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FINAL REPLY:

Lawrence S. Criscione
Springfield, Illinois

TO:

Borchardt, EDO

FOR SIGNATURE OF :

** GRN **

CRC NO:

Leeds, NRR

DESC:

2.206 - Callaway Nuclear Power Plant
(EDATS: OEDO-2010-0326)

ROUTING:

Borchardt
Virgilio
Mallett
Ash
Mamish
Burns/Rothschild
Collins, RIV
Burns, OGC
Mensah, NRR
Scott, OGC
Kotzalas, OEDO

DATE: 04/29/10

ASSIGNED TO:

NRR

CONTACT:

Leeds

SPECIAL INSTRUCTIONS OR REMARKS:

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General Information

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OEDO Due Date: 6/1/2010 11:00 PM

Other Assignees:

SECY Due Date: NONE

Subject: 2.206 - Callaway Nuclear Power Plant

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CC Routing: OGC; Tayna.Mensah@nrc.gov; Catherine.Scott@nrc.gov

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Special Instructions:

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Originator Name: Lawrence S. Criscione

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10CFR2.206 request for Information Notice on October 21, 2003 Incident at Callaway Plant

April 27, 2010

1412 Dial Court
Springfield, IL 62704

Mr. William Borchardt
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

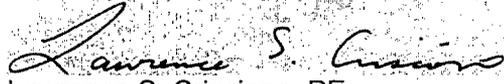
Subj: 10CFR2.206 Request for an Information Notice on the October 21, 2003 Incident at
Callaway Plant

Dear Mr. Borchardt:

I am submitting the information contained below to you as a 10CFR2.206 request. The address above is my home address; however, I work in the Washington, DC area and make it home to Illinois infrequently. Please send all correspondence to me electronically at either my personal email account (LSCriscione@hotmail.com) or my work email. If you must send me a hard copy, please send it to me at Mail Stop CSB/C2 A7.

Please be assured there are no new allegations present in this request. Although I might not agree with the final resolutions, all allegations have been documented by Region IV as either RIV-2007-A-0028, RIV-2007-A-0096 or RIV-2009-A-0036. This request is an attempt to ensure the lessons learned from the October 21, 2003 Incident are addressed in the industry.

Very respectfully,



Lawrence S. Criscione, PE
(573) 230-3959

§1. Action Requested

Issue an Information Notice to licensees in the commercial nuclear industry which informs the licensees of the abnormalities of the October 21, 2003 reactor shutdown at Callaway Plant. The Information Notice should address the following:

1. At Callaway Plant on October 21, 2003 between 09:38 and 10:00 am, reactor coolant temperature dropped 9°F. The cause of this temperature transient was a combination of secondary plant equipment malfunctions (steam line drains), poorly written procedures, and the failure of the operating crew to adequately account for the buildup of Xenon-135. According to the NRC [from an enclosure in a February 26, 2010 letter to me]:

...the operating crew did not anticipate the impact of the rapid shutdown from the reactivity management perspective, which then resulted in transients on the plant at the lower power operating levels...operators did not recognize that the reactor was responding to the steady state main turbine demand through the reactor coolant system temperature decrease, which then caused the decrease in pressurizer level and the letdown system isolation.

2. The letdown system isolated at 10:00 am.
3. The reactor was operated below the Minimum Temperature for Critical Operation from 10:00 to 10:13 am.
4. In order to assist in recovery of reactor coolant temperature, the Shift Manager directed the main turbine be tripped at 10:13 am.
5. At the time, the plant's procedure for tripping the main turbine was inadequate. The procedure directed the operators to place the condenser steam dumps in "steam pressure" mode and set the lift point at 1092 psig (corresponding to 557°F which is Callaway Plant's no-load average coolant temperature). Tripping the main turbine with reactor coolant temperature at 552°F resulted in a "no steam demand" condition until reactor coolant temperature heated up 5°F to 557°F. As a result of the October 21, 2003 Incident, the procedure has since been revised to direct the operators to, just prior to tripping the turbine, set the lift point of the steam dumps such that the group 1 condenser steam dumps are slightly open.
6. Upon tripping the main turbine, the removal of steam demand near the point of adding heat and the rapid negative insertion of reactivity from the temperature rise (average coolant temperature rose more than 1°F within the first 20 seconds, 2.5°F in the first minute, and 4°F in the first two minutes) caused the reactor plant to shut down. According to the NRC:

After the turbine trip, the reactor coolant system temperature increased to the programmed level adding negative reactivity. This, along with the Xenon accumulation, shut the reactor down...

7. Although they deny it, the reactor shutdown apparently went unnoticed by the NRC licensed reactor operators, who were still responding to the off-normal procedure for "Loss of Letdown".
8. The Shift Manager and the Control Room Supervisors both have stated in sworn testimony that they knew the reactor would go subcritical shortly after tripping the turbine. Although I dispute their claims (I believe the entire operating crew failed to recognize the reactor had shut down until the channel 2 SRNI energized at 11:25 am) I do not have a problem with the NRC accepting the operators' positions since there is no

definitive way to prove that the operators are lying. However, the circumstantial facts of the incident should be publically presented in this Information Notice so that knowledgeable individuals (i.e. Senior Reactor Operators) can decide for themselves whether or not they believe the operators' claims. Honesty is important and one of the ways to deal with dishonesty is to combat it with the facts.

9. The operators restored letdown flow to 75 gpm and exited the off-normal procedure for "Loss of Letdown" at 10:18 am. By this time, the reactor had shut down to the point where it would have been unwise to attempt to recover criticality without using the Reactor Startup procedure (fission power had fallen 80% in the five minutes since tripping the main turbine).
10. Despite their claims that they knew the reactor would shut down shortly after the turbine trip, upon exiting the off-normal procedure for "Loss of Letdown" the operators made no efforts to actively insert negative reactivity for the next 106 minutes. The Shift Manager had been a Reactor Operator aboard a nuclear powered naval vessel and had later been an instructor at a shore-based nuclear power training command (one of the navy prototypes in Idaho). In addition to holding an NRC issued Senior Reactor Operator license at Callaway Plant, he had been a qualified instructor for Initial License Training where licensed operator candidates are trained on how to operate the reactor. Although this background would not necessarily have prevented him from making the "omission" error of failing to recognize the reactor had shut down following the turbine trip, this background SHOULD have prevented him from making the "commission" error of intentionally conducting the reactor shutdown by removing steam demand and allowing the reactor to passively shut down without actively inserting negative reactivity for 106 minutes. I do not believe that the reactor was INTENTIONALLY shut down in this manner (i.e. I believe the reactor shutdown was "inadvertent"), but the NRC has accepted the Shift Manager's and the Control Room Supervisor's testimonies that it was. Assuming that the Shift Manager and Control Room Supervisor were honest in their testimony (i.e. assuming the operators intentionally allowed the reactor to passively shut down while taking no action to actively insert negative reactivity), the NRC must stress to its licensees that this is NOT an acceptable method of conducting a reactor shutdown.
11. Between 10:18 and 10:39 am, reactor power lowered over four decades, passing through the Point of Adding Heat (POAH) around 10:25 am and reaching the source range around 10:39. During this twenty minutes, the operating crew had ample time to insert control rods or commence borating. At 10:34 am NRC licensed reactor operators secured an Intake pump and placed Cooling Tower Blowdown in service. From 10:18 to 10:48 the NRC licensed Reactor Operator, using a normal operating procedure (i.e. a non-emergency procedure), increased letdown flow from 75 gpm to 120 gpm. The fact that the operators had time to conduct these evolutions is testimony to the fact that, if they so chose, they had time to insert the control banks. Although the NRC has thus far been unwilling to acknowledge it, to most licensed operators the fact that the crew was performing these tasks as reactor power passively transited from the power range to the source range is an indication that the operators had not recognized that the reactor had shut down.
12. Because of the high subcritical multiplication rate afforded by the control rods being maintained at their last critical rod heights, between 10:39 to 11:25 am reactor power was in the source range without the Source Range Nuclear Instruments (SRNIs) energized. During this time frame the NRC licensed operators stopped a condensate pump and allowed Instrumentation & Controls technicians to conduct calibrations on the Power Range Nuclear Instruments (PRNIs). The fact that NRC licensed operators would intentionally allow a commercial reactor to remain passively shut down on Xenon-135, with reactor power in the source range and the control rods still at their last critical

rod heights, and place non-emergency evolutions (i.e. equipment lineups on the steam plant and calibration of nuclear instruments) above actively inserting negative reactivity is troubling. If the NRC believes that their licensed operators would intentionally conduct a reactor shutdown in this manner, then they need to address it in this Information Notice. If the NRC believes (as I do) that the behavior of the operators indicates that they had failed to recognize that reactor power was in the source range, then the NRC needs to address that in this Information Notice.

13. At 11:25 am the channel 2 SRNI energized, causing an alarm to annunciate on the reactor plant's main control board. At 11:38 am the channel 1 SRNI energized, causing a "re-flash" of the earlier annunciator. The energizing of the SRNIs was documented by the NRC licensed operators in the Reactor Operator Daily Log. The log entry was attributed to time 11:34 but was made at some time after 11:42 am. It is safe to say that by 11:25 am the NRC licensed operators were aware that the reactor was no longer critical (they claim they knew it all along, but those who doubt this claim will likely acknowledge that once the main control board annunciator was received the crew would have recognized the reactor had shut down).
14. For 39 minutes (from 11:25 am until 12:04 pm) from the energizing of the first SRNI, the NRC licensed operators delayed inserting the control banks. In sworn testimony, the Shift Manager claimed that part of the reason for this delay was the fact that an "off-normal" procedure was still being performed and that completion of this procedure took precedence over inserting the control rods. At 08:21 am, while retesting the failed electrical inverter that had required the plant to shut down, the retest failed and the crew entered OTO-NN-00001 (the procedure for "Loss of Safety Related Instrument Power") for the failure of an instrument bus. By 08:33 am, all control room actions for this procedure were complete, however the procedure remained open while awaiting word from an equipment operator that the valves in the Auxiliary Feedwater system were in their required positions. The valve lineup of the Aux Feed system was delivered to the control room at 11:34 am and the Control Room Supervisor exited off-normal procedure OTO-NN-00001 at 11:37 am. Although the off-normal procedure was "technically" being performed until 11:37 am, the NRC has determined that performance of this procedure did not prevent the control room operators from inserting the control rods at any time during the shutdown.
15. It is the opinion of me and other Senior Reactor Operators from Callaway Plant (names can be provided upon request) that the 39 minute delay in inserting the control banks was effected to cover up the inadvertent reactor shutdown from the upper management of Callaway Plant. That is:
 - a. The shutdown of the reactor shortly after the turbine trip was unintended (i.e. "inadvertent") and went unrecognized by the control room operators.
 - b. The control room operators failed to insert the control rods before 11:25 am because they were unaware the reactor had shut down. That is, they mistakenly believed the reactor was still critical.
 - c. The control room operators first became aware that the reactor was shutdown when the channel 2 SRNI energized at 11:25 am.
 - d. The Operations Manager and the Shift Manager were in the main control room at 11:25 am when the first SRNI energized.
 - e. The Operations Manager and the Shift Manager intentionally "dragged their feet" in inserting the control rods. They knew that Xenon-135 would maintain the reactor shutdown.
 - f. Shortly after noon (12:04 pm) the operators commenced inserting the control banks. Since, by procedure, the reactor is normally shut down by inserting the

control banks (at no commercial plant in the US is there a procedural provision for allowing the plant to passively shut down due to the removal of steam demand and the buildup of Xenon-135), when the Outage Control Center (OCC) was made aware at 12:04 pm that the control banks were being inserted, they would naturally assume that the reactor was being shut down. No one outside of the personnel in the main control room (the Operations Manager and the NRC licensed operators) were aware that at 12:04 pm the crew was actually inserting the control banks on a reactor that had been shutdown for nearly two hours.

- g. The fact that the reactor had shut down shortly after the turbine trip was not made known to upper management at Callaway Plant until it was discovered during a data review in February 2007.
16. Although the atypical nature of the October 21, 2003 shutdown was clearly similar to some of the events in WANO SOER 07-1, the utility (Ameren) never provided information on the event to the Institute of Nuclear Power Operations (INPO).
17. Licensees should ensure their procedures for placing the condenser steam dumps in service do not contain any of the pitfalls that contributed to the October 21, 2003 inadvertent shutdown at Callaway Plant.
18. Licensees should ensure that their procedures definitively indicate that reactor power is always to be actively controlled; in the event of a passive reactor shutdown, the crew should immediately take action to insert negative reactivity by either inserting the control rods, tripping the control rods, normal borating, emergency borating or initiating ECCS flow depending on what the circumstances warrant.
19. Licensees should ensure their procedures minimize holding reactor power in MODE 2 Descending. Any power holds during a reactor down power should be done in MODE 1 at a power level where reactivity-temperature feedback is not degraded.
20. Licensees should ensure that all abnormal plant shutdowns are reported to the rest of the industry through the SEE-IN program.

§2. Facts that Constitute the Basis for the Request

At the end of this document are two graphs displaying some of the critical parameter data from the October 21, 2003 shutdown. The raw data came from Callaway Plant's eDNA computer data base and the NRC can obtain it from Callaway Plant. Copies of the control room logs from Callaway Plant are available as part of OI Case 4-2007-049. The sworn testimonies of the NRC licensed operators is also available from OI Case 4-2007-049 (released as Freedom of Information Act Request 2009-0064). Other FOIAs concerning this incident are FOIA 2009-0095, 2009-0102, 2009-0115, 2009-0222.

Item I.C.5 of the *TMI Action Plan* requires that licensee shall:

...prepare procedures to assure that operating information pertinent to plant safety originating both within and outside the utility organization is continually supplied to operators and other personnel and is incorporated into training and retraining programs.

Per Generic Letter (GL) 82-04 the NRC is allowing the licensees to meet Item I.C.5 by participating in the SEE-IN program run by INPO ("Significant Event Evaluation and Information Network" as run by the "Institute of Nuclear Power Operations").

Although Ameren is an INPO member and thus technically participates in the SEE-IN program, Callaway Plant has failed to submit a document to the SEE-IN program concerning the October

21, 2003 atypical reactor shutdown. As a result, the rest of the nuclear licensees are unable to learn from the experience at Callaway Plant. The best remedy to this situation is for the NRC to issue an Information Notice as requested above in section §1.

Ameren has also failed to share the details of the October 21, 2003 Incident with its own NRC licensed operators. Although a few specifics of the October 21, 2003 Incident have appeared in NRC licensed operator training documents at Callaway Plant, the most important aspects of the incident have not been revealed. Specifically, there are no lesson plans for the NRC licensed operators at Callaway Plant which contain the following significant details:

1. The operators "intentionally" [Callaway's version of events] shut down the reactor by removing steam demand and allowing a passive phenomenon – the buildup of Xenon-135 with the absence of steam demand – to cause the reactor to become subcritical.
2. The operators relied on transient Xenon-135 to maintain the reactor subcritical while, with reactor power in the source range and the control rods still at their last critical rod heights, they performed the following evolutions:
 - a. Secured an intake pump.
 - b. Placed Cooling Tower blowdown in service.
 - c. Performed I&C calibrations on the PRNIs.
 - d. Swapped from the turbine driven feed pump to the motor driven feed pump.
 - e. Secured a condensate pump.
 - f. Raised letdown flow from 75 gpm to 120 gpm.
 - g. Commenced containment mini-purge.
 - h. Exited the off-normal procedure for "Loss of Safety Related Instrument Power" by completing the Auxiliary Feedwater system valve lineup.
 - i. Held a crew brief to discuss their performance for the off-normal procedures for "Loss of Letdown" and "Loss of Safety Related Instrument Power".

The October 21, 2003 Incident happened over six years ago. The details of the incident were uncovered during a data review over three years ago. Ameren has had ample time to inform INPO of the incident and Callaway Plant has had ample time to get the important details of the incident incorporated into their training program. It is obvious to me that Ameren wishes to downplay this significant incident as much as possible. The basis for this 10CFR2.206 request is that a detailed Information Notice is now the only way the commercial nuclear industry, including the NRC licensed operators at Callaway Plant, will be made aware of the details of the October 21, 2003 Incident and the important lessons to be learned from it.

Figure 1

MODE 2 declared and turbine tripped at 10:13. 3°F rise in temperature at turbine trip near POAH and rising Xenon-135 caused reactor shutdown. Reactor shutdown. Approximately .3 dpm SUR at 10:23 on departure from POAH.

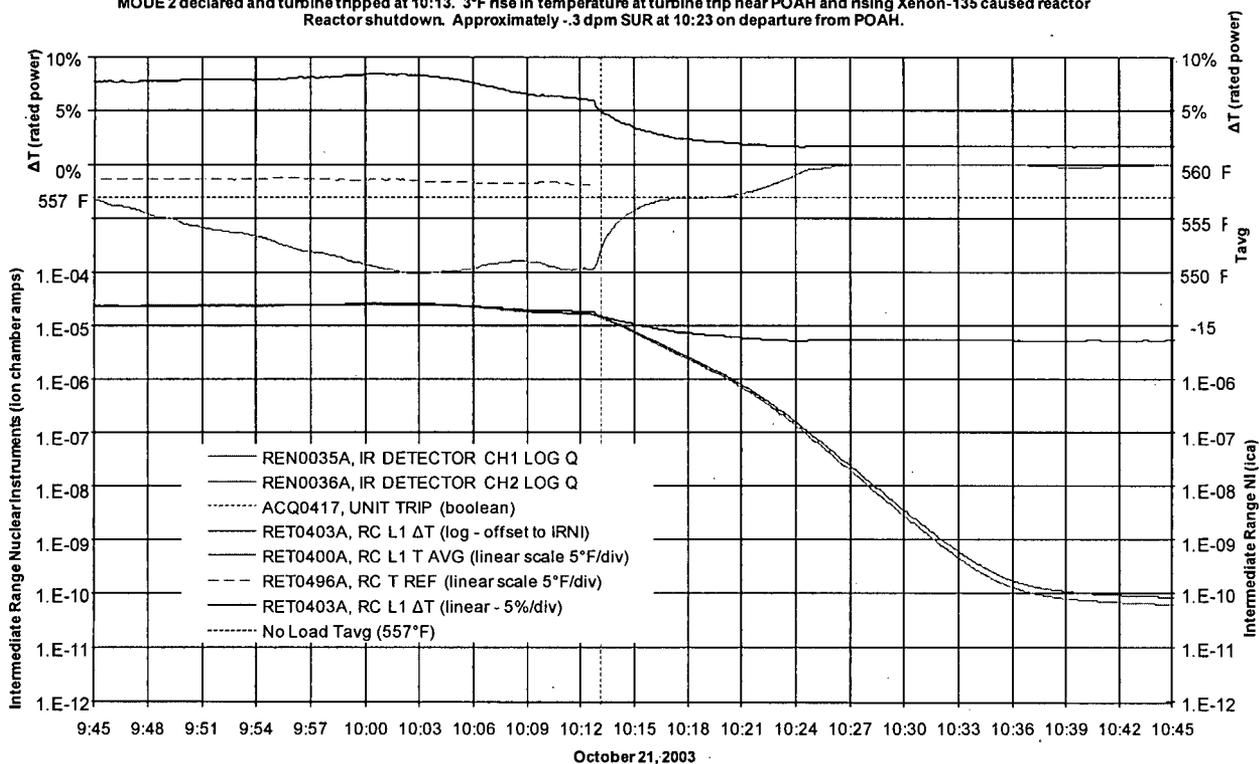


Figure 2

Reactor was allowed to passively shut down at 10:13 am when the main turbine was tripped. Reactor power entered the source range at approximately 10:39 am. Control Bank insertion began at 12:04 pm.

