

AP1000DCDFileNPEm Resource

From: Altmayer, Scott A [altmaysa@westinghouse.com]
Sent: Wednesday, July 14, 2010 4:34 PM
To: Buckberg, Perry; Patel, Pravin
Cc: Loza, Paul G.; Stipanovich, Steven M
Subject: RAI-TR44-01 R1D (parallel with TR44-06 R2B-a)
Attachments: RAI-TR44-01 R1D NRC final draft-date.doc

Perry, Pravin,

The draft RAI-TR44-01 R1D is attached...as aligned to the methodology/strategy discussed last week and written in TR44-06 R2B-a earlier this week.
I plan to see you tomorrow.

--SCOTT ALTMAYER--

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AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

RAI Response Number: RAI-TR44-01

Revision: 1 DC-date

Question: (Revision 0)

Section 2.8.5 indicates that both drop scenarios are from 36 inches above the top of the AP1000 New Fuel Storage Rack. Describe the fuel handling operation that leads to this drop height.

New Question: (Revision 1C)

During the June 2010 fuel rack technical audit, the NRC identified the need to request additional clarification (regarding the response to Revision 0) about what administrative controls will be put in place to prevent raising the fuel assembly over 36 inches over the New Fuel Storage Rack (NFR) as established in the DCD.

Westinghouse Response:

(Revision 0)

Fuel handling operations associated with new fuel drop scenarios in Section 2.5 deal with receipt inspection of new fuel, moving new fuel into the new fuel rack or removing it to place in the spent fuel pool. These operations are performed by a new fuel handling crane. The conservative drop height of 36 inches is used, however it is unlikely that the drop height will ever be 36 inches as the top of the rack is only six inches below the floor elevation and the fuel assembly will be close to the floor. Administrative control will be put in place to prevent raising the fuel assembly over 36 inches over the New Fuel Storage Rack.

~~New Question: (Revision 1C)~~

~~During the June 2010 fuel rack technical audit, the NRC has questioned how the following limitation (that the fuel handling process precludes a fuel assembly from being dropped from a height in excess of 36" above the top of the New Fuel Storage Rack) is established in the DCD.~~

~~Westinghouse New Response: (Revision 1DC)~~

~~Considerations and responses noted in OI-SRP9.1.4-SBPA-03, Revision 3, regarding fuel handling machine (FHM) hoist operations describe that the only hoist capable of moving new fuel above the operating floor is a the single failure proof hoist. With the single failure proof~~

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AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

~~hoist of the fuel handling machine (FHM) at the maximum "up" interlock limit, the bottom of a new fuel assembly has about seven feet of clearance over the top of the new fuel storage rack.~~

~~In addition, the duration of new fuel assembly lifts are limited and the probability of aligning the dropped assembly directly over the open cell through the new fuel pit cover are also unlikely. Dropping a load from this height is an unlikely occurrence as discussed below; and the risk is minimal based on the low probability and negligible safety-related consequences outlined in RAI-TR44-06 R2B-a.~~

~~During normal fuel handling operations, the single failure proof hoist maximum height limit is controlled by design. This hoist is required to operate over a large range of elevations and locations as specified in DCD Rev 17, Section 9.1.4.3.3, "Fuel Handling Machine" (FHM) which discusses safety interlocks, fail safe design features, and component redundancy to assure safe handling of fuel assemblies and other components within the auxiliary building fuel handling area. Operations that could endanger the operator or damage the fuel are prevented by mechanical or failure tolerant electrical interlocks or by redundant electrical interlocks and are explicitly designated for clarity using an asterisk (*). Based on considerations and responses noted in OI-SRP9.1.4-SBPA-03-R3A regarding fuel handling hoist operations and drop scenarios involving the new fuel and new fuel pit, the only hoist capable of moving new fuel above the operating floor is a single failure proof hoist. Per NUREG-0612 (Reference 4) guidelines, drops from a single failure proof hoist are deemed unlikely and non-credible and do not require further analysis. Westinghouse has taken this position for the postulated new fuel assembly drop accident scenario.~~

~~Westinghouse concludes that the current design of the single failure proof hoist protects and safeguards new fuel in the new fuel storage pit during handling using administrative controls, safety interlocks, fail safe design features, and/or component redundancy.~~

~~During normal fuel handling operations, the single failure proof hoist maximum height limit is controlled by design. This hoist is required to operate over a large range of elevations and locations as specified in DCD Rev 17, Section 9.1.4.3.3, "Fuel Handling Machine" (FHM) which discusses safety interlocks, fail safe design features, and component redundancy to assure safe handling of fuel assemblies and other components within the auxiliary building fuel handling area. Operations that could endanger the operator or damage the fuel are prevented by mechanical or failure tolerant electrical interlocks or by redundant electrical interlocks and are explicitly designated for clarity using an asterisk (*).~~

~~Specifically, Section 9.1.4.3.3, Part A, and Paragraph *2, requires that the hoist be raised to the maximum "up" limit before traversing to other locations in the fuel handling area:~~

~~*"When the hoist load weighing system detects a load greater than the spent fuel assembly handling tool, the machine cannot traverse unless the hoist is at the up limit. For new fuel handling, the load is greater than the new fuel handling tool."*~~

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Response to Request For Additional Information (RAI)

With the single failure proof hoist at the maximum "up" limit, the bottom of a new fuel assembly has about seven feet of clearance over the top of the new fuel storage rack. Dropping a load from this height is a non-credible scenario for the following reasons:

a. The new fuel assembly handling tool (NFAHT) incorporates the same design features as the spent fuel assembly handling tool (SFAHT) such that the gripper assembly is designed to prevent opening while the weight of the fuel assembly and control component is suspended from the grippers.

b. The hoist is single failure proof with inherent redundancy.

Safety is assured by redundancy and equipment design. ~~Therefore, changing tool handling design or crane limits is not needed or preferred.~~

The conclusions for a hypothetical accident involving a new fuel rack drop from the reference elevation of 36" over the top of the new fuel rack is deemed acceptable and safe. Structural integrity of the fuel pit floor is maintained, neutronic subcriticality remains bounded, and there is no operational impact on other safety-related systems or components. These conclusions are based on a graded risk assessment discussed in RAI-TR44-06 R2B-a that addresses the following features: 1) drop analysis, 2) engineering assessment, 3) unlikely occurrence, 4) no impacted SSCs, and 5) incremental drop height assessment.

Westinghouse concludes that the current design and use of the FHM single failure proof hoist to handle new fuel assemblies protects new fuel, new fuel storage racks, and the new fuel storage pit structure during fuel handling using administrative controls, safety interlocks, fail safe design features, and component redundancy.

References:

1. APP-GW-GLR-026, Revision 30, May 2010, "New Fuel Storage Rack Structural/Seismic Analysis," (Technical Report Number 44, TR44)
2. APP-FS02-Z0C-001, Revision 20, July 2009, "Analysis of AP1000 Fuel Storage Racks Subjected to Fuel Drop Accidents"

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AP1000 TECHNICAL REPORT REVIEW

Response to Request For Additional Information (RAI)

Design Control Document (DCD) Revision:

None

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PRA Revision:

None

Technical Report (TR) Revision:

None