Commonwealth Edison Company
Dresden Generating Station
6500 North Dresden Road
Morris, IL 60450
Tel 815-942-2920

ComEd

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

Subject: Dresden Nuclear Power Station Units 2 and 3
Reply to Unresolved Items; Inspection Report 50-237/249/98007
NRC Docket Numbers 50-237 and 50-249

Reference: (a) J. A. Grobe letter to O. D. Kingsley, dated April 14, 1998, transmitting NRC Inspection Report 50-237/249/98007 and Notice of Violation

(b) J. M. Heffley (ComEd) letter to USNRC letter dated March 31, 1998, regarding "Design Basis Initiative Program"

The purpose of this letter is to provide ComEd's reply to the unresolved items related to the post dam failure, containment service water pump performance and potential effects of Dresden canal dike failure transmitted by reference (a). The requested information can be found in the Attachments 1 through 4 to this letter.

As a result of these items, Dresden is committing to the following new actions:

Replace wooden stop logs with metal structure with gasketed edges.

In addition, the following action, previously identified in reference (b), remains a commitment:

Revise DOA 0010-01, "Dresden Lock and Dam Failure," to increase the minimum level in the CCSW intake bay to elevation 505'. These changes will be performed to revise DOA 0010-01 to reflect UFSAR changes.

IE01

This response contains no proprietary or safeguards information. If there are any questions concerning this letter, please refer them to Mr. Frank Spangenberg, Dresden Station Regulatory Assurance Manager, at (815) 942-2920 extension 3800.

Sincerely,

J. M. Heffley
Site Vice President
Dresden Station

Attachments

cc: Regional Administrator, Region III
M. Ring, Branch Chief, Division of Reactor Projects, Region III
L. Rossbach, Project Manager, NRR (Unit 2/3)
K. Riemer, Senior Resident Inspector, Dresden
Office of Nuclear Facility Safety – IDNS

ATTACHMENT 1
RESPONSE TO UNRESOLVED ITEM
NRC INSPECTION REPORT
50-237/98007, 50-249/98007
97021-01A

Unresolved Item:

It was not demonstrated that the station could shutdown per the UFSAR statements in Section 9.2.5.3.2 post dam failure coincident with a LOCA.

ComEd Response:

UFSAR Section 9.2.5.3.2 describes how Dresden Station would cope with the beyond design basis event of an earthquake that causes a catastrophic failure of the Dresden Lock & Dam, loss of Class II systems, loss of offsite power, and a LOCA in one of the two units. The fire protection system, a Class II system, is needed for make-up to the isolation condenser of the non-LOCA unit. However, the use of the fire protection system was identified as an exception to the Class I requirement in the original response to the NRC's question. NRC consultants identified its vulnerability to potential damage from an earthquake during original plant licensing and during the Systematic Evaluation Program. However, it was not identified as a deficiency in any Safety Evaluation Report. In reference (b), ComEd committed to an action to evaluate a seismically qualified path to deliver water to the shell of the isolation condenser from the ultimate heat sink.

It should be noted that the travelling screen refuse pumps and associated piping and valves which are used to reflood the fire pump suction bay are also not a Class I system. However, the suction piping for the refuse pumps is contained within a reinforced concrete structure below grade and protected against earthquake damage. The electrical breaker for the refuse pumps is located on ground level in the River Screen House and is susceptible to damage if the block walls of the River Screen House were to collapse during an earthquake. However, this vulnerability is judged acceptable based on the low rate of occurrence (less than 1.0E-06/year) of the concurrent postulated events.

As described in Sections 6.2.2.2 and 9.2.1.2 of the UFSAR, the CCSW pumps develop sufficient head to maintain the cooling water heat exchanger tube side outlet pressure 20-psi greater than the LPCI subsystem pressure on the shell side. This is designed to prevent shell side water leakage into the CCSW water and subsequent discharge to the river. This differential pressure requirement applies to design basis conditions where two CCSW pumps are used for containment cooling. The coping scenario in Section 9.2.5.3.2 of the UFSAR describes how one CCSW pump would be used for containment cooling of the LOCA unit. The coping scenario did not discuss the differential pressure requirement nor imply that it must be met.

In 1968, the ability of the coping scenario to mitigate the consequences of a LOCA under the postulated conditions (earthquake, loss of Class II systems, and loss of offsite power) was based on engineering judgement. The coping scenario is still judged as adequate to prevent consequences that exceed 10CFR Part 100 limits. Engineering judgement of the potential consequences is deemed appropriate for this beyond design basis event which has a rate of occurrence less than 1.0E-06 per year. As noted in reference (b), it is acceptable to not postulate accidents where the expected rate of occurrence is approximately 1.0E-06/year if, when combined with reasonable qualitative arguments, the realistic probability can be shown to be lower. This has been demonstrated in this case.

ATTACHMENT 2
RESPONSE TO UNRESOLVED ITEM
NRC INSPECTION REPORT
50-237/98007, 50-249/98007
97021-01B

Unresolved Item:

It was not demonstrated that Dresden Station could be safely shutdown during normal operation following a dam failure as described in Section 9.2.5.3.1 of the UFSAR, using seismic Class I systems only. The licensee does not believe that this requirement is part of the design basis and intends to clarify the UFSAR. However, assuming no damage to Class II systems, the UHS inventory is less than that assumed in the evaluation and SWP performance at the 495' MSL has not been evaluated.

ComEd Response:

The coping scenario discussed in Question I.F stated that parts of the fire protection system can meet the requirements of a Class I system. This statement was based on the ability to isolate failed portions following an earthquake. Although NRC consultants identified its vulnerability to potential damage from an earthquake during original plant licensing and during the Systematic Evaluation Program, it was not identified as a deficiency in any Safety Evaluation Report.

Furthermore, there are several other redundant and diverse means of immediately providing make-up water to the isolation condenser following a dam failure. These include the diesel-driven isolation condenser make-up pumps (2/3-43122A & 2/3-43122B) and clean demineralized water pumps (2/3-4303-A & 2/3-4303-B). Both types of pumps take suction from the clean demineralized water storage tank (T-105B). Water from the condensate storage tanks (CSTs, 2/3-3303-A & 2/3-3303-B) can also be used as make-up to the isolation condenser by using the condensate transfer pumps (2(3)-3319-A & 2(3)-3319-B). Although not designed to Class I seismic requirements, these redundant and diverse means provide a high degree of confidence that at least one make-up source will be available following an earthquake that may fail the fire protection system.

The volume of water retained in the Unit 2/3 intake and discharge canals was re-evaluated by conservatively assuming that the level in the discharge canal rapidly drops to elevation 495', the high point on the bottom of the intake canal. Although the high point on the floor of the discharge canal is 498', its level can equalize with the level in the intake canal at 495'. This could occur due to any of the following reasons: 1) leakage through the flow diverter gates in the discharge canal, 2) backflow through the circulating water system piping, and 3) opening of the deicing line. Flow through any of these paths will cause water above elevation 495' in the discharge canal to flow into the intake canal and then flow over the high point in the intake canal at 495' back to the river at elevation 483.25".

Per a calculation sent to the NRC during the Systematic Evaluation Program (SEP), approximately 2,500,000 gallons of water per reactor are required by the isolation condenser to remove decay heat over a period of 30 days. Per the analysis performed during the SEP, the total capacity of the UHS is 9,000,000 gallons. Approximately 2,500,000 gallons are available between elevations 495' and 492' in the intake canal and 3,000,000 gallons are available between elevations 498' and 495' in the discharge canal. If water level in the discharge canal between elevations 498' and 495' is lost to the river, approximately 6,000,000 gallons are left in the UHS. Most of the water in the UHS can be supplied to the isolation condensers since the refuse pumps obtain water from the lowest point in the cribhouse, elevation 480'. The refuse pumps are used to flood the fire pump suction bay so that the Unit 2/3 fire pump can supply make-up water to the shell of the isolation condensers. Portable low head, high volume engine-driven pumps can also obtain water from the lowest point in the discharge canal and move this water to the intake canal. Furthermore, portable low head, high volume engine-driven pumps can also make-up water to the intake canal from the river. Therefore, if the water level in the discharge canal decreases from 498' to 495', sufficient water remains available to safely shutdown.

During a review of systems important to safety for potential vortexing, no vortex or NPSH calculations were found to support the operation of the service water pumps following a dam failure. Problem Identification Form D1998-01231 was written on February 25, 1998 to identify this problem and action item NTS 237-201-98-15101 was generated to develop vortex limit and NPSH calculations. As a result of the inspector's concerns, the evaluation of the service water pumps was expedited.

As noted in the Inspection Report, the submergence of the service water pumps is less than that recommended by the Hydraulic Institute Standards. The submergence is also less than that recommended by the manufacturer, Ingersoll-Dresser Pump Company. Because the recommended submergence typically includes significant margin, a ComEd pump expert contacted technical experts at Ingersoll-Dresser. It was concluded that the submergence of the service water pump suctions following a dam failure is insufficient to assure the pumps could operate at their design flowrate. However, there is insufficient test data to conclusively determine the extent to which the flowrate would degrade. ComEd is still working with the pump manufacturer to determine ways to maximize the output of the pumps when the submergence is less than recommended. However, even if the service water pumps were to completely fail, all functions important to safety can still be accomplished.

The service water pumps are credited in the coping scenarios with the ability to perform three functions, if necessary, following a dam failure: 1) provide make-up to the shell of the isolation condensers (back-up to the fire protection pumps), 2) provide cooling water to the RBCCW heat exchangers so that cold shutdown can be achieved by the Shutdown Cooling Heat Exchangers, and 3) provide a means to flood the containment.

A portable engine-driven pump drawing suction from the intake canal and discharging into the fire protection system can provide make-up to the shell of the isolation condensers. Therefore, a portable engine-driven pump can serve as a back-up to the fire pumps and compensate for the inability to use the service water pumps for this function following a dam failure.

If the service water pumps cannot cool the RBCCW heat exchangers, cold shutdown cannot be achieved. However, the original design criteria for Dresden Units 2 & 3 did not require the ability to achieve cold shutdown conditions. Safe shutdown was defined as hot shutdown. During the Systematic Evaluation Program (SEP) review of SEP topic VII-3, the NRC determined that General Design Criteria 19 and 34 require the capability of achieving cold shutdown from normal operating conditions using safety grade systems. The containment cooling service water (CCSW) system and pressure relief system are used in conjunction with the LPCI subsystem to provide this capability. However, postulating a dam failure was not included in the NRC's evaluation of topic VII-3. Therefore, achieving cold shutdown following a dam failure is not a function important to safety.

The service water pumps are used to flood the containment through the standby coolant supply system that is discussed in Section 9.2.8 of the UFSAR. The purpose of the standby coolant supply system is to provide an inexhaustible supply of water to the condenser hotwell so that feedwater flow to the reactor can be maintained in the event it is needed for core flooding and/or containment flooding following a postulated LOCA. However, flooding the containment can also be achieved by gravity draining water in the circulating water pump bays to the condenser hotwell through the circulating water system. Gravity draining can be accomplished by removing bolted access plates near the bottom of the condenser hotwell, opening a bolted access cover for the circulating water piping, and opening a discharge valve for each circulating water pump. These actions will flood the condenser pit area to a level above the bottom of the condenser hotwell. Condensate and/or feedwater pumps can then inject this water into the reactor pressure vessel. This water will then flow through the break into containment.

Loss of the service water pumps would not lead to a failure of the reactor recirculation pump seals. Loss of the service water pumps will result in the loss of the reactor building closed cooling water system (RBCCW). However, operating procedure DOA 3700-01 "LOSS OF COOLING BY REACTOR BUILDING CLOSED COOLING WATER (RBCCW) SYSTEM" requires that the units be manually scrammed and the reactor recirculation pumps tripped if RBCCW is lost and cannot be restored within one minute.

ATTACHMENT 3
RESPONSE TO UNRESOLVED ITEM
NRC INSPECTION REPORT
50-237/98007, 50-249/98007
980007-02

Unresolved Item:

The UFSAR stated that the CCSW intake bay would be sealed by installing stoplogs across the two openings to the bay. The licensee did not quantify the maximum leakage expected. The inspector was concerned that the stoplogs would leak excessively, further reducing CCSW capacity. Evaluation of CCSW pump performance with vent holes cut in the suction piping and the stoplogs in place is considered an unresolved item.

ComEd Response:

DOA-0010-01 is being revised to ensure that the water level in the CCSW intake bay is maintained at elevation 505' or above following installation of the stop logs. The vents on top of the suction elbows will be at elevation 501'. This 4 feet of submergence is enough to prevent air entrainment due to vortexing. Surveillance procedure DOS-0010-01 will also be revised to demonstrate that level in the CCSW intake bay can be maintained at elevation 505' or above when a CCSW pump is running.

Two types of stop logs are used for the CCSW intake bay. One is made of rough hewn timbers similar to the cross-ties for a railroad track. The other is a metal framed structure with a hard rubber gasket material on the sealing surfaces. The inspector has expressed concern that leakage through the rough hewn stop logs may be significant. Dresden engineering personnel believe that the leakage through the rough hewn stop logs is negligibly small. However, because of the high cost required to prove that leakage is negligibly small, Dresden Station will replace the rough hewn stop logs with a metal framed structure with a hard rubber gasket material on the sealing surfaces. Therefore, both stop logs will be similar.

It should be noted that the capacity of the refuse pumps exceeds the flow required by concurrent operation of the Unit 2 & 3 fire pump and a CCSW pump. Each of the two refuse pumps has a capacity of 2,400 gpm for a total capacity of 4,800 gpm. Only 3,500 gpm (3,602 gpm for Unit 2) is required by the CCSW pump. Only 350 gpm of make-up to the shell of the isolation condenser is needed to balance the reactor decay heat 35 minutes following a scram. The required make-up capacity continues to drop over time. Because the Unit 2 & 3 fire pump will not be used until 2 hours following a scram, the required make-up capacity will be significantly less than 350 gpm. Therefore, the refuse pumps have sufficient capacity to supply both the Unit 2 & 3 fire pump and a CCSW pump and still have margin available to compensate for leakage through the stoplogs.

ATTACHMENT 4
RESPONSE TO UNRESOLVED ITEM
NRC INSPECTION REPORT
50-237/98007, 50-249/98007
98007-04

Unresolved Item:

A dike is located at the south side of the hot canal to the Dresden lake near the intersection of Collins and Dresden roads. All the canal dikes were seismic Class II and assumed to fail after an earthquake strong enough to destroy the dam. It appeared that the failure of this dike might lower intake level to below 495' MSL. This failure did not appear to have been analyzed in the safety evaluation of Hydrology SEP topics II.3.C, Safety Related Water Supply (Ultimate Heat Sink). Review of the potential for dike failure to lower the intake level below the assumed 495' MSL is considered an unresolved item.

ComEd Response:

The elevation at all connections of the lake hot and cold canals to the Unit 2 & 3 intake and discharge canals is 496'. Therefore, the volume of water in the hot and cold canals is assumed to be unavailable following a dam failure where the level in the Unit 2 & 3 intake and discharge canals is assumed to drop to elevation 495'. Failure of the dikes on the hot and cold canals cannot lower the water level in the Unit 2 & 3 intake and discharge canals to less than 495' since the elevation is at 496'where the hot and cold canals connect to the intake and discharge canals. Therefore, failure of any dike on the hot and cold canals will not impact safety.