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

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
Docket Nos. 50-282 License Nos. DPR-42
50-306 DPR-60

Response to Single-Failure-Proof Crane Upgrade
License Amendment Safety Evaluation Open Items
TAC Nos. M81883 and M81884

The attached information is provided in response to open items contained in the NRC Safety Evaluation for Prairie Island License Amendments 99 and 92 issued July 9, 1992. Amendments 99 and 92 revised the Prairie Island Technical Specifications to eliminate cask handling restrictions and replace them with requirements for the use of a single-failure-proof handling system in the handling of heavy loads.

Attachment 1 describes the test plan for the special lifting device to be utilized in handling the TN-40 spent fuel storage casks at Prairie Island.

Attachment 2 provides the justification for the dynamic load factor utilized in the structural analysis of the TN-40 special lifting device.

Our October 4, 1991 License Amendment Request, which proposed the Technical Specification changes issued by Amendment 99 and 92, stated that the special lifting device to be utilized in handling the TN-40 spent storage casks would be designed to meet the requirements of the 1978 revision of ANSI N14.6. The October 4, 1991 License Amendment Request was in error. As stated in Section 2.1 of Transnuclear Specification E-12261, Revision 0, "Design Criteria for Lifting System for TN-40 Dry Cask Storage Cask at Prairie Island", which was transmitted to the NRC by our letter dated February 3, 1992, the special lifting device to be utilized in handling the TN-40 spent storage casks is being designed in accordance with the requirements of ANSI N14.6 1986. We apologize for any inconvenience this error may have caused.

Our October 4, 1991 License Amendment Request stated that we would be unable to comply with the special lift device load test requirements of ANSI N14.6 and that any load testing performed per ANSI N14.6 would be performed at the 125% level. That exception to ANSI N14.6 is no longer valid, the special lifting device for the TN-40 cask will be load tested in accordance with the requirements of ANSI N14.6, 1986.

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The specific NRC commitments contained in this transmittal are listed in Attachment 3. Please contact Gene Eckholt (612-388-1121, ext. 4663) if you have any questions related to the information provided.

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Director
Nuclear Licensing

c: Regional Administrator - Region III, NRC
Senior Resident Inspector, NRC
NRR Project Manager, NRC
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Attachments:

1. Testing of TN-40 Cask Special Lifting Device.

2. Justification of TN-40 Cask Special Lifting Device Dynamic Load Factor.

3. NRC Commitments Contained in This Transmittal

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

ATTACHMENT 1

Testing Plan for the TN-40 Cask Special Lifting Device

As stated in our October 4, 1991 License Amendment Request, the special lifting device to be utilized in handling the TN-40 spent fuel storage casks at Prairie Island will meet the requirements of ANSI N14.6, "Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds or More for Nuclear Materials", as outlined in guideline (1)(a) of Section 5.1.6 of NUREG-0612. The testing plan for the TN-40 special lifting device is outlined below. Except as noted below, testing of the TN-40 special lifting device will conform with the requirements of ANSI N14.6, 1986.

ACCEPTANCE TESTING

Initial acceptance testing of the special lifting device for the TN-40 cask will be conducted in accordance with the requirements Sections 6.2, 7.1 and 7.3 of ANSI N14.6, 1986.

Load Testing

Section 7.1 of ANSI N14.6 defines the requirements for special lifting devices for critical loads. Section 7.1(1) of ANSI N14.6 allows the use of special lifting devices, like the TN-40 special lifting device, that utilize load bearing members with increased stress factors for handling the critical load rather than dual load paths. Section 7.3 of ANSI N14.6 states that if a special lifting device is designed with increased stress design factors instead of dual load paths, acceptance testing shall be conducted in accordance with 6.2.1, except that the test load shall be three times the weight that the device is to support rather than the 150% requirement of Section 6.2.1. The acceptance testing of the special lifting device for the Prairie Island TN-40 casks will be performed at three times the weight the device is to support.

Section 6.2 of Transnuclear Specification E-12261, Revision 0, "Design Criteria for Lifting System for TN-40 Dry Storage Cask at Prairie Island", which was transmitted to the NRC by our letter dated February 3, 1992, states that the TN-40 special lift device will be load tested to 150% of the design load prior to shipping. That statement was in error. As stated above, the TN-40 cask special lifting device will be acceptance tested at three times the weight that the device is to support.

Functional Testing

Non-load-bearing functioning parts of the TN-40 special lifting device will be tested, as prescribed by Section 6.2.3 of ANSI N14.6, 1986, prior to initial use of the device.

TESTING TO VERIFY CONTINUING COMPLIANCE

Testing of the special lifting device for the TN-40 cask to verify continuing compliance with the requirements of ANSI N14.6 will be conducted as described below. The plan for periodic testing and inspection the TN-40 special lifting device is based, with some exceptions, on the requirements of Sections 6.3 and 7.3 of ANSI N14.6, 1986.

Annual Testing

Section 7.3 of ANSI N14.6, 1986 states that annual testing shall be conducted in accordance with Section 6.3.1 of ANSI N14.6 except that the device shall be subjected to three times the weight that the device is to support. Section 6.3.1(2) of ANSI N14.6, 1986 allows, in cases where surface cleanliness and conditions permit, the annual load testing requirements to be replaced with dimensional testing, visual inspection, and nondestructive testing of major load carrying welds and critical areas in accordance with Section 6.5 of ANSI N14.6, 1986. The annual testing of the special lifting device for the Prairie Island TN-40 casks will be performed in accordance with Section 6.3.1(2), therefore, no annual load testing will be performed.

The functional testing of the TN-40 special lifting device, prescribed in Section 6.2.3 of ANSI N14.6, 1986 for acceptance testing, will be repeated on an annual basis per Section 6.3.4 of ANSI N14.6, 1986.

Sections 6.3.1 and 6.3.4 of ANSI N14.6, 1986 specify that the period for annual testing of special lifting devices not exceed 14 months. Section 4.0 of the Prairie Island Technical Specifications allows the time interval between surveillance tests to be adjusted plus or minus 25% to accommodate normal test schedules. Surveillance testing performed at Prairie Island, including testing not specifically required by Technical Specifications, is scheduled using this allowance. For consistency, the TN-40 special lifting device annual testing will be scheduled as part of the plant surveillance program using the plus or minus 25% allowance. The surveillance will be scheduled to be competed every 12 months, but the interval could be extended to a maximum interval of 15 months if scheduling or other conflicts arise.

The annual testing required by Sections 6.3.1(2) and 6.3.4 of ANSI N14.6, 1986 will not be performed on an annual basis if the TN-40 lifting device is not to be used for a period exceeding one year. In that case, the testing required by Sections 6.3.1(2) and 6.3.4 will be performed before returning the device to service.

Section 6.3.8 of ANSI N14.6, 1986 prescribes that each special lifting device be tagged or the record system updated after annual testing, indicating the expiration date of the validity of that test. As noted above, surveillance testing of the TN-40 special lifting device will be scheduled and controlled by the plant surveillance program. This program will ensure that the annual testing will be performed per the required schedule and that the results of the annual testing will be properly documented.

Additional Load Testing

The TN-40 special lifting device will be load tested as prescribed in Section 6.2.1 of ANSI 14.6, 1986 after any of the following:

1. Major maintenance or alterations, as defined in Section 6.3.2 of ANSI N14.6, 1986,

2. An incident in which any of the load-bearing components of the TN-40 special lifting device may have been subjected to stresses substantially in excess of those for which it was previously qualified, or

3. An incident that may have caused permanent distortion of its load-bearing parts.

Additional Functional Testing

Per Section 6.3.5 of ANSI N14.6, 1986, the functional testing prescribed in Section 6.2.3 of ANSI N14.6, 1986 for acceptance testing, will be repeated following any incident in which repairs or alterations have been required on non-load-bearing functioning components or in which the TN-40 special lifting device has suffered detectable distortion.

Visual Inspection

Section 6.3.6 of ANSI N14.6, 1986 prescribes that special lifting devices be visually inspected by operating personnel for indications of damage or deformation prior to each use. Section 6.3.7 of ANSI N14.6, 1986 prescribes that special lifting devices be visually inspected by maintenance or other non-operating personnel at intervals not to exceed three months for indications of damage or deformation.

The visual inspections prescribed by Sections 6.3.6 and 6.3.7 appear to be designed to address concerns with a special lifting device which is used on a continuing basis and, as such, could experience significant degradation over time from usage. The visual inspection by operating personnel would identify any degradation which may occur between more thorough quarterly inspections.

Because the TN-40 special lifting device is only expected to be used on the average of twice per year, the quarterly visual inspection requirements prescribed by Section 6.3.7 are inappropriate. Therefore, the requirements of Sections 6.3.6 and 6.3.7 will be combined, and the TN-40 special lifting device will be visually inspected by maintenance or non-operating personnel prior to each use of the lifting device.

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ATTACHMENT 2

Justification of TN-40 Cask Special Lifting Device Dynamic Load Factor

A dynamic load factor of 0.05 was used in the structural analysis of the special lifting device to be utilized in handling the TN-40 spent fuel storage casks at Prairie Island. The dynamic load factor was obtained by multiplying the maximum hoisting speed for the upgraded Prairie Island auxiliary building crane (5 ft/min) by 0.005 (0.5%). This is recommended in the Crane Manufacturers Association of America (CMAA) Specification #70, 1988 revision, to calculate the Hoist Load Factor for a crane. The result, 0.025, was doubled to provide an additional safety margin.

Crane Manufacturers Association of America Specification #70, 1988 revision, also recommends that the Hoist Load Factor not be less than 0.15 for the crane design. However, the Crane Manufacturers Association of America minimum Hoist Load Factor value is not applicable for the Prairie Island TN-40 special lifting device design because the Crane Manufacturers Association of America minimum Hoist Load Factor pertains to the crane structure which is designed with a stress factor of 5 to ultimate; while the Prairie Island TN-40 special lifting device is designed with stress factors of 6 to yield and 10 to ultimate.

Additionally, as outlined below, the upgraded Prairie Island auxiliary building crane is designed for very smooth operation which will minimize dynamic loads on the lift beam due to accelerations or decelerations.

The crane is equipped with a DC hoist control with a stepless drive which provides for smooth acceleration and deceleration. It also requires less maximum motor torque than AC type drives.

The impact forces imparted on the lift beam are further minimized by the following:

- The maximum hoist speed that will be used when handling a TN-40 storage cask is very slow (5 ft/min).
- The hoist is equipped with an energy absorbing torque limiter, which limits the torque to 130% of the design value.
- The hoist is equipped with a load cell which automatically stops the crane if a load of 125% of the rated static load is detected.
- Strict administrative controls are exercised over all crane operations Only qualified and trained operators will operate the crane.
- The crane wire cable will also provide damping effects which will reduce the dynamic load amplification factor.
- Two separate magnetic brakes are provided on the crane as well as regenerative braking. Each magnetic brake provides a braking force of 150% of rated load and are timed (sequenced) to act in series. Thus, the sequenced magnetic brakes and the regenerative motor brake assures that smooth lowering and hoisting speeds can be maintained regardless of the load on the hook.

PRAIRIE ISLAND NUCLEAR GENERATING PLANT

ATTACHMENT 3

NRC Commitments Contained in This Transmittal

1. Initial acceptance testing of the special lifting device for the TN-40 cask will be conducted in accordance with the requirements Sections 6.2, 7.1 and 7.3 of ANSI N14.6, 1986. The acceptance testing of the special lifting device for the Prairie Island TN-40 casks will be performed at three times the weight the device is to support.

2. Non-load-bearing functioning parts of the TN-40 special lifting devic will be tested, as prescribed by Section 6.2.3 of ANSI N14.6, 1986, prior to initial use of the device.

3. The annual testing of the special lifting device for the Prairie Island TN-40 casks will be performed in accordance with Section 6.3.1(2) of ANSI N14.6, 1986, no annual load testing will be performed.

4. The functional testing of the TN-40 special lifting device, prescribed in Section 6.2.3 of ANSI N14.6, 1986 for acceptance testing, will be repeated on an annual basis per Section 6.3.4 of ANSI N14.6, 1986.

5. The TN-40 special lifting device annual testing will be scheduled as part of the plant surveillance program using the Technical Specification plus or minus 25% allowance. The surveillance will be scheduled to be competed every 12 months, but the interval could be extended to a maximum interval of 15 months if scheduling or other conflicts arise.

6. The annual testing required by Sections 6.3.1(2) and 6.3.4 of ANSI N14.6, 1986 will not be performed on an annual basis if the TN-40 lifting device is not to be used for a period exceeding one year. In that case, the testing required by Sections 6.3.1(2) and 6.3.4 will be performed before returning the device to service.

7. The TN-40 special lifting device will be load tested as prescribed in Section 6.2.1 of ANSI 14.6, 1986 after any of the following:

   a. Major maintenance or alterations, as defined in Section 6.3.2 of ANSI N14.6, 1986,

   b. An incident in which any of the load-bearing components of the TN-40 special lifting device may have been subjected to stresses substantially in excess of those for which it was previously qualified, or

   c. An incident that may have caused permanent distortion of its load-bearing parts.

8. Per Section 6.3.5 of ANSI N14.6, 1986, the functional testing prescribed in Section 6.2.3 of ANSI N14.6, 1986 for acceptance testing, will be repeated following any incident in which repairs or alterations have been required on non-load-bearing functioning components or in which the TN-40 special lifting device has suffered detectable distortion.

9. The TN-40 special lifting device will be visually inspected by maintenance or non-operating personnel prior to each use of the lifting device.