Review of NRC 08-02-13 Comments on NEI 13-02 Section 1, 2, 4, 5 and 6

August 12, 2013

Objectives

- ✓ Review of Comment Resolution
  - Listing of Accepted Comments
  - Cursory Review of Proposed Alternatives
  - Explanation of Deferred/No change recommended Comments
  - Discussion of Alignment Topic Comments

Summary of NRC Comments

- Section 1 – Grouped into 12 Comments
  - 6 Accepted
  - 1 Alternative proposed
  - 5 No change recommended (Order language, clarity to industry or procedure interface)
- Section 2 - Grouped into 16 Comments
  - 7 Accepted
  - 6 Alternative proposed
  - 1 Discussion Suggested
  - 1 Deferred for Phase 2 work
  - 1 No change recommended (Engineered Filter)

Summary of NRC Comments

- Section 4.1 – Grouped into 14 Comments
  - 7 Accepted
  - 0 Alternative proposed
  - 7 Discussion suggested
  - 0 No change recommended
- Section 4.2 - Grouped into 21 Comments
  - 16 Accepted
  - 0 Alternative proposed
  - 3 Discussion suggested
  - 2 No change recommended (Platform and Vented Fluid Temperature)

Summary of NRC Comments

- Section 5 – Grouped into 5 Comments
  - 1 Accepted
  - 1 Alternative proposed
  - 3 Discussion Suggested
  - 0 No change recommended
- Section 6 - Grouped into 11 Comments
  - 7 Accepted
  - 1 Alternative proposed
  - 3 Discussion Suggested
  - 0 No Change Recommended

Section 1 Comments

- 1 Alternative proposed comment
  - 1-2: Phase 2 and rulemaking interface
    - Better discussion in Section 3 and/or Appendix C for how to utilize “overall accident management plan for Mark I and Mark II containments” required for DW strategies.
- 5 No change recommended
  - 1. : Rescinded order specifics provide clear meaning of rescinded to industry
  - 1-4: This relates to the first part of the quote from the Order language used in this section.
    - The list provides some of the actions taken by the NRC, Utilities and Oversight bodies to improve Nuclear Plants related to the protecting the public health and safety following an accident
  - 1-2: Order language
    - Phase 2 provides direction that an Drywell Strategy alternative is acceptable
    - No Order requirement that vent needs to be sized for WW and DW operation at the same time.
  - 1-3: Procedure interface critical for Accident Management and Order requirement 3.1

Section 2 Comments

- 6 Alternative proposed
  - 2.2.2.1: Plant actions to address an ELAP are contained in the plants response to NRC Order EA-12-049, commonly referred to as FLEX. An ELAP itself is not considered a severe accident since use of FLEX mitigates core damage. However, if ELAP is not mitigated a severe accident with core damage may evolve.
  - 2.2.4: Design basis venting resolution should be addressed through its NRC review under the FLEX RAI process. Resolution should be obtained before issuance of the OIP such that proper sizing of the vent line occurs.
  - 2.3: The proposed changes focus the scope too narrowly. Procedures are symptom based to vent based on containment pressure conditions regardless of cause. Add "For the purpose of this order, the severe accident is caused by loss of active containment heat removal capability or failure to mitigate an ELAP."
  - 2.3.3: For the purpose of this order, the severe accident is caused by loss of active containment heat removal capability or failure to mitigate an ELAP.
  - 2.4: the HCVS design should meet ~~not exceed~~ the current capability of the limiting containment components or the conditions under which it is required to operate.

Section 2 Comments

- 6 Alternative proposed (cont'd)
  - 2.4.4.1: Agree that further discussion is needed. The industry is not in agreement with values beyond 545 degrees F as this is already well beyond the design temperature of the primary containment structure and should bound the "meet or exceed" criteria of limiting containment components.
  - New language from 2.4.4.1:
    - The maximum of this range, 545ºF, is recommended as the design temperature for the drywell and shared portions of the vent unless a lower number can be analytically justified. Design temperatures have inherent margin to the components much higher plastic failure temperatures; AISC Fire Ratings for Steel is representative of this type of margin.
    - Notes:
    - JSME proposed standard related to *"SA Management Design Guideline for External Events"* considers 200°C as the temperature where the Primary Containment failure begins due to penetration impact resulting from thermal growth of the shell and shear fracture of penetration sleeves.
      - TEPCO proposed containment vent system design uses values of two (2) times containment design pressure and 200°C (392°F).
    - The Switzerland Regulator imposed a vent design pressure of150% of containment design pressure or 66% of failure pressure via HSK-AN-2026.
      - A European BWR uses 150°C (302°F) as the design temperature for its vent system.

Section 2 Comments

- 1 Discussion Suggested
  - 2.4: This is a direct quote or the Order language.
    - We need to limit containment evaluation of limiting components to the generic work already done for the head seal, penetrations, etc. The industry is not interested in embarking on a science project of determining the most limiting component in each containment. In any event, even if we pick a component that is not the most limiting, we will still have a vent system that “meets or exceeds” the most limiting component.
- 1 Deferred for Phase 2 work
  - 2.4.5.2: Appendix H contains details. We will wait until review of the entire document before addressing staff comments relative to the hydrogen.

Section 2 Comments

- 1 No change recommended
  - 2: There is no detailed information on a engineered filter in the Order only a statement in front matter. This option will be as part of the Rulemaking.

Section 4.1 Comments

- 7 Discussion Suggested
  - 4.1.1: Comment - *As stated in earlier staff comments, the HCVS is also not to be the weakest link, thus it is to be no less than the limiting containment component capability to be considered reliable.*
    - This is a direct quote or the Order language.
  - 4.1.1.1.3.2: Comment - *These should include a statement requiring confirmation by licensee calculations.*
    - Per section 4.1.1.1.3.4 confirmatory calculations if we justify a vent with less than 1 percent RTP capacity.
    - If we design our vent with at least 1% RTP capacity, then confirmatory calculations should not be required. ISG-JLD-2012-02 provides 3 hour heat capacity statement.
  - 4.1.2.1.3.4: Comment - *NRC guidance allows for passive barriers like flanges (or even rupture disks) to serve in the place of a locked closed valve. The guidance should address the use of rupture disks in the vent lines.*
    - Industry perspective is use of rupture diaphragms would be for inadvertent actuation where burst pressure will be higher than containment design pressure (Language in 6.1.1.2.2)
  - 4.1.4.1.5: Comment - *Position indication for those valves/dampers that would normally be open or local verification of shut position?*
    - We should have position indication sufficient to verify proper system lineup for venting, indication will be for HCVS valves. Plants are not providing indications for all containment isolations and this should be considered the same.

Section 4.1 Comments

- 7 Discussion Suggested (cont'd)
  - 4.1.9: Comment - *FLEX as in pre-core damage and not required to be able to setup and maintained after core damage*
    - Although not required, it doesn't mean it can't or won't be available.
  - 4.1.9: Comment - *Staff recognizes that this is a sample evaluation table. Since a SOV is a low cost item, will this represent a situation where design would consider redundancy n the SOVs to increase the reliability of the HCVS? Will this section include more details to show how the evaluations are intended to be used by the licensees?*
    - We already know this table is incomplete which is why it is highlighted. Work in progress, looking for NRC feedback.
  - 4.1.9: Comment - *No explicit requirement for full redundancy even though active components involved and may be required to repeatedly change position/state. If a single pipe, two valves in series gives redundancy to close but not to open.*
    - Industry has no intention of making this system single failure proof given the low probability of occurrence of the BDBEE.

Section 4.2 Comments

- 3 Discussion Suggested
  - 4.2: Comment - *Where does this guidance provide for rupture disk use in the system design?*
    - Not sure how a parallel line with a rupture diaphragm that will passively meet the order will not have isolation valves so operators can take action to isolate the vent path as directed by procedures/plant conditions. With addition of isolation valves in the rupture diaphragm parallel branch line, it would not nearly eliminate valve failure to close or open.
  - 4.2.4: Comment - *Industry should consider an acceptable standard range of the monitor for all the Mark I and Mark II fleet. Is there any intent to include such information in Appendix G?*
    - Should be able to do so based on information from Appendix G, This can be developed during the public comment period. We will add it to this document once the range question is determined prior to final endorsement.
  - 4.2.6: Comment - *One consideration would be a parallel branch line with rupture disk and open valve(s).*
    - Same as NRC 4.1-7

Section 4.2 Comments

- 2 No change recommended
  - 4.2.3.1.1.7: Platforms are acceptable versus scaffolds
  - 4.2.3.1.1.8: Vented Fluid Temperature is not a required indication of vent operation

Section 5 Comments

- 1 Alternative proposed
  - 5.4.4.1: Comment - *Does this [AP 913] specifically speak to severe accident service equipment or is it assumed adequate/appropriate*
    - Delete reference to AP 913
- 3 Discussion Suggested
  - 5.1: Comment - *However, being the "weakest link" or being less capable than the limiting containment component would be considered lacking sufficient reliability. Are the subsequently provided values of temperature and pressure established to ensure this is the case with all affected reactor containments, or does each licensee have to confirm this with identification of the limiting containment component(s). Also, see staff's comments elsewhere on this matter of "limiting containment components."*
    - This is a direct quote or the Order language.

Section 5 Comments

- 3 Discussion Suggested (cont'd)
  - 5.1: Comment - *NRC staff has not taken a position on whether 545 deg F is the appropriate generic, default or bounding value*
    - Discussed under Section 2
  - 5.1.1.3: Comment - *If this is what would be present or would be expected to bound the radiation conditions should the core relocate to the drywell floor. Is this a statement of analytical results? How would the DBA radiological condition in the drywell differ from that of a severe accident with ex-vessel core debris?*
    - Appendix G has been developed to describe the radiological conditions within the wetwell and drywell by reference to Response Technical Manual 96 (RTM-96), which provides bounding values for radiation levels based on source terms defined in NUREG-1465. The values from RTM-96 address both in-vessel and ex-vessel core damage conditions.
    - Drywell radiological conditions should be consistent with the conditions assumed in the plant's current licensing basis (CLB) for a major accident. (i.e., the most severe design basis accident during or following which the equipment is required to remain functional, including the radiation resulting from recirculating fluids for equipment located near the recirculating lines and including dose-rate effects.)

Section 6 Comments

- 1 Alternative proposed
  - 6.2: Add - Allowable leakage through a barrier is to include determination as to the potential consequences of the leaked radioactivity and combustible gasses through that barrier (does it disperse readily, could it accumulate). If all interfacing boundaries are leak tested simultaneously, the entire leakage should be attributed to the most limiting barrier regarding potential adverse consequences.
  - New Items 6.2.3.4 &5:
    - When testing the HCVS volume, allowed leakage should not exceed the sum of the interfacing valve leakages as determined by the licensee's test program (e.g., ASME OM Code).
    - For HCVS designs that contain interfacing valves between the HCVS and an isolated system, i.e. systems that do not vent to atmosphere. An assessment of the impact of cumulative leakage past interfacing valves into an isolated system should be performed. The results of the assessment should be used in establishing the leakage limits for interfacing valves between the HCVS and the isolated system(s).
- 3 Discussion Suggested
  - 6.1.2: instrumentation available during ELAP conditions that supports HCVS operation, including that used for detection/confirmation of vessel breach by core melt
    - The vent will be used in symptom based procedures, i.e., vent at predefined pressures. It is not dependent on knowing whether or not the vessel has been breached by core debris.
    - New Item 6.1.2.1.5 - HCVS instrumentation available that supports HCVS operation

Section 6 Comments

- 3 Discussion Suggested (cont'd)
  - Table: Comment - *This regime would allow for maintenance and restoration of suspect barriers. Wording needed regarding inspection/assessment of any barrier breach for signs of potential inability to meet leakage limits.*
    - New Item 6.2.4: Second item in the table should identify any potential barrier breach or inability to meet leakage limits which would then require maintenance and subsequent leakage testing.
  - 6.3: Comment - *30 days or less considered high priority? (*New item 6.3.2)
    - Yes. Most if not all utilities use a 13 week planning and scheduling process for work control. For maintenance items that need correction sooner than that timeframe would be considered high priority, with different thresholds for completion, but generally less than 30 days is expected for these items.