part of the feedback and improvement processes required by the Department of Energy (DOE). Operational excellence requires the use of internal and external operating experience information (OEI) to minimize the likelihood of undesirable behaviors and promote noteworthy practices. Lessons learned, both positive and negative, are systematically evaluated and implemented to continuously improve performance. During the 2nd Qtr FY-14, there were 459 Lessons Learned internally generated by MFC, EES&T, ATR, and F&SS. An additional Lesson was shared with Laboratory personnel following the death of a local family who died of carbon monoxide poising inside their home.

Of those Lessons Learned, seven were entered into the INL database to be shared. These are summarized below:

Bucket Truck Injury

Managers, foremen, and employees must be vigilant when it comes to safety. Even routine work can still be hazardous. Managers must ensure work processes identifying hazards associated with routine low risk work, as well as non-routine high risk work, are followed. All employees must take an active role in caring for coworkers' safety. Be on the lookout for at-risk conditions and behaviors and show each other we care by intervening.

Managers must be diligent in their approach to equipment evaluation, safety upgrades, and ensuring employees attend required safety training. Focusing on all hazards associated with a work activity ingrains expectations of safety performance.

Nitric Acid Spill

Long term chemical compatibility of sample and secondary chemical containers needs to be considered for each task. While some materials are suitable for many short-term applications, they may not be suitable for long-term storage. This applies to all chemical containers; even those for chemicals still in the original containers as these can degrade over time as well.

If there is any indication that there is something wrong with any container containing a chemical or chemical preparation, pause long enough to evaluate the hazards of the chemicals in the container and the potential consequences of container failure. Consult coworkers and, if deemed necessary, put additional mitigations in place before proceeding.

When working in a chemical hood, the hood sash is a physical barrier between the workers face and the hazards in the hood. For this to be effective, the laboratory worker must always be aware of the sash position and adjust appropriately for the standing or sitting position.

When turning over lab space responsibilities due to short or long term absences, when personnel are returning from extended absences, and when personnel are reassigned or because of termination, a thorough discussion of the state of all activities and items in the laboratory needs to occur to establish the condition of the laboratory space so that items needing attention are dealt with in a timely fashion.

WIPP Fire

Small problems left uncorrected over time can add up to enable a significant operational event. Deficiencies need to be fixed promptly and tracked to completion.

The operational configuration of equipment must be maintained in accordance with rigorous design requirements and only allowed to change with proper analysis.

Fire Hazard Analysis needs to be comprehensive and diligently implemented.

Emergency preparedness/response actions need to be analyzed, reviewed, trained, and practiced regularly to ensure proper response during emergencies.

Manipulator Dislodges LO/TO Device from Breaker
(YELLOW — 2014-1230)

Lessons Learned: Personnel performing work or moving equipment in close proximity to installed LO/TO devices should use caution to ensure the LO/TO devices remain in place.

Summary: On 10/29/13, work was being performed on glovebox limit switches and exposed terminations. Prior to the work commencing a simple LO/TO was placed by the workers to isolate electrical energy to the glove box switches. The breaker is located outside of room 130 on the wall of the facility hot cell and within the working and storage radius of the hot cell manipulator. The work was stopped for the day and was continued the next day. Later, an assigned operator moved the manipulator to its storage location which was very close to the LO/TO devices. Work continued the next day by maintenance. At a certain point during the work, the maintenance employee went to the breaker box to confirm the label to be placed on the new breaker box. Upon inspection, the worker noticed that the LO/TO device was no longer attached to the breaker, but was hanging in place between the breaker panel and the manipulator arm.

Moving Drums with Drum Dollies
(YELLOW — 2014-1235)

Lessons Learned: Personnel moving liquid-filled drums with a drum dolly should not let go of the dolly when it is in the 60 degree position and resting on all four wheels. If the liquid sloshes and shifts its center of gravity, the drum could fall off the dolly.

Summary: During the Clean Harbors milk run on 02/18/14, a laborer at ATR picked up a poly 55-gallon drum using a drum dolly. He attached the top hook of the dolly to the lip of the drum and tilted it back and began to move it toward the truck for loading. The truck driver did not have the lift-gate in position to receive the drum, so the equipment operator leaned the drum back to the 60 degree position so that it was resting on the second set of wheels and took a few steps back. At this point, the top hook on the dolly slipped off of the lip of the poly drum causing the dolly to slam to the ground and the drum flopped forward. There were no injuries and the drum remained upright.

Air Compressor Falls from Rollers during Installation
(BLUE — 2014-1229)

Lessons Learned: Workers must always consider "what could go wrong" before starting a job. Rolling top-heavy equipment into a building with an uneven floor could result in the equipment tipping over. This situation resulted in a 1,500 pound air compressor falling off rollers during installation.

Summary: On Tuesday morning, 11/12/13, two subcontracted employees were in the process of replacing an air compressor that supplies air to MFC-782, when the air compressor being installed tipped over and fell to the ground. The compressor was located in a small outbuilding adjacent to the Machine Shop. The old compressor had been removed from the building and the new air compressor, having been staged inside the outbuilding the day before, was being moved into its desired location. The new compressor is a rotary screw compressor weighing approximately 1,500 lbs and was noted as having a high center of gravity.

The subcontractor employees began moving the air compressor using Hilman® Rollers and push bars. The compressor was almost into position when it began to tip backwards, causing the rollers to become dislodged from underneath the unit and the unit then proceeded to fall backwards to the ground. The employees were not in the path of the falling unit and neither was injured as a result of the incident. Damage to the air compressor was minimal. The compressor that was installed was extremely top-heavy. In the future, air compressors that have a more stable body should be ordered and maintained at the INL to prevent similar mishaps.

Knowledge Workers – Validate Assumptions
(BLUE — 2014-1231)

Lessons Learned: Knowledge workers need to validate assumptions. Engineers typically apply assumptions and engineering judgment in order to bound uncertainties in analyses. The development of assumptions relies on worker knowledge and experience, particularly when data and/or clear guidance is not available. Legacy assumptions are of particular interest in that the basis or technical rational may not be adequately documented. Organizations using knowledge-based workers are at risk for increased error rate

when more experienced personnel leave prior to transferring sufficient knowledge to less-experienced personnel. The use of Human Performance tools for knowledge workers is critical for error prevention in the conduct of expert-based processes. “Errors by knowledge workers, especially engineers, potentially have the greatest adverse impact on safety and economic performance.” – INPO 05-002

Summary: The fundamental purpose of the following human performance tools is to help the engineer or knowledge worker maintain positive control of a work situation, especially during critical tasks or activities—that is, *what is intended to happen is what happens, and that is all that happens*.

INPO 05-002, “Human Performance Tools for Engineers and Other Knowledge Workers,” provides fundamental tools and conditional tools to assist knowledge workers in doing the job right, every time.” One of the fundamental tools is to validate assumptions.

Oversight of Subcontractors
(BLUE — 2014-1237)

Lessons Learned: Subcontractors place themselves at risk when they work without proper controls over their equipment. Recently, a subcontractor at Advanced Test Reactor (ATR) assumed that since they were working on their own equipment they were allowed to follow their own work practices instead of those of ATR. A Subcontractor Field Representative (SFR) was not assigned by ATR to work with the subcontractor and to instruct them in what is permissible.

Summary: On 9/9/13, at approximately 1000, subcontractor representatives for the Ashland Chemical Company came to the ATR to gather data from the Ashland OnGuard water monitoring unit (test equipment that Ashland installed to collect data for chemistry control of the ATR secondary system). While collecting data, the Ashland representatives determined the monitoring unit needed to be adjusted and, without informing anyone in Operations, opened the main power breaker on the front of the unit and unplugged the unit power cord from the 480 V welding receptacle. After adjustments were made, the monitoring unit would not power up and the Ashland representatives requested assistance from the control room supervisor, who sent a process operator to determine what the representatives needed. The process operator found the Ashland representatives with two blown fuses and, believing they had approval to work on their equipment, helped them obtain replacement fuses. With the monitoring unit still de-energized, the fuses were replaced and the unit was powered on. When informed of the actions that had been taken, the Shift Supervisor immediately stopped work as he had not authorized any work to be done on the Ashland OnGuard water monitoring unit. At no time were the Ashland employees exposed to a hazardous energy source. One of the contributing factors from the analysis was that an SFR had not been assigned to ensure that requirements were understood and followed.

Weld Callout on Drawings
(GREEN — 2014-1234)

Lessons Learned: Ensure the weld symbol on a drawing also includes the weld length requirement. Additionally, a visual representation of the weld on the drawing would be useful. Weld lengths called out elsewhere in a drawing may not be clearly understood. Lack of clarity can result in an incorrect weld length and significant rework.

Summary: A mistake was made on a part when the drawing did not clearly note the dimension for the length of the weld separate near the weld symbol. This led to an error by the welder. The welder did not see the weld length requirement and welded along the entire length of the part, leading to a non-conformance and a significant amount of rework.

Analysis: While defining the weld length separately from the weld symbol is not incorrect, it can cause confusion and thus should be avoided.

Exposure to Carbon Monoxide Poisoning
(Communicated to INL Personnel via Email)

In February, police in Pocatello, ID, investigated the deaths of multiple persons at a residence in the Pocatello area. Following a formal investigation, it was determined that four family members and a family pet died from exposure to carbon monoxide produced by a faulty water heater.

What can we learn? The United States Consumer Product Safety Commission has stated, "carbon monoxide detectors are as important to home safety as smoke detectors are," and recommends each home have at least one carbon monoxide detector, and preferably, one on each level of the home.

These devices, which are relatively inexpensive and widely available, are either battery- or AC-powered, with or without battery backup. Carbon monoxide detectors are usually installed around heaters and other equipment. If a relatively high level of carbon monoxide is detected, the device sounds an alarm, giving people the chance to evacuate and ventilate the home. Unlike smoke detectors, carbon monoxide detectors do not need to be placed near ceiling level.

2nd Qtr FY-14 GROUP 1 – OPERATIONAL EMERGENCIES

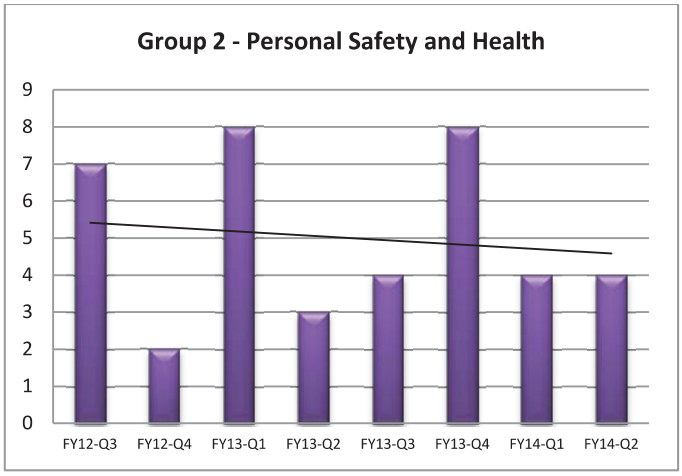
There were no operational emergencies reported during the 2nd quarter of FY-14. The last operational emergency was reported in April 2012, when boron triflouride gas leaked from a neutron detector (NE-ID-BEA-INLLABS-2012-0003). The rate of occurrences of operational emergencies continues to trend at zero.

2nd Qtr FY-14 GROUP 2 PERSONNEL SAFETY AND HEALTH EVENTS

TREND SNAPSHOT

Personnel Safety and Health Events: For 2nd Qtr FY-14, 12 events occurred that were related to personal safety and health. Four met reportable criteria and were reported to DOE through ORPS. The rate of occurrence of reportable personnel safety and health events continues to trend downward. **During the past twelve months, there have been three personal injuries related to slips and falls on ice. Although similar in nature/cause, they are not considered repetitive but are anticipated during winter months in Idaho. Steps are taken each year to reduce the chance of slips and falls. These steps have been successful in reducing the rate of occurrence of these injuries.**

Personnel safety and health occurrences were the second most frequently reported event type, accounting for 20 reportable events in the last 12 months. Four events were reported during the 2nd Qtr FY-14 and are summarized below. Additionally, eight non-reportable events were also reported through the INL issues management software during the current quarter and are also summarized below.



Employee Slips and Falls on Unmarked Ice Concealed by New Snow Fall

NE-ID--BEA-MFC-2014--0001 (Significance Category 3)
At approximately 0900 hours on 01/08/2014, while traveling from one building to another on an acceptable walkway, an employee slipped, fell and hit their head on the asphalt, as a result of unmarked ice concealed by freshly fallen snow. Initial evaluation occurred at Materials and Fuels Complex (MFC) Medical, with the employee then requiring transport to local hospital for further evaluation. The employee was released with full recovery expected.

Following the injury, stanchions were placed on the unmarked ice area and ice melt was applied. Announcements were made across MFC on the voice paging system and emails sent out warning of the slick walking surfaces outdoors. Additional MFC Employees joined laborers in clearing walkways and applying ice melt to aggressively address the slick conditions.

A cat scan was performed on the employee, revealing no internal damage to the face or head although the doctor determined the employee received a concussion. An over-the-counter (OTC) prescription was written for the employee

in the event they needed to fill it to manage pain and nausea. The employee returned to work the next day.

Personnel need to be aware of icy conditions and look out for fellow employees. The risk of falling on ice can be reduced by wearing appropriate footwear, walking carefully, and ensuring your hands are free to help maintain balance. In addition, personnel need to recognize that the environment can quickly change, and they need to be able to adapt quickly and recognize changing conditions and the hazards that arise.

Failure to Follow Hazardous Energy Control Program for Normal Production Operation (No Exposure)

NE-ID--BEA-SMC-2014-0001 (Significance Category 4)
On 2/3/2014, at approximately 1030, a Life Safety System technician entered an Equipment Operation Zone (EOZ) for a production line at the Idaho National Laboratory's (INL) Specific Manufacturing Capability (SMC) facility without following the approved process for such entry.

EOZs are established to protect people from the point of equipment operations by using engineered safety devices, such as light curtains and pressure mats, that provide hazardous energy controls when entry is needed during normal production operations. These devices do not provide protection for servicing and maintenance - which is governed under the INL LO/TO program - but the devices and associated controls are part of the established hazardous energy control program at SMC.

The system was not in operation at the time of the event, and there was no exposure to a hazard. However, the technician's unapproved entry was a failure to follow the established hazard control program. Attention to surroundings and signage could have prevented this event.

Inadvertent Contact with Boiler Igniter

NE-ID--BEA-CFA-2014-0002 (Significance Category 2)
At approximately 23:40 on 2/21/14, a Central Facilities Area (CFA) Utility Operator was performing the flame sensor safety check on the CFA-608 boiler. While reinstalling the flame sensor, the Operator inadvertently contacted the flame sensor against the igniter wire (similar to spark plug wire) and received a shock to his right hand. He promptly reported to CFA medical for evaluation and they released him back to work with no restrictions.

The investigation found the potential for a shock hazard was previously unrecognized and, therefore, unmitigated. To identify and mitigate hazards, work control processes are implemented with built-in lines of defense, which include administrative, hazard identification, engineering, and management oversight. When working with an energized system, hazard controls must be in place to ensure all forms of hazardous energy have been evaluated and the proper controls and/or Personal Protective Equipment (PPE) are in place to protect personnel. Additionally, personnel must be adequately trained with applicable procedures. Procedures and steps/directions in the procedure must be followed accurately and in the proper order.

Unexpected Discovery of Uncontrolled Power Source at MFC-768

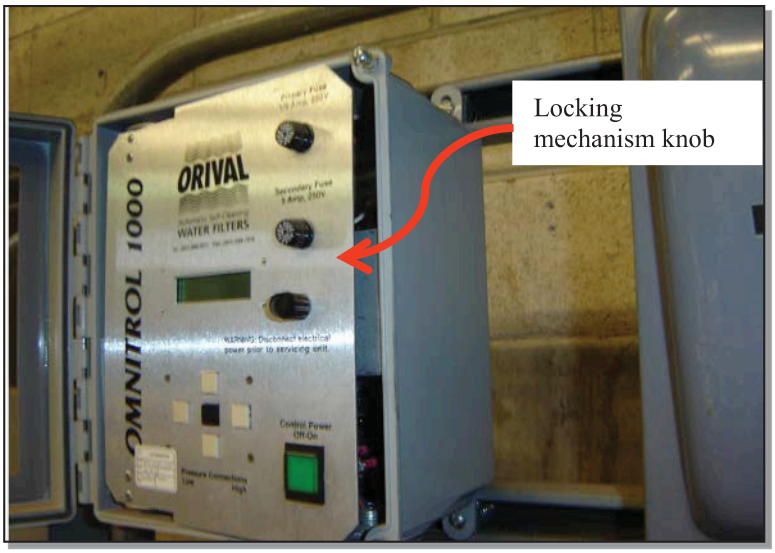
NE-ID--BEA-MFC-2014-0002 (Significance Category 3)
At approximately 1300 hours on 02/25/14, A DOE Facility Representative (FR) noticed an equipment display/control panel that appeared to be slightly opened (approximately 3/4 inch). A second FR was contacted, and upon arrival, observed red Light Emitting Diode (LED) lights energized on the inside of the panel. The second FR guarded the area until facility management arrived. The area was immediately posted to protect access to the panel while notifications to Facility Management were made. No one was directly exposed to the hazardous energy.

The panel's power source was not clearly marked, so electrical engineering was contacted to determine hazard category to aid in PPE requirements needed to safely secure the display door. The display panel was secured by electricians. It was determined, based on the hazard category determination, that the Operations Specialists (Ops Spec) were adequately trained to secure the display panel door.

Power to the control panel is supplied by a 480 V line to a step down transformer to 125 V. There is a secondary transformer inside the control panel dropping the power to 24V. The labeling on the equipment was not labeled to reflect the voltage.

The Ops Specs access this panel once a day during daily rounds and press the face buttons to determine if the filters needed to be flushed. The display panel is attached to the panel box with a plastic knob with a locking lobe on one side to secure the panel to the box. When the Ops Specs push the control buttons daily, the locking knob worked itself down, unlocking the panel.

The Ops Specs stated that they have seen the panel slightly opened once or twice over the past year, but with their training, they felt comfortable to close the panel and re-secure the knob. They recognized that it was not a normal



condition. The Ops Spec that performed the rounds the previous night, stated that the display panel was closed.

What can we learn? Over time the locking mechanism had become weakened to the point that when taking readings, the knob would rotate on its own and the door would come open. Operators did not recognize this as an abnormal condition or recognize that their "higher than normal electrical risk" qualification did not allow them to take the actions that they had been taking.

Other Non Reportable Events

There were eight personnel safety and health concerns reported in LabWay during the 2nd Qtr FY-14. These events did not meet ORPS reporting thresholds and are as follows:

CO-2014-0264

An employee suffered a minor finger puncture when they contacted a sign attached to a door. The employee was exiting a room through the door held by a fellow employee when the employee reached to hold the door open and contacted a sharp corner on the hard plastic sign. The sign was positioned at approximate elbow height, slightly above the door handle level. The fire door sign does possess sharp corners and is slightly elevated from the door surface, due to the thickness of the adhesive materials connecting the sign to the door. With signs on doors throughout the MFC, this condition likely exists on other doors and warrants further evaluation by each facility/building owner. MFC Supervisors checked signs on all doors to MFC facilities to ensure they did not present a similar hazard. No additional problems were found.

CO-2014-0074

An employee was working with three others to move a Special Nuclear Material detector out of Building MFC-719. During this work evolution, the employee's left index finger was pinched/smashed between the detector and his steel-toed boot. The laceration required two stitches.

As the workers pushed to slide/rotate the detector, it either caught on the bottom and tipped or the top of the detector was pushed with enough force to tip it over and pinch the workers finger between it and his boot. Personnel must place emphasis on the importance of situational awareness (such as where am I, and what are the potential hazards) and also on good communications in order to prevent such occurrences.

CO-2014-0614

While walking across the parking lot between the two sidewalks (from UB-3 to the sidewalk leading to EROB), an employee slipped on a path of black ice and landed on their back. The employee's head hit the pavement during the fall. The employee noted no immediate symptoms other than tenderness in the head, minor bruising on right elbow, and some soreness on the left elbow. The next day, the employee experienced slight vision and perception changes, so the employee visited their personal doctor. The doctor ordered a CT scan; the CT scan was negative. The employee's symptoms subsided a few hours later.

As stated in the reportable occurrence that resulted from a slip and fall on black ice, personnel need to maintain awareness, wear appropriate footwear, and walk carefully.

CO-2014-1674

On 3/26/14, at 1700, the ATR Shift Supervisor was informed that an operator had entered Building TRA-634 to lock out and tag out a piece of equipment in the building without wearing the PPE (Tyvek coveralls and full-face respirator). Clean-up of legacy beryllium contamination had recently

started, which changed PPE requirements for building entry. This change had not been adequately communicated to the Shift Supervisor who authorized the employee's entry. In addition, signage/barriers were inadequate to communicate the change in PPE requirements.

At the time of entry, workers performing the clean-up were on break. Following discovery of the event, air samples were obtained to determine employee exposure. Analysis of air samples collected at the time of the event concluded all air samples were below the limit of quantification (LOQ). Smears were also below the DOE release criteria for surface levels.

It is important to ensure personnel are made aware of and understand when hazards in a facility change.

CO-2014-0397

On Tuesday, 1/21/14, at approximately 1820, Bus 501 (no passengers) was traveling east on Highway 20, a little past the I-15 overpass. The bus was in the left lane and stopped at the light at the I-15 off-ramp. There was a car and a truck in the right lane beside the bus. After the light turned green and all of the vehicles accelerated up to speed, between 40 to 50 mph, and the bus driver decided to get into the right lane as he approached his exit. The bus driver checked the mirrors and could see the truck behind the bus in the right lane but did not see any other vehicle. The bus driver signaled he was changing lanes checked the mirrors again and started to move to the right. The driver of the car next to the bus saw the signal light and realized the bus was starting to move to the right. The driver of the car went to the right as far as he could, but there were concrete barriers. He tried to accelerate ahead of the bus and then the front corner of the bus contacted the back corner of the car, pushing the car sideways across the front of the bus, and then off to the left side of the road facing west. All vehicles stopped and personnel contacted the police. There were no injuries. Damage to the bus was minimal paint transfer. The car had paint transfer along the side and a dent behind the rear wheel. There were no citations issued.

The presence of a blind spot on the right side of the bus was a major factor in this accident. As a corrective measure, an extra convex mirror was placed on this bus and will be added to the rest of the INL bus fleet. Along with the addition of convex mirrors, the fleet is looking at adding additional labels warning of bus blind spots.

What can we learn from this event? At INL we have some of the best bus drivers in the nation who have been recognized for their safe driving. Unfortunately, with larger vehicles like buses and tractor trailers, there exist inherent blind spots that prevent the drivers from seeing vehicles around them. Personnel driving private vehicles can help prevent these types of accidents by not lingering in these blind spots.

CO-2014-0005

On 1/2/14, at approximately 1120, an electrician felt a pop and pain in his left shoulder while manipulating a small motor casing he was refurbishing. The motor in its current condition weighs approximately 10 lbs. The electrician was working on the small motor and had removed the rotor and other parts and was manipulating the motor with his left hand to look at the other end when he heard and felt a pop and experienced pain in his left shoulder. The employee notified a co-worker and was transported to Medical. Medical personnel evaluated the employee's injury, completed an x-ray and determined the employee had likely experienced a sprain in his shoulder. Medical provided OTC medication for pain and put a sling on the employees left arm.

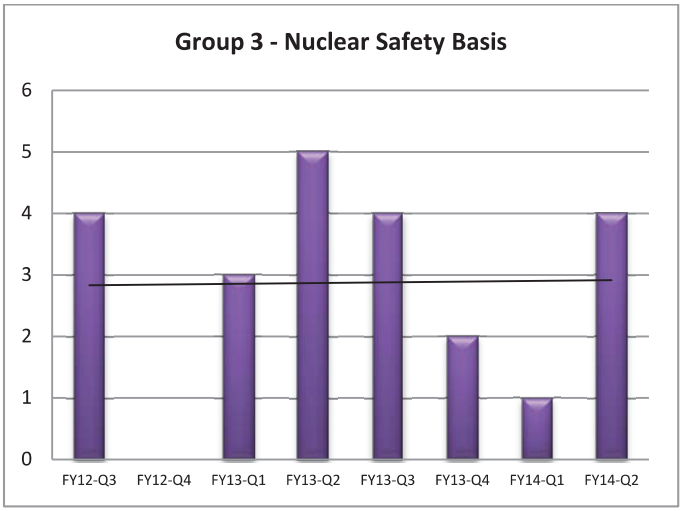
The manner in which the electrician was lifting the motor contributed to the injury. The electrician was holding the motor in front of his body with his arms extended. He then made a twisting motion with his arms. This extended load in conjunction with the twisting motion caused the injury. When lifting materials, ensure you hold them close to your body to prevent strain on your arms, wrists, and shoulders.

TREND SNAPSHOT

Nuclear Safety Basis Events: Nuclear safety basis events accounted for 29% of the events reported in the 2nd Qtr FY-14. The number of nuclear safety basis events increased from last quarter and the rate of occurrence of nuclear safety basis is trending upwards.

There were no similarities of the one Nuclear Safety basis event that occurred this quarter, nor in their causes, organizations, or work groups that would indicate an adverse trend or recurring problems within the last 12 months.

Nuclear safety basis events were the fourth most frequently reported event type, accounting for 14 reportable events in the past 12 months. Four events were reported during the 2nd Qtr FY-14; they are summarized below.



ATR Manual Reactor Shutdown Due To Incomplete Loop 2A Experiment Safety Analysis

NE-ID--BEA-ATR-2014-0004 (Significance Category 2)

On 1/16/14, during Safety Operations and Review Committee (SORC) review of a revision to the Electric Power Research Institute (EPRI)-1, -2, and -3 Experiment Safety Analysis Package (ESAP), it was discovered that the ESAP and supporting analysis did not demonstrate compliance with the Safety Analysis Report (SAR)-153, Chapter 15.4, Condition 2 loop voiding accident criteria.

The ESAP stated that the Condition 2 criteria were met, but the statement was not supported by analysis. The EPRI-1, -2, and -3 experiments were not installed in the (ATR. The SORC review was conducted to support future EPRI-3 installation.

On 1/17/14, at 1030, based upon the new information identified during the SORC review, the ESAP, and supporting analyses for the 2A-C stainless steel backup test were reviewed. The review identified that, similar to the EPRI-1, -2, and -3 experiments, the ESAP and thermo-hydraulic analysis did not provide a basis for protection against a Condition 2 experiment loop voiding reactivity insertion event. Because the ESAP did not demonstrate compliance with the Condition 2 event, Technical Safety Requirements (TSR)-186, Limiting Conditions for Operation (LCO)-3.9.1 was not met.

The ATR TSR-186 surveillance requirement (SR)-4.9.1.3, requires that the loop facility operating conditions are within limits specified in the ESAP and Core Safety Assurance Package (CSAP) prior to a scheduled startup. This requirement was not met.

At 1505 on 1/17/14, a controlled shutdown of the ATR was completed by inserting a manual scram following required gas cooled experiment cool down and purge.

A preliminary evaluation of the 2A-C stainless steel backup test for the Condition 2 experiment loop voiding accident indicated that the results were bounded by the SAR-153, Chapter 15.4, Condition 2 experiment loop voiding reactivity accident. The minimum margins to critical heat flux and flow instability were preserved during irradiation of the 2A-C stainless steel backup test.

This event underscores the importance of using Conduct of Operations and Human Performance tools, such as self-checking and peer-checking, to achieve successful development and publication of critical documents.

Use of Mark IV and Mark V Fuel Elements in ATRC Facility Results in Potential Inadequacy in the Safety Analysis (PISA)

NE-ID--BEA-ATR-2014-0007 (Significance Category 4)
During a review of Advanced Test Reactor Critical (ATRC) facility fuel loading and procurement documents, it was determined that the ATRC contains fuel elements that were procured under Contract C-264 using specification ATR-PPCS-259.

Contract C-264 references both Mark V and Mark VI fuel element drawings; however, the ATRC SAR-192 does not address the use of Mark V and Mark VI fuel elements in the ATRC. (SAR-192 addresses the use of Mark IV and Mark VII fuel elements).

The ATRC is fueled with two Mark IV and 38 Mark V fuel elements, procured in 1965 under Contract C-264. No documentation can be found that addresses the use of Mark V and Mark VI fuel elements. A determination was made that a PISA exists.

This event provides a good lesson in that the inadequacy in the safety analysis was identified by a new engineer providing a set of "Fresh Eyes". The inadequacy had existed for several years until the new engineer began to review the safety basis adequacy and identified the problem.

In-Pile Tube (IPT) Inlet Pressure Used to Calculate Maximum Allowable Temperature Results in Positive Unreviewed Safety Question (USQ)

NE-ID--BEA-ATR-2014-0008 (Significance Category 2)
On 3/7/14, a Potential Inadequacy in the Safety Analysis (PISA) was declared regarding concerns with In-Pile Tube (IPT) operating temperature analyses for the 1C-W, 1D-N, 2B-SE, 2D-SW, and 2E-NW loops. The allowable IPT inlet and outlet temperature are determined using lobe power, test fission power, IPT inlet pressure, and IPT inlet flow, to ensure that the wall temperature of the IPT remains below 800°F and bulk water conditions are below saturation. The IPT operating temperature analyses did not specify if the nominal operating pressure of the specified pressure band or the lowest allowable pressure in the specified operating band should be used in the calculation. Standard Practice (SP)-10.6.2.1, Experiment Safety Assurance Package Preparation and Approval, directs the use of the nominal pressure when calculating maximum allowable IPT inlet and outlet temperature.

Affected loop pressures were adjusted to ensure the loop operating pressure stayed above the nominal pressure specified for the cycle until a new normal operating band was calculated and the experiment operating letters were modified, as needed.

Analysis (Boodry and Hendrickson 1995; Hendrickson 1995 and 1996a) demonstrates that for IPT inlet pressures above nominal pressure, the IPT wall temperatures and loop bulk water saturation conditions meet the ATR SAR-153 requirements.

Potential Inadequacy in the Safety Analysis (PISA) Regarding ATR Fuel Element Drops in the ATR Facility Results in Positive USQD

NE-ID--BEA-ATR-2014-0009 (Significance Category 2)
On 3/10/14, a Potential Inadequacy in the Safety Analysis (PISA) was declared regarding the lack of a structural analysis to qualify the potential damage to an ATR fuel element resulting from a drop in the ATR facility. The potential for a fuel drop can occur outside of the canal on the ATR main operating floor, inside the reactor, and inside the ATR canal.

The integrity of an ATR fuel element following a drop in the ATR facility, is assumed in SAR-153, Chapter 15, Accident Analysis for Condition 2, 3, and 4 fuel handling accidents and in the SAR-153, Chapter 9, Criticality Safety Analysis. Because a structural analysis has not been performed to quantify the potential damage to a fuel element resulting from a drop, the damage that is assumed in the safety basis may not be assured. The potential fuel damage could exceed that assumed in the safety basis.

Past experience indicates that the ATR fuel elements are very robust. Although not documented in the ATR safety basis, SAR-192, Safety Analysis Report for the ATR Critical Facility, Section 10.3.3.2.1, discusses past experiences that demonstrate that dropping an ATR fuel element into the canal does not damage the element. The SAR-192 discussion documents that subsequent inspections and geometry measurements of the dropped elements showed that there was no damage to any features of the ATR fuel elements, indicating that the ATR fuel elements (and therefore, the plates) are structurally capable of withstanding the forces from drop events.

An interim control was placed on the ATR fuel elements, that restrict the movement of the fuel elements, until a cooling time of 30 hours following power operation is met.

Other Non Reportable Events There were no additional non-reportable events related to nuclear safety basis problems reported during the 2nd Qtr FY-14

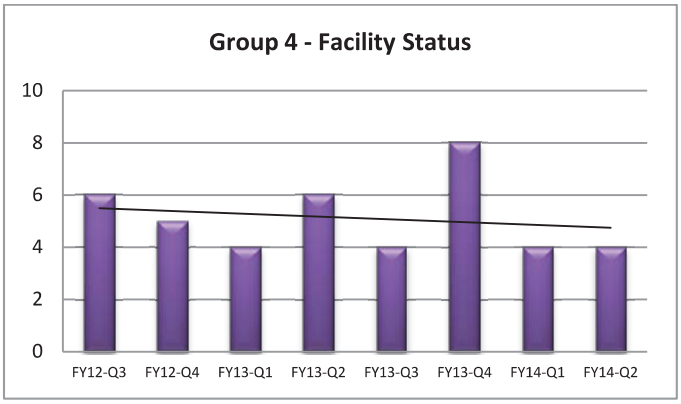
2nd Qtr FY-14 GROUP 4 - FACILITY STATUS EVENTS

TREND SNAPSHOT

Facility Status Events: Facility status events accounted for 29% of the events reported in the 2nd Qtr FY-14. The rate of occurrence of facility status events is trending down over the past two years. Over the past 12 months, ATR has reported 15 events that fall into the Facility Status Events categories. Twelve of the 15 events were the result of degradation of a safety significant component (SSC) (seven when the SSC was required to be operable and five when SSC operability was not required).

A review of the 12 SSC issues at ATR did not reveal a negative trend. Although four of the ATR SSC issues involved equipment associated with the Primary Coolant System, none were related to the same equipment. The other ATR issues involved different plant SSCs. There were no similarities of the four Facility Status events that occurred this quarter that would indicate an adverse trend or recurring problems within the last 12 months.

Events related to facility status have been the most frequently reported event type, accounting for 20 reportable events in the past 12 months. Four facility status events were reported during the 2nd Qtr FY-14 and are summarized below.



Quadrant 1 Delta Pressure Transmitter (DPT)-1-21 Instrument Failure at the Advanced Test Reactor (ATR)

NE-ID--BEA-ATR-2014-0001 (Significance Category 3)
On 1/3/14, at ~1844, the Quadrant 1 Delta Pressure Transmitter (DPT)-1-21 indication failed, then returned to normal. Quadrant 1 flow, as indicated on the console display system, never varied and total Primary Coolant System (PCS) flow never varied. The trend graph showed delta pressure spiked high to 165 psi, then failed to zero for one minute, before returning to normal.

DPT-1-21 was declared out of service, and the Technical Safety Requirements (TSR)-186, Limiting Conditions for Operation (LCO)-3.3.1.4, Condition C, was entered and average flow for Quadrant 1 was established. LCO actions allow use of alternate indications of quadrant flow, which showed no change.

Nuclear Materials Inspection and Storage (NMIS) Facility Halon Fire Protection System Bottles Low Out of Specification

NE-ID--BEA-ATR-2014-0003 (Significance Category 3)
At 1200, on 1/14/14, Nuclear Materials Inspection and Storage (NMIS) Facility Halon bottles were weighed as a back-up to the semi-annual liquid level Preventative Maintenance activities and found to be low out of specification. The NMIS Halon Fire Protection System was declared out-of-service and Technical Safety Requirements (TSR)-154, Limiting Conditions for Operation (LCO)-3.154.2.A was entered.

All activities in the Special Nuclear Material (SNM) storage vault were ceased and compensatory measures were instituted, as indicated by LCO-3.154.2.A, and the fire

protection engineer, with concurrence of the facility manager. Compensatory measures included 4-hour fire watches via remote camera indication monitored by security and required a wet pipe sprinkler fire suppression system be operable in all areas of the NMIS facility (with the exception of the vestibule area leading to the SNM storage vault and in the security corridor), no handling of SNM, and no hot work operations. Maintenance activities continued, as allowed by the LCO compensatory measures, to place the fire protection system back in service.

This event underscores the importance of reviewing maintenance procedures to ensure adequacy. Although liquid level determination is allowed by NFPA 12A, a more accurate measurement is accomplished by weighing the bottles.

Advanced Test Reactor (ATR) Plant Protective System (PPS) - "A" Battery Room Supply Transformer E-12A Failure

NE-ID--BEA-ATR-2014-0005 (Significance Category 4)
On 1/21/14 at 1505, an ATR Process Operator performing routine rounds noted an acrid odor coming from the PPS Room A transformer and that the transformer was warm/hot to the touch. Upon investigation, the operator noted that the associated PPS Room A battery charger supply breaker 670-E-15 A5 was in the tripped position. The operator positioned the breaker in the full open position and reported the findings to the reactor control room.

The Emergency Firewater Injection System (EFIS) at the reactor vessel bottom head was manually isolated to prevent inadvertent firewater addition to the vessel. Automatic bottom head firewater injection valves would fail to open if the PPS room battery completely discharged due to the transformer and battery charger being out of service.

At the time of the transformer failure, the ATR was in the Cycle 155B-1 outage with fuel removed from the reactor vessel. Consequently, the PPS Room A battery and the associated loads were not required to be operable.

TRA-786-M-1 Diesel Fuel Transfer Pump Failed to Start at the Advanced Test Reactor (ATR)

NE-ID--BEA-ATR-2014-0006 (Significance Category 4) On 1/21/14, at 1405, while performing the 100-day Technical Safety Requirements (TSR) Surveillance Procedure using Detailed Operating Procedure (DOP)-8.3.15, "Deep Well Pump Operational Test," (Step 5.2.9), and Operating and Maintenance Manual (OMM)-8.2.13.1.1.2, Section 4.8, to minimize unnecessary run time for the emergency diesel, the 786-M-1 diesel automatic fuel transfer pump failed to start and transfer fuel to maintain the onboard fuel storage tank level. At this point, the test was terminated, 786-M-1 diesel was shut down and DOP-8.3.15 was exited.

The ATR in Cycle 155B-1 outage and defueled and, therefore, not in the applicability condition requiring the deep well to be supplied by emergency power. 786-M-1 is required to be operable with irradiated fuel elements in the reactor.

Other Non Reportable Events

There were two additional facility status events reported in LabWay during the 2nd Qtr FY-14, that did not meet ORPS reporting thresholds. They are as follows:

CO-2014-1574.
On 3/21/14, at 0717, an abnormal alarm from Loop 2E-NW was received in the ATR Control Room. Investigation into the 2E alarm discovered loss of temperature control due to failure of Temperature Control Valve (TCV)-1 which was unrecoverable. At 0719 the ATR was manually shut down. Manually shutting down the reactor for this loop equipment issue ensures if an experiment loop voiding accident were to occur when loop temperature is too low, the safety basis assumptions for the loop voiding accident are protected.

CO-2014-1452.
At approximately 10:00 on 3/18/14, CFA Craft reported to Power Management that smoke/steam was coming out of the pad mounted transformer located east of CFA-623. The Fire Department was notified and Power Dispatch isolated power feeding the transformer. It was determined that the steam line running near the transformer was leaking, migrating through the gravel base and entering the area under the transformer. The Fire Department was called, Power Management isolated the transformer feed power, and CFA Operations isolated the steam supply. Battelle Energy Alliance (BEA) Management and DOE were notified.

TREND SNAPSHOT

Environmental Events: Environmental events accounted for 7% of the events reported in the 2nd Qtr FY-14. The rate of occurrence of environmental events continues to trend upwards, due to new 40 CFR, Part 63, Subpart ZZZZ requirements. Although the event reported this quarter is exact in nature to the environmental event reported the past three quarters, its occurrence is not indicative of an averse trend.

Events related to environmental problems are one of the least reported event types, only accounting for five events in the past 12 months one of which was reported in the 2nd Qtr FY-14. This event is described below.

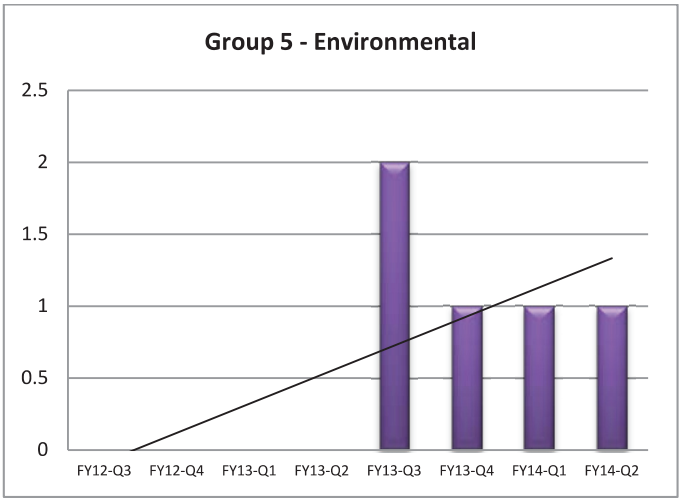
Quarterly Report of Diesel Engine Startup at the Advanced Test Reactor (ATR)

NE-ID--BEA-ATR-2013-0034 (Significance Category 4)
New environmental regulations operation and maintenance requirements for ATR Complex diesel engines are in effect: 40 CFR, part 63, subpart ZZZZ, National Emissions Standards for Hazardous Air Pollutants for stationary Reciprocating Internal Combustion Engines (RICE), also known as Quad Z.

The following ATR Complex engines are non-emergency stationary RICE: Generators 670-M-42, 670-M-43, and 674-M-6. Without installation of emissions controls, units 670-M-42, 670-M-43, and 674-M-6 do not meet the new emission standards for hazardous air pollutants that went into effect on 5/2/13. INL has negotiated with the Idaho Department of Environmental Quality (DEQ) a Voluntary Consent Order (VCO) to replace units 670-M-42 and 670-M-43 with a commercial power based uninterruptible power supply (UPS). When the UPS project is complete in 2015, all three units will be designated as emergency stationary RICE.

Other Non-Reportable Events

There were no additional non-reportable events due to environmental events.



2nd Qtr FY-14 GROUP 6 - CONTAMINATION/RADIATION CONTROL EVENTS

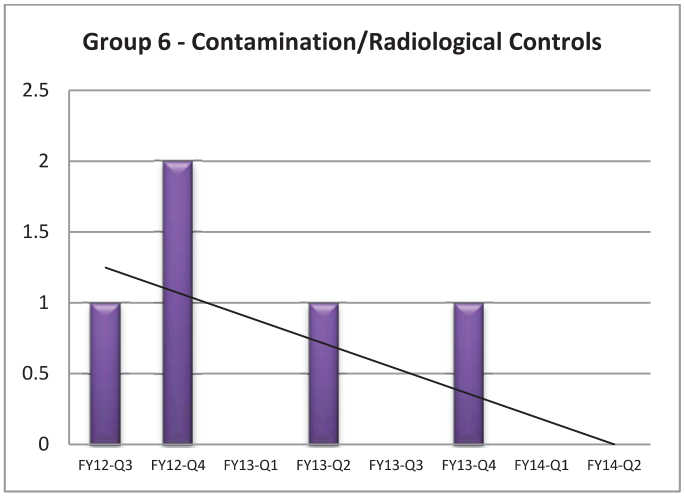
Events related to contamination and/or radiation control are some of the least reported event types at the INL, only accounting for two events in the past 12 months. There were no contamination/radiation control events reported in the 2nd Qtr FY-14.

Other Non-Reportable Events

There was one additional non-reportable event related to contamination/radiation control; it is summarized below.

CO-2014-1598.

On 3/24/14, a sample transfer was completed between the Fuel Conditioning Facility (FCF) and the Analytical Lab. The radiation levels for the sample dictated the use of a radiation area RWP to perform the transfer. The Analytical Lab sample handler was not informed of this requirement and handled the sample without signing into an RWP.



2nd Qtr FY-14 GROUP 7 – NUCLEAR EXPLOSIVE SAFETY EVENTS

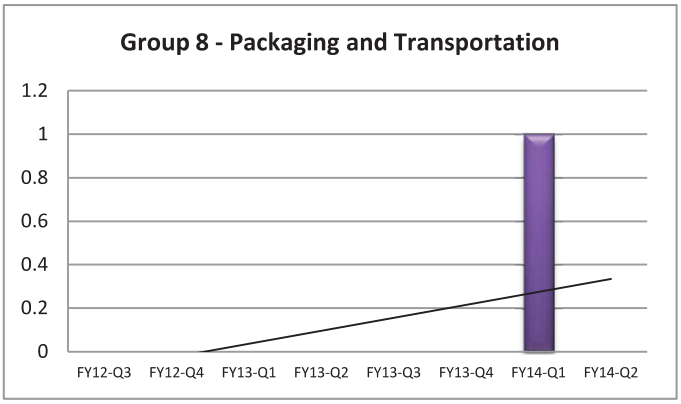
There were no events related to nuclear explosive safety during the 2nd quarter FY-14. BEA has never reported an event under this reporting criterion since taking over the contract for the INL in 2005.

2nd Qtr FY-14 GROUP 8 - PACKAGING AND TRANSPORTATION EVENTS

TREND SNAPSHOT

Packaging/Transportation Events: There were no packaging and transportation events reported during the 2nd Qtr FY-14. The two year trend data shows an increasing trend because of the one event reported during the 1st Qtr FY14.

Events related to packaging and transportation rarely occur at INL; there has been one such event in the last two years. No packaging and transportation events were reported during the 2nd Qtr FY14.



2nd Qtr FY-14 GROUP 9 - NONCOMPLIANCE NOTIFICATIONS EVENTS

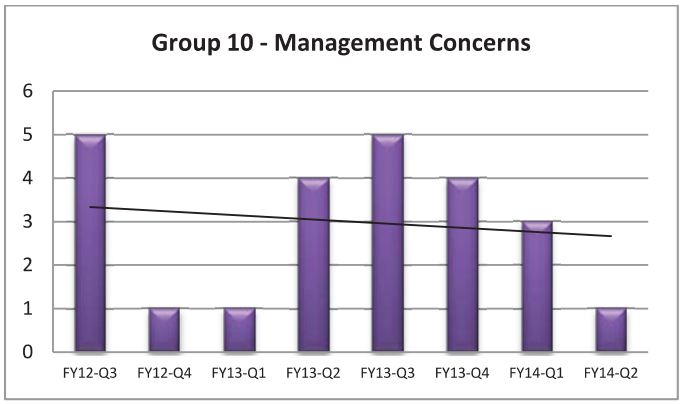
Noncompliance notification events are reported when the INL receives written notification from an outside regulatory agency that the site or an INL facility is considered to be in noncompliance with a schedule or requirement. Over the past 12 months, zero noncompliance notification events have been reported through ORPS.

Recurring Occurrence – A series of two or more events determined by performance analysis to have an unacceptable high frequency and severity, **for which previous corrective actions failed to prevent repetition within a 12-month period**.

EFCOG Contractor Guide for Performance Analysis

2nd Qtr FY-14 GROUP 10 - MANAGEMENT CONCERNS AND ISSUES

Events reported as management concerns or issues accounted for 7% of the events reported during the 2nd Qtr FY-14 and 18% of those reported over the past 12 months. One event was reported during the 2nd Qtr FY-14. The event is summarized below.



Acid Spill in the Radio-Analytical Chemistry Lab

NE-ID–BEA-INLLABS-2014-0001 (Significance Category 3)
At approximately 1600, on the afternoon of 2/19/14, a researcher was in the process of doing routine housekeeping in Lab 114 of the Radio-Analytical Chemistry Lab (TRA-1627) at the ATR-Complex. The researcher was in the process of compositing samples in a radiological contamination area (CA) into a single container for elementary neutralization prior to disposal to the warm waste drain. Samples were poured into a 1 L plastic wide mouth bottle and the tubes and containers were placed in a plastic bag with sorbent for disposal to the radiological trash. These samples are prepared and preserved in 1% nitric acid for analysis on the ICP-MS or ICP-OES instruments in Lab 114. The sample composite step was complete, leaving about 800 ml of liquid for neutralization.

Some pH indicator solution was added to a small amount of 50% sodium hydroxide solution, which was then placed into the CA and added step-wise to the 1L container. When the last of this solution was added, the pH of the 800 ml became basic. Nitric acid is used to titrate back to neutral. There was an existing 50 ml centrifuge tube in the CA containing nitric acid for this purpose. The researcher grasped the tube in his right hand and began to open it with his left hand. It was a plug-seal type tube. As torque was applied the researcher felt something like a grating of the lid, followed immediately by the disintegration of the tube in his hand. His hand then closed, directing the tube contents (approximately 25-30 mls) back out of the hood on to him.

The researcher immediately felt a burning sensation start on his chest and neck. He then stripped the vet gloves and nitrile gloves while proceeding to the eye wash/safety shower, which is about 8-10 feet from the hood CA. He then began flushing his face, neck, head, and chest with the eye wash. After 2 or 3 minutes of initial rinse, he paused long enough to remove a cell phone from his shirt pocket and call the backup Lab Space Coordinator (LSC), who was in the office area of the same building, for help. This was at 16:06, as noted on the researcher's cell phone log. The researcher requested the backup LSC to bring the RAD CON technician to the lab and that he had spilled acid on himself in a CA. The researcher then continued to flush his face and chest in the safety shower. The backup LSC came to the lab door to verify what was happening, whereupon, the researcher gave some brief detail of the work he had been performing in the RAD hood CA when the acid tube ruptured and splashed out onto the researcher and the floor. The backup LSC verified the researcher was okay and checked the LI for the list of further

notifications that were needed and went out of the affected area to make or direct further notifications, such as, spill team, Industrial Hygiene & Safety, Emergency Response, Line and Facility Management, etc.

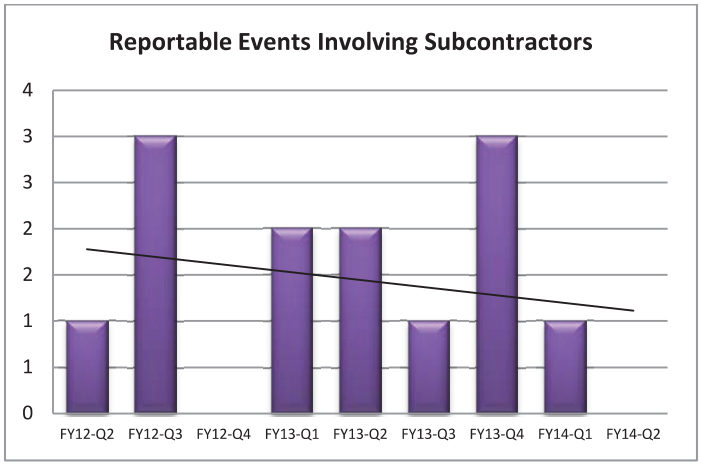
At about 16:10, the researcher stopped rinsing briefly and placed a call to his department manager's cell phone, where he left a message. By this time, there were several responders in the lab so the researcher, as he was being surveyed by radiological control personnel in the lab and before leaving the lab, gave a brief description of what happened and what hazards existed to the industrial hygiene/safety and radiological control personnel present. After donning a new (clean) lab coat, the researcher removed his boots, socks, and jeans and went to the restroom with the EMTs to further asses his condition. After some scrubs (clothing) were provided, he entered the PCM 1B, surveyed and walked to the ambulance, where he was taken to CFA Medical for evaluation and treatment.

CFA Medical evaluated the researcher for chemical burns to the chest and facial area. After having him shower, his burns where evaluated. The burns where classified as 1st to 2nd degree burns. He was provided burn ointment and released to go home with orders to return to CFA medical in the morning for further evaluation of his burns.

We can learn several lessons from this event including:

- When personnel go on extended leaves of absence a thorough turnover of activities need to take place before the leave of absence and upon return.
- When the potential for equipment or material to be used outside the manufactures recommendations alternative methods, materials or additional controls should be utilized.

2nd Qtr FY-14 EVENTS INVOLVING SUBCONTRACTORS



There have been twelve events involving subcontractors reported through ORPS during the past two years; none were reported during the 2nd Qtr FY14.

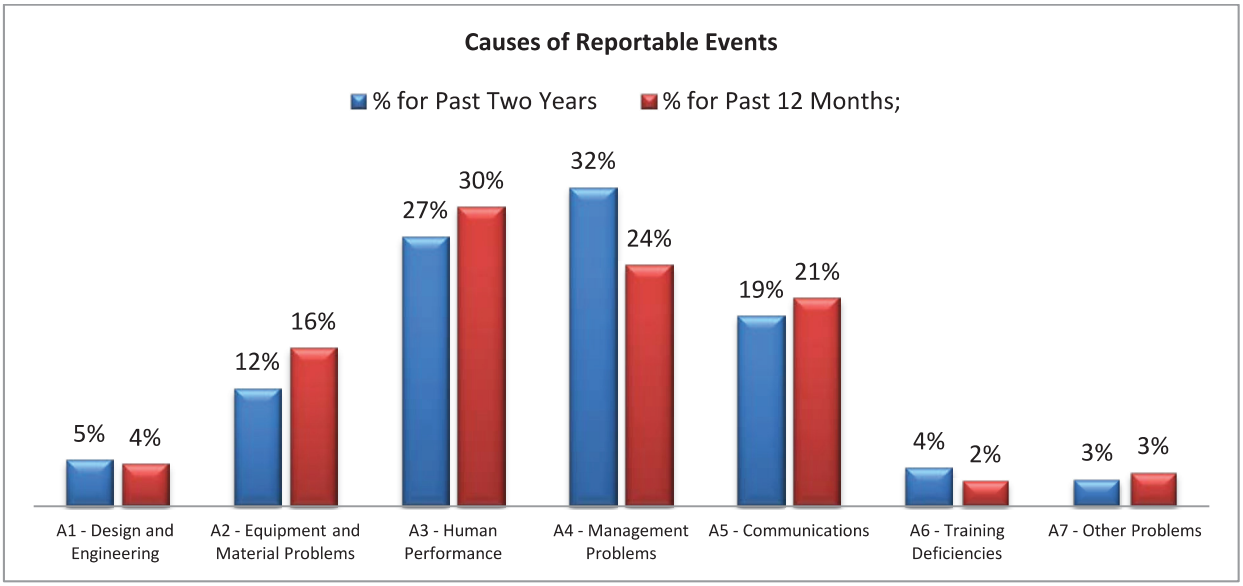
TREND SNAPSHOT

Events Involving Subcontractors: No events involving subcontract employees were reported during the 2nd Qtr FY-14. The rate of occurrence of events involving subcontractors is trending downwards over the last two years.

2nd Qtr FY-14 ANALYSIS OF CAUSES OF REPORTABLE EVENTS

Cause analysis results documented in ORPS were analyzed to determine trends, within the causes identified, over the past two years and during the past 12 months. The analysis shows that the majority of causes over both time periods can be attributed to human performance, management, and communications.

Over the past twelve months, human performance problems were most often associated with personnel ignoring signs to stop and underestimating problems when faced with uncertainties. Management problems were most often associated with less-than-adequate enforcement (or understanding) of policies and with less-than-adequate job scoping. Communication problems were associated with written communications that included ambiguous instructions and those where the instructions were not complete or the situation encountered was not covered.



2nd Qtr FY-14 ANALYSIS OF IOPAC TRENDING ANALYSIS

TREND SNAPSHOT

IOPAC Trending Analysis: For 4th Qtr FY-14, the eight mission centers (ATR, MFC, SMC, National Homeland Security, Nuclear S&T, Energy and Environment S&T, Facilities and Site Services, Laboratory Protection) evaluated ORPS events, INRs, ICAMS, and LabWay issues for trending. In addition, analysis from the Radiological Controls Management System, the INL Work Management System, and Conduct of Operations were also presented by the IOPAC to INL Senior Management. Issues common across the INL and issues that continue to affect the INL are summarized below.

Common Themes across the INL:

- The work scheduling process needs improvement.
- There is a need for increased management field presence.
- Legacy issues (those older than 200 days) need to be reviewed and validated for continued action.
- Procedure adequacy, procedure compliance, and less-than-adequate work documents continue to be problems.
- Trending of issues in the INL Issues Management system needs improvement. Trending teams need training so that there is some consistency in how trend codes are applied to issues.

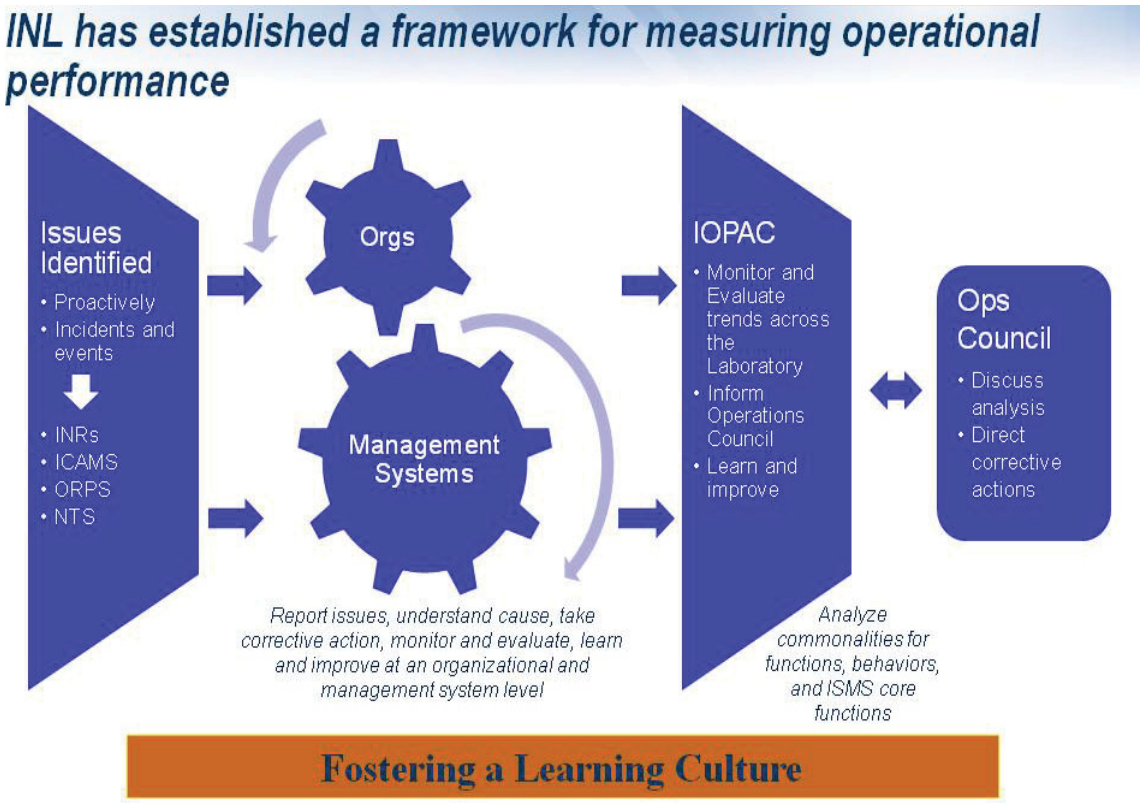


Figure 1. Framework for Measuring Operational Performance

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INL Laboratory Performance Expectations

The INL mission involves performing and deploying world class research that meets the nation's needs in the areas of nuclear energy, other energy, the environment, and national security. Laboratory Performance plays a critical role in supporting the INL mission. Our mission is to:

- Ensure we as a Lab know how we are doing and are improving our performance.
- Own and manage the Laboratory Issues Management System.
- Provide high quality QA program support for research and operations.
- Provide effective independent oversight.

"In order to be successful, we must be leaders, we must be competent, and we must be accountable. We must also exhibit the INL values of excellence, integrity, ownership, and teamwork." – Chris Hott, Director – INL Laboratory Performance

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