EDO Principal Correspondence Control

FROM: J. Sam Armijo, Chairman ACRS

DUE: 08/17/12

EDO CONTROL: G20120527
DOC DT: 07/17/12
FINAL REPLY:

TO:

R. W. Borchardt, EDO

FOR SIGNATURE OF : ** GRN **

CRC NO:

EDO

DESC:

Draft Interim Staff Guidance Documents in Support of Tier 1 Orders (EDATS: OEDO-2012-0440)

ROUTING:

Borchardt
Weber
Johnson
Ash
Mamish
OGC/GC
Kotzalas, OEDO

DATE: 07/20/12

ASSIGNED TO: NRR

CONTACT: Leeds

SPECIAL INSTRUCTIONS OR REMARKS:

Please prepare response to ACRS for the signature of the EDO. Add the Commission and SECY as cc's. Also, include: RidsAcrsnw_MailCTR to your distribution list on the concurrence page. USE SUBJECT LINE IN RESPONSE.

TEMPLATE: EDO-001

ERIDS: EDO-01

EDATS

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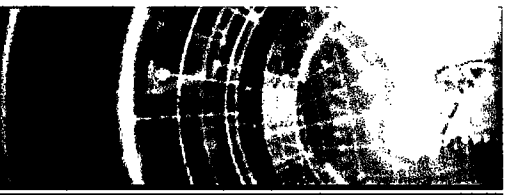

EDATS Number: OEDO-2012-0440 **Source:** OEDO

General Information

Assigned To: NRR
OEDO Due Date: 8/17/2012 11:00 PM
Other Assignees:
SECY Due Date: NONE
Subject: Draft Interim Staff Guidance Documents in Support of Tier 1 Orders
Description:

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Response/Package: NONE

Other Information

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OCM Concurrence: NO
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Document Information

Originator Name: J. Sam Armijo
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UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

July 17, 2012

Mr. R. W. Borchardt
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: DRAFT INTERIM STAFF GUIDANCE DOCUMENTS IN SUPPORT OF TIER 1 ORDERS

Dear Mr. Borchardt:

During the 596th meeting of the Advisory Committee on Reactor Safeguards (ACRS), July 11-13, 2012, we reviewed the staff's draft Interim Staff Guidance (ISG) documents for nuclear power reactor applicants and licensees. These ISGs identify acceptable measures to be taken to comply with requirements contained in the three Tier 1 Orders (EA-12-049, EA-12-050, and EA-12-051) issued on March 12, 2012. Our Fukushima Subcommittee also reviewed these matters on June 20, 2012. During these reviews, we met with representatives of the NRC staff and members of the public. We also had the benefit of the documents referenced.

RECOMMENDATIONS

JLD-ISG-2012-01: Compliance with Order EA-12-049, Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

- The special allowance that permits only a single backup for FLEX equipment serving multiple units should be reconsidered.
- The staff should provide guidance to address the use, or development if necessary, of appropriate standards for FLEX quality requirements.
- Hazard evaluations should also account for correlated damage that is caused by extreme natural events that may adversely affect FLEX equipment availability or mitigation strategies.

JLD-ISG-2012-02: Compliance with Order EA-12-050, Reliable Hardened Containment Vents

- The staff should review the requirement that the venting system be able to accommodate decay heat levels up to 1% of licensed/rated thermal power to assure that it addresses an appropriate range of scenarios.
- The staff should provide a clearer definition of "seismically rugged design."

JLD-ISG-2012-03: Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation

- The ISG should be modified to specify that the resolution of spent fuel pool (SFP) water level measurements be adequate to detect pool draining quickly and accurately.
- The ISG should be modified to specify direct measurement of temperature in the SFP.
- The ISG should be modified to specify the capability to display pool levels and temperatures as a function of time.

BACKGROUND

On October 3, 2011, the NRC staff issued a notation vote paper (SECY-11-0137) for Commission consideration of the staff's proposed prioritization of the Fukushima Near-Term Task Force (NTTF) recommendations. For certain high priority recommendations, the staff in SECY-11-0137 proposed the issuance of Orders to licensees. The Commission issued three Orders on March 12, 2012, addressing mitigation strategies for beyond-design-basis external events, reliable hardened vents for Mark I and Mark II containments, and SFP instrumentation.

The staff has conducted several public meetings to discuss the development of appropriate guidance for the Orders. As a result of interactions with industry during these public meetings, the Nuclear Energy Institute (NEI) developed guidance documents for use in implementing Orders EA-12-049 and EA-12-051. The staff has issued three draft ISGs: JLD-ISG-2012-01, JLD-ISG-2012-02, and JLD-ISG-2012-03 identifying acceptable means of complying with the Orders.

DISCUSSION

JLD-ISG-2012-01: Compliance with Order EA-12-049, Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

Order EA-12-049 requires that all U.S. plants improve the protection of portable safety equipment put in place to comply with the requirements of 10 CFR 50.54(hh)(2) and obtain sufficient equipment to support all reactors at a given site simultaneously. The corresponding draft ISG incorporates, with exceptions and clarifications, the industry's FLEX approach, as described in NEI 12-06, Revision B1, for dealing with scenarios that disable all plant alternating current (ac) electric sources or cooling water supplies.

The Order requires guidance and strategies to remedy the loss of power, motive force, and normal access to the ultimate heat sink, affecting all units at a site simultaneously. A sequential approach for mitigating beyond-design-basis external events is specified. The initial phase requires the use of installed equipment and resources to maintain or restore core cooling, containment, and SFP cooling. The transition phase requires maintaining or restoring these functions using sufficient, portable, onsite equipment and consumables until they can be accomplished with resources brought from offsite. The final phase requires obtaining sufficient offsite resources to sustain those functions indefinitely.

From our review and discussions it appears that the staff has determined that threats from extreme external events (currently being addressed under NTTF Recommendation 2.1) need not be completed prior to the implementation of this Order. The response by the industry and the FLEX program is scheduled to begin before the work to reevaluate seismic and flooding design basis (and beyond design basis) hazards is complete. We were informed by the staff that this approach is necessary to meet the implementation schedules required by the Orders. We note that this approach, while timely, may require significant staff and industry resources to implement additional changes that may become necessary after the hazards evaluations are completed.

The ISG establishes, through the FLEX strategy, an N+1 equipment availability criterion to assure that sufficient equipment will be available in the case of an extreme external event. For example, at a single-unit site, the N+1 strategy would require that two FLEX pumps are normally available onsite: one pump that can provide the needed safety functions, plus a backup. Supplemental offsite resources would be needed only if both onsite FLEX pumps were to fail. For a dual-unit site, the N+1 strategy would normally require three onsite FLEX pumps; for a three-unit site, four pumps would be required; etc. With this strategy, failure of one FLEX pump would not disable the safety functions at any unit. Failures of two pumps would require mobilization of offsite resources to restore the safety functions for at most one unit, while the other units remain supplied by the onsite FLEX equipment. However, there is a special allowance that permits only a single onsite backup for a resource that is sized to support all required functions across multiple units simultaneously. For example, consider the case where a single FLEX pump is capable of all water supply functions for a dual-unit site. Here, the N+1 allowance would simply require a second onsite pump of equivalent capability. In this case, failures of both onsite FLEX pumps would disable the safety functions for both units at the site and could further complicate the mobilization of alternate offsite resources. It is not evident that the special allowance for a single onsite backup has adequately accounted for the reliability of onsite and offsite FLEX resources or the consequential risk from evolving conditions at multiple units. If this allowance is permitted, it should be risk-beneficial.

The staff ISG and FLEX guidance incorporate discussion regarding storage, maintenance, testing, and training associated with the onsite backup equipment, their connection points, and their access routes. Development of implementation evaluations, training, and exercises is necessary to ensure that the FLEX equipment will perform its intended function. By its nature, the FLEX program will require substantial onsite and offsite mobilization of personnel and resources under unusual, challenging conditions. Determining the effective and appropriate ways to assure this preparedness is critical to sustain a successful program.

The ISG describes the general quality requirements for FLEX onsite and offsite equipment. We recommend that staff and industry expectations include the use, or development as necessary, of appropriate standards for performance, testing, and maintenance for equipment such as diesel pumps or portable ac power generators.

The current FLEX document indicates that several onsite and offsite hazards do not require consideration because they are "not a natural phenomenon." No rationale has been provided for summarily screening these hazards from consideration without further site-specific

evaluation. Assumptions about the independence of hazards may affect FLEX equipment protection strategies and presumed personnel warning times. For example, a severe seismic event may damage onsite structures, systems, and components (SSCs) and cause coincident site flooding from failures of upstream dams. A seismic event may damage a nearby industrial plant, chemical facility, or pipeline, with consequential releases of toxic or flammable gases. The site-specific evaluations should consider correlated damage conditions that may affect FLEX equipment availability or mitigation strategies.

JLD-ISG-2012-02: Compliance with Order EA-12-050, Reliable Hardened Containment Vents

Order EA-12-050 applies to BWRs that have Mark I or Mark II containment structures. Mark I licensees must review and improve, as appropriate, installed venting systems to help prevent core damage in the event of an accident. Mark II licensees must install reliable hardened venting systems. The corresponding draft ISG provides more detail on the technical requirements for the vents, as well as how vent designs and operating procedures should avoid, where possible, relying on plant personnel taking actions under hazardous conditions.

The proposed ISG identifies the staff's positions on all hardened containment venting system (HCVS) requirements specified in the Order. These positions form the basis by which the staff will evaluate the compliance plans.

The staff stated that this current ISG deals with the operation of hardened vents in the context of preventing core damage, with a focus on accessibility and operability of venting systems. Additional work by the staff will consider the use of filtered venting systems during beyond-design-basis accidents, wherein the production and migration of hydrogen will be more important with respect to these events.

The ISG recognizes that the wetwell is the preferred venting location to provide effective radionuclide scrubbing in the event of core damage. Therefore, licensees proposing alternative venting locations are required to provide sufficient justification. If the staff concludes that sufficient justification has been provided for alternative venting designs, we would like the opportunity to review the basis for such decisions.

These venting systems are to be designed to be able to handle decay heat levels up to 1% of licensed/rated thermal power conditions. There may be situations in response to beyond-design-basis external hazards where a licensee might want to vent in order to reduce pressure and utilize FLEX equipment soon after an event. This may demand that the venting be able to handle an energy release rate greater than that specified for these nominal conditions, as specified in the ISG. We recommend that the staff give careful consideration to the integration of the venting equipment design capabilities with the range of potential operational strategies that may be necessary for mitigation.

There is a need for a clearer definition for "seismically rugged design." The staff stated that there is a general understanding within industry regarding this concept. A more detailed definition would assure reasonable consistency across the industry in the quality and capabilities of FLEX equipment.

JLD-ISG-2012-03: Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation

Order EA-12-051 requires all plants to install enhanced equipment for monitoring water levels in each plant's SFP. The corresponding draft ISG details the water level range and accuracy requirements, as well as standards for equipment mounting, powering and testing, personnel training, and other criteria. This draft ISG incorporates, with exceptions and comments, the industry guidance document NEI 12-02, Revision B. With conformance to these exceptions and clarifications, the NRC staff considers this approach to be an acceptable means of meeting the requirements of this Order.

We do not agree. Water level measurement should be achieved with simple, reliable devices that will be compatible with the expected conditions that will exist following an extreme external event. This instrumentation should be capable of detecting unexpected changes in SFP level and provide appropriate alarms to alert the operations staff. Emphasis should be on the ability to detect water level reductions early during the event. The system should also have the capability to track and display changes in the SFP water level. This capability would provide the operations staff with the ability to know whether the rate of water level reduction was accelerating, slowing, or remaining constant.

NEI 12-02 specifies the display of three discreet pool levels. Level 1 is for maintaining normal SFP operation, Level 2 which would still allow personnel access to the SFP vicinity, and Level 3 where the water level is at the top of the fuel. We disagree with the approach that accepts water level resolution capabilities of 1 foot for SFP Monitoring Level 1 and 3.5 feet for SFP Monitoring Level 2. A measurement resolution capability of inches rather than feet from the top of the pool to the top of the fuel would enhance operator ability to assess whether the rate of pool draining was constant or changing in the event of significant damage, and reduce the potential for confusion by the operators. The ISG should also be revised to specify that both channels of instrumentation be normally available for display in the main control room.

The ISG should be modified to specify direct measurement of temperature in the SFP. Operators should know, as early as possible, if pool cooling is degrading. Information about SFP temperature provides operators with defense-in-depth information about the status of spent fuel cooling. Temperature information about the approach to boiling may also affect decisions regarding local personnel actions in the vicinity of the SFP. The temperature instrumentation should be simple, capable of being monitored continuously, and displayed in the main control room.

We look forward to continuing work with the staff on these and other important matters related to the Fukushima response efforts.

Sincerely,

/RA/

J. Sam Armijo
Chairman

REFERENCES:

1. Notation Vote SECY-11-0137, "Prioritization of Recommended Actions to be Taken in Response to Fukushima Lessons Learned," October 3, 2011 (ML11272A111)

2. Order EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," March 12, 2012 (ML12054A735)

3. Order EA-12-050, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents," March 12, 2012 (ML12054A694)

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

5. JLD-ISG-2012-01, "Compliance with Order EA-12-049, Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," June 1, 2012 (ML12146A014)

6. JLD-ISG-2012-02, "Compliance with Order EA-12-050, Reliable Hardened Containment Vents," June 1, 2012 (ML12146A371)

7. JLD-ISG-2012-03, "Compliance with Order EA-12-051, Reliable Spent Fuel Pool Instrumentation," June 1, 2012 (ML12144A323)

8. NEI 12-06 Revision B1, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," May 2012 (ML12143A232)

9. NEI 12-02 Revision B, "Industry Guidance for Compliance with NRC Order EA-12-051, "To Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation," May 2012 (ML12135A414)