TECHNICAL BASIS FOR B.5.b SIGNIFICANCE DETERMINATION PROCESS

1.0 PURPOSE

The basis for IMC 0609 Appendix L is outlined in this document. The objective of IMC 0609 Appendix L is to assess inspection findings associated with the development and implementation of guidance and strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant due to explosions or fire as required by Section B.5.b of the Interim Compensatory Measures (ICM) Order, EA-02-026, dated February 25, 2002, the conforming license conditions imposed in the course of development of the mitigating strategy requirements, and 10 CFR 50.54(hh)(2).

2.0 BACKGROUND

Following the events of September 11, 2001, the Commission determined that the genera threat environment warranted all licensees to establish specified interim safeguards and security compensatory measures. These compensatory measures were initially required by the ICM Order, EA-02-026, of February 25, 2002, more fully developed as described below, and finally codified as 10 CFR 50.54(hh)(2). The provisions of 10 CFR 50.54(hh) (2) state, “each licensee shall develop and implement guidance and strategies intended to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities under the circumstances associated with loss of large areas of the plant due to explosions or fire, to include strategies in the following areas: (i) Fire fighting; (ii) Operations to mitigate fuel damage; and (iii) Actions to minimize radiological release.”

During the development of the requirements for Section B.5.b of the ICM Order, the U.S. Nuclear Regulatory Commission (NRC) and industry conducted a series of assessments and workshops to clarify the attributes for adequately implementing mitigating strategies for postulated losses of large areas of a plant resulting from explosions or fires. These efforts were ultimately divided into three Phases. Phase 1 required licensees to assess their nuclear power plants, in accordance with Section B.5.b of the ICM Order, to identify readily available mitigative strategies to address a range of potential scenarios that may result in the loss of large areas of the plant resulting from explosions or fires. Licensees were required to implement these mitigative strategies, and the staff completed inspection of the implementation of most of the Phase 1 items by the end of 2006. Some items were deferred to Phases 2 and 3.

For Phases 2 and 3, the NRC determined that differences in plant design and configuration warranted independent, site-specific assessments of spent fuel pools (SFP) (Phase 2) and the reactor core and containment (Phase 3). These assessments were completed in December 2005 and June 2006, respectively. In October 2006, the staff requested that licensees provide

site-specific details for implementing Phase 2 and 3 mitigation strategies. To assist licensees in preparing their site-specific responses, the Nuclear Energy Institute (NEI) prepared NEI 06-12, "B.5.b Phase 2 & 3 Submittal Guideline," which included a set of generic mitigating strategies. The staff reviewed and provided comments on NEI 06-12, and in December 2006, NEI issued Revision 2 to NEI 06-12, incorporating changes to address comments provided by the staff. The staff concluded that NEI 06-12, Revision 2, provides an acceptable method for addressing B.5.b Phase 2 and 3 actions and endorsed the guidance in correspondence to NEI issued on December 22, 2006 (ML063560235).

All licensees submitted their proposed, site-specific mitigation strategies to the NRC. The staff reviewed these submittals and concluded that all licensees had identified a range of strategies that, if implemented as described, would be adequate to satisfy the industry-proposed B.5.b license conditions. The safety evaluation reports and the site-specific license conditions are available in the Agency-wide Documents Access and Management System. These documents are not publicly available because they contain Official Use Only - Security-Related Information.

The staff prepared a draft Temporary Instruction (TI) 2515/171, "Verification of Site Specific Implementation of B.5.b Phase 2 & 3 Mitigating Strategies," to be used to verify implementation of the B.5.b Phase 2 and 3 strategies at each site. The inspection program revealed a range of inspection findings, which the staff screened using IMC 0612, Appendix B, "Initial Screening," to determine if they were more than minor in significance. Licensees made on-the-spot corrections to procedures or calculations, or they entered an action into their corrective action program. When issues were determined to be more than minor, the inspectors initially used IMC 0609, Appendix M, "Significance Determination Process Using Qualitative Criteria," to determine the significance of the findings.

The staff recognized that Appendix M was not the right significance determination process (SDP) tool to evaluate the significance of B.5.b findings because of "the beyond design basis" nature of the findings. All B.5.b scenarios are initiated by events that are beyond the design basis of the plant. Since these events are outside the baseline risk of the plant, assessing the significance of findings quantitatively would result in an inflated significance. Appendix M, although a qualitative risk tool, is focused on determining if the licensee is operating within its design basis by assessing safety attributes, such as safety margin and defense-in-depth. To deal with the unique nature of the B.5.b inspection finding, the staff recognized the need to develop a specific qualitative significance determination model based on expert judgment, focused on defense-in-depth, informed by stakeholder input. To ensure a consistent assessment of findings identified during B.5.b inspections, the staff, with input from industry stakeholders, developed a special SDP for TI 2515/171. This SDP focused on performance deficiencies affecting the feasibility of multiple strategies that have a greater significance than those deficiencies that affect the feasibility of a single strategy. The NRC issued TI 2515/171, Appendix C, on May 16, 2008, and an SDP tailored to B.5.b requirements. The staff incorporated this SDP into Revision 1 of the TI, and issued the TI for use on July 25, 2008.

In April 2009, the staff reported to the Commission that they had completed the inspection of Phase 2 and Phase 3 action items. In the report (ML090771056), the staff committed to incorporate the lessons learned from the performance of TI 2515/171 into the Reactor Oversight Process (ROP) baseline inspection program.

During the 2009 ROP Re-alignment meetings, the staff decided to incorporate the guidance into the Triennial Fire Inspections. The staff issued the SDP used for TI 2515/171 as IMC 0609 Appendix L for Alternative Mitigation Strategies (B.5.b).

3.0 TECHNICAL BASIS FOR THE B.5.B SDP

Once a finding has been determined in accordance with IMC 0612, Appendix B "Issue Screening", the finding is evaluated by the B.5.b SDP based on its effect on the mitigating strategies. The B.5.b SDP is structured such that any finding evaluated by the SDP will be at least Green, with the significance of the finding reflecting the significance of the loss of the ability to perform the objective of the mitigating strategies. The technical basis for the thresholds for the significance of B.5.b findings is expert judgment, focused on defense-in-depth, informed by stakeholder input. The significance of a finding is based on the following criteria:

- A Green finding results from the licensee's inability to recover the availability of any individual mitigating strategy.

- A White finding results from the licensee's inability to 1) recover the availability of multiple mitigating strategies such that SFP cooling, injection to reactor pressure vessel, or injection to steam generators cannot occur, or 2) recover the availability of on-site, self-powered, portable pumping capability, or 3) perform command and control enhancements.

- A Yellow finding results from the licensee's failure to substantially establish mitigating strategies in one or more of the overall mitigating strategy areas. These areas include fire fighting response strategies, operations to mitigate reactor core fuel damage including command and control and actions to minimize release, and operations to mitigate SFP fuel damage including command and control and actions to minimize release.

- A Red finding results from an actual B.5.b event with a substantial failure of mitigating strategies to function as intended (i.e., achieve the strategies' objectives) in one or more of the overall mitigating strategy areas. These areas include fire fighting response strategies, operations to mitigate reactor core fuel damage including command and control and actions to minimize release, and operations to mitigate SFP fuel damage including command and control and actions to minimize release.

If the mitigating strategies intended to maintain or restore core cooling, SFP cooling, or containment integrity are not developed and implemented adequately the public may be placed at greater risk. The elevated safety significance, as described in the criteria for the thresholds (i.e., Green, White, Yellow, Red), is consistent with the decrease in defense-in-depth and subsequent increase in risk to the public from the loss of the ability to perform the mitigating strategies.

For example, if the finding results in all of the mitigating strategies in a general grouping being non-feasible, the inability to perform the objective of that group of strategies (e.g., provide SFP cooling) would be characterized as having a greater significance (White) than a finding affecting only one strategy (Green). Similarly, a finding affecting the use of the on-site, self powered, portable pumping capability that is used in multiple strategies would be characterized as having a greater significance (White) due to the diminished ability to perform the objectives of multiple strategies.

A finding involving the failure to establish all of the mitigating strategies in a general category would have been characterized during the TI 2515/171 inspections as having a greater significance (Yellow) than a finding resulting in all of the mitigating strategies in a category being non-feasible (White).

Similar to the treatment of significance in the Emergency Preparedness SDP, the greatest significance (Red) is reserved for an actual B.5.b event (loss of a large area of the plant due to fire or explosion) in which a finding results from the substantial failure of the mitigating strategies to function as they are intended.

4.0 REFERENCES

1) Temporary Inspection (TI) 2515/171, “Verification of Site Specific Implementation of B.5.b Phase 2 & 3 Mitigating Strategies”

2) Inspection Manual Chapter (IMC) 0609, Appendix L, “B.5.b Significance Determination Process”

3) IMC 0612, Appendix B “Issue Screening”

4) IMC 0609, Appendix M, “Significance Determination Process Using Qualitative Criteria”

5) Nuclear Energy Institute (NEI) 06-12, “B.5.b Phase 2 & 3 Submittal Guideline”

END

ATTACHMENT 1
Revision History for IMC 0308 Attachment 3, Appendix L

Commitment Tracking Number	Accession Number Issue Date Change Notice	Description of Change	Description of Training Required and Completion Date	Comment and Feedback Resolution Accession Number
N/A	ML100220219 05/09/14 CN 14-011	Researched commitments for 4 years and found none. This Appendix to the IMC 0308, Attachment 3 is the basis for the new SDP Appendix L used for determining the significance of B.5.b findings.	None	ML102510609