

**Responses to Information Requests from Senator David Vitter et al
Letter Dated February 4, 2013**

As the U.S. Nuclear Regulatory Commission (NRC) continues to understand the factors involved in the Fukushima Dai-ichi accident, a guiding principle is to ensure these activities do not adversely affect the day-to-day safe operation of the current fleet of operating plants. Accordingly, the NRC staff is considering the availability of agency and industry resources in developing plans and guidance for post-Fukushima activities. The staff also recognizes the overlap of certain activities and is currently working with industry to understand the impact of implementation dates to avoid unwarranted cumulative impacts of requirements arising from lessons learned from the accident. The Commission's regulations require a cost/benefit analysis for any proposed regulatory action not needed to ensure adequate protection of public health and safety.

In developing possible actions to address lessons learned from the Fukushima Dai-ichi accident, the Commission prioritized those actions to ensure timely implementation of the most important safety improvements. The prioritization, as described in a staff paper to the Commission dated October 3, 2011, consists of three tiers ranging from actions that should be started without delay and for which sufficient resource flexibility exists (Tier 1), to those that had to wait for factors such as further technical assessment, resolution of Tier 1 issues, or availability of critical staff skills (Tier 2), or to those that require further study, are dependent upon completion of a shorter-term action, or need a critical skill set that is also needed for higher priority work (Tier 3). This prioritization has allowed the Commission to address safety-significant issues identified by the Near-Term Task Force, and after subsequent review by numerous stakeholders, the agency has proceeded with implementing the Tier 1 actions. The staff's longer-term plans for addressing the Tier 3 items are described in a subsequent paper to the Commission dated July 13, 2012.

(1) Confirm that the NRC is completing a thorough analysis of the differences between the regulatory atmosphere in Japan and the U.S., and an explanation of the methodology of how that analysis is being conducted.

The Commission recently directed the NRC staff to document its comparison of U.S. and Japanese regulatory requirements that were in effect at the time of the accident, focusing on those areas most relevant to the sequence of events and accident mitigation capabilities at Fukushima. The staff's documentation will describe how those differences were factored into post-Fukushima actions taken by the NRC and will facilitate the NRC's communications with the public on its post-Fukushima activities. We will provide this document to the Committee when it is completed.

Our primary focus has been on the course of events to determine if our regulatory programs are sufficient for U.S. plants to prevent or mitigate the types of conditions that contributed to core damage and the release of radioactive materials following the earthquake and tsunami in Japan. As an example, the mitigating strategies to cope with large fires and explosions, implemented at U.S. plants following the terrorist attacks of September 11, 2001, may have been of use in responding to the extended loss of electrical power and core cooling capability that occurred at Fukushima. However, this equipment was not designed or required to handle multi-unit events or survive extreme natural phenomena, such as a beyond-design-basis flood. Upon identifying these limitations, the NRC responded by issuing orders to U.S. plants to install additional portable power supplies and pumps that would be protected from extreme natural phenomena to ensure that equipment would be available to cool the reactors if all electrical power is lost, no

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matter what causes the loss of power. This new requirement addresses one of the most safety significant lessons from the Fukushima accident.

The NRC routinely considers international operating experience within our regulatory processes. We have completed targeted comparisons of U.S. requirements against those of Japan and other countries where such an evaluation might enhance our understanding of the events at Fukushima Dai-ichi or could help identify lessons learned from the Fukushima accident. For example, the NRC staff assessed differences in the regulatory requirements for addressing loss of electrical power or station blackout events to assist in determining whether further regulatory action was warranted. Likewise, the NRC staff has had extensive discussions with other foreign regulators to compare lessons learned and implementation strategies. These have informed the staff's efforts and confirmed that we have identified the appropriate lessons learned.

(2) Describe whether and how the NRC has given due consideration for safety benefits gained by post-Fukushima actions already taken.

The NRC's assessments of the Fukushima accident, including the Near-Term Task Force report "Recommendations for Enhancing Reactor Safety in the 21st Century," determined that the continued operation of U.S. nuclear power plants does not pose an imminent risk to public health and safety. As already noted, the Commission has prioritized and initiated certain activities to enhance safety at U.S. nuclear power plants. However, the NRC continues to evaluate potential lessons learned from the accident to determine if additional actions might be warranted. As described in more detail below, the NRC will account for actions already taken or planned in evaluating regulatory decisions regarding post-Fukushima actions.

Several processes are in place for the rigorous review of possible changes to NRC regulatory requirements. Following the Fukushima accident, the Commission established a senior management steering committee to consider proposals for all activities that the NRC staff undertakes. In addition, the NRC operates in accordance with its own 'backfit rule,' which applies whenever the NRC considers adopting possible regulatory changes. These backfit rule assessments consider the safety benefits of existing plant features and those required by previous regulatory actions (e.g., the Orders issued in March 2012).

As the agency continues to evaluate Tier 2 and Tier 3 recommendations, actions planned or already taken will be considered. For example, the Commission is currently considering a March 27, 2013, staff proposal to change the implementation plans for Tier 2 emergency preparedness recommendations because their intent is adequately addressed through the implementation of the March 2012 Orders on mitigating strategies. In addition, as discussed in more detail in the response to question (3), the Commission recently directed the staff to begin rulemaking efforts for the inclusion of filtering strategies for boiling-water reactors (BWRs) with Mark I and Mark II containments. In that decision, the Commission approved issuing Orders that require licensees to install severe accident capable hardened vents. Therefore, as part of the rulemaking effort, the staff will assume the installation and safety benefit of those severe accidents capable hardened venting systems.

The NRC staff addresses the cumulative effect of developing new or revised regulations primarily through interactions with stakeholders and the timely development of guidance related to the subject rulemakings. The process is described in two papers to the Commission dated October 11, 2011, and October 5, 2012, and is being used to develop the rulemaking plans for those Fukushima action items that involve changes to regulatory requirements established by the NRC.

(3) Identify any areas where the NRC has departed from a thorough and systematic cost-benefit analysis in imposing additional requirements at the nation's nuclear plants since the Fukushima accident.

The NRC has followed its processes for ensuring a sufficient basis exists for imposing regulatory requirements. The NRC uses two methods for determining regulatory requirements. The first method involves actions needed to provide reasonable assurance of adequate protection of public health and safety. Actions taken to provide such assurance are not subject to a cost/benefit analysis and are pursued without consideration of costs, although the NRC works with stakeholders to find and implement cost-effective means of doing so. The second method involves regulatory requirements that are considered to substantially enhance safety beyond that needed for reasonable assurance of adequate protection. These safety enhancements are evaluated using a thorough and systematic cost/benefit analysis and pursued if the estimated benefits are found to outweigh the projected costs. The Orders issued in March 2012, requiring improved containment venting for boiling water reactors (BWRs) with Mark I and Mark II containments, are intended to help avoid core damage and were issued based on the Commission's decision that the modifications were needed for reasonable assurance of adequate protection. Likewise, the March 2012 Orders on mitigation strategies for beyond-design basis external events, issued to all power reactor licensees, were based on adequate protection. The third set of Orders in March 2012, which require all power reactor licensees to install reliable spent fuel pool instrumentation, were issued under an administrative exemption to the backfit rule. The administrative exemption, which is used only in exceptional circumstances, was utilized because the Commission determined that use of such instrumentation would provide a substantial increase in the protection of public health and safety.

Recently, the subject of filtered containment vents for BWRs with Mark I and Mark II containments was considered by the Commission. In the staff's November 26, 2012, paper to the Commission various options and recommendations were presented that related to containment venting systems for BWRs with Mark I and Mark II containments. In this paper, the NRC staff included a cost/benefit assessment of the options, using both quantitative and qualitative factors. The part of the cost/benefit assessment that can be quantified compares the estimated costs of imposing new requirements with the estimated, probability-weighted potential benefits and averted costs associated with implementing those requirements. In addition to those factors presented quantitatively, cost-benefit assessments may also consider various qualitative factors that may not be amenable to representing in units such as dollars or averted radiation dose. The Commission's deliberations regarding the merits of the various options considered the qualitative factors identified in the paper as well as the results of the quantitative assessment.

On March 19, 2013, the Commission approved enhancements to the March 2012 Order that required reliable hardened venting systems at 31 BWRs with Mark I and Mark II containments by requiring licensees to replace or upgrade those hardened venting systems with a containment venting system designed and installed to remain functional during severe accident conditions. The Commission directed the staff to develop, within one year, the technical bases to support rulemaking that would require filtering strategies for Mark I and Mark II containments following a severe accident. As part of producing the technical bases, the Commission directed the consideration of engineered filters, as well as any performance-based approach that would also result in a reduction in radioactive releases during an accident. The rulemaking process will address the need to engage a diversity of external stakeholders and develop a solution that provides the best approach to ensuring public health and safety. The staff is also expected to

present its work to the Advisory Committee on Reactor Safeguards at appropriate points in the process. The Commission further instructed the staff to fully explore the requirements associated with measures to enhance the capability to maintain containment integrity and to cool core debris during severe accidents. The Commission directed the staff to prepare a proposed rule within 2 years and a final rule within 4 years. Independent of these efforts, the Commission also asked the staff to seek detailed Commission guidance regarding the use of qualitative factors in a future voting paper.