Proposed Resolution NRC Comments from 8-02-13 on NEI 13-02

Section	NRC Comment	Resolution	Justification
NRC1-1: 1 Introduction	necessary. Therefore, Order EA-12-050 required hardened containment venting systems in BWR facilities with Mark I and Mark II containments ~~are being required by the NRC~~ on the basis that they are needed to ~~ensure~~ provide reasonable assurance of adequate protection of public health and safety. ~~Prompted by Fukushima Dai-ichi accident, the NRC issued Order EA-12-050 requiring installation of a reliable hardened vents for Mark I and Mark II containments. As directed by the NRC, Commission th,e~~ Subsequently the original ~~Order~~ order was rescinded and replaced with a new order to ~~address~~ require severe accident capable containment vent ~~severe accident conditions~~ on the basis that it provides a cost-justified substantial safety improvement b~~. B~~eyond what is needed to provide reasonable assurance of adequate protection of public health and safety. Order EA-13-109 was issued to ~~maintain the same~~expand the set of design and quality requirements originally imposed by EA-12-050 ~~and included additional requirements~~ to ensure that venting functions are available during postulated severe accident conditions. Because EA-12-050 has been rescinded	Accepted	N/A
NRC1-2: 1 Introduction	, including any applicable time lines for submission of integrated plans, or for complete implementation *{Comment: Delete, does not appear pertinent to a design and quality requirements guidance document,}*	No Change Recommended	Provides clear meaning of rescinded
NRC1-3: 1.1 Purpose	Reference language changes	Accepted	N/A
NRC1-4: 1.1 Purpose	Continuous Improvement Items {*Comment: This verbiage appears to wander a little far afield regarding EA-13-109 implementation and if it remains will likely be noted as not being endorsed by the ISG}*	No Change Recommended	This relates to the first part of the quote from the Order language used in this section. This 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
NRC1-5: 1.2 HCVS Guiding Principles	systems in BWR facilities with Mark I and Mark II containments ~~are being~~were required by the NRC (Order EA-12-050) on the basis that they are needed to enhance protection of public health and ~~safety~~ safety. reliable hardened vent ~~for~~ to be capable of operation during severe accident conditions. The new ~~Order~~ order is applicable to all operating boiling water reactor (BWR) licensees with Mark I and Mark II containments issued under Title 10 of the Code of Federal Regulations (10 CFR), Part 50, "Domestic Licensing of Production and Utilization Facilities." The original Order EA-12-050 [Ref. X] required that all boiling water reactor (BWR) Mark I and Mark II containments have a reliable hardened vent to remove decay heat from the containment and maintain ~~control of~~ containment pressure within acceptable limits following events that result in the loss of active containment heat removal capability or prolonged station blackout (SBO), i.e., Extended Loss of AC Power (ELAP). The original order did not include ~~explicit~~ requirements relating to severe accident service for the hardened containment venting system (HCVS); rather, the ~~focus of the~~ HCVS was ~~to~~ only required to be able to support strategies related to the prevention of core damage under a wide range of plant conditions. JLD-ISG-2012-02 (Ref. X) provided the Interim Staff Guidance (ISG) ~~to drive compliance to~~for implementation of Order EA-12-050. All licensees subject to Order EA-12-050 provided integrated plans for the design and implementation of reliable hardened containment vents by February 28, 2013. In SRM-SECY-12-0157 [Ref. 3], the Commission directed the staff to revise Order EA-12-050 to require the upgrade or replacement of the reliable hardened vents required by Order EA-12-050, with a containment venting system designed and installed to remain functional during severe accident conditions. EA-13-109 requires that BWRs with Mark I or Mark II containments ensure that in addition to pre-core damage venting capability, the HCVS also provides a reliable	Accepted	N/A

Section	NRC Comment	Resolution	Justification
NRC1-6: 1.2 HCVS Guiding Principles	debris. A drywell strategy for alternate heat removal instead of the drywell vent requirement ~~is acceptable~~may be proposed for NRC staff review as an acceptable alternative. The severe accident capable HCVS is intended to keep the originally required function of the HCVS, which is to help prevent severe accidents from	No Change Recommended	B2 and Order Phase 2 Clearly states it is acceptable to have a strategy not to install a DW vent: B. PHASE 2 (reliable, severe accident capable drywell venting system) Licensees with BWRs with Mark I and Mark II containments shall either: (1) design and install a HCVS, using a vent path from the containment drywell, that meets the requirements in Section B.1 below, or (2) develop and implement a reliable containment venting strategy that makes it unlikely that a licensee would need to vent from the containment drywell before alternate reliable containment heat removal and pressure control is reestablished and meets the requirements in Section B.2 below.
NRC1-7: 1.2 HCVS Guiding Principles	alternative. The severe accident capable HCVS is intended to keep the originally required function of the HCVS, which is to help prevent severe accidents from occurring, and to add the capability of ~~helping to mitigate the consequences of a~~operating during severe accident ~~should one occur~~conditions. The wetwell and drywell	Accepted	N/A
NRC1-8: 1.2 HCVS Guiding Principles	~~a~~operating during severe accident ~~should one occur~~conditions. The wetwell and drywell vent pathways are not required to be ~~in operation at the same time~~fully functional by the same implementation date. The development and implementation of the severe accident capable HCVS consists of two phases. The first phase consists of providing a	No Change Recommended	This statement is not related to implementation but to sizing and operation of the vent paths. There is no requirement to vent from both the WW and DW at the same time
NRC1-9: 1.2 HCVS Guiding Principles	*{Comment: To make matters clear, include a discussion of the relation between Phase 2 and rulemaking. The extension of Phase 2 implementation (drywell vent) is to converge with the rule making, so that need/no need for a drywell vent satisfies both Order EA-13-109 and rule making.}*	Alternative	Add to Section 3 and Appendix C which will contain the Drywell vent specifics and "overall accident management plan for Mark I and Mark II containments" required for DW strategies.
NRC 1-10: 1.3 Procedural Interface	*{Comment: The material in this section provides a background of the SAMGs and devotes a lot of discussion to the SAMGs and how a drywell vent becomes even more unlikely to be used after a post Fukushima revision to the SAMGs. This verbiage ranges out beyond the scope of what the ISG will endorse as it goes far beyond what EA-13-109 deals with, the technical and quality requirements of severe accident capable vents. This section essentially argues a case against equipment requirements in the order. The industry is free to continue to present its case in the rule making and during the development of Appendix C (assessment of need for drywell vent) to this guidance document. Until a reliable venting strategy that does not require a reliable severe accident capable drywell venting system is agreed to, this section has no meaning and staff recommends that it be removed from the guidance document.}*	Alternative	Supports the procedure and training aspects of EA-13-109. Reference Section 3.1 of the order. Modified introductory section to address usage of this section of guide.

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NRC 1-11: 1.4 Overview	*{Comment: Method acceptable to NEI, an ISG will endorse specific provisions or not and in any event the NRC staff will review and determine acceptability of how licensee's will be implementing order EA-13-109.}*	Accepted	~~This industry guidance provides an acceptable method for satisfying those requirements.~~ Licensees may propose other methods for satisfying these requirements. The NRC staff can review such methods and determine their acceptability on a case-by-case basis.
NRC 2-1: 2 WW Bases	Editorial in 1st paragraph	Accepted	N/A
NRC 2-2: 2 WW Bases	*{Comment: Any thought to stating that venting just from the drywell with an external engineered filter could be an acceptable alternative, or is that left to the ISG to state?}*	No Change Recommended	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.
NRC 2-3: 2 WW Bases	The requirements of Order EA-12-050 addressed the use of the HCVS for both prevention of core damage and protection of the containment from overpressure failure during a Beyond Design Basis Event (BDBE) that had not progressed to core damage and severe accident conditions.	Accepted	N/A
NRC 2-4: 2.1 WW	Use of the HCVS during design basis accidents or other design basis events (DBE) is not assumed nor required. ~~However, the EPGs provide directions on the use of the HCVS to support maintaining adequate core cooling and prevent core damage in response to containment conditions that progresses beyond plant design basis conditions.~~ *{Comment: The ISG for order EA-13-109 is not endorsing specific EPG content regarding venting and this fact will be noted in the ISG. See staff comment on Section 1.3}*	Accepted	N/A
NRC 2-5: 2.2.2.1 WW	*{Comment: An ELAP is not considered a severe accident itself but may eventually result in core damage and severe accident conditions. The scope of EA-12-049 is prevention of core damage and does not address severe accident conditions.}*	Alternative	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.
NRC 2-6: 2.2.4 WW	*{Comment: Any reason for not referencing specific installed equipment. The staff would like to know if equipment other than RCIC pumps or isolation condensers are included in the scope of this statement.}*	Accepted	"The HCVS venting pressure for a BDBE may be ~~initiated below PCPL~~ driven by ~~other~~ conditions created during BDBEs, such as to lower pressure to use a low pressure portable pump, or to control containment conditions to allow continued use of installed equipment such as installed steam driven equipment that discharges to the Suppression Pool/Torus during loss of containment cooling."
NRC 2-7:	*{Comment: The early venting involves a policy issue that is*	Alternative	See changes above. Design basis venting resolution

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2.2.4 WW	*currently under discussion within the NRC and between the industry and the NRC staff.}*		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.
NRC 2-8: 2.3.WW	to protect the containment from over-pressure failure caused by the loss of active containment heat removal capability or ELAP. T~~t~~he increase in containment pressure is caused by~~from~~ steam or non-condensable gases, and elevated~~er~~ containment temperature ~~within containment~~ following severe core damage. The conditions include both scenarios in which all core debris is	Alternative	The proposed changes focus the scope too narrowly. Procedures are symptom based to vent based on containment pressure conditions regardless of cause: ~~For the purpose of this order,~~ The primary severe accident use of the HCVS is to protect the containment from over-pressure failure caused by the increase in containment pressure is caused by ~~from~~ steam or non-condensable gases, or elevated containment temperature ~~within containment~~ following severe core damage. 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.
NRC 2-9: 2.3.WW	*{Comment: The ISG will not endorse specific SAG provisions directly or indirectly.}*	Accepted	The following statement is part of the Accident Management; The HCVS would also be used as an element of the ~~SAGs~~ Plant procedures to maintain the Pressure Suppression Pressure function of the containment prior to RPV breach by controlling torus pressure and level.
NRC 2-10: 2.3.1.WW	*{Comment: Need clarification as to what is meant/intended here. Is it meant to capture the limitation of penetration seals, drywell head gasket or is it meant to address the water injection}*	Accepted	The spectrum of severe accidents considered within the HCVS design are limited to those that do not compromise the containment integrity (i.e., the limitation of penetration seals, drywell head gasket) to reasonably retain radionuclides from being released to the environment given severe accident conditions
NRC 2-10: 2.3.3.WW	*{Comment: Staff agrees that head penetration is the focus but there may be other temperature limited penetration seals in the upper drywell.}*	Alternative	Item 2.3.3 was added based on NRC comment at a public meeting that the objective of the order is to address the drywell head gasket. The HCVS will not be designed above the capability of the containment as stated in Order item 1.2.10.
NRC 2-11:	*{Comment: Revise to state "meet or exceed" instead of*	Alternative	the HCVS design should meet ~~not exceed~~ the current

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2.4.WW	*"should not exceed'}*		capability of the limiting containment components or the conditions under which it is required to operate.
NRC 2-12: 2.4.WW	**Order Reference: 1.2.10** – The HCVS shall be designed to withstand and remain functional during severe accident conditions, including containment pressure, temperature, and radiation *{Comment: From entrained fission products} while venting steam, hydrogen, and other non-condensable gases and aerosols.}* The design is not required to exceed the current capability of the limiting containment components. *{Comment: How about active voice, "…is required to meet or exceed…" Although not explicitly required by EA-13-109, meeting this requirement would appear to require identification of the limiting component(s) regarding the design parameters and their limiting parameter values. Staff's position was stated to the industry in several meetings. Full alignment not yet reached between the staff and industry.}*	No Change Recommended	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.
NRC 2-13: 2.4.3.WW	*{Comment: Insufficient removal of decay heat from fission products resulting in superheat or non-saturated conditions in drywell.}*	Accepted	During a severe accident, temperature of gases in the wetwell and drywell will differ due to insufficient decay heat removal from fission products resulting in superheat or non-saturated conditions in the drywell ~~the high temperatures induced by core damage~~.
NRC 2-14: 2.4.4.1.WW	*{Comment: Further discussions required to determine if a generic default design value is bounding and appropriate for all licensees. This is another item on which staff and industry are not in alignment.}*	Alternative	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:

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			• 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. • Not all BWR Containment, Drywell Sprays and Suppression Pools are sized and/or configured similarly depending on NSSS provider and construction timeline.
NRC 2-15: 2.4.5.2.WW Hydrogen	*{Comment: Where and under what conditions, DW, WW, vent line? While venting with some condensation occurring in the flow, or after vent valve closed and steam condensation really commences. Staff reserves comment on this section, until completion of its review of the referenced documents. Will this guidance be included in Appendix H?}*	Defer	Appendix H contains details. We will wait until review of the entire document before addressing staff comments relative to the hydrogen.
NRC 4.1-1: 4 Design	ll containments to preserve containment capability~~integrity~~ in a wide spectrum of possible beyond design basis accident conditions including the presence of ex-vessel core debris, controlling containment pressure within acceptable limits by venting the	Accepted	N/A
NRC 4.1-2: 4.1.1 Design	*{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.}*	No Change Recommended	This is a direct quote or the Order language.
NRC 4.1-3: 4.1.1.1.3.1	*{Comment: Unless all affected licensee's have a PCPL below and would remain below their containment design pressure, this should probably also include the design pressure limitation.}*	Accepted	A wet well vent sized under conditions of constant heat input at a rate equal to 1 percent of rated thermal power and containment pressure equal to the PCPL or containment design pressure, the exhaust-flow through the wetwell vent would be sufficient to

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			prevent the containment pressure from increasing.
NRC 4.1-4: 4.1.1.1.3.2, 3 and 4	*{Comment: These should include a statement requiring confirmation by licensee calculations.}*	Accepted	Modified 4.1.1.1.3.2 The torus suppression capacity is typically ~~can be assume to be~~ sufficient to absorb the decay heat generated during at least the first three hours following the shutdown of the reactor with suppression pool as the source of injection. Licensees shall have an auditable engineering basis for the decay heat absorbing capacity of their suppression pools, selection of venting pressure such that the HCVS will have sufficient venting capacity under such conditions to maintain containment pressure at or below the primary containment design pressure and the PCPL
NRC 4-5: 4.1.2.1	*{Comment: Those portions of the vent within the containment boundary are to be consistent with existing requirements/guidance for the purpose of design basis accidents.}*	Accepted	Already included in 4.1.2.1.2.2: Any piping that is part of the containment penetration boundary must be designed to the appropriate criteria (typically, protected from pipe whip, jet impingement, missiles, and be designed to ASME Section III class 2 with the added requirement for low stresses during design basis operation of the plant to preclude having to postulate pipe break or pipe cracks)
NRC 4.1-6: 4.1.2.1.2.3	4.1.2.1.2.3. Locating the PCIVs close to the containment penetration ~~precludes any~~restricts the possibility for practical local-manual ~~operation,~~operation; section 4.2 discusses design features that will increase remote-manual operation.	Accepted	N/A
NRC 4.1-7: 4.1.2.1.3.2, 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.}*	Discussion	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) versus Staff perspective to use rupture diaphragms as a means of passive venting to meet the requirements of the order where burst pressure will be less than PCPL or the containment design pressure.
NRC 4.1-8: 4.1.2.1.4	*{Comment: By NRC guidance extension if a rupture disk is used as a penetration barrier, leak testing would also be*	Accepted	Add item between 4.1.2.1.4.2 & 3 • Periodic rupture diaphragm testing frequency

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	appropriate.}		- shall be based on manufacturer recommendations, if the rupture diaphragm is used as a relied upon penetration barrier Modify 4.1.2.1.4.2 as follows: - However, testing at any time may be required if a valve or rupture diaphragm reliability issue arises
NRC 4.1-9: 4.1.4.1.5	*{Comment: Position indication for those valves/dampers that would normally be open or local verification of shut position?}*	Accepted	We should have position indication sufficient to verify proper system lineup for venting, indication will be for HCVS valves. Added statement about operator action for open items: - If Operator actions are required for changing state of interfacing valves, then validation of the action using normal plant validation methods should be performed.
NRC 4.1-10: 4.1.5.2.2	*{Comment: Away from any entry point that might be expected to be opened during the event (to perhaps provide natural circulation ventilation)}*	Accepted	Add a new sentence for interaction with other openings. - The release point should be situated away from ventilation system intake and exhaust openings or exhaust openings that may be used during a BDBEE (e.g., to prevent entrainment into natural circulation ventilation flowpaths.)
NRC 4.1-11: 4.1.7	The evaluation of gas ignition is to document the capability of the HCVS piping to maintain integrity should deflagration or detonations occur. Deformation of the pipe is acceptable given the integrity and continued functional capability of the ~~pipe~~ vent system is shown to be maintained.	Accepted	N/A
NRC 4.1-12: 4.1.9	*{Comment: FLEX as in pre-core damage and not required to be able to setup and maintained after core damage.}*	Alternative	Although not required, it doesn't mean it can't or won't be available. Added limitation of Severe Accident
NRC 4.1-13: 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*	Alternative	We already know this table is incomplete which is why it is highlighted. Work in progress, looking for NRC feedback. Added introductory paragraph: - The table below provides an example of a

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	to be used by the licensees?}		Failure Evaluation that will be included in the Overall Integrated Plan. The table details the HCVS system interactions with design and operation for potential failures and alternate actions. However, it should not be construed from inclusion of this table in this guide, that the HCVS should be designed as a single failure proof system due to the low probability of a Severe Accident BDBEE
NRC 4.1-14: 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.}*	Alternative	Added statement above for NRC 4.1-13 and following note after table: • Note: If a low cost equipment change or redundancy can provide enhanced reliability, it should be considered.
NRC 4.2-1: 4.2	By nature, the ELAP creates a need to initially operate the vent manually (either locally or from remote stations) and the design concepts espoused in this document protect that operational capability.	Accepted	N/A
NRC 4.2-2: 4.2	*{Comment: Where does this guidance provide for rupture disk use in the system design? There is agreement that a single vent path with a rupture disk may not be optimal, but in a parallel branch path it would appear to allow near elimination of valve failed shut or/operator not opening the vent to limit pressure near design values.}*	Discussion	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.
NRC 4.2-3: 4.2	The challenges found in operating the vents at Fukushima have been addressed by this guidance as have the required actions to complete multiple functions (e.g. FLEX heat removal venting, normal plant venting, intermittent venting ~~for source term control~~ in severe accidents, post severe accident venting for combustible gas control). *{Comment: Delete, it is not in scope of order EA-13-109. Is this a filtration strategy?}*	Accepted	N/A
NRC 4.2-4: 4.2.1	The design of the HCVS should incorporate features, such as control panel key-locked switches, locking systems, rupture discs, or administrative controls to prevent the inadvertent opening of the vent. ~~use of the vent valves.~~ *{Comment: How about just "...inadvertent opening of the*	Accepted	N/A

Section	NRC Comment	Resolution	Justification
	vent…" Having a rupture disk with burst pressure at or probably somewhat above containment design pressure could allow the valve(s) in series to be normally open.}		
NRC 4.2-5: 4.2.2.1.1.3	*{Comment: Needs further clarification. Does this mean sustained operations will be a minimum of seven days even if an alternate method of containment heat removal is put in place before then? As discussed in the meetings, clarify that alternate method of heat removal should not rely on the HCVS. For as long as releases and cross contamination due to interface leakages are a concern, the operation of HCVS will still be under sustained operations.}*	Accepted	Modified as follows: • Sustained operations provisions should continue until 7 days or a shorter period of time if ~~until~~ an alternative method of containment heat removal is put in place by using installed or portable equipment (e.g., a means of shutdown cooling aligned directly to the RPV, drywell or suppression pool). The alternate method of containment heat removal should not rely on the HCVS (i.e., the HCVS isolation valves should be able to remain closed such that releases and cross unit or system interface leakages are no longer a concern.)
NRC 4.2-6: 4.2.2.1.1.4	*{Comment: Does this indicate that any mention of automatic vent valve cycling/throttling for containment pressure control made during previous meetings is no longer being contemplated?}*	Accepted	Modified as follows: • During Sustained Operation, the containment barrier is initially manually controlled by the plant staff/ containment heat removal operations (either by containment venting or alternative measures) to prevent further fuel damage. This manual containment heat removal allows RPV injection by use of RCIC or external water supplies (reduced containment pressure may be required). This does not prevent the use of automatic vent valve cycling/throttling for containment pressure control after initial vent operation.
NRC 4.2-7: 4.2.2.1.1.5	*{Comment: What would be the conditions for this determination? Would these recognize the potential for gross leakage from over-heated penetrations if primary containment pressure is maintained elevated.}*	Accepted	The conditions are determined by procedure guidance. Under conditions that the HCVS would be used to vent the containment, Operators will only vent as needed to maintain primary containment pressure within established limits. Added wording to clarify. • Severe accident venting to remove containment heat should be stopped as soon as possible to fully restore the containment function so that the containment source term

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			barrier is available (i.e., no substantial leakage through containment components). Thus allowing design barriers to be maintained for potential degrading core conditions.
NRC 4.2-8: 4.2.2.1.3	*{Comment: This is pre core-melt. Address severe accident conditions. That ISG was for that order and that order has been superseded, should deleted the "… consistent with…" portion.}*	Accepted	Added wording to address comment on severe accident conditions. • Availability of permanently installed HCVS equipment, including any connections required to supplement the HCVS operation during an ELAP (e.g., electric power, N_2/air) consistent with the staff's guidance in JLD-ISG-2012-01 for Order EA-12-049 with consideration of severe accident conditions.
NRC 4.2-9: 4.2.2.1.7	HCVS valve position indicators and indications should be powered from sources that will be available during the appropriate mission time *{Comment: Is this during the "sustained operations", 24 hours or some other time frame?}* of the HCVS system.	Accepted	This should be for the sustained operation time. • HCVS valve position indicators and indications should be powered from sources that will be available during the appropriate mission time of the HCVS system. The mission time varies by component but should be no less than the first 24 hours post event for installed plant HCVS equipment.
NRC 4.2-10: 4.2.2.1.8	*{Comment: Primary?}*	Accepted	Modified as follows: • The HCVS system should include indications for the Containment Pressure and Wetwell level for determination of vent operation. These indications may be either at the primary control location (order criteria 1.2.4) for the HCVS or at another location with communication to the HCVS controll~~ing~~ location.
NRC 4.2-11: 4.2.3.a.	If direct access and local operation of the valves is not feasible due to temperature or radiological hazards, licensees should include design features to facilitate remote manual operation of the HCVS valves. This could include means such as reach rods, chain links, hand wheels, alternative control locations, and portable equipment *{Comment: This is after the installed equipment endurance period of 24 hours?}* to provide motive force as needed (e.g., air/N_2 bottles, diesel powered	Accepted	Agree that portable equipment would be applicable after the "24 hour" period where operator action should not be required to replenish electrical or pneumatic supplies to HCVS components. For more on the 24 hour period, see comments in Section 6. Add the following to the end of section: Note, throughout this section portable equipment will

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	compressors, and DC batteries).		not be relied upon until 24 hours after event initiation.
NRC 4.2-12: 4.2.3.1.1.4	*{Comment: This statement appears to be either primarily editorial or dismissive of potential mechanical linkage operation. This would not be NRC endorsed guidance verbiage.}*	Accepted	Deleted
NRC 4.2-13: 4.2.3.1.1.6	*{Comment: This is for after the initial 24 hours? Also, referenced guidance is for prevention of core melt. Address severe accident conditions.}*	Accepted	Addressed in NRC 4-24 resolution and with modification below: • If a portable motive force (e.g., air or N_2 bottles, DC power supplies) is used in the design strategy, licensees should provide reasonable protection of that equipment consistent with the staff's guidance in JLD-ISG-2012-01 for Order EA-12-049 considering severe accident conditions.
NRC 4.2-14: 4.2.3.1.1.7	*{Comment: As opposed to permanent platforms?}*	No Change Recommended	A permanent platform that meets all other accessibility requirements would be acceptable.
NRC 4.2-15: 4.2.3.1.1.8	*{Comment: Vented fluid temperature also?}*	Accepted	Added new item under 4.2.4.1: • HCVS system should include indications of effluent temperature. Permanently installed gauges that are at, or nearby, the HCVS control panel is an acceptable method to address this item
NRC 4.2-16: 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?}*	Accepted	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.
NRC 4.2-17: 4.2.4.1.3.2	4.2.4.1.3.2 Alternative approaches for system status instrumentation may be considered with appropriate ~~provided a~~ justification provided for alternative approaches ~~must be provided~~.	Accepted	N/A

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NRC 4.2-18: 4.2.4.2	4.2.4.2 The means to monitor system status should support sustained operations during an ELAP, and be designed to operate under ~~potentially~~ environmental conditions that would be expected following a loss of containment heat removal capability and an ELAP. "Sustained operations" may include the use of portable equipment to provide an alternate source of power to components used to monitor HCVS status. *{Comment: After 24 hours?}*	Accepted	24 hours addressed in NRC 4-24 resolution
NRC 4.2-19: 4.2.5.1.2	HCVS operation must be possible without placing the operators in dose fields above those allowed by the ERO guidance *{Comment: Agree. Wording change here and below should address the comment.}* to conduct local equipment operation. The use of shielding may provide acceptable radiation levels for operator access	Accepted	Added The use of shielding may provide acceptable radiation levels for operator access
NRC 4.2-20: 4.2.5.1.5	4.2.5.1.5 The HCVS vent pipe routing and shielding must be considered for other actions required of the plant staff/ERO during the event should venting be required during severe accident conditions. Guidance for the	Accepted	N/A
NRC 4.2-21: 4.2.6	*{Comment: One consideration would be a parallel branch line with rupture disk and open valve(s).}*	Discussion	Same as NRC 4.1-7 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) versus Staff perspective to use rupture diaphragms as a means of passive venting to meet the requirements of the order where burst pressure will be less than PCPL or the containment design pressure.
NRC 5-1: 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."}*	No Change Recommended	This is a direct quote or the Order language.
NRC 5-2: 5.1	*{Comment: NRC staff has not taken a position on whether 545 deg F is the appropriate generic, default or bounding value.}*	Alternative	See NRC 2-14
NRC 5-3:	*{Comment: If this is what would be present or would be*	Defer	Appendix G has been developed to describe the

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5.1.1.3	*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?}*		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.)
NRC 5-4: 5.3.1	HCVS components should, as minimum, meet the quality design requirements of the plant, ensuring HCVS functionality. *{Comment: Is this already something established and agreed upon elsewhere? This is too broad a statement. Needs clarification as to which portions of the vent are under Appendix B and which are not.}*	Accepted	Broaden with statements similar to: 5.3.1.1 The HCVS up to and including the second isolation valve is designed to the same requirements of the connected system or the equivalent of ASME Class 2 criteria. 5.3.1.2 HCVS elements that are not covered by 5.3.1.1 should be reliable and rugged to ensure HCVS functionality following a seismic event 5.3.1.3 Additionally, non-safety equipment installed to meet the requirements of Order EA-13-109 must be implemented so that they do not degrade the existing safety-related systems. 5.3.1.4 Design requirements and supporting analysis documentation should be auditable, consistent with generally accepted engineering principles and practices, and controlled within the configuration document control system.
NRC 5-5: 5.4.4.1	*{Comment: Does this [AP 913] specifically speak to severe accident service equipment or is it assumed adequate/appropriate.}*	Accepted	Delete reference to AP 913: HCVS permanently installed equipment should be

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			subject to maintenance and testing guidance ~~provided in INPO AP 913, Equipment Reliability Process,~~ to verify proper function.
NRC 6-1: 6.1	*{Comment: Not acceptable. The HCVS must be capable of operating in the first 24 hours with permanently installed equipment by operator action at a control panel (i.e. switches, push buttons, etc.). Shorter than 24 hours in this mode is not allowed.}* *{Comment: Delete. Less than 24 hours not acceptable}* *{Comment: Delete any reference to less than 24 hours. However, retain and include additional requirements for supplemental connection/design of pre-engineered disconnects for electrical power and mechanical systems (compressed air, etc.) for operation beyond 24 hours.}*	Accepted	Modified language to not allow less than 24 hours post event use of portable equipment. HCVS should be capable of operating with permanently installed equipment for at least 24 hours during the extended loss of AC power~~, unless a shorter period is justified by the licensee~~. The system should be deigned to function in this mode with permanently installed equipment ~~Durations of less than 24 hours will be considered if justified by adequate supporting information from the licensee.~~ Include in the justification an evaluation of the expected number of valve operations. To ensure continued operation of the HCVS beyond 24 hours, licensees may credit manual actions,…. ~~For justifying periods less than 24 hours,~~ For the period of sustained operation beyond the initial 24 hours, the licensee should consider the number and complexity of actions and the cumulative demand on personnel resources that are needed to maintain hardened vent functionality ~~(e.g., installation of portable equipment during the first 24 hours to restore power to the HCVS controls and/or instrumentation)~~ as a result of design limitations. The use of supplemental portable power or pneumatic sources may be acceptable if the supplemental power or pneumatic source was readily available, could be quickly and easily moved into place, and installed through the use of pre-engineered quick disconnects, and the necessary human actions were identified along with the time needed to complete those actions. Conversely, supplemental power or pneumatic sources located in an unattended warehouse that require a qualified electrician or mechanic to temporarily wire into the panel or connect to a piping system would not be considered acceptable because its installation requires a series of complex, time-consuming actions in order to achieve a successful outcome. ~~There are similar examples that could apply to mechanical systems, such as pneumatic/compressed air systems.~~
NRC 6-2: 6.1	*{Comment: Clarify? Does it mean that operator actions are required for system alignment. The system shall align itself into the venting mode by simple operator actions at a control panel.}*	Accepted	Modified as follows: • The system should be designed to function in this mode for a minimum duration of 24 hours with no operator actions required or credited to replenish electrical power and pneumatic supplies. Operator action is expected to perform system alignment and monitoring functions from either the primary (1.2.4) or alternate (1.2.5) locations as needed for event mitigation.
NRC 6-3: 6.1.1	*{Comment: Not in the scope of the current severe accident capable vent order. They will be determined as part of the rule*	Accepted	Changed as follows:

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(New 6.1.1.3)	*making and Phase 2 portion of the order.}*		these venting locations or select new locations, provided that the requirements of this guidance document are satisfied. The HCVS ~~in conjunction with active core debris cooling~~ improves the chances of mitigating a core damage accident by removing heat from containment and lowering
NRC 6-4: 6.1.1 Item 2 (New 6.1.1.5)	*{Comment: Also requirement 1.2.11. This discussion should include piping reaction loads from HCVS valve opening and for wetwell HCVS, concurrent hydrodynamic loads from SRV discharges.}*	Accepted	Add wording to clarify concurrent load design requirements. • In accordance with Requirement 1.2.10 and 1.2.11, the HCVS should be designed for pressures that are consistent with the higher of the primary containment design pressure and the primary containment pressure limit (PCPL), as well as including dynamic loading resulting from system actuation and hydrogen deflagration or detonation if the gases passing through the system cannot be maintained below flammability limits. In addition, the system should minimize leakage. System actuation should consider the dynamics of the driving force for the venting such as the pressure fluctuations from SRV actuations, etc.
NRC 6-5: 6.1.2 (New 6.1.2.1.5)	• instrumentation available during ELAP conditions that supports HCVS operation, including that used for detection/confirmation of vessel breach by core melt.	Alternative	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. Revised wording: • HCVS instrumentation available that supports HCVS operation
NRC 6-6: 6.1.2 (New 6.1.2.3.3)	• With backup power and from local manual location/alternate remote location during conditions of ELAP/loss of UHS with core damage and vessel breach for containment heat removal AND containment pressure control (PCPL). (Severe Accident Capable Vent)	Accepted	N/A
NRC 6-7: 6.1.2.1 (New 6.1.2.4.3)	• Coordinate SAGs with HCVS operation on normal and backup power and from primary and alternate locations during conditions of ELAP/loss of UHS with core damage and vessel breach. System use is for containment heat removal AND containment pressure control (PCPL) with potential for combustible gases.	Accepted	N/A

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NRC 6-8: 6.2 (New 6.2.3.3, 4 &5)	leakage rates for the interfacing valves should be within the requirements of American Society of Mechanical Engineers Operation and Maintenance of Nuclear Power Plants Code (ASME OM) – 2009, Subsection ISTC – 3630 (e) (2), or later edition of the ASME OM Code.) 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). 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.	Alternative	New Language added after public meeting: • The test pressure should be based on the HCVS design pressure. Methods for testing system boundary leakage should be consistent with the licensee's design basis for these tests (e.g., permissible leakage rates for the interfacing valves should be within the requirements of American Society of Mechanical Engineers Operation and Maintenance of Nuclear Power Plants Code (ASME OM) – 2009, Subsection ISTC – 3630 (e) (2), or later edition of the ASME OM Code.) • 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).
NRC 6-9: Table (New 6.2.4)	*{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.}*	Accepted	Added new item • When interfacing components are found to be degraded such that the HCVS function cannot be assured, then an entry into the plants Corrective Action Program shall be made to address the cause(s) of the non-functionality of the HCVS and prevent recurrence
NRC 6-10: 6.3 item 3b (New 6.3.1.3.2)	b. The actions to be taken and the schedule for restoring the system to functional status including actions to ~~and~~ prevent recurrence, and	Accepted	N/A

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NRC 6-11: 6.3 (New 6.3.2)	*{Comment: 30 days or less considered high priority?}*	Accepted	Add to the end of the last sentence • "not to exceed 30 days unless compensatory actions are established per 6.3.1.2."