



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

September 26, 2014

Mr. Joseph E. Pollock
Vice President, Nuclear Operations
Nuclear Energy Institute
1201 F Street, NW, Suite 1100
Washington, DC 20004

SUBJECT: STAFF ASSESSMENT OF NATIONAL SAFER RESPONSE CENTERS
ESTABLISHED IN RESPONSE TO ORDER EA-12-049

Dear Mr. Pollock:

By letter dated March 12, 2012, the U.S. Nuclear Regulatory Commission (NRC) issued Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events [BDBEEs]" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12054A736). The NRC staff has been conducting ongoing audits of all United States operating nuclear power plant licensees to evaluate information pertaining to their Overall Integrated Plans (OIPs) submitted in response to Order EA-12-049.

Order EA-12-049 requires that operating power reactor licensees and construction permit holders use a three-phase approach for mitigating BDBEEs and develop strategies to maintain or restore core cooling, containment and spent fuel pool cooling capabilities. To supplement onsite equipment, the final phase (Phase 3) requires obtaining sufficient offsite resources to sustain those functions indefinitely. In order to address the Phase 3 requirements of Order EA-12-049, the United States nuclear industry collectively formed the Strategic Alliance for FLEX¹ Emergency Response (SAFER). SAFER has established two National SAFER Response Centers (NSRCs), procured the Phase 3 equipment needed by licensees, and developed procedures to maintain and deliver the Phase 3 equipment to any United States nuclear power plant in response to a BDBEE.

By letter dated September 11, 2014, (ADAMS Accession No. ML14259A222), the Nuclear Energy Institute (NEI) provided a white paper titled "National SAFER Response Centers," which provides the programmatic aspects and implementation plans for the SAFER program. Enclosed is the NRC staff's assessment of the white paper and the SAFER program with regard to conformance with the applicable portions of guidance document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide", Revision 0, as endorsed by NRC document Japan Lessons-Learned Project Directorate (JLD) Interim Staff Guidance (ISG) JLD-ISG-2012-01, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events." The NRC staff has concluded that SAFER has procured equipment, implemented appropriate processes to maintain the equipment, and developed plans to deliver the equipment needed to support site

¹ FLEX is not an acronym, but refers to the industry's response to Order EA-12-049, which it has named "Diverse and Flexible Coping Strategies (FLEX)"

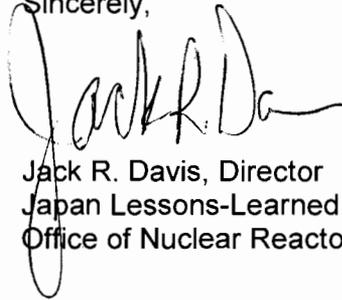
J.Pollock

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responses to BDBEEs, consistent with NEI 12-06 guidance. Therefore, the NRC staff concludes that licensees can reference the SAFER program and implement their SAFER Response Plans to meet the Phase 3 requirements of Order EA-12-049.

If you have any questions concerning this staff assessment, please contact Steve Philpott of my staff at (301) 415-2365, or via email at Stephen.Philpott@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Jack R. Davis". The signature is fluid and cursive, with a large initial "J" and "D".

Jack R. Davis, Director
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Enclosure:
Staff Assessment



UNITED STATES
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STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO THE STRATEGIC ALLIANCE FOR FLEX EMERGENCY RESPONSE
AND NATIONAL SAFER RESPONSE CENTERS SUPPORT FOR
RESPONSE TO ORDER EA-12-049,
“ORDER MODIFYING LICENSES WITH REGARD TO REQUIREMENTS FOR MITIGATION
STRATEGIES FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS”

1.0 INTRODUCTION

The earthquake and tsunami at the Fukushima Dai-ichi nuclear power plant in March 2011, highlighted the possibility that extreme natural phenomena could challenge the prevention, mitigation and emergency preparedness defense-in-depth layers already in place in nuclear power plants. At Fukushima, limitations in time and unpredictable conditions associated with the accident significantly challenged attempts by the responders to preclude core damage and containment failure. During the events at Fukushima, the challenges faced by the operators were beyond any previously faced at a commercial nuclear reactor and beyond the anticipated design-basis of the plants. The U.S. Nuclear Regulatory Commission (NRC) determined that additional requirements needed to be imposed to mitigate such beyond-design-basis external events (BDBEEs).

By letter dated March 12, 2012, the NRC issued Order EA-12-049, “Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events” [Reference 1]. This order directed licensees to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool (SFP) cooling capabilities in the event of a BDBEE. Order EA-12-049 applies to all operating power reactor licensees and all holders of construction permits for power reactors. Part of Order EA-12-049 requires obtaining sufficient offsite resources to sustain those capabilities indefinitely. By letter dated September 11, 2014, the Nuclear Energy Institute (NEI) submitted a white paper titled “National SAFER [Strategic Alliance for FLEX¹ Emergency Response]

¹ FLEX is not an acronym, but refers to the industry’s response to Order EA-12-049, which it has named “Diverse and Flexible Coping Strategies (FLEX)”

Response Centers” (NSRCs) [Reference 2], which describes the United States nuclear industry’s collective program to address this requirement.

2.0 REGULATORY EVALUATION

On February 17, 2012, the NRC staff provided SECY-12-0025, “Proposed Orders and Requests for Information in Response to Lessons Learned from Japan’s March 11, 2011, Great Tohoku Earthquake and Tsunami,” [Reference 3] to the Commission, including the proposed order to implement the enhanced mitigation strategies. As directed by SRM-SECY-12-0025 [Reference 4], the NRC staff issued Order EA-12-049, “Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events” [Reference 1].

Attachment 2 of Order EA-12-049, [Reference 1] requires that operating power reactor licensees and construction permit holders use a three-phase approach for mitigating BDBEEs. The initial phase requires the use of installed equipment and resources to maintain or restore core cooling, containment and SFP cooling capabilities. The transition phase requires providing sufficient, portable, onsite equipment and consumables to maintain or restore these functions until they can be accomplished with resources brought from off site. The final phase (Phase 3) requires obtaining sufficient offsite resources to sustain those functions indefinitely.

On August 21, 2012, NEI submitted document NEI 12-06, “Diverse and Flexible Coping Strategies (FLEX) Implementation Guide,” Revision 0 [Reference 5] to the NRC to provide specifications for an industry-developed methodology for the development, implementation, and maintenance of guidance and strategies in response to the Mitigation Strategies order (i.e., Order EA-12-049). On August 29, 2012, the NRC staff issued Japan Lessons-Learned Project Directorate (JLD) Interim Staff Guidance (ISG) JLD-ISG-2012-01, “Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events” [Reference 6], endorsing NEI 12-06, Revision 0, as an acceptable means of meeting the requirements of Order EA-12-049, and published a notice of its availability in the *Federal Register* (77 FR 55230).

In order to address the Phase 3 requirements of Order EA-12-049, the United States nuclear industry collectively selected and contracted with a newly formed industry group called SAFER. SAFER is comprised of a partnership between Pooled Equipment Inventory Company (PEICo) and AREVA, Inc. All United States nuclear power plant licensees have executed a contract with PEICo to utilize SAFER to provide the offsite FLEX equipment needed for Phase 3 of their mitigation strategies response plans. SAFER has established facilities and developed procedures to procure and maintain the needed Phase 3 equipment and deliver it to any United States nuclear power plant in response to a BDBEE.

3.0 TECHNICAL EVALUATION

By letter dated September 11, 2014, NEI submitted the “National SAFER Response Center” white paper [Reference 2]. The white paper describes the organization, equipment, deployment strategies, and response plans of the SAFER program. Staff from the Office of Nuclear Reactor Regulation (NRR), supported by staff from the Office of Nuclear Security and Incident Response (NSIR), reviewed the SAFER program and proof-of-concept demonstrations. Order EA-12-049

requires that power reactor licensees submit to the NRC overall integrated plans (hereafter referred to as the Integrated Plans or OIPs) describing their mitigation strategies addressing the three phases required by the order. The NRC staff has been conducting ongoing audits of all United States nuclear power plant licensees to evaluate their Integrated Plans. Each licensee's Integrated Plan refers to their contractual agreements with SAFER to provide the offsite portable equipment needed to meet the Phase 3 requirements of the order. Due to their management of the industry's pre-existing Pooled Inventory Management (PIM) program (a nuclear industry sponsored, joint inventory storage and maintenance facility for capital spares), Southern Nuclear Operating Company (Southern) provided information related to SAFER and Phase 3 response for NRC staff audit via the Southern Electronic Reading Room (ePortal). In support of the white paper and the NRC staff's review of the NSRCs and the SAFER program, the following information was also provided by SAFER via the Southern ePortal and audited by the NRC staff.

- NSRC Training Plan and other SAFER training materials and documentation
- NSRC Equipment Technical Requirements Document (ETRD)
- Draft SAFER Response Plans (Site-specific plans credited in OIPs)
- Plans for SAFER Proof-of-Concept Demonstrations
- Technical Requirements for Transportation
- Equipment Transportation Report

On May 14, 2014, NRC staff conducted a public meeting at which industry representatives from SAFER and NEI provided an overview and status update of the SAFER program. Additionally, the NRC staff visited the NSRCs on several occasions, conducted audit visits with contracted transportation providers, observed proof-of-concept demonstrations, and observed equipment testing. The staff also conducted several follow-up audit discussions with SAFER management and staff from Southern Company, PEICo, and AREVA to clarify information they provided and to obtain additional information in support of the NRC staff assessment.

3.1 SAFER Deployment Strategy

SAFER established and maintains two diverse and redundant equipment storage facilities identified as the National SAFER Response Centers (NSRCs). These NSRCs are located in Memphis, TN and Phoenix (Tolleson), AZ. The NSRCs contain portable equipment such as portable generators, portable pumps, hoses, and other supporting equipment (as described in the white paper) to be used by licensees to meet Phase 3 requirements of the order. SAFER has established plans, in part through contracts with Federal Express Custom Critical (FedEx Custom Critical or FCC) and commercial heavy-lift helicopter operators, to allow either one of the NSRCs to provide this equipment to any nuclear power plant in the United States. SAFER has also established two redundant SAFER Control Centers (SCCs) in Lynchburg, VA (primary) and Birmingham, AL (alternate) that will be manned and operated to coordinate the SAFER response for any such event.

In reviewing SAFER's plans, NRC staff sought reasonable assurance that SAFER is capable of delivering the Phase 3 equipment within the time needed to support the licensees' Integrated Plans, including delivery to a regional area potentially impacted by the BDBEE. NEI 12-06, Section 12.1 states that "[o]n-site resources will be used to cope with the first two phases of the

casualty for a minimum of the first 24 hours of the event. The site-specific [Extended loss of alternating current power] ELAP analysis will dictate the deployment schedule for off-site equipment. The delivery schedule for the off-site equipment must allow for sufficient margin to meet the deployment times of the off-site equipment.” In order to support the most limiting licensee Integrated Plans, SAFER developed plans and procedures to deliver the first piece(s) of necessary equipment to the affected site within 24 hours of SAFER being notified. In general, sites do not need Phase 3 equipment to be delivered within 24 hours, but the licensees’ SAFER Response Plans are written to support the 24 hour delivery time.

3.1.1 Proof of Concept Demonstrations

The SAFER organization conducted two Proof-of-Concept demonstrations, one in cooperation with the Three Mile Island Nuclear Power Station, Unit 1 (TMI) and one in cooperation with the Surry Power Station, Unit Nos. 1 and 2 (Surry), to demonstrate the communication, coordination, and execution of SAFER’s response plan and deployment strategy. The first demonstration, conducted on July 10, 2014, demonstrated transportation of NSRC equipment by road from the Memphis response center to TMI in Pennsylvania. The second demonstration, conducted on July 17, 2014, simulated transport of NSRC equipment by air from the Phoenix response center to Surry in Virginia. Several NRC staff from NRR, NSIR, and the Regional offices observed these demonstrations from each of the various locations where event response actions were performed or simulated. The NRC staff issued audit plans to the participating licensees for these proof-of-concept demonstrations (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML14183A013 and ML14189A320, respectively). The locations where NRC staff observed included TMI and Surry onsite training facilities (simulated control rooms and Surry’s simulated corporate Emergency Response Center), the Exelon corporate Emergency Operation Facility, the offsite staging areas (defined in the SAFER white paper and specified in each site’s SAFER Response Plan), the Virginia Emergency Operations Center (Richmond, VA), the SAFER Control Center (Lynchburg, VA), and participating NSRCs (Memphis, TN and Phoenix, AZ). The NRC staff reviewed and observed SAFER’s procedures for coordination and communication between the SAFER response teams, plant staff and emergency response personnel, contracted transportation providers, and several state and local officials in order to evaluate their ability to successfully deliver the equipment to an affected site in time to support Phase 3 of its mitigation strategies. The NRC staff provided its observations from the demonstrations in an exit meeting held by conference call with SAFER on July 29, 2014. The most significant observations and their resolution are discussed below.

During the demonstrations, NRC staff noted instances where the SAFER roles and responsibilities were not clear to the licensee. For example, there were cases where it was not clear to the licensee if they were required to provide resources (personnel or equipment) for offloading the SAFER equipment or if SAFER will provide the initial fuel supply for the equipment. In response to this observation, SAFER updated the Roles and Responsibilities table in its SAFER Response Plans to provide further clarification to the licensees. SAFER provided additional information detailing SAFER’s responsibility to offload the equipment. SAFER will provide technicians and has forklift contracts in place to accomplish this task. The sites are responsible for providing all fuel for the Phase 3 equipment.

At the time of the demonstrations, SAFER had not yet completed training for staff that will fill positions at the SCCs, the NSRCs, and the staging areas. NRC staff noted that SAFER

technicians are responsible for conducting a proper turnover of the equipment and supporting site personnel until initial operation is successful after connection, and therefore it is critical that these technicians receive adequate training prior to the NSRCs being declared operational. In response to this NRC observation, SAFER provided their training plan and documentation of position-specific training for the response positions staffed by SAFER and provided information that training plans and records are maintained per AREVA's (or PIM's for non-AREVA personnel) quality assurance program and training program. The NRC staff reviewed this information and determined that the SAFER training plan is acceptable and is sufficient to adequately prepare the SAFER staff to support execution of the SAFER Response Plans and turnover and operation of the equipment provided.

The proof-of-concept demonstrations raised the concern with the NRC staff that more specific information was needed regarding SAFER's plan to obtain helicopter resources, if necessary to deliver the equipment to the site from the offsite staging area. The NRC staff held subsequent audit discussions with SAFER on this topic and obtained additional detailed information regarding the plans. The final plans with regard to helicopter resources, and the NRC staff's conclusion regarding these plans, are discussed further in section 3.1.3 of this safety assessment.

3.1.2 Ground and Fixed Wing Transportation

SAFER has contracted with FCC to provide ground (trucking) and fixed wing aircraft transportation of the NSRC equipment to the affected site(s). On July 22, 2014, NRC staff conducted an audit at FCC headquarters in Uniontown, Ohio to review the FCC processes for supporting SAFER in the transportation of mitigating strategies equipment. FCC provided an overview of their processes, a tour of their facilities, and a description of contingencies (i.e., exigent situations) that FCC has supported in the past. These contingencies included providing or arranging prioritized flights during the closure of airspace by the Federal Aviation Administration (FAA) in the immediate aftermath of the terrorist events of September 11, 2001, as well as ground and air support for Hurricane Katrina recovery in New Orleans. FCC has a track record of obtaining clearance from the FAA for urgent deliveries that would otherwise be precluded by flight restrictions, as was the case immediately after the terrorist events of 2001. During that event, FCC expedited several time-critical air shipments of medical materials using "lifeguard" flight approvals. While "lifeguard" prioritization may not specifically apply to the shipment of NSRC equipment, this history does demonstrate the experience FCC has with working closely with the FAA and other Federal authorities.

FCC has a fleet of over 1,400 vehicles (from cargo vans to tractor trailers and flatbeds) positioned throughout the United States and Canada, and priority access to the FedEx Express air fleet, as well as other transportation alliances of brokered and specialized carriers to provide extensive delivery reach. FCC is divided into a group for surface expediting, a group for air expediting, and a white glove services group with specially trained drivers and specialty equipment for safe transportation of sensitive shipments.

The FCC fleet of vehicles is operated by independent contractors that are owner-operators of the vehicles. FCC provides annual training for the operators and maintains records of their personal information to allow coordination with licensees for security access to United States nuclear power plants, as necessary. The vehicles are equipped with GPS tracking systems and

communications systems that access cellular and satellite data links to allow communication, tasking and monitoring. FCC has a system of alerts to show when the progress made by a truck is not matching the expected progress, based on a comparison of GPS location and the straight-line projected position of a shipment, thereby allowing intervention by an expeditor to correct or compensate for obstacles to delivery.

The NRC staff also reviewed an AREVA report titled “Regional Response Center Project: FedEx Memphis – Trip Report.” This report documented transportation of seven flatbed trailers with equipment from the Memphis NSRC to the Memphis FedEx hub. This was a timed exercise that tested the response center shipping procedures and was used to 1) validate and optimize packaging configuration for loading the SAFER equipment onto a FedEx plane, and 2) verify and streamline the timing sequence and planning assumptions for the SAFER Response Plans. The report provided details of the timed events and described lessons learned from the operation. Most notably, the report documented that it took 9.5 hours from event initiation to load and prepare the plane for departure. With the longest flight time from either NSRC to the farthest approved destination airport, this would result in a total delivery time to the destination airport of 14 hours, 18 minutes – 18 minutes longer than assumed necessary in the SAFER Response Plans. This is the time determined for delivery to the regional airport near the site and does not include movement to the offsite staging area or delivery to the site. NRC staff reviewed corrective actions implemented by SAFER to improve the loading configuration and shoring of equipment in order to reduce equipment loading time. The NRC staff determined, based on the AREVA trip report and corrective actions implemented, that there is reasonable assurance that SAFER and FCC can ship the equipment by aircraft in time to support SAFER’s 24 hour delivery time called for in the NEI 12-06 guidance.

Based on the descriptions of the capabilities of FCC, its operational record in past contingency support, and audit of the trip report described above, the NRC staff concluded that there is reasonable assurance that FCC will be able to provide the logistics and transportation services described in the SAFER Response Plans.

3.1.3 Helicopter Delivery

Delivery plans also include the use of heavy-lift helicopters if a site is inaccessible by ground transportation. These helicopters would be used to deliver the equipment from an offsite staging area, as described in the white paper, to the affected site. The SAFER white paper describes a 3-tiered approach to obtaining helicopters. The NRC staff held several audit discussions with SAFER to gain clarification and obtain additional information regarding helicopter resources.

The first tier of the SAFER plan is established through PEICo contracts with commercial heavy-lift helicopter vendors for “first call out of services.” With this type of contract, the vendors are not obligated to support SAFER’s response, and helicopter availability is dependent on the utilization and deployment location of the vendor’s fleet of helicopters at the time the request is made. For this reason, SAFER has contracted with multiple vendors and has committed to maintain and annually update the list of vendors that can provide the needed capability. The NRC staff questioned SAFER regarding the location of the helicopter vendors, number and operating areas of the helicopters, and the likelihood of availability of the contracted helicopters. SAFER provided additional information regarding the location and fleet sizes of five commercial helicopter vendors, with which they have, or are in the process of executing contracts. The

operating areas of these commercial helicopters would typically be throughout North America and the vendors can not specify the likelihood of availability in advance of an unforeseen event. Additional helicopter vendors (not under contract) may also have helicopters available to support SAFER's response and could be contacted at the time of an event. The contact information for all known capable helicopter vendors is maintained in each site's SAFER Response Plan.

The second tier of the SAFER plan is to request State helicopter resources (National Guard or other) via the site's State emergency response organizations. The SAFER Response Plan specifies that tier 2 actions are the responsibility of the affected site's licensee and are expected to be conducted via existing protocols with State emergency management agencies. Licensees are responsible for having procedures in place for coordination with State emergency response organizations to request the use of State helicopter resources in the event of a BDBEE. Some licensees, who are also represented on the SAFER Steering Committee, have already worked with the State agencies for their sites to update the State's emergency procedures to include the potential request for heavy-lift helicopters. Not all states have heavy-lift helicopter resources available, so tier 2 is not a guaranteed source for helicopter resources.

The third tier of helicopter support is for the site to request Federal helicopter resources. The SAFER Response Plan specifies that tier 3 actions are the responsibility of the affected site's licensee. The licensee would request Federal resources via the NRC's Operations Center. To confirm protocols are in place for requesting Federal helicopter resources, the NRC staff attended a meeting on September 9, 2014, with representatives from NEI, SAFER, the Federal Emergency Management Agency (FEMA), and the Department of Defense (DOD). In emergency cases where the Stafford Act applies, FEMA's National Response Framework would provide a path to request Federal military assets. It is expected that State emergency management agencies would contact FEMA's Regional Response Coordination Center and request Federal (DOD) resources. The NRC can also request Federal military resources directly to DOD or through FEMA's National Response Coordination Center.

Also on September 9, 2014, NRC staff from NRR and NSIR attended a meeting with representatives from NEI, SAFER, the FAA, the Department of Energy (DOE), the National Nuclear Security Administration (NNSA), and one of the SAFER contracted helicopter vendors (Croman Corporation). The purpose of the meeting was for SAFER to inform FAA staff of SAFER plans for delivery of Phase 3 equipment, and to discuss the use and pre-approval of congested area flight plans for helicopter operations. Croman Corporation has been contracted by SAFER to develop congested area flight plans for all operating power reactor sites to allow for expedited approval by the FAA in the event of a BDBEE that necessitates delivery of NSRC equipment via helicopter.

In summary, while no single helicopter vendor, or any one tier of the SAFER plan for requesting helicopter support is individually assured of providing helicopter resources to support 24-hour delivery time of SAFER equipment, SAFER has developed a "defense-in-depth" approach of having multiple vendors and multiple tiers. Also, in the case of a large-scale event with the assumed impact of a BDBEE, it is reasonable to expect that State and/or Federal resources will be made available to the maximum extent possible to support maintenance or restoration of critical safety functions of an impacted nuclear power reactor. Therefore, the NRC staff finds that the SAFER plan provides reasonable assurance that capable helicopter resources will be

available, if needed, to deliver NSRC equipment to the site(s) in support of licensees' response plans for meeting Phase 3 of Order EA-12-049.

3.2 NEI 12-06 Evaluation

NEI 12-06, Revision 0, was endorsed by the NRC staff as an acceptable means of meeting the requirements of Order EA-12-049. Section 12 of NEI 12-06 discusses guidelines related to off-site resources used to support the third phase of a plant's response to a BDBEE. Section 12.2 states that "each site will establish a means to ensure the necessary resources will be available from off-site" and lists 10 considerations that should be addressed in establishing this capability. The NRC staff evaluated the NSRCs and the SAFER program, plans, and procedures against these 10 considerations from NEI 12-06.

The NEI 12-06 Section 12.2 considerations and the NRC staff's assessment of SAFER's (the NSRC's) conformance to these guidelines is documented below.

(1) A capability to obtain equipment and commodities to sustain and backup the site's coping strategies.

The white paper provides a programmatic description of SAFER's established plans and contracts with transportation providers to deliver the NSRC equipment to an affected site. It also describes the contractual agreements that all licensees relying on SAFER and the NSRCs have executed with PEICo and how the NSRCs are managed organizationally. The NRC staff held several audit discussions with SAFER staff to obtain additional information and clarify SAFER's plans for obtaining heavy-lift helicopter resources, if needed. The NRC staff also sought clarification regarding the quantities of "non-generic" NSRC equipment to be maintained (defined as equipment required by fewer than 70 percent of the total participating units).

In addition to the information provided, the NRC staff observed the proof-of-concept exercises and held several subsequent audit discussions regarding transportation providers and plans, as previously described. Based on this information, the NRC staff finds that the plans provide reasonable assurance that SAFER will be able to deliver appropriate quantities of NSRC equipment to affected sites if needed.

The staff audited the AREVA, Inc. document "National SAFER Response Center Equipment Technical Requirements," document (Engineering Information Record Document No. 51 - 9199717, hereafter referred to as the ETRD), revisions 8 - 12. The ETRD includes the design criteria for the 480 volt (V) and 4.16 kilovolt (kV) turbine generators. During its review, the NRC staff requested that the SAFER group address concerns with the capability of 480V and 4.16kV turbine generators to start during extreme high and low temperatures. In response to the staff's questions, the SAFER group stated that each turbine generator unit is designed to start between -65 degrees Fahrenheit (°F) and 135 degrees °F. Based on this information, the NRC staff finds that the 480 V and 4.16kV turbine generators are adequately designed to operate following an extreme temperature event.

As part of the audit, the NRC staff reviewed the capability to synchronize four 4.16kV turbine generators to obtain additional capacity to support recovery actions at some reactor sites. The staff reviewed test data provided by SAFER. On August 28, 2014, the NRC staff also visited the turbine generator manufacturer's (Turbine Marine's) facility to witness testing of the 4.16 kV

turbine generators and found that the SAFER group has demonstrated that up to four 4.16 kV turbine generators can be synchronized and loads connected using a mobile electrical distribution center. Based on its review, the NRC staff determined that the operational capability and capacity of the 480 V and 4.16kV turbine generators (including synchronization of up to four 4.16kV turbine generators operated in parallel) is adequate to support the expected demands following a BDBEE.

In response to a staff question regarding cable submergence, the SAFER group noted that cables may be exposed to wet conditions with some submergence, but not at cable connection points. Through discussions with the SAFER group, the staff confirmed that these cables are not qualified for submergence, but are designed to function in wet conditions, including brief periods of submergence due to heavy rains or snow melt. The staff finds that the design of the cables is adequate to perform their function under wet conditions.

The NRC staff also reviewed the pumps and other associated equipment that will be provided by the NSRCs to ensure that they are adequately designed and maintained. Specifically, the NRC staff reviewed the technical details for the High Pressure / Low Flow (HP/LF) Pump, Steam Generator/Reactor Pressure Vessel (SG/RPV) Makeup Pump, Low Pressure / Medium Flow (LP/MF) Pump, Low Pressure / High Flow Pump (LP/HF), diesel fuel oil supplies and transfer capabilities, and the mechanical connections and associated hoses.

The NRC staff reviewed the ETRD with regard to the design criteria for the HP/LF Pump, SG/RPV Makeup Pump, LP/MF Pump, LP/HF Pump, and the mechanical connections and associated hoses. During its audit, the NRC staff sought clarification from SAFER regarding the ability of the HP/LF pump to take suction from a salt or brackish water source. This pump is constructed of materials suitable for deionized or borated water sources. SAFER stated, and AREVA updated the ETRD (in Revision 11) to notify licensees, that "It is not intended for this pump to be used with salt/brackish water suction source. The unit will pump saltwater and suction strainers are provided[;] however, saltwater has not been evaluated to determine if any performance degradation will occur over time." By inclusion of this note, licensees are informed of this potential limitation on the use of this equipment and can plan for the limitation in the site-specific Integrated Plans.

The NRC staff also sought clarification from SAFER regarding the ability of the SG/RPV pump to take suction from a pressurized source. Based on its audits of site-specific Integrated Plans, the staff notes that several plans call for connecting pumps in series. AREVA confirmed that all pumps can take suction from a pressurized source, and AREVA updated the ETRD to reflect this.

During its audit, the NRC staff sought clarification from SAFER regarding diesel fuel oil supplies for Phase 3 equipment. Specifically, the staff sought clarification on who would be responsible for providing fuel for Phase 3 equipment and the ability of the Phase 3 equipment to run on a variety of fuel oil sulfur levels (e.g., low-sulfur versus ultra-low-sulfur). SAFER stated that the sites are responsible for all fueling of Phase 2 and Phase 3 equipment. However, if the site is not accessible by land, SAFER will provide a 500-gallon fuel bladder that can be transported by helicopter with fuel. In the case where this fuel transfer would be needed, SAFER would continue to fly fuel into the site from the SAFER offsite staging area as long as needed. In addition, the SAFER group stated that all of the equipment, except for the lighting towers, will be

able to run on any available diesel fuel oil. AREVA updated the ETRD, in the description of "Mobile Lighting Towers" to state that the lighting tower diesel generators use ultra-low-sulfur fuel per manufacturer recommendation. The lighting towers will require ultra-low-sulfur diesel fuel oil. By inclusion of this note, licensees are informed of this potential limitation on the use of this equipment and can plan for this limitation in site-specific Integrated Plans.

Based on the information stated above, the NRC staff finds that the NSRCs and the SAFER plans and procedures conform to the guidance described by Consideration 1 of NEI 12-06, Section 12.2.

2) Off-site equipment procurement, maintenance, testing, calibration, storage, and control.

Consideration (2) of NEI 12-06, Section 12.2 pertains to procurement, maintenance, testing, calibration, storage, and control of the offsite (NSRC) equipment. As stated in the white paper, "the Program Manager Organization (PMO) acts as an agent of PEI Co for designated activities. The PMO manages the nuclear industry sponsored, joint inventory storage and maintenance facility for capital spares (referred to collectively as Pooled Inventory Management or "PIM")." The PMO is "responsible for developing warehouse storage and maintenance procedures, and monitoring and directing contractor support activities to ensure that detailed storage and maintenance requirements are implemented." The PMO's maintenance instructions were developed in accordance with the Electric Power Research Institute (EPRI) template for Phase 2 and Phase 3 equipment and / or vendor recommendations, as applicable. While the NSRC equipment is not required per Order EA-12-049 to be maintained under Title 10 of the *Code of Federal Regulations* Part 50, Appendix B approved quality assurance program, PIM maintains the NSRC equipment under PEI Co's existing Appendix B quality assurance program.

The NRC staff reviewed the electrical equipment that will be maintained at the NSRCs to ensure that they are adequately designed and maintained to support the offsite resource portion of each nuclear power plant's mitigating strategy plan as required by NRC Order EA-12-049. Specifically, the staff reviewed the technical details for the turbine generators, cables, and batteries (which are supporting components to certain diesel-powered equipment).

The staff reviewed the environmental storage conditions of each NSRC, and determined that the equipment will be stored in an enclosed building that was designed and constructed to meet ANSI N45.2.2/NQA-1 Level B requirements. The SAFER organization noted that cooling (Phoenix only) and heating is to be installed to meet the Level B storage requirements. Based on this information, the staff finds that the equipment will be adequately stored to ensure that it will be available when needed.

The staff also reviewed the general testing and maintenance plan for the electrical equipment (i.e., 480 V and 4.16 kV turbine generators, cables, and batteries) and found that the electrical equipment will be routinely tested and maintained in accordance with vendor recommendations or industry consensus standards/documents to ensure the equipment will remain available when called upon. This includes establishing test acceptance criteria for each electrical component. Furthermore, SAFER stated that age and temperature sensitive components will be entered into the PIM shelf life program, where they will be evaluated, tracked and replaced. SAFER noted that it will perform a temperature study at each storage facility to establish the high, low, and

average temperatures for shelf life calculations. Based on this information, the staff finds that the equipment will be adequately monitored and maintained to ensure that they will be available when needed.

With regard to the HP/LF Pump, SG/RPV Makeup Pump, LP/MF Pump, LP/HF, and associated hoses, the staff reviewed the environmental storage conditions, and determined that the equipment will be stored in a building that will protect the equipment from weather-related degradation mechanisms, such as rain and abrasive winds. Additionally, each storage building's temperature will be controlled and/or monitored to ensure that the equipment is adequately maintained with regard to storage temperature conditions. The staff also reviewed the general testing and maintenance plan for this equipment and found that the equipment will be routinely tested and maintained in accordance with vendor recommendations or industry consensus standards to ensure the equipment will remain available if needed.

Based on the above, the NRC staff finds that the NSRCs and the SAFER plans and procedures conform to the guidance described by Consideration 2 of NEI 12-06, Section 12.2.

3) A provision to inspect and audit the contractual agreements to reasonably assure the capabilities to deploy the FLEX strategies including unannounced random inspections by the Nuclear Regulatory Commission.

The white paper describes the contractual agreements between the licensees and PEICo and between SAFER and the transportation vendors with regard to stipulations for unannounced random inspections and independent audits. This includes details regarding a required internal annual audit by PEICo of the PMO's activities as well as triennial audits by a Nuclear Procurement Issues Committee (NUPIC) team comprised of utility members. The SAFER program and NSRCs are subject to future oversight by the NRC.

Based on review of the information provided in the SAFER white paper and previous audit discussions, the NRC staff finds that the SAFER program conforms to the guidance described by Consideration 3 of NEI 12-06, Section 12.2.

4) Provisions to ensure that no single external event will preclude the capability to supply the needed resources to the plant site.

As previously described, the SAFER plan includes two redundant NSRCs and two redundant SCCs in diverse locations to address this consideration. The white paper also describes the formation of an equipment committee that SAFER used to determine the needed capabilities and quantities of equipment to be maintained at the NSRCs. SAFER reviewed the natural hazards considered per NEI 12-06 and divided all of the United States nuclear sites into regional groups for consideration of the applicable hazards. Based on this regional assessment of sites and the likelihood of applicable hazards within those regions, SAFER determined the maximum number of reactor units likely to need support from the NSRCs due to a single BDBEE is four units. The NRC staff reviewed these regional groupings and agrees that it is reasonable to expect the NSRC's would need to support a maximum of four reactor units simultaneously. The white paper describes how the quantities of SAFER's "generic equipment" (defined as that equipment determined by the equipment committee to be needed by at least 70 percent of the participating units) are adequate to support up to four units simultaneously from each NSRC. Each NSRC maintains five full sets of generic equipment to allow for one set of

equipment to be out of service for maintenance and for the possibility that one NSRC will be unable to ship its equipment.

The ETRD details the specific quantities of all generic and “non-generic equipment” to be maintained at the NSRCs. The NRC staff sought clarification from SAFER regarding how the quantities of non-generic equipment were determined to support multiple sites. During audit discussions, SAFER stated that non-generic equipment each has its own equipment committee which determined the quantities needed to support the plants’ needs. In some cases, such as the 4.16kV generators, the non-generic units are identical to and are used in addition to the generic units to provide the total quantity of units needed.

SAFER updated the ETRD with a table to more specifically show the quantities of non-generic equipment that are needed to support sites’ BDBEE coping strategies. Additional quantities are also maintained by the NSRCs for additional units that would use the equipment as “defense in depth,” which SAFER defines in this case as “equipment that is not needed for a given plant’s coping strategy, but which is available to facilitate long term stabilization/recovery of the plant.” A review of ETRD Revision 12 indicates that SAFER can supply the non-generic equipment required for coping to two sites from either NSRC.

Based on the above, the NRC staff finds that the NSRCs and the SAFER plans and procedures conform to the guidance described by Consideration 4 of NEI 12-06, Section 12.2.

5) Provisions to ensure that the off-site capability can be maintained for the life of the plant.

SAFER has included clauses in the participation contracts between PEICo and the licensees, and in its contracts with the transportation providers to continually renew. PIM has been managing the nuclear industry’s shared equipment inventory program for over 30 years, and PEICo, AREVA, and FedEx CC are all companies with long histories and proven capabilities in their fields.

Based on the above, the NRC staff finds that the SAFER program conforms to the guidance described by Consideration 5 of NEI 12-06, Section 12.2.

6) Provisions to revise the required supplied equipment due to changes in the FLEX strategies or plant equipment or equipment obsolescence.

SAFER equipment committees will be used to facilitate procurement of additional equipment or replacement of obsolete equipment. The PMO’s configuration management program includes the periodic review of the SAFER Response Plans, which list the equipment needed by each site and will be updated with any changes. The white paper also describes the process for making changes to equipment participation or equipment functionality. The NRC staff finds that the SAFER organization and the PMO have sufficient procedures in place to revise the required supplied equipment due to changes in the FLEX strategies or plant equipment or equipment obsolescence. Therefore, the NRC staff finds that the NSRCs and the SAFER plans and procedures conform to the guidance described by Consideration 6 of NEI 12-06, Section 12.2.

7) The appropriate standard mechanical and electrical connections need to be specified.

Licensee participation in the SAFER equipment committee led to the development and approval of industry standard connections used for both Phase 2 and Phase 3 equipment, which are documented in the ETRD. Therefore, the NRC staff finds that the NSRCs and the SAFER plans and procedures conform to the guidance described by Consideration 7 of NEI 12-06, Section 12.2.

8) Provisions to ensure that the periodic maintenance, periodic maintenance schedule, testing, and calibration of off-site equipment are comparable/consistent with that of similar on-site FLEX equipment.

The SAFER equipment is maintained under the PEICo maintenance, testing, and calibration program. The maintenance instructions for this program were developed in accordance with EPRI maintenance plan templates, which are used throughout the industry. The maintenance instructions also took into account vendor recommendations. The white paper documents additional details with regard to provisions of the maintenance program. The NRC staff reviewed this information and also sought clarification from SAFER regarding the maintenance, testing and acceptance criteria of the FLEX generators. The NRC staff finds that the PEICo program for the periodic maintenance, testing, and calibration of the SAFER equipment is comparable or consistent with that of similar on-site FLEX equipment. Therefore, the NRC staff finds that the NSRCs and the SAFER plans and procedures conform to the guidance described by Consideration 8 of NEI 12-06, Section 12.2.

9) Provisions to ensure that equipment determined to be unavailable/non-operational during maintenance or testing is either restored to operational status or replaced with appropriate alternative equipment within 90 days.

For the generic SAFER equipment, as previously defined, SAFER maintains one additional unit or set of units at each NSRC beyond the minimum equipment needed to support four reactor units at one time. This allows for one unit to be out of service for maintenance at any time. The SAFER program uses this additional equipment to minimize the risk of required equipment being out of service for greater than 90 days. The white paper also describes the PEICo procedures that are in place for tracking equipment out of service, handling nonconformance reports, informing the SAFER participants, and developing a recovery plan, which will include replacing the equipment or making equivalent equipment available within 90 days. These procedures apply to the generic and the non-generic equipment. Based on this information, the NRC staff finds that the NSRCs and the SAFER plans and procedures conform to the guidance described by Consideration 9 of NEI 12-06, Section 12.2.

10) Provision to ensure that reasonable supplies of spare parts for the off-site equipment are readily available if needed. The intent of this provision is to reduce the likelihood of extended equipment maintenance (requiring in excess of 90 days for returning the equipment to operational status).

The white paper states that PEICo will maintain and track an inventory of spare parts in accordance with vendor recommendations for any critical spare parts that are not readily available. The NRC staff finds that the NSRCs and the SAFER plans and procedures conform to the guidance described by Consideration 10 of NEI 12-06, Section 12.2.

3.3 NSRC Operational Status

SAFER has developed an operational checklist titled, "National SAFER Response Centers (NSRC) Checklist to Declare Operational." SAFER will complete this NSRC operational checklist for each reactor site. The checklist verifies several criteria to confirm that the needed equipment is available and ready at the NSRCs and that the procedures and training are in place and complete to support execution of the site's SAFER Response Plan. With the completion of the operational checklist, SAFER will declare the NSRCs operational for that site. This will support the licensee's declaration that they meet the offsite support requirements of Order EA-12-049. The checklist will be completed by SAFER staff, verified by a SAFER manager, and maintained in PEICo document control. The NRC staff reviewed this checklist as a part of the audit and finds that the NSRC checklist is a comprehensive list of criteria needed to declare the NSRCs operational and available to support a licensee's declaration of compliance with the order.

4.0 CONCLUSION

The NRC staff reviewed the SAFER program description provided in the NEI white paper and additional information via audit, and observed proof-of-concept exercises and equipment testing, as described above. SAFER has procured equipment, implemented appropriate processes to maintain the equipment, and developed plans to deliver the equipment needed to support site responses to BDBEEs, consistent with NEI 12-06 guidance, as endorsed by JLD-ISG-2012-01. Therefore, the NRC staff concludes that once the NSRCs are declared operational for each site in accordance with the NSRC checklist described above, those licensees can reference the SAFER program and implement their SAFER Response Plans for plant-specific compliance with the final phase requirements of Order EA-12-049.

5.0 REFERENCES

1. Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," March 12, 2012 (ADAMS Package Accession No. ML12054A736)
2. Letter from J. Pollock, NEI, "National SAFER Response Center Operational Status," dated September 11, 2014 (ADAMS Package Accession No. ML14259A221)
3. SECY-12-0025, "Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," February 17, 2012 (ADAMS Package Accession No. ML12039A103)
4. SRM-SECY-12-0025, "Staff Requirements – SECY-12-0025 - Proposed Orders and Requests for Information in Response to Lessons Learned from Japan's March 11, 2011, Great Tohoku Earthquake and Tsunami," March 9, 2012 (ADAMS Accession No. ML120690347)
5. Nuclear Energy Institute document NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, August 21, 2012 (ADAMS Accession No. ML12242A378)

6. JLD-ISG-2012-01, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," August 29, 2012 (ADAMS Accession No. ML12229A174)

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responses to BDBEEs, consistent with NEI 12-06 guidance. Therefore, the NRC staff concludes that licensees can reference the SAFER program and implement their SAFER Response Plans to meet the Phase 3 requirements of Order EA-12-049.

If you have any questions concerning this staff assessment, please contact Steve Philpott of my staff at (301) 415-2365, or via email at Stephen.Philpott@nrc.gov.

Sincerely,

/RA/

Jack R. Davis, Director
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Office of Nuclear Reactor Regulation

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