

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

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January 9, 1985 06

BLRD-50-438/83-31

BLRD-50-439/83-27

U.S. Nuclear Regulatory Commission
Region II

Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

Dear Mr. O'Reilly:

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2 - TORNADO DEPRESSURIZATION -
BLRD-50-438/83-31, BLRD-50-439/83-27 - THIRD INTERIM REPORT

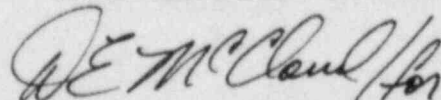
The subject deficiency was initially reported to NRC-OIE Inspector Linda Watson on April 14, 1983 in accordance with 10 CFR 50.55(e) as NCR BLN NEB 8304. This was followed by our interim reports dated May 16 and December 19, 1983. Several NCRs were later initiated documenting a similar concern. Enclosed are our final reports for NCRs BLN NEB 8304, BLN NEB 8404, BLN NEB 8406, BLN NEB 8407, and BLN NEB 8411 and our third interim reports for NCRs BLN NEB 8405, BLN NEB 8408 and BLN NEB 8409. We expect to submit our next report by December 20, 1985. A several week delay of this submittal was discussed with Inspector S. Weise on December 21, 1984.

Please note that TVA does not consider the conditions documented in NCRs BLN NEB 8404, BLN NEB 8406, and BLN NEB 8411 adverse to the safe operation of the plant. Therefore, we will amend our records to delete these nonconformances as 10 CFR 50.55(e) items.

If you have any questions, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY



J. W. Hufham, Manager
Licensing and Regulations

Enclosure

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ENCLOSURE

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2

TORNADO DEPRESSURIZATION

BLRD-50-438/83-31, BLRD-50-439/83-27

10 CFR 50.55(e)

FINAL REPORT FOR NCRs BLN NEB 8304, BLN NEB 8406, BLN NEB 8407 AND

BLN NEB 8411

THIRD INTERIM REPORT FOR NCRs BLN NEB 8405, BLN NEB 8408, and BLN NEB 8409

NCR BLN NEB 8304 (Final Report)

Description of Deficiency

TVA's Nuclear Engineering Branch's (NEB) calculation TI-ECS-47, "Common Zone and Fuel Handling Area Tornado Depressurization Analysis," assumes closed doors blow open at a pressure differential of 0.5 lb/in². Subsequent analyses by TVA's Civil Engineering Branch indicate that doors may be significantly stronger when the pressure differential acts against the door frame. (A differential pressure of approximately 2 lb/in² may be required to cause door failure in this case.) Loading on walls within the building may be higher than was originally calculated. This is due to a misinterpretation, by responsible TVA personnel, of the information supplied by the vendor.

Safety Implications

A higher differential pressure acting on the affected structural features than what was originally designed for could possibly result in a failure of those features. This could adversely affect the safety of operations of the plant.

Corrective Action

TVA has performed a tornado depressurization analysis on the (BLN) Auxiliary Building using a revised differential pressure of approximately 2 lb/in² to cause door failure. The effects of the revised pressures on (1) the structural concrete walls and slabs and (2) removable concrete block walls were evaluated. As a result, the determination was made that the structural concrete walls and slabs are adequate as is and will not require any modifications. Removable concrete block walls within the building will be restrained as necessary to resist the differential pressure across the respective walls. This will be accomplished by the use of structural steel restraints, welded wire fabric in the mortar joints, or a combination of the two. All necessary work will be done under engineering change notice (ECN) 1343. Corrective action for this item will be completed by July 8, 1986, for unit 1, and by June 19, 1987, for unit 2. The responsible personnel were instructed in the correct interpretation of the information, and this information has been incorporated into the new analysis.

NCR BLN NEB 8404 (Final Report)

Description of Deficiency

The spent fuel cooling pumps at BLN are located in the common zone of the Auxiliary Building. The common zone vents in the event of a design basis tornado. The gypsum wallboard fire barrier of the pump room is designed to withstand an internal pressure differential of 0.4 lb/in^2 . Pressure relief panels in the walls are held closed by explosion bolts. These panels are designed to open at 0.25 lb/in^2 and are designed to swing outward only. These panels would open as a result of the depressurization phase of a pressure transient induced by a design basis tornado.

During the repressurization phase of the tornado pressure transient, the relief panels could be forced closed by the air returning to the just-vented pump area. An external pressure differential against the walls could result and could possibly exceed the design capability of the walls. This could result in a failure of the fire barrier walls and could possibly result in damage to the spent fuel cooling equipment and the associated air handling unit.

Safety Implications

TVA has completed a review of BLN drawing No. 3AW0910-00-30. This review has identified that the gypsum walls of the pump room are penetrated by 23.67 ft^2 of duct and air return openings. Each of the openings contains a fire damper which will maintain the integrity of the rooms in case of fire while allowing free passage of air at other times. The area of opening which is required to vent this room is slightly less than 20 ft^2 . Since the duct openings provide more venting area than required, no problems associated with the tornado pressure transient could occur. Therefore, TVA no longer considers 10 CFR 50.55(e) applicable to this item.

NCR BLN NEB 8406 (Final Report)

Description of Deficiency

The intake pumping station (IPS) electrical board room equipment hatches at BLN are not designed for the 3 lb/in^2 differential pressure of the design basis tornado. This condition is in conflict with BLN design criteria N4-50-D741.

Safety Implications

TVA has determined that the electrical board room equipment hatches at BLN were not purchased from the Bilco Company as the subject nonconformance report (NCR) indicated. Rather, the hatch frames and covers were designed and constructed by TVA. A review of the applicable BLN design drawing (8KW0202-X2-01) and design calculation has shown that the hatches are designed for 3 lb/in^2 acting either to open or close the hatch.

The escape hatches, which are a part of two of the equipment hatches, are detailed on BLN design drawing 7KW0314-00-01. The two hatches are designated as O-MA-MDOR-026 and O-MA-MDOR-027. These hatches were designed and fabricated to the specification requirements of contract 78K70-823716 N4H-44. The contractor was Julius Mock, Incorporated. Contractor note 3 on the design drawing stipulates that the hatch units shall be designed for 3 lb/in² acting to open the hatch.

Based on the results of this review, TVA no longer considers 10 CFR 50.55(e) applicable to this item.

NCR BLN NEB 8407 (Final)

Description of Deficiency

The lower floors of the Auxiliary Building at BLN, and in particular the trains A and B zones, are provided with emergency drains which have dropout panels designed to release with the accumulation of 18 to 24 inches of water. The drains relieve into the Auxiliary Building common sump which is directly beneath these floors. During a design basis tornado, the sump volume depressurizes because it is open to the Auxiliary Building common zone. The depressurization will produce a differential pressure across the dropout panels equal to or greater than the release pressure of the panels. The panels will drop out and allow the trains A and B zones of the auxiliary building to depressurize. Safety-related equipment in these zones is not qualified for the pressure transient.

TVA has determined that this deficiency occurred due to a lack of a requirement to consider tornado depressurization in BLN design criteria H4-50-D705, "Miscellaneous Steel Components for the Auxiliary, Control, and Diesel Generator Buildings and Main Steam Valve Room B." The loads which are required to be considered due to tornado depressurization are given, however, in design criteria N4-50-D702, "Design of Civil Structures." The less stringent criteria was used in determining loads in the design of the dropout panels.

Safety Implications

A depressurization event in an area containing safety-related equipment which is not qualified to withstand depressurization could result in a failure of the equipment to perform an intended safety function. This could adversely affect the safety of operations of the plant.

Corrective Action

TVA will lower the dropout panels (to increase depth of water accumulation) and will increase the size of the explosion bolts used to secure the panels. This will increase the amount of pressure required to cause a release of the panels and will ensure that the panels will remain in place during a tornado depressurization event. TVA has revised BLN drawings 4AW0880-X2-1 through -3 to reflect these changes.

To prevent recurrence, a design input memorandum (DIM) has been written to N4-50-D705, section 4.2. This DIM requires the consideration of a differential pressure load of 1.5 lb/in² on dropout panels due to tornado depressurization. This correlates to those values required for consideration in N4-50-D702, section 3.6.4, with consideration of the effects of dissipation on the pressure transient due to the location of the sump area.

All work required to correct this deficiency will be completed by June 25, 1986.

NCR BLN NEB 8411 (Final Report)

Description of Deficiency

A design basis tornado at BLN could cause a nonisolatable blowdown of steam generator "A" with a vertical missile hit in the "A" main steam valve vault. This is due to the fact that no tornado missile protection is provided for the main steam isolation valve (MSIV), main steam safety valves, or piping in the vent room. At the same time, the tornado could have disabled the turbine-driven auxiliary feedwater (AFW) subsystem because the equipment in zone Q had not been rigorously qualified for the tornado depressurization and repressurization event. A single failure in the "B" train AFW or in supporting "B" train systems could have then resulted in a loss of all AFW.

Safety Implications

TVA has performed a design review of the affected turbine-driven AFW equipment in zone Q. This review has now identified that the subject equipment is qualified to withstand a tornado depressurization transient. As such, no design or hardware changes are required. Therefore, TVA no longer considers 10 CFR 50.55(e) applicable to this item.

NCR BLN NEB 8405 (Interim Report)

The exhaust opening for each electrical board room in the IPS at BLN has a fan, rainhood, damper, and grill that are not qualified for a design basis tornado depressurization and repressurization event. If the unqualified ventilation exhaust equipment deforms during a tornado event, this could partially or fully block the exhaust openings. As a result, there could be little or no essential room cooling flow. Additionally, if the exhaust equipment remains intact during the depressurization but is weakened, it could be blown into the room during the repressurization phase of the transient. There is safety-related equipment directly under or near the exhaust grill in the board rooms.

Interim Progress

TVA is still in the process of investigating the subject deficiency.

NCR BLN NEB 8408 (Interim Report)

TVA BLN design criteria N4-VG-D740 requires in part that ventilation ducts in the diesel generator building (DGB) remain functional after being subject to the effects of a design basis tornado. A tornado depressurization study of the DGB has determined that in some instances, failure of safety-related duct is likely. This is because the differential pressure produced by the design basis tornado in some of the inner rooms of the DGB may be greater than the 10-20 inches of water differential pressure which is the design pressure for the DGB ductwork.

Interim Progress

In accordance with TVA's Office of Engineering (OE) design calculation T1-ECS-93, the affected ductwork will be reinforced as necessary to withstand the external and internal pressure differential.

NCR BLN NEB 8409 (Interim Report)

Description of Deficiency

A design review for BLN has identified that during an evaluation of the ability of equipment in the IPS and DGB to vent during a design basis tornado depressurization, only 1E qualified equipment was evaluated. Since non-1E qualified equipment is located in these buildings, there is a possibility that a tornado depressurization could provide secondary damage or missiles from this equipment.

Additionally, the spent fuel cooling pump and heat exchanger area, located in the Auxiliary Building, is designed to depressurize during a tornado depressurization event. Electrical equipment located in this area, both 1E qualified and non-1E, which could affect the operation of the spent fuel cooling system has not been qualified for a depressurization event.

Interim Progress

TVA is presently evaluating the affected equipment to determine the corrective action necessary to qualify the equipment to the depressurization effects.