VIRGINIA ELECTRIC AND POWER COMPANY
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W. L. STEWART
VICE PRESIDENT
NUCLEAR OPERATIONS

July 26, 1983

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Attn: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Serial No. 325
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Docket Nos. 50-280
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DPR-37

Gentlemen:

NUREG 0612 - CONTROL OF HEAVY LOADS
PHASE I
SURRY POWER STATION UNITS 1 AND 2

As requested via your letter, dated May 16, 1983, the following is provided for final resolution of the open item, " Special Lifting Devices," and for demonstrating Surry Power Station Units 1 and 2 conformance to NUREG-0612, "Control of Heavy Loads at Nuclear Power Plants," Phase I.

Special Lifting Devices [Guideline 4, NUREG-0612, Section 5.1.1(4)]

"Special lifting devices should satisfy the guidelines of ANSI N14.6-1978, 'Standard for Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds (4500 kg) or More for Nuclear Materials' [10]. This standard should apply to all special lifting devices which carry heavy loads in areas as defined above. For operating plants, certain inspections and load tests may be accepted in lieu of certain material requirements in the standard. In addition, the stress design factor stated in Section 3.2.1.1 of ANSI N14.6 should be based on the combined maximum static and dynamic loads that could be imparted on the handling device based on characteristics of the crane which will be used. This is stress design factor on only the weight (static load) of the load and of the intervening components of the special handling device [NUREG-0612, Guideline 5.1.1(4)]."

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A detailed comparison was made by Westinghouse of the information contained in ANSI N14.6 with the information that was used to design, manufacture, inspect and test the special lifting devices used at Surry Power Station. The comparison shows that the special lifting devices meet the intent of the ANSI requirements for design, fabrication and quality assurance. However, they are not in strict compliance with all the ANSI N14.6 requirements for maintenance, acceptance testing, and verification of continuing compliance.

The design, fabrication and quality assurance requirements were defined by Westinghouse on the detailed manufacturing and assembly drawings and purchase order documents. Manufacturing surveillance with hold points, procedure review and personnel qualification to adequately meet ANSI N14.6 requirements were also provided by Westinghouse during the design, fabrication and assembly of the special lifting devices.

Although ANSI N14.6 Section 5.2.1 required initial load testing at 150 percent maximum load, the reactor vessel head lifting rig had load and lift tests of 100 percent maximum loads performed followed by appropriate non-destructive tests after site assembly, while the reactor internals lifting rig and the reactor coolant pump motor lifting device were not required to be load tested. However, load tests were performed on these two devices prior to their initial use in the plant.

ANSI N14.6 Section 5.3 requires verification of continuing compliance of the special lifting devices by either annual load test at 150 percent of maximum load or non-destructive testing and visual examination. Because these devices are located in the containment these tests are impractical to perform. Maintenance procedures require the reactor vessel head and internals lifting rigs to be inspected prior to each refueling and at each containment maintenance period if they are to be used and have been idle for a period of more than six months or the last inspection has been over one year. The reactor coolant pump motor lifting rig is required to be inspected prior to each refueling and at each containment maintenance period if they are to be used and the last inspection has been over one month. These inspections are visual inspections of the devices, their critical welds and any bolted joints or connections, and do not require disassembly of any components. These inspections and results are documented per the appropriate procedures and their attachments. A load cell is used with the reactor vessel head and internals lift rigs for continued monitoring during all lifting and lowering.

A stress report has been prepared by Westinghouse to determine the acceptability of the special lifting devices to meet the design requirements of ANSI N14.6. The actual design criteria used in most cases was that the resulting stress in the load members, when subjected to the total combined lifting weight, does not exceed one fifth (1/5) of the ultimate strength of the material. These devices when designed and fabricated were not classified

as nuclear safety components thus formal documentation of design requirements and stress reports were not required. However, the design, fabrication and quality assurance requirements were defined on detailed manufacturing drawings and purchase order documents.

Application of the ANSI N14.6 criteria of three (3) and five (5) stress design factors to the special lifting devices results in acceptable stress limits for tensile and shear stresses with the following exceptions for the reactor internals lifting rig.

(1) The tensile and shear stresses in the side plates;

(2) The thread shear stress in the leg adaptor; and

(3) The tensile stress at the minimum section of the engaging screw,

slightly exceed the criteria that three (3) times the calculated stress must be less than the yield stress. However, the conservative criteria that five (5) times the calculated stress must be less than the ultimate stress is met, therefore these three items can also be considered acceptable, and in compliance with ANSI N14.6.

In conclusion, the following can be stated:

1. The ANSI N14.6 requirements for design, fabrication and quality assurance are generally in agreement with those used for the special lift devices.

2. The special lift devices may not be in strict compliance only with the ANSI N14.6 requirements for acceptance testing, maintenance and verification of continuing compliance. However, the load and non-destructive tests performed following fabrication and assembly demonstrates the acceptability of these devices. Also the present station Maintenance and Administrative Procedures address the concerns of the maintenance and verification of continuing compliance with the ANSI N14.6 requirements.

3. The ANSI N14.6 criteria for stress limits associated with certain stress design factors for tensile and shear stresses with design criteria for stress design factors of three (3) and five (5) are adequately satisfied and considered acceptable.

Conformance of special lifting devices used to handle spent fuel shipping cask and/or irradiated specimens to ANSI N14.6 - 1978, ANSI B30.8 - 1971 and other appropriate criteria shall be verified prior to use of such devices.

If you have any questions or require further clarification or information concerning the resolutions provided, please advise.

Very truly yours,

W. L. Stewart

cc: Mr. James P. O'Reilly
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Mr. Donald J. Burke
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Surry Power Station