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Sent: Friday, May 16, 2008 7:59 PM
To: Daniel Frumkin; Alex Klein
Cc: Robert Radlinski
Subject: Concerns/Comments - NRC Closure Plan for MSO

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Hi Dan and Alex,

I wanted to submit my comments/concerns on the NRC's proposed closure plan for the MSO situation (presented by the NRC in a public meeting on March 27, 2008 and commented by NEI in a public meeting on May 7, 2008) for your consideration prior to drafting the SECY for Commission review (planned for late June).

1. In general, based on the commission guidance in SRM/SECY-2006-196, I feel that the proposed method does not appear to be technically sound and does not have a traceable regulatory footprint. This will lead to more questions in the future (differences between green and orange) and possibly having to revisit this scenario again. So, this approach will most likely not lead to permanent closure for this issue. Also, this approach does not really address Multiple Spurious Operation, but it adds more confusion on what is an allowed manual action and what is not. In fact, I think the proposed methods provide a significant change to the historical regulations and guidance provided for evaluating spurious operation.
2. Based on the NRC's presentation slides on 3/27/08, the "green" box are those systems that are required to achieve and maintain hot shutdown, and those in the "orange" box are those systems that are not part of the train of systems credited for hot shutdown, but whose spurious operation could affect safe shutdown capability. The "green" systems are required to meet Appendix R Section III.G.1, 2 and 3 (or an exemption/deviation will have to be requested). The "orange" items are not required to meet Section III.G. However, the effects of fire damage to the "orange" systems can be protected in accordance with III.G, can be mitigated by performance of a manual action, or other options under development. I interpret this as black and white, and that means that the protection of "orange" systems are NOT regulated by Section III.G.
3. Per item #2, there would be no limit or criteria for determining an acceptable method of protection that the licensee deems acceptable, and the regulators would have no basis for "approving" or "not approving" the condition. Limiting the resolution to manual actions and not risk-informed approaches or any other approach would not be legally binding. AND, if the "orange" systems are not regulated by Section III.G, then what is to say that licensees have to postulate hot shorts, open circuits, and shorts to ground, let alone postulated them happening simultaneously to several components.
4. It was mentioned during the Q/A at the end of the 5/7/08 public meeting, that the consequences of these "orange" spurious operations are not restricted to the performance goals of Section III.L.2, but they cannot lead to an unsafe condition. So, does this mean that the "green" systems have to be able to maintain the system within the pressurizer level, but

spurious operation of the “orange” system can result in shrinkage of the RCS beyond the przr level indication?

5. This is where more “gray” starts coming into play. Regulators will start saying that the “orange” spurious operation(s) does affect the ability of the hot shutdown system to perform its function (i.e., pump run out, diversion greater than pump’s capability, rapid depressurization, rapid shrinkage, etc.), and they should have been in the “green” box. I’ll use the examples given in NRC slide #9 of “orange” spurious operations that should be required to be protected IAW III.2 or III.G.3 because of the consequences:

- RHR/RCS isolation valves – Spurious opening of these valves could lead to a catastrophic failure of the low pressure system (RHR) when exposed to the higher RCS pressures inadvertently (Note: GL 81-12 required specifically that these types of valves be protected from fire damage and GL 86-10 states that proper polarity hot shorts are required to be postulated for these high/low pressure interface valves”
- SG ADVs valves – spurious operation could result in rapid cooldown of the primary system and shrink the RCS inventory well below the pressurizer level within minutes (depending on how many SG ADVs open)
- Steam bypass valves - depending on the size of the line, they may also result in inadvertent cooldown

6. Regulatory Requirement:

Section III.G.1 requires that *“Fire protection features shall be provided for structures, systems, and components important to safe shutdown. These features shall be capable of limiting fire damage so that:*

“a. One train of systems necessary to achieve and maintain hot shutdown conditions from either the control room or emergency control station(s) is free of fire damage...”

Section III.G.2 provides the methods to protect one train of systems required to achieve and maintain hot shutdown. Section III.G.2 requires that: *“ Except as provided for in paragraph G.3 of this section, where **cables or equipment**, including **associated non-safety circuits that could prevent operation or cause maloperation due to hot shorts, open circuits, or shorts to ground, of redundant trains of systems necessary to achieve and maintain hot shutdown conditions are located within the same fire area** ... one of the following means of ensuring that one of the redundant trains is free of fire damage shall be provided...”*

Generic Letter 81-12 describes the concern with associated circuits (safety related, non-safety related, Class 1E, and non-Class 1E) as systems *“that can effect shutdown capability and thereby prevent post-fire safe shutdown”* and it defines these associated circuits as cables that have a physical separation less than III.G.2 and have either a common power source or common enclosure with the safe shutdown cable, or a *“**connection of circuits of equipment whose spurious operation would adversely affect the shutdown capability.**”*

7. It is my opinion that the “orange” spurious operations fall into the definition of associated circuits, as defined in the clarification letter to GL 81-12. Diagram 2B clearly defines spurious operation is of equipment (valve or pump) whose spurious operation could affect safe shutdown, and the spurious operation equipment is not related to the protected train. This is

the historical regulatory footprint. Thus, in accordance with GL 81-12, the cables associated with the spurious operation equipment will need to be protected in accordance with:

- (a) Section III.G.2, or
- (b) one of the **alternative methods** (guidelines) described in GL 81-12 Clarification Letter (Section B of Enclosure 2 of the Clarification letter) can be used, or
- (c) an exemption/deviation from the requirements of Section III.G.2, or
- (d) another alternative method different from the guidelines (Note: GL 81-12 states that *“all proposed methods for protection of the shutdown capability will be evaluated by the staff for acceptability.”*)

8. The requirements for protecting associated circuits were initially included in Section Q of the proposed Appendix R rule (Federal Register Vol 45, no. 105, pg 36090) and later included incorporated into Section III.L.7 of the final Appendix R Rule. Section III.L.7 states that *“safe shutdown equipment and systems for each fire area shall be known to be isolated from associated non-safety circuits in the fire area, so that hot shorts, open circuits, or shorts-to-ground in the associated circuits will not prevent operation of the safe shutdown equipment.”* This regulatory description is more aligned with common power supply and common enclosure associated circuits that could directly affect (or “prevent operation”) of the safe shutdown equipment. But the clarification letter in GL 81-12 includes the description of spurious operation equipment, and it is not directly related to the safe shutdown equipment.
9. The clarification letter to Generic Letter 81-12 was the official document used to address methods to meet Section III.G requirements (i.e., achieve safe shutdown compliance, including guidance on alternative shutdown compliance). Licensees who were required to meet Appendix R Section III.G or who were committed to meet Section III.G were required to follow the guidance in the GL 81-12. In addition, NRC inspectors reviewed and accepted a plant’s alternative shutdown capability during the triennial inspections and documented their approval/acceptance of the alternative shutdown capability in a Safety Evaluation Report and/or within the Appendix R inspection report.
10. Below is my take on a proposed resolution method for multiple spurious operation of equipment. It may not be popular for the industry, but it has a traceable regulatory footprint (follows the purpose of GL 81-12) and it is technically sound. Plus, I also feel this method would provide some comfort level to the public that the requirements of Appendix R will continue to apply to MSO scenarios.
 - Spurious operation of equipment (SOE) should be considered associated circuits of concern as defined in GL 81-12
 - Per GL 81-12, protect cables associated with SOE in accordance with Section III.G.2, or one of the alternative methods described in GL 81-12.
 - The alternative method described in GL 81-12 is generally an accepted alternative capability approach (III.G.3) to resolving SOE in an SER
 - Other methods to resolve SOEs would need to be evaluated as a “alternative capability” that is reviewed by the NRC (III.G.3)
 - Section III.G.3 requires that the fire detection and a fixed fire suppression system shall be installed in the fire area, room or zone. Otherwise, an exemption/deviation will need to be requested for this.

- Consequences of SOEs are limited to the requirements of the performance goals of Section III.L.2
- Currently GL 86-10, Enclosure 2, Question/answer 5.3.10 requires that the plant transient for designing the alternative shutdown capability consider one worst-case spurious operation, although it was recognized by the NRC that more than one spurious operation may occur in a given fire area. (Note: the old Inspection Procedure 64100 dated 3/16/87, Section 03.01.e.2.(f) gave guidance to inspectors that licensees are required “to analyze for any and all spurious actuations or failures where no such spurious actuations or failures occur simultaneously.”)
- Results of the NEI/EPRI fire tests in 2000 showed that more than one spurious operation could occur, so the results of the test are clearly outside the original NRC position of considering only one worst-case spurious operation in the plant transient. It will have to be a backfit requirement for licensees to **demonstrate the number of spurious operation** that would be credible in the area, room or zone, and the alternate shutdown capability in each area, zone and room would need to be re-evaluated for each licensee required to meet Appendix R or committed to meet Appendix R.
- Because this would be a backfit to the current regulations and guidance for complying with Appendix R, NRR will need to review every plants resolution to MSO for compliance with III.G.3 (for those not transitioning to an NFPA 805 program) or compliance with NFPA 805 requirements during the review of the licensees LAR (for those transitioning to an NFPA 805 license basis). NUREG -800 plants are governed by their license condition, so the backfit review would require an NRR review of the LAR to amend their current license.
- Demonstrating the number of spurious operation can involve fire modeling techniques and credit design features available (i.e., conduits, shield, metal barriers, etc.) or the NRC can mandate limiting the number of spurious operations (based on NRR research and test data).
- In GL 81-12, one of the methods for mitigating SOE is to provide a means to detect the SOE and then procedure to defeat the maloperation), NRC could consider allowing more operator actions in the Control Room for the ASD capability and not limit it to only Rx trip (based on NRR research and test data on HRA and fire damage considerations).
- This approach is consistent with evaluating common power supply and common enclosure associated circuits and the resolution of MSOs that affect common power supply and are in a common enclosure would continue to follow the guidance in GL 81-12 (“alternate method”).
- As stated above, this resolution path would require plants to review compliance with III.G.3 automatic detection and fixed suppression requirements. So, each plant can also include the basis for the current level of protection (if there is no detection or fixed suppression in the area) based on the fire hazards of the fire area.
- Even though this approach is defined as “alternative shutdown”, it does not imply that the Control Room has to be evacuated for a fire in an area, zone or room. This is an “alternative shutdown methodology” and, in my opinion, all ASD methodologies should be approved by NRR via a SER, regardless if they can demonstrate compliance with Section III.L. It is the III.G.3 methodology that is being reviewed and approved. This SER is the best ticket that a licensee can have to show NRC inspectors.
- If a utility wants to use a risk-informed approach as part of the ASD methodology for resolving spurious operations, then they should be able to use the approach to show

compliance with Section III.G.3. Again, III.G.3 is not a predefined methodology, but is plant specific, and as long as the risk-informed approach is reviewed by NRR and is characterized as an alternative method, the current regulations would allow the use of the "alternative" methodology. The NRC could dictate that any risk-informed approaches would have to involve generation of a Fire PRA IAW with NUREG-6850.

- I don't think there is any way around NRR having to review each utilities response to the MSO concern. This is new information obtained after plants' received their license condition and after the standard license condition (of making changes without NRC approval). I think it is the NRC's due diligence to the public to perform this review.

I wasn't sure if it would be best to formally document my comments in a letter to the NRC on company letter head. But, I can do that if we want to formally docket my comments (Unless, of course this email is adequate to docket public comments). If you have any questions, comments or need some clarification, please call me at my office or on my cell phone. I am truly concerned that there will be more public scrutiny on resolving fire protection issues if we follow through on the NRC's MSO resolution path that was proposed in the 3/27/08 public meeting.

Thank you.

Thanks,

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