

Enclosure 1 to ULNRC-1037

SAFETY EVALUATION

This amendment request revises the timing associated with Technical Specification Surveillance 4.6.1.6.1, by extending the containment vessel tendon surveillances by a step change of six (6) months. This extension is required for the initial Callaway inspection because INRYCO, a common inspection contractor to Union Electric and Alabama Power Co., is needed to evaluate anomalies found at the Farley - Unit 2 plant, prior to performing inspections at Callaway. The following sections address the Callaway post tensioning system design conservatism, inspections of installation activities, field anchor head materials, recent field inspection results, and expected results of the initial tendon surveillance based on Bechtel experience.

Design Conservatism

The containment vessel post tensioning system is designed to provide a minimum level of prestress of 1.2 times the design accident pressure at the end of the 40-year design life of the plant. The prestressing tendons are initially stressed to provide an even higher level of prestress to allow for time dependent stress losses which occur during the life of the plant. As such, there is a significantly higher level of prestress provided at the beginning of the design life than at the end.

The Callaway post tensioning system was designed for an internal containment pressure of 72 psig, which is 1.2 times the design accident pressure of 60 psig. In the event of a postulated main steam line break (yields the maximum containment pressure), the maximum pressure will be only 48.1 psig, however. This provides an actual margin of 1.31 instead of the required value of 1.2. When the prestressing levels which are predicted to occur in approximately six months from now are also taken into account, the margin becomes approximately 1.43.

It should be noted that the required level of prestress of 1.2 times the accident pressure is provided only to maintain compression in the concrete shell during the SIT. This level of prestress is not required, however, to maintain structural integrity. The containment was designed to remain elastic up to internal pressures of approximately 90 psig and it can be shown that the ultimate capacity is at least 120 psig.

Inspections of Installation Activities

During the period of February 1981 through October 1981, the following audits, surveillances and inspections were completed as a result of witnessing the installation of the Callaway containment post tensioning system by INRYCO.

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- 1 - Bechtel/UEQA Audit
- 0 - UEQA Surveillances
- 1 - DIC/UEQA Audit
- 3 - DIC/QA Surveillances
- 7 - NRC Inspection Reports

These reports document the performance of tendon button heading, tendon stressing, greasing, material storage, equipment calibration/qualification, QC inspection, and personnel qualification. These reports indicate satisfactory performance of installation of the Callaway post tensioning system by INRYCO.

UEQA Surveillance Report 4/81-11 documents measures taken by INRYCO to assure that anchorhead failures which occurred in other plants in the past will not occur at Callaway.

#### Field Anchor Head Materials

A sampling review of the records provided by INRYCO on the Callaway anchor head steel manufacturers and heat treatment vendors showed the following:

<u>Steel Manufacturer</u>	<u>Manufacturing Dates</u>
Copperweld	1980, 81
Tech. Steel & Alloy	1979, 80
Timken	1976, 80

  

<u>Heat Treatment Vendors</u>	<u>Procedure Used</u>
Varco Heat Division	MIL-H-6875-F
Accurate Steel Treating	INRYCO PT 5.2.1
FPM Heating Division	INRYCO PT 5.2.1

The use of the Military specification used by Varco was approved by Bechtel via SDDR No. 10.

Problems encountered with cracking anchor heads at other job sites were found to be with different steel manufacturers and heat treatment vendors and manufactured in the early 1970's. In addition, INRYCO attributed as one of the possible causes for cracking to be the nickel content. As a result of this, INRYCO revised their specification to limit the nickel content to a maximum of 0.25% (Surveillance Report 4/81-11). The records reviewed showed that in all cases the Callaway anchor heads have nickel content below 0.25%.

Based on the above it would appear that the anchor heads used at Callaway are acceptable based on the fact that Callaway had different manufacturers and material analyses that were involved with anchor head failures at other sites.

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### Recent Field Inspection Results

On February 5, 1985 a visual inspection of the Callaway containment post tensioning system was conducted by personnel from Union Electric engineering and operations maintenance departments and Bechtel field engineering. The inspection involved looking for tendon grease cap deformation or grease leakage and excessive cracking around the tendon bearing plates. Further visual inspection cannot be performed without removing the grease cap, which requires the services of INRYCO to re-instate to operable status.

A close inspection was made of 172 (86 tendons) inverted U and 100 (50 tendons) hoop anchorages. No deformation, excessive grease leakage or cracking was found.

An inspection of the remaining 170 (85 tendons) hoop and 60 (30 tendons) horizontal dome anchorages was made with the aid of field glasses. No deformation or excessive grease leakage was found.

Based on this inspection of all Callaway tendon anchorages, no evidence was found to indicate a tendon failure nor evidence to indicate excessive stress in the concrete.

### Bechtel Initial Tendon Surveillance Experience

Bechtel has designed 14 units which employ post tensioning system and have completed the first year inspections. Four of these units involved INRYCO, the same supplier as was used at Callaway. All surveillances were acceptable.

### Conclusion

Based on the information above, the proposed revision to Technical Specification 4.6.1.6.1 does not affect or endanger the health and safety of the general public and does not involve an unreviewed safety question.

Enclosure 2 to ULNRC-1037

SIGNIFICANT HAZARDS CONSIDERATIONS

This amendment request revises the timing associated with Technical Specification Surveillance 4.6.1.6, by extending the containment vessel tendon surveillances by a step change of six (6) months. The Safety Evaluation, included as Enclosure 1 to this letter, provides Union Electric's bases for concluding that the Callaway Plant can be safely operated consistent with the revised surveillance schedule.

The Commission has provided guidance concerning the application of the standards in 10CFR50.92 by providing certain examples (48 FR 14870). This amendment request is not completely analogous but is most similar to the example of an action involving no significant hazards consideration which relates to a change which either may result in some increase to the consequences of a previously - analyzed accident or may reduce in some way a safety margin, but where the results of the change are clearly within all acceptable criteria with respect to the system or component specified in the Standard Review Plan. However, based on the Safety Evaluation, we do not believe the increase in the initial surveillance interval in any discernible way increases the consequences or reduces the safety margin associated with the containment post tensioning system.

This amendment request does not involve a significant increase in the probability or consequence of an accident or other adverse condition over previous evaluations; or create the possibility of a new or different kind of accident or condition reduction in a margin of safety. Based on this information, the requested license amendment does not present a significant hazard.

CONTAINMENT VESSEL STRUCTURAL INTEGRITYLIMITING CONDITION FOR OPERATION

4.6.1.6 The structural integrity of the containment vessel shall be maintained at a level consistent with the acceptance criteria in Specification 4.6.1.6.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

- a. With more than one tendon with an observed lift-off force between the predicted lower limit and 90% of the predicted lower limit or with one tendon below 90% of the predicted lower limit, restore the tendon(s) to the required level of integrity within 15 days and perform an engineering evaluation of the containment and provide a Special Report to the Commission within 30 days in accordance with Specification 6.9.2 or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.
- b. With any abnormal degradation of the structural integrity other than ACTION a. at a level below the acceptance criteria of Specification 4.6.1.6, restore the containment vessel to the required level of integrity within 72 hours and perform an engineering evaluation of the containment and provide a Special Report to the Commission within 15 days in accordance with Specification 6.9.2 or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.6.1.6.1 Containment Vessel Tendons. The containment vessel tendons' structural integrity shall be demonstrated at the end of <sup>1.5</sup>~~1~~, <sup>3.5</sup>~~3~~, and <sup>5.5</sup>~~5~~ years following the initial containment vessel structural integrity test and at 5-year intervals thereafter. The tendons' structural integrity shall be demonstrated by:

- a. Determining that a random but representative sample of at least 11 tendons (4 inverted U and 7 hoop) each have an observed lift-off force within predicted limits for each. For each subsequent inspection one tendon from each group may be kept unchanged to develop a history and to correlate the observed data. If the observed lift-off force of any one tendon in the original sample population lies between the predicted lower limit and 90% of the predicted lower limit, two tendons, one on each side of this tendon should be checked for their lift-off forces. If both of these adjacent tendons are found to be within their predicted limits, all three tendons should be restored to the required level of integrity. This single deficiency may be considered unique and acceptable. Unless there is abnormal degradation of the containment vessel during the first three inspections, the sample population for subsequent inspections shall include at least 6 tendons (3 inverted U and 3 hoop);