WOLF CREEK
NUCLEAR OPERATING CORPORATION

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Subject: Docket No. 50-482: Special Report 2000-001 on Containment Tendon Surveillance Deficiencies

Gentlemen:

The attached Special Report 2000-001 is submitted in accordance with Wolf Creek Generating Station (WCGS) Technical Specification 5.5.6 and WCGS Technical Requirements Manual 3.6.1. Special Report 2000-001 discusses three instances in which sheathing filler grease voids in excess of five percent were identified. No commitments are contained in this report.

If you have any questions regarding the attached report, please contact me at (316) 364-4034, or Mr. Tony Harris, at (316) 364-4038.

Very truly yours,

Richard A. Muench

RAM/rlr

Attachment

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SPECIAL REPORT 2000-001

Fifteenth Year Containment Surveillance Deficiencies -

Sheathing Filler Grease Voids

This report is being submitted in accordance with Wolf Creek Generating Station (WCGS) Technical Specification 5.5.6 and WCGS Technical Requirements Manual 3.6.1 to report three instances of sheathing filler grease voids in excess of five percent of net tendon duct volume. These voids were discovered during the fifteenth year containment tendon surveillance conducted on May 1 and May 2, 2000.

The WCGS Technical Requirements Manual requires that the structural integrity of the containment vessel prestressing tendons be demonstrated at the end of 1, 3, and 5 years following the initial containment vessel structural integrity test, and at 5-year intervals thereafter. This is accomplished through performance of surveillance test procedure STS MT-044, "Containment Tendon Inspection," and approved vendor work instructions. WCGS Work Order 99-206694-000 was initiated to implement the fifteenth year inspection. The inspection sample included three vertical and three horizontal tendons.

The surveillance involves removing grease cans from the tendon ends and performing various tests and inspections, including examination of the grease. The grease cans are then replaced and grease is pumped into each duct until grease exits the grease can opposite the injection end for horizontal tendons or the dome vents for the vertical tendons, or until the specified pumping pressure is maintained for at least one hour with no additional grease injection. The amount of grease replaced cannot exceed 5 percent of the net duct volume when injected at $\pm$ 10% of the specified installation pressure.

Contrary to the above requirement, the net refill volumes of the sheathing filler material exceeded 5 percent of the net duct volume for the following three tendons:

Tendon Number	Percent of Net Grease Added	Reference Work Order
H17CB	5.9	00-218185
V65	9.6	00-218177
V76	6.9	00-218177

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These three deficiencies were reported to the WCGS Control Room on May 1 and May 2, 2000. Since the process used to measure and identify the voids involved filling of the grease voids, restoration of the tendon grease to operable status was achieved simultaneously with the identification of the voids.

Prevention of corrosion of the tendons is assured by adequately coating the tendon wires and wire anchorage components. As long as sufficient grease has been introduced into the system to coat the wires and anchorages completely, corrosion protection is assured. The original greasing of the tendons required that clean, clear grease exit the grease can opposite the grease injection end for horizontal tendons and the dome vents for the vertical tendons. This greasing technique coated each tendon wire with grease. The material used in the WCGS post-tensioning system, Visconorust 2090P-4, accomplishes its corrosion protection function by: the filler material's affinity to adhere to steel structures; its ability to emulsify any moisture in the system thereby nullifying the ability of the moisture to cause rusting; and by its resistance to moisture, mild acids, and alkalis. Due to Visconorust 2090P-4's affinity for steel; once applied it will not come off under normal circumstances without cleaning with a solvent. Additional protection was also given to each tendon wire by individually precoating them with Amber 1601, and by coating the tendon anchorage components with Visconorust 2090P-4, prior to installation. Due to the materials used and the application methods, the degree of filling the interstitial spaces, which comprise the net duct volume, is not directly related to the degree of coating which occurs, and, consequently, is not of significant importance as an indicator of operability of the sheathing filler material.

Due to the physical characteristics of the sheathing filler material and industry standard installation techniques, voids up to approximately 15 percent could be expected after the initial filling operation. Voids in the tendon sheathing may be attributed to a number of additional factors:

1. Visconorust 2090P-4 (filler material used in the tendon) has a coefficient of expansion which yields a contraction of about 1 percent per every 20° Fahrenheit. Initial filling temperatures of the filler material averaged

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160° Fahrenheit. Cold weather conditions can cool the filler material to 40° Fahrenheit, giving a contraction of 6 percent of the net duct volume. During the fifteenth year inservice tendon surveillance, the temperature of filler material averaged 70° Fahrenheit (estimated), giving a contraction of 4 to 5 percent.

2. Voids between the wires that comprise the tendon bundle and in other areas, such as where wires are in contact with the sheathing, may yield about 7 percent, or greater, of the net duct volume.

3. Characteristics of the initial filling method may induce air entrapment into the filler material. Pumping operations can introduce air into filler material, and may add up to as much as 2 percent of the net duct volume.

In summary, even under optimum filling conditions, voids ranging from 12-15 percent could be expected after the initial filling operation.

Preliminary surveillance inspection and test results indicate the following:

1. Visual examination of the filler material has shown virtually no change in the physical appearance of the grease, including no presence of free water.

2. Visual inspection of the different components of the anchorage system and the wire removed from the tendons revealed proper coverage by the filler material with no signs of corrosion or moisture.

3. Visual examination of the containment's external surface revealed no cracking, spalling or grease leakage for the subject tendons.

Based on the above discussion, the voids found during the surveillance are consistent with what may be expected. As indicated above, the function of the filler material in protecting the post-tensioning system is being maintained. The final acceptability of the post-tensioning system will be based on an engineering evaluation of all the tendon surveillance inspection and test results, such as concrete cracking in excess of .01 inch width, and tests for chemical properties of the filler material. However, the presence of voids of

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the extent found is not considered a sign of degradation and has not impaired the containment structural integrity. The tendons and the containment remained capable of performing their design function. Additionally, the voids were filled by the additional grease pumped into the tendon ducts, thereby correcting the non-conforming condition. No additional corrective actions are required.

Furthermore, future scheduled tendon surveillances and containment integrated leak rate testing will monitor the structural parameters of the containment to detect any potential abnormal degradation, assure continued operability of the system, and verify containment building structural integrity.