

2016

U.S. Nuclear Power Industry

Emergency Classification Notifications

Statistics, Trends & Operating Experience



Operations Support Services, Inc.

1716 White Pond Lane
Waxhaw, NC 28173
(704) 243-0501

1/4/2017

NOTICE

This report was prepared by Operations Support Services, Inc. (OSSI). Neither OSSI nor any of its employees or consultants make any warranty, expressed or implied, or assume any legal liability or responsibility for the accuracy, completeness or usefulness of any information disclosed in this report, or represent that its use would not infringe privately-owned rights. The opinions, conclusions, and recommendations set forth in this report are those of the authors and do not necessarily represent the views of OSSI, its employees or consultants.

NOTICE

This document may be freely distributed contingent upon the fact that it is distributed as a whole document. This includes printing it as a whole document or providing it as a resource by linking to it. This document may not be republished or modified in any form without written consent from Operations Support Services, Inc.

Should you have questions about the contents of this report, please contact **Kelly Walker**.

<mailto:ossikelly@aol.com>

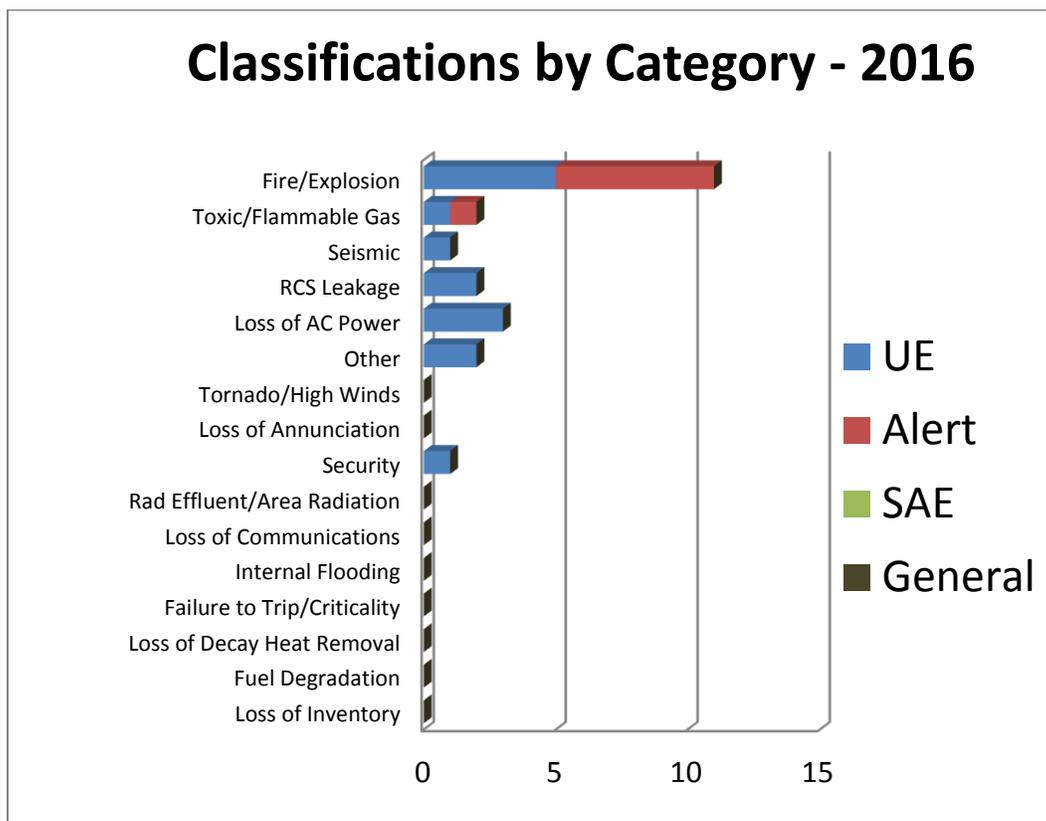
(704) 243-0501

STATISTICS & TRENDS

During 2016, there were fifteen (15) Unusual Event and seven (7) Alert emergency classification notifications made to the NRC. **Figure 1** depicts the number of emergency classification notifications made in 2016 by category. The categories in Figure 1 are those, which we have tracked since the inception of our annual report in 2008. **Figure 2** depicts total emergency classification notifications made by category over a ten year period.¹ The distribution of emergency classifications for the year 2016 deviates somewhat from the cumulative totals, by category, over the ten-year period shown in Figure 2. Reasons include:

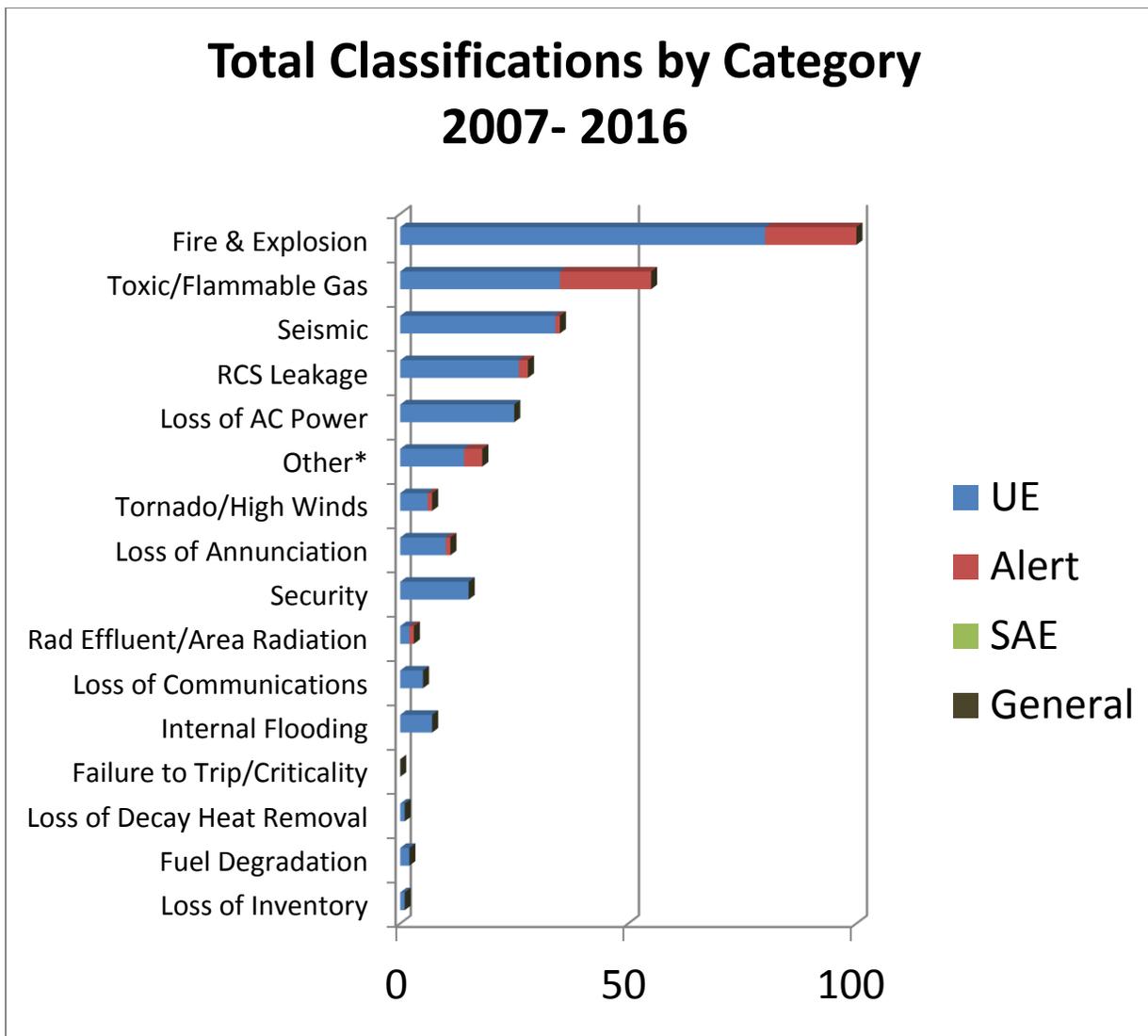
- There continues to be a significant reduction in hazardous gas event classifications over the previous five-year period.
- The lack of hurricane and seismic activity in the US has again significantly reduced natural-event-based classifications.
- Three “loss of AC power” events in 2016 following a year with no loss of AC electrical power-based classifications.

Figure 1



¹ Compiled from data available on the [Nuclear Regulatory Commission Event Report website](#)

Figure 2



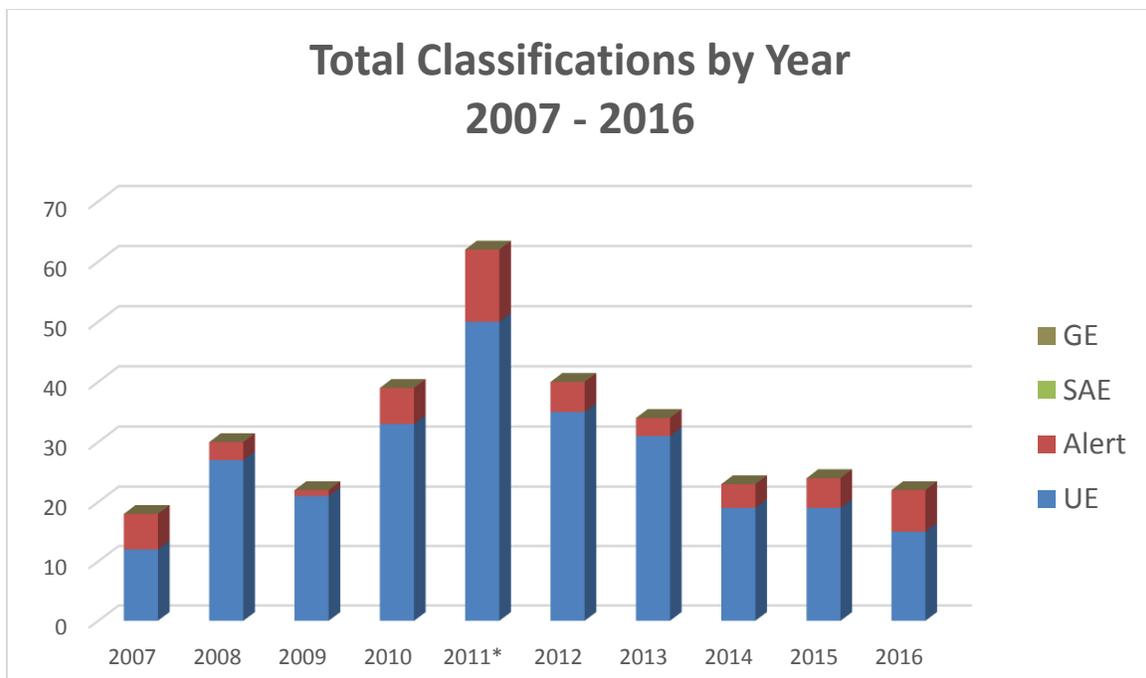
* The **Other** category includes reported events such as: high and low ultimate heat sink/intake levels, Containment operability issues, fuel handling incidents, and Emergency Director judgment.

2016 Emergency Classification Notifications

Figure 3 depicts total number of emergency classifications reported to the Nuclear Regulatory Commission per year for the years 2007 through 2016. The 2016 total (22 declared events) represents the fourth year in a row that total classifications are significantly below the previous 10-year historical average (~34 declared events per year).

2016 again saw a higher percentage of fire/explosion related Alert classification notifications – 6 of 11 (~55%), relative to ten-year historical data – 20 of 100 (20%).

Figure 3



* Sixteen (16) Unusual Events and one (1) Alert were declared on 8/23/11 due to an east coast seismic event.

INSIGHTS

After-the-Fact Classifications

In 2016, there were no after-the-fact classifications. As noted in last year's report, the lack of such classifications is due to licensees adhering to the guidance provided in NEI 99-01, Revision 6, Section 5.9, "After-the-Fact Discovery of an Emergency Event or Condition" which states that "...when personnel discover that an event or condition existed which met an EAL, but no emergency was declared, and the event or condition no longer exists at the time of discovery," that no emergency declaration is warranted and the event should be reported to the NRC in accordance with 10CFR50.72 (consistent with the guidance provided in NUREG-1022).

Emergency Classification Notification Retractions

In 2016, there were two (2) emergency classification notification retractions. Emergency classification retractions are typically based on classified events that were later determined to have been either inaccurate or over-classified.

- On 1/14/16, Diablo Canyon Power Plant declared an Unusual Event ([51655](#)) based on an unauthorized person in the Owner Controlled Area later determined to not meet the EAL intent related to threat to security or threat to site personnel.
- On 1/17/16, the WEC – Uranium Fuel Fabrication Facility declared an Alert ([51660](#)) based on a fire in the mechanical factory strap plating room not extinguished within 15 minutes. A subsequent assessment determined that the fire was, in fact, extinguished within 15 minutes.

Focus Area: Alert Classifications Based on Fire/Explosion

In 2016, six (6) of the eleven (11) Fire/Explosion-based emergency classification notifications were classified as an Alert (~55%). Excluding the retracted Fuel Fabrication Facility Alert noted above, four (4) of the remaining five (5) Fire/Explosion-related Alerts involved damage limited to the components, which failed resulting in the fire or explosion. That is, 80% of the declared Fire/Explosion based Alert events did not result in visible damage to any other safety system structure or component. The impact of these events was limited to the operability of the failed components. See summary of NRC EPFAQ 2016-002 below.

Update: NRC Emergency Preparedness (EP) Frequently Asked Questions (EPFAQs)

The NRC EPFAQ process provides a mechanism for addressing emergency preparedness issues where the regulatory guidance may not be sufficiently clear or where consistency in application would benefit both the NRC and licensees. Some of these FAQs are related to clarification of generic emergency action level guidance. Endorsed FAQs are often subsequently incorporated in the associated regulatory guidance.

The following is a summary of some selected (not comprehensive) recent EPFAQs related to emergency classification:

2015-012 Endorsed NRC Response

Related to the use of instrumentation or indications external to the control room within EAL thresholds. The NRC response does not preclude development of EALs that use instrumentation or indications external to the control room provided such instrumentation or indications support emergency classification in a reasonable time (e. g. "...within 30-minutes") and this timing limitation is clearly described within the EAL technical bases. This FAQ would be applicable to EAL scheme change License Amendment Request (LAR) submittals or revision of existing EALs within a licensee's currently approved classification scheme. In all cases, prior NRC approval would be required.

2015-013 Endorsed NRC Response

Related to the security-based General Emergency threshold (HG1 in NEI 99-01 Rev. 5 and Rev. 6). This FAQ supports justification for not incorporating a security-based General Emergency threshold in an EAL scheme change LAR submittal or deletion of existing security-based General Emergency EALs within a licensee's currently approved classification scheme. In all cases, prior NRC approval would be required.

2015-014 Endorsed NRC Response

Related to mode applicability for the Site Area Emergency control room evacuation IC/EAL (HS6 in NEI 99-01 Rev. 6). The FAQ supports justification for deleting the Defueled mode applicability and restricting mode applicability related to reactivity control to those modes where insufficient shutdown margin may exist at the time of control room evacuation. This FAQ would be applicable to EAL scheme change LAR submittals or revision of existing control room evacuation Site Area Emergency EALs within a licensee's currently approved classification scheme. In all cases, prior NRC approval would be required.

2016 Emergency Classification Notifications

2015-015 Endorsed NRC Response

Related to loss of AC power ICs/EALs (SU1, SA1, SS1, SG1, SG8, CU2 and CA2 in NEI 99-01 Rev. 6), this EPFAQ provides clarification as to when a list or table of credited qualified onsite and offsite AC power sources should be incorporated into the loss of emergency bus AC power EALs.

2016-001 Under NRC Review

Related to security-based ICs/EALs, this EPFAQ clarifies that a projectile fired by a Hostile Force impacting within the Protected Area constitutes a Hostile Action within the Protected Area relative to the Site Area Emergency (HS4 in NEI 99-01 Rev. 4/5 and HS1 in NEI 99-01 Rev. 6).

2016-002 Under NRC Review

Related to hazardous event-based ICs/EALs (HA2 in NEI 99-01 Rev. 4/5 and CA6/SA9 in NEI 99-01 Rev. 6), this EPFAQ proposes clarification of the generic definition of Visible Damage, by excluding damage that is limited to the component which failed (i.e., the failure did not cause damage to a safety-related structure or any other safety-related equipment). Additionally, this EPFAQ proposes the addition of a note excluding classification due to hazards resulting in damage only to systems or components that were already non-functional at the time of the event (e.g., tagged out for maintenance).

2016 Classification Notification Summaries by Category

	<u>Page</u>
<u>Fire/Explosion</u>	
1/17/16 WEC – Uranium Fuel Fabrication Facility <i>Alert</i> (retracted)	8
2/7/16 Brunswick Nuclear Plant <i>Alert</i>	8
3/6/16 Oconee Nuclear Station <i>Unusual Event & Alert</i>	9
3/9/16 Watts Bar Nuclear Plant <i>Unusual Event</i>	10
6/27/16 Dresden Nuclear Power Station <i>Alert</i>	10
7/6/16 D. C. Cook Nuclear Plant <i>Unusual Event</i>	10
7/12/16 Brunswick Nuclear Plant <i>Alert</i>	11
8/30/16 Watts Bar Nuclear Plant <i>Unusual Event</i>	11
11/8/16 Indian Point Energy Center <i>Unusual Event</i>	12
12/15/16 Palo Verde Nuclear Generating Station <i>Alert</i>	12
<u>RCS Leakage</u>	
5/15/16 Byron Station <i>Unusual Event</i>	13
8/13/16 Prairie Island Nuclear Generating Plant <i>Unusual Event</i>	13
<u>Security</u>	
1/14/16 Diablo Canyon Power Plant <i>Unusual Event</i> (retracted).....	14
<u>Toxic/Flammable Gas</u>	
5/15/16 Millstone Power Station <i>Unusual Event</i>	15
11/1/16 Farley Nuclear Plant <i>Alert</i>	15
<u>Loss of AC Power</u>	
8/21/16 St. Lucie Power Plant <i>Unusual Event</i>	16
10/8/16 Robinson Nuclear Plant <i>Unusual Event</i>	17
10/8/16 Harris Nuclear Plant <i>Unusual Event</i>	17
<u>Seismic</u>	
9/3/16 Cooper Nuclear Station <i>Unusual Event</i>	18
<u>Other</u>	
4/6/16 Browns Ferry Nuclear Plant <i>Unusual Event</i>	19
10/4/16 Saint Lucie Nuclear Power Plant <i>Unusual Event</i>	19

Event identification numbers are enclosed in parentheses and hyperlinked to the [NRC Event Report website](#).

FIRE/EXPLOSION

(NEI 99-01 Rev. 5 IC HU2/HA2: Rev. 6 IC HU4/CA6/SA9)

1/17/16 ALERT - FIRE NOT EXTINGUISHED WITHIN 15 MINUTES (retracted)

WEC - URANIUM FUEL FABRICATION FACILITY ([51660](#))

A plant employee discovered a fire in the mechanical factory strap plating room and activated the fire alarm. At 0529 EST, the licensee notified the Richland County Fire Department. The fire was extinguished and the Alert declaration was terminated at 0709 EST. No radioactive materials were involved and no injuries were reported.

This notification was retracted. Upon further review and investigation by the licensee, it was determined that the fire was extinguished within 15 minutes. As such, no Alert declaration was required. Based on these facts, the licensee retracted the event notification.

2/7/16 ALERT - ELECTRICAL FAULT RESULTING IN FIRE/EXPLOSION

Brunswick Nuclear Plant ([51715](#))

At 1326 EST, Brunswick Unit 1 declared an Alert under EAL HA2.1 due to an explosion/fire in the Balance of Plant 4 kV switchgear bus area. Prior to the Alert declaration, the operators initiated a manual SCRAM due to an unexpected power decrease from 88% to 40%. The licensee visually verified that there was no ongoing fire and was investigating the initial cause of the event. Offsite power was available to the site, but EDGs 1 and 2 were running and supplying Unit 1 loads. The Main Steam Isolation Valves (MSIVs) shut and High Pressure Coolant Injection (HPCI) / Reactor Core Isolation Cooling (RCIC) were being used to maintain vessel pressure and level. At 1412 EST, the NRC decided to remain in Normal Mode.

The licensee subsequently reported that at 1313 hours EST a manual reactor scram had been initiated due to loss of both recirculation system variable speed drives as a result of an electrical fault. At the time, a Startup Auxiliary Transformer (SAT) experienced a lockout fault; interrupting offsite power to emergency buses 1 and 2. Emergency Diesel Generators (EDGs) 1, 2, 3, and 4 automatically started and EDGs 1 and 2 synchronized to emergency buses 1 and 2 per design. The power interruption resulted in closure of the MSIVs, per design. The manual scram also resulted in closure of Group 2 and 6 Containment Isolation Valves.

The RCIC system was manually started and was being used to control reactor water level. The HPCI system was manually started and was being used for pressure control.

The Plant response to the event was per design.

Unit 2 was not directly affected by the event, however, due to the shared electrical distribution system was in a Technical Specification Action statement due to the inoperable Unit 1 SAT.

At 1751 EST, the licensee reported that the emergency declaration had been downgraded to an Unusual Event at 1730 because the plant no longer met the criteria for an Alert, but did meet the criteria for an Unusual Event due to a "loss of all offsite power to Emergency 4 kV buses E1 (E3) and E2 (E4) for greater than or equal to 15 minutes."

At 1814 EST the emergency declaration was terminated because offsite power was restored.

**3/6/16 UNUSUAL EVENT – FIRE/EXPLOSION IN MAIN TRANSFORMER
ALERT – DAMAGE TO SAFETY RELATED EQUIPMENT**

Oconee Nuclear Station ([51770](#))

At 1512 EST, a fire/explosion occurred in the Unit 1 Main Transformer which resulted in a reactor trip. At 1520 EST, the licensee declared a Notification of Unusual Event. Offsite assistance was requested. At 1633 EST, smoke and flame were no longer visible. Fire brigade personnel were applying additional foam to prevent a re-flash. No personnel injuries occurred.

Offsite assistance was requested with three local fire departments responding.

All rods inserted on the trip. Steam generator feed was by the normal path. The plant was in its normal shutdown electrical lineup.

At 1658 EST, the licensee declared an Alert based on EAL Alert A.1. The cause of entry was that the fire damaged an overhead power line that supplies emergency power to all three units at Oconee. Offsite power was still available to all units.

At 1708 EST, the fire was declared out. At 2016 EST, the licensee terminated all emergency declarations.

3/9/16 UNUSUAL EVENT – FIRE GREATER THAN 15 MINUTES

Watts Bar Nuclear Plant ([51780](#))

Watts Bar Unit 2 declared an Unusual Event at 0342 EST based on a fire greater than 15 minutes in the turbine building - 2B hotwell pump motor. The fire was extinguished by 0401 EST. At the time of notification, Unit 2 was shut down in Mode 5 making preparations for startup. No offsite assistance was requested. All personnel were accounted for and there were no personnel injuries reported.

The licensee terminated the Unusual Event at 0508 EST based on verification that the fire was out and that the fire response team had been secured.

6/27/16 ALERT – HIGH PRESSURE COOLANT INJECTION SYSTEM FIRE

Dresden Nuclear Power Station ([52046](#))

At 1050 CDT an Alert was declared at Dresden Unit 3. The Alert was due to Unit 3 experiencing a fire in the HPCI (High Pressure Coolant Injection) system, auxiliary oil pump motor. The fire was subsequently put out.

Dresden Unit 3 was stable and continued to operate at 100% power and HPCI was declared inoperable. There was no impact on Dresden Unit 2.

Fire in the HPCI room was verified extinguished. HPCI system was deemed inoperable.

Dresden Unit 3 terminated the Alert at 1319 CDT. Dresden Unit 3 continued to operate at 100% power.

7/6/16 UNUSUAL EVENT – STEAM LEAK IN TURBINE BUILDING

D. C. Cook Nuclear Plant ([52065](#))

At 0038 EDT, DC Cook Unit 2 Reactor was manually tripped and at 0050 EDT an Unusual Event (N-7 'Unanticipated Explosion') emergency declaration was made due to steam leak and associated damage to the turbine building.

Unit 2 was being supplied by offsite power. All control rods fully inserted. Decay heat was being removed via Steam Generator PORVs Power Operated Relief Valve (PORVs). Preliminary evaluation indicated all plant systems functioned normally following the reactor trip. DC Cook Unit 2 remained stable in Mode 3 while conducting the Post Trip Review. No radioactive release was in progress as a result of the event.

7/12/16 ALERT – FIRE IN THE SERVICE WATER BUILDING

Brunswick Nuclear Plant ([52082](#))

At approximately 2035 EDT, there was smoke in the Service Water Building with the trip of the 2C conventional service water pump. In accordance with plant procedures, Unit-2 was ramped down to 70 percent power and the Alert was declared at 2039 EDT. EAL SA8.1 was entered for fire/smoke damage with degraded performance including visible damage to the service water pump. Service water pressure was eventually restored and the plant was stabilized.

At 2118 EDT, the site exited the 'Alert' when service water pressure had been restored, and the fire was confirmed out (i.e., no reflash within 30 minutes).

8/30/16 UNUSUAL EVENT – FIRE IN MAIN BANK TRANSFORMER

Watts Bar Nuclear Plant ([52210](#))

At 2110 EDT, Watts Bar Nuclear Plant Unit 2 reactor tripped due to an electrical fault affecting the 2B Main Bank Transformer, resulting in a fire in the transformer. Concurrent with the reactor trip, the Auxiliary Feedwater system actuated as designed.

All Control and Shutdown rods fully inserted. All safety systems responded as designed. The unit was stable in Mode 3, with decay heat removal via Auxiliary Feedwater and main steam dump systems. Unit 2 was in a normal shutdown electrical alignment.

Offsite assistance was requested from the county and off duty fire brigade members.

The fire was reported at 2149 EDT. Local Fire Departments responded to the site as requested.

The fire was out at 2230 EDT. The cause of the fire was under investigation.

There was no effect on WBN Unit 1 and continued to operate at 100% power throughout the event.

The Unusual Event was exited at 2342.

11/8/16 UNUSUAL EVENT – EQUIPMENT FAILURE RESULTING IN AN EXPLOSION IN THE PROTECTED AREA

Indian Point Energy Center ([52353](#))

At approximately 0840 EST, plant personnel reported an explosion within the Protected Area resulting in a fire with potential damage to plant structures or equipment. An Unusual Event was declared at 0851 EST. The onsite Fire Brigade was mobilized. The fire was extinguished at 0848 EST. The explosion was to the 138 kV power cross connect cable between the Unit 2 and 3 Station Auxiliary Transformers. Both Units were operating normally. There was no release of radioactive material. An investigation of the event was in progress.

Offsite assistance was not required. Unit 2 was in a normal electrical line-up and Unit 3 was not affected.

The Unusual Event was terminated at 0946 EST based on the fire being out.

12/15/16 ALERT – CATASTROPHIC FAILURE OF AN EMERGENCY DIESEL GENERATOR

Palo Verde Nuclear Generating Station ([52435](#))

During a scheduled surveillance test run of the PVNGS Palo Verde Nuclear Generating Station (PVNGS) Unit 3 'B' Train Emergency Diesel Generator, there was a catastrophic failure of a piston to include crankcase damage and diesel trip. The Emergency Plan was entered and an Alert was declared at 0410 MST based on an explosion resulting in visible damage to a safety system required for safe shutdown. The cause of the failure was unknown at the time. PVNGS Fire Department responded and no fire was observed. Unit 3 remained on line at 100% power. No other safety functions were impacted.

No personnel injuries occurred. The unit was in a ten day technical specification action statement on an emergency diesel generator being inoperable.

The Alert was terminated at 0636 MST.

RCS Leakage

(NEI 99-01 Rev. 5 IC SU5: Rev. 6 SU4)

5/15/16 UNUSUAL EVENT – EXCESSIVE UNIDENTIFIED LEAKAGE DURING PLANT STARTUP

Byron Station ([51931](#))

Byron Unit 2 experienced RCS Leakage, potentially Pressure Boundary Leakage, or Unidentified Leakage greater than 10 gpm for greater than 15 minutes. The Reactor Vessel Flange Temperature High Leakoff alarm was received. This met the threshold for declaration of an Unusual Event at 1118 CDT per MU6. Unit 2 was in Mode 3. Investigation was in progress to identify specific leakage location.

The plant was stable with leakage indicating about 32 gpm. The startup was stopped. There was no impact on Unit 1.

At 1459 CDT, the conditions under MU6 were no longer met. The site terminated the Unusual Event.

Unit 2 was stable and in Mode 3 pending further evaluation. The leak stopped when a loop drain isolation valve was closed.

8/13/16 UNUSUAL EVENT – EXCESSIVE RCS LEAKAGE

Prairie Island Nuclear Generating Plant ([52178](#))

Prairie Island Unit 1 declared an Unusual Event at 2359 CDT based on Reactor Coolant System (RCS) identified leakage being greater than 25 gpm. The RCS leakage was 40 gpm for three minutes. The RCS leakage was stopped when letdown flow was isolated. Minimum charging flow was established and Excess Letdown was placed in service. Prairie Island Unit 1 was stable and continued to operate at 100 percent power. There was no impact on Prairie Island Unit 2.

CV-31339 (Letdown Line Containment Isolation Valve) failed closed. VC-26-1 (Regenerative Heat Exchanger Letdown Line Outlet Relief to Pressurizer Relief Tank [PRT]) lifted with 40 gallons per minute to the PRT for three minutes. Operators entered procedure 1C12.1 AOP3, Loss of Letdown Flow to VCT. Letdown was isolated per 1C12.1 AOP3, relief valve VC-26-1 reseated and leakage to the PRT stopped. Charging flow was reduced to one charging pump at minimum speed (16 GPM). Excess letdown was placed in service to maintain pressurizer level between 32 - 34 percent. The cause for CV-31339 closing had not yet been determined.

At 0329 CDT the Notice of Unusual Event was terminated based on confirmation that conditions met all termination criteria. RCS conditions were stable. RCS leakage was less than Technical Specification limits. Subsequently, the value of RCS Identified Leakage was 0.038 gpm. Classification criteria was no longer met.

SECURITY

(NEI 99-01 Rev. 5 IC HU4: Rev. 6 HU1)

**1/14/16 UNUSUAL EVENT – SECURITY CONDITION THAT DOES NOT INVOLVE HOSTILE ACTION
(retracted)**

Diablo Canyon Power Plant ([51655](#))

A Security Condition that did not involve a hostile action was reported by the Diablo Canyon security watch commander.

At 1443 PST Diablo Canyon declared an Unusual Event, due to an unauthorized person in the Owner Controlled Area. Site Security was dispatched and assistance was requested from the local Sheriff's Department. The individual was apprehended.

At 1602 PST Diablo Canyon terminated the Unusual Event after the individual was apprehended and placed in custody of local law enforcement. Diablo Canyon remained at 100 percent power for the duration of the event.

This notification was retracted. Upon further evaluation, Pacific Gas and Electric determined that declaration of the Unusual Event was not required. The event did not constitute a threat or compromise to site security, did not involve a threat or risk to site personnel, did not represent a potential degradation to the level of safety of the plant, and did not affect the health and safety of the public.

TOXIC/FLAMMABLE GASES

(NEI 99-01 Rev. 5 IC HU3/HA3: Rev. 6 IC HU3/HA5)

5/15/16 UNUSUAL EVENT – MAIN GENERATOR HYDROGEN LEAK IN TURBINE BUILDING

Millstone Power Station ([51929](#))

At 0638 EDT an Unusual Event (EAL GU.2) was declared on Millstone Unit 3 due to a Main Generator hydrogen gas leak into the Turbine Building.

At 0645 EDT, operators manually tripped the reactor. All rods inserted. All systems functioned as expected following the reactor trip. Auxiliary Feedwater System (AFW) initiated on the reactor trip. The trip was uncomplicated and the plant was placed in Mode 3 with a normal electric lineup and decay heat being removed via steam dumps to the condenser. Operators were venting the remaining hydrogen from the generator through the normal vent path. There was no safety related equipment out-of-service. The plant was in a normal post-trip electrical line-up. All Emergency Diesel Generators were available.

At 0949 EDT, the licensee terminated the Unusual Event.

The cause of the hydrogen leakage was under investigation.

11/1/16 ALERT – AMMONIA EXCEEDING IDLH LEVELS IN THE AUXILIARY BUILDING

Farley Nuclear Plant ([52340](#))

An ALERT was declared at 1743 CDT based on Emergency Action Level (EAL) HA3 (Release of toxic, asphyxiant, or flammable gases within vital areas which jeopardizes operation of systems required to maintain safe operations or establish or maintain safe shutdown) due to an ammonia discharge into the Auxiliary Building. Farley Unit 1 was in Mode 2 at 2 percent power and Unit 2 was in Mode 1 at 100 percent power throughout the event.

Actions completed during and leading up to termination from the event included walk down of the area to locate the ammonia source, and isolating the ammonia source while atmospheric monitoring was performed in all affected and adjacent areas. Installation of additional ventilation fans was completed.

At 2202 CDT the ammonia source was identified as Valve N1P20V913. At 2228 CDT, the ammonia source was isolated. Final assessment of the Auxiliary Building showed that the ammonia levels were less than 5 ppm. It was determined that a deficiency in the valve component was the cause of the ammonia leak.

The Alert was terminated on at 2340 CDT.

A review of the Alert classification had determined that the classification was timely and accurate. All required notifications were completed accurately and in a timely manner. The Emergency Response Organization (ERO) notification system functioned as expected and all emergency response facilities were activated in a timely manner. There were no missing or injured personnel during the event. There is no evidence of tampering or sabotage of plant equipment leading to this event.

LOSS OF AC POWER

(NEI 99-01 Rev. 5 IC SU1/CU3: Rev. 6 IC SA1/CU2)

8/21/16 UNUSUAL EVENT – LOSS OF OFFSITE AC POWER

St. Lucie Nuclear Power Plant ([52191](#))

At 1926 EDT, St. Lucie Unit 1 experienced a reactor trip and a loss of offsite power due to a main generator inadvertent Energization Lockout Relay actuation. The cause of the lockout was under investigation. Coincident with the loss of offsite power, the four reactor coolant pumps deenergized. Both the 1A and 1B Emergency Diesel Generators started on demand and powered the safety related AC buses. All Control Element Assemblies (CEAs) fully inserted into the core. Offsite power to the switchyard remained available during the event, and at 2036, restoration of offsite power to St. Lucie Unit 1 was completed. Decay heat removal was being accomplished through natural circulation with stable conditions from Auxiliary Feedwater and Atmospheric Dump Valves. Pressurizer pressure was being maintained at 1850 psia and Reactor Coolant System temperature at 532 degrees F.

St. Lucie Unit 2 was unaffected and remained in Mode 1 at 100% power.

The Unusual Event was terminated at 2125 EDT after the plant restored normal offsite power.

At 2330 EDT, St. Lucie Unit 1 started two Reactor Coolant Pumps to establish Forced Circulation in order to enhance decay heat removal. Plant conditions remained stable with Auxiliary Feedwater and Atmospheric Dump Valves in service.

10/8/16 UNUSUAL EVENT – LOSS OF OFFSITE AC POWER

Robinson Nuclear Plant ([52290](#))

Unusual Event SU1.1 was declared due to momentary loss of power from the qualified off-site source.

At 1303 EDT a reactor trip occurred. The cause was under voltage to the plant 4kV buses due to an offsite grid disturbance. The cause of the disturbance was under investigation. Following the reactor trip, the Auxiliary Feedwater System actuated as expected on low steam generator level. At the time of the trip, the plant was in Mode 1. Subsequently, the plant was in Mode 3. The RCS Temperature was 550 degrees F (average), and the Steam Generator Levels were in the range of 42 to 53% (normal range) with levels controlled by the Auxiliary Feedwater System. Decay heat removal was being controlled by the steam generator PORVs. 'A' Service Water Pump did not start on Blackout sequencer, however, sufficient Service Water flow was available from the other three operating service water pumps 'B', 'C', and 'D'. All other systems operated as designed.

At 2323 EDT Emergency Bus E-2 was powered from off-site power.

At 0011 EDT on 10/09/2016 Robinson Nuclear Plant terminated the Unusual Event. The basis for the Unusual Event termination was restoration of power to Emergency Bus E-2 from off-site power.

10/8/16 UNUSUAL EVENT – LOSS OF OFFSITE AC POWER

Harris Nuclear Plant ([52291](#))

At 1328 EDT, while shutdown in Mode 4 (Hot Shutdown), Harris declared an Unusual Event due to a loss of offsite power (loss of all offsite power capability, Table S-5, to 6.9kV emergency buses 1A-SA and 1B-SB for greater than or equal to 15 minutes). Following the loss of offsite power (LOOP), the Emergency Diesel Generators (EDGs) started and loaded onto their respective emergency buses. The reactor remained stable and shutdown in Mode 4. The licensee was investigating the cause of the LOOP and the emergency buses continued to be powered by the EDGs until the licensee had determined the cause for the LOOP. Offsite power was available into the switchyard.

The cause of the LOOP was not known at the time of the event. Duke Energy Control Center evaluated the grid and was comfortable with Harris connecting emergency buses back to the grid. Harris Plant

evaluated restoration. Faults were validated on the 115kV Cape Fear North and South supply lines into the Harris switchyard.

The cause of the LOOP was subsequently determined to be a momentary electricity loss on the 115kV Cape Fear North and South supply lines into the Harris switchyard.

Based on the grid being stable and the 115kV Cape Fear North and South lines being available, the licensee terminated the Unusual Event at 2049 EDT.

SEISMIC EVENTS

(NEI 99-01 Rev. 5 IC HU1/HA1: Rev. 6 IC HA2)

9/3/16 UNUSUAL EVENT – SEISMIC EVENT ALARM

Cooper Nuclear Station ([52221](#))

At 0710 CDT, Cooper Nuclear Station declared a Notification of Unusual Event under EAL HU1.1 due to the station seismic event alarm registering a response to an earthquake (epicenter near Pawnee, OK). The reactor was not affected by the earthquake and remained at 93 percent power. The licensee performed walk downs of structures and equipment to verify that the site was unaffected.

At 1547 CDT, Cooper Nuclear Station terminated the Unusual Event. All inspections and walk downs of the plant had been completed. No damage or injuries were reported. The seismic event caused no impact to the plant.

OTHER

4/6/16 UNUSUAL EVENT – MAIN STEAMLINE HIGH RADIATION CONDITION

Browns Ferry Nuclear Plant ([51850](#))

At 1545 CDT Browns Ferry Unit 3 declared and exited the declaration of an Unusual Event due to a main steamline high-high radiation condition. Power on Unit 3 was reduced to 91 percent power. The high radiation condition alarm cleared at 1526 CDT. Browns Ferry Unit 3 reported that the high radiation conditions were due to resin intrusion from the condensate demineralizers into the reactor and hydrogen water chemistry was a potential contributor to the event. The cause was still under investigation.

At 1941 CDT Brown's Ferry determined this notification to be potentially newsworthy due to receiving notification that counties surrounding the plant were alerted of this event. No plant conditions changed.

10/4/16 UNUSUAL EVENT – HURRICANE WARNING

Saint Lucie Nuclear Power Plant ([52280](#))

A Hurricane Warning was in effect for St. Lucie County including the plant site. A hurricane warning was issued by the National Weather Service at 2250 EDT. St. Lucie Nuclear Power Plant entered an Unusual Event classification for the Hurricane Warning.

The Hurricane Warning was downgraded to a Tropical Storm Warning by the National Weather Service for St. Lucie County including the Plant Site. At time 1044 EDT on 10/7/16, St. Lucie Nuclear Power Plant terminated from the Unusual Event classification.

Should you have questions about the contents of this report, please contact **Kelly Walker**.

(<mailto:ossikelly@aol.com>) - (704 243-0501)

NOTICE

This document may be freely distributed contingent upon the fact that it is distributed as a whole document. This includes printing it as a whole document or providing it as a resource by linking to it. This document may not be republished or modified in any form without written consent from Operations Support Services, Inc.

Copyright © 2017 Operations Support Services, Inc. All rights reserved.