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Commonwealth Edison
Dresden Nuclear Power Station
6500 North Dresden Road
Morris, Illinois 60450
Telephone 815/942-2920

March 3, 1 94

MDL Ltr. 94-0005

W.L. Axelson, Director
Division of Radiation Safety and Safeguards
United States Nuclear Regulatory Commission
801 Warrenville Road
Lisle, Illinois 60532-4351

Subject: Dresden Nuclear Power Station Unit 1
Confirmatory Action Letter (CAL) RIII-94-001
NRC Docket No. 50-010

References: (a) W.L. Axelson letter to M.J. Wallace, transmitting Confirmatory Action Letter RIII-94-001, dated February 1, 1994.

(b) M.D. Lyster letter to W.L. Axelson, transmitting initial radiological assessment of Item 3 of CAL RIII-94-001, dated February 3, 1994.

Dear Mr. Axelson:

On February 1, 1994, at 1755 hours, Dresden Station received the reference (a) Confirmatory Action Letter (CAL) requesting specific information relating to eight issues. Responses to the eight issues are included as an attachment to this letter.

Item 3 of the CAL required an initial radiological assessment be provided within 48 hours of our receipt of the CAL, and was provided to your staff in reference (b). A more comprehensive radiological assessment has been performed, and is discussed in this response.

Item 6 of the CAL requested that, within 60 days of our receipt of the CAL, we provide information on our long term plans to address the fuel in the fuel transfer system. That information is included in this response.

If you have any questions concerning this response, please call JoAnn Shields, Regulatory Assurance Supervisor, at 815-942-2920 x 2714.

Sincerely,

Michael D. Lyster
Site Vice President
Dresden Station

MDL/kls

cc: J.B. Martin, Regional Administrator - RIII
P.B. Erickson, Dresden 1 Project Manager - NRR
C.D. Pederson, Region III
M.N. Leach, Senior Resident Inspector, Dresden
FILE: NUMERICAL

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ATTACHMENT

Item 1:

Immediately evaluate the benefit of providing backup heaters and an alternative energy source/power supply in the vicinity of the fuel transfer tube isolation and bypass valves located inside containment to ensure that no additional freezing potential exists in that area even with the inadvertent loss of the currently installed heater or associated power supply. If the evaluation concludes that an additional heater and an alternative energy source/power supply is not warranted, provide this evaluation to NRC Region III within 48 hours of receiving this letter.

CECo Response:

Heating needs in the vicinity of the fuel transfer tube isolation and bypass valves in the Unit 1 containment were evaluated. A second heater, supplied from a separate power center was installed within 48 hours of the CAL. This heater is a conservative measure to ensure that no additional freezing potential exists. A thermocouple is attached to the heater, with remote readout. This indication is monitored periodically to ensure heater operability, and if the heater is not operating properly, appropriate corrective actions will be taken.

Dresden Station Operating Department will perform a daily visual surveillance from October 1 through April 1 on the fuel transfer tube and valve, along with the 488' elevation in the sphere per the Unit 1 Rounds. The surveillance is generally performed using remote TV cameras. Any leaks, water accumulation, or other visually noticeable abnormalities will be identified during the surveillance.

The Station Winterizing Procedure, DOS 0010-09 will be revised by October 1, 1994, to verify operability of the heaters and power supplies and will be in effect until ultimate resolution of the sphere heat issue is obtained.

Item 2:

If you intend to remove the fuel pool gates within the next 30 days, notify NRC Region III of this action and provide written justification and an evaluation of the safety consequences for this action. In addition, provide within 30 days, a detailed description of the actions and safety evaluations you would perform to remove the fuel pool gates in the future.

CECo Response:

No manipulations of the fuel gates were performed within the initial 30 day time period. It is anticipated that, under normal operating conditions, the gates will be installed. Future removal of the fuel storage pool to fuel transfer pool gates will be performed in accordance with an approved station procedure, and no manipulations of the fuel pool gates will be performed prior to implementation of this procedure. A safety evaluation will be performed on the original procedure. At a minimum the procedure will contain the following requirements:

1. Shift Engineer approval is required for removal of the fuel pool gates, and a Heightened Level Awareness briefing will be conducted. This briefing will define the conditions under which the gates should be re-installed.

2. The Operations Shift Supervisor will be notified prior to installation or removal of the fuel pool gates. The Operations Shift Supervisor will then verify that either the following instruments are operable or appropriate compensatory actions have been taken prior to allowing gate removal:

   a. Unit 1 fuel storage pool water level alarm
   b. Both Unit 1 fuel building area radiation monitors
   c. The Unit 1 fuel building SPING

3. The Fuel Handling Department will verify that the Unit 1 fuel storage pool and fuel transfer pool water levels are essentially steady, and within one foot of normal water level prior to gate removal.

4. The Fuel Handling Department will visually inspect the fuel pool gate seal condition both following removal and prior to installation of the fuel pool gates.

5. Unit 1 Dresden Fuel Procedure (DFP) 0850-01, "Slow or Rapid Water Level Loss in Unit 1 Fuel Pool", will be referenced.

6. During environmental conditions where freezing could exist, the pool gates will be installed unless the Transfer Tube is adequately heated.

Removal of the gates in the near future is anticipated for the following reasons:

1. To permit seal inspection and possible replacement

2. To inspect and possibly perform maintenance on the seal seating surface

3. Based upon final design of the demineralizer system, install a flow hole near the top of the gate which will permit water communication for demineralizer operation

4. To permit transfer between pools, of irradiated metals, filters, and other hardware for clean-up and shipment activities.

Item 3:

Provide to NRC Region III within 48 hours of receiving this letter an initial evaluation, followed by a formal evaluation within 30 days of receiving this letter, of the consequences, including expected doses to occupational workers and members of the public and radiological contamination estimates, that might occur should portions of the fuel pool transfer tube located inside containment fail, assuming the fuel pool gates remain installed or are removed.

CECo Response:

In the case of a fuel transfer tube failure with the fuel pool gates installed, the radiological consequences would be minimal. With the gates installed, the fuel storage pool will be isolated from the fuel transfer pool, and only the 23 fuel assemblies located in the fuel transfer pool will be affected. For the worst credible transfer tube failure, which is assumed to occur at the 502' elevation where the tube exits the concrete floor, approximately 12 feet of water coverage would remain above these 23 assemblies. As demonstrated by underwater dosimetry readings and the Sargent and Lundy calculation, radiation levels with this amount of water coverage are no greater than the background dose with normal pool water level. Thermal heat-up will not be a problem based on historical pool temperature data and the Sargent and Lundy calculation.

An initial evaluation of the radiological consequences should portions of the fuel transfer tube fail with the fuel gates removed was provided to the NRC on February 3, 1994 (reference b). More detailed calculations are currently being performed and reviewed. Final results of these calculations will be provided by March 20, 1994. Preliminary data are available, and several of the key results are summarized below. A copy of the preliminary Sargent and Lundy report is attached as Attachment A.

The average assembly decay heat was calculated to be 51.5 watts per assembly. Peak pool temperature is expected to be below 120° F, and hence pool boiling is not anticipated. The peak temperature inside a fuel pin in the worst conditions analyzed (fuel totally uncovered) was less than 270° F. This is well below the limit at which cladding rupture is anticipated (1058° F). Direct radiation at the pool edge was calculated to be approximately 800 REM/hr for the totally uncovered case. Scattered radiation dose rates were 3 REM/hr at the Unit 1 fuel building entrance, less than 1 mREM/hr in the Unit 2/3 control room, and less than 2 mREM/hr at the closest point on the site boundary.

Contamination estimates are attached as Attachment B. This is based on estimates of crud composition in the pool and does not include possible dislodging of such material by attempts to re-flood the pool.

Item 4:

Within 30 days of receiving this letter, provide to NRC Region III an engineering evaluation of the current condition of the fuel pool transfer tube and valves, taking into consideration that during the coldest part of the recent severe cold weather, portions of the fuel pool transfer tube may have experienced some freezing. Include surveillance plans for monitoring the fuel pool transfer tube and valves for potential leakage as long as fuel is in the transfer system. Additionally, include in this report the results of any other inspections such as non-destructive examinations (NDE) of the piping and valves that you have or plan to perform in the near future to assure that the system is in good condition.

CECo Response:

On February 16, 1994, Dresden Station performed ultrasonic examinations of the Unit 1 fuel transfer tube (42" O.D.) and bypass line (8"O.D.). These examinations identified:

1. The thickness of the Unit 1 fuel transfer tube (average thickness .53", lowest thickness .501") and bypass line (average thickness .325", lowest thickness .310")

2. Elevation of water above and below the valves (the water level was determined to be approximately 13 feet (519') above the valve elevations, and no water could be identified in the four feet of exposed pipe below the valve elevations).

Dresden Station has evaluated the pipe thicknesses recorded for the transfer tube and bypass line. Based on a comparison to the original pipe thickness and schedule, Dresden has determined that the fuel transfer tube and bypass line meet the original designs within the code allowable, and the structural integrities are acceptable.

On March 1, 1994, Dresden Station conducted a transfer tube inspection with camera-equipped submersible robots, and has determined that water is actually present in the transfer tube below the valve elevation.

Based upon the assumption that a gas pocket existed below the transfer tube valve, an Engineering evaluation identified that, under the January 1994 temperatures, complete radial freezing of the 42" transfer tube would not have occurred; however, the contents of the 8" bypass line could have frozen with pressure relief through the center of the pipe to the 42" line. As a result of the pressure relief, rupture of the 8" line was not predicted.

As a result of the determination that these is no gas bubble beneath the transfer valve, the Engineering evaluation will be re-performed, and the results submitted to your staff by April 1,

1994. A visual inspection was performed on the valves and piping and showed no structural defects. Additional field examinations will be performed if required during the final evaluation.

Dresden Station is preparing a surveillance procedure for the Unit 1 fuel transfer tube and valve assembly to ensure structural integrity is maintained. This inspection will only be required as long as there is fuel in the Unit 1 spent fuel pool. This procedure is currently in on site review, and is anticipated to be effective before June 1, 1994.

Item 5:

Perform and provide to NRC Region III within 30 days an inventory of all special nuclear material (SNM) located in the fuel pool and fuel pool transfer system.

CECo Response:

On February 17, 1994, a special serial number audit of all nuclear fuel in the Unit 1 fuel storage pool and fuel transfer pool was conducted in accordance with Dresden Technical Surveillance DTS 8071, "Special Nuclear Material Inventories". This audit showed a total of 660 fuel assemblies and 1 fuel rod basket (containing two full length rods and one partial length fuel rod) stored in the fuel storage racks in the fuel storage pool. In addition, a total of 23 fuel assemblies were stored in two fuel transfer baskets in the fuel transfer pool. These results were consistent with Nuclear Material accountability records. Two barrels containing non-fuel special nuclear material are also present in the fuel storage pool. These barrels contain portions of discharged Unit 1 Local Power Range Monitor detector strings.

The fuel transfer cart was moved from the fuel transfer tunnel to the fuel transfer pool on February 24, 1994. The transfer cart was visually inspected and found to contain an empty fuel transfer basket. No fuel assemblies were present in the fuel transfer cart, consistent with Nuclear Material accountability records.

A copy of the fuel assembly audit is attached as Attachment C.

Item 6:

Should fuel movement be required within the next 60 days at Dresden unit 1, provide to NRC Region III your plans and precautions to be taken to assure that fuel pool water inventory is not compromised. Additionally, provide to NRC Region III within 60 days of receiving this letter, your plans to address the long term safety of the fuel that is currently located in the fuel transfer system.

CECo Response:

No fuel movement is currently planned within the specified 60 day period. There is no immediate need to move fuel and the fuel handling grapple has been removed to facilitate installation of a suitable fuel handling tool. In addition, we will continue to monitor the structural integrity of the transfer tube to ensure adequate water inventory.

Long term safety of the fuel in the transfer pool is being addressed as follows:

1. In the event of damage to the transfer tube at or above the 502' elevation, a minimum water coverage of 12' would remain above the top of active fuel of the 23 assemblies in the transfer pool. As demonstrated by underwater dosimetry readings and the Sargent and Lundy calculation, radiation levels with this amount of water coverage are no greater than the background dose with normal pool water level. Thermal heat-up will not be a problem based on historical pool temperature data and the Sargent and Lundy calculation.

2. Commonwealth Edison has reviewed the criticality design of the fuel transfer pool storage system and found it to be acceptable. The K_{eff} of the fuel storage system is < 0.90 for normal conditions and < 0.95 for credible accident conditions.

3. Dresden Station will perform a visual examination of the two fuel transfer baskets presently in use as well as the three seating rings in the fuel transfer pool by August 1, 1994. These inspections will be performed with the transfer baskets in place. These inspections will continue as long as fuel remains in the transfer pool.

4. The possibility of storing one or two transfer baskets containing fuel in the fuel storage pool will be reviewed for physical compatibility, criticality, and basket motion restraint. This review will be completed as a contingency should fuel movement become necessary.

5. In the long term, CECo is actively pursuing options to transfer the fuel in the Unit 1 Fuel Building to other storage facilities.

Item 7:

Perform a comprehensive walkdown of all piping systems and components in containment to assure that no other systems contain sources of fluids that might results in containment flooding. Provide a written report of the results of this effort to NRC Region III within 30 days of the date of this letter.

CECo Response:

Commonwealth Edison Company has reviewed Dresden Unit 1 system drawings to identify those systems which contain penetrations to containment (the sphere). Further research was performed to determine which of these systems have the potential to cause flooding in the Unit 1 containment. The systems identified as having the potential to cause sphere flooding were extensively walked down to verify that they will not cause flooding in the sphere. Those systems that could not be isolated from the sphere have been secured. They are currently being modified by cutting and capping to isolate them from the sphere. Those system which have been isolated by valve closure are being evaluated for long term resolution. The following systems, which are no longer needed to support Unit 1 activities, were identified as having the potential to flood the sphere. Corrective actions taken to isolate the systems from the sphere are:

1. Service Water System (penetrations H-30 and H-31).

   The 16" supply and return lines to the sphere have been cut and capped outside the spnere.

2. Contaminated Demineralizer Water (penetration H-32).

   The 6" Contaminated Demin line has been cut and capped outside the sphere.

3. Clean Demineralizer Water (penetration H-66).

   The 2" clean demineralizer water supply line has been cut and capped outside of the sphere.

4. Core Spray System and Post Incident System (penetrations H-22 through H-29, H-35, H-55).

   The water supply for the Core Spray and Post Incident Systems is from the Fire Protection System. The Fire Protection system is normally pressurized at all times. Presently both the Core Spray and Post Incident Systems have two isolation valves Out Of Service in the closed position in the system between the pressurized Fire Protection header and the Unit 1 sphere. To address the long term concern that perhaps these valves could leak in the future, the fire protection line will be cut and capped. This work will physically be completed by October 1, 1994.

5. Filtered Water Supply to the Fuel Transfer Tube (penetration H-62).

   The system line is isolated inside of the sphere by a locked closed valve. However, a possible flow path exists to the sphere when the Radwaste Collector Tank Transfer Pumps are running. Presently, the system has two isolation valves Out Of Service in the closed position located in the Unit 1 radwaste building between the pumps and sphere penetration to eliminate this flowpath by October 1, 1994.

6. Post Incident System (penetrations H-22 through H-29).

   The potential exists for water to get into the sphere via back flow from the Service Water return line through the Post Incident heat exchangers. This possible flow path presently is isolated by two valves Out Of Service in the closed position. The Service Water System will be removed from service or the Service Water lines will be cut and capped outside the sphere by October 1, 1994.

7. Heating System to the sphere (penetration H-54).

   Steam Heating is no longer supplied to the sphere. There are presently two isolation valves Out Of Service in the closed position between the Unit 2/3 heating boilers (Unit 1 boilers are no longer in use), and the sphere. The heating steam to the Unit 1 sphere will be restored, or the line will be cut and capped by October 1, 1994.

No other systems leading to or inside of the Unit 1 sphere present a flooding problem to the sphere based on system isolations, system reviews, and walkdowns performed. Dresden has identified that some of the systems have not been properly drained or could not be drained in certain low spots. Freezing and pipe damage has occurred in some of these locations. As this ice thaws, the water will drain into the floor drain system and eventually end up in the Radwaste System.

Dresden Station has concluded that all potential sources of water to the sphere that could cause flooding have been identified. Dresden has identified the actions necessary to prevent sphere flooding from re-occurring. Therefore, a comprehensive walkdown of all the piping systems and components is not required to prevent further flooding in the Unit 1 sphere.

Item 8:

Conduct an investigation to determine the root causes that resulted in the heating system being isolation from the Dresden 1 containment when piping in the containment contained water. This investigation should consider how this action correlated with the provisions of your decommissioning plan and your facility license. Provide the results of this investigation to NRC Region III within 30 days of receiving this letter.

CECo Response:

A root cause investigation team conducted a review of the decision to discontinue heating to the Dresden Unit 1 sphere. The primary causal factor was determined to be the limited scope of the engineering studies addressing removal of heat to the sphere. The studies only evaluated the potential impact on four systems and the sphere itself based on the assumption that all other systems in the sphere had been drained and isolated. The scope appears to have occurred as a result of:

1. knowledge/training deficiencies concerning the function and importance of the transfer tube.

2. communication deficiencies between the Station and Engineering regarding what systems and components had been drained and where they needed to be isolated

3. inadequate application of 10CFR50.59

4. the absence of a formal review and approval of the Engineering studies by either the Station or Engineering.

While a multi-department task force initiated the studies, the lack of formal reviews by the Station or Engineering eliminated another potential opportunity for the deficiencies to be identified and corrected.

The investigation team also determined that the decision to remove heat from the sphere represented an inconsistency with the CECo decommissioning plan (SAFSTOR) submittals to the NRC, but is not inconsistent with the Facility license. Some of the CECo submittals indicated that heating to Unit 1 would be maintained. The inconsistency appears to have resulted primarily from knowledge and communication deficiencies.

ATTACHMENT A

CAL Item 3: Preliminary Sargent and Lundy report, Radiological and Thermal Characteristics of the Dresden Unit 1 Fuel Storage Pool with Lower than Normal Water Levels.