UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

November 7, 2012

The Honorable Allison M. Macfarlane
Chairman
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: RESPONSE TO THE AUGUST 15, 2012 EDO LETTER REGARDING ACRS RECOMMENDATIONS IN LETTER DATED JULY 17, 2012 ON THE DRAFT INTERIM STAFF GUIDANCE DOCUMENTS IN SUPPORT OF TIER 1 ORDERS

Dear Chairman Macfarlane:

During the 598th meeting of the Advisory Committee on Reactor Safeguards (ACRS), October 4-6, 2012, we reviewed the EDO's letter dated August 15, 2012 regarding disposition of the ACRS recommendations contained in our letter of July 17, 2012. These recommendations pertain to the three proposed Interim Staff Guidance Documents (ISGs), at that time being developed by the staff, to identify acceptable measures to be taken to comply with requirements contained in the three Tier 1 Orders:

Order EA-12-049, Requirements for Mitigation Strategies for Beyond-Design-Basis External Events
Order EA-12-050, Reliable Hardened Containment Vents
Order EA-12-051, Reliable Spent Fuel Pool Instrumentation

At the time of the ACRS letter writing, these ISGs were expected to be released as final by the end of August 2012. Several public meetings were held by the staff between July and mid August and on August 29, 2012, the ISGs were issued as final.

CONCLUSIONS AND RECOMMENDATIONS

The staff's disposition of the ACRS recommendations enumerated in our July 17, 2012 letter is satisfactory with the following exceptions related to the Reliable Spent Fuel Pool (SFP) Instrumentation:

1. The staff's response to our recommendations relies mainly on their interpretation of explicit Commission guidance in SFP Order EA-12-051. We interpret the Commission guidance more broadly and believe that the system design should include diverse instrumentation that provides more accurate SFP water inventory data and SFP temperature data throughout an extreme event.

2. The resolution capability permitted in the ISG for SFP water level measurement systems is too coarse to alert operators, as early as possible and throughout the course of the event, of stable or changing water levels.

3. SFP water level can change after a severe event due to structural damage to the pool, loss of cooling, or both. Inferring SFP cooling from changes in water level alone is unsatisfactory because of the long delay between loss of cooling and overheating of the pool, and the confounding possibility of pool structural damage. Instrumentation is needed to provide direct measurements of SFP temperatures and diverse data for SFP damage assessment. This capability should be incorporated in the ISG.

DISCUSSION

Spent Fuel Pool Water Level Measurement

The ISG identifies design requirements for SFP water level-monitoring systems. The ISG permits a depth-dependent minimum water level resolution capability. From the top of the pool to 10 feet above the top of the fuel, a minimum resolution capability of one foot is acceptable. In this range, access by plant staff to the SFP would be permitted. At lower water levels a minimum resolution capability of 3.5 feet would be acceptable. At these lower water levels, access to the SFP floor would not be permitted and actions would be required to keep the fuel covered.

With a one-foot resolution capability the water level measurement system would have the capability to detect only those situations in which there has been significant structural damage leading to rapid pool draining. Such a system does not provide the information needed to alert operators as early as possible of stable or falling water levels during the initial stages of an event. Further, the coarse resolution capability makes it difficult to know whether the water level is remaining constant or whether the rate at which the water level is falling is slowing or accelerating. In view of the wide range of spent fuel pool and related system damage possibilities, we continue to recommend a water level resolution capability of inches over the full range, to provide operators with early warnings and clear indications of trends. Such resolution is readily obtainable with simple, reliable systems.

Spent Fuel Pool Temperature Measurement

We also recommended that water level sensors be supplemented with pool temperature measurement instrumentation to ensure that unambiguous knowledge of SFP heat removal has not been lost or impaired by the event. In preparing our recommendations to the staff we reviewed Section 4.2.4 of the NTTF report, wherein the staff summarized:

> "The Task Force concludes that clear and coherent requirements to ensure that the plant staff can understand the condition of the spent fuel pool and its water inventory and coolability and to provide reliable, diverse, and simple means to cool the spent fuel pool

under various circumstances are essential to maintaining defense-in-depth. The Task Force sees significant value in ensuring that sufficient cooling capacity exists under various design-basis natural phenomena."

In addition, Recommendation 7.1 of the NTTF report states that the Commission should direct the staff to:

> "Order licensees to provide sufficient safety-related instrumentation, able to withstand design-basis natural phenomena, to monitor key spent fuel pool parameters (i.e., water level, temperature, and area radiation levels) from the control room." Adding a temperature monitoring system offers several advantages. A temperature monitoring system would help in the diagnosis of a complex or long-term event. First, the added diversity enhances the reliability under extreme events since it is more likely that one of these systems will survive the event and alert operators to problems associated with the pool. Second, water level sensors alone will not provide early information about the status of the spent fuel pool cooling. Although the staff's logic that increases in pool temperature would eventually lead to decreases in water level is correct, operators would not be alerted in a timely manner. A combination of water level and temperature measurement capability would resolve whether SFP problems are due to loss of cooling or drain-down, and aid operators in early diagnosis and management of the event.

In summary, management of severe accident recovery actions to ensure that the plant and SFP are in a stable condition requires unambiguous knowledge of both SFP water inventory and heat removal/cooling status, as well as knowledge of the physical condition of the reactor plant and support systems. Our recommendations enhance the ability to monitor the SFP and provide operators with early and continuing indications of potential adverse conditions.

We look forward to continuing our work with the staff on the important matters resulting from the Fukushima-related efforts.

Sincerely,

/RA/

J. Sam Armijo
Chairman

REFERENCES

1. EDO Letter, "Disposition of the Advisory Committee on Reactor Safeguards' Recommendations Related to Draft Interim Staff Guidance Documents in Support of Tier 1 Orders," August 15, 2012 (ML12215A083)

2. ACRS Letter to the EDO, "Draft Interim Staff Guidance Documents in Support of Tier 1 Orders," July 17, 2012, (ML12198A196)

3. JLD-ISG-2012-01, "Compliance with Order EA-12-049, Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," August 29, 2012 (ML12229A174)

4. JLD-ISG-2012-02, “Compliance with Order EA-12-050, Reliable Hardened Containment Vents,” August 29, 2012 (ML12229A475)

5. JLD-ISG-2012-03, “Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation,” August 29, 2012 (ML12221A339)

6. Order EA-12-051, “Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,” March 12, 2012 (ML12054A679)

7. “Recommendations for Enhancing Reactor Safety in the 21st Century, The Near –Term Task Force Review of Insights from the Fukushima Daiichi Accident,” July 12, 2011

4. JLD-ISG-2012-02, “Compliance with Order EA-12-050, Reliable Hardened Containment Vents,” August 29, 2012 (ML12229A475)

5. JLD-ISG-2012-03, “Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation,” August 29, 2012 (ML12221A339)

6. Order EA-12-051, “Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation,” March 12, 2012 (ML12054A679)

7. “Recommendations for Enhancing Reactor Safety in the 21st Century, The Near –Term Task Force Review of Insights from the Fukushima Daiichi Accident,” July 12, 2011

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