

EPFAQ 2013-004 Response

Question:

The below eight questions concern implementation of Supplement 3. NEI identifies the applicable section of Supplement 3 at the beginning of each question.

Question 1 - Section 2.7 and the Attachment block "Rapidly progressing severe accident": Can a Rapidly Progressing Severe Accident be defined in terms that are easily identified by the control room staff (e.g., tied to a specific time frame and sites Emergency Action Levels)?

Question 2 - Does guidance for a short term (puff release) release discussed in RIS 2005-08, Endorsement of Nuclear Energy Institute (NEI) Guidance "Range of Protective Actions for Nuclear Power Plant Incidents, April 2005", still apply to the development of PARs? If so, under what conditions should it apply?

Question 3 - Question concerns Attachment Note 9: Should the most limiting Evacuation Time Estimate (ETE) for the 0-2 mile zone and 2-5 mile zones downwind be the deciding factor for PAR determination for a Rapidly Progressing Severe Accident?

Question 4 - Attachment block "Evacuate 2 mile radius and SIP 5 miles downwind, all others monitor and prepare" (staged evacuation): Are there circumstances where it is appropriate to not implement staged evacuation. What type of justification is required?

Question 5 - Attachment block "When safer to do so, begin staged evacuation of all affected areas": When is it "Safer to do so"? What type of criteria should apply?

Question 6 - Section 2.6 and Attachment Note 6: Supplement 3 Section 2.6 provides guidance related to the expansion of Protective Action Recommendations (PARs). Changes in wind direction may indicate that if a release begins, it could affect different downwind sectors. If the licensee believes that containment may fail, it should pursue the expansion of PARs?

Supplement 3, Note 6 states "If the plant has mitigated the conditions that caused the GE declaration expanding the PAR to evacuate downwind sectors upon completion of initial staged evacuation may not be necessary." It appears therefore the reverse is true and if plant conditions still indicate a GE then the downwind sector is evacuated. In addition, other factors related to plant conditions, radiological release conditions and event progression may impact decisions on offsite protective action recommendations.

Using information from Section 2.6 and logic derived from Note 6, what specific guidance applies to plant condition expansion of PARs for a wind shift?

Question 7 – Section 2.6: How is the expansion of PARs for a wind shift applied to the time period when the control room is in command and control?

Question 8- Section 2.6: Diurnal wind shifts or the passage of a storm front can cause extreme wind shifts. How are weather conditions factor into the expansion of PARs decision making process?

NEI Proposed Solution:

Proposed solution question 1: A rapidly progressing severe accident may be defined as a loss of all core cooling systems AND a loss of the containment barrier in accordance with the Emergency Action Levels AND responsibility for PARs has not been transferred to the TSC or EOF. If these criteria cannot be immediately confirmed, assume a rapidly progressing severe accident is not occurring. Licensees may choose to substitute a loss of core cooling with an identifiable instrumentation value such as greater than or equal to Containment High Range Area Radiation Monitor Potential Loss EAL Threshold (20% Clad Damage). Any value used should be of sufficient magnitude to indicate the loss of core cooling and/or 20% clad damage or greater.

Proposed solution question 2: This answer assumes that guidance discussed in RIS 2005-08 associated with a short-term release (puff release) still applies to PAR development. The NEI guidance contained in the RIS states "...it is appropriate to identify likely sources of short term releases in the planning process so that considered protective actions can be developed. For example, controlled evolutions such as containment venting are characterized by definitive actions that provide some measure of certainty regarding release duration and resultant doses. On the other hand, releases from unmonitored release paths would result in highly uncertain assessments of source term."

Therefore, it is appropriate to apply the PAR strategy of shelter in place for controlled venting from containment during the period of time when the augmented emergency response is in command.

Proposed solution question 3: It is acceptable to use the limiting ETE for the 0-2 mile zone and the limiting ETE for all 2-5 mile zones down wind. One PAR strategy should be developed for 0-2 miles and one overall strategy for all 2-5 mile zones down wind. These PAR strategies are not dependent on wind direction.

It is not expected that a matrix of PARs consisting of shelter in place or evacuate be developed depending on wind direction.

Proposed solution question 4: Yes, it is acceptable with the proper justification to not use staged evacuation. The licensee provides a basis for the following justifications – (1) ETE demonstrates the evacuation times are not improved for the 0– 2 mile radius by using staged evacuation. AND/OR (2) ETE increases to the 2-5 mile zone outweigh ETE advantages to the 0-2 mile zone.

Proposed solution question 5: It is “Safer to do so” when the augmented Emergency Response Organization (ERO) is staffed for both the licensee and OROs. No further protective actions are initiated by the control room (accept for a wind shift) until the augmented ERO is present to evaluate conditions and perform assessments.

When the augmented ERO is staffed, consider the prognosis for continued radioactive release, assess the radiological conditions offsite, and (1) if the 0-2 mile radius was sheltered in place, determine if the 0-2 mile radius should remain sheltered in place or be evacuated; (2) if the 2-5 mile zones were sheltered in place, determine if they should remain sheltered in place or be evacuated; (3) determine if the 5-10 mile downwind sectors should be evacuated.

Proposed solution question 6: There are conditions used for PAR development without a reliance on dose assessment or dose projection results exclusively. Examples of criteria to use to determine when conditions apply are identified in NEI 12-10, Guideline for Developing a Licensee Protective Action Recommendation, Appendix B, and Section 2.2.

Proposed solution question 7: The PAR is extended to the new sector.

Proposed solution question 8: A diurnal wind shift (for example; sea breeze effects) or the passage of a storm front can cause extreme wind shifts. During an extreme wind shift the PAR in the initial wind direction is not extended to the sectors the wind is shifting through unless it is shown (dose assessment) that the PAG is exceeded. The PAR is extended to the sectors in the final wind direction if the conditions in question four are met. For the sectors where the plume passes through, where the PAGs are not exceeded, it is not necessary to include these areas in the upgraded PAR. A new PAR is required within 15 minutes once determined the wind is persisting to a new sector or on completion of a dose assessment indicating a PAG is exceeded in a new sector.

NRC Response

Question 1

Section 2.7 and the Attachment block “Rapidly progressing severe accident”: Can a Rapidly Progressing Severe Accident be defined in terms that are easily identified by the control room staff (e.g., tied to a specific time frame and sites Emergency Action Levels)?

NRC Response

The proposed response does not address the issue fully. Emergency Director judgment is important in this rapid, but unlikely scenario. However, the staff understands the need to formalize criteria to the extent practical. The following criteria would be appropriate as supplemented by hostile action considerations:

A rapidly progressing severe accident may be defined as:

- This protective action recommendation is the first after a General Emergency has been declared
AND
- Greater than or equal to Containment High Range Area Radiation Monitor Potential Loss EAL Threshold (20% Clad Damage)
AND
- There is loss of the containment barrier per the Emergency Action Levels

OR

1. Control of the site has been lost to hostile action and the containment barrier is compromised

OR

2. Emergency Director Judgment that a significant radiological release will occur within an hour

As noted in Supplement 3, if these conditions cannot be determined, the Emergency Director should assume they are not taking place.

The guidance for protective action strategy is applicable to conditions directly after a General Emergency is declared. However, the declaration and the large early release could take place after the Technical Support Center (TSC) or Emergency Operations Facility is activated and the criteria would be applicable.

Question 2

Does guidance for a short term (puff release) release discussed in RIS 2005-08, Endorsement of Nuclear Energy Institute (NEI) Guidance "Range of Protective Actions for Nuclear Power Plant Incidents, April 2005," still apply to the development of PARs? If so, under what conditions should it apply?

NRC Response

The proposed response does not fully address the issue. Supplement 3 updates the information in RIS 2005-08. The NEI guidance referenced in the RIS provides useful background on Environmental Protection Agency (EPA) guidance that is not changed nor impacted by Supplement 3. Supplement 3 provides guidance on the use of Shelter in Place (SIP) as a protective action for impediments, hostile action and when evacuation support is necessary but necessary traffic controls are not yet in place. Other appropriate uses of SIP are for special needs and transport dependant populations. Guidance on this issue is provided in Supplement 3, Section 3.2, "Emergency Messaging," and may be incorporated into augmented Emergency Response Operations (ERO) protective action strategy procedures, but would not be appropriate for the Control Room procedure.

Controlled venting could affect an area beyond initial evacuation orders, e.g., five to ten miles downwind. It is difficult to identify scenarios, other than controlled venting, that would include a short term release of known duration. In any case, augmented ERO radiological staff and decision makers should be aware of the possibility and have evacuation times available for various emergency response planning areas within the emergency planning zone. A decision could be made in such cases to SIP for a short duration release, but such considerations would not be appropriate for control room guidance.

Finally, the NEI guidance endorsed by RIS 2005-08 notes the use of advisory messaging to direct the public to monitor. This measure has been emphasized in Supplement 3 as direction to “monitor and prepare.” SIP is not the same measure as “monitor and prepare.” An SIP order that is not necessary prevents families from reuniting when it would be beneficial for evacuation readiness. Automatic SIP for areas not affected by an actual or potential radiological release should not be recommended nor implemented as it has the potential to detract from public health and safety.

Question 3

Question concerns Attachment Note 9: Should the most limiting Evacuation Time Estimate (ETE) for the 0-2 mile zone and 2-5 mile zones downwind be the deciding factor for PAR determination for a Rapidly Progressing Severe Accident?

NRC Response

The proposed response does not fully address the issue. Clearly one ETE value for the 0-2 mile zone exists and should be used, regardless of wind direction. However, it is possible that ETE values for 2-5 mile downwind sectors and associated emergency response planning areas could vary substantially. In that case the decision should be based upon wind direction. Use of the longest ETE could potentially prevent evacuation when it is more beneficial. It would be reasonable to consider this effect where the relevant ETEs vary by more than about 25%. However, this would only be applicable when some of the 2-5 mile ETEs exceed the guidance in Supplement 3 (i.e., 3 hours), otherwise, evacuation would be recommended regardless of wind direction. This information could be provided in a simplified form, such as:

- Wind directions A, B, C: SHELTER IN PLACE
- All other wind directions: EVACUATE

Licenses could justify some other value based on a technical evaluation.

Question 4

Attachment block “Evacuate 2 mile radius and SIP 5 miles downwind, all others monitor and prepare” (staged evacuation): Are there circumstances where it is appropriate to not implement staged evacuation. What type of justification is required?

NRC Response

Staged evacuation is the preferred protective action strategy and is shown to be effective according to NRC studies. Staged evacuation emphasizes protection of those most at risk and limits impact upon the public in the event the General Emergency is mitigated. Staged evacuation is used in emergency response nationwide.

Licensees can appropriately provide the best technical PAR acknowledging that Offsite Response Organizations' protective action decisions may differ.

However, the studies conducted by the NRC (NUREG/CR-6953, Vol. 1, "Review of NUREG-0654, Supplement 3, 'Criteria for Protective Action Recommendations for Severe Accidents,'" ADAMS Accession No. ML080360602) to support Supplement 3 used national level parameters for analyses. Licensees may perform a site-specific dose-based analysis to show the efficacy of alternate protective action strategies. The techniques in the NUREG/CR-6953 may be instructive in the conduct of such analyses and the results should be provided to NRC staff for review.

Question 5

Attachment block "When safer to do so, begin staged evacuation of all affected areas": When is it "Safer to do so"? What type of criteria should apply?

NRC Response

Licensees can reasonably expect that the determination to begin staged evacuation will not be made by the on shift ERO because the augmented ERO may be activated before the General Emergency (GE) declaration or soon after. The determination should be based upon radiological assessment at the time for this unlikely event. Preplanning of specific criteria for "when safer to do so" may not be possible. The implementation of evacuation after SIP due to a rapidly progressing severe accident will rely upon the judgment of decision makers within the licensee and ORO organizations. The goal of the evacuation is to reduce public exposure and would be based upon ground deposition dose rates, ETEs for the sheltered areas and current radiological release rate. It should be noted that this consideration is only applicable to sites that would SIP the 0-2 or 2-5 mile emergency response planning areas for this event.

Question 6

Section 2.6 and Attachment Note 6: Supplement 3, Section 2.6 provides guidance related to the expansion of PARs. Changes in wind direction may indicate that if a release begins, it could affect different downwind sectors. If the licensee believes that containment may fail, it should pursue the expansion of PARs? Supplement 3, Note 6 states: "If the plant has mitigated the

conditions that caused the GE declaration ..., expanding the PAR to evacuate downwind sectors upon completion of the initial staged evacuation may not be necessary.” It appears therefore the reverse is true and if plant conditions still indicate a GE then the downwind sector is evacuated. In addition, other factors related to plant conditions, radiological release conditions and event progression may impact decisions on offsite protective action recommendations.

Using information from Section 2.6 and logic derived from Note 6, what specific guidance applies to plant condition expansion of PARs for a wind shift?

NRC Response

Supplement 3, Section 2.6 and Supplement 3, Attachment A, Note 6 address different aspects of protective action strategy development. Combining them would not clarify guidance.

Supplement 3, Note 6 is intended to allow for an assessment before expanding staged evacuation to the 2-5 mile downwind sectors. This would only be applicable to sites that use staged evacuation and reflects the significant potential for a General Emergency to be mitigated while ensuring the population most at risk (i.e., within 2 miles) is evacuated.

Supplement 3, Section 2.6 addresses the issue of expansion of PARs after keyhole evacuation has been accomplished. The intent of guidance in Supplement 3, Section 2.6 is to eliminate unnecessary protective actions. As noted above with inappropriate SIP recommendations, evacuation of the public not at risk of exceeding radiological protective action guides is counterproductive. In addition to the disruption of the public and health risk from evacuation, unnecessary evacuation can create a shadow evacuation that could delay the movement of populations most at risk. Unnecessary evacuation also places demand on ORO resources that would be better used to address the evacuation of those at risk.

In any case, Supplement 3 should be implemented in a manner that minimizes demands upon on-shift ERO decision maker(s). The considerations discussed in Section 2.6 are applicable to the augmented ERO and are not applicable to the protective action strategy guidance provided to the on-shift ERO.

Question 7

Section 2.6: How is the expansion of PARs for a wind shift applied to the time period when the control room is in command and control?

NRC Response

If a wind shift occurs when the control room has command and control, then plant conditions may be used as a basis for expanding the PAR to the new sector. If radiological assessment is available during this time period, it should be used to inform the PAR decision making.

Question 8

Section 2.6: Diurnal wind shifts or the passage of a storm front can cause extreme wind shifts. How are weather conditions factored into the expansion of PARs decision making process?

NRC Response

Diurnal wind shifts take place regularly and the NRC expects that the ERO is well aware of this site specific phenomenon. Site specific protective action strategy should address such weather patterns.

The NRC staff used national average weather conditions in the calculations in NUREG/CR-6953 that support Supplement 3. Note 2 of the Supplement 3 development tools mentions extreme weather conditions because alternative protective actions may be appropriate in such conditions. Should such conditions exist, the augmented ERO would be expected to use judgment in the recommendation of protective actions and to brief OROs in support of the protective action decision. However, this consideration need not be included in the control room protective action strategy because the combination of the General Emergency and the extreme weather is unlikely. The control room protective action strategy must not unduly deflect focus from immediate response to nuclear safety issues.