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Dalwyn R. Davidson
VICE PRESIDENT
SYSTEM ENGINEERING AND CONSTRUCTION

November 30, 1981

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U.S. NUCLEAR REGULATORY COMMISSION

Mr. Robert L. Tedesco
Assistant Director for Licensing
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Perry Nuclear Power Plant
Docket Nos. 50-440; 50-441
Response to Request for
Additional Information -
Auxiliary Systems

Dear Mr. Tedesco:

This letter and its attachment is submitted to provide an additional draft response to concerns identified in your letter dated September 1, 1981 in regard to Auxiliary Systems. This supplements our previous submittal dated October 16, 1981.

It is our intention to incorporate these responses in a subsequent amendment to our Final Safety Analysis Report.

Very Truly Yours,

Dalwyn R. Davidson

Dalwyn R. Davidson
Vice President
System Engineering and Construction

DRD: mlb

Attachment

cc: G. Charnoff, Esq.
M. Dean Houston
NRC Resident Inspector

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410.5 Section 3.6.2.3.5 of the FSAR indicates that analyses of flooding resulting from high or moderate line failures have been performed. For areas containing high or moderate pipies, present the results of these analyses on a room by room basis to demonstrate that the plant will be able to achieve safe shutdown considering the height to which the water would rise assuming the failure of one of the pertinent sump pumps.

Response

The response to this question is provided in revised Section 3.6.2.3.5.

These analyses take no credit for operation of building sump pumps, none of which are safety-related.

effects of such flooding when allowance is given for safety related means of detecting the event and a reasonable time period for corrective action to be taken.

The following areas are subject to flooding due to breaks in high and moderate energy lines:

3.6.2.3.5.1 Inside the Reactor Building

Loss of reactor coolant, including ECCS injection of the entire contents of the condensate storage tank, could result in flooding the drywell and RPV pedestal to the height of the weir wall. The containment is designed for flooding above this level as required for accident recovery (see Section 3.8.3.3.1.g). Equipment required for safe shutdown is designed to withstand these effects as described in Section 3.11.

A break in the RWCU system in the containment steam tunnel could conceivably flood containment isolation valve operators. Sleeves in the floor of this room drain directly to the suppression pool, and are more than adequate for the maximum break.

Breaks in other areas of the containment building drain directly to the suppression pool or contain no items necessary for safe shutdown and subject to flood damage.

3.6.2.3.5.2 Inside the Auxiliary Building

Hallways within the Auxiliary Building at elevations 568'-4" and 574'-10" are subject to flooding from a through-wall crack in a 16" emergency service water pipe. Allowing 30 minutes, after a high level alarm, to isolate the crack, a depth of 16" will exist on 568'-4". The ECCS racks are located within these hallways. These racks are mounted on 6" concrete pads and have 14" of clearance between rack bottom and first level instrumentation. Therefore, any depth less than 20 inches will not jeopardize the operability of the ECCS racks.

In both units, the Service Water piping is routed above the 599'-0" floor elevation. This piping is of 24" nominal diameter in Unit 1 and of 42" nominal diameter in Unit 2. In order to mitigate the need of postulating a double-ended break, the pipe has been supported to Seismic Category I. However, the need to postulate a through-wall crack remains. 391 and 916 gallons per minute, in Units 1 and 2 respectively, will exit the crack and flood elevation 599'-0". In addition, there is approximately 13,600 $ft.^3$ of water available to drain through the crack after shutdown of the service water pumps. Limiting the inventory to 13,600 $ft.^3$ requires that the nearest valves, up and down stream, in all branches be closed.

In order to mitigate the effects of such a flood, the following will be implemented:

New curbs, along with the existing ones on elevation 599'-0", will keep the flood from flowing to elevation 568'-4". Shields will be installed to assure that jets from the service water piping will not spray over these curbs. These shields need only be installed for the length of pipe adjacent to the curbs.

An 8" drain will be installed at elevation 599'-0" of Unit 1 and 2 Auxiliary Buildings. In Unit 1, the installation will be in the northwest corner. In Unit 2 installation will be the southwest corner. This drain will be routed down, through the elevation 574'-10" floor deck and into the Auxiliary Building Condensate Demineralizer Room pipe chase. In this chase there exists an 8" underdrain. The underdrain is fed by seven small sumps and discharges into the Condensate Demineralizer room sump. Using Unit 2 as a scenario and taking no credit for flow into the condensate demineralizer room sump, a leak may continue at 916 gpm for 50 minutes. Such time will be sufficient to isolate the crack, and assure the operability of essential components within the area.

On elevation 620'-6" the major threat of flooding exists due to a 24 inch emergency service water pipe routed to the swale. 286 gallons per minute will exit a through-wall crack in this pipe. Curbs within the RHR cubicle will divert the flood down the east stairwell. It will take 34 minutes to actuate a high level alarm on elevation 568'-4". Allowing another 30 minutes to isolate the crack, 3.3 inches of water will exist on elevation 620'-6". This along with the volume passed under the stairwell door, during the duration of the leak, will result in a final depth of 9" on elevation 568'-4". Such a depth is acceptable. Therefore, operability of any essential components is not compromised. The watertight construction of the ECCS pump rooms protects against mass flooding of redundant ECCS pumps due to a break within any one cubicle (see Section 6.3.1.1.3).

Within the steam tunnel, breaks in the main steam, feedwater, and reactor water cleanup systems have been considered. These breaks do not release sufficient volume to endanger any isolation valves or other components required to achieve and maintain safe shutdown.

3.6.2.3.5.3 Inside the Intermediate Building

The intermediate building is subject to flooding from breaks in the intermediate and auxiliary buildings. Redundant, safety-related level switches are provided to alarm for flooding in excess of two inches, allowing ample time to isolate breaks before the depth exceeds six inches. No safety-related equipment in the intermediate building is threatened by floods of this depth.

3.6.2.3.5.4 Inside the Fuel Handling Building

Flooding hazards and protective measures are described in Section 3.6.1.2.2.b.

3.6.2.3.5.5 Inside the Control Building

Flooding hazards and protective measures are described in Section 3.6.1.2.2.e.

3.6.2.3.5.6 Inside the Diesel Generator Building

Diesel generators are located in separate cubicles. A flood in any one cubicle due to a crack in the diesel generator cooling water system will affect only that diesel generator. Minor wetting of floors in adjacent buildings is of no consequence.

3.6.2.3.5.7 Inside the Emergency Service Water Pump House

Discharge from cracks in emergency or fire service water lines drains directly through floor grating into the suction pit. No significant flooding potential exists.

3.6.2.3.5.8 Flooding in Other Plant Buildings

The auxiliary boiler building, heater bays, off-gas buildings, radwaste building, condensate demineralizer buildings, circulating water pump house, service water pump house, and other detached structures contain no components essential to safe shutdown. The turbine buildings contain instruments and controls supplying inputs to safe-shutdown systems. These systems trip to the safest position on loss of signal. No flood protection is required for any of these areas.

3.6.2.3.6 Electrical Protection Criteria

An evaluation was made of effects of pipe break on plant electrical control and instrumentation systems. The evaluation considered effects of physical damage to equipment, cabling, penetrations and instrument piping resulting from the break. Specific events included are:

a. Dynamic motion and impact of identified pipe whips, if any.

b. Fluid jet impingements identification.

c. Temperature, pressure humidity and flooding conditions determined in the thermal-hydraulic analyses.