U.S.NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

Status and Path Forward on Generic Safety Issue (GSI) 191 Pressurized Water Reactor Sump Performance

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Presented to:

Public Meeting on GSI-191

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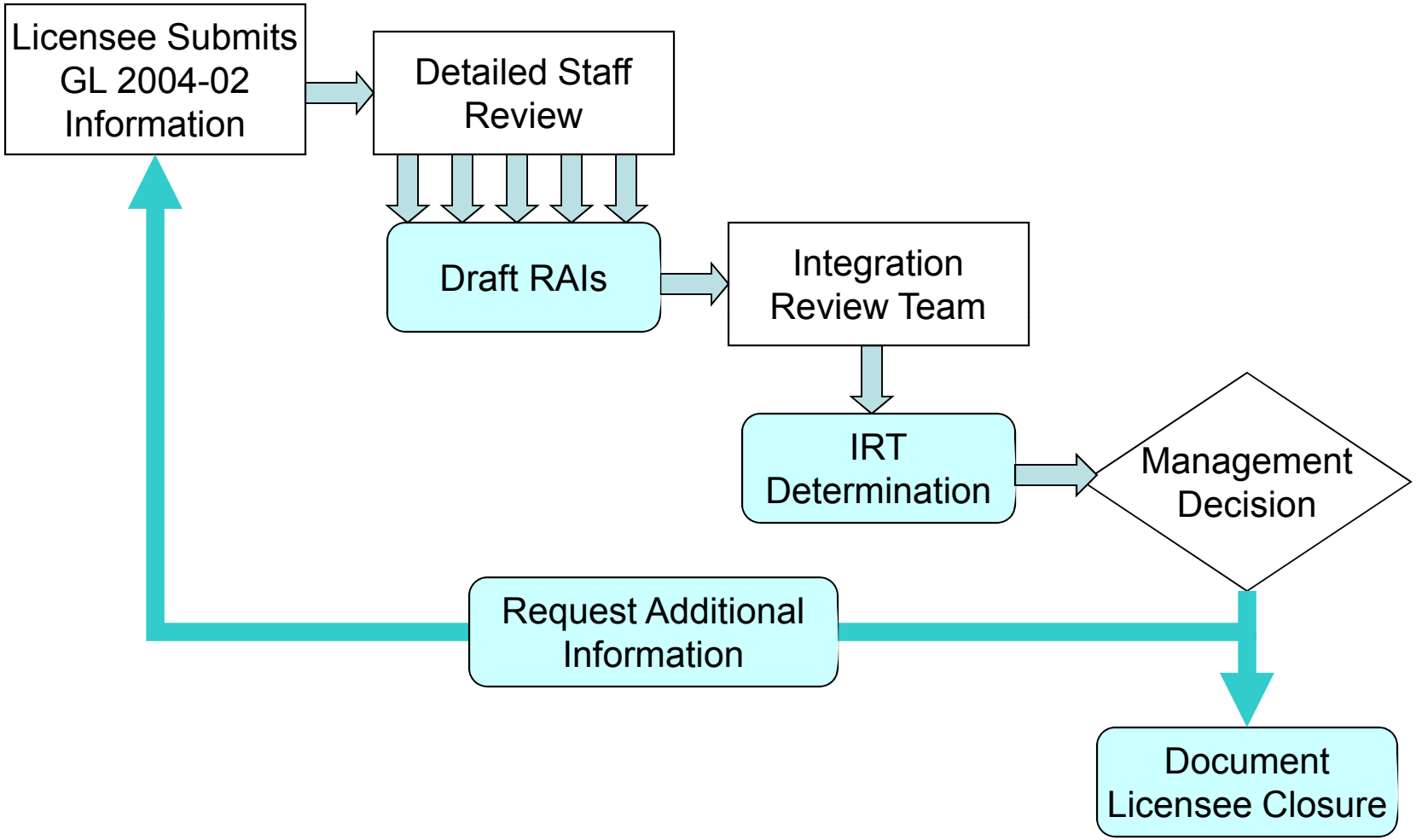
NRC Review Process

- Detailed review of licensee supplemental responses in each subject area
- Follow-on review by Integration Review Team (IRT) to reach holistic conclusion based on evidence presented by licensees as to whether each licensee has adequately addressed the sump performance issue
- Intention was to get beyond technical questions that would not impact the overall conclusion of safety and compliance

Review and Closure Process



Problem Definition

- The deadline for resolving GSI-191 issues (Generic Letter 2004-02) was December 31, 2007
- However…
  - As of June 2009, NRC staff considers only 13 of 69 PWR units to be complete or essentially complete
  - The NRC staff still has potentially significant technical issues with many plants' testing and/or evaluations of strainer performance

Current Condition

- All PWRs have made a number of modifications that have significantly improved plant safety, and most have concluded that their corrective actions for GL 2004-02 are complete

HOWEVER:

- Information available in most supplemental responses is not sufficient for NRC staff to conclude plants compliant for design-basis limiting break

Crux of the Matter

- A relatively small amount of problem debris can lead to a significant head loss – and there is no known empirical basis for a debris bed thickness beneath which there is categorically no concern
- While a holistic review has been able to reach closure in the face of limited uncertainties and potential nonconservatisms, it has not been able to do so given numerous uncertainties and potential nonconservatisms
- Thus, for many plants, NRC has not yet been able to conclude that a problem debris bed will not form on the emergency core cooling system (ECCS) strainers

Current Review Results

- The staff has informed several licensees with “low-fiber” plants that the staff has few or no additional questions
- North Anna, a two-unit plant with significant fibrous insulation, has attained the same status
- Most other plants have received, or will receive in 2009, requests for additional information (RAIs)
- Some plants are being “re-reviewed” using latest supplemental response rather than send out RAIs based on earlier information
- “Placeholder” RAI for in-vessel downstream effects, since most plants relied on WCAP-16793-NP

Current Status

- The 69 PWRs may currently be binned into four groups:
  - Essentially Complete (~20%)
    - No remaining items or placeholder in-vessel item only
  - Approaching Completion (~20%)
    - Some residual items remaining
    - Resolution likely without significant additional testing
  - Significant Obstacles Remaining (~55%)
    - Large number of issues remaining
    - Likely need to retest and revise analyses
    - Different types of retesting possible (e.g., ZOI and head loss)
    - Non-trivial additional plant modifications may be needed
  - Unclear due to insufficient information in submittals (~5%)

Contrasting Characteristics

Plants Complete or Approaching Completion

- Fewer problematic debris sources
- Larger strainers
- Audited plants or lots of interactions with staff
- Plants with recent head loss testing without crediting settling
- Plants that maintained high consistency with conservative 2004 safety evaluation (SE) positions

Plants with Significant Obstacles

- More problematic debris sources
- Smaller strainers
- Plants with less interaction with staff
- Plants with “old” head loss testing or testing that credited debris settling
- Plants that applied custom methodologies without adequate justification

Why Make Refinements to the Testing and Evaluation Methodology?

- Low-fiber plants do not generally need the refinements
- Refinements generally intended to avoid removing fibrous insulation
- Only acceptable if the refinements are defensible
- Some plants have already concluded that major insulation changeout is needed
- North Anna is evidence that it is not always needed

Genesis of Obstacles to Closure

- Licensee reliance on industry-developed methodologies that were not reviewed in advance by staff
- Licensee and regulator emphasis on near-term actions to reduce vulnerability ("build before validate")
- New information and approaches from licensees are still surfacing in 2009 – thus not surprising that new issues are still emerging
- Greater knowledge in 5 years since issuance of safety evaluation on NEI 04-07
- Differences in expectations and outcomes - licensees may have underestimated/misunderstood NRC staff expectations for level of detail of information needed

Obstacles to Closure

- For plants with significant obstacles:
  - Too many uncertainties and potential non-conservatisms of unknown magnitude to reach holistic decision
  - Indeterminate magnitude of conservatisms
  - Resolution from analysis alone is unlikely
- For plants with fewer obstacles:
  - Some have relied on testing on which the staff cannot rely
  - Difficult to rule out a problem thin debris bed without an adequate test

Learning Lessons

- Licensees that are struggling should consider successful examples
- Some high-fiber plants have had relatively few issues, e.g., North Anna (acceptable test and evaluation protocol)
- Some submittals have had helpful discussions of conservatisms
  - Dominion plants
  - Quantification helps where possible
- Resolution of individual issues
  - Millstone 2 presented an acceptable response for the issue of a LPSI pump single failure to stop
- Licensee interactions with NRC staff are crucial to success

Resolution of Debris Loading RAIs

- Issues such as those related to ZOI testing, debris erosion, and interceptors affect strainer debris loading
- Resolution of these issues needs to occur in the near term since an unfavorable resolution could require additional strainer testing
- NRC views extensive delays in doing retesting as not acceptable
- NRC considering issue-specific group dialogue with affected plants to expedite resolution of issues – need to discuss today

However…

- Some licensees plan additional near-term head loss testing, although they have not resolved RAIs that affect the debris loading
- If the debris loading RAIs are not resolved acceptably, the additional head loss testing may be a waste of time and money
- NRC encourages plants with significant testing and/or evaluation issues to discuss path forward with NRC staff prior to testing
  - Provide NRC and licensee staffs confidence that the new testing will be acceptable to the NRC

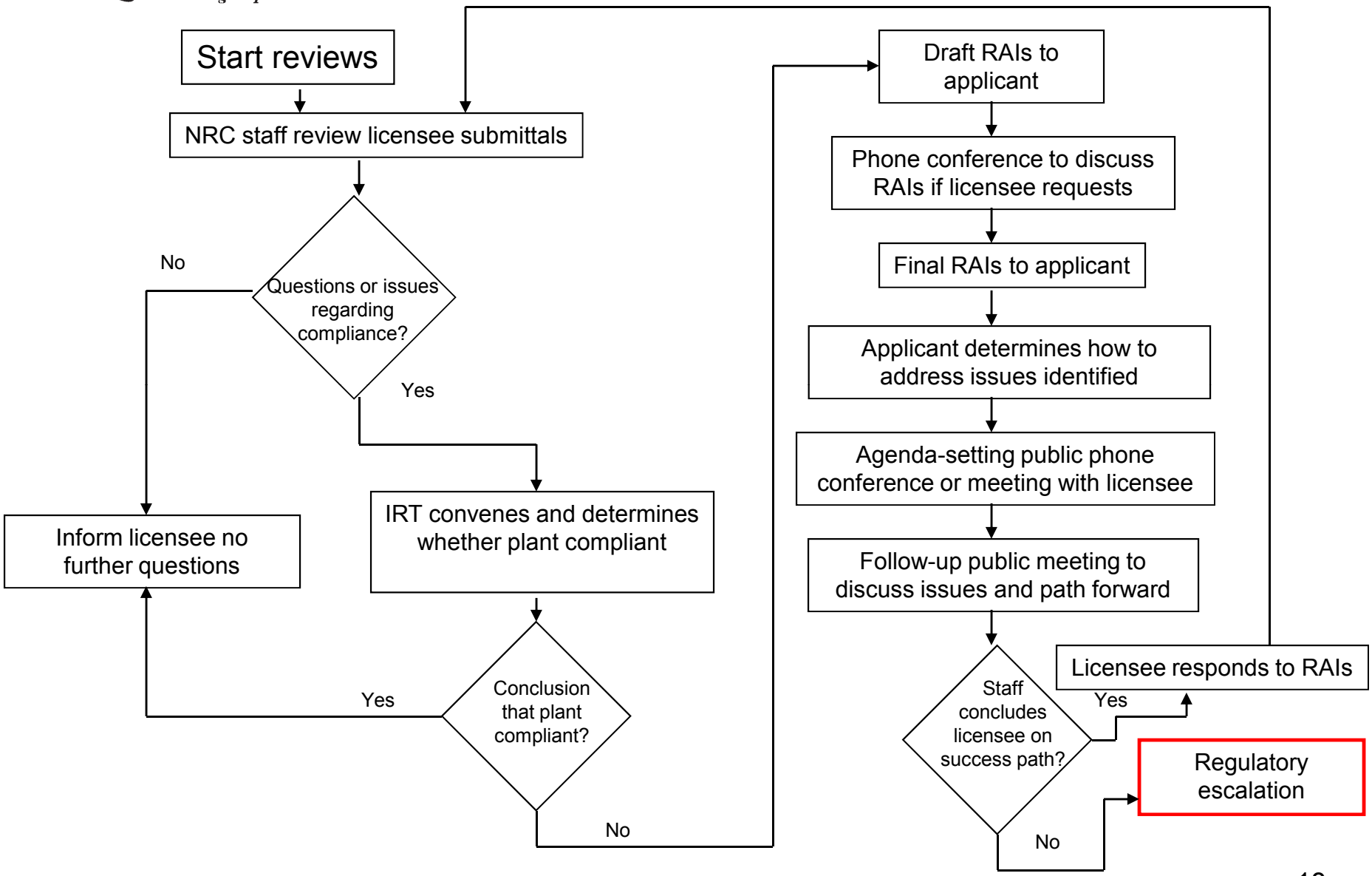
Now What?

- Need to determine issues identified in the supplemental reviews that affect multiple licensees - for each, determine best path to resolution
- List for discussion today
- Complex path forward where plants have plant-specific and “generic” questions
  - How to address plant-specific issues until generic concerns are resolved?
  - Industry progress on some multi-plant activities has been less than expected
  - If resolution path does not become clear for a given multi-plant issue, NRC will expect affected licensees to address on a plant-specific basis

Now What? (Continued)

- NRC position is that an adequate test is needed to show satisfactory strainer performance unless licensee justifies that their strainer has significant nonfiltering area
- Ultimate result for many plants will be:
  - Defensible test and evaluation protocol
  - Removal of problem materials
  - Regulatory escalation [e.g., 10 CFR 50.54(f)]

Process Going Forward



Phone Calls and Meetings

- The "agenda-setting public phone call or meeting" involves discussing each RAI for plant in question and ensuring:
  - Licensee discusses how they plan to resolve each RAI
  - NRC staff provides feedback
- These discussions may last several hours
- NRC staff and licensee found the first such discussion helpful in reducing misunderstandings
- Planned licensee responses about which staff has significant concerns or questions are the primary subjects for the follow-up public meeting
- Licensee will also summarize holistic safety case for plant at the follow-up meeting
- At the end of the follow-up public meeting, NRC staff will summarize remaining concerns (if any), then both parties will caucus separately to decide on closing statements
- Final discussion will involve clear definition of agreements (and disagreements if any) and agreed actions, to be documented in meeting summary

Are There Other Paths Forward?

- Industry may choose to take additional actions
  - For example, develop enhanced risk perspectives
  - Or testing to identify a debris bed thickness beneath which there is no concern (challenging)
- Absent a changed approach, NRC staff expects to reach congruence, through the process described, with each licensee on its path forward by the end of 2009

In-vessel Downstream Effects

- Revised topical report WCAP-16793 submitted late April 2009
- Staff reviewing – RAIs due by early July 2009
- Initial review has led to concern that proposed limit (grams fiber per assembly) not adequately supported by test data
- Final NRC staff SE scheduled for February 2010
- Licensee submittals 90 days after issuance of final SE
  - Demonstration that plant is bounded by topical report and SE, or
  - Plant-specific demonstration of adequacy
- NRC review of submittals complete by late summer 2010

Closure Activities

- NRC will issue a closure letter to each licensee when sufficient information is provided to close the issue for that plant
- After all licensees have been issued closure letters, GL 2004-02 will be formally closed – expected to occur late 2010
- Some modifications will be made after planned issue closure - NRC will track all commitments to completion

Conclusion

- Delayed resolution of GL 2004-02 to date is not surprising in hindsight – many factors
- Lack of alignment between intuitive expectation of plant safety and the inability to rigorously demonstrate compliance for limiting break
- Existing path will lead in 2009 to one-on-one interactions with licensees, followed by either agreed path forward or regulatory escalation
- Need to move forward on multi-plant issues
- Licensees need to learn from each other
- NRC staff open to outside-the-box ideas from industry as long as approach chosen demonstrates safety and compliance