



Westinghouse Electric Company
Nuclear Power Plants
P.O. Box 355
Pittsburgh, Pennsylvania 15230-0355
USA

U.S. Nuclear Regulatory Commission
ATTENTION: Document Control Desk
Washington, D.C. 20555

Direct tel: 412-374-6206
Direct fax: 724-940-8505
e-mail: sisk1rb@westinghouse.com

Your ref: Docket No. 52-006
Our ref: DCP_NRC_002786

February 19, 2010

Subject: AP1000 Response to Proposed Open Item (Chapter 3)

Westinghouse is submitting the following responses to the NRC open item (OI) on Chapter 3. These proposed open item response are submitted in support of the AP1000 Design Certification Amendment Application (Docket No. 52-006). The information included in these responses is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification and the AP1000 Design Certification Amendment Application.

Enclosure 1 provides the response for the following proposed Open Item(s):

OI-SRP3.4.1-RHEB-02 R1

Questions or requests for additional information related to the content and preparation of this response should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

A handwritten signature in black ink, appearing to read "Robert Sisk".

Robert Sisk, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Enclosure

1. Response to Proposed Open Item (Chapter 3)

cc: D. Jaffe - U.S. NRC 1E
E. McKenna - U.S. NRC 1E
P. Clark - U.S. NRC 1E
T. Spink - TVA 1E
P. Hastings - Duke Power 1E
R. Kitchen - Progress Energy 1E
A. Monroe - SCANA 1E
P. Jacobs - Florida Power & Light 1E
C. Pierce - Southern Company 1E
E. Schmiech - Westinghouse 1E
G. Zinke - NuStart/Entergy 1E
R. Grumbir - NuStart 1E
D. Lindgren - Westinghouse 1E

ENCLOSURE 1

AP1000 Response to Proposed Open Item (Chapter 3)

AP1000 DESIGN CERTIFICATION REVIEW

Response to SER Open Item (RAI)

RAI Response Number: OI-SRP3.4.1-RHEB-02

Revision: 1

Question:

The staff reviewed the proposed increase in storage volume in the larger firewater storage tank. The amendment seeks to increase the tank volume from 400,000 to 490,000 gallons. The applicant, however, has not provide an analysis of the external flooding caused by tank rupture of the new tank design on safety related structures, systems and components.

Additional Question

The response to the subject OI does not provide sufficient detail for the staff to conclude that water will drain from the subject tank away from the turbine and Nuclear Island buildings due to site grading. Alternately, Westinghouse may choose to propose a wall that will deflect water from the subject tank away from the turbine and nuclear island buildings.

Westinghouse Response:

In DCD Subsection 3.4.1.1.1 it is stated that the “slope of the yard grade directs water away from the buildings.” The firewater storage tank is on the North side of the turbine building approximately 320 feet away from the Nuclear Island. In the event of sudden release of the water from the 490,000 gallon firewater storage tank this will not affect the Nuclear Island structures because of its distance from the tank, and the site grading that directs the water away from the safety related structures.

The following statement is added to the first bullet in DCD Subsection 3.4.1.1.1 related to site drainage: “Water will drain from the tanks away from the turbine and Nuclear Island buildings due to site grading.”

Response Revision 1:

In DCD Section 2.4 it is stated that actual site grade will be a few inches below plant elevation 100' (nominal plant grade) to prevent water from entering the doorways. In DCD Subsection 3.4.1.1.1 it is also noted that the site is graded to provide protection to the Category I structures. In Section 2.7 of the Westinghouse AP1000 Civil Design Criteria, APP-GW-C1-001, the finished grade at the building perimeter shall be 6 inches below the nominal floor elevation. For the Nuclear Island and turbine, annex and radwaste buildings, this nominal floor elevation is 100'-0". The requirement for the grade adjacent to building is for a minimum of a 1.0 percent slope away from the buildings. These grading requirements are generic and are not site specific.

AP1000 DESIGN CERTIFICATION REVIEW

Response to SER Open Item (RAI)

The turbine building and the systems and components contained within do not have a safety function. The turbine building is not required to be protected. The turbine building is seismic Category NS except for the first bay adjacent to the auxiliary building, which is seismic Category II.

The fire water storage tanks are located to the North of the turbine building; see Items 13 and 14 on DCD Figure 1.2-2. The shield building does not have direct access to the outside at the 100' elevation. The auxiliary building does not have openings to the outside at the 100' elevation. The openings into the auxiliary building at the nominal plant grade elevation of 100' are on the East side of the auxiliary building and separated from direct access to the outside by the annex building and radwaste building. The distance from the fire water tank to the closest point of the nuclear island building structure (auxiliary building) is 320'.

Water emanating from the Fire Water Storage Tank failure was assumed to discharge radially from the tank's location, creating a depth of water inundation based on the tank's volume. This depth, 2.2 inches, was conservatively calculated based on an assumed uniform, level ground surface elevation in all directions from the tank, and no uninhibited flow from adjacent structures. The volume of water is based on a radius of 320' that is the closest point to the nuclear island. This conservative assumption does not incorporate the protective influences of the adjacent structures and required site grading which would divert flow away from the nuclear island (NI). Further, no credit is taken recognizing that the fire water tank site grade is 12 inches (based on a finished grade at the building perimeter to be 6 inches below nominal floor grade and the site to be at 1% grading) lower than nominal grade of elevation 100'.

If the Fire Water Storage Tank would be breached in any quadrant, except the southeast, the flood flow path would be away from the NI due to the site grading and adjacent SWS cooling towers. These towers are south of the fire water storage tank and in the path towards the NI. The site grade all along the west side would be such that it diverts flow away from the turbine building and NI.

If the Fire Water Storage Tank were to breach in its southeast quadrant, most of the initial flow of the discharge would be directed towards the northwest corner of the turbine building. The turbine building and site grading would divert the flow in both the north and south directions. The grading is such as to direct the south flow towards the west away from the nuclear island.

Higher depths from a Fire Water Storage Tank failure could be calculated assuming open-channel flow; however, this is not realistic since there is no true open-channel flow as there are no defined channel side walls. Therefore, realistically the flow would spread laterally in all directions in an uncontrolled path as assumed in the calculation of the water depth.

In summary:

AP1000 DESIGN CERTIFICATION REVIEW

Response to SER Open Item (RAI)

- The estimated total volume of water in the tank is 65,504 cubic feet (490,000 gallons). Conservatively considering a release that is dispersed radially on a level surface with no redirected flow due to existing structures away from the NI, the resulting water depth at the closest point between the NI and the tank is calculated to be 2.2 inches.
- In accordance with Section 2.7 of the AP1000 Civil Design Criteria, the finished exterior grade at the building perimeter shall be 6 inches below the nominal ground floor elevation except at a truck ramp. The site shall be smooth graded with a minimum slope of one percent to drain surface runoff water away from the buildings (NI and turbine building) to the nearest drainage structure.
- The estimated grade at the base of the Fire Water Storage Tank is 12" lower than the site grade (Elev. 99.0' nominally). The finished floor grade of the NI and adjacent structures is Elev. 100' nominally.

Therefore, based on the grading requirements and level of the site grade, the release of water from the rupture of the Fire Water Storage Tank, conservatively estimated to be 2.2 inches of depth water level, will not affect the nuclear island.

Design Control Document (DCD) Revision: (Post Rev. 17 revision)

Modify the first bullet in Subsection 3.4.1.1.1 to the following:

- Fire water tanks as described in subsection 9.5.1. These two tanks have volumes of approximately 325,000 and 490,000 gallons, and are located at the north end of the turbine building. Water will drain from the tanks away from the Nuclear Island and adjacent buildings due to the required site grading.

PRA Revision:

None