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OCAN071402

July 18, 2014

U. S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

Subject: Reply to Notice of Violation; EA-14-008  
Arkansas Nuclear One – Units 1 and 2  
Docket Nos. 50-313 and 50-368  
License Nos. DPR-51 and NPF-6

Reference(s):

1. Entergy License Event Report dated May 24, 2013 (LER 50-313/2013-001-00 (OCAN051303))
2. Entergy letter dated July 31, 2013, "Augmented Inspection Team Information Request" (OCAN071303)
3. Entergy Licensee Event Report dated August 22, 2013 (LER 50-313/2013-001-01 (OCAN081301))
4. NRC letter dated March 24, 2014, "AIT Follow-up", Inspection Report 05000313/2013012 and 05000368/2013012
5. NRC letter dated June 23, 2014, "Final Significance Determination of Two Yellow Findings and Notice of Violation", NRC Inspection Report 05000313/2014008 and 05000368/2014008

Dear Sir or Madam:

In Reference 5, the Nuclear Regulatory Commission (NRC) transmitted two Yellow Findings and a Notice of Violation to Entergy Operations, Inc. (Entergy). The Yellow Findings involved the approval of a vendor-design for the temporary hoisting assembly to lift an approximately 500 ton stator assembly that was "not supported by detailed drawings, specifications, evaluations, and/or certifications." Additionally, load deficiencies in a vendor calculation and an incorrectly sized component of the temporary hoisting assembly were not identified prior to the lift. The vendor-engineered temporary hoisting assembly was not designed for at least 125 percent of the projected hook load nor was the temporary hoisting assembly load tested in all configurations for which it would be used.

Entergy performed a root cause analysis to determine the causes of the temporary hoisting assembly failure and developed and implemented associated corrective actions.

Pursuant to 10 CFR 2.201 Entergy's response to the Notice of Violation is provided in the attachment to this letter.

Entergy recognizes the importance of maintaining both industrial and nuclear safety and controlling its contractors, and recognizes that it shoulders ultimate responsibility for NRC regulated activities. Corrective actions to address the causes have been completed or are on-going. Entergy is currently in compliance with applicable NRC Regulations and the Entergy Material Handling Program.

Regulatory Commitments are contained in Attachment 2 of this submittal.

Should you have questions or comments, please contact Stephenie Pyle at 479-858-4704.

Sincerely,

**ORIGINAL SIGNED BY JEREMY BROWNING**

JGB/rmc

Attachments: 1. Response to Notice of Violation EA-14-008  
2. Regulatory Commitments

cc: Mr. Marc L. Dapas  
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U. S. Nuclear Regulatory Commission  
Region IV  
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NRC Senior Resident Inspector  
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**Attachment 1 to**

**OCAN071402**

**Response to Notice of Violation EA-14-008**

## NOTICE OF VIOLATION

Entergy Operations, Inc.  
Arkansas Nuclear One, Units 1 and 2

Dockets: 05-313:05-368  
Licenses: DRP-51, NPF-6  
EA-14-008

10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings," states, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings.

Quality Procedure EN-MA-119, "Material Handling Program," Section 5.2[7], "Temporary Hoisting Assemblies," Step (a) states, in part, that vendor supplied temporary overhead cranes or supports, winch-driven hoisting or swing equipment, and other assemblies are required to be designed or approved by engineering support personnel. The design is required to be supported by detailed drawings, specifications, evaluations, and/or certifications.

Quality Procedure EN-MA-119, "Material Handling Program," Section 5.2[7], "Temporary Hoisting Assemblies," Step (b) states, in part, that the assembly shall be designed for at least 125 percent of the projected hook load and should be load tested and held for at least 5 minutes at 125 percent of the actual load rating before initial use. The assembly shall be load tested in all configurations for which it will be used.

Contrary to the above, on March 31, 2013, the licensee did not accomplish the Unit 1 main turbine generator stator lift and move, an activity affecting quality, as prescribed by documented instructions and procedures. Specifically:

- A. The licensee approved a design for the temporary hoisting assembly that was not supported by detailed drawings, specifications, evaluations, and/or certifications. The licensee failed to identify the load deficiencies in vendor Calculation 27619-C 1, "Heavy Lift Gantry Calculation," and the incorrectly sized component in the north tower structure of the temporary hoisting assembly. In addition, the temporary hoisting assembly was not designed for at least 125 percent of the projected hook load.
- B. The licensee failed to perform a load test in all configurations for which the temporary hoisting assembly would be used.

As a result, on March 31, 2013, while lifting and transferring the Unit 1 main turbine generator stator, the temporary overhead crane collapsed causing the 525-ton stator to fall on and extensively damage portions of the plant, affecting safety-related equipment.

## Reply to a Notice of Violation; EA-14-008

Entergy Operations, Inc. (Entergy) does not contest the violations.

Entergy expended considerable resources to perform a root cause investigation into the failure of the temporary lift assembly which resulted in one fatality, injuries to personnel and damage to equipment and portions of the turbine building. The root cause team consisted of outside expertise in industrial safety and structural failure analysis in addition to fleet resources and Arkansas Nuclear One (ANO) members. This team identified the root cause of the failure of the temporary lift assembly to be an inadequate design by the sub-contractor hired to perform the special heavy lift and a failure on the part of this sub-contractor to comply with Occupational Health and Safety Administration (OSHA) regulations requiring the prior load testing of the special lift assembly. The first contributing cause was inaccurate representation by the sub-contractor and the primary contractor that the temporary lift assembly had been used at other electric power stations to lift components that exceeded the anticipated weight of the ANO Unit-1 stator. A second contributing cause was the failure of the primary contractor to provide adequate oversight of the sub-contractor. The third and fourth contributing causes identified by the root cause team capture the violation cited by the Nuclear Regulatory Commission (NRC) and identify that Entergy's procedure governing the use of special lift assemblies lacked clear guidance regarding independent reviews of special lift equipment and that the individuals involved with these reviews lacked sufficient knowledge of OSHA and American Society of Mechanical Engineers (ASME) requirements as they apply to the use of special lift assemblies. Those portions of the root cause report dealing with the third and fourth contributing causes were used to respond to the violation below.

It should be noted the violation states that with the collapse of the temporary lift assembly and the drop of the stator that safety-related equipment was affected. No safety-related components were damaged by the crane collapse or the collateral damage. Non safety-related ties to offsite power and the station's alternate alternating current (AC) emergency diesel generator were damaged; however, all safety-related equipment required to operate to mitigate the damage caused by the stator drop performed as designed.

### (1) The reason for the violation

EN-MA-119, "Material Handling Program", Section 5.2(7) addresses "Temporary Hoisting Assemblies." Revision 12 to this procedure was in effect at the time when discussions were taking place between supplemental Project Management personnel and contract and sub-contract personnel related to load testing. Contained in Step 5.2[7](a) is the requirement for vendor supplied temporary overhead cranes or supports and other assemblies to be designed or approved by Engineering Support Personnel (ESP). Step 5.2[7](b) requires temporary hoisting assemblies be designed for at least 125 percent of the projected hook load and should be load tested and held for at least five minutes at 125 percent of the actual load rating before initial use. The assembly shall be load tested in all configurations for which it will be used. This section of the procedure is modified by a NOTE which states:

*These are general requirements for temporary hoisting assemblies typically used at Entergy sites. Specially designed lifting devices, for specific applications, may be designed and tested to other approved standards.*

This NOTE was placed in Section 5.2[7] in order to allow specially designed lifting devices used for specific applications to be designed and tested to other approved standards. The NOTE does not refer to the References in Section 2.0 or specifically identify other approved standards that may be acceptable, or the process by which the user determines and obtains the necessary review and approval of an alternate standard.

Per EN-AD-101-1, "EMM Procedure Writer Manual", Note Statements apply to the step/paragraph/section directly following the note. The NOTE to Section 5.2[7] of EN-MA-119 follows the heading in Step 5.2[7] and is worded such that it appears to apply to the section in its entirety.

With regard to the ANO Stator Project, in the course of addressing EN-MA-119, Section 5.2[7], primary contractor and sub-contractor personnel did not identify any specific regulation, code or standard as the other "approved standard" to which the temporary lifting assembly would be designed and tested. Neither did they demonstrate satisfaction to some specific standard. Rather, the sub-contractor's design engineer insisted to Entergy supplemental support personnel that they were not required to load test their equipment, had never load tested it and would not be load testing it in advance of the ANO lift. The primary contractor had an open action to respond to Entergy's request related to documentation of a load test. Ultimately, the primary contractor closed their open action by delivery of the February 8, 2013, designer's stamped professional engineer (PE) certification citing the design basis for the assembly, prior use of the components and certified safe lifting capacity of the entire temporary lifting assembly.

The sub-contractor's February 8, 2013, stamped PE certification inaccurately stated that "the hoist assembly has been used at other electric power stations to lift components that exceed the anticipated weight of the unit 1 stator." Had this statement been accurate, acceptance by prior use may have been consistent with industry standards (subject to availability of test and maintenance records, etc.) and precluded the need for load testing. The sub-contractor's inaccurate representation of acceptance by prior use as a basis for substituting the need for load testing is considered a contributing cause.

ANO enhanced its Stator Project organization with supplemental personnel. It included a Field Implementing Supervisor (FIS) familiar with heavy lifting operations, an FIS familiar with rigging, and a Project Civil Engineer familiar with use of ANO's installed gantry cranes. None of these individuals had experience specific to application of OSHA or ASME NQA-1 requirements as they relate to temporary special purpose heavy lifting assemblies as provided by the sub-contractor in this application. These supplemental personnel appear to have accepted the inaccurate representations by the sub-contractor's purported expert without sufficiently rigorous independent review to preclude the event.

The sub-contractor calculations and supporting drawings for the temporary lift assembly were reviewed by the supplemental Project Civil Engineer as input to his floor loading calculation. This individual stated that he performed a "reasonableness review" of the sub-contractor's calculation as part of this effort to extract needed data from the calculation for input into a floor loading calculation that supported placement of the sub-contractor's equipment in the ANO Unit-

1 turbine building. Additionally, the primary contractor was responsible for providing oversight of the sub-contractor's work and, as recorded on March 12, 2013, in an e-mail, provided indication that the primary contractor had reviewed the sub-contractor's supporting calculation in order to respond to Entergy's request that they identify the two lowest margin components in their sub-contractor's heavy lifting assembly. While these reviews were performed, they were not performed with the level of rigor or formality implied by Step 5.2[7](a). The root cause team found no record of a specific ESP review and approval, as such, of the sub-contractor's temporary assembly design.

It appears the placement of the NOTE in advance of Step 5.2[7](a) was interpreted by ANO Stator Project supplemental personnel to provide an acceptable alternative to compliance with prescriptive requirements for ESP review and 125% load testing in favor of another approved standard. The root cause investigation did not find evidence that supplemental support personnel interacting with the contractor and sub-contractor on this issue considered elevating for clarification any question or concern regarding compliance with the requirements of Step 5.2[7]. The lack of clear guidance in EN-MA-119 and knowledge of OSHA and ASME requirements as they apply to temporary lift assemblies by the project team was determined to be the reason for the violations implicated for Entergy in the Notice of Violation.

As noted in Reference 4 above, the NRC expressed a concern that the ANO root cause evaluation did not sufficiently address the control of contractors related to this event. Entergy is performing a fleet wide analysis of adverse trends in technical errors and risk management (as related to control of contractors) that has resulted in identified consequential organizational and operational impacts. That analysis includes the ANO stator event. This action is a commitment noted in Section 3 below.

(2) The corrective steps that have been taken and the results achieved

EN-MA-119, *Material Handling Program*, Section 5.2[7] has been revised to remove the NOTE and require a documented engineering response be developed, if not previously performed, to evaluate critical lifts if using:

- I. Any specially designed temporary lifting device, or
- II. Any lifting device that cannot be load tested per EN-MA-119 criteria, or
- III. Any lifting device without a certified load rating name plate rating affixed to it

The engineering response includes the following:

- An owner review in accordance with EN-DC-149, "Acceptance of Vendor Documents", documenting the structural acceptance and testing of the assembly
- Verification of a third party independent review of vendor calculations
- Verification of appropriate code application including application of appropriate safety factors
- Verification of 3D finite element analysis modeling performed if a load test > 125% of the projected hook load is not performed
- Verification of Load Testing
- Load and Functional performance
- Specification of additional safety factors when load testing is not possible
- Examination of critical welds post load test
- Installation verification
- Establishment of an exclusion zone considering the failure of the lift assembly and worst case load and discussion of the path to exit the exclusion area in an emergent condition

- Identification of Plant Equipment that could be damaged due to the lift assembly failure

The guidance in Section 4.0[8](f) of EN-DC-114, "Project Management", was revised to include in the consideration of project team composition experience necessary to assess adequacy of associated decisions related to high consequence evolutions. The standards for establishing vendor oversight plans were reinforced to the Strategic Capital Project Managers. Additionally, a vendor oversight "What It Looks Like" (WILL) sheet was developed for use during one cycle period to monitor and provide feedback to ensure Project Managers are implementing the vendor oversight process.

(3) The corrective steps that will be taken

Entergy is performing a fleet wide common cause analysis examining higher consequence conditions (category A and B Higher Tier conditions) that have occurred in the last two years associated with contractor performed work. The review and recommendations for corrective actions will be completed during the third quarter of 2014.

Although not specifically in response to this violation, ANO is performing an additional common cause analysis examining several conditions that occurred in 2013-2014 including the stator drop event to identify common causal factors. Corrective actions will be developed from this effort designed to further reduce the likelihood of a similar event from occurring in the future.

(4) The date when full compliance will be achieved

Full compliance was achieved when the revisions to EN-MA-119 and EN-DC-114 were effective on September 29, 2013, and November 21, 2013, respectively.

**Attachment 2 to**  
**OCAN071402**  
**Regulatory Commitments**

### List of Regulatory Commitments

The following table identifies those actions committed to by Entergy in this document. Any other statements in this submittal are provided for information purposes and are not considered to be regulatory commitments.

COMMITMENT	TYPE (Check One)		SCHEDULED COMPLETION DATE (If Required)
	ONE TIME ACTION	CONTINUING COMPLIANCE	
Entergy is performing a fleet wide common cause analysis examining higher consequence conditions (category A and B Higher Tier conditions) that have occurred in the last two years associated with contractor performed work.	√		Third Quarter 2014