June 14, 2005

MEMORANDUM TO: Chairman Diaz
Commissioner McGaffigan
Commissioner Merrifield
Commissioner Jaczko
Commissioner Lyons

FROM: Luis A. Reyes ***/RA/***
Executive Director of Operations

SUBJECT: STATUS OF STAFF ACTIVITIES TO RESOLVE GENERIC SAFETY ISSUE 189, "SUSCEPTIBILITY OF ICE CONDENSER AND MARK III CONTAINMENTS TO EARLY FAILURE FROM HYDROGEN COMBUSTION DURING A SEVERE ACCIDENT"

This memorandum informs the Commission of recent activities related to Generic Safety Issue (GSI) 189, "Susceptibility of Ice Condenser and Mark III Containments to Early Failure from Hydrogen Combustion During a Severe Accident," resolution (reference SRM-SECY-01-0162 dated December 31, 2001). The staff assessed the feasibility of rulemaking to resolve GSI-189 by further developing the technical basis and completing the regulatory analysis (Attachment 1). In parallel, the staff continued to engage the affected licensees to develop criteria for providing reliable power to operate the hydrogen igniters during station blackout (SBO) and to explore voluntary industry actions for resolving GSI-189. Past activities related to this GSI are provided in Attachment 2.

The regulatory analysis found that the option of rulemaking is cost beneficial and could be interpreted as providing a substantial increase to the public health and safety with regards to pressurized water reactors (PWRs) with ice condenser containments. However, when the analysis accounts for possible voluntary PWR licensee actions to provide alternate sources of power to the hydrogen igniters, the impact may not be substantial enough to warrant rulemaking. In the case of boiling water reactors (BWR) with Mark III containments, the analysis clearly showed that the costs exceed the benefits of a rulemaking, or a rulemaking after voluntary actions. Based on this regulatory analysis, resolving GSI-189 by rulemaking cannot be justified for BWR licensees. The difference in outcome is principally a result of the lower conditional containment failure probability (CCFP) used for the BWR Mark III containments, and the lower economic damage associated with site specific conditions at the BWR sites.

In addition to the regulatory analysis, the staff considered defense-in-depth attributes of the proposed action. The NRC philosophy for safety goal evaluations involves the concept of defense-in-depth, which includes maintaining a reasonable balance between prevention and mitigation. When a comprehensive risk analysis (i.e., a risk analysis that thoroughly addresses the frequency of challenges to safety functions and the uncertainties in the frequencies and

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outcomes) is not, or cannot, be done, traditional defense-in-depth considerations should be used to compensate for those uncertainties. Existing probabilistic assessments indicate that SBO sequences are a significant contributor to overall core damage frequency (CDF) at the facilities addressed by GSI-189. Recent technical evaluations indicate that ice condenser and Mark III pressure suppression containment types have a high CCFP after core damage if igniters are not used to manage hydrogen concentration. Evaluations of these events involve substantial uncertainties in the CDF and CCFP. Therefore, the proposed action provides an additional, unquantified benefit by improving the balance between prevention and mitigation of core damage resulting from SBO events. This consideration of defense-in-depth may support rulemaking as the appropriate regulatory action to take for both the PWRs with ice condenser containments and BWRs with Mark III containments.

While the regulatory analysis was being finalized, the staff continued to engage the affected stakeholders to explore voluntary industry actions as an alternative approach to resolve GSI-189. A public meeting was held on February 3, 2004, to discuss the staff's proposed criteria for providing reliable power to operate the hydrogen igniters during an SBO. Based on industry feedback at this meeting, the criteria were revised. The staff presented the revised proposed criteria to the industry at a public meeting on March 31, 2004, and then refined the criteria to address plant-specific concerns. During a public meeting held on September 21, 2004, the staff discussed the refined criteria with representatives of the ice condenser plants, the BWR Owners Group (BWROG) representing the Mark III plants, and the Nuclear Energy Institute. All stakeholders considered the criteria, as described in the regulatory analysis to be generally acceptable, except that the BWROG considered the 1-hour limit for providing reliable power for fast SBO sequences too short for manual hookup and agreed to implement a 2-hour limit as an alternative. In view of the improved protection of the containment barrier afforded by the availability of the hydrogen igniters during SBO events, the industry indicated a willingness to pursue voluntary actions to resolve GSI-189.

Based on the outcome of recent security actions, it appears that the scope of issues affecting the addition of reliable power to the hydrogen igniters can be broadened. On March 30, 2005, the staff met with senior representatives of the six affected utilities to discuss safety-security-related insights and the potential changes to the voluntary proposals. The staff will continue to monitor the safety-security interface as it relates to GSI-189.

The staff will continue to engage stakeholders in resolving GSI-189 through voluntary actions. The staff will request the 6 licensees that operate the 13 affected units to submit their action plan and projected schedules for the voluntary actions. Further, the staff will continue to follow the guidance in Management Directive (MD) 6.4, "Generic Issues Program," for the management and resolution of GSI-189. In accordance with MD 6.4, the staff will track the

implementation and verification stages of GSI-189. In the event that the voluntary actions fail to achieve the desired outcomes, the staff will revisit the option of rulemaking where supported by the Regulatory Analysis.

Attachments: As stated

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