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Operations with a Potential for Draining the Reactor Vessel (OPDRV)

July 27, 2011 Public Meeting

Between the U. S. Nuclear Regulatory Commission (NRC Staff) and the Boiling Water Reactor Owner's Group (BWROG)

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OPDRV Meeting Ground Rules

- Participate
- Be respectful of the speaker so he or she can be heard
- Limit side conversations
- Start and end on time
- Adhere to the agenda
- See Nichole with procedural questions

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Meeting Objective

To reach a common understanding of the BWROG position and the NRR Staff position on the Technical Specification Applicability Phrase – Operation With a Potential for Draining the Reactor Vessel (OPDRV)

HISTORICAL REVIEW OF TECHNICAL SPECIFICATION REQUIREMENTS

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Historical Review
August 1974 to Present

Identified RPV Loss of Inventory OpE,

OPDRV Generic Communications, and

Interactions with the BWROG during Development of Improved STS.

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Historical Review of TS Requirements

- OPDRV was in TSs of BWR's licensed in the early 1970's.
- OPDRV has been in GE-STS since NUREG-0123, Rev. 2, August 1979.
- OPDRV issues began with General Electric Service Information Letter No. 388 on RHR Misalignment in 1983
- Generic Communications began IN 84-81 "Inadvertent Reduction in Primary Coolant Inventory in Boiling Water Reactors During Shutdown and Startup," November 1984.
- In total, one Generic Letter, one Bulletin, three Information Notices, and a General Electric Service Information Letter have been issued to address BWR loss of vessel inventory events.

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General Electric Service Information Letter No. 388

RHR Valve Misalignment During Shutdown Cooling Operation for BWR 3/4/5/6 (February 1983)

- Key message
  - RHR shutdown cooling is entirely controlled by manual operator actions and is, therefore, subject to operator error which could result in hydraulic and thermal conditions not specifically considered during the design process.
  - Highlights the importance of operator training and compliance with plant operating procedures.

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Information Notice 84-81

Inadvertent Reduction in Primary Coolant Inventory in BWRS During Shutdown and Startup

- Key message
  - Two of five drain down events caused unnecessary challenges to safety systems because licensees focused on systems being tested without proper consideration for the system as a whole during OPDRVs.

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Information Notice 86-74

Reduction of Reactor Coolant Inventory Because of Misalignment of RHR Valves

- Key message
  - Problems of draining the reactor vessel through misalignment of the RHR valves continue to occur in spite of GE and NRC communications alerting licensees to them.

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Generic Letter 92-04

GL 92-04, "Resolution of the Issues Related to Reactor Vessel Water Level Instrumentation in BWRs Pursuant to 10 CFR 50.54(F).

- Key message
  - Addressed instrument inaccuracies responsible for water inventory losses.

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NRC Bulletin 93-03

Resolution of Issues Related to Reactor Vessel Water Level Instrumentation in BWRs

- Key message
  - Requested short term compensatory actions and hardware modification.
  - Enhanced monitoring, procedures and operator training.

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Improved STS Meeting with BWROG

- In a July 1993 meeting about BWROG discussions on the definition of OPDRVs, the NRC Staff stated that it disagreed with the industry interpretation of OPDRV.
- The NRC Staff informed the BWROG that the OPDRV issue may have to be resolved under the shutdown risk program.
- Ultimately, the shutdown risk program did not address TS OPDRV issues.
- This resulted in carrying over application of the plain language usage of the term OPDRV from the old STS to the improved STS.

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Information Notice 94-52

- Inadvertent Containment Spray and Reactor Vessel Draindown at Millstone 1.
- Key message
  - Rigorously reviewing procedures for potential systems interactions and of avoiding inadvertent system lineups that have the potential to drain the reactor vessel.

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NRC Operating Events
Loss of Vessel Inventory Reports
1995 - 2011

- 13 report inventory drain down events
- Attributed to inadequate procedures and configuration control when aligning RHR flow paths.
- 2 events occurred in 2010

Current Situation

Clinton Violation

- Violation Report was based on the NRC's conclusion that the process by which Exelon chose to define OPDRVs is in contrast to the plain language contained in the Clinton licensing basis [Clinton Power Station NRC Integrated Inspection Report 05000461/2010-003].
- [W]e (NRC) concluded that this procedure did, in fact, create a new TS definition of OPDRV ... by defining a specific threshold below which OPDRV does not apply. That definition is inconsistent with the plain language wording of OPDRV, which is intended to address the threat of any reactor coolant inventory loss.

NRC STAFF SAFETY ISSUES

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NRC Staff Safety Issue

- During OPDRVs conditions a redundant barrier to the release of fission products is needed when fuel can be postulated to be uncovered.
  - Can't count on cladding.
  - RCS boundary is not intact.
  - Primary containment boundary is removed.
  - Capability to cool the fuel may be threatened.

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NRC Staff Expectation for OPDRV Definition

- The OPDRV definition should be clear, like the TS definitions for Modes, and not subject to interpretation.
  - A plant condition either is an OPDRV activity or is not an OPDRV activity.

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NRC Staff Priority of Issues

- Safe conduct of operations when the potential exists to drain the reactor pressure vessel water level with the possibility to uncover fuel.
- Compliance with TS
- Consistent application of OPDRV licensing basis.
- Utilize correct regulatory process for defining operations as OPDRVs.

NRC STAFF DEFINITION OF OPDRV

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What's in Tech Specs about OPDRVs?

- ✓ OPDRV is a acronym unique to BWR Standard Technical Specifications.
- ✓ OPDRV describes a condition of an Applicable Mode, i.e., subset of the Mode Applicability requirements.
- ✓ OPDRV is during Modes 3, 4 and 5 .
- ✓ OPDRV is also used as a Required Action in specifications that do not have OPDRV for an LCO Applicability.

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What's in Tech Specs about OPDRVs?

- ✓ Per the Bases ASA OPDRVs are situations for which:
  - significant releases of radioactive material can be postulated.
  - the capability of detecting radiation releases due to uncovered fuel must be provided to ensure that offsite dose limits are not exceeded.
  - to ensure that offsite dose limits are not exceeded if core damage occurs
    - Secondary containment, standby gas treatment system, control room habitability systems and automatic reactor level isolation are required to be operable by Tech Specs during OPDRVs.

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What's in Tech Specs about OPDRVs?

- Per STS: Automatic ECCS pump start is not required during OPDRVs if the RPV cavity is flooded 23 feet above the RPV flange.
  - RPV inventory is large allowing operator action to terminate inventory loss prior to uncovering fuel during a drain down.
  - Secondary containment still required.

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What about OPDRVs is not in Tech Specs?

- ✓ No size of hole is used to define OPDRV.
- ✓ No allowance for mitigating capability to establish a threshold that precludes an OPDRV.
- ✓ No specific inventory makeup requirements.
- ✓ Old STS and custom TS plants don't have a stated basis for OPDRV.

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NRC Staff Position on OPDRVs Definition for BWR Licensees

- OPDRVs should not be construed to be a plant-specific term because RHR design is standard and OPDRV is a statement of LCO Applicability applied to all BWR licensees.
  - GE SIL sent to BWR 3/4/5 and 6 customers.
- OPDRVs will retain the plain language meaning until licenses are amended.

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Suggested NRC Staff OPDRV Definition

Any repair, maintenance, or system restoration activity that could result in draining or siphoning the reactor pressure vessel water level below the top of fuel.

- Without allowing for mitigating measures.