

NRC Operating Experience (OpE) Examples/Issues

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Areas of Recent OpE Focus

- The following slides depict recent events and areas of concern for domestic and international OpE:
- Domestic Issues:
 - Transformer and offsite power reliability
 - Emergency Diesel Generators
 - Human Performance
 - Feedwater/Service Water
 - Emergency Core Cooling System (ECCS) Voiding
- International Events:
 - Japanese Earthquake (July 2007)
 - Forsmark loss of vital power
 - Control rod shaft cracking (Forsmark/Oskersham BWRs)



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Transformer Failures/ Loss of Offsite Power

- Transformer failures were 2nd most common cause of declared events in 2007-2008
- Can lead to loss of offsite power event
- Fire/Personnel safety hazard when a transformer fails catastrophically

Recent Transformer (xfmr)/ Offsite Power Events

- Nine Mile Point Unit 1 - LOOP May 13, 2008 caused by a relay actuation at a neighboring plant
 - [Event Notification 44206](#)
 - [Licensee Event Report](#)
- Monticello – Loss of 2R xfmr with 1R xfmr out of service Sep 11, 2008
 - [Event Notification 44484](#)
 - [Licensee Event Report](#)
 - [NRC Special Inspection Report](#)
- Diablo Canyon Unit 2 main xfmr fire due to bushing failure Aug 16, 2008
 - [Event Notification 44419](#)
 - [Licensee Event Report](#)
- Point Beach Unit 1 LOOP to safety related buses due to degraded underground cables to station auxiliary transformer Jan 15, 2008
 - [Event Notification 43907](#)
 - [Licensee Event Report](#)
 - [NRC Special Inspection Report](#)
 - [Related NRC Generic Letter 2007-01](#)
- Braidwood Unit 1 trip due to offsite power fluctuation June 27, 2007
 - [NRC Information Notice 2008-12](#)
 - [Licensee Event Report](#)

Emergency Diesel Generator Reliability

- Emergency Diesel Generators (EDGs) are required in the event of a loss of offsite power.
- When coupled with transformer, grid, and switchyard issues, EDG reliability becomes more important.
- Electrical and mechanical component failures have affected EDG reliability.
- Recent Generic Communication
 - [IN 2008-05](#) – “Fires Involving EDG Exhaust Manifolds”
 - [IN 2007-36](#) – “EDG Voltage Regulator Problems”
 - [IN 2007-27](#) – “Recurring Events Involving EDG Operability”



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EDG Events

- Failed speed probe leads to excessive voltage swings at San Onofre Unit 3 on Dec 31, 2007 (Related issue at Cooper 1/15/08)
 - [San Onofre Unit 3 Special Inspection Report](#)
 - [Cooper Baseline Inspection Report](#)
- High Vibrations followed by failed main coupling at Hatch July 2008
 - [NRC Special Inspection Report](#)
- Fuel metering rods sticking due to painting activities at Comanche Peak November 2007
 - [Baseline Inspection Report](#)
 - [NRC Special Inspection Report](#)
 - [Licensee Event Report](#)
- Failure of local control (alternate safe shutdown) capability on EDG #4 at Brunswick Aug 19, 2008
 - [NRC Special Inspection Report](#)
 - [Event Notification 44425](#)
 - [Licensee Event Report](#)

Emergency Core Cooling System Voiding

- Emergency Core Cooling System (ECCS) voiding can lead to:
 - Air binding of pumps
 - Inadequate discharge pressure
 - Water hammer
- NRC issued [Generic Letter 2008-01](#) last January
 - Inspectors are identifying voiding issues and developing mitigation strategies
 - Industry and the NRC are working on the technical aspects
- Started out as OpE Issue for Resolution and Management briefing (in 2004)

Recent ECCS Voiding Issues

- Wolf Creek - Voids found in Safety Injection system piping Jan 2008
 - [Event Notification](#)
 - [Licensee Event Report](#)
 - [NRC Special Inspection](#)
- Beaver Valley Unit 1 - Voids found in Low Head Safety Injection suction piping Sept 2008
 - NRC Special Inspection Report (pending)

Feedwater and Service Water Systems

- Main Feedwater
 - Not a safety-related system, but
 - Failure can lead to challenges to safety-related systems
 - RCIC (reactor core isolation cooling)
 - HPCI (high pressure coolant injection)
 - AFW (auxiliary feedwater)
- Essential Service Water
 - Subject to harsh operating environments
 - Failure can affect ultimate heat sink availability



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Feedwater and Service Water Events

- Perry - Failure of digital feedwater control system power supplies leading to scram and RCIC failure on November 28, 2007
 - [Licensee Event Report](#)
 - [NRC Special Inspection](#)
 - [NRC Information Notice 2008-13](#)
- Prairie Island Unit 1 - trip followed by failure of Turbine-Driven Auxiliary Feedwater (TDAFW) pump to run July 31, 2008
 - [Event Notification 44377](#)
 - [Licensee Event Report](#)
 - [NRC Special Inspection](#)
- Vermont Yankee - cooling tower leak, and its effect on safety related cell of the cooling tower July 11, 2008
 - NRC Special Inspection Report (pending)
- Byron Essential Service Water riser degradation October 19, 2007
 - [Event Notification 43735](#)
 - [Licensee Event Report](#)
 - [NRC Special Inspection](#)

Human Performance Issues

- Human performance is a factor in a large percentage of events at nuclear power plants.
- A licensee's ability to effectively identify and resolve problems and to maintain a safety conscious work environment are monitored during NRC inspections.
- Recent Generic Communication
 - [Information Notice 2007-11](#) – “Recent Operator Performance Issues at Nuclear Power Plants



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Human Performance Events

- Oconee Unit 1 - RCP Vibration and Seal Package Failures April 12, 2008
 - [NRC Special Inspection Report](#)
- Vogtle Unit 1 - Operator Error leads to RCS dilution and reactivity transient September 4, 2008
- Dresden Unit 3 - Inadvertent rod withdrawals while shutting down for RFO Nov 6, 2008
 - [Event Notification 44665](#)
- Palisades - Five individuals (including NRC inspector) trapped inside containment due to unlatched airlock door and failure of communications equipment Aug 6, 2008
 - [NRC Special Inspection](#)
- Salem Unit 1 - Loss of control of RCS level during pressurizer draindown Oct 15, 2008
 - NRC Special Inspection report pending



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Japanese Earthquake

- On July 16, 2007, a magnitude 6.6 earthquake occurred near the western coast of the island of Honshu, Japan, impacting the seven-unit Kashiwazaki-Kariwa (KK) Nuclear Power Plant
- OpE Staff Activities related to the earthquake:
 - Coordinated the NRC staff response to this event, including working with the Japanese regulatory agency and with members of an IAEA task force that visited the KK site.
 - Provided a briefing to U.S. Senate staff members and media training.

- Electrical fault in 400kV switchyard resulted in inverter failures and subsequent loss of 2 of 4 emergency diesel generators
- OpE staff activities related to Forsmark
 - [IN 2006-18](#)
 - [IN 2006-18, Supplement 1](#)

Control Rod Shaft Cracking

- October 2008, control rod shaft cracking discovered at 2 Swedish BWRs (Oskarshamn and Forsmark)
- OpE staff response:
 - Compiled international news releases and kept NRC management informed.