ENCLOSURE 2

Summary of the Evaluation of Recommendations

Table C-1 of LIC 504: Decision Options

#	Option[a]	Analysis Approach[b]	Affected Principles or Factors[c]	Criteria Used to Evaluate Options[d]	Evaluation[e]
1	Take no follow-up actions.	Used quantitative and qualitative guidance in LIC-504, "Integrated Risk Informed Decisionmaking Process for Emergent Issues," Revision 5, dated March 4, 2020 (Agencywide Documents Access and Management Systems (ADAMS) Accession No. ML19253D401).	Not analyzed since this option is not recommended.	Guidance in LIC-504.	Not recommended because risk analysis for eight plants highlighted potential opportunities to enhance plant safety and enhance the quality of the U.S. Nuclear Regulatory Commission's (NRC's) risk-informed decisionmaking activities.
2	Issue orders to promptly shut down or implement compensatory measures at nuclear power plants (NPPs) that may be vulnerable to events similar to the derecho that occurred at the Duane Arnold Energy Center (DAEC) NPP.	Used conservative upper bound results generated using the NRC's Standardized Plant Analysis Risk (SPAR) models.	Not analyzed since this option is not recommended.	LIC-504 criteria on conditional core damage frequency (CCDF), conditional large early release frequency (CLERF), and guidance on defense in depth (DID) and plantwide safety (SM).	Not recommended because conservative upper bound evaluations demonstrated that CCDF was less that $1x10^{-3}$/year and CLERF was less than $1x10^{-4}$/year. Also, the issue does not contribute to significant degradation of DID plantwide and SM (see ADAMS Accession No. ML20315A117 for details).
3.	Issue orders requiring licensees to comply with design requirements.	Used input from DAEC inspection report to determine whether insights	Not analyzed since this option is not recommended.	Design- and licensing-basis requirements for DAEC.	Not recommended because follow-up inspections did not identify violations of design requirements, procedure noncompliances, or

		obtained from DAEC derecho event demonstrate potential noncompliances with system design requirements.			inadequate quality assurance or maintenance (see ADAMS Accession No. ML20314A150).
4	Proceed with a cost-benefit portion of a regulatory analysis in accordance with guidance in NUREG\BR-0058, “Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission,” Revision 5, draft report for comment, issued April 2017 (ADAMS Accession No. ML17100A480).	Used maximum change in core damage frequency (∆CDF) gains that can be achieved at various plants analyzed, considering uncertainties, conservatisms, and nonconservatisms.	Not analyzed since this option is not recommended.	Information provided in Figure 2-2 of NUREG\BR-0058, Revision 5.	Not recommended since the ∆CDFs calculated using readily available information have high uncertainties, conservatisms, and nonconservatisms, and implementation of recommendations #7, 8, 11, 12, and 13 could be sufficient to achieve the desired potential safety gains. Furthermore, these ∆CDFs represent safety gains in the event a modification is able to completely eliminate the potential increase in risk. A cost-benefit portion of a regulatory analysis should be based on the subset of this ∆CDF that can be eliminated by a proposed modification. Such an analysis is outside the scope of an LIC-504 analysis. Management could revisit the need to perform the cost-benefit portion of the regulatory analysis based on insights obtained from implementing the five recommendations (items 7, 8. 11, 12, and 13).
5	Issue bulletin requiring licensees to determine their potential vulnerability to events such as the DAEC derecho event and implement potential safety enhancements to	Used refined ∆CDF results generated using SPAR models for eight NPPs and potential impacts on DID and plantwide SM and NRC Office of	Not analyzed since this option is not recommended.	NRR generic communication guidance on circumstances that should prompt issuance of bulletins and LIC-504 guidance (Figure 3).	Not recommended because the estimates of risk significance do not warrant requiring prompt actions especially in light of significant uncertainties in risk estimates and availability of alternative means (e.g., issuance of an information notice) that can be employed to

	reduce risks from events that could cause loss of power (LOOP) and concurrently degrade emergency service water (ESW) performance.	Nuclear Reactor Regulation (NRR) guidance on generic communications.			achieve desired outcomes.
6	Issue generic letter requesting licensees to provide information that the NRC staff could use to determine whether follow-up regulatory actions are warranted.	Used refined CCDF and CLERF results generated using SPAR models for eight NPPs and potential impacts on DID and plantwide SM and NRR guidance on generic communications.	Not analyzed since this option is not recommended.	NRR guidance on circumstances that should prompt issuance of generic letters and LIC-504 guidance (Figure 3).	Not recommended since circumstances do not warrant issuance of a generic letter. For example, analysis performed from readily available information demonstrates that the issue may be of significance to a handful of operating units and, as such, issuance of a generic letter is unnecessary. Furthermore, the NRC can use alternative means (e.g., information notice) to achieve desired outcomes.
7	Issue an information notice informing licensees about the event and factors that influence the risk significance based on insight gained from the NRC's LIC-504 analysis.	Used refined ΔCDF results generated using SPAR models for eight NPPs and potential impacts on DID and plantwide SM and NRR guidance on generic communications.	Availability of information would enable licensees to examine whether there are opportunities to enhance safety at their plants.	NRR guidance on circumstances that should prompt issuance of information notices and LIC-504 guidance relating to issuance of generic communications.	Recommended since issuance of an information notice may prompt licensees to explore potential safety enhancements. For example, a site that has several factors that could increase risk (e.g., located in a region with relative high propensity to weather-related LOOPs, not equipped with the capability to bypass ESW strainers) may find opportunities to enhance safety and, if appropriate, update the probabilistic risk assessment (PRA) model.
8	Examine how industry response to Fukushima-related orders on extended loss of alternative current power and loss of ultimate heat sink	Used refined ΔCDF results generated using SPAR models for eight NPPs with and without credit for FLEX strategies.	Insights from such an examination may demonstrate means to maximize risk	Differences in ΔCDF with and without credit for FLEX strategies (see Enclosure 1 for details).	Recommended since it demonstrates safety gains attributed to FLEX strategies and the means to maximize those benefits and provides insights on opportunities for improvement.

	(EA-12-049) impacted the risk significance of this issue and identify opportunities to further enhance reliability of diverse and flexible mitigation capability (FLEX) strategies.		reductions that could be achieved from FLEX strategies.		
9	Perform additional performance monitoring.	Used risk analysis results to identify key uncertainties that may significantly impact estimated risks.	Not analyzed since this option is not recommended.	NUREG-1855, "Guidance on the Treatment of Uncertainties Associated with PRAs in Risk-Informed Decisionmaking, Final Report," Revision 1, issued March 2017 (ADAMS Accession No. ML17062A466), on how performance monitoring could be used as a means to address key uncertainties associated with risk assessment.	Not recommended because the risk assessment did not identify any issues whose uncertainties could be addressed by additional performance monitoring.
10	Perform additional inspections at more plants.	Used risk analysis and related operating experience to identify benefit of additional inspections.	Not analyzed since this option is not recommended.	Operating experience with respect to derechos and regulatory requirements.	Not recommended since the team did not identify issues of potential noncompliances (violations of regulations, technical specifications).
11	Communicate risk insights gleaned from the DAEC LIC-504 with	Discussed options available to NRR's Division of Reactor	Availability of information would enable	NRR/DRO/IOEB guidance on selecting information	Recommended because availability of risk insight will enable regions to enhance use of budgeted inspection

	regional staff and NRR staff.	Oversight (DRO), Operating Experience Branch (IOEB), to share information with regional staff.	inspectors to examine whether there are opportunities to enhance safety at their plants.	that must be shared with regional staff.	resources in a risk-informed manner at a few plants where there may be opportunities to enhance safety.
12	Share risk insights gained from the DAEC accident sequence precursor and the LIC-504 analysis with the regulated community.	Considered benefits that can be obtained by sharing risk insights with regulated communities who have the ability to influence risk-informed decision making in the regulated community.			Recommended because it would enhance the regulated community's awareness of the importance of a combined loss of ESW and LOOP for a few plants.
13	During fiscal years 2021 and 2022, update two SPAR models that possess multiple design characteristics that yield relatively higher risk estimates.	NRR's Division of Risk Assessment (DRA), PRA Oversight Branch (APOB), has an ongoing action to identify and update several SPAR models. NRR\DRA\APOB has identified two plants for updating in fiscal years 2021 and 2022.	Improving accuracy of SPAR models enhances the NRC staff's risk-informed decisionmaking capabilities.	General guidance used by NRR\DRA to identify a limited number of SPAR models for future updates.	Recommended because it would enable the staff to further enhance its understanding of the risks associated with derechos.

a. Define each decision option (e.g., shut down plant immediately, shut down in specified time period, or disallow a plant from restarting).
b. Identify available analytical tools (quantitative or qualitative), such as risk analysis tools or engineering models.
c. Identify potential impact on the principles of risk-informed decisionmaking or other factors being analyzed or evaluated to differentiate the options.
d. Define the basis or standard for accepting or rejecting each decision option.
e. Compare the options and justify the option recommended for implementation.