

Mark I and Mark II BWRs Containment Venting Systems

Guidance for Order EA-13-109 and
Accident Management Rulemaking
June 13, 2013

Agenda

- Introductions
- Opening remarks
- Overview
- NRC presentation – Accident management for containments rulemaking
- NEI/Industry presentation – Accident management for containments rulemaking
- NRC presentation – Guidance development
- NEI/Industry presentation – Guidance development
- Public questions and comments

Overview

Overview - SRM

- SECY-12-0157 issued November 26, 2012
- SRM issued March 19, 2013
 - Modify Order EA-12-050 to include severe accident conditions
 - Develop technical bases for filtering strategies with drywell filtration and severe accident management of containments
 - Develop proposed and final rules for filtering strategies
 - Seek Commission guidance on use of qualitative factors in regulatory decisions

Overview – Order EA-13-109

- Order EA-13-109 issued June 6, 2013
- Included a phased approach to ensure minimal delays in implementing adequate protection provisions and cost justified safety enhancements of the Order, while allowing possible development of alternate approaches
- Also included a 2-phase implementation of Order with subsequent incorporation of requirements into rulemaking activities, which would also include broader accident management strategies

Phase 1 - Scope

Mark I and II

- Wetwell Venting System
- Requirements from EA-12-050
 - Reliable, hardened containment venting system
 - Adequate protection
- Revised order will add Severe Accident Capability
 - Cost Justified Safety Enhancement

Phase 1 Timeline

- Implementation :
 - no later than startup from the second refueling outage that begins after June 30, 2014, or June 30, 2018, whichever comes first.
- Integrated Plan
 - June 30, 2014

Phase 2 - Scope

Mark I and II

- Drywell Venting System
 - Cost Justified Safety Enhancement

Options:

- Installation of severe accident capable drywell vent, or
- Develop reliable strategy that obviates need for drywell vent

Phase 2 Timeline

- Implementation :
 - no later than startup from the first refueling outage that begins after June 30, 2017, or June 30, 2019, whichever comes first.
- Integrated Plan
 - December 31, 2015

Note: SRM schedule for proposed rule in mid-2015 and final rulemaking in mid-2017

NRC Presentation

**Filtering Strategies and Severe Accident
Management for Mark I and Mark II
Containments Rulemaking**

NEI/Industry Presentation
Filtering Strategies and Severe Accident
Management for Mark I and Mark II
Containments Rulemaking



NRC Presentation Guidance Development

Interim Staff Guidance For Order EA-13-109 Severe Accident Capable vent Mark I and Mark II Containments

- Order EA-13-109, Reliable severe accident capable hardened vent**

Focus is prevention of core damage as well as capability to vent under severe accident conditions, including those associated with core debris breach of RPV

Phase 1 – Wetwell vent

Phase 2 – Drywell vent or reliable venting strategies that makes it unlikely to venting from drywell would be needed

Industry volunteered to develop a guidance document and Staff agreed to endorse to the extent possible, via an ISG

Immediate attention is on Phase 1. Staff's preference would be to attain as much alignment as possible for staff to endorse Industry guidance with few, if any, of exceptions

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- Order EA-12-050, Reliable hardened Containment Vent**

Focus is prevention of core damage

ISG issued by staff is a coordinated effort between staff, industry, and input from other stakeholders

Vent from either wetwell or drywell acceptable

Significant number of licensee submittals depicted both a wetwell and drywell vent, however, many licensees stated that drywell vents would not necessarily be in full compliance with the ISG

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- ISG and BWROG template for EA-12-050 HCVS is a good starting point for the development of severe accident capable vent**

Revise guidance and include new guidance as necessary to implement a severe accident vent

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- New or revised requirements**
- Radiological Conditions**

Routing

Shielding

Relocate vent pipe out of Control Room Envelopes

Affect on accident responders

HCVS control panel locations

Affect on HCVS equipment (Valves/actuators/seals, effluent discharge monitoring, other instrumentation and electrical power supplies, etc.)

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- New or revised requirements**
- New order requires 24 hours of operation with permanently installed equipment.**

previous order stated 24 hours in ISG, but also allowed licensees the option of justifying time lower than 24 hours. No such provision will be considered for severe accident vents.

BWROG recommended a minimum of 5 valve operating cycles. Need to determine minimum cycles for new order.

Issues - Vent cycling as a filtering strategy? When is a vent valve opened, and just as importantly, when is it subsequently closed?

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Severe Accident Capable vent

Mark I and Mark II Containments

- New or revised requirements**
- Hydrogen – “ensure the flammability limits of gases passing through the system are not reached; otherwise, the system shall be designed to withstand dynamic loading resulting from hydrogen deflagration and detonation”**

Best option may be to inert the vent line. Line can be continuously inerted or inerting system initiated before venting (N₂ supply continuously aligned for 24 hr supply).

If designed to withstand dynamic loading from hydrogen deflagration and detonation, should consider the potential for recurrences during multiple venting cycles, a condition that could exist most likely in vent pipe when valve is closed.

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Severe Accident Capable vent

Mark I and Mark II Containments

- **Other Considerations**
- **Schematic drawings submitted in response to Order EA-13-109 indicate for a number of plants, both wetwell and drywell vents. Many licensees indicated that drywell vent would not necessarily be in full compliance with the order.**

Phase 1 guidance shall include evaluation of the wetwell and drywell vent configurations for impact on complying with the requirements of the severe accident capable wetwell vent (e.g. seismic requirements, leak tightness, and any other manner in which it can impact a wetwell vent,) and if required, include appropriate modifications/changes in design.



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– Other Considerations

Drawings submitted for order EA-12-050 indicate a variety venting configurations. The submittals appear to be aimed at back-fitting the reliable hardened vent requirements to already existing configurations to the maximum extent possible. While a single configuration is not required by the order, the staff believes that a common understanding of how best to achieve venting with minimum reliance on operator actions is desirable.

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- Other Considerations**
- Venting configuration, including venting discharge layout should give consideration for dove tailing the vents to future changes resulting from phase 2 of the vent order and the rule making (e.g. drywell vents, filtering strategies which may require external filters, etc.). Browns Ferry's submittal for EA-12-050 appear to be taking such things into consideration.**
- Submittals for EA-12-050 and FLEX mitigating strategies (EA-12-049) are cross referencing each other, which is acceptable, for pre core melt response (both 050 and 049 are pre-core damage). Need to consider the changes required to this approach under severe accident conditions.**
- Industry did not provide a response to staff's request for basis (regulatory or otherwise) for early venting to facilitate injection from permanent (RCIC) or portable FLEX equipment. Need to establish the basis and its acceptability for early intentional breaching of containment.**
- Fault Tree analysis? How is "reliability" verified, understanding single failures are not considered in design.**



NEI/Industry Presentation Guidance Development

Questions & Discussion

