



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

December 17, 2018

MEMORANDUM TO: Gregory T. Bowman, Chief  
Reactor Oversight Process Assessment Branch  
Division of Inspection and Regional Support  
Office of Nuclear Reactor Regulation

FROM: Donald Helton, Jr., Senior Reliability and Risk Engineer */RA/*  
Reactor Oversight Process Assessment Branch  
Division of Inspection and Regional Support  
Office of Nuclear Reactor Regulation

SUBJECT: INTERIM GUIDANCE TO CLARIFY THE USE OF INSPECTION  
MANUAL CHAPTER 0609 IN DISPOSITIONING FINDINGS  
IDENTIFIED UNDER TEMPORARY INSTRUCTION 2515/193

This memorandum provides clarification of the use of existing Significance Determination Process (SDP) guidance to disposition inspection findings identified under Temporary Instruction (TI) 2515/193, "Inspection of the Implementation of EA-13-109: Order Modifying Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions." It considers findings related to both Phase 1, "Reliable Severe Accident Capable Wetwell Venting System," and Phase 2, "Reliable Wetwell Venting Strategy," of the associated Order. Note that all licensees to date have chosen to meet Phase 2 using Severe Accident Water Addition (SAWA) and Severe Accident Water Management (SAWM) strategies, rather than by installing a severe accident-capable drywell vent system<sup>1</sup>. This guidance may also be used for dispositioning findings related to this same Order (EA-13-109, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions") that arise during inspections other than TI-193, and prior to future updates of the SDP guidance. A simplified flowchart summarizing this memorandum is provided in Figure 1, with the guidance below providing additional detail on each decision point.

CONTACT: Donald Helton, NRR/DIRS  
301-415-1545

---

<sup>1</sup> The SAWA strategy seeks to provide cooling to ex-vessel debris during a severe accident to provide reasonable assurance that drywell temperatures would remain below 545°F, while the SAWM strategy seeks to ensure that the wetwell venting capability is preserved for an extended period of time, until an alternate means of reliable containment heat removal and pressure control can be established. NRC Interim Staff Guidance JLD-ISG-2015-01 and the industry guidance it endorses (with exceptions and clarifications), NEI 13-02, Revision 1, provide additional information.

### Establishment of the Appropriate Cornerstone [Block 1 of Figure 1]

Regarding the establishment of the relevant cornerstone(s) in Inspection Manual Chapter (IMC) 0609, Attachment 4, "Initial Characterization of Findings," TI-193 findings can generally be readily dispositioned in a very similar manner to other inspection findings. However, one key clarification is warranted. Specifically, in evaluating the "Barriers Cornerstones" items in Table 2, one must understand that SAWA/SAWM strategies would fall under the category of pressure control systems. The reason for this is that these strategies provide a means for ensuring continued viability of the hardened containment venting system (HCVS), as an alternative to a drywell vent capability, and thus have a key role in pressure control.

### Selection of the Appropriate SDP Appendix

#### *Findings Related to Shutdown Operations [Blocks 2 and 3 of Figure 1]*

Regarding the routing function of IMC 0609, Attachment 4 (in Table 3), Item A will direct degraded conditions during shutdown, refueling, and forced outages to IMC 0609, Appendix G, "Shutdown Operations Significance Determination Process." This routing is appropriate for TI-193 findings; however, such findings are anticipated to almost always have very low safety significance (Green), on the basis that the period of exposure where the plant is in a shutdown condition (as defined in IMC 0609, Appendix G) but also has containment functional, is expected to be very small (e.g., less than 1 day).

#### *Relationship to Order EA-12-049 and Use of Appendix O [Blocks 4 and 5 of Figure 1]*

If the finding does not relate to shutdown operations, IMC 0609, Attachment 4 (Table 3, Item E) will ask if the finding relates to Order EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," or EA-12-051, "Order Modifying Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," and if so, will direct the inspector to IMC 0609, Appendix O, "Significance Determination Process for Mitigating Strategies and Spent Fuel Pool Instrumentation." Findings related to Order EA-13-109 may have a nexus to Order EA-12-049, in particular because many licensees use Order EA-12-049 (a.k.a., FLEX) equipment in their HCVS and SAWA/SAWM strategies<sup>2</sup>. However, even in these cases, the degraded condition will likely have an impact beyond that associated with Order EA-12-049. This is because containment venting and SAWA/SAWM strategies have been a part of boiling water reactor accident management for decades, and from the delta-risk/probabilistic risk assessment (PRA) function perspective, are relevant to more than accident sequences involving a declared extended loss-of-ac power. As such, Appendix O may only represent a portion of the overall risk significance of the issue. For this reason, inspectors would generally answer "No" to this question for TI-193 findings. However, if the inspector and senior reactor analyst (SRA) believes that the finding can be adequately assessed solely by the Order EA-12-049 context, Appendix O can be used. Note that Appendix O has not been updated specifically for Order EA-13-109, and in fact there are plans to sun-set that document; therefore, this path is likely to lead to the use of Appendix M, "Significance Determination Process Using Qualitative Criteria." However, IMC 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power" is being updated to acknowledge Order EA-13-109 findings.

---

<sup>2</sup> Note that the opposite is true also, wherein licensees use the Order EA-13-109 vent in meeting the requirements of Order EA-12-049.

## Use of the At-Power SDP Appendices

### *Use of Appendix A for At-Power Inspection Findings [Blocks 6 and 7 of Figure 1]*

For at-power findings, IMC 0609, Attachment 4 (Table 3, Item F.2) will direct the analyst to IMC 0609, Appendix A. IMC 0609, Appendix A provides screening questions related to the Initiating Events, Mitigating Systems, and Barrier Integrity cornerstones. Findings under TI-193 would not generally be expected to affect the Initiating Events cornerstone, and if they did, it is expected that the existing guidance would be clear and sufficient. Findings under TI-193 may affect the Mitigating Systems cornerstone (if they involve venting prior to core damage), and the existing screening questions are generally relevant and useful for determining whether the finding should screen to Green or proceed to a detailed risk evaluation (a.k.a., a DRE).

If the finding does not screen to Green, the TI-193 cross-regional panel and the Inspection Finding Review Board will decide whether existing tools can efficiently quantify the change in core damage frequency (CDF), or whether a planning Significance and Enforcement Review Panel should be conducted to determine if IMC 0609, Appendix M is the appropriate tool for characterizing the significance of the finding. This decision will be made on a case-by-case basis, but will generally be governed by (i) whether the finding affects the functionality of venting strategies that have long been included in PRAs, and (ii) whether the applicable plant-specific risk model already has this capability modeled<sup>3</sup>. As more experience is gained, it should be possible to refine the screening questions and provide further guidance on when a finding should be screened to Green, when a detailed risk evaluation should be performed, or when the use of IMC 0609, Appendix M is appropriate.

### *Additional Considerations for the Barrier Integrity Cornerstone [Block 8 of Figure 1]*

Findings under TI-193 are most likely to affect the Barrier Integrity cornerstone (either venting after core damage or SAWA/SAWM). Regarding the Appendix A Barrier Integrity screening questions and the use of IMC 0609, Appendix H, "Containment Integrity Significance Determination Process," there are two notable ambiguities that might hamper an inspector's use of Appendix H for TI-193 findings:

- A literal interpretation of the Appendix A screening questions (Exhibit 3, Question B) would screen all HCVS pressure control-related findings (as opposed to heat removal function) and all SAWA/SAWM findings to Green; and
- Use of Table 4.1 in Appendix H would indicate that HCVS findings (other than those that affect containment isolation) need not be considered Type B (LERF-only) findings.

In both cases, it is unclear whether these items were informed and deliberate simplifications in the guidance or an inadvertent omission from the guidance. The underlying technical basis document, NUREG-1765, "Basis Document for Large Early Release Frequency (LERF) Significance Determination Process (SDP)," states: "slowly developing accident sequences that involve failure of containment heat removal and ultimately progress to containment failure, e.g., TW sequences in boiling water reactors (BWRs), are assumed not to contribute to LERF. It is assumed that effective emergency response actions can be taken for these accident sequences." Conversely, NUREG/CR-6595, Volume 1, "An Approach for Estimating the

---

<sup>3</sup> At this time, BWR Standardized Plant Analysis Risk models have not been updated to reflect the plant modifications associated with Order EA-12-049 or Order EA-13-109, though such work is underway.

Frequencies of Various Containment Failure Modes and Bypass Events,” specifically discusses the need to consider the timing of a General Emergency declaration relative to the timing of containment venting or failure. Complicating the picture, Order EA-12-049 results in venting under somewhat different conditions (namely, earlier in some accident sequences) than considered at the time Appendix A and Appendix H were formulated, while the combination of Orders EA-12-049 and EA-13-109 will generally tend to increase the reliability of venting and drywell flooding relative to that same earlier formulation. Note that higher reliability (and the resulting risk reduction) from these actions in the baseline plant risk can result in a larger change in risk for some degraded conditions.

Since the SDP focuses on the change in LERF caused by the degraded condition, the key question is whether the finding has substantially increased the likelihood of having a release that is un-scrubbed and prior to effective evacuation. Since this may not be readily discernible to an inspector, the inspector is encouraged to consult with the regional SRA when needed. The SRA will also have the option of consulting with Headquarters risk experts, who may be in a position to provide insights based on studies, such as NUREG-2206, “Technical Basis for the Containment Protection and Release Reduction Rulemaking for Boiling Water Reactors with Mark I and Mark II Containments,” as well as ongoing efforts to clarify the treatment of effective evacuation in Appendix H. In the interim, an ROP feedback form will be opened to reflect the need to clarify and augment the guidance in this regard in Appendix H.

### Conclusion

Other than the items noted above, application of the existing guidance to TI-193 inspection findings should be straight-forward, and inspectors are encouraged to consult their regional SRA when questions arise. Difficulties in applying either the guidance in this memo or other guidance used to disposition TI-193 findings should be fed back to the TI-193 cross-regional panel, so that additional clarification can be developed.

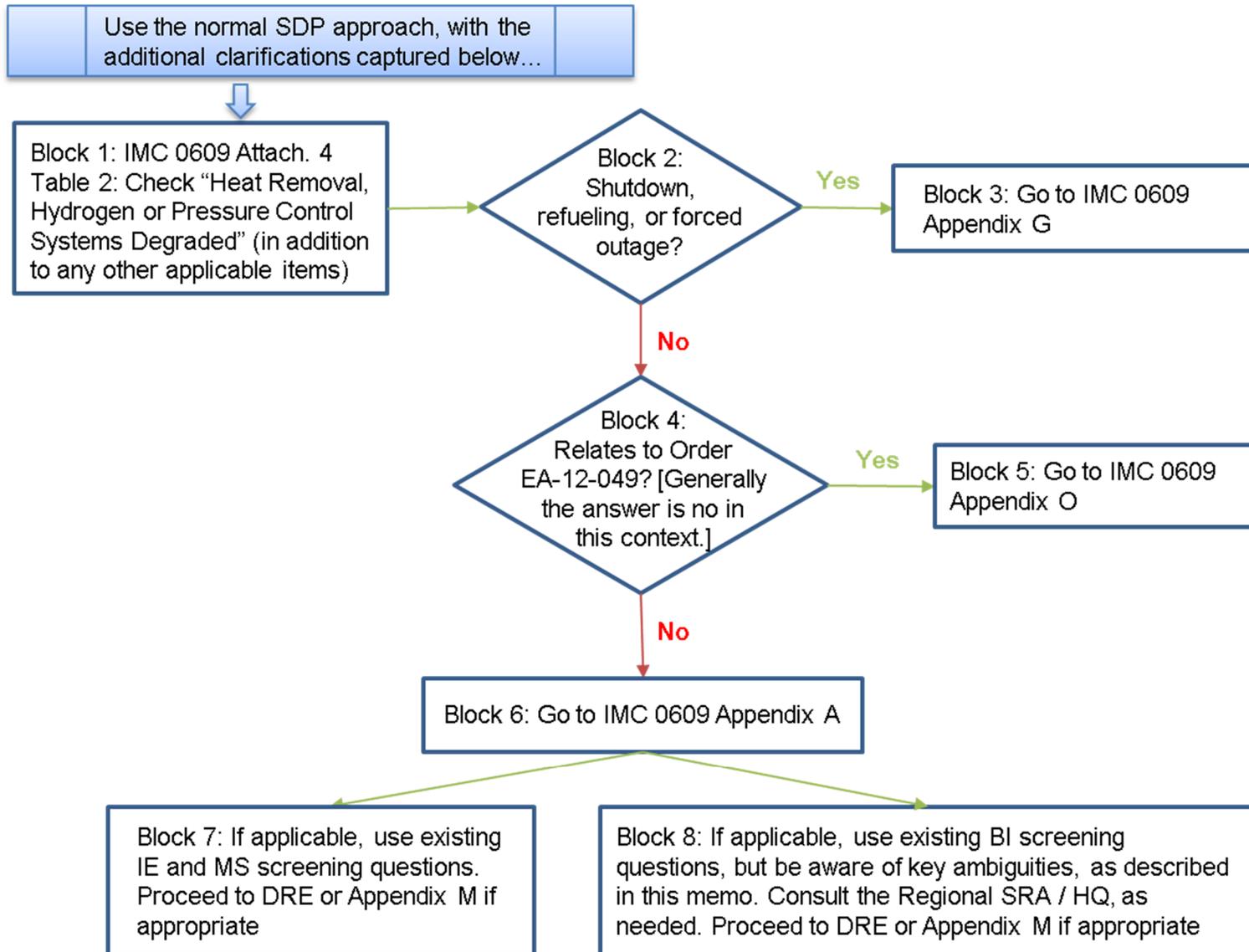


FIGURE 1: OVERVIEW OF TI-193 SDP ROUTING

SUBJECT: INTERIM GUIDANCE TO CLARIFY THE USE OF INSPECTION MANUAL  
CHAPTER 0609 IN DISPOSITIONING FINDINGS IDENTIFIED UNDER  
TEMPORARY INSTRUCTION 2515/193 DECEMBER 17, 2018

DISTRIBUTION:

FArner, RI  
CCahill, RI  
CLally, RI  
GMacDonald, RII  
SNewman, RII  
RRodriguez, RII  
JHanna, RIII  
LKozak, RIII  
SSheldon, RIII  
RAlexander, R4  
RDeese, RIV  
DLoveless, RIV  
DAird  
AGarmoe  
RGibbs  
MHumberstone  
MLEech  
ALewin  
JMitman  
KRoche  
AZoulis  
RidsNrrDraApla Resource  
RidsNrrDlpPbeb Resource

**ADAMS Accession Number: ML18254A221**

OFFICE	NRR/DIRS/IRAB	NRR/DIRS/IRAB
NAME	DHelton	GBowman
DATE	9/14/2018	12/17/2018

**OFFICIAL RECORD COPY**