From: "BENNETT, STEVE A" <SBENNE2@entergy.com>
To: Tom Alexion <twa@nrc.gov>
Date: 3/14/03 1:43PM
Subject: Draft Response to NRR RAI on ANO L-3 Crane

Tom,

Attached is the draft response to the NRR questions on the spent fuel crane. There is nothing in this draft that is proprietary and is acceptable to be placed on the docket.

steve bennett

DRAFT

0CAN030303

March 19, 2003

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

SUBJECT: Arkansas Nuclear One, Units 1 & 2
Docket Nos. 50-313 and 50-368
Response to NRC Request for Additional Information on Handling Heavy Loads for Arkansas Nuclear One's Spent Fuel Crane

REFERENCE:

1 Entergy letter dated February 24, 2003, *Proposed License Amendment for Increase in Handling Heavy Loads for Arkansas Nuclear One's Spent Fuel Crane* (0CAN020307)

Dear Sir or Madam:

As discussed in Reference 1, Entergy Operations, Inc. (Entergy) requested NRC approval of a proposed license amendment for Arkansas Nuclear One (ANO), Units 1 and 2 for the spent fuel crane (L-3 crane) for movement of loads up to the new rated capability of the single failure proof crane which is 130 tons. Entergy requested approval of this amendment by March 31, 2003, on an exigent basis in accordance with 10CFR50.91, paragraph (a)(6).

NRC review of the proposed amendment has resulted in requests for additional information (RAI) from the Mechanical and Civil Engineering Branch and the Plant Systems Branch. The RAIs were discussed with the NRC Staff on March 12, 2003. Attachment 1 provides the Entergy response for the RAIs.

In addition, a subsequent review of Reference 1 by Entergy, revealed that statements were made regarding heavy loads being restricted from being moved over the spent fuel pools in accordance with ANO technical specifications. Even though the spent fuel pool restrictions are in the ANO-2 technical specification, the ANO-1 restrictions have been relocated to the ANO-1 Technical Requirements Manual. However, the intent of the ANO-1 restriction is unchanged by its relocation to the Technical Requirements Manual.

Two commitments are being made as a result of our response to the RAI. If you have any questions or require additional information, please contact Steve Bennett at 479-858-4626.

I declare under penalty of perjury that the foregoing is true and correct. Executed on March 19, 2003.

Sincerely,

DRAFT

Sherrie R. Cotton
Director, Nuclear Safety Assurance

SRC/sab

Attachments:
1. Response to NRC Request for Additional Information on ANO Spent Fuel Crane Heavy Load Lifts
2. Revised FSAR Table 9.1-X
3. List of Regulatory Commitments

cc: Mr. Ellis W. Merschoff
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Attachment 1

0CAN030303

Response to NRC Request for Additional Information on ANO Spent Fuel Crane Heavy Load Lifts

Response to NRC Request for Additional Information on ANO Spent Fuel Crane Heavy Load Lifts

NRC EMEB RAI 1

Methodologies from two different standards have been used for computing the vertical and horizontal impact loads. (CMAA Specification No. 70 methodology for the vertical impact load and ACI 318-89 standard for the horizontal impact load.) Provide the rationale and justification for using two different standards for determining impact loads.

ANO Response:

The cited reference (Ref. 4) for the transverse horizontal load is in error. This should have referred to Reference 5, ASME NOG-1-1995-Rules for construction of Overhead and Gantry Cranes". This is consistent with CMAA and the proposed use of NOG will yield conservative results. The ANO design records have been adjusted.

NRC EMEB RAI 2

Provide calculations to support the statement in Attachment 6 of the amendment request that, "The period of oscillation of the lifted load in pendulum motion during a seismic event is long. Therefore, the horizontal seismic effect due to lifted load is very small and will be neglected." In the case when loads are lifted to higher elevations, it seems feasible that the period of oscillation in pendulum motion could interact with the motion of the crane and support structure during a seismic event.

ANO Response:

The maximum lifted height is normally at the fuel pool floor elevation. All other lifted positions would be lower than that of the floor elevation (loads from this elevation are lowered to an elevation below this position). The assumption is based on the maximum lifted height and maximum critical load (MCL) of 130 tons which when lifted to its maximum height would be just below the upper limit switch; therefore all other lifted heights would be lower than the basic assumption.

In addition, the MCL load was considered as the design load for the crane components. This load of 130 tons is what was used in defining the impact load for the component. The bent frame analysis indicate that the expected frequency of the building structure at this elevation is at or near the ZPA range of our site response spectra, therefore in changes in oscillation is not expected to be significant. Therefore it is justified that the "worst case" is that addressed in the calculation and the stated assumption is valid.

NRC EMEB RAI 3

The calculations to evaluate the adequacy of the bent frame and the columns to the upgraded crane loads indicate that the OBE seismic load case has not been evaluated. Since the allowable limits for the OBE seismic load case are more restrictive than the DBE loading case, we request that you demonstrate compliance with your design code limits for the OBE condition as well. The interaction coefficient for the DBE case relating to the girder in Unit 1 is slightly greater than one. Compliance for this case needs to be demonstrated.

ANO Response:

For the Category 2 design, ANO's use of OBE and DBE loads were evaluated to determine which load is most critical for design. Since the design used the site's existing response spectra, in lieu of Uniform Building Code (UBC) seismic values for Category 2 components, it was concluded that the DBE case would be more conservative. As stated in our response to EMEB RAI 5, the "design code" limits are those accepted codes and standards applicable to the design of Category 2 components. In this case the use of the stated load cases reflect the most severe loading condition and performing an additional analysis for the OBE condition would not result in a significant change in the conclusions reached.

The applied loads are considered to be conservative since the loads reflected are based on ANO-2 values. If values for ANO-1 were to be applied the interaction would result in a lower value. For this portion of the analysis the computer analysis applied the code check requirements of AISC against the computed stresses with no increase in these allowable values to account for DBE conditions. In conclusion, the results are based on the OBE allowable case and these allowables were not exceeded.

A secondary check to confirm the conservative nature of the calculation is provided at the end of this attachment.

NRC EMEB RAI 4

The analysis of the frame structure and columns for the revised crane loads in Section 8.0 of Attachment 6, indicates that only the following loading combinations will be evaluated:

1. DL+LL+IL+WL (with AISC allowable)
2. DL+LL+DBE (with 1.5 times AISC allowables not to exceed 0.9 F_y)

Please define the acronyms in the above equations. You also stated that the crane will not be used to lift the maximum load during plant operation. Discuss the lifted loads and provide their magnitude for the evaluation of the frame structure considering the above loading combinations.

ANO Response:

DL = Dead Load
LL = Lifted Load
IL = Impact Load
WL = Wind Load
DBE = Design Bases Earthquake

The maximum lifted load during normal operations is defined as the load of a full dry cask with lifting apparatus. This load is equivalent to 127 Tons. However the crane design load is for the MCL condition of 130 Ton. It is not anticipated that noncritical loads exceeding the MCL load will be required to be lifted by the crane during its design life. Therefore the MCL load will be the maximum load on the crane and adequate design margin is included as required by the established codes and standards to ensure the design of the crane is acceptable for this intended use.

NRC EMEB RAI 5

Provide confirmation that the loading combinations and allowables used in the revised analysis with the upgraded loads are in compliance with the requirements in the UFSAR for the normal/upset, emergency and faulted loading conditions. If deviations from the UFSAR requirements exist, discuss the nature of the deviation and provide justification for noncompliance.

ANO Response:

The location of the crane is in the Class 2 portion of the turbine/auxiliary building. Therefore the UFSAR provides no specific loading combination for consideration in design. The analysis approach is based upon design methods of accepted codes and standards insofar as they are applicable to this design. The application of normal/upset, emergency and faulted loading conditions are applied with respect to the design guidance for single failure proof crane designs. This is consistent with the information provided in the UFSAR as stated in ANO-1 SAR Section 5.1.3.3 and ANO-2 SAR Section 3.2.1 for Category 2 components and structures.

NRC EMEB RAI 6

In response to RG 1.104, position C.1.d, you state in Attachment 4 to the amendment request that the weld geometries used in the existing bridge structure are not considered susceptible to lamellar tearing. Describe the screening criteria used to make this determination.

ANO Response:

The original bridge structure is constructed of thin plates utilizing small welds. The bridge and its welds were not impacted by this modification. This is based on review of CMAA 70 Table 3.4.8-2, the existing girder design drawing and walk down of the crane prior to development of final design.

NRC EMEB RAI 7

In response to RG 1.104, positions C.1.b(3), C.1.b(4), C.4.d, and C.3.1, you state in Attachment 4 to the license amendment request, that a commercial grade dedication plan and various nondestructive testing will be implemented. Describe the current status of implementation and available results of nondestructive examinations and fatigue life evaluations.

ANO Response:

ANO performed a visual inspection of all crane components in association with the modification activities. In addition, calculations were performed to verify that the existing welds and connections were adequate for the upgrade. The results of these calculations are documented in the design change package for the crane upgrade. The use of "commercial grade dedication" is meant to demonstrate that all the required controls necessary to meet the requirements of the single failure proof crane and those of the Ederer topical report are adequately maintained during the installation process. Since the crane is non safety related, yet required to be seismically designed and requiring certain QA inspection requirements, these aspects were included in the design package to adequately capture this information.

Fatigue review was performed based on the fatigue stress provision of CMAA 70. This review is addressed through the re-evaluation of the box girder and its connections to meet the requirements of CMAA.

Appendix C to EDR-1 for ANO L-3 Crane has been updated to reflect more appropriate discussion for the 10CFR50, Appendix B application and is provided in Attachment 2.

NRC SPLB RAI 1

Under Ederer Topical Report Section III.F.1 in Attachment 4, the main hoist wire rope is described by a trade name. Describe the construction of and material used for the main hoist wire rope.

ANO Response:

The wire rope is from Williamsport Wire Rope Works; Royal Purple Plus Triple-Pac with the following characteristics:

Min. tensile strength: 259,200#

Min. yield strength: 207,360# (0.2% offset)

Manufactured in right regular lay in a 6x36 Class construction grade

1-3/8 diameter x 380 feet long

Grade: EEEIP+

Core: 7X7 independent wire rope center

NRC SPLB RAI 2

In Appendix C (RG 1.104, C.4.d) it that states: *The ambient temperature when the 125% static load test is performed will be the minimum operating temperature for the crane. In the event that the crane must be operated at a lower temperature, another 125% static proof test will be performed at the lower temperature.* It is expected that temperatures below the ambient temperature that the crane was load tested will require additional testing. If additional load tests are not planned provide basis for the adequacy of how NDT requirements are met. Apply NUREG-0554 guidance.

ANO Response:

The statement in Appendix C to the Proposed Table 9.1-X (Attachment 4 in Reference 1) is correct for the cold test and the ambient temperature at which the load test was to be performed. The upgraded crane load test was performed in January 2003 which is within the coldest season of the year whereby any affects from external temperatures would be typically bounding. Temperature measurements were not directly taken at the bridge associated with the load test, however a temperature was taken in the turbine building the day after the cold test while performing testing of the hook. The crane bridge is at turbine building elevation 404 and is not directly exposed to outside ambient temperatures. However, on the day that the 125% load cold test was performed on the crane, the hatch was open which allowed external air flow to the bridge area. At the time that the hook test was performed the hatch was closed which prevented colder outside air from cooling this area of the building. The temperature measurement for the hook was 65ºF and is considered conservative for the cold test minimum operating temperature. In the interim, the crane minimum operating for the maximum critical loads will be 65ºF.

A cold test is only one means of establishing minimum operating ranges to prevent brittle fracture concerns from occurring. Nil ductility transition (NDT) temperature can be performed in accordance with the ASME Boiler and Pressure Vessel Code which satisfy NUREG-0554. If Entergy chooses to establish alternately acceptable minimum operating temperatures using NDT temperatures, the guidance of NUREG-0554 will be used. This will be performed under the requirements of 10CFR50.59.

Attachment 1 to
0CAN030303
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Confirmatory Calculation Supporting Interaction Coefficient for ANO Runway Girder

Problem Identification:

Section 6.2 "Check Unit 1 Runway Girder for DBE Load Case", gives an interaction ratio of 1.048. Determine if, when applying final design loads, the interaction ratio would result in a value less than 1.0.

Resolution:

The calculation states that the interaction is adequate because for A36 steel the F_y is usually higher than 36 ksi and also the damping value used in Unit 1 is 2.5% compared to damping of 5% used in Unit 2. Additionally, as demonstrated below, the design loads are more severe than the final loads.

The following confirmation calculation demonstrates that the above stated conclusion is reasonable.

Description	Design Load [1]	Final Load
Maximum design wheel load (V_{TL})	208 kips	No change
Lifted load including lower block weight (LL)	265 kips	No change
Maximum Trolley Weight (MTW)	100 kips	67 kips

1 - From original calculation provided in Reference 1, Attachment 6, Section 4.0

Using only the change in trolley weight and keeping all other loads the same the following is provided. Also, only formulas required to show interaction change will be used in this confirmatory calculation.

From Section 5.0:

Maximum wheel load due to lifted load only = V_{LL}= ½ (LL) x 0.9 kips.

V_{LL} = ½ (265) x 0.9 = 119.25 kips.

Where, 0.9 is the load position to span factor.

Maximum wheel load V_D due to crane dead weight: (change MTW=100 to 67 kips)

V_D= 50/4 + 4.0 + 7.5/2 + 67X0.5X0.9 kips = 50.4 kips

Then:

Vertical Impact load due to crane dead weight V_{ID}= 0.1X V_D = 0.1X 50.4= 5.04 kips

Vertical Impact load due to lifted load V_{IL}= 0.15 x V_{LL} = 0.15X119.25 = 17.9 kips

Total Vertical impact load = V_{IT}= 17.9 + 5.04 kips = 22.94 kips

Design forces for Normal Loading:

Moment due to Crane load $M_{V\text{-}LL}$ = **1404 ft-kips** (from original calc)

Moment due to vertical impact = $M_{V\text{-}IT}$ = 22.94 x 27/4 = **154.85 ft-kips**

The above loads will be used in Section 6.2.

From Section 6.2:

Seismic load in the vertical direction = V_{SL} = 0.3 x V_{TL} = 0.3x208 kips = 62.4 kips

Moment due to vertical seismic load = M_{VSL} = 62.4 X 27/4 = **421.2 ft-kips**

Assume conservatively that entire transverse horizontal seismic load is resisted by one runway girder. Seismic load in the transverse horizontal direction per wheel = $H_{T\text{-}SL}$

$H_{T\text{-}SL}$ = 0.58 x (WCC+MTW)/2 = 0.58 X (61.5 + 67)/2 = 37.27 kips

Moment due to horizontal seismic load = M_{HSL} = 37.27 X 27/4 = **251.54 ft-kips**

Axial load in the runway girder due to horizontal seismic = 2 X 37.27 = **74.54 kips**

d= 36 /2+0.5 + 6 =24.5" where d is the distance from center of the runway girder to the top of the rail.

Major axis moment due to axial load in the girder = 37.27 X d/2 = 37.27 X 24.5/2/12 = **38.05 kips**

Check Unit 1 Runway Girder for DBE Load Case

f_{bc} = 1404 x12/1200 + [(421.2 x12/1195)^2 + (**251.54** x12/195)^2 + (**38.05** X 12/1195 + **74.54**/93.49)^2]$^{1/2}$ = 14.05 + 16.09 = **30.14** ksi > 0.9 X 36 ksi

I.C = **30.14**/32.4 = **0.93**

Using only the change in trolley weight as a basis, the Interaction Coefficient calculated is less than 1. This indicates that the design loads are more severe than the final loads and that the structure remains adequate as previously documented.

Therefore, the ANO-1 runway girder remains adequate for the DBE load case.

Attachment 2

0CAN030303

Revised FSAR Table 9.1-X

(Appendices B and C to Ederer Topical Report EDR-1)

Table 9.1-X
Appendix B Supplement to Generic Licensing Topical Report EDR-1 for Spent Fuel Handling Crane L-3
Summary of Plant Specific Crane Data

Reg. Guide 1.104 Position	EDR-1 Topical Report Section	Information To Be Provided	Specific Crane Data
C.1.a	III C(C.1.a)	1 The actual crane duty classification of the crane specified by the applicant	1. The trolley has a Class "C" crane duty classification in accordance with CMAA Specification #70. The bridge has a Class A crane duty classification.
C 1 b	III C(C.1.b)	1 The minimum operating temperature of the crane specified by the applicant	1. The trolley was designed and fabricated for a minimum operating temperature of 30°F.
C 2 b	III C(C 2 b) III E 4	1 The maximum extent of load motion and the peak kinetic energy of the load following a drive train failure 2 Provisions for actuating the emergency drum brake prior to traversing with the load, when required to accommodate the load motion following a drive train failure	The main hoist was designed such that the maximum vertical load motion following a drive train failure is less than 1 5 foot and the maximum kinetic energy of the load is less than that resulting from one inch of free fall of the maximum critical load 2 Provisions for automatically actuating the emergency drum brake prior to traversing with the load are not required since the maximum amount of load motion and kinetic energy has been factored into the facility design floors of the SFP, and Elev 404'-0" can accommodate the load motion the load will be administratively controlled to maintain > 1.5 feet when traversing the Elev 404'-0" floor documented in operation of spent fuel crane Procedure 1402 133
C.3 e	III.C(C.3 e)	1 The maximum cable loading following a wire rope failure in terms of the acceptance criteria established in Section III C(C 3 e)	1. The maximum cable loading following a wire rope failure in the main hoist meets the maximum allowed by the acceptance criteria established in Section III.C(C.3.e)
C 3 f	III C(C 3 f)	1 Maximum fleet angle 2 Number of reverse bends	1. 3 5 degrees, Main Hoist 2 None, other than the one between the wire rope drum and the first sheave in the load block

Table 9.1-X
Appendix B Supplement to Generic Licensing Topical Report EDR-1 for Spent Fuel Handling Crane L-3
Summary of Plant Specific Crane Data

		3	Sheave diameter	3.	18 x wire rope diameter, Main Hoist
C 3 h	III C(C 3 h) III E 11	1.	The maximum extent of motion and peak kinetic energy of the load following a single wire rope failure.		The main hoist was designed such that the maximum load motion following a single wire rope failure is less than 1.5 foot and the maximum kinetic energy of the load is less than that resulting from one inch of free fall of the maximum critical load
C 3 i	III C(C 3 i)	1.	The type of load control system specified by the applicant	1	A. Ederer AC flux vector, Main Hoist B. Shepard Niles mechanical load brake, Aux Hoist
			Whether interlocks are recommended by Regulatory Guide 1.13 to prevent trolley and bridge movements while fuel elements are being lifted and whether they are provided for this application	2	The crane will not be used to lift fuel elements from the spent fuel racks Therefore, interlocks to prevent trolley and bridge movements while hoisting have not been provided
C.3 j	III C(C 3 j)	1	The maximum cable and machinery loading that would result in the event of a high speed two blocking, assuming a control system malfunction that would allow the full breakdown torque of the motor to be applied to the drive motor shaft.		The energy absorbing torque limiter (EATL) was designed such that the maximum machinery load, which would result in the event a two-blocking occurs while lifting the rated load at the rated speed and that allows the full breakdown torque of the motor to be applied to the drive shaft, will not exceed 3 times the design rated loading In addition, the EATL design does not allow the maximum cable loading to exceed the acceptance criteria established in Section III C(C.3 e) during the above described two-blockings
		2.	Means of preventing two blocking of auxiliary hoist, if provided	2.	The 15 Ton Auxiliary Hoist has a geared upper limit switch and an arm actuated up over-travel switch
C 3 k	III C(C 3 k)	1.	Type of drum safety support provided	1.	The alternate design drum safety restraint shown in Figure III D 4 of EDR-1 is arranged to counter gear and brake forces as well as downward loads These brackets act on the diameter of the ends of the drum on the Main Hoist
C 3 o	NA	1	Type of hoist drive to provide incremental motion	1.	AC flux vector.
C.3 p	NA	1	Maximum trolley speed	1.	28 fpm
		2	Maximum bridge speed	2.	25 fpm

Table 9.1-X
Appendix B Supplement to Generic Licensing Topical Report EDR-1 for Spent Fuel Handling Crane L-3
Summary of Plant Specific Crane Data

		3 Type of overspeed protection for the trolley and bridge drives	3 Overspeed switches which actuate the brakes are provided for the trolley and bridge drives
C 3 q	NA	1. Control station location	1. The complete operating control system, including an emergency stop button, is located on the remote radio control station. An additional emergency stop button is located on the pendant station, permitting de-energization of the crane independent of the control station
NA	III D.1	1. The type of emergency drum brake used, including type of release mechanism.	1. Pneumatically released band brake will be used for the Main Hoist.
		2. The relative location of the emergency drum brake 3 Emergency drum brake capacity	2. The emergency drum brake engages the wire rope drum of the Main Hoist 3 The Main Hoist emergency drum brake has a minimum capacity of 125% of that required to hold the design rated load
NA	III D 2	1. Number of friction surfaces in EATL 2 EATL torque setting	1. The main surface of the EATL has 21 friction surfaces 2 The specified EATL torque setting is approximately 130% of the Main Hoist design rated load
NA	III D.3	1. Type of failure detection system	1. A totally mechanical drive train continuity detector and emergency drum brake actuator have been provided in accordance with Appendix G of Revision 3 of EDR-1 for the Main Hoist
NA	III D 5	1 Type of hydraulic load equalization system	1. Main Hoist hydraulic load equalization system includes both features described in Section III.D 5
NA	III D 6	1 Type of hook. 2 Hook design load 3. Hook test load	1 Both the Main and Aux hooks have a single load path 2 A The Main Hook design critical lift load is 130 tons with a 10 1 factor of safety on ultimate B The Aux Hook design lift load is 15 tons with a 5 1 factor of safety on ultimate 3. The test load for each load path of the Main Hook will be 260 Tons

Table 9.1-X
Appendix B Supplement to Generic Licensing Topical Report EDR-1 for Spent Fuel Handling Crane L-3
Summary of Plant Specific Crane Data

NA	III F.1	1. Design rated load	1. Main Hoist – 130 Ton Aux Hoist – 15 Ton
		2 Maximum Critical Load (MCL) rating	2 Main Hoist – 130 Tons Aux Hoist – N/A
		3 Trolley weight (net)	3. 74,000 LB (incl Hooks)
		4 Trolley weight (with load)	4. 334,000 LB
		5 Hook lift	5. Main Hook – 80 feet, 0 inches Aux Hook – 80 feet, 0 inches
		6 Number of wire rope drums.	6 The Main and Auxiliary Hoist each have one wire rope drum
	III F.1	7. Number of parts of wire	7 Main Hoist – 4 parts per wire rope, 2 ropes, with (2) ropes off drum Auxiliary Hoist – 4 parts per wire rope
		8 Drum size (pitch diameter)	8 Main Hoist – 33 inches Aux Hoist – 16 inches
		9 Wire rope diameter	9 Main Hoist – 1-3/8 inch Auxiliary Hoist – 5/8 inch
		10 Wire rope type	10 Main Hoist – Spelter socket Williamsport Wire Ropes Works Royal Purple Plus Triple PAC Auxiliary Hoist – 6 x 37 EIPS/IWRC
		11. Wire rope material	11. Carbon steel Main and Aux Hoist
		12. Wire rope breaking strength	12 Main Hoist – 259,200 LB Aux Hoist – 41,200 LB

Table 9.1-X
Appendix B Supplement to Generic Licensing Topical Report EDR-1 for Spent Fuel Handling Crane L-3
Summary of Plant Specific Crane Data

		13 Wire rope yield strength	13. Main Hoist – 207,360 LB Aux Hoist – N/A
		14 Wire rope reserve strength	14. Main Hoist – 0.5777 Aux Hoist – N/A
		15 Number of wire ropes	15. The Main Hoist has 2 ropes The Aux Hoist has one rope

Table 9.1-X
Appendix C Supplement to Generic Licensing Topical Report EDR-1 for Spent Fuel Handling Crane L-3
Summary of Plant Specific Crane Data

Reg Guide 1.104 Position	EDR-1 Topical Report Section	Information To Be Provided	Specific Crane Data
	III C(C.1.b(1))	1 The extent of venting of closed box sections	1. Closed box sections are not vented since the auxiliary building that houses the crane will not be pressurized.
C.1 b(3) C 1 b(4) C 4 d	III.C(C 1 b(3)) III.C(C.1 b(4)) III.C.(C 4.d)	1 The nondestructive and cold proof testing to be performed on existing structural members for which satisfactory impact test data is not available	1. The procurement documents for the modified bridge structure did not invoke 10CFR50 Appendix B An installation plan, to capture all of the critical characteristics of the structural members, is being used to ensure the structural members meet the requirements for the cranes intended function Cold proof testing has been performed on the modified bridge, followed by a visual inspection of all accessible welds whose failure would result in the drop of a load Visual indications of structural degradation of the modified bridge will be investigated further by the appropriate nondestructive examination techniques The ambient temperature when the 125% static load test is performed is the minimum operating temperature for the crane. In the event that the crane must be operated at a lower temperature, another 125% static proof test will be performed at the lower temperature or will be demonstrated to meet acceptable NDT requirements of NUREG-0554
C 1 c	III C (C.1 c)	1 The extent the crane's structures which are not being replaced are capable of meeting the seismic requirements of regulatory guide 1.29	The modified bridge structure and new trolley have been analyzed for see Attachment No. 1. Existing steel and concrete support structures are being analyzed for the design basis earthquake [(peak) ground acceleration] while supporting the maximum critical loads documented in Entergy Calculations 61, Bechtel Book 21, Rev 1.

Table 9.1-X
Appendix C Supplement to Generic Licensing Topical Report EDR-1 for Spent Fuel Handling Crane L-3
Summary of Plant Specific Crane Data

C 1 d	III C(C 1 d)	1. The extent welds joints in the crane's structures, which are not being replaced, were nondestructively examined	1 Nondestructive examinations of the existing bridge structure were not required by existing regulations at the time of construction However, the X-SAM® system provides additional overload protection, and the Inspections of the existing structure described in C 1 b(3) above are adequate to ensure the structural integrity of the existing bridge
		2 The extent the base material, at joints susceptible to lamellar tearing, was nondestructively examined	2 The weld geometries used in (a) the existing bridge structure and (b) the replacement trolley structure are not considered to be susceptible to lamellar tearing
C 1 e	III C(C.1.e)	1 The extent the crane's structures, which are not being replaced are capable of withstanding the fatigue effects of cyclic loading from previous and projected usage, including any construction usage	1 All past and projected use of the modified structural components were assessed to ensure the crane is within the cyclic loading capability of the modified bridge structure and welds at 130 Tons for CMAA Class "A" service
C.1.f	III C(C 1 f)	1 The extent the crane's structures which are not being replaced, were post-weld heat-treated in accordance with Sub article 3 9 of AWS D1.1, "structural welding code"	1 The material thickness of the modified Bridge components are such paragraph III C (C.1.f) of edr-1 does not require post-weld heat treatment.
C 2 b	III C(C 2 b) III E 4	1 Provisions for accommodating the load motion and kinetic energy following a drive train failure when the load is being traversed and when it is being raised or lowered	1 Administrative procedures are used to assure that a minimum of 1 5 feet of clearance is maintained between the load and surfaces that cannot withstand the kinetic energy associated with 1-inch free fall of the load involved. The spent fuel pool floor and elevation 404'-0" lay down area can withstand the kinetic energy associated with 1-inch free fall of the MCL, documented in Entergy OP-1402 133

Table 9.1-X
Appendix C Supplement to Generic Licensing Topical Report EDR-1 for Spent Fuel Handling Crane L-3
Summary of Plant Specific Crane Data

C.2.c	III C(C 2 c)	1 Location of safe laydown areas for use in the event repairs to the crane are required that cannot be made with the load suspended	1 The laydown areas that can be used in the event that repairs to the crane are required that cannot be made with the load suspended are the spent fuel pool floor and elevation 404'-0" laydown area, documented in Entergy OP-1402.133.
C.2 d	III C(C 2 d)	1 Size of modified components that can be brought into the building for repair of the crane without having to break the building integrity. 2 Location of area where repair work can be accomplished on the crane without affecting the safe shut-down capability. 3 Any limitations on operations that would result from crane repairs	1 The X-SAM® trolley and modified bridge components can be brought in through the auxiliary building floor opening The opening is 12'-0" x 24'-0". 2 Area is identified in Entergy OP-1402 133 and Entergy OP-1402 135. 3 No limitations for normal operations
C 3 b	III C(C 3 b)	1 The design margin and type of lifting devices that are attached to the hook to carry critical loads.	1 As an alternative to a dual load path system, the normal stress design factors have been doubled Each lifting device attached to the hook to carry critical loads will support a load six times the static plus dynamic load being handled without permanent deformation The safety factor is 10 1 when compared to ultimate This is in accordance with NUREG-0612, Section 5.1.6, Paragraph 1(a) and ANSI N14 6, Section 7.2.1.
C.3 t	III C(C 3 t)	1 The extent construction requirements for the crane's structures, which will not be replaced, are more severe than those for permanent plant service	1 Prior use and load histories has been documented and reviewed for the modified bridge components as part of the final closeout information documented in Entergy MAI's and ER-ANO-2000-2688-02 associated with the spent fuel crane modifications.

Table 9.1-X
Appendix C Supplement to Generic Licensing Topical Report EDR-1 for Spent Fuel Handling Crane L-3
Summary of Plant Specific Crane Data

		1 The modifications and inspections to be accomplished on the crane following construction use, which was more severe than those for permanent plant service.	1 Nondestructive examination of the accessible load bearing weld seams, and justification that the fatigue life of the modified components has not been compromised, will be completed prior to the 125% design load test.
C.3.u	NA	1 The extent of installation and operating instructions	1 The installation and operating instructions will be updated to fully comply with the requirements of Section C 3.u OF Regulatory Guide 1.104 and Sections 7.1 and 9 of NUREG-0554
C 4 a C 4 b C 4 c C 4 d	NA	The extent of assembly checkout, test procedures, load testing and rated load marking of the crane	Prior to handling critical loads, the crane will be given a complete assembly checkout, and then given a no-load test of all motions in accordance with updated procedures provided by Ederer. A 125% static load test and 100% performance test will also be performed at this time in accordance with updated test procedures provided by Ederer. A no-load test of all motions and a two blocking test will be performed by Ederer prior to delivery of the crane per Topical Report EDR-1. The maximum critical load is plainly marked on each side of the crane
C>5 a	III C(C 5 a)	The extent the procurement documents for the crane's structure's, which will not be replaced, required the crane manufacturer to provide a quality assurance program consistent with the pertinent provisions of Regulatory Guide 1 28	The procurement documents for the components of the modified bridge structure did not invoke 10CFR50 Appendix B However, these components were built to the manufacturer's quality control processes Quality assurance provisions denoted in the procurement documents covered such items as design control, material selection and inspection and testing The installation of the trolley and any structural modifications to the existing bridge is controlled by the Arkansas Nuclear One quality plan and design change package ER-ANO-2000-2688-002

Attachment 3

0CAN030303

List of 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		SCHEDULED COMPLETION DATE (If Required)
	ONE-TIME ACTION	CONTINUING COMPLIANCE	
In the interim, the crane minimum operating for the maximum critical loads will be 65ºF.		X	March 31, 2003
If Entergy chooses to establish alternately acceptable NDT temperatures, the guidance of NUREG-0554 will be used. This will be performed under the requirements of 10CFR50.59.	X		Conditional Commitment

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