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February 13, 1985

United States Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: Mr. George W. Knighton, Chief
Licensing Branch 3
Office of Nuclear Reactor Regulation

SUBJECT: Beaver Valley Power Station - Unit No. 2
Docket No. 50-412
Additional Information on Draft SER Outstanding Issue 136

Gentlemen:

Conversations with your staff have indicated that additional information is required to complete your review of the control of heavy loads (Outstanding Issue 136). Additional information is attached to this letter to address the following items:

1. Design comparison of special lifting devices to ANSI N14.6-1978
2. Technical specification limits
3. Shield plug design

This completes the Duquesne Light Company response to this outstanding issue.

DUQUESNE LIGHT COMPANY

By E. J. Woolever
E. J. Woolever
Vice President

KAT/wjs
Attachments

cc: Mr. B. K. Singh, Project Manager (w/a)
Mr. G. Walton, NRC Resident Inspector (w/a)

SUBSCRIBED AND SWORN TO BEFORE ME THIS
13th DAY OF February, 1985.

Anita Elaine Reiter
Notary Public

ANITA ELAINE REITER, NOTARY PUBLIC
ROBINSON TOWNSHIP, ALLEGHENY COUNTY
MY COMMISSION EXPIRES OCTOBER 20, 1986

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COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF ALLEGHENY)

On this 13th day of February, 1985, before me, a Notary Public in and for said Commonwealth and County, personally appeared E. J. Woolever, who being duly sworn, deposed and said that (1) he is Vice President of Duquesne Light, (2) he is duly authorized to execute and file the foregoing Submittal on behalf of said Company, and (3) the statements set forth in the Submittal are true and correct to the best of his knowledge.

Anita Elaine Reiter
Notary Public

ANITA ELAINE REITER, NOTARY PUBLIC
ROBINSON TOWNSHIP, ALLEGHENY COUNTY
MY COMMISSION EXPIRES OCTOBER 20, 1986

ATTACHMENT 1

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

The December 22, 1980, Generic Letter from Mr. Eisenhut stated in part:

> "Verification that lifting devices identified in 2.1.3-c, above, comply with the requirements of ANSI N14.6-1978, or ANSI B30.9-1971 as appropriate. For lifting devices where these standards, as supplemented by NUREG 0612, Section 5.1.1(4) or 5.1.1(5), are not met, describe any proposed alternatives and demonstrate their equivalency in terms of load-handling reliability."

The following additional information is provided on this subject:

ANSI N14.6-1978 (Special Lifting Devices for Shipping Containers Weighing 1,000 Pounds or More for Nuclear Materials), Section 3.1, Designer's Responsibilities

A. Limitations on the use of Lifting Device (3.1.1)

Response

The standard states that the designer of the lifting device is to prepare a design specification containing in part a definition of performance criteria, requirements for drawings and materials, inspection and testing to be performed and limitations on the use of the device with respect to temperature, corrosive environments, etc. At the time these devices were procured and fabricated, a requirement for a design specification did not exist. The designer, the Westinghouse Electric Corporation, did not write a design specification concerning these specfic requirements. However, assembly and detailed manufacturing drawings and purchasing documents contain the following information:

- Material specification for most of the critical load path items to ASTM, ASME specifications or special listed requirements (See B below)
- Welding, weld procedures, and welds to be in accordance with ASME Boiler and Pressure Vessel Code - Section IX
- Special NDT for specific critical load path items to be performed to written and approved procedures in accordance with ASTM or specified requirements
- All coatings to be performed to strict compliance with specified requirements
- Letters of compliance for materials and specifications were required for verification with original specifications

No limitations were identified as to the use of these devices under specific environmental conditions. The conditions under which the

lifting devices are stored and used were considered and accounted for in their design and fabrication. This can be demonstrated by the use of protective coatings applied in accordance with the designers specified requirements.

B. Identification of Critical Components and Definition of Critical Characteristics (3.1.2)

Response

A critical items list of parts and welds has been prepared for the reactor vessel head lift rig and the reactor vessel internals lift rig and the RCP motor lift rig. The information contained on this list includes material identification and the applicable volumetric and surface inspections that were performed in the fabrication of these special lifting devices. In some instances, non-destructive testing was not specified since the material selection and strength result in very low tensile stresses and thus, non-destructive testing was not justified.

The material selection for most critical load path items was made to ASTM, ASME, or special material requirements. However, the non-design items of the RCP motor lift sling were selected based on their load carrying capabilities. These include "U" bolts, wire rope slings, shackles, turnbuckles, and hooks. The material requirements were supplemented by Westinghouse imposed non-destructive testing, and/or special heat treating requirements for all of the critical items. Westinghouse required all welding, welders, and weld procedures to be in accordance with ASME Boiler and Pressure Vessel Code Section IX for carbon steel welds. They also required a certificate, or letter of compliance that the materials and processes used by the manufacturer were in accordance with the purchase order and drawing requirements. Westinghouse also performed final inspections on these devices and issued quality releases.

C. Signed Stress Analyses which Demonstrate Appropriate Margins of Safety (3.1.3)

Response

A stress analysis of the special lifting devices has been prepared by Westinghouse. This analysis documents the adequacy of the special lifting devices in that they can perform their function within appropriate margins of safety. The ANSI N14.6 criteria have been met for tensile and shear stresses.

D. Indication for Permissible Repair Procedures (3.1.4)

Response

The standard states that the designer should indicate what repair procedures are permissible. The following guidance will be used for repairs to these devices. Any repair to these special lifting devices is considered to be in the form of welding. Should pins,

bolts or other fasteners need repair, they should be replaced, in lieu of repair, in accordance with the original or equivalent requirements for material and non-destructive testing. Weld repairs and examinations will be performed in accordance with plant procedures.

ANSI N14.6 Section 3.2; Design Criteria

A. Use of Stress Design Factors of 3 for Minimum Yield Strength and 5 for Ultimate Strength (3.2.1)

Response

The load bearing members of the special lifting devices are capable of lifting three times the combined lifting weight of the design lift without generating a combined shear stress or maximum tensile stress within the lifting device in excess of the corresponding minimum yield strength of the materials of construction. They also are capable of lifting five times that weight without exceeding the ultimate strength of these materials. This has been documented in the stress report prepared for these devices. The ANSI N14.6 criteria (3 for yield, 5 for ultimate) has been met for tensile and shear stresses.

High strength materials were used in these devices. Although the fracture toughness was not tested, the materials used were selected based on their excellent fracture toughness characteristics. However, in lieu of a different stress design factor, the ANSI N14.6 stress design factors of 3 and 5 were used in the analysis and the resulting stresses are considered to be acceptable. NUREG-0612, Article 5.1.1 (4) further states that the stress design factor should be based on the combined maximum static and dynamic loads that could be imparted on the handling device based on the characteristics of the crane which will be used.

The dynamic characteristics of the crane would be based on the main hook and associated wire ropes holding the hook. Should the crane hook suddenly stop during lifting or lowering of a load, a shock load could be transmitted to the connected device. Because of the elasticity of the wire ropes, the dynamic factor for a typical containment crane is not not much larger than 1.0. The maximum design factor that is recommended by most design texts is a factor of 2.0 for loads that are suddenly applied. The stress design factor of 3 for yield strength from the ANSI criteria certainly includes consideration of suddenly applied loads for cases where the dynamic impact factor may be as high as 2.0.

B. Similar Stress Design Factors for Load Bearing Pins, Links and Adapters (3.2.4)

Response

The stress design factors of ANSI N14.6 Section 3.2.1 of 3 and 5 were used in the analysis and the resulting stresses were

acceptable. This has been documented in the stress report. Where necessary, the weight of pins was considered for handling.

C. Slings used Comply with ANSI B30.9-1971 (3.2.5)

Response

The wire rope used on the RCP Motor Lift Sling complies with ANSI B30.9-1971.

D. Subjecting Materials to Dead Weight Testing or Charpy Impact Testing (3.2.6)

Response

Drop weight and Charpy impact tests were not required. However, all material selection was based on its excellent fracture toughness characteristics.

ANSI N14.6 Section 3.3; Design Considerations

A. Design Shall Assure Even Distribution of the Load (3.3.4)

Response

These special liftig devices were designed to assure even distribution of the load.

B. Retainers Fitted for Load-Carrying Components which may become Inadvertently Disengaged (3.3.5)

Response

Locking plates, pins, etc. are used throughout these special lifting devices.

C. Verification that Remote Actuating Mechanisms Securely Engage or Disengage (3.3.6)

Response

Remote actuation is only used when engaging in the internals lift rig with the internals. Position indication is provided from the operating platform.

ANSI N14.6 Section 4.1; Fabricator's Responsibilities

A. Verify Selection and Use of Material (4.1.3)

Response

The critical load carrying members of these special lifting devices were designated by Westinghouse, the designer, as requiring letters of compliance to document the use of the correct materials.

B. Compliance with Fabrication Practices (4.1.4)

Response

General good manufacturing processes were followed in the manufacture of these devices. Assembly and detailed manufacturing drawings contained information regarding the fabrication of these special lifting devices. Westinghouse performed checks and inspections during various steps of manufacturing.

C. Qualification of Welders, Procedures, and Operators (4.1.5)

Response

The manufacturer's welding procedures and non-destructive testing procedures, as well as personnel qualifications, were reviewed by Westinghouse.

D. Provisions for a Quality Assurance Program (4.1.6)

Response

The manufacturer's welding procedures and non-destructive testing procedures were reviewed by Westinghouse prior to use.

E. Provisions for Identification and Certification of Equipment (4.1.7)

Response

Most of the critical load carrying members require letters of compliance for material requirements. In addition, Westinghouse performed checks and inspections during various steps of manufacturing.

F. Verification that Materials or Services are Produced Under Appropriate Controls and Qualifications (4.1.9)

Response

Westinghouse Quality Assurance personnel performed in-process and final inspections on the materials, work and finished product. Final Westinghouse review included visual, dimensional, procedural, cleanliness, personnel qualifications checks, and the issuance of a quality release to ensure conformance with drawing requirements.

ANSI N14.6 Section 5.1; Owner's Responsibilities

A. Implementation of a Periodic Testing Schedule and a System to Indicate the Date of Expiration (5.1.3)

Response

The special lifting devices at Beaver Valley Unit 2 will be used infrequently, normally only during refueling outages which will be occurring on a frequency of approximately 18 months. During refueling outages, these devices may only be used for 2 to 3 lifts each.

For this reason, it is considered impractical to implement a periodic testing schedule. The ANSI Standard was written for special lifting devices which could be used at a much greater frequency, where a periodic testing schedule would be appropriate.

In order to verify special lifting device capability of reliably performing their function, procedures require a visual check of critical welds and parts prior to use and as an initial step when performing a lift.

B. Provisions for Establishing Operating Procedures (5.1.4)

Response

Instructions on the use of special lifting devices will be contained in plant refueling and maintenance procedures.

C. Identification of Subassemblies which may be Exchanged (5.1.5), and

D. Suitable Markings (5.1.5)

Response

It is obvious, from their designs, that these rigs are specific lifting devices that can only be used for their intended purpose and that parts are not interchangeable. Therefore, labeling each special lifting device for its intended purpose is not necessary.

E. Maintaining a Full Record of History (5.1.6)

Response

A record of the history of the special lifting devices is maintained in accordance with plant procedures. Records are available documenting the inspections performed on these devices, pre-lift and during lift, as well as the completed procedures which were followed during their use. If maintenance is required on these devices, plant procedures provide for the documenting of the repairs performed.

F. Conditions for Removal from Service (5.1.7)

Response

Any special lifting device which has experienced any incident causing doubt as to its being able to perform acceptably, or which has been damaged will be removed from service until it has been repaired or it has been demonstrated to be capable of performing its intended function. These devices will not be used until the required visual inspections have been performed in accordance with plant procedures.

ANSI N14.6 Section 5.2; Acceptance Testing

A. Load Test to 150% and Appropriate Inspections Prior to Initial Use (5.2.1)

Response

The special lifting devices were load tested after field assembly to 125% maximum load followed by non-destructive testing of critical welds. Load testing to 125% is considered adequate in view of the safety factors designed into these devices.

B. Qualification of Replacement Parts (5.2.2)

Response

Replacement parts, should they be required, will be made of identical or equivalent material and inspected as originally required.

ANSI N14.6 Section 5.3; Testing to Verify Continuing Compliance

A. Satisfying Annual Load Test or Inspection Requirements (5.3.1)

Response

These special lifting devices are used during plant refueling which will be approximately every 18 months. During plant operation, these devices are inaccessable since they are permanently installed and/or remain in the containment. It is considered impractical to attempt to remove these devices from containment for load testing. Likewise, load testig to 150% of the total weight before each use would require special fixtures and is impractical to perform.

In order to demonstrate continuing compliance, a visual examination of critical welds and parts will be conducted prior to lifting and at the initial lift prior to moving to full lift and movement. This will be accomplished by raising the load slightly above its support and holding it for 10 minutes. During this time, critical welds and parts will be visually inspected. If no problems are apparent, the lift will continue. Additionally, a non-destructive examination of major load-carrying welds will be performed as part of the ten-year inservice inspection outage. This testing interval is justified because of the low usage these special lifting devices receive during this period.

Non-destructive testing on an annual basis is not considered practical for the following reasons:

° Access to the welds for surface examination is difficult. These rigs are in containment and some radioactive contamination may be present.

° All tensile and shear stresses in the welds are well within the allowable stresses.

° The items that are welded remain assembled and cannot be misused for any litt other than their intended function.

° To perform non-destructive tests would require the following which from an ALARA standpoint is not justified.

1. Removal of contaminated paint around the area to be examined.
2. Performance of either magnetic particle inspection or liquid penetrant inspection
3. Repainting after testing is completed
4. Clean-up of contaminated items

° The frequency of use and, therefore, the wear on the special lifting devices is much lower than for shipping containers for which the Standard was written.

Dimensional checking is not included since these structures are large and the results of dimensional checking would always be questionable. Other checks on critical load path parts such as pins, are also not included since an examination of these items would require disassembly of the special lifting devices.

This ANSI standard was written for special lifting devices for shipping containers weighing 10,000 pounds or more. Lifting devices for this application are typically far less complicated in design and, therefore, meeting this standard would be easily achieved. Application of this part of the standard to the special lifting devices at Beaver Valley is not considered practical. The activities as described in this respose should meet the intent of the standard in determining that the lifting device is capable of performing its intended function safely.

B. Testing Following Major Maintenance (5.3.2)

Response

Any major maintenance which may be needed on these special lifting devices is considered to be in the form of welding. Weld repairs will be performed in accordance with plant procedures. The repaired area will be non-destructively examined to determine acceptability of the repairs. It will then be subjected to loading to the level expected to be carried within the repaired area and then another non-destructive examination will be performed.

C. Testing After Application of Substantial Stresses (5.3.3)

Response

If the load-bearing components of these special lifting devices have been subjected to stresses substantially in excess of those for which it was qualified, the following will be performed. Replaceable parts will be tested in accordance with approved procedures to determine if they are acceptable for continued use or they will be replaced as described in the respose to ANSI N14.6 Section 5.2.2. Welds will be non-destructively examined in accordance with plant

procedures to determine if they are acceptable for continued use or they will be repaired and tested in accordance with the response to ANSI N14.6 Section 5.3.2.

D. Inspections by Operating (5.3.6) and Non-Operating or Maintenance Personnel (5.3.7)

Response

Plant procedures require these special lifting devices to be visually inspected prior to use by maintenance personnel. These devices are also visually inspected at critical welds while under load by holding the load slightly above its support for 10 minutes.

For any lift of a heavy load with a special lift device, present procedures provide for a Quality Control Inspector to provide surveillance of the lift activity. This includes proper installation of rigging and a visual inspection of critical welds on these devices.

ATTACHMENT 2

Technical Specification Restriction on Loads Carried over the Spent Fuel Pool

The BV-2 Draft Technical Specification, Section 3.9.7 for Refueling Operations, has a 3,000 pound limit specified for loads that could be carried over the fuel pool when there are fuel assemblies stored in the pool. This 3,000 pound limit is based on the combied weight of a fuel assembly, a fuel storage container, and the spent fuel handling tool.

The motor driven platform crane hoist has an interlock setting of less than 3,000 pounds. Administrative procedures require that maintenance operations be carried out along a safe path away from the spent fuel pool. In these special cases, the hoist interlock can be overridden.

Analyses have been performed which show that there is no adverse safety impact if a handling tool or a fuel assembly and its handling tool are dropped onto the fuel racks.

ATTACHMENT 3

Concrete Shield Plugs

The movement of concrete shield plugs follows safe load paths. These load paths as discussed in FSAR Section 9.1.5 are utilized to preclude dropping heavy loads on safety-related equipment or spent fuel. The integrity of removable concrete shield plugs during their movement is ensured by the provision of a minimum factor of safety of four against pull out for the lifting inserts. Therefore, adequate protection is provided against damage to safety related equipment.