TENNESSEE VALLEY AUTHORITY

NUCLEAR ENGINEERING

WATTS BAR NUCLEAR PLANT

ENGINEERING SPECIFICATION

N3M-940

FOR

DESIGN AND PROCUREMENT

OF LIFTING DEVICES

(Previously ER-WBN-MNM-001)

QA Record

B26'91 0227 077

	RIMS ACCESSION NUMBERS					
	REVISION R0	R1	R2	R3	R4	R5
PREPARED	2-6-91 RA Heuges					
SUPERVISED	2-14-91 E. Bruce Epperson					
VERIFIED	Satish C. Lall 2/19/91					
APPROVED						
DATE	2/27/91					

Title: DESIGN AND PROCUREMENT OF LIFTING DEVICES	REVISION LOG N3M-940	
Revision No.	Description of Revision	Date Approved
0	Initial issue. This specification supercedes Engineering Requirements Specification ER-WBN-MNM-001 R/0 titled "Design and Procurement of Lifting Devices." No other changes are provided.	FEB 27 1991

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1.0 INTRODUCTION

1.1 Purpose

The purpose of this specification is to provide the requirements for designing and procuring lifting devices used at Watts Bar Nuclear Plant (WBN) and provides for the classification of lifting devices based on their potential impact on nuclear safety.

1.2 Scope

The overhead handling systems used at WBN can be categorized into two general classifications:

1. Those handling systems used in areas of the plant where nuclear safety-related/safe shutdown systems and equipment are located.

2. Those handling systems used exclusively in areas of the plant where nonsafety-related systems are found.

Overhead handling systems and the associated lifting devices in the first category require special design considerations which can be found in NUREG-0612 and ANSI N14.6. Because of the interpretive nature of these documents, due in part to ambiguous wording regarding design requirements, this specification attempts to provide a clear and usable interpretation of the design requirements limited to the following types of lifting devices:

1. Lifting beams (structural lifting device) as defined in ANSI/ASME B30.20 - 1985, Chapter 20-1, Group I, "Structural and Mechanical Lifting Devices" (excluding manipulating, friction-type and/or pressure gripping devices).

2. Slings as defined in ANSI/ASME B30.9 - 1984.

Providing clarification of the design requirements will result in their consistent application and adherence to the requirements contained in this specification will achieve compliance with the regulatory guidelines for NUREG-0612 lifting devices identified for use at WBN.

Lifting devices used in nonsafety-related areas are not required to meet the design considerations stated herein but shall comply with the requirements contained in the applicable ASME/ANSI standard (i.e., B30.9 or B30.20).

1.3 Background (excerpts taken from NUREG-0612)

In nuclear power plants heavy loads may be handled in several plant areas. If these loads were to drop in certain locations in the plant, they may impact spent fuel, fuel in the core, or equipment that may be required to achieve safe shutdown and continued decay heat removal. If sufficient spent fuel or fuel in the core were damaged and if the fuel is highly radioactive due to its irradiation history, the potential releases of radioactive material could result in off-site doses that exceed 10 CFR Part 100 limits. If the load damaged equipment associated with redundant safe shutdown paths, the capability to achieve safe shutdown may be defeated. Additionally, if fuel is of sufficient enrichment, the normal boron concentrations that are maintained may not be sufficient to prevent a load drop from causing the fuel assemblies to be crushed and result in criticality.

The Nuclear Regulatory Commission (NRC) staff has developed an overall philosophy that provides a defense-in-depth approach for controlling the handling of heavy loads. This philosophy encompasses an intent to prevent as well as mitigate the consequences of postulated accidental load drops. The following summarizes this defense-in-depth approach:

1. Provide sufficient operator training, handling system design, load handling instructions, and equipment inspection to assure reliable operation of the handling system.

2. Define safe load travel paths through procedures and operator training so that to the extent practical heavy loads avoid being carried over or near irradiated fuel or safe shutdown equipment.

3. Provide mechanical stops or electrical interlocks to prevent movement of heavy loads over irradiated fuel or in proximity to equipment associated with redundant shutdown paths.

The intent of NUREG-0612, Section 5.1.1 is to provide adequate measures that minimize the occurrence of the principal causes of load handling accidents and to provide an adequate level of defense-in-depth for handling of heavy loads near spent fuel and safe shutdown systems.

The objectives of NUREG-0612 guidelines are to assure that either the potential for a load drop is extremely small, or for each critical lift zone identified, the following evaluation criteria are satisfied:

1. Release of radioactive material that may result from damage to spent fuel based on calculations involving accidental dropping of a postulated heavy load produce doses that are well within 10 CFR Part 100 limits of 300 rem thyroid, 25 rem whole body (analyses should show that doses are equal to or less than 1/4 of Part 100 limits.

2. Damage to fuel and fuel storage racks based on calculations involving accidental dropping of a postulated heavy load does not result in a configuration of the fuel such that Keff is larger than 0.95.

3. Damage to the reactor vessel or the spent fuel pool based on calculations of damage following accidental dropping of a postulated heavy load is limited so as not to result in water leakage that could uncover the fuel, (makeup water provided to overcome leakage should be from a borated source of adequate concentration if the water being lost is borated).

4. Damage to equipment in redundant or dual safe shutdown paths, based on calculations assuming the accidental dropping of a postulated heavy load, will be limited so as not to result in loss of required safe shutdown functions.

Because it is not feasible, and in some cases not possible, to demonstrate that the above criteria can be satisfied for the postulated dropping of every critical load handled at WBN, the aspects of load handling which are identified in NUREG-0612, Section 5.1.1, (i.e., safe load paths, procedures, crane operator qualification, lifting device design, crane inspection, and crane design) have been addressed in TVA's response to Section 2.1 of Enclosure 3 to NRC's Generic Letter 81-07. Due to known deficiencies with some existing WBN lifting devices as reported in WBN's 2.1 response, this specification provides direction and clarification of the design (and procurement) requirements for lifting devices as stated in NUREG-0612, Section 5.1.1.(4), "Special Lifting Devices."

1.4 Acronyms

ANSI - American National Standards Institute
ASME - American Society of Mechanical Engineers
ASTM - American Society for Testing and Materials
AWS - American Welding Society
NP STD - Nuclear Power Standard
NRC - U. S. Nuclear Regulatory Commission
NSSS - Nuclear Steam Supply System
NUREG - Nuclear Regulation
TER - Technical Evaluation Report

1.5 Definitions

Note: Definitions provided are adapted from various reference documents listed in Section 2.0 and are worded, where appropriate, for clarity and consistency. The reference source and location is identified for each.

Critical Items List - A list that identifies the items of a "Special Lifting Device," and specifies their essential characteristics for which specific requirements shall apply in the design, fabrication, utilization, and maintenance of the device. (ANSI N14.6-1986, paragraph 3)

Critical Lift Zone (CLZ) - An area, whether permanent or temporary, within a licensed plant where a load-drop impact could potentially release radioactive material into the environment or prevent equipment from properly functioning that may be required to achieve and maintain safe unit shutdown. (NP STD-10.3.175 [or 179], Section 5.0)

Critical Load - Any "Heavy Load" whose uncontrolled movement or release could adversely affect irradiated nuclear fuel, any safety-related system when such system is required for unit safety, or could result in potential off-site release of radiation. (ANSI N14.6 - 1986, paragraph 3)

Dual-Load-Path Lifting Device - A system (device) providing two distinct paths of support from the crane through the special lifting device to the load. Each path is capable of supporting the load in such a manner that no uncontrolled movement of the load will result from the failure or malfunction of a single part. (ANSI N14.6-1986, paragraph 3)

Handling System - A system comprised of all load bearing components used to lift a load, including the crane or hoist, the lifting device, and the interfacing load lift points. (NUREG-0612, paragraph 1.2)

Heavy Load - Any load carried in a critical lift zone that weighs more than the combined total weight of a single spent fuel assembly and its associated handling tool. (NUREG-0612, paragraph 1.2; NP STD-10.3.175 [or 179], Section 5.0)

Lifting Device - Any hardware used to suspend an object from a crane or hoist hook. The hardware may consist of a single component or an assembly of components which transmit the load from lifting attachment points that are permanently affixed to the object being lifted to the hook(s) of an overhead hoisting system. (NP STD-10.3.175 [or 179], Section 5.0)

Safe Load Path (SLP) - A specific path defined for the transport of a specific heavy or critical load that will completely eliminate or minimize the possibility of adverse affects if the load is dropped. (NUREG-0612, paragraph 1.2)

Note: If the hazard to a potential target is minimized by sufficient distance resulting from electrical interlocks or mechanical stops, the stops and interlocks should not be bypassed without approval from the shift supervisor or other designated plant management personnel. (NUREG-0612, paragraph 5.1.1[1])

Safe Shutdown Equipment - Safety-related equipment and associated subsystems that would be required to bring the plant to cold shutdown conditions or provide continued decay heat removal following to the occurrence of a load drop incident. (NUREG-0612, paragraph 1.2)

Special Lifting Device - A lifting device that is designed and designated specifically for handling a particular load or loads. (NUREG-0612, paragraph 1.2)

Stress Design Factor - The ratio of the allowable stress of the material from which a part is fabricated to the actual stress the part will experience in service. The stress design factor shall be based upon both the ultimate strength and yield strength of the material. (ANSI-N14.6-1986, paragraph 3)

NOTE: When a material's yield strength exceeds 80 percent of its ultimate strength, the designer shall establish and justify criteria to assure adequate fracture toughness of the material. (ANSI N14.6-1986, paragraph 5)

Manufacturer - The source of fabricated materials contained in a special lifting device where special processes are required to facilitate completion of the lifting device. Prequalification of special processes such as welding and heat treating is required before the process is applied. The term "manufacturer" as used herein serves to identify the "source" of commercially available catalog products or fabricated items. This definition differentiates the manufacturer (or fabricator) from the vendor (or "assembler") of the lifting device. (ANSI N14.6-1986, paragraph 5)

Vendor - The source of an assembled lifting device. The "vendor" or "assembler" may combine catalog-sourced products and/or fabricated components to create a lifting device within his facility. The manufacturer and vendor may be the same party.

2.0 REFERENCES

ANSI N14.6 - 1986, Special Lifting Devices for Shipping Containers Weighing 10,000 Pounds or More

ANSI/ASME N45.2.15-1981, Hoisting, Rigging, and Transporting of Items for Nuclear Power Plants

ANSI/ASME B30.9 - 1984, Slings

ANSI/ASME B30.20 - 1985, Below-the-Hook Lifting Devices

NUREG-0612, Control of Heavy Loads in Nuclear Power Plants

NRC Letter dated December 22, 1980 and supplemented by NRC Generic Letter GL 81-07 dated February 3, 1981

NRC Generic Letter GL 85-11 dated June 28, 1985

TVA letter to NRC dated February 6, 1984 (A27 840206 001), 2.1 Response

TVA Standard NP STD-4.10.50, Procurement of Materials, Components, Spare Parts, and Services

TVA Standard NP STD-10.3.175, Safe Practices for Operation of Overhead Handling Systems (pending). This standard is currently identified as NP STD-10.3.179.

Watts Bar Engineering Procedure EP-43.11, Modification Compliance Review - NUREG-0612

Watts Bar Engineering Procedure WP-22, Walkdown to Determine Any Modifications Which Affect the Requirements of NUREG-0612

3.0 DESIGN PROCEDURE

3.1 Design Steps

3.1.1 Handling System Utilization - In order for the designer to reach design decisions which will satisfy the regulatory intent of NUREG-0612, the designer must initially have a detailed knowledge of existing and proposed plant general arrangement, crane/monorail locations and operating zones, handling equipment capacities, load lift heights, and a general knowledge of the loads to be lifted/moved. An initial assessment should be made to identify handling systems having no potential for adverse effects on nuclear fuel or safety-related equipment required to achieve or maintain safe-shutdown of the plant. No further special consideration is required for these handling systems, lifting devices, and their associated loads.

3.1.2 Handling Systems for Critical Loads - For handling systems which are initially identified as carrying critical loads, a detailed review shall be conducted in accordance with Section 5, "Guidelines for Control of Heavy Loads," of NUREG-0612, and succeeding paragraphs 3.1.3 through 3.1.4 of this specification.

3.1.3 Load/Target Analysis - A handling system used to carry critical loads must comply with the requirements of NUREG-0612, but may be excluded from such requirements based on a documented definitive study of the following load target characteristics as they relate to the elimination of potential targets.

3.1.3.1 Load Characteristics - The physical characteristics of the load must be evaluated. Load characteristics include but are not limited to:

A. Weight, and outline dimensions.

B. Required lift height, or lowering distance to a lower elevation through a hatch.

C. Potential motions of the load during a postulated drop event, i.e., tendency to roll, topple, or remain stationary at the point of impact. Also, consideration should be given to motions which could result if the load strikes other objects or structures during its descent.

D. Maximum distance moved along a potential travel path (i.e., along a monorail path, or the operating zone of a rectilinear crane system). Consideration should be given to mechanical stops and electrical interlock systems, either permanent or temporary, which could exist as part of the handling system which would limit travel distance.

E. A potential load should be assessed for expected repair frequency. (An example of a low repair frequency item is the component cooling pump lower casing and pedestal, where all internal parts subject to normal wear and/or damage are removable as subassemblies. The pump casing may be identified as a potential critical load, but a special handling device need not necessarily be designed/procured in advance.)

3.1.3.2 Target Identification - A target evaluation is required for each safety-related target within a CLZ and examined with respect to each potential missile (i.e., load).

A. The CLZ for a given handling system may be bounded by one or more loads, generally the heaviest or widest/longest load. For example, using the dimensions of the widest load of a given handling system in addition to providing an additional buffer distance based on the load characteristics, the boundaries of a critical lift zone can be defined along the path of the handling system. Potential targets beyond the CLZ are judged "not affected" due to sufficient physical separation distance.

B. Defining the boundary of a CLZ may require consideration of other factors. For example, the load may have a tendency to roll or topple if dropped. Likewise, a compact load might be lifted to a height substantially higher than the initial bounding load, presenting a risk not previously considered.

3.1.3.3 Target Exclusion -Potential targets associated with a specific handling system may be excluded from consideration for the reasons listed below:

A. Target is not within a critical lift zone for the handling system and potential missile (i.e., dropped load).

B. Target is redundant and both trains of the system in question cannot be impacted simultaneously, due to sufficient separation distance or physical barriers.

C. Target is "out-of-service" when the load is moved. The target may be associated with the load itself (e.g., a pump assembly) or the target may be out-of-service per applicable plant Technical Specifications. A target identified as "out-of-service" cannot be automatically eliminated solely as a result of being shutdown and tagged out. The potential targets must be reviewed to ensure that an impact will not damage piping associated with the "out-of-service" component which would put interconnected trains of the system at risk. Valve isolation of the "out-of-service" component must be sufficiently remote from the postulated point of impact to ensure the continued integrity of essential system trains.

D. Target has been shown by analysis to withstand the maximum credible impact imparted by the load in question without exceeding the criteria stated in Section 5.1 of NUREG-0612 and restated in Section 1.3 of this specification.

E. Target is protected by an intervening structure, demonstrated by analysis to be capable of withstanding the impact of an uncontrolled load without causing damage to safety-related equipment. These structures may include walls, floors, closed hatch covers, etc.

F. Where credit is taken for an intervening concrete structure, the affects of spalling must be considered, especially spalling of the bottom surface of floor slabs.

G. Targets may be provided a degree of protection by an electro-mechanical interlock which limits crane/monorail travel and protects the target by maintaining a suitable separation distance between target and missile. This approach is impractical where numerous targets exist at different locations for a particular handling system.

3.1.4 Handling System Exclusion - A handling system may be excluded from the requirements of this specification when it can be demonstrated by inspection and analysis that all potential targets associated with a handling system are eliminated for one or more of the reasons listed in 3.1.3.3.

3.1.5 Safe Load Paths - A "safe load path" for each heavy load shall be developed to minimize the potential for damage if a heavy load is dropped. A safe load path does not substitute for enhanced design since it is an administrative control measure. A safe load path complements other protective measures, such as interlocks or mechanical stops by providing the prescribed "defense-in-depth" protection. A target exclusion is not appropriate based solely on a "safe load path."

3.1.6 NUREG-0612 - Handling System Design (crane monorails, etc.) - Cranes transporting heavy or critical loads along load paths or where safety-related targets exist for which target exclusions cannot be identified, shall meet the design requirements of Section 5.1.1 (6) and (7) of NUREG-0612.

3.1.7 NUREG-0612 - Lifting Device Design - Lifting devices carrying heavy or critical loads along load paths where safety-related targets exist for which exclusions cannot be identified, shall meet the design requirements of Section 4.1 of this specification.

3.1.8 Non-NUREG-0612 - Crane Design - Cranes, monorails, etc., transporting loads in areas of the plant where safety-related targets and nuclear fuel are not found shall meet the design requirements stated in TVA procurement specifications for those cranes, monorails, etc.

3.1.9 Non-NUREG-0612 - Lifting Device Design - Lifting devices (rigging) used in conjunction with non-NUREG-0612 cranes per paragraph 3.1.8 above shall meet the design requirements of the applicable ASME/ANSI Standard and utilized in accordance with NP STD-10.3.175 (or 179).

3.2 Classification of Systems and Devices - Adherence to the evaluation process described in Section 3.1 above will result in all handling systems, all lifting devices, and all loads, being defined as either: (a) NUREG-0612, or (b) non-NUREG-0612. These groupings are consistent with the reporting requirements of Enclosure 3 to NRC Generic Letter GL81-07 which addresses the design, fabrication, testing, and utilization of handling systems and lifting devices.

3.2.1 Initial identification of hazards can be accomplished using plant general arrangement drawings, and crane/monorail layout drawings. This permits preliminary decisions to be reached concerning the design characteristics of cranes and lifting devices.

3.2.2 Final assessment of safety hazards related to "field run" piping, electrical raceway (conduit) and instrument tubing must follow the "construction complete " project phase. Final walkdown to determine potential hazards must be accomplished in accordance with Watts Bar Engineering Procedures WP-22, "Walkdown to Determine Any Modifications Which Affect the Requirements of NUREG-0612," and Watts Bar Engineering Procedure (WBEP) EP43.11, "Modification Compliance Review - NUREG-0612."

4.0 DESIGN REQUIREMENTS FOR NUREG-0612 LIFTING DEVICES

4.1 Lifting devices shall meet the requirements of this design standards.

4.1.1 Nuclear Engineering (NE) interpretation of apparent conflicting requirements.

4.1.1.1 ANSI N14.6 provides a definition for the term "special lifting device" that is inconsistent with that provided in Section 1.2 of NUREG-0612. N14.6, paragraph 1.1, states that "simple slings or chains, with or without spreader bars," are excluded from the requirements of the standard. N14.6 also states that only devices requiring uniquely designed parts to accomplish the motions required for remote engagement are governed by the standard. In contrast, NUREG-0612 states that any device, whether simple or complex, is governed by the requirements of N14.6 if the device is designed and dedicated to handle a specific critical load or loads.

4.1.1.2 Subsequent to the issuance of NRC Generic Letter GL-85-11, which reduced the scope of reporting requirements to only those described in Section 2.1 of Enclosure 3 to GL-81-07, the Watts Bar Engineering Project (WBEP) affirms its position that the design factors as stated in this document will remain a goal for WBN.

4.1.1.3 WBEP adopts the definition of a "special lifting device" as provided in NUREG-0612 and ANSI N14.6-1986, Section 3.

4.1.1.4 A lifting device designed for a critical load and consisting of an assemblage of preengineered catalog source components which requires no other fabrication steps by a vendor other than connection and lockpinning, etc., shall not be exempted from the fabricator's responsibilities of N14.6, paragraph 5.0, and should be so indicated in TVA's procurement specification. Interpretation of N14.6 quality assurance (QA), special material(s) and testing requirements are provided in Table I of this specification.

4.1.2 The design requirements shown in Table I provides a description of ANSI N14.6 requirements, as well as an interpretation of each design rule as it shall be applied to NUREG-0612 lifting devices designed by or for TVA's WBN.

4.2 Lifting Devices for Non-NUREG-0612 Loads

Lifting devices used for general handling shall meet the requirements described in Section 3.1.9 of this specification. The guidelines of ANSI N14.6 could be applied to special lifting devices which handle noncritical loads. The guidelines of ANSI B30.9 pertain to special lifting devices which contain wire rope, synthetic fiber, or chain elements.

The lifting devices for general usage should be uniquely identified to clearly distinguish such devices from those designed for dedicated service.

5.0 PROCUREMENT REQUIREMENTS FOR NUREG-0612 SPECIAL LIFTING DEVICES

5.1 NUREG-0612 lifting devices shall be supplied by a qualified vendor having documented experience in satisfying the design and QA requirements of NUREG-0612 and ANSI/ASME N14.6.

5.2 The vendor of lifting devices assembled from catalog-sourced items is not required to maintain a QA program meeting the requirements of 10 CFR 50 Appendix B or a TVA-approved QA program. The vendor shall be capable of furnishing a certificate of compliance statement, verifiable proof load certificate from the original manufacturer of a catalog product, load test records for assemblies and subassemblies tested by the vendor, records of nondestructive examinations performed by the vendor or his subvendors, retrievable records of pretest and post-test dimensional inspections, and other records as required by TVA procurement specifications.*

5.3 The manufacturer of lifting device components requiring fabrication using special processes (e.g., welding, heat treating, etc.) shall meet all the requirements of ANSI N14.6, Section 5.1.1 through 5.1.12 as interpreted in Table I of this specification. In particular, the vendor shall have a program which supports the requirements of Section 5.2 of this specification for the manufacture of those items identified as critical items in the TVA design calculation.

6.0 INSPECTION AND STORAGE OF LIFTING DEVICES

6.1 TVA shall witness proof load testing of assembled lifting devices at the vendor or manufacturers facility, as stated in the procurement specification (see NP STD-4.10.50, paragraph 6.6.12).

6.2 TVA shall periodically inspect and retest lifting devices in accordance with NP STD 10.3.175 and applicable industry standards to demonstrate continued compliance with NUREG-0612 requirements.

6.3 TVA shall provide operating procedures, identification, rated load markings, historical records of usage and repair, and removal from service for NUREG-0612 lifting devices as required by NP STD 10.3.175.

*See NP Standard-4.10.50, "Procurement of Materials, Components, Spare Parts, and Services," paragraph 6.6.12.

ANSI N14.6-1986 Section	Description of ANSI N14.6 Requirement	Interpretation and Application of Requirements
1 2,3	Scope, References, and Definitions - These sections define the scope of the document and include pertinent definitions of specific items.	See paragraph 4.1.1 of this specification.
4 4.1 4.1.1 to 4.1.5	Design Designer's Responsibilities - This section contains requirements for preparing a design specification and prescribes its contents.	The TVA Nuclear Engineering (NE) designer is not required to produce a design specification as described in ANSI N14.6-1986, Section 4.1. In lieu of the described design specification, the TVA designer shall produce a design calculation verifying that each load bearing component has been designed using the appropriate stress design factor(s). When a material is selected which has a yield strength above 80 percent of its ultimate strength, the designer shall establish and justify criteria to assure adequate fracture toughness of that material. The issued design calculation shall contain a "Critical Items List." The calculation will will identify all critical items and determine the stress which will be experienced by each load bearing component of the lifting device. The designer shall consider the effects of heat treatment, fabrication practices, and environmental conditions to which the lifting device will be exposed in selecting appropriate materials for the components of the lifting device. The designer shall verify that all applicable topics identified in Section 4.1 of N14.6 which are not covered by the design calculation are adequately addressed in the lifting device procurement specification or contract. All NUREG-0612 lifting devices shall be procured as QA Level III, and the vendor shall provide a Certificate of Compliance as specified in section 5.2 of this specification. All other lifting devices may be procured as QA Level 0 with no additional certification requirements.

ANSI N14.6-1986 Section	Description of ANSI N14.6 Requirement	Interpretation and Application of Requirements
4. (Continued)	Design (Continued)	Where potential critical targets are protected by analytically verified intervening structures, i.e., floor slabs, walls, or building structural members, stress factors may be 3.0 based on material yield strengths and 5.0 based on material ultimate strength. Where potential targets exist inside areas protected by stops and interlocks, stress factors for handling devices may be 3.0 based on material yield strength, and 5.0 based on material ultimate strength. Human factors and operating experiences shall be reviewed to minimize load handling difficulties and assure personnel safety. Environmental conditions (radiation dose rates, elevated temperatures, etc.), accessibility of adjustment features and interface attachments points, and the weight of items requiring manual maneuvering, shall be considered in the lifting device design. When designing lifting devices with equally loaded legs which use manually adjusted load equalizing features such as turnbuckles, the designer shall make allowance for a minimum of 10 percent unequal load distribution because the adjustment of these devices requires a subjective evaluation by the installer to determine leg loading. This will ensure that the more highly loaded legs remain within the specified stress design factors. The designer of NUREG-0612 3- and 4-point attachment lifting devices is not required to assume a component failure and the resultant effects on stress design factors if the total load were to be transmitted through only 2-attachment points. However, the designer shall assume that the total load is equally distributed within the total number of legs minus one. This approach will provide an adequate degree of conservatism. For any engineered components requiring unique or special manufacturing and testing, the designer shall verify that the appropriate procedure and acceptance criteria is specified and communicated to the vendor.

ANSI N14.6-1986 Section	Description of ANSI N14.6 Requirement	Interpretation and Application of Requirements
	Design Criteria	
4.2 4.2.1 to 4.2.6	Stress Design Factors - These sections contain requirements for the use of stress design factors of 3 and 5 for allowable stresses of yield and ultimate, respectively, for combined shear stress and maximum tensile stresses; high strength material stress design factors; special pins; wire rope and slings to meet ANSI B30.9-1984; and drop-weight tests and Charpy impact test requirements.	Selection of stress design factors for non-NUREG-0612 special lifting devices may follow the rules of Section 4.2 of ANSI N14.6-1986 or the rules in ANSI B30.9 if wire rope, synthetic fiber, or chain is used as an element in a special lifting device. All loads not excluded from consideration due to elimination of targets are considered to be critical loads. The design of all lifting devices which handle critical loads shall be designed in accordance with the requirements stated in N14.6-1986, Section 4.2.1 and NUREG-0612, Section 5.1.1(4).
4.3 4.3.1 to 4.3.10	Design Considerations - These sections contain considerations for materials of construction, lamellar tearing, decontamination effects, remote engagement provisions, equal load distribution, lock devices, position indication of remote actuators, retrieval of device if unintentional, disengagement occurs, and nameplates.	The guidelines of ANSI N14.6, Section 4.3, shall apply for the design of NUREG-0612 lifting devices.
4.4 4.4.1 to 4.4.6	Design Considerations to Minimize Decontamination Efforts in Special Lifting Device Use - These sections contain fabrication, welding, finishes, joint and machining requirements to permit ease in decontamination.	The guidelines of N14.6, Section 4.4, shall apply for the design of NUREG-0612 lifting devices. Removable components such as pins or bolts shall have positive locking devices.
4.5 4.5.1 to 4.5.10	Coatings - These sections contain provisions for ensuring that proper methods are used in coating carbon steel surfaces and limit chloride content to prevent stress corrosion cracking of stainless steel items.	The guidelines of N14.6, Section 4.5, shall apply for the design of NUREG-0612 lifting devices..
4.6 4.6.1 to 4.6.3	Lubricants - These sections contain requirements for special lubricants to minimize contamination and degradation of lubricants that contacted other surfaces or water pools.	The guidelines of N14.6, Section 4.6, shall apply for the design of NUREG-0612 lifting devices.
5 5.1 5.1.1 to 5.1.12	Fabrication Fabricators Responsibilities - These sections contain specific requirements for proper quality assurance, document control, deviation control, procedure control, material identification and certificate of compliance.	The guidelines of ANSI N14.6, Section 5.1, shall govern the fabrication process, except the term "vendor" shall replace the term "fabricator" and the term "procurement specification" shall replace the term "design specification."

ANSI N14.6-1986 Section	Description of ANSI N14.6 Requirement	Interpretation and Application of Requirements
5.2 5.2.1 to 5.2.6	Inspectors Responsibilities - These sections contain requirements for a nonsupplier inspector.	The guidelines of ANSI N14.6, Section 5.2, shall govern the fabrication process, except the term "vendor" shall replace the term "fabricator" and the term "procurement specification" shall replace the term "design specification."
5.3 5.3.1 to 5.3.3	Fabrication Considerations - These address the use of low stress die stamps for ID marking, avoidance of contamination of stainless materials by carbon steel debris, and thermal cutting practices.	The guidelines of ANSI N14.6, Section 5.3, shall govern the fabrication process, except the term "vendor" shall replace the term "fabricator" and the term "procurement specification" shall replace the term "design specification.
6	Acceptance Testing, Maintenance, and Assurance of Continued Compliance	
6.1 6.1.1 to 6.1.8	Owners Responsibilities - Sections 6.1.1 and 6.1.2 require the owner to verify that the special lifting devices meet the performance criteria of the design specification by reviewing records and witness of testing.	The guidelines of ANSI N14.6, Section 6.0, shall govern the acceptance testing process, and verification of compliance with the performance criteria. The term "fabricator" shall be replaced with the term "vendor" and the term "design specification" shall be replaced with the term "procurement specification."
	Section 6.1.3 requires periodic functional testing.	NP STD-10.3.175 (or 179) addresses and satisfies the guidelines of this section.
	Section 6.1.4, 6.1.5.2, and 6.1.5.2 require special identification and marking to prevent misuse.	NP STD-10.3.175 (or 179) addresses and satisfies the guidelines of this section.
	Sections 6.1.6, 6.1..7, and 6.1.8 require the owner to provide written documentation on the maintenance, repair, testing, and use of these rigs.	NP STD-10.3.175 (or 179) addresses and satisfies the guidelines of this section.
6.2 6.2.1 to 6.2.3	Acceptance Testing - These paragraphs require the lifting devices to be initially tested to 150 percent maximum load (i.e., design-rated load) followed by nondestructive testing of critical load bearing parts and welds, qualification of replacement parts, and proper performance of nonload-bearing functioning parts.	Acceptance testing of all special lifting devices shall be conducted in accordance with ANSI N14.6, Section 6.2.1. All lifting devices which use wire rope, synthetic fiber, or chain shall be tested in accordance with the applicable sections of ANSI B30.9 (i.e., 200 percent of design-rated load).
6.3 6.3.1 to 6.3.8	Testing to Verify Continued Compliance	Testing to verify continued compliance is governed by NP STD 10.3.175 (or 179) which states that the guidelines of section 6.3 of ANSI N14.6 shall be met.

ANSI N14.6-1986 Section	Description of ANSI N14.6 Requirement	Interpretation and Application of Requirements
6.4 6.4.1 to 6.4.2	Maintenance and Repair - This section requires any maintenance and repair to be performed in accordance with original requirements and no repairs are permitted for bolts, studs, and nuts.	The guidelines of N14.6, Section 6.4 shall apply for all special lifting devices. In addition, the designer or other qualified personnel shall approve all repairs.
6.5 6.5.1 to 6.5.2	Nondestructive Testing Procedures, Personnel Qualifications, and Acceptance Criteria - This section requires nondestructive testing to be performed in accordance with the requirements of the ASME Boiler and Pressure Vessel Code.	The guidelines of N14.6, Section 6.5, shall apply for all special lifting devices. In addition, other NDE methods may be utilized with approval by the designer or other qualified personnel.
7 7.1 7.2 7.3	Special Lifting Devices for Critical Loads - These sections contain special requirements for items handling critical loads.	The guidelines of N14.6, Section 7, are considered excessive and do not apply to specially designed lifting devices which handle critical loads.

ENCLOSURE 2

LIST OF REMAINING ACTIVITIES

ENCLOSURE 2

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2
NUREG-0612 COMPLIANCE
OPEN ITEMS

The following items must be completed for WBN Units 1 and 2 to be in compliance with NUREG-0612 heavy loads requirements, as stated in Enclosure 1 of this letter. Also provided is the expected completion milestone for each of the open items.

	ACTIVITIES REMAINING	MILESTONE
1.	Provide an intervening structure to protect one train of Spent Fuel Pool Cooling Heat Exchanger suction piping from a potential load drop of 4.2-Ton filter handling shield plate (both trains could be damaged by this drop - See Enclosure 1, Table II, Section B).	Fuel Load
2.	Issue calculation to verify that crane 0-CRN-270-I1 meets the intent of CMAA-70 and ANSI-B30.2 (ANSI-B30.5).	Fuel Load
3.	Provide procedural mechanism to assure that field routed commodities are installed without violating WBN's NUREG-0612 program.	Fuel Load
4.	Perform walkdowns to substantiate the Safe Load Paths portion of WBN's NUREG-0612 program as depicted on TVA drawings 44W411 series.	Fuel Load
5.	Revise Engineering Administrative Instruction (EAI) 7.01 to be consistent with the requirements of the revised NUREG-0612 response.	Fuel Load
6.	Revise Site Standard Practice (SSP)-6.06 to be consistent with the requirements of the revised NUREG-0612 response.	Fuel Load
*7.	Complete outstanding design and procurement/fabrication activities for special lifting devices required for initial fuel load (see Enclosure 1, Table V).	Fuel Load
*8.	Complete outstanding design and procurement/fabrication activities for special lifting devices required for first Refueling Outage (see Enclosure 1, Table V).	First Refueling Outage
9.	Initial testing of Westinghouse Lift Devices will be performed before initial fuel load.	Fuel Load
10.	WBN Unit 2 Heavy Loads Program (NUREG-0612) will be in compliance with the requirements as stated in Enclosure 1 by Unit 2 fuel load.	Unit 2 Fuel Load

* In addition to those special lifting devices that are required for initial fuel load or first refueling outage, as stated in Table V, WBN is also committed to be in compliance prior to the first time any lifting device is used after fuel load. This requirement is proceduralized in SSP-6.06.

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