

# **Idaho National Laboratory Quarterly Performance Analysis FY 2013 Third Quarter**

August 2013



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

**Idaho National Laboratory Quarterly Performance  
Analysis  
FY 2013 Third Quarter**

**August 2013**

**Idaho National Laboratory  
Idaho Falls, Idaho 83415**

**<http://www.inl.gov>**

**Prepared for the  
U.S. Department of Energy  
Office of Nuclear Energy  
Under DOE Idaho Operations Office  
Contract DE-AC07-05ID14517**

# Idaho National Laboratory

## Quarterly Performance Analysis

DEEPER LEARNING THROUGH EVENT ANALYSIS



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## INL/INT-13-29860

FY2013 3<sup>rd</sup> Quarter

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

The Department of Energy 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 64 occurrence reports and over 50 deficiency reports (including not reportable events) identified at the INL during the period of July 2012 through June 2013.

Battelle Energy Alliance (BEA) operates the INL under contract DE-AC-07-051D14517

## Highlights...

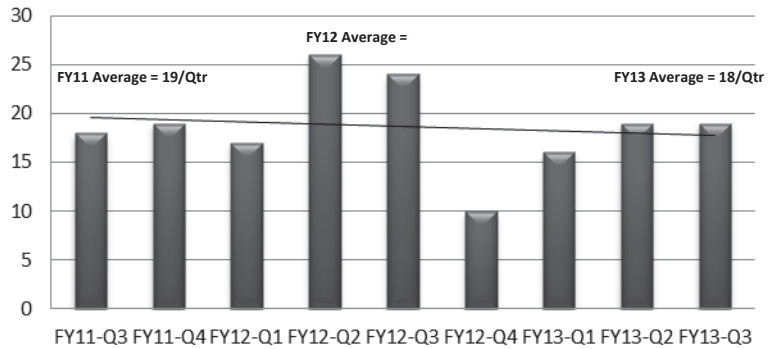
The average number of occurrences reported at the INL each quarter has remained consistent between 18 and 19. The rate of significant events (those reported as Operational Emergencies, Recurring Issues, and/or Significance Categories 1 or 2) continues to increase with a FY13 year to date total of 14.

The average number of days between significant occurrences has been increasing, which indicates a positive trend.

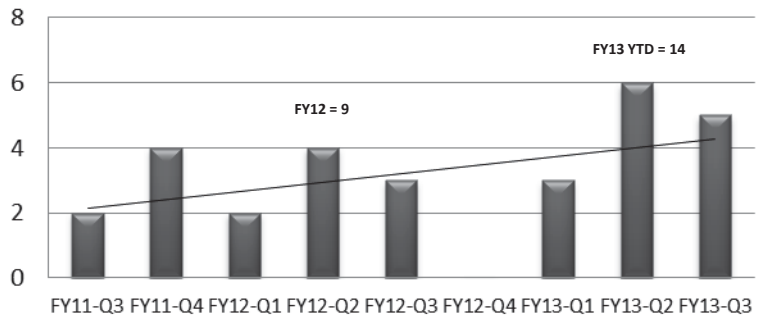
This quarterly analysis reviews those events that were reportable through ORPS, events that did not meet ORPS reporting thresholds, some deficiencies tracked in ICAMS, the causes of reportable events, and trending performed by the INL Operational Performance Analysis Committee (IOPAC) group.

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

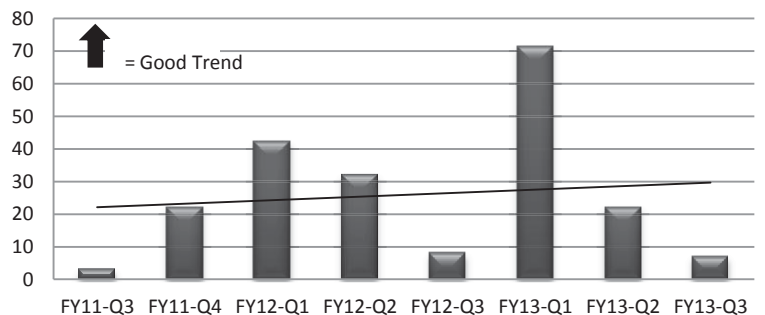
### Occurrence Reporting Rates as of FY13 Q3



### Significant Occurrences Reported (FY11Q3 - FY13Q3 Category OE, R, 1, and 2)



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



**Response to DOE:** Following the last quarterly ORPS report, Department of Energy Idaho Operations Office (DOE-ID) issued a finding for BEA's failure to identify recurring events for several lockout/tagout (LO/TO) violations and several Technical Safety Requirements (TSR) violations. BEA's definition of recurrence and DOE-ID's interpretation of the term differed and, although BEA was following approved company procedures, DOE did not believe BEA was being conservative enough in identifying recurring issues. BEA has agreed to make improvements in this quarterly ORPS report and to work with DOE-ID to re-define a recurring issue. This report reflects the changes to the quarterly ORPS report. An action to redefine recurrence is being tracked under IO-027970.

## New INL Occurrences

From 4/1/2013 through 6/30/2013, the INL reported 19 new events to DOE, in accordance with DOE Order 231.1B. These events are analyzed to determine commonalities related to: Operational Emergencies (Group 1); Personnel Safety and Health (Group 2); Nuclear Safety Basis (Group 3); Facility Status (Group 4); Environmental (Group 5); Contamination and Radiation Control (Group 6); Nuclear Explosive Safety (Group 7); Packaging and Transportation (Group 8); Noncompliance Notifications (Group 9); and Management Concerns (Group 10).

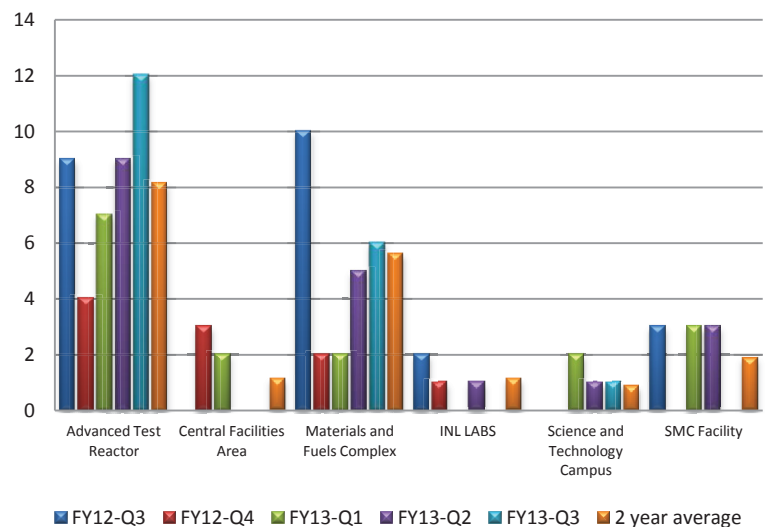
In addition, the INL reported six events through our local issues tracking software that did not meet or exceed the ORPS reporting thresholds. These events are also discussed and analyzed within this report.

### TREND SNAPSHOT

**Occurrences by Facility:** Both the Material and Fuels Complex (MFC) and Advanced Test Reactor (ATR) facilities saw a slight increase in the number of events reported during the 3<sup>rd</sup> Qtr FY13 as compared to the 2<sup>nd</sup> Qtr FY13. Because of the nature of work occurring at the ATR and MFC Facilities, it is not unexpected that they report the most number of events.

ATR reported 63% and MFC 32% of the events during this reporting quarter. Analysis of the nature and causes of all the reportable events is covered in other sections of this report.

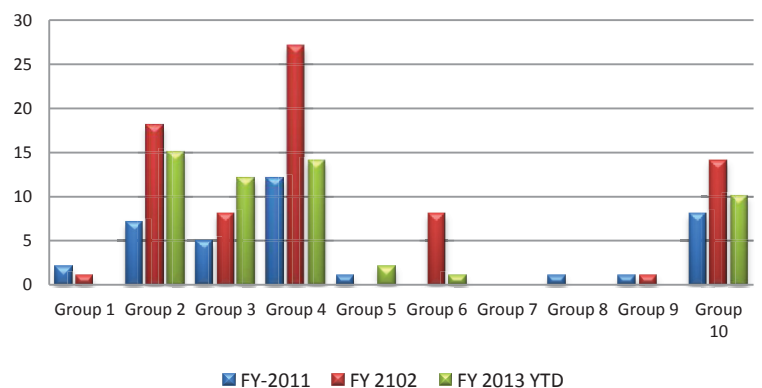
**Occurrence Reports by Facility**  
(FY12 Q3 through FY13 Q3)



### TREND SNAPSHOT

**Occurrences by Reporting Criteria:** INL continues to experience the majority of events related to personnel safety and health, nuclear safety basis, facility status, and those reported as management concerns. Analysis of all reportable events and any noted trends is covered in other sections of this report.

**Occurrence by Reporting Criteria**  
(FY-11 Data Includes only Q3 and Q4)



Personnel safety and health occurrences were the second most frequently reported event type, accounting for 17 reportable events in the last 12 months. Four events were reported during the 3<sup>rd</sup> Qtr FY13 and are summarized below. Additionally, two non-reportable events were also reported through the INL issues management software.

### Employee Sustains Hairline Fracture to Wrist

**NE-ID--BEA-ATR-2013-0021** (Significance Category 3)

On April 15, 2013, an employee sustained a hairline fracture and strain/swelling to his right wrist in a fall from the back of a truck. The employee was descending from the back of the truck when the rope/strap he was holding onto with his right hand broke. The employee fell two to three feet to the ground, breaking the fall with his right hand which resulted in the fracture.

### Uranium Silicide Compact Ignites

**NE-ID--BEA-FASB-2013-0001** (Significance Category 3)

On April 10, 2013, three Uranium Silicide (U<sub>3</sub>Si<sub>2</sub>), Uranium Silicon, compacts (contained inside poly bags) were transferred out of an inert glovebox and into a hood at the MFC facility. When the compacts were removed from the poly bags, one of the three compacts started to glow red, at which time METL-X fire extinguishing agent was applied to the compact. The fire alarm pull box was activated and the facility was evacuated as a precautionary measure. Upon confirmation of no fire or hot spots by the fire department, Health Physics Technician (HPT) personnel re-entered the building to perform surveys. No contamination was detected. The two additional compacts and the reacted powder were transferred back from the hood to an inert glove box.

### Engineer Receives Electrical Shock

**NE-ID--BEA-ATR-2013-0018** (Significance Category 2)

On May 2, 2013, an Engineer at ATR received what he thought to be an electrical shock from a portable boroscope (Model Everest XLG3 Video Probe System) when he felt a slight tingle on his hand holding the hand-held video probe. He reported this to his manager and was taken to the Central Facilities Area (CFA) medical facility. Further investigation showed that the extension cord that was used with the boroscope had a broken ground wire, resulting in 57 volts from the boroscope to ground.

### Electrician Discovers an Unexpected Electrical Hazard

**NE-ID--BEA-ATR-2013-0011** (Significance Category 3)

On April 2, 2013, an electrician working on an overhead fan discovered 120 VAC control power in the motor starter cabinet. The 480 VAC power to the fan motor was tagged out and locked out with a simple LO/TO to disconnect the motor at the terminal box on the motor. The Electrical Supervisor elected to disconnect the motor at the starter cabinet. The starter cabinet contained 120 VAC control power from another source that was not isolated. Prior to commencing work, the electrician noticed two conduits entering the starter cabinet and performed a proximity test, which led to the identification of the 120 VAC power.

### Other Non Reportable Events

There were 14 personnel safety and health concerns reported in ICAMS during the past 12 months. Three were reported in the 3<sup>rd</sup> Qtr FY13 but did not meet ORPS reporting thresholds. These are as follows:

#### ICAMS IO-026676

On April 9, 2013, a technician injured his lower back while using his shoulder to apply leverage to a stuck lock mechanism on the hydrogen shed door at the MFC.

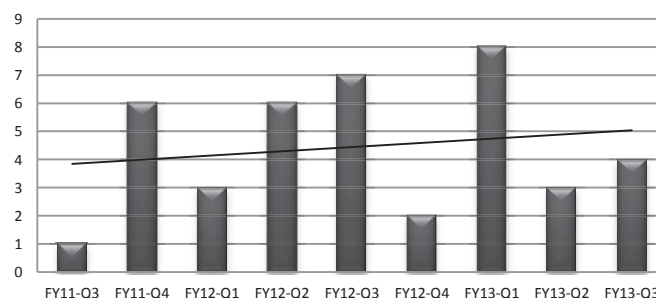
#### ICAMS IO-027561

On May 14, 2013, an INL employee was injured when using a popcorn popper. Hot butter/oil splashed into the employee's eye, causing a burn and abrasion to the left cornea.

#### ICAMS IO-027696

On June 11, 2013, INL Fire Department responded to a brush fire located near the US 20/26 Junction. The size of the fire was reported less than ½ acre, with a total time of response of less than one hour. The cause of the fire was determined to be mechanical failure of a private vehicle. DOE received notification from the Warning Communication Center (WCC) when the fire department responded.

Group 2 - Personal Safety and Health



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## TREND SNAPSHOT

**Personnel Safety and Health Events:** Personnel safety and health events accounted for 21% of the events reported in ORPS during the 3<sup>rd</sup> Qtr FY13. The rate of personnel safety and health issues is trending upwards. Causes of the 3<sup>rd</sup> Qtr FY13 occupational safety events varied and can be primarily attributed to management problems, particularly less-than-adequate supervisory methods. Additional problems were discovered in both written and verbal communications. BEA is monitoring a recent event (4<sup>th</sup> Qtr FY13) involving a fall from a bucket truck that is similar in nature to a fall that occurred on October 24, 2012. Pending outcome of the investigation and cause analysis, BEA will determine if a recurring issue should be reported. If so, the results of the analysis will be presented next quarter.

While there have been a number of LO/TO errors during the past 12 months, they are not indicative of a failure of the INL LO/TO Program, nor are they due to a failure to implement the LO/TO program at the INL site nor at any INL facility. They do indicate ongoing issues with personnel consistently performing work within controls that is listed in a majority of these events. The INL has ongoing efforts to improve in this area and should see improvement, in time, with consistent effort by management, to monitor work activities and enforce expectations.

**A fire inside a glove box, reported on January 24, 2012, and the one reported this quarter, bear no similarities. The January 2012 fire resulted from welding activities taking place outside the glove box.**

**There were no similarities in the six personnel safety and health events that occurred this quarter nor in their causes, organizations, or work groups, that would indicate an adverse trend or recurring problem.**

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## 3<sup>rd</sup> Qtr FY13 NUCLEAR SAFETY BASIS EVENTS

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Nuclear safety basis events were the third most frequently reported event type, accounting for 12 reportable events in the past 12 months. Four events were reported during the 3<sup>rd</sup> Qtr FY13 and are summarized below.

### ZPPR Legacy Violation of Combustion Loading Program Results in TSR violation

**NE-ID--BEA-ZPPR-2013-0001** (Significance Category 2)  
In March and April 2013, the Zero Power Physics Reactor (ZPPR) project initiated activities to revise its initial Hazard Evaluation Report. As part of the development of a DOE STD 3009 compliant safety basis, the supporting documents for Fire Hazards Analysis, HAD-436, ZPPR Complex Fire Hazard Analysis, were reviewed and a discrepancy was identified in the amount of polyethylene located in MFC-784. This discrepancy drew increased scrutiny to this aspect and the assumptions of the HAD and it was discovered that the amount of polyethylene located in MFC-784 exceeded the amount used to develop HAD-436. Although the quantities meet the combustible load limits, based on net floor area, they do not meet the concentrated combustion load limit for a LOW Combustible Loading Classification required by

DSA-006-ZPPR, Ch. 5A, AC.5.17: Combustible Loading Program.

Additionally, the form of the Beryllium and Beryllium Oxide were inconsistent in that some documents claimed the Beryllium and Beryllium Oxide were clad in stainless steel, while the reactor physics data, which is believed to be the most accurate, claims that the materials are not clad. The presence of cladding would affect the ability of the Beryllium to disperse. Both of these discrepancies warranted entry into the PISA process. Additional controls on the handling of Beryllium were initiated. There was no adverse impact to workers, the public, or the environment.

### Hex Can Storage TSR Violation at Fuel Manufacturing Facility (FMF)

**NE-ID--BEA-FMF-2013-0003** (Significance Category 3)  
It was discovered on April 22, 2013, during a mockup validation and operator review of changes being made to the Nuclear Material Handling procedure, that material, which was previously handled on February 11, 2013, and currently stored in the FMF vault storage rack, was in violation of an FMF TSR administrative control. This TSR is related to Plutonium/Transuranic Materials Container Requirements,



and states that plutonium and other transuranic materials shall be packaged in a minimum of two NESTED, closed metal containers when stored in the vault. The material handled and stored in February was contained within a single Hex Can configuration.

**Declaration of Positive USQ Determination Concerning PPS Nuclear Instrumentation Cable Separation PISA NE-ID--BEA-ATR-2013-0014** (Significance Category 2)

Through an extent of conditions review associated with an unreviewed safety question (USQ) reported via NE-ID--BEA-ATR-2012-0027 in November 2012, a problem was discovered associated with an electrical pull box located on the ATR reactor main floor. The review identified both Plant Protection System (PPS) (Safety-Related) and non-PPS (non Safety-Related) cables that are in direct contact with each other. The pull box contains 24 Volt direct current (dc) cabling supplying the actuation solenoid for the safety related Vessel Vent System (VVS). Design criteria specify that Safety-Related and non-Safety-Related cabling are to meet minimum separation requirements.

The current configuration of the cabling in this pull box does not meet these criteria. Further, during attempts to identify the 24 V dc cabling, it was noted that each VVS solenoid has a power supply that is also common to a single channel of several reactor shutdown system (RSS) scram subsystem components. An individual failure of one of these power supplies or power cabling will fail a single channel (B or C) of the VVS and a single channel (B or C) of several RSS subsystems. Some RSS channels are fail safe in that a loss of power would trip the subsystem channel. This physical

configuration of the cable routing has existed since the system was installed in the late 1980s, with no degradation/failures caused by the lack of separation.

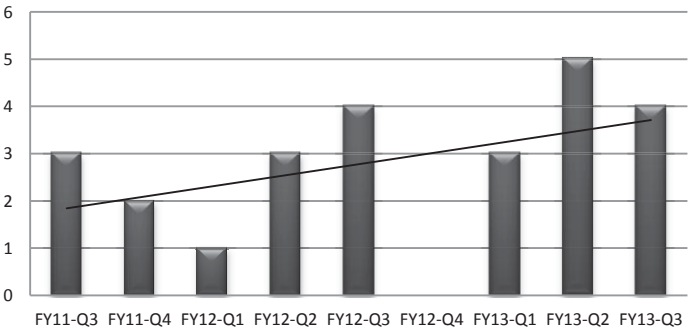
**PISA Concerning Radiation Monitoring and Seal System (RMSS) Channel and Cable Separation at the ATR Results in Negative USQ Determination**

**NE-ID--BEA-ATR-2013-0017** (Significance Category 4)  
On 9 May 2013, at 1212, a Potential Inadequacy in the Safety Analysis (PISA) was declared as a result of an extent of conditions (EOC) review performed due to PISA ATR Complex-USQ-2012-778. The EOC identified that the Radiation Monitoring and Seal System (RMSS) signal and control cables in the Health Physics Monitoring Panel are located in close proximity and near non-Safety-Related cabling. This configuration may not meet minimum separation requirements between channels and between Safety-Related and non-Safety-Related cabling. Furthermore, the documented safety analysis credits this engineered safety feature (ESF) to shut off the ventilation supply and exhaust fans and to seal the building ventilation ducts when radiation readings in the ventilation off gas reach a predetermined set-point. Because of the common location of signal channels and other non-Safety Related cabling, the assumed independence and redundancy for RMSS actuation may not be met.

**Other Non Reportable Events**

There were no additional non-reportable events related to nuclear safety basis problems reported during the 3<sup>rd</sup> Qtr FY13.

**Group 3 - Nuclear Safety Basis**



*Through an extent of conditions review associated with an unreviewed safety question (USQ) reported via NE-ID--BEA-ATR-2012-0027 in November 2012, a problem was discovered associated with an electrical pull box located on the ATR reactor main floor.*

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## TREND SNAPSHOT

**Nuclear Safety Basis Events:** Nuclear safety basis events accounted for 21% of the events reported in the 3<sup>rd</sup> Qtr FY13. Although the number of nuclear safety basis events dropped from last quarter, the rate of occurrence of nuclear safety basis is trending upwards as indicated in the chart to the right.

Last quarter, BEA identified five TSR violations during the reporting period. DOE-ID questioned if the rate of occurrence indicated a recurring issue related to TSR violations. BEA's determination that the issues are not recurring stands as it is currently supported by our company procedures. In the future months, BEA will work with DOE-ID to clarify INL's definition of recurring and to clarify our process for categorizing an event as recurring.

**During this reporting period, two of the nuclear safety basis events were similar in nature because they were discovered as a result of a focused extent of conditions review. Besides these similarities, there were no additional similarities in the four nuclear safety events, their causes, organizations, or work groups that would indicate an adverse trend or recurring problem.**

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## 3<sup>rd</sup> Qtr FY13 FACILITY STATUS EVENTS

Events related to facility status have been the most frequently reported event type, accounting for 19 reportable events in the past 12 months. Four facility status events were reported during the 3<sup>rd</sup> Qtr FY13 and are summarized below.

### **ATR Manual Scram Due to Imminent Loss of Diesel Power**

**NE-ID--BEA-ATR-2013-0012** (Significance Category 2)  
On April 12, 2013, the ATR was manually scrambled due to an imminent loss of diesel power. At the time of the event, diesel power was being supplied by the M-6 diesel generator. An alarm on the M-6 diesel generator was received and operations personnel investigated. The cause of the alarm was found to be due to a tripped supply breaker to the motor control center (MCC) that provides power to auxiliary systems for the M-6 generator. The pre-emptive scram initiated by operations personnel, along with the recovery actions detailed in the emergency procedures, ensured the facility was maintained in a safe condition.

### **Failure of MFC Fire Systems Notifier Circuitry**

**NE-ID--BEA-MFC-2013-0002** (Significance Category 4)  
The MFC notifier failed some time during the evening of May 4, 2013, presumably due to a lightning strike from a thunder/rain storm that passed through the area. Information of the failure was not expeditiously communicated to the MFC fire systems engineer or affected facility managers. This resulted in a period of time where fire

alarms would not communicate to the CFA alarm center or the MFC fire station and system and panel supervisory circuits would not communicate trouble alarms to CFA. Effective compensatory measures were not in place to mitigate this deficient condition.

As a result of this new discrepant condition, area panel walk downs were increased to be performed at one hour intervals until the notifier was repaired. It was determined that from the timeframe from Saturday evening until Monday at about 1230 hrs., Fire Alarm Center (FAC) was not able to receive alarms from the MFC 901 notifier, leaving the INL vulnerable to not being able to know of, and respond to, a fire alarm within the notifier's purview.

### **ATR Manual Scram Due to Loss of M-42 and M-43 Diesel Generators**

**NE-ID--BEA-ATR-2013-0019** (Significance Category 4)  
On May 21, 2013, the ATR was manually shut down due to loss of diesel generators M-42 and M-43. Investigation into the cause determined that the gasket between the Keeney valve, used to measure compression when diesel generators are running and on-line, and the #1 cylinder head had failed. This failure caused discharge of combustion gases through the sealing surface. In preparation to transfer the E-3 bus load, M-43 diesel generator was started and ran for approximately four minutes before it tripped on low lube oil pressure. At 0512, inspection of M-42 diesel indicated

increased leakage and the reactor was manually scrammed at 0513. Emergency procedures were entered and the plant was placed in safe shutdown condition. E-3 diesel bus was transferred to M-6 diesel generator at 0525 and M-42 diesel was secured. The cause of M-43 diesel generator trip on low lube oil pressure is being investigated.

#### ATR East N-16 Tube Leaking

**NE-ID--BEA-ATR-2013-0022** (Significance Category 2)

On 12 June 2013, ATR Operations completed N-16 Calibration Checks. Review of the DOP data indicated that the East N-16 tube may be leaking. ATR Engineering completed an evaluation of the N-16 tube and confirmed that the East N-16 tube is leaking. An investigation into the cause of the leak was initiated.

#### Other Non Reportable Events

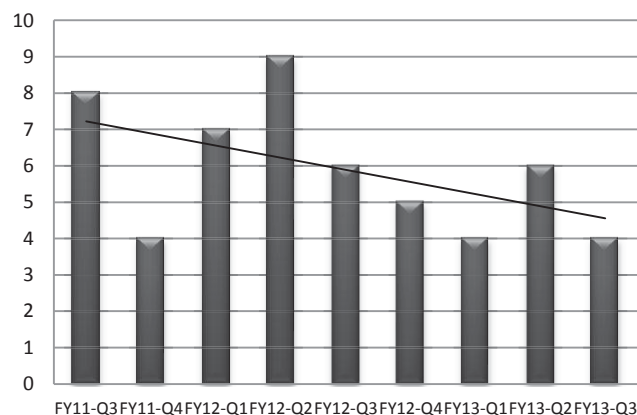
There were no additional non reportable events due to facility status.

#### TREND SNAPSHOT

**Facility Status Events:** Facility status events accounted for 21% of the events reported in the 3<sup>rd</sup> Qtr FY13. The rate of occurrence of facility status events is trending down over the past two years.

**Two of the facility status events reported this quarter were similar in nature (loss of diesel power) but not in cause. There were no additional similarities in the facility status events related to their causes, organizations, or work group. The analysis performed recognizes no actionable patterns.**

Group 4 - Facility Status



### 3<sup>rd</sup> Qtr FY13 ENVIRONMENTAL EVENTS

Events related to environmental problems are one of the least reported event type, only accounting for two events in the past 12 months – both of which were reported in the 3<sup>rd</sup> Qtr FY13 and both of which are identical in nature and cause. These events are described below.

#### Notification of Diesel Engine Startup at the ATR

**NE-ID--BEA-ATR-2013-0015** (Significance Category 4)

New environmental regulations include operation and maintenance requirements for ATR Complex diesel engines are in effect, as described in 40 CFR, part 63, subpart ZZZZ, National Emissions Standards for Hazardous Air Pollutants for stationary Reciprocating Internal Combustion Engines (RICE), also known as Quad Z. The following ATR Complex engines are non-emergency stationary RICE: generators 670-M-42, 670-M-43, and 674-M-6.

Without installation of emissions controls, units 670-M-42, 670-M-43 and 674-M-6 will not meet the new emission standards for hazardous air pollutants beginning 2 May 2013. INL has negotiated with the Idaho Department of Environmental Quality (DEQ) a Voluntary Consent Order (VCO) to replace units 670-M-42 and 670-M-43 with a commercial power-based uninterruptible power supply (UPS). When the UPS project is complete in 2015, all three units will be designated as emergency stationary RICE.

Every startup of 670-M-42, 670-M-43, and 674-M-6 diesel generators, results in an excess emissions event which are not covered in the VCO and is, therefore, a noncompliance to Quad Z and is reportable. On 3 May 2013, at 1615, DEQ was notified that the ATR was going to run 670-M-43 diesel for a post-maintenance test of the diesel governor. The diesel was started on 4 May 2013 at 0955 and secured at 1350 the same

day. After the second reportable event of this nature, the INL obtained approval from DOE to not report each diesel engine startup. When the UPS project is complete in 2015, all three units will be designated as emergency stationary Reciprocating Internal Combustion Engines.

Notification of Diesel Engine Startup at the ATR

NE-ID--BEA-ATR-2013-0016 (Significance Category 4)

On 7 May 2013, DEQ was notified that the ATR was going to run 670-M-43 diesel for a Detailed Operating Procedure (DOP)-2.8.6, Commercial Power Under Voltage Relay Set Point Test. The diesel was started on 7 May 2013 and

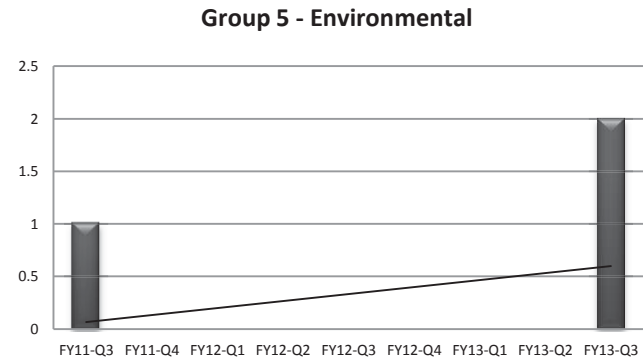
necessitated reporting under ORPS criteria 5A(2).

Other Non-Reportable Events

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

TREND SNAPSHOT

Environmental Events: Environmental events accounted for 11% of the events reported in the 3<sup>rd</sup> Qtr FY13. The rate of occurrence of facility status events trended upwards due to this quarter's two events at the ATR Complex.



Every startup of 670-M-42, 670-M-43, and 674-M-6 diesel generators results in an excess emissions event which are not covered in the VCO and is, therefore, a noncompliance to Quad Z and is reportable.

3<sup>rd</sup> Qtr FY13 CONTAMINATION/RADIATION CONTROL EVENTS

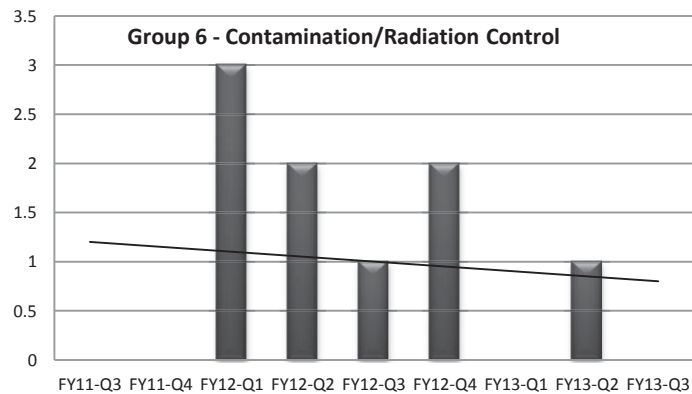
Events related to contamination and/or radiation control are some of the least reported event type at the INL, only accounting for three events in the past 12 months. There were no contamination/radiation control events reported in the 3<sup>rd</sup> Qtr FY13 or were there any non-reportable events related to contamination or radiation control.

Further analysis was done on radiological control deficiencies reported during the 3<sup>rd</sup> Qtr FY13, to see if any similarities existed among the deficiencies reported through ICAMS.

Three similar issues associated with the need to improve attention to detail in radiological control survey maps and log books were noted at MFC facilities. These problems were discovered during a management assessment and are not indicative of a site-wide or programmatic problem.

TREND SNAPSHOT

Contamination/Radiation Events: Contamination and/or radiation events accounted for only 5% of the events reported in the last 12 months. The rate of occurrence of these events continues to trend downward over the past two years.



## 3<sup>rd</sup> Qtr FY13 PACKAGING AND TRANSPORTATION EVENTS

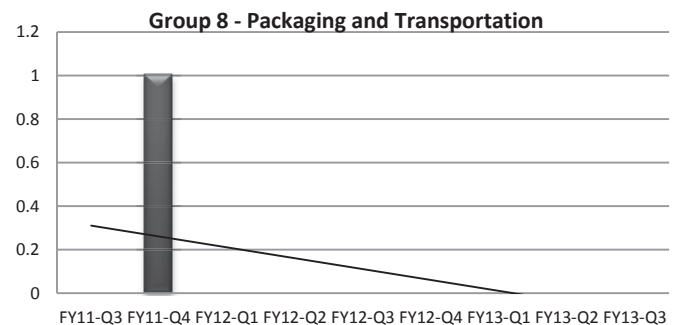
Events related to packaging and transportation rarely occur at the INL; there have been no such events since the 4<sup>th</sup> Qtr FY11.

For the purpose of trending, additional analysis was performed on packaging and transportation deficiencies reported through ICAMS during the 3<sup>rd</sup> Qtr FY13, to see if any patterns or similarities exist. There were no packaging and

transportation (PT) deficiencies reported in ICAMS during that time period. A separate search of the ICAMS database for PT issues for the past 12 months revealed two issues; one was an observation related to the need to update PT transportation plans and one a deficiency related to the transportation of a leaking neutron detector containing boron trifluoride gas. There are no adverse trends or recurring issues associated with packaging and transportation events at the INL.

### TREND SNAPSHOT

**Packaging and Transportation Events:** Packaging and transportation events accounted for none of the events reported in ORPS during the last 12 months. The rate of occurrence of these events continues to trend downward over the past two years.



## 3<sup>rd</sup> Qtr FY13 NONCOMPLIANCE NOTIFICATIONS EVENTS

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

A review of ICAMS shows four deficiencies reported during the 3<sup>rd</sup> Qtr FY13, related to environmental protection and one noncompliance reported by DOE-ID regarding a "Failure of the ORPS Quarterly Analysis to identify recurring events". Three of the four environmental deficiencies were identified by DOE-ID and include:

### Lengthy Storage of Hazardous Waste in Lab SAAs

**IO-027188**

Contrary to the agreement with DEQ from June 25, 2002, the contractor has not implemented an SAA management process that ensures waste inventories are routinely dispositioned from SAAs, as sufficient quantities are accumulated for efficient and safe lab packing. This ultimately results in lengthy storage of wastes.

### Incomplete Implementation of the Formal Corrective Action Process

**IO-027189**

Contrary to the requirements of BEA's Environmental Management System (EMS) that is formalized in PDD-8100, Environmental Management System, BEA failed to correct identified deficiencies in waste management programs to prevent noncompliance with regulatory requirements and agreements, and to reduce the potential for release of hazardous wastes.

### Sample Management in BEA Labs

**IO-027187**

Contrary to the requirements of LWP-8000, authorization for extended sample retention has not been maintained as required for the MFC analytical laboratory.

Over the past 12 months, zero noncompliance notification events have been reported through ORPS.

The remaining noncompliance is as follows:

**Failure of the ORPS Quarterly Report to Identify Recurring Events**

**IO-027920**

DOE issued a finding that BEA's ORPS Quarterly Analysis continues to require improvement stating that specific examples where inadequate justification was given to discount similarities between events existed with reportable LO/TO and TSR events.

In response to this finding, BEA met with DOE-ID on several occasions to discuss the issue. During those meetings, DOE-ID agreed that BEA took appropriate corrective actions for both the LO/TO and TSR issues and that BEA correctly followed its current issues management process when determining if an event is recurring.

BEA's process follows guidance issued by DOE-HQ during the revision of DOE Order 232.2. Item #7 of the crosswalk for DOE Order 232-2 issued in 2011 and identifies that DOE Guide 231.1-1 will be replaced by an EFCOG document on the

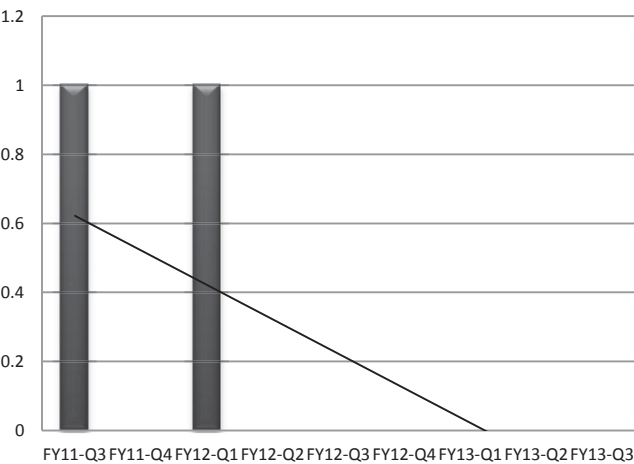
same topic (<https://www.directives.doe.gov/pdfs/RevCom-1-27967-o232.2DirectiveCrosswalk.pdf>). BEA used the *EFCOG guide for Performance Analysis* to define recurring issues (<http://efcog.org/guides/Performance Analysis Contractor Guide-2008-1.pdf>).

In retrospect, DOE does not believe the EFCOG guide provides a definition of recurrence consistent with DOE's understanding of recurring issue. In response to this finding by DOE, BEA has taken actions to revise the ORPS quarterly report and is working with DOE-ID to re-define recurring events and to incorporate the new definition into INL procedures.

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

*EFCOG Contractor Guide for Performance Analysis*

Group 9 - Noncompliance Notifications



**TREND SNAPSHOT**

**Noncompliance Notification Events:** Noncompliance notification events have not been reported at the INL since the 1<sup>st</sup> Qtr FY12. The rate of occurrence of these events continues to trend downward over the past two years.

Corrective action plans to address the four deficiencies identified by DOE-ID are ongoing. Reportable and non-reportable noncompliance notifications, and those deficiencies related to agencies requiring to report, will continue to be monitored.



Events reported as management concerns or issues accounted for 26% of the events reported during the 3<sup>rd</sup> Qtr FY13 and 17% of those reported over the past 12 months. Five events were reported during the 3<sup>rd</sup> Qtr FY13 and are summarized below.

### Exposed Unguarded Terminal Board

**NE-ID-BEA-ATR-2013-0013** (Significance Category 3)  
On April 24, 2013, an ATR Radiological Controls Technician (RCT) discovered that the back of the SPING cabinet, located in the Radiological Controls office area, was left off for troubleshooting, which had started earlier in the day. The equipment/work area was left in a condition that, it was believed, could potentially allow untrained workers to enter the 3'6" Restricted Approach Boundary, which is in violation of National Fire Protection Association (NFPA) 70E, Section 130.2, Approach Boundaries to Live Parts.

It was believed that the electrical energy source within the SPING cabinet was 110V and, upon being informed of the condition of the SPING cabinet, the ATR Shift Supervisor (SS) immediately secured the area (stationed a guard). Upon further investigation, it was discovered that the exposed electrical circuitry was 24V and posed no threat to employees.

### Unintentional Contact with Energized 120V Transformer Results in no Shock or Injury

**NE-ID-BEA-STC-2013-0002** (Significance Category 3)  
On June 5, 2013, service subcontractor electricians began work to provide support to a service subcontractor controller technician in the pulling of new controller cables through conduit to support an HVAC upgrade in the EROB West penthouse. The EROB HVAC and Fan System Controls upgrade (the upgrade) included the replacement of the existing Staefa control system to the Carrier i-Vu control system. The Staefa control panel houses mostly low voltage controllers (24V) and termination points for the sensors. However, the Staefa panel also houses a 120 VAC transformer near the top of the panel where conduit enters. The inside of the Staefa panel had been covered with a voltage rated vinyl insulated barrier (Salisbury RLBPVC1 Class 1 Clear Roll Blanket) a few weeks earlier to mitigate the 120V transformer hazard and allow energized work to be performed inside the panel. The Staefa panel was operating (energized) at the time of the event.

The electrician obtained a metal fish tape to facilitate running the cable to the panel. While pushing the fish tape, the vinyl insulation barrier slipped more than once, requiring the electrician to pull the vinyl barrier back into place to cover the work area. The action required the electrician to hold the vinyl barrier in place to prevent it from slipping while he manipulated and pushed the fish tape. During this evolution, the fish tape came into contact with a terminal on the 120V transformer. The contact resulted in a small arc, which blew an HVAC fuse and caused the fans to immediately shut down. There were no injuries to personnel.



**Figure 1 Inside of the Staefa Controller Panel with the Clear Vinyl Insulation Barrier Installed**

### Alpha-7 Continuous Air Monitor (CAM) Alarms – Potential Interference

**NE-ID-BEA-HFEF-2013-0002** (Significance Category 4)  
On April 12, 2013, Hot Fuel Examination Facility (HFEF) personnel and HPTs responded to three separate spurious CAM alarms on the main operating floor. The first alarm (High level alarm) occurred with the original CAM. It was noted the CAM alarmed approximately ten minutes after the decontamination cell roof hatch was opened. SS evacuated the main floor and made notifications. Access was restored to area as no contamination was found. Decontamination cell roof hatch was closed at 1055.

Approximately two hours later, the second alarm (High level alarm) occurred with the original CAM. The CAM alarmed approximately 15 minutes after the decontamination cell roof hatch was opened. SS evacuated main floor and made notifications. Access restored to area as no contamination was found. Decision was made to replace CAM with CAM from Manipulator Repair Group (MRG) room. Decontamination cell roof hatch remained open. Roughly an

hour later, the third CAM alarm occurred with replacement MRG CAM in position. This time, the alarm was a Poor Fit maintenance alarm. SS evacuated the main floor and made notifications. Access was restored to area as no contamination was found. Decontamination cell roof hatch was closed at 1315.

Work was suspended in HFEF due to these multiple spurious alarms. No further CAM alarms occurred. On 4/17/2013, HFEF Management staff and HPTs monitored CAM while roof hatch was opened. They noted CAM indications rose after the open roof hatch strobe actuated. It was identified that, after turning/rotating the CAM 90 degrees, Derived Air Concentration (DAC) levels returned to normal background level. This test activity was performed twice with the CAM.

### Light Dropped From Suspended Ceiling during Blower Replacement at Nuclear Materials Inspection and Storage (NMIS) Facility

**NE-ID-BEA-ATR-2013-0020** (Significance Category 3)  
On June 4, 2013, during the replacement of NMIS facility return blower, a 4 bulb florescent light fixture fell out of the

suspended ceiling. The ceiling had been partially disassembled for the NMIS return blower replacement. When the fixture fell out of the ceiling, the electrical conductors separated, tripping the breaker. No fuel handling operations were in progress and all fuel was in storage in the NMIS vault.

### Near Miss to ATR TSR Limiting Condition for Operations

**NE-ID-BEA-ATR-2013-0021** (Significance Category 3)  
On June 5, 2013, while preparing for calibration of the Reactor Vessel Differential Pressure (D/P) Transmitter Channel "A," trip bars were installed on the trip logic modules for the Vessel D/P Channel "A" and related subsystem comparators in Channel "A" that share a sensing line with the transmitter to be calibrated. Prior to the valves being shut to remove the Vessel D/P transmitter from service, the DOE Facility Representative questioned why some of the intentionally tripped instrument alarms were not on in the reactor control room. This led to finding the failed trip bars.

Had the isolation valves for the transmitter been shut without the comparators in a tripped state, a condition not allowed by LCO-3.1.1 would have occurred.

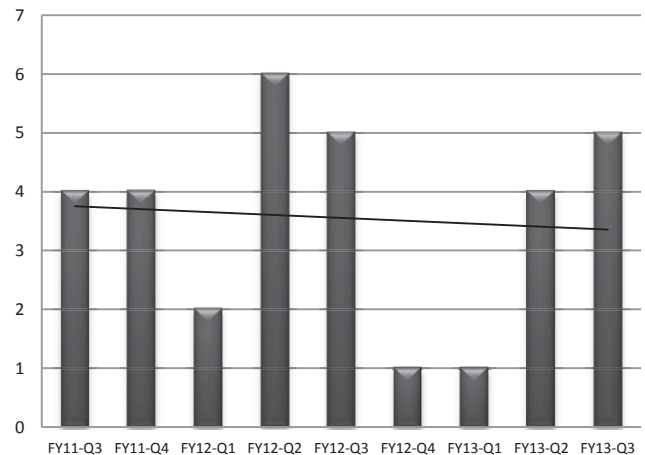
## TREND SNAPSHOT

### Reportable Management Concerns and Issues

**Events:** Although there was an increase in the number of management concerns reported during the 3<sup>rd</sup> Qtr FY13, the rate of occurrence of these events has been trending downward.

**Analysis of the events reported over the past 12 months does not indicate existence of any adverse trend or recurring issue.**

Group 10 - Management Concerns/Issues





## 3<sup>rd</sup> Qtr FY13 EVENTS INVOLVING SUBCONTRACTORS

There have been 13 events involving subcontractors reported through ORPS during the past two years. One was reported this quarter and has been described under the personnel safety and health section of this report but is summarized below.

### Unintentional Contact with Energized 120V Transformer Results in no Shock or Injury

**NE-ID-BEA-STC-2013-0002** (Significance Category 3)

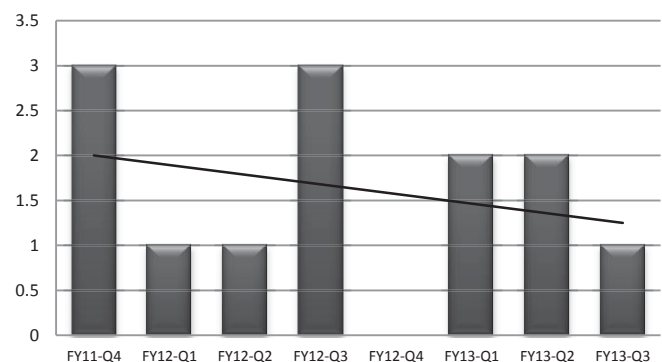
On June 5, 2013, service subcontractor electricians began work to provide support to a service subcontractor controller

technician in the pulling of new controller cables through conduit to support an HVAC upgrade in the EROB West penthouse. The inside of the Staefa panel had been covered with a voltage rated vinyl insulated barrier (Salisbury RLB PVC1 Class 1 Clear Roll Blanket) a few weeks earlier to mitigate the 120V transformer hazard and allow energized work to be performed inside the panel. While pulling the fish tape through the panel, the tape came in contact with the 120V transformer inside the panel. The Staefa panel was operating (energized) at the time of the event.

### TREND SNAPSHOT

**Events Involving Subcontractors:** A review of the ORPS reports data for events involving subcontract personnel shows that there is no trend involving the nature of the events nor the subcontractors involved in the events. The rate of occurrence of events involving subcontract personnel continues to trend downward over the past two years.

Reportable Events Involving Subcontractors



## 3<sup>rd</sup> Qtr FY13 ANALYSIS OF CAUSES OF REPORTABLE EVENTS

Cause analysis results document in ORPS were analyzed to determine trends, within the causes identified, over the past two years and during the past 12 months.

The analysis shows that the majority causes over both time periods can be attributed to management and human performance problems, followed closely by problems with written communications. Specifically, management problems associated with change management and with less-than-adequate (LTA) supervisory methods were most often identified. Human performance problems primarily exist due to knowledge-based errors committed by workers because they justified their actions based upon previously successful

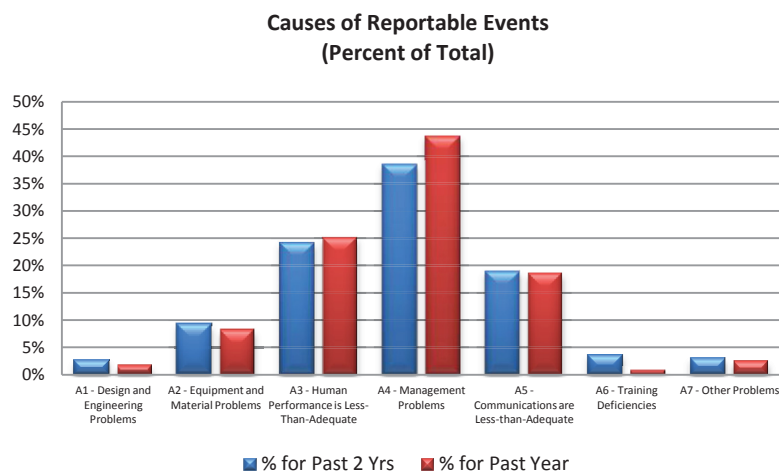
work evolutions and because they made incorrect assumptions about the tasks they were performing.

The human performance causes were often coupled with less-than-adequate communications, specifically, less-than-adequate written communications.

*A3 – Knowledge Based Errors are Occurring  
A4 – Supervisory Methods are LTA  
A5 – Written Communications are LTA*

## TREND SNAPSHOT

**Causes of Reportable Events:** A review of the causes of reportable events shows that there has been little change in cause of events over the past two years.



## 3<sup>rd</sup> Qtr FY13 ANALYSIS OF IOPAC TRENDING ANALYSIS

In FY13, the INL assembled a group of representatives from INL facilities and programs to form the IOPAC. The IOPAC established a framework for measuring operational performance and, each month, analyzes issues for commonalities in functions, behaviors, and ISMS core functions. The committee reports to the INL Operations Council and, while right now they are focused on analyzing events at a facility or program level, the committee will mature to eventually propose recommended improvement actions to the operations council. These recommended actions may be for an individual site or program or may be actions intended to facilitate site-wide changes.

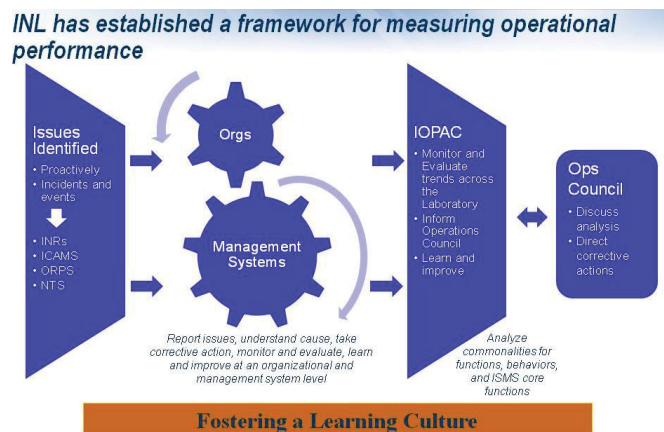
The first IOPAC report was presented to the Operations Council in June 2013. The IOPAC identified that problems across the INL are being recognized in the following three main topical areas:

- Work Processes – specifically with document accuracy and procedure compliance
- Leadership and Accountability – often with staffing and training and qualifications
- Personal Accountability

In addition, the two categories where the most prevalent concerns were noted across the site included document accuracy and procedure compliance. This coincides with the analysis of cause documented in the previous section, in that

written communications are often less-than-adequate and errors committed by workers are occurring because the worker justifies his or her actions based upon previously successful work evolutions and because the worker is making incorrect assumptions about the tasks they are performing.

Also supporting this analysis is the selection of the most prevalent discipline code, that being associated with Conduct of Operations and a failure to comply with procedures. The sixth most commonly selected discipline code is related to document adequacy.



**Figure 2 Framework for Measuring Operational Performance**

### 3<sup>rd</sup> Qtr FY13 ANALYSIS OF COMPLETED EFFECTIVENESS REVIEWS

The INL performs effectiveness reviews of more significant issues in order to:

- 1) Verify completion of the assigned corrective actions.
- 2) Determine the effectiveness of the corrective actions in successfully resolving and preventing recurrence of the problem.

During the 3<sup>rd</sup> Qtr FY13, INL organizations completed three effectiveness reviews on higher significance issues. The focus of the reviews and their results are summarized below.

#### **Effectiveness Review of Corrective Actions Taken for ATR Surge Tank Level Uncertainty Analysis (IO-003388)**

**IAS13113** (Inspection)

The purpose of IAS13113 was to confirm that the implemented corrective actions taken for the ATR surge tank level uncertainty analysis have effectively addressed the action plan.

The assessment found that the corrective actions taken are still in effect and have created the intended results based on the reviews of application documents. Additionally, the corrective actions did not create any new or potential problems.

#### **Effectiveness Review of Corrective Actions Taken for the FMF AFCl Glovebox TSR Violation (IO-017560)**

**IAS131491** (Inspection)

The purpose of IAS131491 was to inspect document evidence and to assess the effectiveness and completion of actions associated with the FMF TSR Violation (NTS NE-ID—BEA-FMF-2012-0001).

The assessment criteria “no additional MFC ICAM issues associated with TSR wording that would indicate the lessons learned case study was ineffective or that similar training needs to be repeated or conducted on a continuing basis” could not be met and a new issue (IO-026933) was assigned.

The inspection found that new and related ICAMS issues associated with TSR wording or implementation had been reported since July 2012. A recommendation was made to conduct a post training effectiveness review against the lessons learned case study and to reevaluate the decision that no additional training be performed.

#### **Effectiveness Assessment for the Fuel Conditioning Facility (FCF) Disabled Audible Alarm on the FCF Control Room Panel (IO-019304)**

**IAS131719** (Independent Assessment)

The purpose of this assessment was to evaluate the effectiveness of corrective actions taken for the FCF Disabled Audible Alarm on FCF Control Room Panel. The assessment reviewed the corrective actions and closure objective evidence for adherence to the corrective action plan specified in INL/MIS-12-26053, Causal Analysis for Disabled Audible Alarms on FCF Control Room Panel, Level 1 Cause Analysis and Corrective Action Plan. Affected personnel (SS, Nuclear Facility Operators, Operations Manager, etc.) were interviewed to determine understanding of the issues, cognizance of corrective actions, and effectiveness of the corrective actions. Document reviews were performed as appropriate to verify compliance with the corrective action plan.

The conclusion of the report states “The effectiveness assessment was evaluated as overall effective. Conduct of operations issues have been addressed appropriately and no blatant or egregious violations have occurred since the April 2012 FCF event. One administrative action (NTS 12) was evaluated to be ineffective and will be corrected and tracked using ICAMS.” It is noted that the assessment focused on conduct of operations at the FCF only and not at other MFC facilities.

Based upon the results of the assessment, it was recommended that no additional effectiveness assessments be completed on this topic.

### 3<sup>rd</sup> Qtr FY13 KEY LESSONS LEARNED ISSUED BY INL ORGANIZATIONS

The INL Lessons Learned Program is an integral part of the feedback and improvement processes required by DOE. Operational excellence requires the use of internal and

external operating experience information (OEI) to prevent recurrence of undesirable conditions and promote noteworthy practices. Lessons learned both positive and

negative, are systematically evaluated and implemented to continuously improve performance. During the 3<sup>rd</sup> Qtr FY13, the INL issued 13 lessons learned, six of which were Yellow (Caution) lessons. No Red (Urgent) lessons were issued by INL. The Yellow lessons are summarized below.

#### **Leaking Fuel Valve Causes Boiler Pressure Excursion (YELLOW – 2013-1134)**

On March 3, 2013, two utility technicians were performing the low water cut out safety checks on “B” boiler at SMC, TAN 679, when a pressure excursion occurred, causing some damage to the boiler. An immediate cause for the over-pressurization of the combustion chamber was not initially known. The damage to the boiler was mainly visible at the rear door and the rain cap for the stack. The rear door was separated and insulation was blown around the room. The door outer welded support structure was clearly stressed and weld fracture was present at several of the connections.

Upon opening of the front door, it was found that the inner door was bowed, the baffle was bent, and the blower housing was cracked and bent. After disassembly and further investigation, the cause of the event was determined to be from leaking main fuel shut-off valves; one of which was a proof of closure valve. It was determined that the valves were not closing completely. When the boiler initiated the start-up sequence, after the low water cut out check, the fuel that had dripped into the hot boiler vaporized and exploded when pilot ignition occurred. The fuel explosion caused a loud report, frightened two operators and caused damage to the boiler. The INL recommends visual verification of complete fuel stoppage upon valve closure. This should be performed on a regular maintenance interval and after any maintenance affecting the fuel supply system.

#### **Safety Basis Implementation Strategy for TSR Should be Rigorously Reviewed on a Periodic Basis (YELLOW – 2013-1145)**

In the first quarter of 2013, the FMF at MFC experienced three TSR violations from three separate events that involved handling transuranic materials. The cause analysis report revealed common causes in all three events. The violations were related to 1) two noncompliant container configurations, 2) a criticality alarm system mode change failure, and 3) workroom staffing violation.

Facility management failed to understand it could not effectively implement TSRs by requiring personnel to remember how to meet those requirements (i.e., knowledge-based operational activities). Safety basis implementation

strategies may be lost if not well documented or understood, and, therefore, should be reviewed by a cross-functional team on a periodic basis (i.e., annually). The team should include performers of the work, safety analysts, engineers, safety personnel, health physics personnel, independent management, etc.

Additionally, procedure writers are strongly encouraged to use independent signatures to verify TSR compliance in a step-wise fashion in procedures that implement TSR requirements. LCO action statements must be fully implemented and DOE directed changes must be carefully implemented.

#### **Lighting Fixture Drops from Suspended Ceiling at NMIS Facility (YELLOW-2013-1148)**

Management and workers need to be aware that the removal of suspended ceiling tile grids to perform ventilation system maintenance can eventually weaken the connection points for the tile grids, creating an unknown hazard – lighting fixtures that are not secured independently of the ceiling tile grid become a fall hazard. Following the June 4, 2013 near miss, the following recommendations were offered:

- These types of light fixtures should have an individual wire support to prevent them from falling. In the future when carpenters begin to remove the tile and/or grid that are close to these fixtures, they will check to verify that the fixture has its own hurricane and/or earthquake clips and individual wires connected to the roof structure.
- Evaluate work that requires partial removal of suspended ceilings, to ensure the proper hazards have been identified and mitigated, due to the wearing of connection points on tile grids and lighting fixtures not supported independently.

#### **Snap-on Breaker Securing Device Used for LO/TO Failed (YELLOW-2013-1122)**

Breaker On or Off securing devices should be evaluated prior to each use, especially if devices will be used for LO/TO. Breaker securing devices may loosen from the breaker over time, potentially causing the LO/TO devices to be released from the actuating mechanism. Inadequate LO/TO devices could possibly cause injury or death if energy sources do not remain secured.

The G-E THP100 On or Off Snap-On breaker securing device is manufactured by the panel manufacturer, GE, and not an after-market design. The device has only three sides and has small tabs that fit into manufactured slots in the face of the breaker. When installed correctly, with the tabs inserted into the slots, the breaker securing device is held into position with the dead front of the panel, however, if the tabs are sprung at all and the dead front of the panel does not fit tightly, the breaker securing device will be allowed to tip forward toward the dead front of the panel. Eventually, the device will loosen its grip on the breaker, the tabs will release from the slots in the breaker, and the device can be pulled or fall out from behind the dead front of the panel.

### **Compact Combustion Event in Hood at Fuels and Applied Science Building (FASB)**

**(YELLOW-2013-1133)**

When handling materials with uncertain reactive properties, one should ensure that hazard identification and mitigation is appropriately addressed in work control documentation.

The FASB is a Radiological Facility, located at MFC at the INL, which provides space and resources for the research and development of low enrichment fuel as an alternative for research reactors, spent fuel treatment, nuclear waste research and development, and the conduct of other experimental projects.

One of the research projects involves developing accident tolerant fuels utilizing liquid phase sintering of Uranium Silicide ( $U_3Si_2$ ), un-reacted depleted Uranium (U), and Silicon (Si). This process involves combining powder size constituents of  $U_3Si_2$ , U, and Si, and then using a press to make, what is referred to as, a green compact. All powder handling and compacting is performed in the inert atmosphere of the Reduced Enrichment Research and Test Reactors (RERTR) Glovebox compartment C, because of the pyrophoric nature of the constituent  $U_3Si_2$  and un-reacted depleted Uranium powders. The green compacts are then liquid phase sintered in a furnace under a cover gas to obtain  $U_3Si_2$  with increased density.

On April 10, 2013, three green compacts composed of  $U_3Si_2+U+Si$  powders were produced by the Principal Investigator (PI) in the inert RERTR Glovebox. Each green compact was placed in a cotton liner for protection and then placed in a small Ziploc plastic bag and labeled Sample 1, 2,

and 3. All three bagged green compacts were placed in a larger Ziploc plastic bag and transferred out of the inert RERTR Glovebox and into East Hood B for decontamination prior to transferring them to a sintering furnace, located in another room in FASB. Inside East Hood B, each of the samples was removed from the plastic bags and cotton liners and placed on a paper towel.

After approximately five minutes, Sample 1 spontaneously began to combust. The PI immediately called out to pull fire alarm and Metal-X fire extinguishing agent was applied to Sample 1, completely covering the combusting green compact (see Figure 1). Approximately 30 seconds elapsed from beginning of observed reaction to application of Metal-X.

All subsequent actions taken were appropriate for this event. The MFC Fire Department found no presence of fire when they entered the facility and thermal imaging indicated that the combustion event was over and did not spread from Sample 1. Radiological Controls personnel performed surveys and found no spread of contamination to personnel or the facility above established regulatory limits. MFC Industrial Hygienist verified that East Hood B was functioning as designed and flow was within specifications.

As a result of this event, the INL provided the following recommendations:

- Ensure good housekeeping at all times (control of combustibles around work area).
- Ensure hazards are properly identified and mitigated in work control documentation, specifically when exposing reactive materials to air.





### ***INL Laboratory Performance Expectations***

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

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

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

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