

FY2016
3RD QUARTER
INL/EXT-16-39633

IDAHO NATIONAL
LABORATORY
QUARTERLY
OCCURRENCE
ANALYSIS

DEEPER LEARNING THROUGH
EVENT ANALYSIS

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INL/EXT-16-39633

FY-16 3rd Quarter

This report is published quarterly by the Idaho National Laboratory (INL) Quality and Performance Management 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 73 reportable events (23 from the 3rd Qtr FY-16 and 50 from the prior three reporting quarters), as well as 45 other issue reports (including events found to be not reportable and Significant Category A and B conditions) identified at INL during the past 12 months (16 from this quarter and 29 from the prior three quarters).

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

Highlights...

The INL reported 23 events this quarter. The quarterly average number of reportable events at the INL has increased from 15 in FY-14 to 21.3 in FY-15 and 18 in FY-16. Thirty percent of the 3rd Qtr FY16 events were associated with personal safety and health.

The rate of higher significant events (those reported as Operational Emergencies, Recurring Issues, and/or Significance Categories 1 or 2) continues to trend downward, however three significant category 2 events have been reported through the 3rd Qtr FY16.

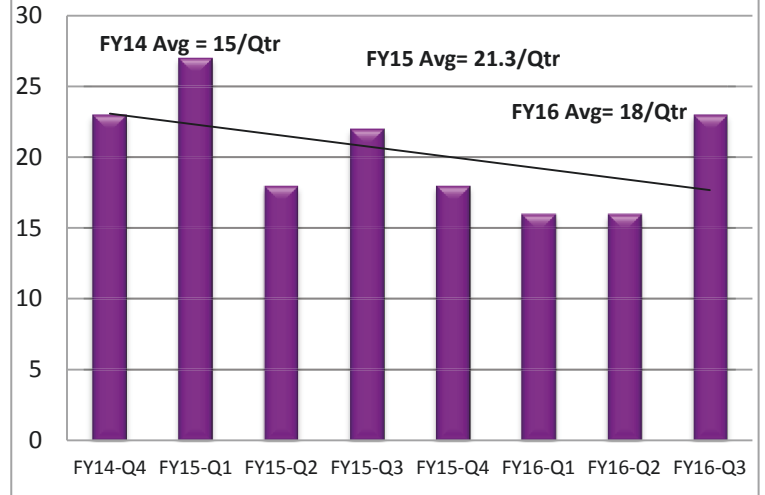
Over the past 24 months, the average number of days between significant occurrences is trending in a positive direction.

A trend of concern was noted in regards to events associated with hazardous energy controls. At this time, it has not been determined to constitute a recurring event and additional analysis has been initiated.

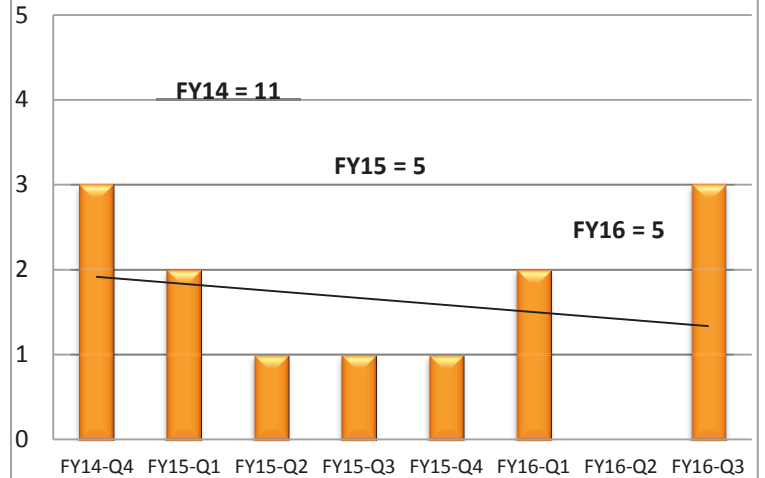
This quarterly analysis reviews those events that were reportable through ORPS, events that did not meet ORPS reporting thresholds, some conditions tracked in LabWay, and the causes of reportable events.

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

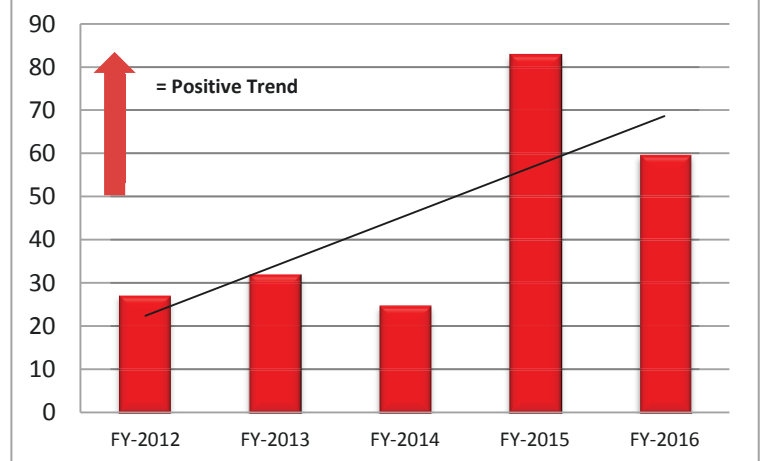
Occurrence Reporting Rates through the 3rd Qtr FY16



Higher Significant Events Reported (Category OE, R, 1, and 2)



Average Days Between Higher Significant Occurrences (Category OE, R, 1, and 2)



INL Occurrence Trend Snapshots

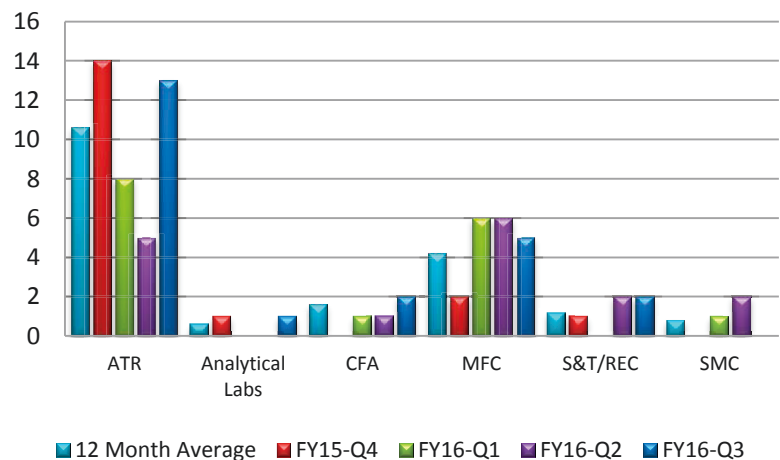
From April 1, 2016 through June 30, 2016, INL reported 23 new events to DOE, in accordance with DOE Order 232.2. These events were analyzed to determine commonalities related to: Operational Emergencies (Group 1), Personnel Safety and Health (Group 2), Nuclear Safety Basis (Group 3), Facility Status (Group 4), Environmental (Group 5), Contamination and Radiation Control (Group 6), Nuclear Explosive Safety (Group 7), Packaging and Transportation (P&T) (Group 8), Noncompliance Notifications (Group 9), and Management Concerns (Group 10).

In addition, INL reported sixteen events and conditions through Initial Notification Reports (INRs) and INL's local issues tracking software (LabWay) that did not meet ORPS reporting thresholds.

TREND SNAPSHOT

Occurrences by Facility: During the reporting quarter, ATR saw a significant increase in the number of events reported while CFA saw a slight increase. ATR was in a reactor turnaround and 62% of the events reported at ATR this quarter were associated with performance degradation of a Safety Class Safety Significant Component when the equipment is not required to be operable. This trend is not unexpected.

Occurrence Reports by Facility

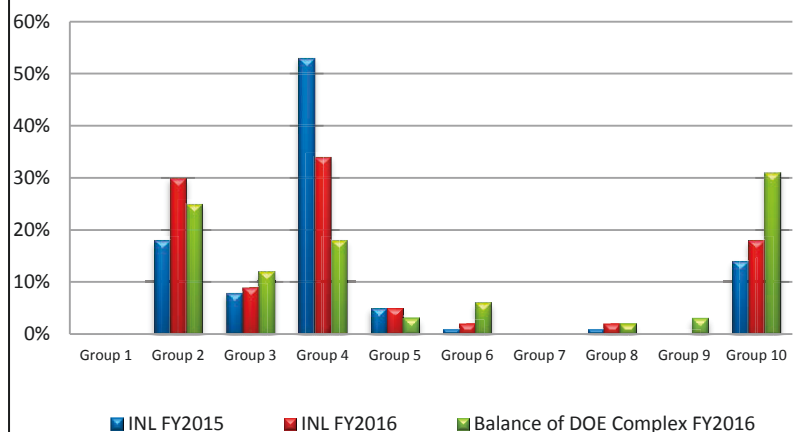


TREND SNAPSHOT

Occurrences by Reporting Criteria:

During the 3rd Qtr FY-16, INL has experienced the majority of events related to: Group 2, Personnel Safety and Health (30%); Group 4, Facility Status (34%); and Group 10, Management Concerns (18%). Comparative analysis to the balance of the DOE complex is shown in the chart to the right and is explained in each section of the report that follows. So far in FY-16, INL is closely mirroring reporting across the DOE Complex. The balance of the DOE Complex reports the majority of events in Group 2 (27%) Group 10, Management Concerns (27%), and Group 4 (20%).

Occurrence by Reporting Criteria



found no contamination of personnel or office space and the package was stored properly.

Some issues identified during the investigation into the contamination included:

- It was determined that an error on behalf of the senders shipping department resulted in the package inheriting incorrect shipping information. INL was not the intended recipient.

What We Can Learn:

While the employees of INL responded appropriately in this instance, reemphasis of the following is important:

- Hazards can originate from routine and otherwise benign sources.
- Proper hazard response is key to mitigating risk.
- Hazard response can be as simple as notification of appropriate personnel.
- Personnel related to hazard response must remain cognizant of their roles and responsibilities.
- General employees must remain mindful of the appropriate emergency contacts.

Pinched Power Cord

Lesson 2016-0017

A researcher was switching a glove-box from catalyst regeneration mode to normal operation. The researcher opened a ball valve on the back side of the glove-box to put the re-circulation blower back in-line. When the researcher opened the ball valve, the valve pinched a 115V electrical cord that had been draped over the valve. The power cord was plugged into a 115 V 20 amp circuit supplying power to an environmental testing chamber (i.e. oven). The pinching of the electrical cord caused an internal short in the cord which subsequently tripped the circuit breaker. The researcher was not injured nor did he receive an electrical shock.

The cause of this event was the unintentional placement of the power cord over a ball valve located on the back side of the glove-box. The glove-box had been in operation for months before the environmental chamber was installed on a bench behind the glove-box. After the installation, the power cord to the chamber was coiled up on the floor next to glove-box and posed a potential tripping hazard. A quick fix to the tripping hazard was to drape the excess cord over the ball valve located on the rear of the glove-box. Draping the cord over the ball valve eliminated the tripping hazard, but in doing so unintentionally created another hazard. The power cord was positioned out of sight and when the researcher turned the ball valve, the power cord was pinched which

caused an internal short and tripped the circuit breaker. Since the glove-box had been operational months before the environmental chamber was installed the researcher did not notice the new cord had been draped across the ball valve before turning it.

What We Can Learn:

This near miss highlights the need to maintain situational awareness and pay attention to detail. The simple act of moving a piece of equipment, plugging in the power cord, and hiding the excess cord led to an interference of another instrument. Installation or relocation of equipment is an ongoing occurrence inside a laboratory. Researchers must remain vigilant in assessing how nearby equipment installation affects the operation of existing equipment. During installation of equipment wrap excess cords with Velcro or zip-ties so they cannot be physically damaged. Inspect areas and look for hidden hazards prior to performing routine tasks. Look for potential pinch points. Inspect the area surrounding equipment prior to each use. Laboratory management needs to encourage and foster a working environment where a questioning attitude is the norm and researchers have a healthy respect for what can go wrong.

INL Engine and Ambulance Vehicle Accident

Lesson 2016-0019

On March 15, 2016 at approximately 1245 hours, an engine company consisting of five firefighters and two apparatus – a fire engine and ambulance - deployed from the Central Facilities Area (CFA) Station 1 northbound on Lincoln road for a routine facility tour. The engine was leading



with the ambulance following. While following the engine, the ambulance driver observed a coyote approaching the roadway from the east (right side of the road). The ambulance driver observed the coyote run in front of the engine causing the ambulance driver to momentarily remove his foot from the accelerator pedal anticipating the engine might need to break to prevent colliding with the coyote.

After observing the coyote successfully cross the road, and not seeing any brake lights from the engine, the ambulance driver re-engaged the accelerator pedal but did not visually

verify his following distance from the engine. The ambulance driver diverted his attention momentarily to the coyote and when he looked back to the roadway, there was no longer enough following distance to avoid a collision with the engine. The ambulance driver, traveling at 60 MPH, simultaneously swerved left, forcefully applied the foot brake, and collided into the rear driver's side of the engine with the front passenger side of the ambulance.

Some issues identified during the investigation into the accident included:

- The fire engine driver rapidly reduced his traveling speed to 20-25 MPH in a posted 65 MPH zone.
- The ambulance driver's attention became distracted by the animal and did not recognize that the engine had slowed significantly, creating an unsafe following distance.
- The auxiliary engine brake did not illuminate rear brake lights to signal deceleration of the fire engine.

What We Can Learn:

- Seat belts save lives and must always be worn – all personnel involved in this accident were wearing seatbelts.
- Identify, discuss and focus personnel's attention on the critical steps necessary to avoid unrecoverable error(s).
- Maintain situational awareness at all times – don't become distracted by wildlife.
- Proper following distances should be maintained and increased up to 600-ft for heavier vehicles requiring increased stopping distance.
- Brake lights on fire apparatus produced prior to 2009 do not typically illuminate when the auxiliary engine brake is engaged (ref. NFPA 1901).
- Driver/operator training should incorporate skills for managing wildlife hazards and other distractions and consider the use of driving simulators to reinforce desired behaviors.
- Never swerve to avoid wildlife in the road – swerving can confuse the wildlife, lead to collisions with other vehicles, cause the car to leave the roadway and greatly increase the chances of injuries.
- If wildlife is seen, do not slow excessively or stop/pause in the roadway if the animal does not pose an immediate threat to safety.
- If at any time drivers feel the need to slow down for a road hazard, including wildlife, consider turning on hazard signals to warn other motorists.

Facility Ventilation Modifications Testing Cause Overheating of Sock Filters

Lesson 2016-0020

Upon partial completion of the Zero Power Physics Reactor (ZPPR) facility ventilation modifications at the Materials and Fuels Complex (MFC), the contractor performing the modifications energized the facility supply fans and heater element for testing. The supply system had been shut down for approximately five months. It was discussed in the job briefing that odors or smoke may be detected during the test. Moments after startup, strong odors and



more smoke than expected were released into the ZPPR workroom. The supply fans and heater were secured immediately and all personnel relocated to the ZPPR control room to discuss what had just happened. Two individuals expressed difficulty breathing and were taken to MFC medical then to Central Facilities Area for further evaluation. They were cleared and returned to work without restrictions. It was determined later that the sock filters downstream of the supply fan and heater had melted from the excess heat.

Some issues identified during the investigation into the incident included:

- Personnel were unaware that the heater would immediately ramp up to 100%.
- During the original design of the system the heater control logic was not programmed by the subcontractor to prevent the heater from immediately ramping up to 100%.

What We Can Learn:

A number of things can be learned from this event.

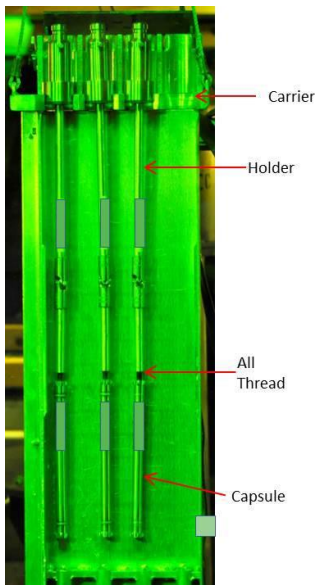
- Even though the facility fire alarm did not activate, there was enough smoke to present a potential health hazard to the employees. Personnel must respond properly to the situation presented and not only to an alarm condition.
- A hidden system response occurred when the heater ramped up to full power rather than ramping up in smaller increments.

Fuel Capsule Unthreads from Fixture during Neutron Radiography

Lesson 2016-0024

On March 23, 2016, at the Material and Fuels Complex (MFC) Hot Fuels Examination Facility (HFEF) Neutron Radiography Reactor (NRAD), while developing film a worker discovered that one of three fuel capsules had come loose from the mount. The capsule became balanced on a fixture 18 feet down a 29 foot remotely operated neutron radiography elevator shaft. Retrieving the pin remotely was not a viable option.

The capsules were threaded onto a holder for positioning in the NRAD neutron beamline. The elevator was lowered to the beamline when the vibration during travel caused the capsule to unthread from the holder and drop onto the carrier.



Facility management determined that recovery of the capsule by raising the elevator was the only course of action. However, doing so could cause the capsule to fall resulting in damage and possible loss of data to an expensive experiment.

With a little luck and two experienced process operators, the capsule was raised successfully. The other two capsules were removed from the carrier and were also found to be loose.

Some of the issues identified during the analysis of the event include:

- The use of the threaded holder without secondary containment or fastening did not provide a backup in case the threads became disengaged. The risk of using the threaded holder method without secondary containment or fastening was discussed in the planning meeting, but the holder design was not changed.
- The capsules were threaded onto the holders until tight, rather than counting complete turns of the capsule to confirm the number of threads engaged.
- The effect of vibration on the system was not given adequate consideration.

- A prototype holder design was tested with each capsule, the threads held successfully. The actual holders used differed slightly from the prototype.
- After the first neutron radiograph, the capsules were checked to see if they were still tight; however, they were discovered to be loose. This was an opportunity to call "Time Out." The capsules were retightened and lowered into position for the second radiograph. It was during this evolution of lowering the elevator when the capsule came off the holder.

What We Can Learn:

- Ensure that concerns are voiced, understood, and addressed before continuing on with the job.
- Exercise "Time Out or Stop Work" authority when things don't feel right.
- Do not succumb to real or perceived schedule pressure. Take the time to mitigate risk properly.

Inadequate LOTO Results in Hand Injury

Lesson 2016-0028

A subcontracted mechanic received an injury to the ring finger on his right hand while performing work on a Heating Ventilating and Air Conditioning (HVAC) Unit at the Energy Innovation Laboratory (EIL). The accident occurred at approximately 1530 hours on June 15, 2016. The mechanic had performed a lockout/tagout (LOTO) on the Variable Frequency Drive (VFD) disconnect for Air Handling Unit (AHU) number 5, observed the system's return fan slow to a stop and observed the lack of digital display on the fan operating panel.



The mechanic then completed zero energy checks by attempting to start the fan. When the equipment was verified to not start, the mechanic removed the safety guard from the belt and pulleys and turned around to set the guard on the ground. While the mechanic's back was toward the HVAC unit, the fan began to rotate; the rotation was not

noticed by the mechanic. The mechanic reached behind him and, attempting to use the belt as leverage to stand upright, he rested his right hand on the belt. This action coupled with the fan rotation resulted in the mechanic's hand being drawn into the rear fan pulley and becoming caught between the belt and pulley. The result was a traumatic injury to the mechanic's hand.

Following the event, INL Facilities and Site Services (F&SS) personnel attempted to replicate the event to determine if the fan started moving due to air flow cause by fluctuations of outdoor wind speed, because of building pressure differentials, or because of an inadequate LOTO. During replication, work was performed in the exact manner as it had been done on the day of the event. F&SS learned that approximately 2 ½ minutes following re-energization of the AH-5 supply fan, the return fan began to slowly rotate, gradually picking up speed. Although the return fan was tagged out of service, the building HVAC control system sensed the need to cycle the supply fan which in turn resulted in movement in the return fan due to building pressure changes. This scenario was repeated several times and each time, return fan began rotating approximately 2 ½ minutes after energy was restored to the supply fan.

What We Can Learn:

- This event emphasizes the importance of identifying all the hazards of an activity, and appropriately implementing controls for those hazards.
- Determine the optimum safe methods to identify, isolate and mitigate all potentially hazardous energy (electrical and mechanical) associated with moving parts. Assure the work planning and job hazards analysis incorporates these methods.

Gang Locking Device Disengages from Lockbox

Lesson 2016-0015

While a worker was applying a personal lock and tag to a multi-person locking device (commonly called gang locking devices), the locking device became disengaged from the lockbox. Upon further examination, it was observed that this was a new gang locking device that appeared to have weaker hasp arms than the devices regularly used at the facility. The weaker hasp arms allowed a sufficient enough gap that the lock could become disengaged easily.

As required by facility procedure, the lockout/tagout Facility Area Supervisor (FAS) accompanied the installation and was a witness to the event. No work had been started under the

lockout/tagout, and there was no loss of exclusive control of the isolation.



The FAS re-established the lockout/tagout with a gang locking device that has been used previously that does not have this issue. An extensive

search of the facility identified only one other similar device, not in use, which was also removed from service. The device in question does not have any manufacturing information other than the name ABUS stamped on the hasp. Through investigation it appears to be, or is similar to, an ABUS Mechanical 752 Aluminum Lockout Hasp Big 38mm (1.5in).

What We Can Learn:

The simplicity of a device or tool, or our familiarity with it, should not preclude a thorough examination, prior to use, to ensure that it will perform its intended function. This is especially true when dealing with items related to safety.

Attachment to Drill Socket Causes Severe Finger Trauma

Lesson 2016-0026

An Advanced Test Rector (ATR) maintenance mechanic received a traumatic injury to his left middle finger while working in a contaminated area in the ATR Safety Rod Drive Corridor.

The injury required surgery and resulted in the partial loss of the finger. The mechanic was operating a



pole hoist powered by a portable 18 volt battery operated drill equipped with a modified ½ inch socket. While operating the drill, M1's finger became entangled in a wire rope lanyard that had been attached to the socket. The entanglement resulted in severe trauma to the mechanic's finger.

The lanyard had been added to the socket to prevent it from becoming lost. Although many people identified a hazard associated with the lanyard, none identified the entanglement hazard and as such did not recognize the risk to safety the lanyard posed.

What We Can Learn:

- Additional attention is needed when working with rotating tools/equipment.
- Perform an extent of condition in your work areas. If any modified tools are found, evaluate and take out of service if unmitigated hazards are present or if modifications have negatively compromised the tool(s).
- Equipment must be used per manufacturer's instructions and be maintained in a safe condition. When modifications are needed, they must be evaluated, and approved to ensure hazards are fully mitigated.

Mislabeled DOT Shipping Container Inadvertently Shipped

Lesson 2016-0013

On November 17, 2015 Department of Transportation (DOT) drum labeled as radioactive was delivered to the Central Facilities Area (CFA) Property Disposal Warehouse. A radiological control technician noticed the radioactive label during his survey of the delivery. The drum had been identified and cataloged for excess and the radiological label had been covered by a piece of paper prior to shipping from the highbay of building IF-603 on September 25, 2015. During transit, the paper covering the radiological label had come off.

Some issues discovered during the investigation include:

- The radioactive label was covered by a piece of paper taped to the drum in question.
- There were no labels or markings showing the drum had been surveyed as "free release" even though it had been surveyed months prior.
- Project personnel were not properly disposing of items when a project/program came to an end; or when items were no longer required.
- Operations and excess personnel did not understand the significance of drum types or the relevance of markings.
- There is currently no process to identify if a drum has been surveyed as "free release."

What We Can Learn:

- Ensure a process is in place that personnel can follow that requires drums no longer being used for radioactive material are surveyed as "free release". This should require radiological control personnel to place a label on the drum to identify that a survey was completed and the date the survey was performed.
- Project personnel need to be aware and understand the process to dispose of materials at the completion of their project/program or when those items are no longer needed.

Personnel Performing Work in an Electrical Control Panel without Proper Hazard Mitigation

Lesson 2016-0013

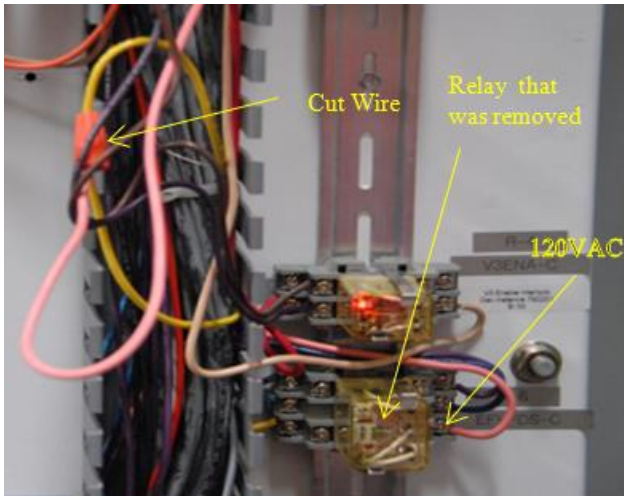
Facility personnel were performing a configuration control inspection of the Space and Security Power Systems Facility (SSPSF) exhaust system control panel. Drawing discrepancies had been noted based on recent activities and personnel were attempting to verify configuration of the panel versus the documentation on the 'as built' drawing. This panel had been upgraded during the NORESKO Energy Savings Performance contract and had been labeled as having "No Exposed Electrical Hazards." After removing a raceway cover to trace the wiring, a conductor was discovered in the raceway with a frayed end that led back to a 24V relay (that appeared to be abandoned in place).

At this time, an Instrumentation & Calibration (I&C) technician entered the room while on another job. Operations personnel discussed the issue with the I&C technician. Personnel present felt that the frayed end should be removed and a wire nut installed. The I&C technician removed the 24V relay and cut off the frayed end of the wire, then re-installed the relay. Personnel then notified the facility Shift Supervisor (SS) of conditions and actions taken. The SS called a time out and notified facility management, knowing that this work had been performed outside of the approved work control for this activity. Subsequent inspection by facility management and the I&C technician revealed there was exposed 120VAC inside the cabinet. No voltage was on the cut wire.

What We Can Learn:

- Exercise Time Out/Stop Work when conditions are not as expected, ensure management is properly notified prior to taking actions, and ensure hazards are mitigated prior to proceeding.

- For panels that have previously been evaluated as <50 volts AC, trust but **VERIFY** the voltages are truly <50.
- The process for evaluating the operator access to electrical cabinets should be reviewed to determine if improvements are needed.



Electrical Fire in a Moveable Server Rack Cabinet

Lesson 2016-0013

On April 10, 2016, in University Boulevard Building 4, a fire occurred in a portable electronics cabinet with rack mounted server equipment installed. The fire self-extinguished after a short circuit caused the breakers to trip and available fuel was consumed. There was extensive fire damage to the wiring and server inside of the cabinet. External damage was limited to some melting of an adjacent PC case and charred surfaces on the cubicle wall. Both of these damaged items were in contact with the cabinet. Soot was found through-out the electronics laboratory and adjacent spaces.

The cause of the fire in the cabinet was the failure of a non-industrial fan that had been mounted inside the cabinet near the top to aid in heat removal from the equipment. The fan fell from its clip-mounted location to the bottom of the wires in the cabinet and overheated. The fan was intended to be clamped to a desk for personal use, not for cabinet installation. It did not have impedance or thermal protection.

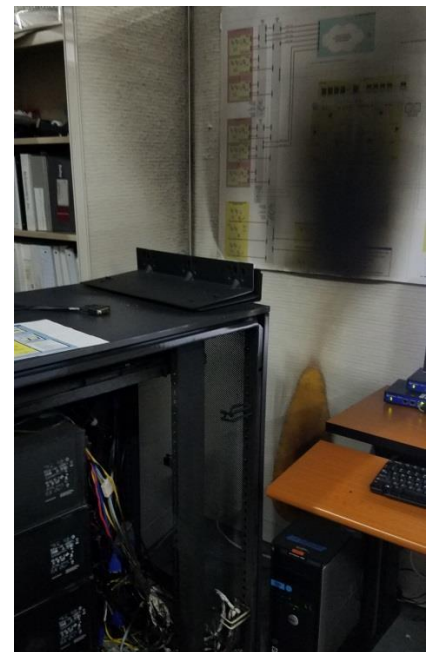
The cabinet was pushed against the wall completely blocking the ventilation path in the back of the cabinet. This contributed to the overheating leading to the fire. It also subjected the wall directly to the heat of the fire. The cabinet was designed to contain this type of fire without causing

significant damage outside the cabinet when proper spacing is maintained.

The two power distribution strips in the server cabinet were powered from two different power distribution strips in adjacent electronic cabinets. Although this condition did not contribute to this incident, this practice is not permitted by most manufacturers of these power strips. The “daisy chaining” can lead to excessive current loads and failure of surge protection systems to properly operate in fault conditions.

What We Can Learn:

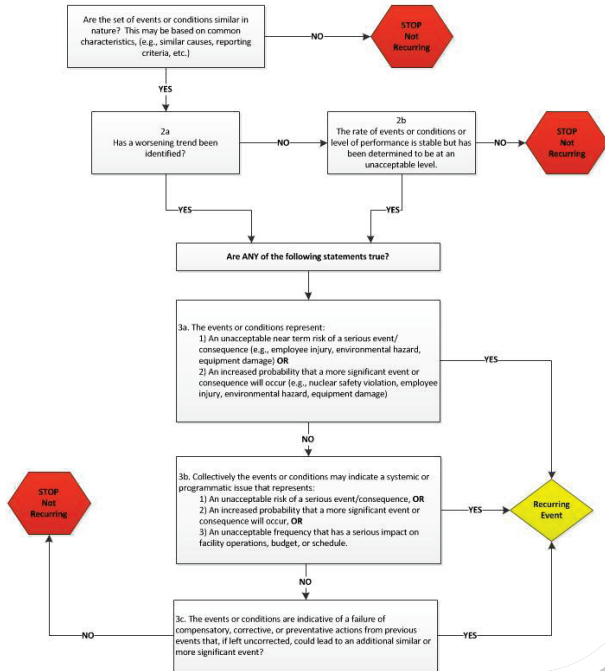
- Match equipment with its intended purpose. Fans installed in electronic equipment or other systems should be designed and listed for the intended purpose. They should also be sized for the expected load. Consideration should be given to thermal and/or impedance protections systems.
- Maintain proper clearance around the electronic cabinets per the manufacturer’s recommendations and requirements.
- Plug power distribution strips and surge protection strips directly into a building receptacle. Do not use with an extension cord or “daisy chain” unless it is specifically evaluated by the electrical authority having jurisdiction or permitted by the manufacturer.



Attachment 1 Recurring Event Flowchart

Why discovered events, conditions, and increasing trends (see definitions) should be reviewed for potential categorization as an ORPS recurring event. Areas of stable performance should also be reviewed periodically to determine if the current level represents an acceptable risk, as determined by management. The analysis must include both reportable AND non-reportable events and conditions.

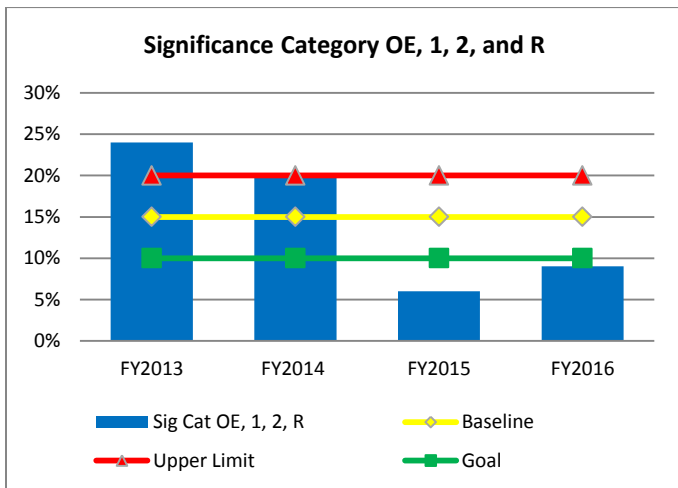
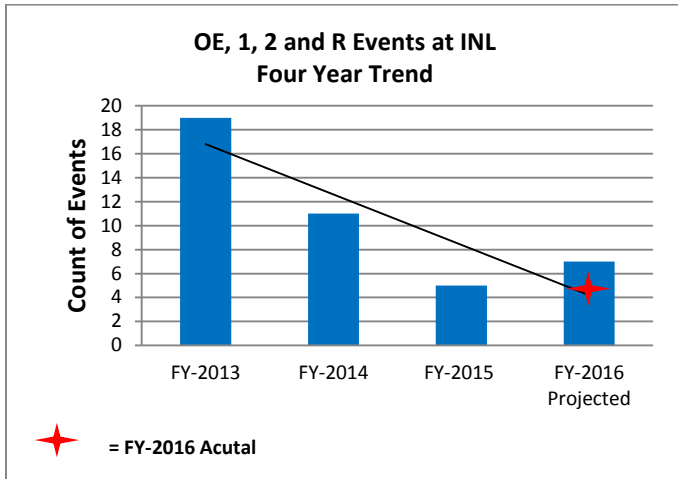
Ultimately the determination of whether a recurring event is warranted is a management decision. The answers in this flowchart can be used to present the logic of that determination to management and to external customers (DOE).



A review of recent operational performance data identified an increase in the occurrence of events containing an element of Hazardous Energy Control. Those events, binned under a discipline code of “Lockout/Tagout”, were used to trend performance since January of 2015. In 2015 there were three events reported. Of those three, one had an increased risk to personnel safety. Since January of 2016 there have been nine events reported and binned under Lockout/Tagout discipline codes. Four of these contain an element of increased risk to personnel.

Based on this cursory review it is apparent that a more detailed analysis is appropriate. Performance Management has assigned a Cause Analyst to lead a team that will review associated data. If the analysis identifies a recurring theme, then an ORPS Significance Category R event will be entered to capture the results of the analysis and the actions necessary to reverse the trend will be identified.

3rd Qtr FY-16 ANALYSIS OF PERFORMANCE COMPARED TO OTHER COMPLEX REPORTING



INL established a set of performance metrics to monitor events by their significance. The measures compare INL events to those reported at other facilities within the DOE complex. Baseline data was derived from complex-wide reporting of 5,630 events in the ORPS database between 2009 and August 2014. INL's goal is to experience a downward trend in the number of higher significant events including Significance Category OE, 1, 2, and R occurring at INL. INL's performance metrics are as follows:

Green: Less than 10% of the events reported at INL are OE, Sig Cat, 1, 2, or R; **Yellow:** Greater than 10% and less than 20% of the events reported at INL are OE, Sig Cat 1, 2, or R; and **Red:** Greater than 20% of the events reported at INL are

OE, Sig Cat, 1, 2, or R. Control Limits for Significance Category OE, 1, 2, and R events were set at +10% of baseline.

Additionally, INL monitors events by significance category to determine if INL reporting is consistent with reporting at other DOE facilities.

As shown in the first chart to the left, INL is experiencing a downward trend in the number of higher significant events occurring at the INL over the past four years, with INL seeing fewer high significant events than reported last fiscal year. So far during FY-16, there have been five events reported as Sig Cat OE, 1, 2 or R. All five were significance category 2 events; one was the result of a positive un-reviewed safety question concerning loop flow reduction due to loss of commercial power at the ATR and one a criticality safety violation that occurred at the FCF when the total fissile mass limit in a fuel bottle container was exceeded.

Three that occurred this quarter were associated with a Technical Safety Requirement Administrative Control violation at ATR, inadequate assumptions made in engineering calculations associated with a transport plan at MFC, and a hand injury that occurred on the Science and Technology Campus due to an inadequate lockout/tagout. If the rate of occurrence continues throughout the balance of the fiscal year, INL will experience more higher significant events than were reported last fiscal year.

During FY-13 and FY-14, INL reported a greater percentage of higher significant events as compared to other DOE facilities (see second chart). However, this rate has steadily decreased and INL continues to meet its goal of less than 10% of events reported as high significant. So far in FY-16, 9% of all reportable events at INL were of higher significance.

Additionally, 38% of events reported at INL during FY-16 are Significance Category 3. This is slightly below the complex baseline average of 43%. And, 53% were Significance Category 4 (higher than the complex baseline of 42%).

Analysis on how INL measures up to the balance of the complex in each of the reporting criteria groups is provided throughout this report.

3rd Qtr FY-16 GROUP 1 – OPERATIONAL EMERGENCIES

There were no operational emergencies reported during the 3rd quarter of FY-16. The last operational emergency at INL was reported in April 2012, when boron trifluoride gas leaked from a neutron detector (NE-ID-BEA-INLLABS-2012-0003). The rate of occurrences of operational emergencies continues to trend at zero.

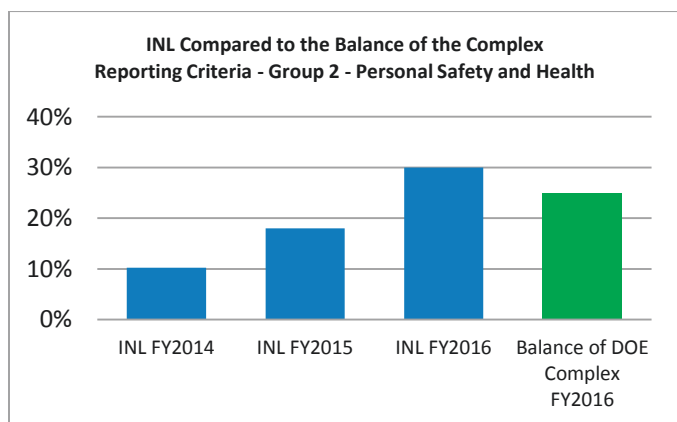
When compared to the balance of the DOE complex, the rate of occurrence of these types of events at INL is consistent with those reported elsewhere. So far in FY-16, two Operational Emergencies were reported throughout the DOE Complex, equating to roughly 0.2% of the total events reported.

3rd Qtr FY-16 GROUP 2 – PERSONNEL SAFETY AND HEALTH

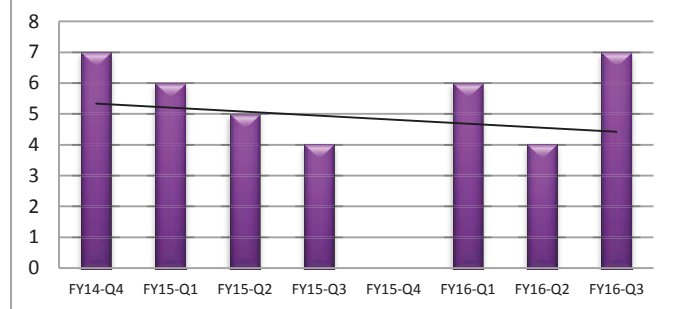
TREND SNAPSHOT

Personnel Safety and Health Events: During the 3rd Qtr FY-16, there were seven reportable events related to personnel safety and health (e.g., occupational injuries, occupational exposures, fires, explosions, or hazardous energy). In addition, four events were reported via INRs or directly into LabWay that did not meet the ORPS thresholds but were related to criteria in this reporting group. The rate of occurrence of reportable personnel safety and health events continues to trend slightly downward over the last two years.

When compared to the balance of the DOE complex, the rate of occurrence of Group 2 events at INL was higher than that reported elsewhere in the complex during FY-16. INL reported 30% of events in this reporting group and the balance of the complex 25%. INL saw a 75% increase in the occurrence of Group 2 events during this quarter.



Group 2 - Personal Safety and Health



The events (reportable and non-reportable) during the 3rd Qtr FY-16 are summarized below:

Power Discovered in TRA-614 Due to Inadequate Lockout/Tagout

NE-ID--BEA-ATR-2016-0007 (Significance Category 3)
On April 15 2016, the ATR Shift Supervisor was notified by an ATR Complex facilities building manager that power had been found in a power panel that was thought to be de-energized in building TRA-614. A scheduled electrical preventive maintenance (PM) outage was in progress in the ATR Complex utility area at the time of discovery.

The lockout/tagout (LOTO) for the work was in place and zero energy checks had been completed. The work group had accepted the LOTO however, work in the panel had not yet begun. As a result, no personnel were exposed to hazardous energy. Discovery was made during a final safety check prior to accessing the panel. The Shift Supervisor ordered all work under the LOTO halted, and verified that the facility was in a safe condition.

Work was immediately stopped and a plan was developed to restore all affected systems (spare breakers had been removed from cubicles as part of the work) and clear the

LOTO until further investigation could be completed at a later date.

The investigation into this event found that two persons responsible for preparing the LOTO failed to verify the accuracy of information provided by others. The person providing the information had extensive electrical experience and too much trust was given to the review performed by this individual. Additionally, two other problems were noted: planning of the LOTO was not done using the work order; and drawings were not up to date.

What We Can Learn:

This issue shows the importance of thorough analyses or reviews. It is imperative to not rely solely on existing data. The use of Conduct of Operations and Human Performance tools, such as self-checking and peer-checking, should be utilized to achieve successful generation and issuance of critical documents.

Personnel should also know that there is no more valuable information than physical evidence. Work planning should take place in the field reviewing the actual configuration of equipment. Supporting information such as tribal knowledge, expert advice, drawings, should be used to validate the actual in plant configurations.

Lockout/Tagout Tags Hung on Incorrect Components

NE-ID--BEA-ATR-2016-0008 (Significance Category 4)

On April 14, 2016, a LOTO device was damaged during breaker upgrade work. The electrician stopped work and guarded the component until the LOTO device could be replaced per LWP-9400, Lockout and Tagout Procedure. The following day, the ATR Shift Supervisor was notified of an error on the LOTO for breaker upgrade in the ATR switchgear room.

Investigation revealed that during replacement of the damaged locking device, the tags were hung on the incorrect components. Locking devices were installed on the correct equipment, but the danger tags had been switched between the two breaker cubicles.

The circuit breakers had been removed from the cubicles during the initial installation of the tagouts, and no personnel were exposed to hazardous energy. The Shift Supervisor ordered all work under the affected LOTOs halted, and verified that the facility was in a safe condition.

What We Can Learn:

- Attention to detail is paramount to ensuring safety in the workplace
- The use of Human Performance Improvement (HPI) tools such as checklists and peer checking are essential to performing work safely.

Personnel Injury at the Advanced Test Reactor Results in Partial Loss of Finger

NE-ID--BEA-ATR-2016-0019 (Significance Category 3)

As described in Lesson 2016-0026, an ATR maintenance mechanic received a traumatic injury to his left middle finger while working in a contaminated area in the ATR Safety Rod Drive Corridor. The injury required surgery and resulted in the partial loss of the finger. The mechanic was operating a pole hoist powered by a portable 18 volt battery operated drill equipped with a modified ½ inch socket.

While operating the drill, M1's finger became entangled in a wire rope lanyard that had been attached to the socket. The entanglement resulted in the severe trauma to the mechanic's finger. A photograph of the pole hoist showing how the socket was attached with the lanyard is shown above.



Electrical Switch Fails during Walkdown Evaluation

NE-ID--BEA-MFC-2016-0015 (Significance Category 3)

While performing a walkdown of an electrical system to



support remodeling of a conference room in Building 752 at the Materials and Fuels Complex

(MFC), the Building Supervisor opened an electrical panel so that Engineering could evaluate the panel internals. When the Building Supervisor closed the panel door, he observed a spark. The Building Supervisor immediately tagged out the panel and barricaded the area.

After a lockout/tagout of the panel was in place, further investigation identified that the spark came from the internals of the switch mounted on the panel door. The investigation found that the rocker switch mounted on the front of the enclosure is connected to a bus bar inside the closure. When the door is opened, the wires are of sufficient length to allow the door to be opened, yet remain connected to the rocker switch. Over time, the wires had come loose allowing them to come in contact with the grounded frame of the panel. The contact created the spark observed by the Building Supervisor and resulted in a tripped breaker.

Lockout Tagout On Escalator Repairs

NE-ID--BEA-STC-2016-0003 (Significance Category 4)

On June 13, 2016, a step back was initiated on escalator repairs at the Willow Creek Building at the Idaho National Laboratory due to inadequate documentation of hazard mitigation (blocking device).

Subcontract technicians were repairing the escalators under a simple electrical LOTO. In order to access the area under the escalators to perform the repairs, the workers also had to



remove a number of the escalator treads. The subcontract workers applied a come-along to block potential unexpected movement of the escalator, as required when removing more

than 6 treads. The subcontract workers were not aware that adding a blocking device to address an additional hazard other than the electrical hazard addressed in the simple LOTO required initiating a complex LOTO. The requirement that, if more than six treads were removed, a complex LOTO would be needed had not been addressed in the JSA or the pre-job brief.

The Facility Area Supervisor (FAS) had been called away briefly and when he returned he immediately recognized the change in status. The FAS initiated a step back and consulted the LOTO subject matter expert for evaluation of the situation. Management and DOE-ID representatives were notified.

What We Can Learn:

It is important to be cognizant of changes that occur during performance of work and how these changes may impact or challenge the hazard controls that are in place.

Inadequate LOTO Determination Results in Hand Injury

NE-ID--BEA-STC-2016-0004 (Significance Category 2)

As previously described in Lessons Learned 2016-0028, a subcontracted mechanic received an injury to the ring finger on his right hand while performing work on a HVAC Unit at the EIL.



What We Can Learn:

F&SS management brought together operations managers, system engineers, subcontractors and subject matter experts to discuss this event and hazard mitigation for windmilling when performing fan maintenance. The consensus of the meeting was that each fan system and maintenance activity is unique and needs to be evaluated. The results of the evaluation should be incorporated in the work control documents to ensure potential energy sources are adequately controlled.

Cracked Insulation Found on 120 Volt Cables

NE-ID--BEA-TREAT-2016-0002 (Significance Category 3)

Insulation on two 120 volt (V) wires on Transient Reactor Test (TREAT) facility diesel generator block heaters was discovered to be cracked. While no energized conductors were accessible in the as found condition, the wires could be bent allowing the energized conductors to be exposed.

An apparent cause analysis was used to identify the cause of the reportable condition. Upon inspection, the cable insulation was found to be degraded. This degradation was determined to be the result of the age of the equipment.

An extent of conditions walk down was performed by facility management. No additional cracked insulation was found.

What We Can Learn:

It is important to frequently inspect equipment and work areas for hidden hazards such as degraded equipment prior to performing routine tasks.

Other Non-Reportable Events

There were four additional non-reportable events related to safety and health problems documented in LabWay during the 3rd Qtr FY-16.

CO 2016-1018

On April 6, 2016, during a tour of the ATR by Idaho State University's "Friends for Learning Organization," a tour member momentarily passed out resulting in the tour member striking his head on the ground. The visitor received immediate and appropriate medical attention by trained personnel at the ATR, i.e., an Automated External Defibrillator (AED) was applied to monitor his heart. The visitor remained lucid and communicative and was transported by ambulance to the Central Facility Area (CFA) Medical Facility for further evaluation.

What We Can Learn:

Prompt action by trained personnel can be invaluable in situations where medical emergencies arise. Luckily in this event, the visitor did not need emergency treatment, but treatment was available if the need arose.

SMC-CO 2016-0072

While a worker was applying a personal lock and tag to a multi-person locking device (commonly called gang locking devices), the locking device became disengaged from the lockbox. Details of this event have already been discussed in Lessons Learned 2016-0015.

CO 2016-1348

On May 11, 2016, an Assistant Manager at ATR was notified that a LOTO device became detached from a circuit breaker. The LOTO had been installed to support maintenance of an air handling unit at the TRA-1627 Radioanalytical Chemistry Laboratory (RACL). The tagout had been checked by several work group representatives (WGR); the last WGR was checking the tag when the locking device became detached from the breaker. Affected work groups were notified of the issue, no work was commenced, and the affected LOTO device was replaced per procedure LWP-9400, Lockouts and Tagouts.

What We Can Learn:

It is important to test the integrity of locking devices to ensure they perform to their intended functions.

CO 2016-1018

On May 24, 2016, maintenance personnel were working in the basement of the Hot Fuel Examination Facility (HFEF) at MFC when one of the workers moved a small table. The movement resulted in damage to an old electrical power strip that had been attached to the table. Work was immediately stopped. The area was guarded while management was notified.

It was determined that the pressure on the attached power cord caused the top of the power strip to separate from its back exposing the electrical components inside.

After discovery, one of the workers guarded the area to ensure others did not enter the area while the other worker left and notified the Shift Supervisor. After assessing the

failed power strip and the area around the power strip, the Shift Supervisor authorized unplugging the power strip which eliminated the electrical hazard. The power cord to the power strip was rendered unusable and disposed of.



What We Can Learn:

Prompt and appropriate action can minimize the chance of injury due to unforeseen hazards. Personnel immediately recognized the hazard of the exposed electrical components and moved away from the area.

ANALYSIS FOR RECURRING EVENTS:

Personnel Safety and Health occurrences have been the most frequently reported event type this fiscal year, accounting for 17 reportable events and 14 non-reportable events in the past 12 months. Three of the reportable events resulted in personnel injury; two from slips, trips, or falls and one reported this quarter at ATR that resulted in an employee losing part of his finger. None of the personnel injuries were found to be recurring or similar in nature to warrant reporting as a recurring event.

Seven of the events were the result of an unexpected discovery of an uncontrolled electrical hazardous energy and

seven related to failure to follow INL’s LOTO process. LOTO events will be analyzed through a common cause analysis scheduled to begin in August 2016. If commonalities are found that necessitate reporting as a recurring event, INL will do so and report as such next quarter.

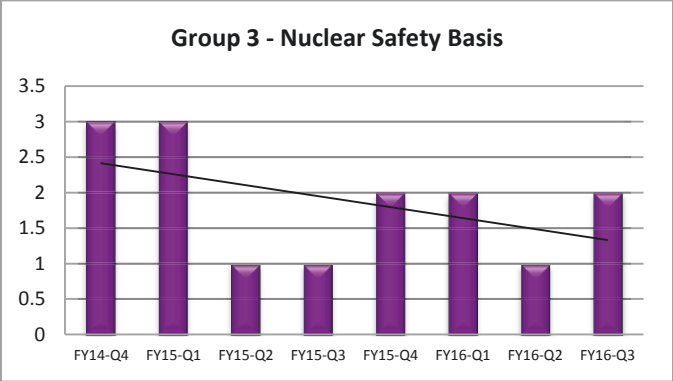
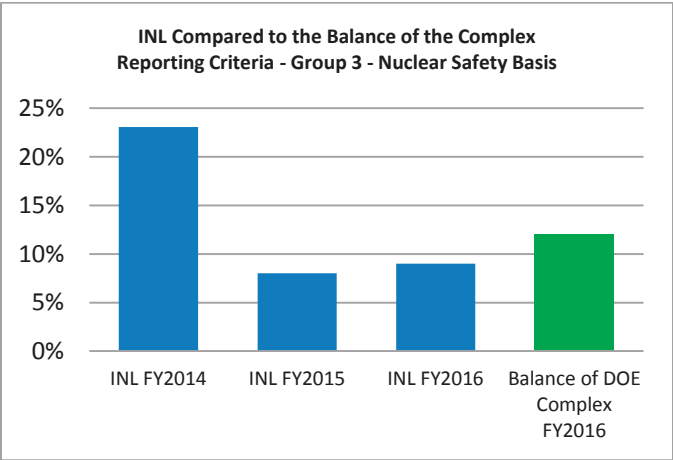
Analysis of the 14 non-reportable events that occurred in the past year found no recurring themes or problem of a similar nature.

3rd Qtr FY-16 GROUP 3 – NUCLEAR SAFETY BASIS EVENTS

TREND SNAPSHOT

Nuclear Safety Basis Events: Two nuclear safety basis events were reported in the 3rd Qtr FY-16. The rate of occurrence of nuclear safety basis events continues to tend downward over the past two years. During the past 12 months, seven events have been reported under this criteria; two were identified at ATR and five at MFC facilities. **An analysis of the events did not reveal any commonalities that would indicate a recurring trend or recurring events.**

When compared to the balance of the DOE complex, INL has reported a lower percentage of events under the Group 3 - Nuclear Safety Basis criteria than the rest of the complex. In FY-16, 9% of INL’s events and 12% of the balance of the DOE complex events were reported under Nuclear Safety Basis criteria.



The number of INL events reported under these criteria continues to trend downward over the last two years. In the 3rd Qtr FY-16, two Nuclear Safety Basis events were reported. These two events are summarized below.

Technical Safety Requirement (TSR) Administrative Control (AC) Violation at the Advanced Test Reactor

NE-ID--BEA-ATR-2016-0016 (Significance Category 2)
On May 24, 2016, the ATR Operations Assistant Manager was notified by the ATR Operations Training manager that four ATR qualified operators (two certified Experiment Operators, and two qualified Basic Experiment Operators) had their qualification checklists signed by an individual whose On-the-Job-Training (OJT) instructor qualification had expired two years earlier. ATR management removed the affected operators’ qualifications and determined that a violation of TSR-186, Specific Administrative Requirement 5.3.2.1 had

occurred. TSR-186 AC-5.3.2.1 requires "An Experiment Operator (EO) shall be in the vicinity of the loop control consoles to act on alarms." ATR management immediately removed the affected operators from the Qualified Watch Relief roster; however, the technical ability of the affected individuals to safely operate the Experiment Loops was not in question nor was the safety of the ATR in jeopardy at any time.

What We Can Learn:

This event demonstrates the need to ensure that persons performing training are qualified to do so. Just because someone is qualified to do the work, does not necessarily mean they are also qualified to train people to perform the work.

Inadequate Assumptions Derived in Engineering Calculation and Analysis Report (ECAR)

NE-ID--BEA-MFC-2016-0004 (Significance Category 2)
While evaluating plan (PLN) 3243, "Transport Plan for the Transfer of Material between MFC and the AMWTP," for the ability to expand the transport scope to add the ATR Complex as an originating facility, concerns about the adequacy of the derived Technical Safety Requirements (TSR) controls to protect the assumptions of the accident analysis and potential consequence from an engulfing fire event were raised by Nuclear Safety Engineering.

This transport plan (a) describes the transport of containers (that is, 55 gallon and 85 gallon U. S. Department of Transportation [DOT] Specification 7A Type A containers) between the Materials and Fuels Complex (MFC) and the Advanced Mixed Waste Treatment Project (AMWTP), and (b) demonstrates equivalent safety for these transport activities

to the Department of Transportation (DOT) Hazardous Materials Regulations (HMR) required by Department of Energy (DOE) Order 460.1, "Packaging and Transportation Safety," and Title 10, Part 830, "Nuclear Safety Management," Subpart B, "Safety Basis Requirements," of the Code of Federal Regulations (CFR)s.

An unreviewed safety question (USQ) evaluation was completed and was found to be positive. The USQ found that while evaluating potential payload configurations that would fall within the limits set forth in PLN-3243 a possible configuration, that complies with the limits but could exceed the estimated dose consequence, was postulated. This resulted in concerns that certain assumptions in the ECAR analysis might not be representative of actual shipping configurations or might not be adequately protected in the derived controls.

What We Can Learn:

This event underscores the need for periodic and rigorous review of analysis contained in safety basis documents. Fresh sets of eyes sometimes identify situations that were not considered when the safety analysis was first performed.

Other Non-Reportable Events

There were no additional non-reportable events related to nuclear safety basis problems documented in LabWay during the 3rd Qtr FY-16.

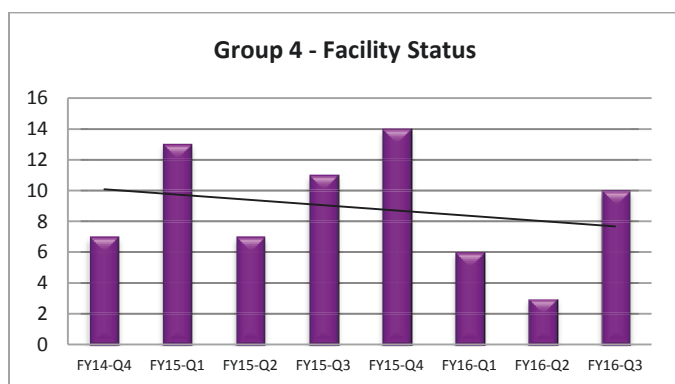
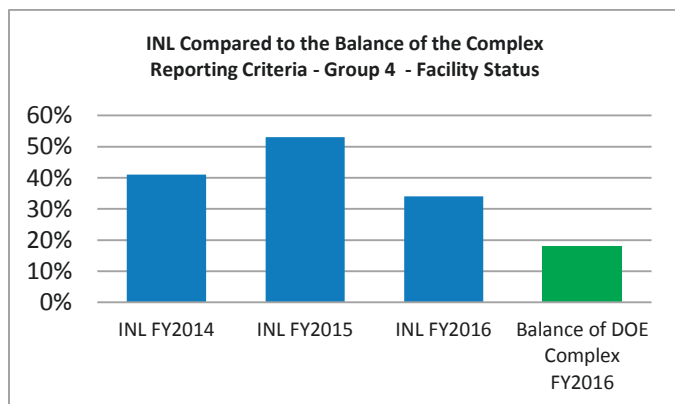
ANALYSIS FOR RECURRING EVENTS:

Analysis of the seven events reported under the nuclear safety basis criteria over the past year revealed no commonalities or recurring themes.

TREND SNAPSHOT

Facility Status Events: Facility status events account for 34% of the events reported in FY-16. The number of events reported under this criteria increased from last quarter (3 to 10). The rate of occurrence of facility status events is trending downward over the past two years. Eight of the 10 events this quarter occurred at ATR and all were related to performance degradation of Safety Class (SC) or Safety Significant (SS) Structure System or Component (SSC) when the system was not required to be in service. Thirty-three events have been reported at the INL under the Group 4 reporting criteria over the past 12 months; 29 of which occurred at ATR.

The percentage of occurrence of Group 4 – Facility Status events at INL is higher than that of the balance of the DOE Complex (34% at INL vs 18% throughout the complex). Sixty seven percent of the Group 4 events in the past 12 months have been reported as performance degradation of a safety class Structure, System or Component (SSC) when it was not required to be in service; all of which occurred at ATR. These events have been anticipated and have occurred during reactor shutdown with most occurring during testing of equipment for restart.



The ten events reported under the Group 4 – Facility Status criteria during the 3rd Qtr FY-16, are summarized below.

Advanced Test Reactor Plant Protective System State of Charge Instrument Failure

NE-ID--BEA-ATR-2016-0009 (Significance Category 4)
On April 19, 2016, the ATR Senior Reactor Auxiliary Operator (SRAO) discovered the State of Charge (SOC) indicator for Plant Protective System (PPS) Channel D battery bank was indicating an error. The SRAO notified his supervision and made appropriate log book entries. The ATR Shift Supervisor (SS) directed the SRAO to investigate the system and report any problems found. No cause for the error could be located.

Later that day, the SS was notified by the system engineer that SOC was indicating errors due to loss of power. The PPS channel D battery bank was declared out-of-service and a request for maintenance was initiated. The ATR was shut down and defueled and the PPS channel D battery was not required to be operational at the time of this event.

Advanced Test Reactor N-16 Beta Chamber Valve Failure

NE-ID--BEA-ATR-2016-0010 (Significance Category 4)
While performing a valve lineup in preparation for startup of the ATR N-16 system, an ATR Reactor Auxiliary Operator (RAO) attempted to open valve GB-18-90 (NE N-16 Beta chamber inlet valve) when the valve stem and packing nut separated from the valve body. Work on N-16 system startup preparations was halted and valves upstream and downstream of GB-18-90 were shut to ensure isolation.

The ATR was in a planned maintenance outage and the N-16 system was not required to be operable at the time of this event.

Advanced Test Reactor 688-M-1 Firewater Pump Place Out-of-Service

NE-ID--BEA-ATR-2016-0011 (Significance Category 4)

An ATR Utility Area Operator noted that the 688-M-1 Firewater Pump was displaying anomalous indications on the control panel screen (scrolling through various menus without any operator input). The ATR Shift Supervisor (SS) was notified of the unexpected condition and the SS declared the 688-M-1 Firewater Pump inoperable pending investigation and operability testing.

The ATR was in a planned maintenance outage at the time of failure and only one of the two firewater pumps (688-M-1 or 688-M-2) was required to be operable.

Advanced Test Reactor Confinement Door 43 Latch Failure

NE-ID--BEA-ATR-2016-0012 (Significance Category 4)

On May 2, 2016, the ATR Control Room Supervisor received a report that the latching mechanism on Door 43, a personnel door into the ATR Confinement area, was discovered to not be latching consistently. The ATR Shift Supervisor declared the confinement function of D-43 inoperable and requested maintenance support to repair the latch. The ATR was in a planned maintenance outage at the time of failure and the confinement system was not required to be operable.

Advanced Test Reactor Confinement Door 43 Latch Failure

NE-ID--BEA-ATR-2016-0013 (Significance Category 4)

On May 5, 2016, the ATR Shift Supervisor received a report that Door 43, a personnel door into the ATR confinement area, would not latch when closed. The ATR Shift Supervisor declared the confinement function of D-43 inoperable and requested maintenance support to repair the latch. The ATR was in a planned maintenance outage at the time of failure and the confinement system was not required to be operable.

Advanced Test Reactor Rod Clutch Coil Power Supply Failure

NE-ID--BEA-ATR-2016-0015 (Significance Category 4)

The ATR Control Room received a Rod Clutch Coil (RCC) Power Supply Over/Under Voltage alarm and a PPS Channel D alarm. Investigation revealed the presence of an acrid odor in the area of the RCC power supply cabinet. Both power

sources to the power supply cabinet were secured, and the RCC power supply was declared out-of-service (OOS).

Failed Reactor Data Acquisition System Voltage Standard at the Advanced Test Reactor

NE-ID--BEA-ATR-2016-0017 (Significance Category 4)

An ATR Shift Supervisor was notified by the Reactor Data Acquisition System (RDAS) engineer that the Programmable Voltage Standard for the RDAS computer system was showing indications of failure. Failure of this voltage standard would render the Lobe Power Calculating and Indicating System (LPCIS) unreliable. Reactor Instrument and Controls Technicians (RICT) replaced the failed voltage standard with a spare, and indications returned to normal. The ATR was in a scheduled reactor outage and the LPCIS was not required to be operable at the time of discovery.

Advanced Test Reactor Confinement Door 39 Closure Mechanism Failure

NE-ID--BEA-ATR-2016-0018 (Significance Category 4)

The ATR Shift Supervisor (SS) received a report that the automatic closure mechanism on D-39, a personnel door into the ATR confinement area, had failed. The ATR SS declared D-39 inoperable and requested maintenance support to repair the closure mechanism. The ATR was in a planned maintenance outage at the time of failure and the confinement system was not required to be operable.

Failed Electrical Wiring Causes Small Fire Resulting in Building Evacuation

NE-ID--BEA-MFC-2016-0006 (Significance Category 3)

On June 8, 2016, an employee at the Materials and Fuels Complex (MFC) observed a small flame on top of a refrigerator/freezer located in the MFC-752 cafeteria. The employee pulled the manual fire alarm triggering a building evacuation. The flame self-extinguished in approximately 20 seconds. The MFC Fire Department responded and assessed the area for additional hazards.

The direct cause of the fire was determined to be a short in the wiring on top of the refrigerator. The cause of the short could not be determined but was likely caused by overheating due to a failure of other components. MFC Maintenance personnel evaluated the wiring and maintenance history of the refrigerator and determined the wiring was factory installed, had not been modified, and that the refrigerator had received ongoing maintenance.

The refrigerator was over 20 years old and had experienced no significant problems during its lifespan.

Evacuation of the Zero Power Physics Reactor Workroom after Smoke Enters from Ventilation System

NE-ID--BEA-ZPPR-2016-0001 (Significance Category 3)
This event has already been discussed in Lessons Learned 2016-0020.

Other Non-Reportable Events

There were nine additional non-reportable event related to facility status reported during the 3rd Qtr FY-16.

CO-2016-1131

On April 19, 2016, the ATR control room received an Automatic Voice Announcement System (AVAS) notification of a fire department response and a water flow alarm in building TRA-634. Facility Incident Response Team (IRT) personnel responded to building TRA-634 to assist the fire department. No evidence of water flow or of fire was detected in building TRA-634. The fire suppression system in TRA-634 is a dry-pipe system. The building fire suppression system piping is maintained dry by an automatic valve controlled by air pressure within the piping. The air compressor which maintains the system supply valve in a shut position had failed. The cause of the water flow alarm was determined to be the opening of the supply control valve with subsequent filling of the piping system within the building.

CO-2016-1133

The Neutron Radiography Reactor (NRAD) had an automatic reactor SCRAM resulting from placing rod control in automatic with 300 watts selected as the desired power while the range selector switch was still in manual control in the 250 watt range. The regulating rod withdrew in automatic and an automatic SCRAM occurred at approximately 110% of indicated power (~275 watts). NRAD was operating to NRAD-OI-5140A at the time of the event. The event was categorized as not ORPS reportable because the SCRAM occurred at approximately 275 watts or approximately three orders of magnitude below the normal operating power of 250 kw, the event did not result in an adverse effect on safety.

CO-2016-1352

While evaluating upcoming modifications to the MFC central alarm system (CAS) MFC personnel identified that a continuous system surveillance capability had been disconnected during the 2012 fire panel upgrade campaign. This circuit continuously monitored the take cover and evacuation alarm system. This condition was determined to

be non-compliant with OSHA standard 1910.165(d)(4) which requires a functioning supervisory system. Compensatory measures were put into place to notify employees of a site Take Cover/Evacuation alarm in the unlikely event of a system malfunction.

CO-2016-1465

On May 25, 2016, the ATR Shift Supervisor was notified by a member of the Life Safety Systems (LSS) group that during servicing of the Halon fire suppression system which protects the Reactor Data Acquisition System (RDAS) computer room inside the ATR, an unintentional release



of Halon gas had occurred. Upon further review, it was determined that the entire contents of one cylinder of Halon 1301 had been released from the cylinder located outside of the ATR facility. The amount of Halon discharged was determined to be 176 pounds.

CO-2016-1564

A fire alarm actuated in building TRA-640 causing the initiation of an automatic Fire Department Response. The cause of the alarm was later determined to be a failing air compressor for the dry pipe fire suppression system which caused a lowering system air pressure and subsequent opening of the automatic fire water clapper valve. The INL Fire Department and facility Incident Response Team responded to the scene and observed a water powered fire alarm ringing. No external evidence of fire was detected. Fire Department personnel entered the building, verified no fire and no fire suppression system sprinkler flow.

CO-2016-1569

On June 6, 2016, NRAD had an automatic reactor SCRAM during a reactor operator (RO) certification practical examination. The RO under instruction was executing a manual power change from 209 kw to a desired operating power of 250 kw. He performed a shim of the regulating rod that was too long in duration which increased power past the desired 250 kw.

The entire event lasted approximately 3 seconds, and the RO over watch did not have time to intervene and reduce power.

The reactor SCRAMed on 110% power (276 kw). NRAD was operating to NRAD-OI-5100 at the time of the event.

The event was categorized as not ORPS reportable because automatic scram function, which is not credited as safety-related, tripped the reactor prior to reaching the LCO (3.406.2B) power limit of 300kW. Since no LCO action statements were entered, the minimum acceptable functional capability or performance level of systems for normal safe operation was not challenged. This event was not adverse to safety.

What We Can Learn:

Situational awareness is fluid. The controlling parameter at one point in an evolution may not be the controlling parameter later in the same evolution. This was clearly evident in this event.

- Ensure that during a pre-job brief, participants identify if and where control parameters change, and assign roles and responsibilities to ensure that the operation is controlled adequately from start to finish.
- Establish explicitly that the over watch's function is the safe operation of the reactor not the training of the RO under instruction. Intervention may terminate the certification evolution but that is preferable to a reactor SCRAM. Sufficient response time by the over watch needs to be factored into future certifications
- Provide procedural queues to inform the operator(s) that a control transition will occur or that equipment response will become more sensitive or that additional care and caution are required to complete a portion of the evolution. Alternatively, inclusion of power margin can reduce over shooting power targets and/or provide some additional response time for the over watch to fulfill his function, the safe operation of the reactor.

CO-2016-1660

On June 16, 2016, a burning odor was noticed in building TRA-628 at ATR. The odor seemed to be coming from a ceiling mounted heat pump located in the NE corner of the building that maintenance was presently performing maintenance on. The building was evacuated as a precautionary measure and the fire department was notified. No smoke or flame was noticed and the building was ventilated and access restored approximately 30 minutes later.

CO-2016-1804

On June 29, 2016, a fire water flow alarm was received at building TRA-628 at the ATR Complex which activated a

Central Facilities Area (CFA) fire department response and building evacuation. The fire department responded and verified that the flow alarm was a false alarm and there was no fire in the building.

Preliminary investigations revealed that the probable cause of the flow alarm was due to a pressure surge (and possibly trapped air in the system from a recent flow test) in the fire water system when one of the fire pumps was started to support maintenance work on a fire hydrant.

CO-2016-1837

NRAD experienced a Console Control System (CCS) Watchdog automatic reactor SCRAM during normal automatic startup. NRAD was operating to NRAD-OI-5100 at the time of the event. Review of the history playback of the event indicates that the CCS computer and the User Interface Terminal (UIT) computer were processing normally and communicating normally.

A test of the CCS Watchdog SCRAM signal is performed as part of normal operations each day the reactor is operational. A review of these daily test indications show that this was the first time a SCRAM signal was received since the panel upgrade. At this time, there is no known cause for the SCRAM.

ANALYSIS FOR RECURRING EVENTS:

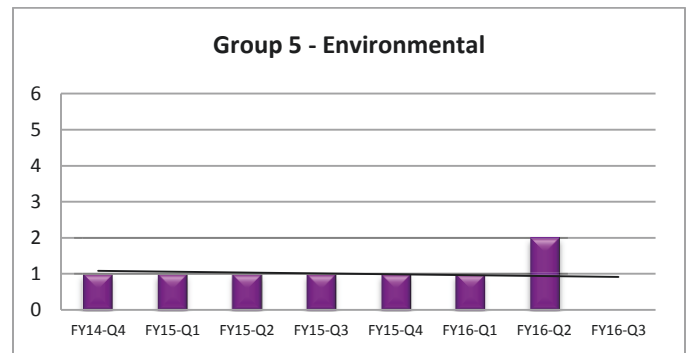
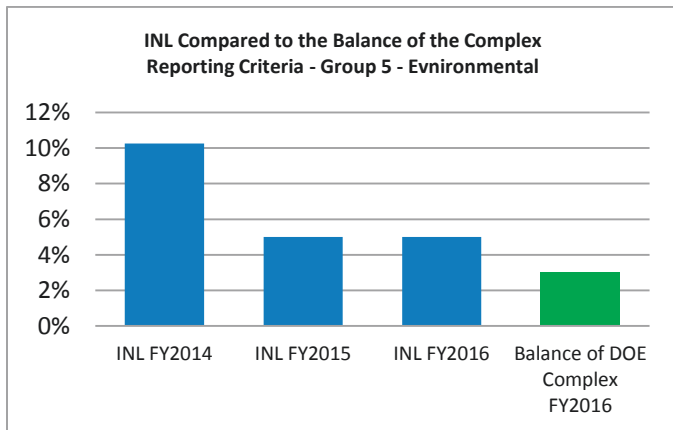
A review of the 33 Facility Status occurrences that were reported in the last 12 months was performed. Although there were multiple events reported related to diesel generator 674-M-6, confinement doors, deep well pumps, emergency coolant pumps and primary coolant pumps, there were no similarities noted in these events that would indicate they are recurring.

Twenty eight of the events in the past 12 months were the result of degradation of a safety class or safety significant component; 22 of these occurred when the component was not required to be operable. All were discovered at the ATR, primarily during preparation for the reactor restart. Many of the events occurred because frequent foot traffic to the facility caused degradation of door seals and latches. Additional problems were discovered because extended shutdown of equipment resulted in loss of backup battery capabilities. Almost 60% of these events occurred 4th Qtr FY-15 during the extended ATR shutdown. Another 36% occurred this quarter. Neither the ORPS Technical Lead nor ATR management identified any recurring events with the Facility Safety events reported.

TREND SNAPSHOT

Environmental Events: There were no environmental releases reported under the Group 5 reporting criteria in the 3rd Qtr FY-16. The rate occurrence of environmental events over the past two years is trending downward.

When compared to the balance of the DOE complex, the percentage of occurrence of Group 5, environmental events reported at INL is slightly higher (5% compared to 3% during FY-16). Aside from three events that have occurred this fiscal year, all of environmental events reported during the last two years have been related to 40 Code of Federal Regulations (CFR) Part 63, Subpart ZZZZ (also known as Quad Z) requirement changes.



Other Non-Reportable Events

There were no additional non-reportable events related to environmental problems reported during the 3rd Qtr FY-16.

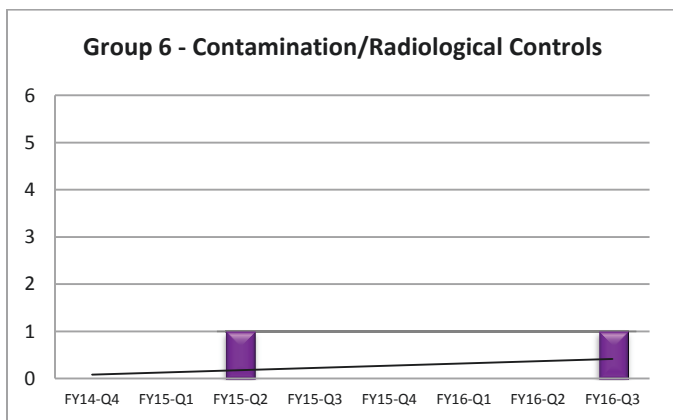
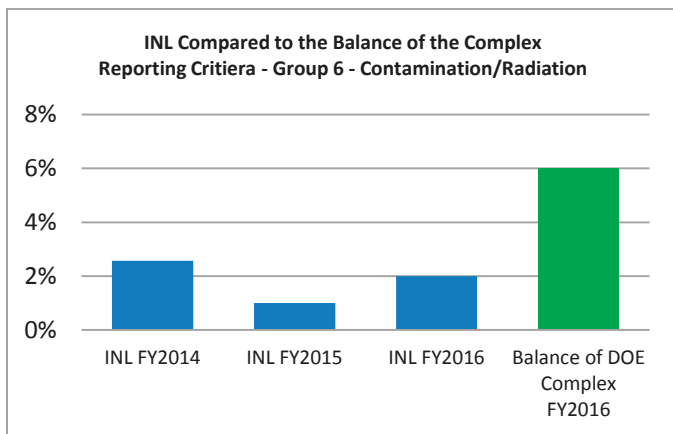
ANALYSIS FOR RECURRING EVENTS:

Four events have been reported under the Group 5 reporting criteria during the last 12 months. One was due to changes to 40 CFR Part 63; the other three were all related to diesel fuel oil spills (one at CFA reported in the 1st Qtr FY-16 and two at ATR reported last quarter). There were no commonalities in the spills that would warrant them being reported as recurring.

TREND SNAPSHOT

Contamination/Radiation Events: There was one reportable event related to contamination/radiation control reported in the 3rd Qtr FY-16. The rate of these types of events is trending near zero over the past two years. The event this quarter is the only event reported during the last 12 months. There were also three non-reportable events documented this quarter.

One of the events reported at INL during the 3rd Qtr FY-16 was reported under Group 6 Contamination/Radiation criteria. The balance of the DOE complex has reported 6% of events under the same criteria during FY-16. Events related to contamination and/or radiation control are some of the least reported event types at INL. These have only accounted for one event at INL in the last 12 months.



Contaminated Soil Outside Warm Waste Evaporation Pond at the ATR Complex

NE-ID--BEA-ATR-2016-0014 (Significance Category 3)

On May 12, 2016, the ATR Control Room Supervisor received a report from the Radiological Control Manager that contaminated soil was discovered outside of the contamination area north of the ATR evaporation ponds.

Pre-work surveys were being performed in preparation for the ATR Complex Warm Waste Evaporation Pond liner replacement project when the contamination was discovered. A Radiological Buffer Area (RBA) had been established that morning to support surveys of the area surrounding the evaporation pond contamination area.

During these surveys, a normally unoccupied area was surveyed and contamination was found in the soil. Further surveys off of the pond berm elevation, and downwind of the pond, found contamination levels to be as high as 250,000 disintegrations per minute (dpm)/100 centimeters (cm)².

Following the discovery, the area was posted as a "Soil Contamination Area." Surveys of the road around the evaporation pond were conducted and no contamination was found.

What We Can Learn:

Always expect the unexpected and know how to respond when it is encountered. Personnel were not anticipating discovery of contaminated soil but knew the possibility of finding it existed. When the soil was discovered, they responded appropriately by restricting access into the area and conducting further surveys to determine the extent of the contamination.

CO-2016-1011

On April 5, 2016 a Personal Contamination Monitor (PCM) 1B alarm occurred on the reactor main floor of TRA-670. A 20,000 DPM $\beta\gamma$ particle was found on the exterior bottom sole toe area of an individual's right shoe.

CO-2016-(Number Unknown)

While attempting to remove two one-curie (Ci) Cobalt(Co) 60 sources received from a vendor, it was discovered that the cap on the source pot had become loose and fallen out during shipment. This allowed the sources to fall to the bottom of the shipping container.



Upon discovery, National and Homeland Security (N&HS) management, radiological controls, Packaging & Transportation, and Facilities

management were notified and the shipping container was resealed in its original configuration.

What We Can Learn:

With the sources not in the expected configuration the sources would be difficult to retrieve and could put personnel at risk of receiving a higher than normal radiation exposure. Taking a step back so that a recovery plan can be developed is often the best immediate action to take.

CO-2016-1806

On June 29, 2016, a contract employee working on the ATR Evaporation Pond rebuild project was found to have 20,000 disintegrations per minute (dpm) per probe beta/gamma contamination on the back of a baseball hat. The hat had been allowed to be worn for sun protection per the Radiation Work Permit (RWP). Appropriate levels of BEA management and DOE-ID were notified of this event.

The contamination was found on the individual during a whole body survey upon exit from the Contamination Area. The baseball hat was bagged and sent to the Radiation Measurements Laboratory (RML) for isotopic analysis. The individual was surveyed again and no further contamination was noted. Isotopic analysis results contained Co-60.

ANALYSIS FOR RECURRING EVENTS:

Aside from the event reported this quarter, there have been no additional reportable events under the Radiation/Contamination reporting criteria the past 12 months and eight non-reportable events including the three this quarter. A review of these eight events identified no commonalities, no adverse trends, and no recurring problems.

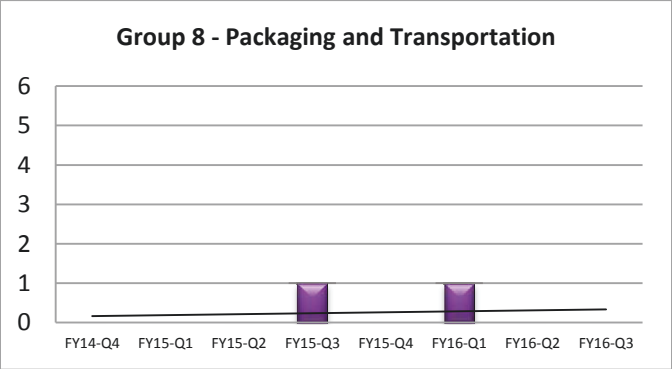
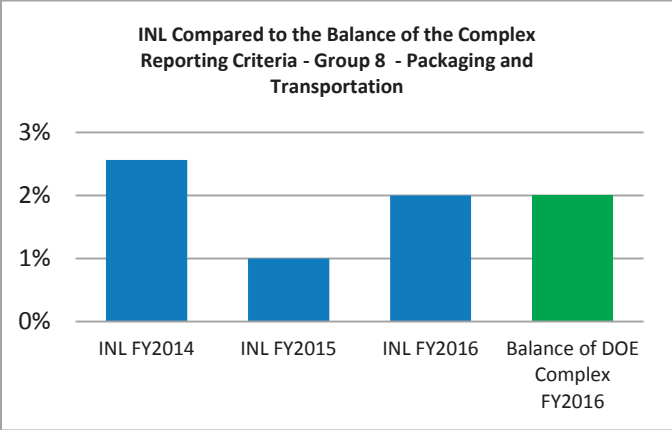
3rd Qtr FY-16 GROUP 7 – NUCLEAR EXPLOSIVE SAFETY EVENTS

There were no events related to nuclear explosive safety during the 3rd quarter FY-16. BEA has never reported an event under this reporting criteria since taking over the contract for the Laboratory in 2005. There was one event reported under the Group 7 – Nuclear Explosive Safety Events criteria in the balance of the DOE Complex during FY-16.

TREND SNAPSHOT

Packaging and Transportation Events: There were no reportable P&T events during the 3rd Qtr FY-16. The rate of occurrence of P&T issues is trending almost even due to an event in the 3rd Qtr FY-15 and one in the 1st Qtr FY-16. These have been the only two Packaging and Transportation related events reported over the past 12 months. There were no additional non reportable events during the 3rd Qtr FY-16.

INL rarely reports events under Group 8 Packaging and Transportation criteria. When compared to the balance of the DOE Complex, INL is reporting the same percentage of events in this reporting group.



ANALYSIS FOR RECURRING EVENTS:

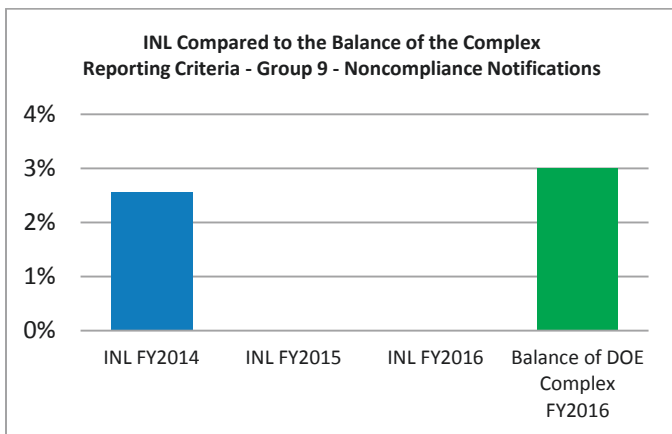
There is no indication of an adverse trend or recurring problems associated with Packaging and Transportation activities at INL.

3rd Qtr FY-16 GROUP 9 – NONCOMPLIANCE NOTIFICATIONS EVENTS

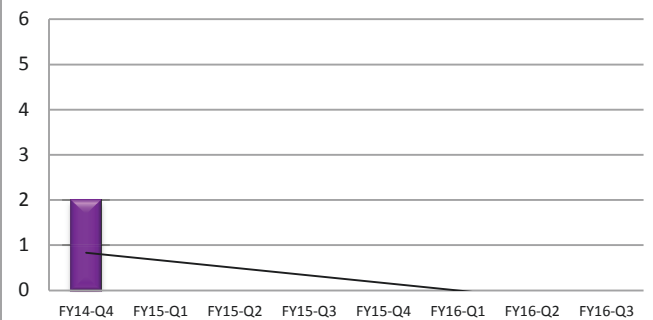
TREND SNAPSHOT

Noncompliance Notification 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, the INL has not been issued any noncompliance notifications and has not received such a notification since 2014. There were no events reported under this criteria during the 3rd Qtr FY-16. The two year trend data for these types of events shows a decreasing trend.

Three percent of the events occurring during FY-16 throughout the balance of the DOE Complex were reported under these reporting criteria. None were reported by INL in the 3rd Qtr FY-16.



Group 9 - Noncompliance Notifications



Other Non-Reportable Events

There were no additional non-reportable events related to noncompliance notifications reported during the 3rd Qtr FY-16.

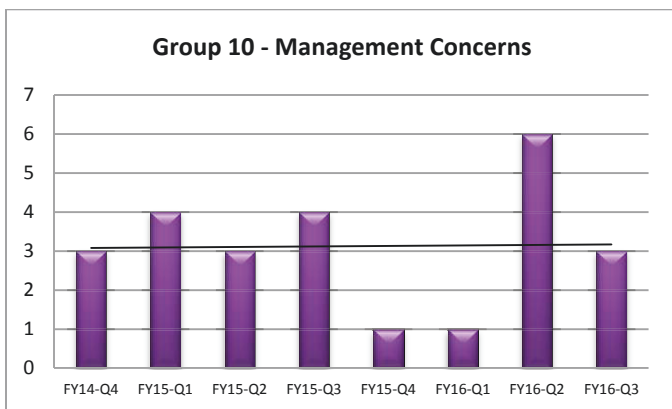
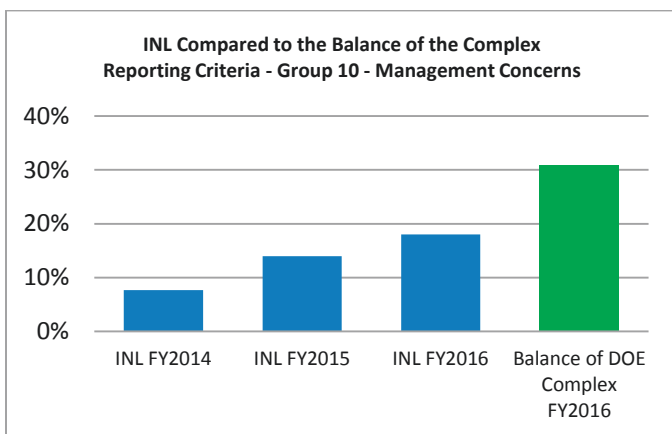
ANALYSIS FOR RECURRING EVENTS:

There is no indication of an adverse trend or recurring problems associated with noncompliance notification reportable events at INL.

TREND SNAPSHOT

Management Concerns and Issues: Three events were reported during the 3rd Qtr FY-16, under reporting criteria for a management concern or issue. The rate of occurrence of reportable management concerns is trending steady over the past two years. During the past 12 months, INL has reported 11 events under Group 10 management concerns.

The balance of the DOE complex has reported 31% of all events from FY-16 under Group 10 Management Concern criteria. In comparison, INL has reported 18% of all events under this criteria.



The three events reported during the 3rd Qtr FY-16 are summarized below:

Idaho National Laboratory Fire Alarm Monitoring Capability Interruption

NE-ID--BEA-CFA-2016-0002 (Significance Category 4)

While clearing a Fire Alarm Impairment at the ATR Complex, Life Safety System Technicians discovered that the fire alarm

signal and receipt transmission capabilities were being interrupted to the INL Alarm center potentially affecting buildings at the Advanced Test Reactor (ATR) Complex, Materials and Fuels Complex (MFC), Research and Engineering Complex (REC), CITRC, INTEC, and Advanced Mixed Waste Treatment Facility.

Compensatory measures were issued by the INL Fire Marshall to include: a request that following any alarm, occupants are to immediately notify the INL fire department to ensure that the fire department has received the information.

Worker Drops Rope and Enters Radiological Buffer Area without Radiological Controls Support

NE-ID--BEA-CFA-2016-0003 (Significance Category 4)

On May 12, 2016, a construction worker at the ATR evaporation pond lowered a Radiological Buffer Area (RBA) boundary rope and entered the area with a forklift without radiological controls personnel present.



When radiological controls arrived, the radiological controls technician (RCT) counseled the worker on the need to have an RCT present and that he could not drop the rope on his own.

The forklift was surveyed out of the area, the work was stopped, and RCT supervision was notified. Upon further

investigation, it was determined that the worker had not been issued an optically stimulated luminescent (OSL dosimeter), and had been in the RBA without proper dosimetry. On 05/16/2016, additional investigation caused personnel to contact Construction Management personnel, and notifications to Construction Management were then made.

What We Can Learn:

- When interviewing the future subcontractor superintendents, INL management has the opportunity to evaluate the experience level of each superintendent and can take the opportunity to remind the superintendents of the danger of a complacent attitude as well as express expectations to perform work within the guidelines of our work control process. Management must stress the importance of having a questioning attitude and encourage other employees on the project to support this attitude.
- It is a good practice to constantly remind employees, in meetings and pre-job briefs, that they all have stop work authority and encourage them to use it when they see something wrong without fear of repercussion.

Electrical Fire in a Moveable Server Rack Cabinet

NE-ID--BEA-INLLABS-2016-0003 (Significance Category 4)

This event and the lessons we can learn from it have already been described in Lessons Learned 2016-0013.

Other Non-Reportable Events

There were no additional non-reportable conditions that are being addressed as management concerns.

ANALYSIS FOR RECURRING EVENTS:

During the past 12 months, there have been 11 events that did not meet ORPS reporting criteria thresholds but were reported as management concerns or were categorized as near misses to a more significant event. The six events reported as not meeting ORPS reporting thresholds were:

- REC Fiber Optic Upgrade
- Batteries Dropped During UPS Maintenance
- Package Containing Unexpected Items Delivered to EROB
- Fire Alarm Monitoring Capability Interruption
- Worker Drops Rope and Enters RBA without Radiological Controls Support
- Electrical Fire in a Moveable Server Cabinet

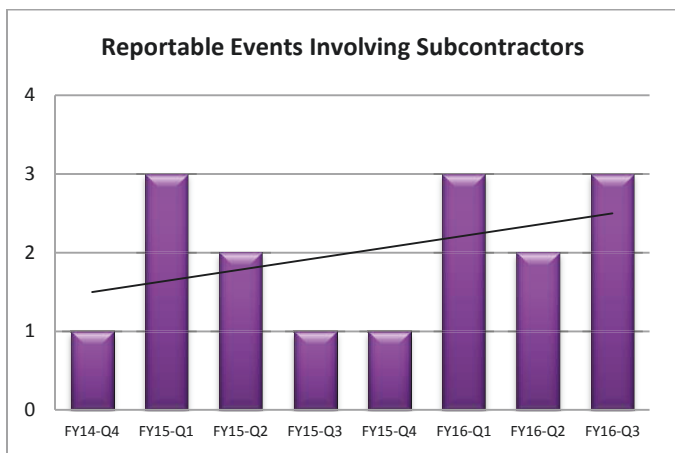
Five events that have been reported as near misses during the past 12 months include:

- Failure of Facility South Roll-Up Door at HFEF
- Fire Department Vehicle Accident
- Near Miss Related to Electrical Problems with Access Gate Ground Fault
- Near Miss Involving Personal Vehicle and Pedestrians
- Pinched Power Cord

After reviewing each event, there is no indication of an adverse trend or recurring problem associated with any of the events being reported as management concerns over the last 12 months.

TREND SNAPSHOT

Events Involving Subcontractors: Three of the reportable events this quarter involved subcontract employees. The number of reportable occurrences involving subcontractors is trending upwards. So far during FY-16, 15% of INL's reportable events involved subcontractors. In comparison, 14% of events occurring throughout the balance of the DOE complex during the same time period involved subcontracted personnel.



There have been nine ORPS reportable events involving subcontractors during the past 12 months. This quarter, the

worker entering the RBA without radiological controls personnel support, the LOTO problems during repair of the escalators, and the hand injury at the EIL due to an inadequate LOTO events all involved subcontract personnel.

ANALYSIS FOR RECURRING EVENTS:

The events of the past year where subcontractors were involved were reviewed for similarities; no similarities were identified. No single subcontractor has been involved in more than one reportable event during the last 12 months. There is no indication of an adverse trend or recurring problem associated with any of the events involving subcontract personnel that have occurred over the last 12 months.

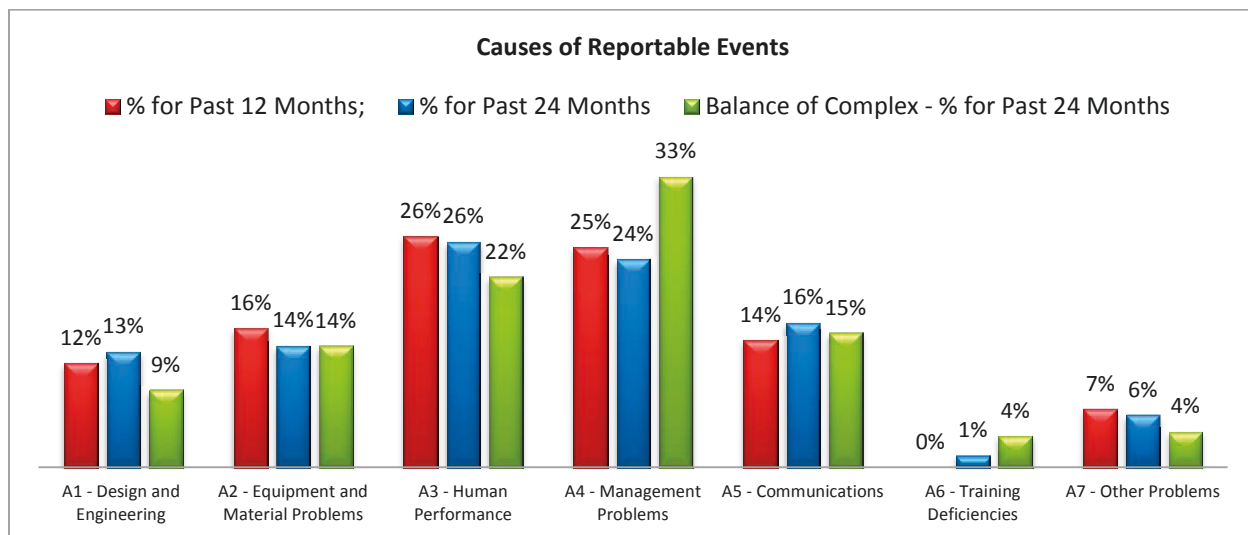
3rd Qtr FY-16 ANALYSIS OF CAUSES OF REPORTABLE EVENTS

Cause codes documented in ORPS were analyzed through ORPS distribution trend reports to get an understanding of what is causing or contributing to events at INL. The data was reviewed to evaluate causes identified over the last 12 months and the past 24 months. Cause codes are not required to be entered into ORPS for Significance Category 4 events, so data from those events is not included in this analysis. Data is also not included from those events that are not yet finalized in ORPS.

The analysis shows that the majority of causes over the last 12 months can be attributed to less-than-adequate human performance (A3) and secondly by management problems (A4). INL has seen a slight reduction in events cause by management problems when comparing the past 12 months to the past 24.

A comparison of the causes of INL events to the causes of events reported by the balance of the DOE Complex for the past two years show that the balance of the Complex reported 33% of the events occurred due, in part, to management problems followed by 22% of events caused by less-than-adequate human performance. These figures have remained somewhat unchanged for the last several reporting periods.

INL recently identified a need to modify occurrence reporting metrics to help improve performance in corrective action development across the site. During FY-17, new metrics will be implemented that will enable INL to evaluate the effectiveness and the value of corrective action plans to ensure corrective actions are appropriate to reduce the risk and likelihood of similar events.

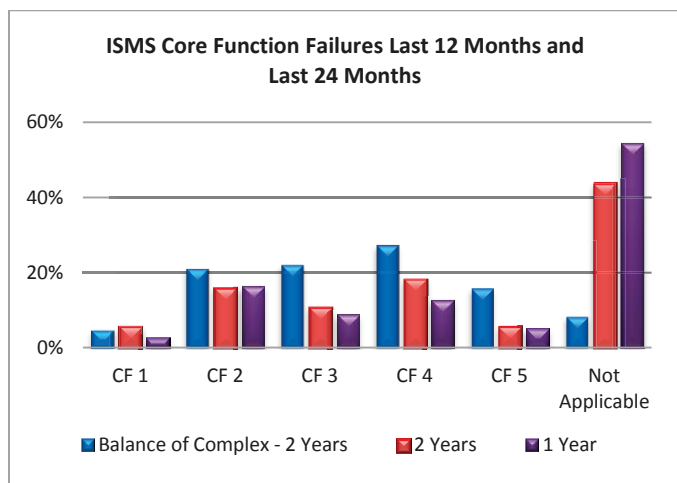


In addition to evaluating the cause of events, INL analyzes each reportable event to identify opportunities where we failed to effectively implement the five core functions of the Integrated Safety Management System (ISMS).

The chart below shows the ISMS analysis that has been documented for all reportable events that have occurred over two separate intervals; the past 12 months, and the past 24 months. The chart also compares INL's reporting of ISMS failures to that of the balance of the DOE Complex.

For the purpose of the chart, ISMS Core Functions are defined as:

- CF1 – Define the Scope of Work
- CF2 – Identify the Hazards
- CF3 – Develop and Implement Hazard Controls
- CF4 – Perform Work Within Controls
- CF5 – Provide Feedback and Continuous Improvement



Over the past year, analysis of 55% of INL reportable events identified no known failures of the ISMS process. These primarily include events related to equipment problems and discovery of suspect counterfeit parts.

Seventeen percent of the events were due to failures to implement ISMS Core Function 2 – Identify Hazards. This is very close to the percentage for the two year comparison. An additional 12% of events identified problems with implementation of Core Function 4 - Perform Work within Controls. This is a 4% decrease from the two year comparison. The INL Management Observation Program strengthens application of Core Function 4 and is almost fully implemented across the INL.

The balance of the DOE complex primarily reports failures when implementing ISMS Core Function 4 – 28%, Core Function 3 – 22%, and Core Function 2 – 21%.

These metrics will continue to be monitored to ensure INL is effectively implementing the ISMS program.

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INL Quality and Performance Management Expectations

INL has a vision to change the world's energy future and secure our critical infrastructure. INL's mission is to discover, demonstrate and secure innovative nuclear energy solutions, other clean energy options and critical infrastructure. Quality and Performance Management 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 Quality and Performance Management

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