

## **NRR-PMDAPEm Resource**

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**From:** Feintuch, Karl  
**Sent:** Tuesday, June 19, 2012 10:11 PM  
**To:** Mendiola, Anthony; Ulses, Anthony; Andersen, James; Kulesa, Gloria; Casto, Greg; Tate, Travis  
**Cc:** Frankl, Istvan; Blumberg, Mark; Feintuch, Karl; Brown, Leta; Torres, Roberto; Walker, Harold; Alvarado, Rossnyev; Hamm, Matthew; Sun, Summer; Guzzetta, Ashley; Lapinsky, George; ONeal, Daniel  
**Subject:** ME7110- Kewaunee LAR 244: Executive Summary of LRA Emergent Issue - further information - generic implications for other plants  
**Attachments:** Executive Summary of Emergent Issue Effects on LAR-244 Final.docx; image002.gif

On Monday evening I received information on an emergent issue at Kewaunee that appears to have some generic implications beyond an LAR (ME7110), a licensing action called "Chi-over-Q" and best described as an AST + 4 interrelated TSTF actions, on which I am working.

I spoke to my licensing contact (Craig Sly) today to determine if he had contacted any other HQ elements to describe this emergent issue. He had not. Therefore, please review the attachment for any further processing or referral to other interested Branches.

You or an assigned Reviewer are invited to the 6/20/2012 session of a weekly project review scheduled on Wednesdays in O-8B6 starting at 3:15 PM. We will be discussing the implications of this emergent issue on the ME7110 project complexity and schedule.

I will send bridge line for call-ins as an update to this message.

Except as this issue impacts ME7110, I hope to address the two issues as separate tasks. I told Sly that I would contact him as needed to support separate efforts to address the emergent issue distinctly from the effort to complete action on ME7110. Therefore, please contact me to arrange for any focused discussions with the licensee.

### **Some additional background:**

Specific for Kewaunee and its configuration, the Locked Rotor Accident (LRA) results in a calculated lengthening of the cooldown time to get to RHR, from a nominally assumed 8 hours to a calculated 19 hours.

This implies that the nominal assumption of 8 hours for cooldown may not be a conservative assumption. It would be a generic issue to determine how sensitive a particular plant was to loss of these fans and what to do about it.

Plant specific effects could vary from low to high (4-loop plant, 3-loop plant, or 2-loop plant (ie, Kewaunee) – sorted by increased severity).

Kewaunee calculation assumes 100/gal per day of leakage: Its actual leakage is zero at this time. Certain plants depend to a greater or lesser extent on non-safety related power as a source of power to these fans. Some plants apply safety related power to some or all fans unlike Kewaunee, which loses all fan cooling on loss of offsite power.

In the least sensitive plants 8 hours to cool might not be extended at all. The most sensitive plants might extend beyond 19 hours (the Kewaunee case).

From this brief description and the attachment, the stakeholder Technical Branches for the attached emergent issue, distinct from ME7110 project needs, appear to be:

SNPB = Nuclear Performance, Anthony Mendiola

SRXB = Reactor Systems, Anthony Ulses  
EEEEB = Electrical Engineering, James Andersen  
ESGB = Steam Generator Tube Integrity and Chem Engineering, Gloria Kulesa  
SPBP = Balance of Plant, Greg Casto  
AADB = Accident Dose, Travis Tate

Karl

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**From:** Feintuch, Karl  
**Sent:** Tuesday, June 19, 2012 9:00 AM  
**To:** Blumberg, Mark; Brown, Leta; Torres, Roberto; Walker, Harold; Alvarado, Rossnyev; Hamm, Matthew; Sun, Summer; Guzzetta, Ashley; Lapinsky, George; ONeal, Daniel  
**Cc:** Frankl, Istvan  
**Subject:** FW: LAR 244: Executive Summary of LRA Emergent Issue

1. We have an important agenda item to discuss regarding Chi-Over-Q based on the attached emergent issue. Preceding this emailed summary was a conference call during last week's project review time. Come to the meeting if you are possibly affected. Mark is not available until 6/22/2012.
2. There may also be a generic issue to consider in that a safety related function is powered by a non-safety related source.
3. We need to discuss schedule impact as well as any need for additional information.
4. I participate in the directly preceding meeting and note that 3:00 PM seems a bit tight for our start. Therefore, I propose that we start this meeting at 3:15 PM.

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**From:** Craig D Sly [<mailto:craig.d.sly@dom.com>]  
**Sent:** Monday, June 18, 2012 5:27 PM  
**To:** Feintuch, Karl  
**Subject:** LAR 244: Executive Summary of LRA Emergent Issue

Karl,

Attached is a summary of the emergent issue that was discovered at Kewaunee that effects the locked rotor accident submitted in KPS LAR 244 (X/Q). This summary was developed as a result of a telephone conversation between the NRC staff and DEK regarding this issue on Wednesday June 13, 2012.

Please let me know if you have any questions or if we need to facilitate additional communications on this topic.

Thanks,

Craig Sly  
Dominion Resources Services, Inc.  
Nuclear Licensing and Operations Support  
W: 804-273-2784  
C: 804-241-2473

**Hearing Identifier:** NRR\_PMDA  
**Email Number:** 408

**Mail Envelope Properties** (26E42474DB238C408C94990815A02F098DA892404A)

**Subject:** ME7110- Kewaunee LAR 244: Executive Summary of LRA Emergent Issue - further information - generic implications for other plants  
**Sent Date:** 6/19/2012 10:10:57 PM  
**Received Date:** 6/19/2012 10:10:59 PM  
**From:** Feintuch, Karl

**Created By:** Karl.Feintuch@nrc.gov

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**Files**

**Size**

**Date & Time**

MESSAGE 4665 6/19/2012 10:10:59 PM  
Executive Summary of Emergent Issue Effects on LAR-244 Final.docx 21909  
image002.gif 2376

**Options**

**Priority:** Standard  
**Return Notification:** No  
**Reply Requested:** No  
**Sensitivity:** Normal  
**Expiration Date:**  
**Recipients Received:**

## **Executive Summary of Emergent Issue Effects on Kewaunee LAR-244**

### **TAC No. ME7110**

A recent discovery at one of Dominion's other nuclear plants (Surry) identified that not all of the Control Rod Drive Mechanism (CRDM) fans are on vital power busses and therefore the cooldown rate of the Reactor Coolant System (RCS) following a Locked Rotor Accident (LRA) with a Loss of Offsite Power (LOOP) would be longer than assumed in the radiological analyses. The effect of not having all of the CRDM fans on vital power and thus not available during a LRA with LOOP is extended cooldown and steaming to get the plant down to RHR entry conditions, which terminates the associated radiological release.

The extent of condition review across the Dominion fleet for this Corrective Action Item identified that the same condition exists at Kewaunee Power Station (KPS). The current LRA analysis contained in LAR-244 is affected by this emergent issue, and the LRA analysis will need to be revised to incorporate the effects of the extended cooldown and steaming from the RCS.

The LRA analysis provided in LAR-244 contains little margin to the 5 Rem control room dose limit. The analysis was reviewed to determine excessive conservatisms that might exist, and that could be used to offset the additional mass steam releases that result due to extending the cooldown to RHR entry conditions. There are insufficient conservatisms in the submitted analysis to offset the increased releases that would result from the additional steaming. Therefore, DEK is proposing to modify the physical plant to gain X/Q reductions (via increased steam release velocity) and revise the method and inputs to the LRA radiological analysis in order to achieve acceptable control room doses within regulatory limits. Offsite doses compared to regulatory limits are not challenged.

Dominion's first response to this emergent discovery was to evaluate the existing design basis for a LRA to determine if challenges to operability exist. Based on existing plant conditions and reasonable assumptions using engineering judgment, the current LRA is acceptable.

Various options were considered to either gain margin or eliminate this condition to resolve the problem.

1. Modify the plant to power the CRDM fans from a vital power supply.
2. Tighten the control room to reduce measured unfiltered inleakage.

3. Remove the diffusers and mufflers from PORV exhausts to promote increased exhaust exit velocities. X/Q reductions by a factor of 5 would be justified, per RG 1.194 criteria.

When considering the viability of each option above, a strong focus was placed on finding a timely solution that could be utilized to revise the LRA originally submitted in LAR 244 and facilitate timely submittal of a supplement to the LAR-244 LRA analysis, eliminating the need for consideration to withdraw the LAR-244 amendment request.

DEK proposes to modify the following elements of LAR-244 in order to achieve acceptable control room dose from a LRA with LOOP.

1. DEK will commit to modify the plant during the next scheduled refueling outage or unplanned shutdown utilizing approved design change processes and reviews. DEK would propose that implementation of the approved amendment would be contingent upon the successful completion of the proposed modifications.
2. The X/Q calculations to the 'A' and 'B' PORV release points will be revised to incorporate the following changes:
  - Elevation of the release points will be modified to new elevations once the 20" mufflers are removed from the 8" PORV exhaust pipes.
  - Taut-string distances will be determined from these new source elevations to receptors (control room intake and worst leakage location). These distances will be converted to effective horizontal distances in order for ARCON96 to calculate correct slant-path distances. *{This method is allowed per RG 1.194 and replaces the current method used for PORV releases in LAR-244. Existing ARCON96 results assume horizontal distances from the PORV locations to receptors that assume only straight-line paths, ignoring intervening structures}*
  - Decreased X/Qs calculated by ARCON96 will be used to demonstrate that the current 'A' and 'B' PORV X/Q values, used in some combination in other radiological analyses in LAR-244, are bounding and conservative. The re-calculation of PORV X/Qs will only be surgically used in the revised LRA allowing NRC review of other accident analyses in LAR-244 to proceed forward
  - Revised inputs and assumptions will be provided in a supplement to the NRC for X/Q confirmatory calculations
3. The removal of the diffusers and mufflers from the PORV exhausts will produce increased exit velocity of steam releasing from the PORVs. Instead of releasing

steam from a 20" muffler, the steam will release from the 8" PORV exhaust pipe, increasing the resulting calculated exit velocity by more than 5 times (*significantly greater than 5 times the 95<sup>th</sup> percentile wind speed at the PORV height at all times during LRA steaming.*) Per RG 1.194, a reduction by a factor of 5 can be credited for releases that meet this criterion.

4. The LRA calculation will be revised incorporating the following changes:

- New mass steam flows will be used to extend the release beyond the current 8 hour assumption, based on achieving RHR entry condition of 350 degrees
- Steaming will be assumed from both the 'A' and 'B' steam generators with a flow split supported by thermal hydraulic analyses and plant operations procedures. (*Steaming from both PORVs is realistic and will replace the current assumption where 100% of the steam flow was assumed to be released from the worst case X/Q PORV*)
- 800 cfm leakage will be assumed from accident initiation through release termination (*This addresses RAI ME7110-RAII-SCVB-Torres-004*)
- New X/Qs revised and reduced by a factor of 5 due to high exhaust exit velocity will be used in the LRA analysis

The above proposed actions would only affect selective portions of LAR-244, specifically **PORV X/Qs** and the **LRA analysis and results**. No other changes or effects to other portions of LAR-244 are anticipated due to this change.

DEK proposes to provide a supplement(s) to LAR-244 that would provide details and commitments necessary to achieve acceptable control room doses from a LRA with LOOP. The time necessary to complete all analysis changes and provide information back to the NRC is estimated to be 3 to 4 months. Meteorological and X/Q data would likely be provided sooner to minimize delay in that area. The primary delay and effect on the NRC review of LAR 244 will be the review of the Lock Rotor Accident Radiological Analysis. A complete new LRA section is proposed to be provided as a replacement for the current LRA section in LAR-244.

If DEK determines that the approach for successful resolution to this matter is not achievable within the time frame proposed, the NRC Project Manager will be notified.

