# Technical Memo TM-141R1

Prepared By: Kimberly Manzione
Reviewed By: Chuck Bullard
To: Holtec Corporate Engineering, Holtec User Group, USNRC Division of Spent Fuel Management
Date: December 19, 2014; Revised 4/15/15
Subject: NRC's Guidance on Design of Lifting Systems and Special Lifting Devices Used in Holtec's Used Fuel Management Program
Category: Safety Significant
Keywords: Lifting Devices, VCT

1. Scope

This memo memorializes the direction provided by the USNRC to Holtec International on the structural acceptance criteria for lifting devices & appurtenances in a conference call on December 11, 2014, and further confirmed in a follow up conference call on December 17, 2014. This memo is intended to be used as a supplemental (mandatory) guide for qualification of heavy load handling ancillaries by Holtec International. This memo will be submitted to the NRC for filing in docket # 72-1032 for future reference.

2. Background

Holtec International prepared a 72.48 evaluation to address the ambiguity in the HI-STORM FW FSAR regarding the use of certain pre-existing vertical cask transporters (VCTs) for handling HI-STORM FW. Holtec submitted the changes implemented under the 72.48 document (Holtec document # 72.48-1095) with a forwarding letter dated November 21, 2014 to the NRC headquarters to obtain regulatory input to insure that the NRC's site inspectors are fully aligned with the technical position articulated in Holtec's safety evaluation.

NRC staff members provided their input in a conference call held on December 11, 2014 in which the following individuals participated:

| **NRC** | **Holtec** | **TVA** |
|---|---|---|
| John Goshen (PM, Licensing Branch) | Stefan Anton (Vice President of Engineering) | Zita Martin (Senior Program Manager, Spent Fuel / HUG Chair) |
| David Tang (Structural Expert) | Kimberly Manzione (Acting Licensing Manager) | Zachary Kitts (Licensing Engineer) |
| Christian Araguas (Branch Chief, Structural Branch) | Andrew Brown (Project Manager) | Tom Hess (Corporate Nuclear Licensing Program Manager) |

NRC participated in a follow up call on December 17, 2014 to clarify certain remaining items and to re-inforce the previous guidance. The attendees were:

| **NRC** | **Holtec** |
|---|---|
| John Goshen (PM, Licensing Branch) | Chuck Bullard (Structural Manager) |

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|---|---|
| David Tang (Structural Expert) | Kimberly Manzione (Acting Licensing Manager) |
| Christian Araguas (Branch Chief, Structural Branch) | Richard Duffy (Project Manager) |

This memo contains the direction provided by the NRC: it will be used to revise the above-mentioned 72.48 evaluation and to perform any new design work on heavy load handling ancillaries designed by Holtec.

3. Guidance

a. Definition of "Lifting Devices" and “Special Lifting Devices”:

The lifting and handling systems used in Holtec’s used fuel management program are made up of individual components or devices. These components can be further classified as either “*lifting devices*” or “*special lifting devices*.”

The term *special lifting device* refers to components to which ANSI N14.6 applies. As stated in ANSI N14.6 (both 1978 and 1993 versions), “This standard shall apply to *special lifting devices* that transmit the load from lifting attachments, which are structural parts of a container to the hook(s) of an overhead hoisting system.” Examples of *special lifting devices* are given in item (e) below.

The term *lifting device* as used in this guidance refers to components of a lifting and handling system that are not classified as *special lifting devices*. ANSI N14.6 is not applicable to these *lifting devices*. These include non-active structural components (components that bear the primary load but are not a constituent of a moving part, e.g., gear train, hydraulic cylinder) of the system, such as the examples listed in item (e) below.

b. Stress compliance criteria applicable to *Lifting Devices* (LDs):

The stress compliance criteria for *lifting devices* are taken from the code applicable to the specific component. For example, slings are required to meet the guidelines of ANSI B30.9,

and overhead beams are required to meet the guidelines of an applicable consensus national standard selected by the designer, such as AISC, CMAA, or ASME Code (Subsection NF).

c. Stress compliance criteria applicable to Special lifting Devices (SLDs):

The stress compliance criteria for *special lifting devices* are taken directly from ANSI N14.6, which requires safety factors of three against the yield strength and five times against ultimate strength.

d. Single Failure Proof Criteria

In order for a *lifting device* or *special lifting device* to be considered single failure proof, the design must also follow the guidance in NUREG-0612, which requires that a single failure proof device have twice the normal safety margin. This designation can be achieved by either providing redundant devices or providing twice the design safety factor as required by the applicable code. Therefore, for a *lifting device* to be considered single failure proof, the applicable code requirements should be doubled, or a redundant *lifting device* should be provided. Similarly for a *special lifting device* to be considered single failure proof, the design safety factors in ANSI N14.6 should be doubled, or a redundant *special lifting device* should be provided.

e. Examples of *Lifting Devices* and *Special Lifting Devices* used in Holtec's systems:

Examples of lifting devices used with Holtec's systems include: a VCT overhead beam or the main girder of a gantry crane

Examples of special lifting devices used with Holtec's systems include: MPC lift cleats, lift brackets, and lift yokes

f. Stress criteria and a critical load drop accident

Both NUREG-0612 and ANSI N14.6 both allow for a load drop analysis to be performed. If the consequences of that analysis are below dose rate and criticality limits, the increased safety factors are not required. Performing a load drop analysis is considered a code compliance analysis, and does not mean that a drop accident is necessarily considered a

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credible accident. The drop analysis is used to determine appropriate stress criteria, and if the handling devices are designed to the correct stress limits, the drop accident is still considered non-credible.

g. Deleted.