In response to the NRC request for additional information dated May 19, 2014 (listed in enclosure 1 of the subject letter to NEI) related to Revision 3 of the BWR Owners' Group (BWROG) Emergency Procedure Guidelines / Severe Accident Guidelines (EPG/SAG Rev 3), the BWROG provides the following summary of assumptions and best estimate expectations on BWR Plant and Operator responses to specific beyond design basis (BDB) stylized scenarios:

Stylized Scenario	**Procedural Guidance/FLEX Guidance:**
#1: BWR Plant experiences an ELAP event due to a BDB Seismic Event and the Ultimate Heat Sink motive force is unavailable. The other governing event assumptions are per NEI 12-06 in response to NRC Order EA-12-049, formally known as FLEX.	1) Anticipatory venting is allowed at the Drywell SCRAM set point, typically above 2 psig, but it is expected that venting will not occur until there is sufficient motive force to "drive" the decay heat out the vent at 10 to 15 psig. This is permitted in case radiological conditions or environmental conditions are better suited to opening sooner rather than at 10-15 psig. a. Anticipatory venting is procedurally allowed as an "override" action to protect steam driven RPV injection if it is all that is available or to protect primary containment (reduce the total offsite dose). When the conditions that allow the override are not present, then the override is not valid and RPV depressurization should be performed when containment pressure reaches the Pressure Suppression Pressure (PSP). The Suppression Pool/Chamber (SP) would be vented to protect from reaching PSP or Primary Containment Pressure Limit (PCPL), determined based on the plant conditions/symptoms. Maintaining containment pressure at or below PSP is considered a containment protection measure to reduce any offsite dose. b. Should suppression pool sprays or drywell sprays become available, an override for containment protection directs to terminate those sprays before containment pressure drops to 0 psig. c. As defined in the plants response to NRC Order EA-12-049, all BWRs must provide flexible and diverse methods and strategies to mitigate core damage and maintain containment integrity. This includes SP anticipatory venting during which the wetwell vent is typically opened and left open at some time between 3 and 9 hours, with some BWR units cycling the vent in a 5 to 15 psig band. Also, the actions to perform the venting must be reasonable and not require heroic actions, using the Fukushima Daiichi venting actions as examples of unacceptable manual actions. The majority of the BWR units' actions will be in the Main Control Room or Electrical Switchgear rooms, which remain accessible during an ELAP. No core damage is assumed to occur during this scenario. Some BWRs will require simple manual actions of opening valves or using compressed gas bottles to facilitate breaching of a rupture disk in the Reactor Building. d. It is anticipated that operation of the wetwell vent will be a collateral duty for one operations person. This includes the manual actions required to initiate venting.
	2) The FLEX portable generators and pumps will be deployed as soon as possible after an ELAP is declared (typically at 45 to 75 minutes) and resources are available. This is usually credited in 4 to 8 hours. In an event where there is early determination that the plant has no RPV injection, then a priority would be placed on the setup and connection of the FLEX portable pump. Using best estimates, the FLEX portable pump could be deployed within 2 to 4 hours with minimum plant staffing levels. a. The quantity of personnel required to deploy and connect the FLEX portable generators and pumps is stated in the plants' phase 2 staffing studies or the Order EA-12-049 Verification and Validation efforts. Using best estimates, these functions would take from 3 to 5 personnel (a mixture of site workers and workers with operations experience) for the FLEX generators and the same for the FLEX pumps. Once the generators or pumps are in service, it is expected

	that they will not require any dedicated personnel—only personnel to monitor and refuel the equipment, of which it is reasonable to assume one person could accomplish this per BWR unit. b. Personnel will be trained on all actions needed to utilize the FLEX pumps and generators, which will enable the actions to be accomplished under the ELAP conditions as required per Order EA-12-049. (On the Job Training/Operating Aides will be utilized for Regional Response Center equipment.)
	3) No planned actions to respond to the BDB event will cause any personnel to receive high radiation (i.e., no one individual receiving greater than 10 rem).
#2: BWR Plant experiences the same events as Scenario 1, except the Steam Driven Pump is not available such that core damage occurs (severe accident), but all FLEX support functions are successful and follow the NRC order EA-12-049 response timeline, except for RPV injection that arbitrarily is defined as not successful.	1) Anticipatory venting will not be initiated because the override conditions do not exist in this scenario without availability of the steam driven pump. Anticipatory containment venting will not be needed because containment pressure will not rise to 10-15 psig before RPV water level lowers to entry level for SAMGs. If cladding oxidation occurs, containment venting may be necessary to limit containment pressure to the pressure suppression (PSP) capability. Containment venting would be used to remove combustible gases from primary containment. Once pressure is lowered, containment venting will be used to maintain primary containment pressure below PSP or below PCPL. (Guidance will recommend staying below PSP because of possible pressure increase from vessel breach.) Additionally, procedural guidance provides direction for opening doors, etc. to provide secondary containment vent paths as required.
	2) Wetwell venting will occur at PSP since it is assumed per SECY 12-0157 evaluations that RPV integrity is maintained until greater than 8 hours. This is postulated to be at 25 to 35 psig. It can be assumed that once RPV breach is imminent, then one last wetwell vent to 2 to 5 psig will be performed to delay subsequent wetwell venting at PCPL after the RPV is breached. The wetwell vent will be used until the wetwell vent is unavailable, most likely due to SP level (given water addition has been successful after RPV breach is eminent). a. The most likely source of water addition would be 400 to 500 gpm. The flow will be directed to the RPV first. Water addition to the RPV will allow the flow to follow the RPV breach and provide direct corium cooling. b. The time the wetwell vent will be abandoned varies widely based on many site-specific parameters. It is reasonable to assume the wetwell vent will be available past 24 hours. In some evaluations, it has remained available for several days depending on the containment water addition flow rate. Once the RPV is breached by core debris, the containment venting will be used only to limit Primary Containment pressure below PCPL or facilitate flooding to the Minimum Debris Submergence Level (MDSL). Venting will be performed considering favorable meteorological conditions under these circumstances. c. The wetwell vent will likely be cycled from 1 to 4 times every 12 hours based on the stylized scenarios evaluated, decay heat load and the core power to containment volume ratio. d. A drywell vent would be opened at a time greater than 66 hours based on analysis performed in EPRI studies. This would occur from an existing vent, whether hardened or not, per BWROG procedure guidance. This venting would be focused on protecting the primary containment by maintaining pressure below PCPL. The expected pressure band would likely be between PCPL and PCPL minus 10 to 15 psig. e. Containment venting is procedurally controlled at the PSP or PCPL, depending on the plant conditions/symptoms. f. As required by NRC Order EA-13-109, the actions needed to operate the Wetwell vent in a core damage scenario will be simple and easily performed such that no action or travel pathway will require personnel to receive heroic dose, and no manned action will be in a high dose (i.e., no one individual receiving greater than 10 rem) area of the plant.

	3) The FLEX generators will be available post-core damage for BWR Mark I and II plants, once FLEX generator deployment has been evaluated for the core damage radiological impact as part of Order EA-13-109. The actions to deploy and initiate operation will be the same as in Scenario 1.
	4) Debris removal, setup and operation of the FLEX pumps should be unaffected by the core damage events because, for most plants, these actions occur outside the reactor building and near the ultimate heat sink. Connections to the FLEX injection pathway may require manual actions within the reactor building. The time lines discussed in scenario 1 should apply.
	5) All actions needed to utilize the FLEX pumps and generators will be trained on and able to be accomplished under the ELAP conditions as required per Order EA-12-049 and as credited for EA-13-109. (On the Job Training/Operating Aides will be utilized for Regional Response Center equipment).

Additional information related to NRC requests:

- There are no stylized scenarios assuming a site ELAP resulting from a natural event and loss of DC power. However, per guidance in NEI 12-06 and directed by site procedures required for compliance with NRC Order EA-12-049, all sites will have the capability and some guidance on how to take manual readings of key parameters using I&C instruments, and to Black-Start RCIC or HPCI.
- There are no procedure evaluations or analysis that postulates the operator actions in a Severe Accident with an external filter. Experienced procedure committee personnel do not project there would be any changes to the symptom based guidance if an external filter were installed. This is based on the fact that the guidance is directing actions based on plant symptoms using all available equipment, and all BWR plants currently have the capability to vent the containment to maintain or extend its function.
- Water management strategies are site-specific but would likely be informed by the analysis and evaluations being performed for Near Term Task Force Recommendation 5.1 rulemaking and order compliance. It is postulated that some BWRs would be able to balance the water addition in such a way to keep the Wetwell vent available for an extended time period while limiting containment degradation and corium migration.
- The Technical Support Center will be staffed with nuclear professionals with access to many external resources. The staff will provide technical assistance and input to the emergency response leadership. This assistance will be problem-oriented to address any current needs, and forward-looking to establish longer term mitigation/response/recovery needs. It is expected that the role of the TSC will be very dynamic in response to any accident, including severe accidents with core damage.

These responses are intended to benefit the NRC in completing actions associated with the post-Fukushima NTTF recommendations. The BWROG understands this information may be referenced in NRC technical bases. As such the discussions are broadly applicable to the U.S. BWR Fleet and provide expert opinions of individuals knowledgeable of the EPG/SAG revision 3 guidance, FLEX compliance actions and Order EA-13-109 Phase 1 compliance plans.

Enclosure 1: NRC Specific Requests, May 21, 2014

Request #2: Major Assumptions related to the BWR Owners' Groups Guidance Documents and other proprietary documents

The NRC requested Revision 3 of the BWR Owners' Group (BWROG) Emergency Procedure Guidelines / Severe Accident Guidelines (EPG/SAG Rev. 3) in a letter dated November 26, 2013 (ADAMS Accession No. ML13325B094).

The industry responded to the letter on December 17, 2013, stating that due to the proprietary nature of the document, the industry will provide the BWROG EPG/SAG Rev. 3 via e-portal to the NRC and will hold a closed meeting (ADAMS Accession No. ML13352A355). The NRC received access and held a closed public meeting in March 2014.

Based on the closed meeting and the NRC's review of the BWROG EPG/SAG Rev. 3 and other relevant proprietary industry documents, the NRC believes the following information is contained within the BWROG EPG/SAG Rev. 3 or other relevant proprietary industry documents and is important for human reliability analysis in the regulatory basis in relation to an extended loss of AC power (ELAP) and ELAP with loss of normal direct current (DC) power scenarios:

1) What pressures and temperatures would anticipatory venting occur?
   a. What pressures would the vents open and close?
   b. What circumstances (e.g., failure of RCIC) would anticipatory venting not occur?
2) What role does the technical support center serve during a severe accident?
3) For your analyses of cases where a severe accident capable drywell vent and external filter are included as mitigation systems, please identify any changes to strategies and operator actions that are assumed (i.e., changes relative to cases that do not include a severe accident capable vent and external filter).
4) For both an ELAP and ELAP and loss of normal DC power scenarios, provide the following information for drywell venting, wetwell venting, water management strategies (if there are different water management strategies that differ in the following areas, address each water management strategy separately), FLEX portable pumps, and FLEX portable generators, unless specified differently.
   a. What are the conditions that use of the equipment will be commenced?
   b. If venting is controllable, how is venting controlled (e.g., closed at a certain threshold and reopened at a certain threshold)? If different pre- and post-core damage, specify for each—drywell venting and wetwell venting only.
   c. Is the action performed automatically (no human actions needed), by the main control room (MCR) or onsite?
   d. If the action is performed by the MCR or onsite, are special tools required? If yes, specify the tool needed.
   e. If the action is performed onsite, is the action location and travel path in a high radiation area (i.e., greater than 10 rem/hour)? If the answer differs pre- and post-core damage, indicate separately.
   f. Are the actions taken discrete (e.g., turn a few switches or align a few valves) or require monitor and control?
   g. How long do the actions take, including travel time and time required to complete the actions?
   h. How many people are needed to perform the action?