

NON-CONCURRENCE PROCESS

SECTION A - TO BE COMPLETED BY NON-CONCURRING INDIVIDUAL

TITLE OF DOCUMENT Operator Performance Issues Involving Reactivity Management at Nuclear Power Plants	ADAMS ACCESSION NO. ML101810282
DOCUMENT SPONSOR Stacey Rosenberg	SPONSOR PHONE NO. 301-415-2357
NAME OF NON-CONCURRING INDIVIDUAL Lawrence Criscione	PHONE NO. 301-251-7603

DOCUMENT AUTHOR DOCUMENT CONTRIBUTOR DOCUMENT REVIEWER ON CONCURRENCE

TITLE Reliability & Risk Engineer	ORGANIZATION US NRC/RES/DRA/OEGIB
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REASONS FOR NON-CONCURRENCE

This Information Notice, as currently presented, leaves unaddressed several questions regarding the Callaway event, the most significant of which are:

- 1) Is it the NRC position that, prior to tripping the main turbine, the Shift Manager recognized that tripping the turbine "was going to initiate the reactor shutdown, because of the continual buildup of poisons and not having a steam demand on the reactor anymore"?
- 2) Is it the NRC position that any of the US NRC licensed operators (i.e. the Shift Manager, the Control Room Supervisor, the Reactor Operator or the Balance of Plant Operator) recognized "the reactor became subcritical by xenon buildup and by the increase in reactor coolant temperature resulting from the operators manually tripping the main turbine" prior to the channel 2 Source Range Nuclear Instrument energizing at 11:25 am on October 21, 2003?

In the response in Section C, it would be helpful if the answers to the above two questions begin with a "yes" or a "no" so that it is transparently evident what the NRC's understanding of the Callaway Plant passive reactor shutdown is.

The above two questions are important to understanding the primary event of the Information Notice. If the agency believes that the operators consciously recognized the reactor shutting down and took no action to actively drive the shutdown AND consciously relied on an informal estimation that transient Xenon-135 levels were adequate to prevent an inadvertent reactor restart, then there needs to be discussion of conservative reactor operation in the Information Notice.

If the agency believes that the operators did not initially recognize the passive shutdown and failed to recognize it until the channel 2 Source Range Nuclear Instrument energized, then there needs to be discussion in the Information Notice of any Human Factors issues that may have contributed to the event and any suggested strategies for mitigating these pitfalls.

The continuation page (Section D) is being provided as justification for why the above two numbered questions (questions 1 & 2) need to be addressed in the response provided in Section C. I do not need an answer to all of the items brought up on the continuation page. The items on the continuation page are my suggestion of information which should be included in the Information Notice and I only need a response to the suggestions which are applicable.

Until I transparently understand the agency's position on when the NRC licensed operators became consciously aware that the reactor had passively shut down, I cannot adequately state what is lacking in the Information Notice. However, I can confidently state that we should not be issuing an Information Notice on an event unless we understand the significant details of it. At what point the operators noted that the reactor they were controlling had shut down is an important detail.

CONTINUED IN SECTION D

SIGNATURE 	DATE 12/15/2010
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SUBMIT FORM TO DOCUMENT SPONSOR AND COPY TO YOUR IMMEDIATE SUPERVISOR AND DIFFERING VIEWS PROGRAM MANAGER

NON-CONCURRENCE PROCESS

TITLE OF DOCUMENT

Operator Performance Issues Involving Reactivity Management at Nuclear Power Plants

ADAMS ACCESSION NO.

ML101810282

SECTION D: CONTINUATION PAGE

CONTINUATION OF SECTION



A



B



C

With regard to questions 1 & 2, if the answer is "no" then the Information Notice should note that it appears the passive shutdown of the reactor went unnoticed by the licensed operators and a discussion of suggested strategies to prevent an unrecognized passive reactor shutdown should be provided. This discussion might include:

- Human Factors issues with main control board instruments and controls that contributed to the unrecognized passive reactor shut down (e.g. PRNIs and ΔT instruments not accurately indicating fission power near the Point of Adding Heat due to decay gammas and decay heat, IRNI instruments being human factored for a reactor startup, operators being used to using rods/boron for controlling temperature and not being used to having to directly control reactivity with rods/boron, etc.)
- Strategies for avoiding an unrecognized, inadvertent reactor shutdown (e.g. maintaining reactor power around 10% so that power is far enough above the Non-Fission Heat Rate to allow full use of Temperature-Reactivity feedback, begin control bank insertion/borating in low MODE 1 thereby minimizing time in MODE 2-Descending to the amount of time necessary to transition from MODE 1 to MODE 3).

With regard to questions 1 & 2, if the answer is "yes" then the answers to the following questions should be addressed in the Information Notice:

(a) Why did the Shift Manager not direct the control banks be inserted along with the turbine trip? Was it because his crew was busy with the off-normal procedure for the Loss of Letdown? Does the NRC believe that operators should trip the reactor if the level of activity in the control room prevents the active control of core reactivity? If so, we should note in the Information Notice that, although there is no specific NRC requirement to do so, conservative reactivity management involves tripping the reactor if the operators become burdened to the point that they cannot actively control the nuclear fission reaction.

(b) Does the Shift Manager's action to consciously allow the reactor to passively become "subcritical by xenon buildup and by the increase in reactor coolant temperature resulting from the operators manually tripping the main turbine" amount to a violation of the plant's Reactor Shutdown procedure (OTG-ZZ-00005) since the revision in effect at the time did not have procedural steps for deliberately shutting down the fission reaction by removing steam demand? That is, since the only procedural guidance for shutting down the fission reaction was by inserting the control banks AND since the procedure assumed the reactor is critical immediately prior to the insertion of the control banks, is consciously allowing passive effects to shut the reactor down (when active means of shutting it down are available) constitute a violation of the reactor shutdown procedure? If so, we should note in the Information Notice that by consciously allowing the reactor to become "subcritical by xenon buildup and by the increase in reactor coolant temperature" the operators violated their procedure for conducting a reactor shutdown.

(c) At any point during the time the "operators delayed inserting control rods for nearly 2 hours" was a formal calculation completed to ensure that enough transient Xenon-135 would be present to prevent an inadvertent reactor restart? That is, was a Shutdown Margin surveillance (i.e. Callaway Plant procedure OSP-SF-00001) performed to ensure that unforeseen transients would not result in an inadvertent return to criticality? If not, we should note in the Information Notice that, although there is no specific NRC requirement to do so, conservative reactivity management involves performing a formal Shutdown Margin calculation if transient Xenon-135 is being relied upon to maintain the reactor shutdown.

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**SECTION B - TO BE COMPLETED BY NON-CONCURRING INDIVIDUAL'S SUPERVISOR
(THIS SECTION SHOULD ONLY BE COMPLETED IF SUPERVISOR IS DIFFERENT THAN DOCUMENT SPONSOR.)**

NAME Ben Beasley


TITLE Branch Chief	PHONE NO. 301-251-7676
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ORGANIZATION NRC/RES/DRA/OEGIB
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COMMENTS FOR THE DOCUMENT SPONSOR TO CONSIDER

- I HAVE NO COMMENTS
- I HAVE THE FOLLOWING COMMENTS

CONTINUED IN SECTION D

SIGNATURE 	DATE 12-15-10
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SUBMIT THIS PAGE TO DOCUMENT SPONSOR

NON-CONCURRENCE PROCESS

TITLE OF DOCUMENT Operator Performance Issues Involving Reactivity Management at Nuclear Power Plants	ADAMS ACCESSION NO. ML101810282
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SECTION C - TO BE COMPLETED BY DOCUMENT SPONSOR



NAME Stacey Rosenberg	
TITLE Branch Chief	PHONE NO. 301-415-2357
ORGANIZATION NRC/NRR/DPR/PGCB	

ACTIONS TAKEN TO ADDRESS NON-CONCURRENCE (This section should be revised, as necessary, to reflect the final outcome of the non-concurrence process, including a complete discussion of how individual concerns were addressed.)

The draft information notice (IN) is being prepared to inform addressees of events involving deficiencies with reactivity management planning and implementation. All of the issues raised by the individual providing the non-concurrence for this IN involve one of the four events discussed in the draft IN. This event involved a shutdown of Callaway in October 2003 when control room operators did not effectively control reactivity during low-power operations. During the concurrence process, many good ideas were provided and changes were included into the development of the IN, including changes recommended by the non-concurring individual.

The non-concurrence presents three issues which are addressed in the attachment. After careful consideration of each of the three issues, no changes were made to the IN for the reasons described in the attachment.

CONTINUED IN SECTION D

SIGNATURE - DOCUMENT SPONSOR 	DATE 2/3/11	SIGNATURE - DOCUMENT SIGNER 	DATE 2/3/11
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NON-CONCURRING INDIVIDUAL (To be completed by document sponsor when process is complete, i.e., after document is signed):

- | | |
|---|---|
| <input type="checkbox"/> CONCURS | <input checked="" type="checkbox"/> WANTS NCP FORM PUBLIC |
| <input checked="" type="checkbox"/> NON-CONCURS | <input type="checkbox"/> WANTS NCP FORM NON-PUBLIC |
| <input type="checkbox"/> WITHDRAWS NON-CONCURRENCE (i.e., discontinues process) | |

Attachment - Response to Non-Concurrence Issues

Issue 1

Questions/Comments

This Information Notice, as currently presented, leaves unaddressed several questions regarding the Callaway event, the most significant of which are:

- 1) Is it the NRC position that, prior to tripping the main turbine, the Shift Manager recognized that tripping the turbine "was going to initiate the reactor shutdown, because of the continual buildup of poisons and not having a steam demand on the reactor anymore"?
- 2) Is it the NRC position that any of the US NRC licensed operators (i.e. the Shift Manager, the Control Room Supervisor, the Reactor Operator or the Balance of Plant Operator) recognized "the reactor became subcritical by xenon buildup and by the increase in reactor coolant temperature resulting from the operators manually tripping the main turbine" prior to the channel 2 Source Range Nuclear Instrument energizing at 11:25 am on October 21, 2003?

The above two questions are important to understanding the primary event of the Information Notice.

Response

The purpose of an information notice is to inform the nuclear industry of significant operating experience with the expectation that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. Specifically, LIC-503, "Generic Communications Affecting Nuclear Reactor Licensees," states, "An information notice is primarily used to inform the nuclear industry of recently-identified, significant operating experience that may have generic applicability. . . . Recipients are expected to review the information for applicability to their facilities or operations and consider actions, as appropriate, to avoid similar problems. . . . An information notice shall not convey or imply new requirements or new interpretations, and shall not request information or action."

The IN was not revised to add information that would answer the above two questions because this information would not elicit more or different actions by other licensees to avoid similar problems and as such, would be outside the LIC-503 specified purpose of an IN. There is no benefit (safety or otherwise) to adding information and presenting unnecessary details only detracts from the IN. Each of the above two questions presented by the non-concurring individual ask what operators "recognized" which involves what operators *thought* versus what operators *did*. For the Callaway event, the information that is relevant to eliciting actions by other licensees is *not* what operators thought but rather (a) the actions operators did or did not perform, (b) the plant response, and (c) an assessment that operators did not effectively control reactivity that was based on operator actions at three separate times during the shutdown.

Issue 2

Questions/Comments

If the agency believes that the operators consciously recognized the reactor shutting down and took no action to actively drive the shutdown AND consciously relied on an informal estimation that transient Xenon-135 levels were adequate to prevent an inadvertent reactor restart, then

there needs to be discussion of conservative reactor operation in the Information Notice. If the answers to questions under Issue 1 above are “yes,” then the answers to the following questions should be addressed in the Information Notice:

- (a) Why did the Shift Manager not direct the control banks be inserted along with the turbine trip? Was it because his crew was busy with the off-normal procedure for the Loss of Letdown? Does the NRC believe that operators should trip the reactor if the level of activity in the control room prevents the active control of core reactivity? If so, we should note in the Information Notice that, although there is no specific NRC requirement to do so, conservative reactivity management involves tripping the reactor if the operators become burdened to the point that they cannot actively control the nuclear fission reaction.
- (b) Does the Shift Manager's action to consciously allow the reactor to passively become “subcritical by xenon buildup and by the increase in reactor coolant temperature resulting from the operators manually tripping the main turbine” amount to a violation of the plant's Reactor Shutdown procedure (OTG-ZZ-00005) since the revision in effect at the time did not have procedural steps for deliberately shutting down the fission reaction by removing steam demand? That is, since the only procedural guidance for shutting down the fission reaction was by inserting the control banks AND since the procedure assumed the reactor is critical immediately prior to the insertion of the control banks, is consciously allowing passive effects to shut the reactor down (when active means of shutting it down are available) constitute a violation of the reactor shutdown procedure? If so, we should note in the Information Notice that by consciously allowing the reactor to become “subcritical by xenon buildup and by the increase in reactor coolant temperature” the operators violated their procedure for conducting a reactor shutdown.
- (c) At any point during the time the “operators delayed inserting control rods for nearly 2 hours” was a formal calculation completed to ensure that enough transient Xenon-135 would be present to prevent an inadvertent reactor restart? That is, was a Shutdown Margin surveillance (i.e. Callaway Plant procedure OSP-SF-00001) performed to ensure that unforeseen transients would not result in an inadvertent return to criticality? If not, we should note in the Information Notice that, although there is no specific NRC requirement to do so, conservative reactivity management involves performing a formal Shutdown Margin calculation if transient Xenon-135 is being relied upon to maintain the reactor shutdown.

Response

The above questions under Issue 2 and 2(a) involve what the operators *thought* (e.g. “consciously recognized,” “consciously relied on,” “Why did the Shift Manager,”) versus the actions operators did or did not perform. Irrespective of what operators recognized or why they did something, the IN provides an assessment based on operator actions at three separate times during the shutdown that captures where operators did not effectively control reactivity. Specifically, the IN states “reactivity was not effectively controlled in that (1) operators did not sufficiently anticipate and compensate for xenon buildup when they attempted to stabilize and hold the plant at approximately 8 percent power which caused reactor coolant temperature to continue to decrease below the technical specification required minimum temperature for criticality; (2) operators did not shut down the reactor in a deliberate manner (e.g., by inserting control rod banks), but rather the reactor became subcritical by xenon buildup and by the increase in reactor coolant temperature resulting from the operators manually tripping the main turbine; and, (3) operators did not insert control rods for nearly 2 hours after the reactor became subcritical. Fully inserting control rods provides assurance that the reactor remains shut down (regardless of reactor coolant temperature or xenon concentration).

Regarding Issue 2(b), Region IV has thoroughly reviewed this event and no violation was issued regarding the plant's reactor shutdown procedure.

Regarding Issue 2(c), the IN already states, "During one of the events discussed above, after the reactor became subcritical through xenon buildup and a reactor coolant temperature increase, operators delayed inserting control rods for nearly 2 hours. NRC IN 92-39 discusses an event in which, after the operators brought the reactor subcritical by inserting control rods, an inadvertent unplanned return to criticality occurred because operators delayed actions to continue inserting control rods while changing shifts. Although not specifically required, licensees may consider revising procedures and training operators so that, after the reactor becomes subcritical, the operators will proceed without delay to insert control rods or add boron to ensure the reactor remains shut down." We do not agree that the IN should state whether or not operators performed a shutdown margin calculation because simply mentioning it could lead the reader to believe that the NRC considers this calculation to be an alternative to inserting control rods without delay, which we do not.

Issue 3

Questions/Comments

If the agency believes that the operators did not initially recognize the passive shutdown and failed to recognize it until the channel 2 Source Range Nuclear Instrument energized, then there needs to be discussion in the Information Notice of any Human Factors issues that may have contributed to the event and any suggested strategies for mitigating these pitfalls. This discussion might include:

- Human Factors issues with main control board instruments and controls that contributed to the unrecognized passive reactor shut down (e.g. PRNIs and ΔT instruments not accurately indicating fission power near the Point of Adding Heat due to decay gammas and decay heat, IRNI instruments being human factored for a reactor startup, operators being used to using rods/boron for controlling temperature and not being used to having to directly control reactivity with rods/boron, etc.)
- Strategies for avoiding an unrecognized, inadvertent reactor shutdown (e.g. maintaining reactor power around 10% so that power is far enough above the Non-Fission Heat Rate to allow full use of Temperature-Reactivity feedback, begin control bank insertion/borating in low MODE 1 thereby minimizing time in MODE 2 Descending to the amount of time necessary to transition from MODE 1 to MODE 3).

Response

Prior to the non-concurrence, both NRR and Region IV considered incorporating these suggestions into the Discussion section of the IN by describing these as potential human factors issues without mentioning Callaway (and thereby not mentioning whether or not these human factors played a role in the Callaway event.) We decided that the information should not be added because it is speculative to what extent (if any) these factors played in the Callaway event or reactivity management events at other plants. In addition, this information would read more like a lesson plan than an IN, the IN already presents the issues well, and the information would distract from the intended purpose of the IN.