Implementing Compensatory Measures under EGM 09-002

Purpose

This paper reviews the regulatory guidance and requirements related to non-compliances discovered during the resolution process for addressing Multiple Spurious Operations (MSOs) as outlined in NEI 00-01 Revision 2 and Regulatory Guide 1.189 Revision 2. It also documents the regulatory and technical basis for crediting the use of Operator Rounds as a generic compensatory measure. Implementation of compensatory measures is a required part of the process outlined in NRC EGM 09-002 in order to be able to receive enforcement discretion for any identified non-compliances. For any issues identified by May 2, 2010, enforcement discretion is granted until November 2, 2012 to allow time for implementing any required corrective actions.

Summary & Conclusions

In order to receive enforcement discretion for the resolution of MSOs using NRC EGM 09-002, compensatory measures must be implemented prior to May 2, 2010. The specific form of the compensatory measures is not outlined in the NRC EGM. Additionally, for the types of issues that are expected to be identified through the MSO Resolution Process, the conditions and required actions defined in the Technical Specifications and the Technical Requirements Manual related to Fire Protection Features are expected to be appropriate. The following approach to compensatory measures is recommended for the resolution of MSOs:

- The use of Nuclear Plant Operator (NPO) rounds in the [***add plant specific information for the areas to be toured***], when coupled with the other aspects of fire protection defense-in-depth (provided by the installed fire protection features and the control of plant combustibles) serves as an effective blanket compensatory measure to cover all of the issues identified in the corrective action program for the Plant Specific MSO Resolution Process at [***add Plant Name***].

[**Note**: Refer to Attachment 1 to this paper for training on the actions required for this blanket compensatory measure.]

- The use of this blanket compensatory measure will satisfy the stipulation in the EGM to have compensatory measures in-place in order to receive enforcement discretion for the MSO issues. As the analysis of each specific MSO scenario progresses, consideration of the need for supplemental compensatory measures is appropriate. In cases where the licensee determines that a specific post-fire safe shutdown condition represents a more significant impact to plant margins supplemental compensatory measures may be warranted. The

guidance in NRC RIS 2005-20 should be consulted for additional information related to this topic.

[**Note**: Should any installed fire protection equipment or features described in [***Technical Requirements Manual (TRM) Sections 3.7.3.1 through 3.7.3.8 – replace with plant specific sections***] be required to be out of service or be discovered to be inoperable, the TRO action of an hourly or continuous fire watch is required. The compensatory action recommended in this paper is not a substitute for the TRO action unless such a substitution is specifically allowed by the TRM.]

The use of the compensatory measure outlined above has been determined to be:

- Consistent with the [***add Plant Name***] License, the NRC Regulations and the stipulation in NRC EGM 09-002 for applying compensatory measures for the MSO issue in order to receive enforcement discretion.
- Technically acceptable and effective in maintaining an appropriate level of plant operating margin relative to the MSO issue.

Background

NEI 00-01 Revision 2 was issued in June of 2009 providing the Industry developed criteria for resolving the difference of opinion between the Industry and the NRC related to MSOs. In November of 2009, the NRC issued Revision 2 to Regulatory Guide 1.189 endorsing major portions of the Industry proposed approach and providing some clarifications/adjustments to other areas. NRC also issued EGM 09-002 allowing enforcement discretion for a period of time while licensees implement the guidance of NEI 00-01 Revision 2 and Regulatory Guide 1.189 Revision 2. With the issuance of Regulatory Guide 1.189 Revision 2 on November 2, 2009, the enforcement discretion period began. One of the provisions within the EGM for obtaining enforcement discretion was to implement compensatory measures. The purpose of this paper is to define the compensatory measures to be used. The selected compensatory measures must be consistent with the licensing basis for [***add Plant Name***] and the NRC Regulations. The selected compensatory measures also must be evaluated for technical acceptability and effectiveness. This paper addresses each of these aspects.

Description of Issue

To resolve a longstanding issue between the NRC and Nuclear Licensees, NEI [NEI 00-01 Revision 2] and NRC [Regulatory Guide 1.189 Revision 2] have issued documents to outline the changes required in the Post-Fire Safe Shutdown Analysis required to address the consideration of multiple fire-induced circuit failures and multiple spurious operations (MSOs). These changes include new guidance for:

- Considering an increased number of fire-induced circuit failures.
- Considering an increased number of fire-induced equipment spurious operations resulting from these fire-induced circuit failures.
- Using and justifying operator manual actions (OMAs) to mitigate the effects of fire-induced circuit failures and spurious operations.

Licensees desiring to resolve the MSO issue for their facility can do so by implementing the approach outlined in NEI 00-01 Revision 2 as amended by Regulatory Guide 1.189 Revision 2. In addition, under EGM 09-002, the NRC is offering enforcement discretion to licensees for a period of time to resolve plant specific issues related to MSOs.

Actions to Receive Enforcement Discretion

NRC EGM 09-002 outlines the steps required for a licensee to obtain enforcement discretion for the period of time required to resolve any issues with MSOs. The maximum amount of time available under EGM 09-002 to receive enforcement discretion is until November 2, 2012. In order to receive enforcement discretion under EGM 09-002, however, the following steps must be completed before May 2, 2010. Each licensee must:

- identify non-compliances
- place these non-compliances into the corrective action program
- implement compensatory measures

For each of the identified non-compliances meeting the criteria outlined above, NRC enforcement discretion will be available until November 2, 2012 at which time these non-compliances must be corrected.

Evaluation of Licensing and Regulatory Guidance and Requirements

The conditions which are being evaluated in the MSO Resolution Process are conditions that represent potential non-conformances in the Post-Fire Safe Shutdown Analysis. Any non-conformances identified as a part of this review will be entered into the corrective action program. Upon entry into the corrective action program, the impact of the condition on plant operability must be assessed. The following generic assessment has been developed for the MSO Resolution Project. For each [***Corrective Action Program Entry (CAP)***] generated, the condition will need to be assessed for compliance with this paper, i.e. it must be a Post-Fire Safe Shutdown issue classified as "operable, but degraded or nonconforming" condition with no specific impact on the fire protection features addressed in the Technical Requirements Manual (TRM). Should the condition be determined to be consistent with the assumptions in this paper, the compensatory measures outlined in this paper represent an acceptable approach for the condition.

- Although impacts to Structures, Systems or Components (SSCs) addressed in the Technical Specifications (TSs) could be identified through the MSO Resolution Process, Operability Determinations used to assess the operability of an SSC described in Technical Specification (TS) must evaluate the ability of that SSC to perform its specified safety function in preventing and/or mitigating design basis accidents. Since the Fire is not a Design Basis Accident, the Fire cannot cause an SSC in the TS to become inoperable. An issue identified during an engineering review of a topic such as Post-Fire Safe Shutdown, at most, represents a noncompliance with the Current Licensing Basis (CLB).
- Since the Fire is not a design basis accident, but rather a CLB commitment, even though the SSC may be described in the TS, the postulated condition does not represent a condition of inoperability, but rather a condition that is considered to be "operable but degraded or non-conforming".
- Similarly, the types of issues identified through the MSO review will not result in the impairment of any existing fire protection features addressed in the [***TRM Sections 3.7.3.1 through 3.7.3.8 – replace with plant specific sections***]. Therefore, none of the compensatory measures required by the TRM for fire protection features apply to the MSO issues. Since the fire protection features addressed in the TRM are not impacted by the MSO conditions, the TRO action contained within the TRM need not be applied to the MSO issues.
- MSO issues are most appropriately classified as conditions that are "operable, but degraded or non-conforming" as defined in NRC RIS 2007-20, Revision to Guidance Formerly Contained in NRC Generic Letter 91-18, "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and On Operability".
- As explained in Section 7.3.a of NRC RIS 2007-20, compensatory measures may be used to restore plant operating margin for an SSC determined to be operable but degraded or nonconforming. As such, the application of compensatory measures for degraded or nonconforming conditions associated with post-fire safe shutdown is not specifically required. As outlined in NRC RIS 2005-20, the degree to which such measures are applied is a function of the level of potential impact to plant margins. Additionally, when such interim compensatory measures are deemed to be appropriate, NRC Information Notice 97-48 states that for these types of conditions, consideration should be given to interim compensatory measures, such as "briefing operators on degraded post-fire safe shutdown conditions; temporary repair procedures; temporary fire barriers; or detection or suppression systems".
- As explained in the section below, the use of Operator Rounds, which uses individuals familiar with the locations and functions of important plant equipment, when coupled with the other aspects of fire protection defense-in-depth (provided by the installed fire protection features and the control of plant combustibles) is a technically acceptable and an effective means of restoring any plant operating margin that may have been eroded by the identification of the MSO issues.

This is particularly true for the MSO issues since many of these issues are currently conditions which are considered to be beyond the current design and licensing basis for the facility and since they, in general, require the occurrence of a moderately large fire and the combined failure of equipment and cables as a result of this fire. The type of fire damage required is not assured even given the fire of the required magnitude. These conditions are judged to be a negligible impact to plant margins. As the analysis of MSOs progresses, diligent monitoring of the potential impact on plant margin will assure that supplemental compensatory measures are added when appropriate.

- The use of Operator Rounds as a compensatory measure for these "operable but degraded or nonconforming" conditions is consistent with the [***add Plant Name***] license, the NRC Guidance in NRC RIS 2005-20 and the stipulation in NRC EGM 09-002 for applying compensatory measures for the MSO issue in order to receive enforcement discretion.

Evaluation of Technical Adequacy and Effectiveness

The justification for this approach from a technical perspective is as follows:

- The issues related to MSOs have been reviewed generically and have consistently been determined to be low risk and low safety significance. In order for MSOs to occur the following types of things need to occur:
    - A large fire with sufficient heat release capability to cause damage to plant cabling. In the Industry sponsored cable fire testing, (NEI/EPRI Cable Fire Testing and NRC Sponsored CAROLFIRE Cable Testing), even a fire source equal to 350 KW situated in close proximity to the cables required approximately 20 minutes before the cabling was susceptible to damage.
    - A fire of this magnitude will, in all likelihood, have been detected by the installed automatic fire detection systems prior to reaching a damaging level.
    - Temperatures in the vicinity of the cables need to approach the 500^{o} to 700^{o} F range to begin to cause cable damage. This temperature range is significantly above the temperature rating on the initiating devices for the automatic suppression systems installed at [***add Plant Name***] to initiate.
    - The temperature in the vicinity of the cable must exist for a period of time in order for the cable to receive sufficient damage for maloperation. Initiation of the fire suppression system will work to immediately reduce the room temperatures in the affected plant area.
    - The cable damage sustained must, in most cases, result in a hot short.
    - The hot short must last for a sufficient amount of time to be able to be combined with a second hot short on a separate conductor or, in many cases, a separate cable located in an adjacent fire zone or room.
    - Due to the robust nature of typical Nuclear Power Plant (NPP) designs, multiple means exist to successfully mitigate most of the typical MSO scenarios. For most MSO scenarios to result in an unacceptable out come, additional failures must occur

to separate divisions of cables/equipment, otherwise the MSO scenario would be mitigated by the remaining trains of plant equipment. Therefore, for an MSO scenario to be of concern, additional trains of cables/equipment would also need to be affected by the same fire. This consideration would require a fire of an even larger size that the one required to affect all components in an individual MSO. Class 1E Electrical separation criteria and spatial arrangements, therefore, provide an additional level of defense-in-depth, since a fire must be of a magnitude so large that it causes the MSO scenario, and also affects redundant cables/equipment that are spatially separated from the MSO target to the point that a viable mitigation path is also lost.

- Most plant areas with even a moderate amount of combustibles at [***add Plant Name***] are protected by Automatic Suppression and Detection. Therefore, a fire of the size and intensity required to cause the required cable damage is unlikely to occur without being detected and suppressed.
- The introduction of transient combustibles into the plant is procedurally controlled at [***add Plant Name***] by limiting the amount allowed in plant areas and tracking their presence.
- Periodic Operator Rounds, even if performed only in selected areas of the plant, will provide an additional assurance of the early identification of conditions with the potential to lead to a damaging fire.
    - Most of the Operators on duty are fire watch qualified, which adds another layer of defense-in-depth.
- Use of Plant Operators to perform this function provides an additional level of effectiveness because of the knowledge these individuals have of plant equipment and systems. This feature allows for a rapid assessment of the potential impacts to plant shutdown for any conditions discovered.
- The combination of the features described above represents a set of compensatory measures that adequately balances the reduction in plant margin currently envisioned for the MSO scenarios.

Recommended Approach

Between now and May 2, 2010, numerous [***CAP's***] will be generated related to the MSO issue. In the title for each of these [***CAP's***], the words ["***MSO Issue – replace with plant specific information***"] will appear. Although in most cases, the issues identified will be classified as being beyond our currently accepted design and licensing basis, for these issues and for any issues identified through this review process that impact our current licensing basis appropriate information related to reportability and/or operability will be included in the description part of the [***CAP***]. As a minimum, the generic compensatory measures outlined in this paper are expected to apply to all of the [***CAP's***] generated for MSO Resolution Process. If additional compensatory measures beyond the generic compensatory measure outlined in this paper need to be applied, a statement regarding

the need for these additional compensatory measures will be added to each [***CAP***], as required. If no additional compensatory measures beyond the generic compensatory measures outlined in this paper are required, then a statement reflecting this will be made in the body of the [***CAP***].

Prepared By: _____ **Date:** _____
ZZZZZZZZZZZ - Engineering

Reviewed By: _____ **Date:** _____
XXXXXXXXXX – [*Nuclear Regulatory Assurance – replace with plant specific name***]**

Reviewed By: _____ **Date:** _____
YYYYYYYYYY – Operations

Enclosure

Training on the required Actions for Operators on Fire Hazard Recognition and Mitigation for the MSO Blanket Compensatory Measure

Purpose: This training is being provided to reinforce the need to identify fire hazards while performing operator rounds and any other time while in the plant. The use of operator rounds to identify and mitigate fire hazards in the plant is part of an Alternate Compensatory Measure being implemented to address a new NRC regulatory issue for multiple spurious operations. It takes a significant fire to create a condition that could result in cable failures that could lead to multiple spurious operations. Ensuring that fire hazards in the plant are controlled will reduce the likelihood of a significant fire. In addition to Operators looking for fire hazards while performing rounds, existing fire detection, fire suppression, fire barriers, the use of fire retardant cable and high flashpoint lube oils all play a role in preventing a severe fire from occurring. As a compensatory measure to meet the intent of NRC Enforcement Guidance Memorandum EGM 09-002, Plant Operators are being asked to be vigilant in looking for fire hazards during rounds and whenever they enter, for any reason, any of the plant areas listed below.

Scope: [***Add Plant Specific Procedure Reference***] directs operators to PERFORM these area checks while performing rounds that include (among other actions) to:

Check general area cleanliness

Check for safety concerns including checking for smoke or odors, fire hazards and hazardous debris.

Check to ensure fire-fighting equipment is staged and accessible

This includes all rounds performed in [***Add Plant Specific locations where rounds will be performed as a comp measure for MSOs***].

While performing operator rounds and while in the plant for any reason, it is requested that each equipment operator actively look for the following **fire hazards or conditions**:

- Transient Combustible Materials without a Transient Combustible Permit or a Work in Progress Sign.
- Transient Combustible Materials with a Transient Combustible Permit or WIP sign that is out of date or does not match the description.
- Oil leaks or accumulation of oil.
- Trash cans without flame tamer lids or have lids out of place.
- Trash cans overflowing.
- Anti-C bins overflowing.
- Unsecured cylinders, particularly for flammable or combustible gasses.

- Combustible or Flammable liquids not in stored in Flammable cabinets.
- Flammable cabinets with open doors or damaged.
- Fire protection equipment (fire extinguishers or hose stations) blocked or missing.
- Fire doors not closing or damaged.
- Any condition that could lead to a fire or increase the severity of a fire.

If any of these conditions are found:

- If you happen to discover a fire, notify the control room and then attempt to extinguish the fire with a portable fire extinguisher if safe to do so.
- If possible, correct the condition upon discovery and please document in an [***Add Plant Specific Corrective Action Program reporting mechanism***] and contact [***Add Plant Specific Fire Protection Engineering personnel***].
- If the condition cannot be corrected, contact supervision, document in an [***Add Plant Specific Corrective Action Program reporting mechanism***] and contact [***Add Plant Specific Fire Protection Engineering personnel***].
- If there is any question (or the work group involved is reluctant to correct the issue) contact [***Add Plant Specific Fire Protection Engineering personnel***].

Documentation: Please document the rounds in [***Esoms – replace with plant specific information***]. The Housekeeping check-off is to be revised to include "fire hazards", as described in this attachment. If emergent plant condition prevents performance of rounds on a shift, please notify shift management to ensure that the next shift will perform the area check.