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JOHN L. HANKINS
VICE PRESIDENT
ELECTRIC PRODUCTION

March 27, 1978

Re: Docket Nos.: 50-277
50-278

IE Bulletin No.: 78-03

Mr. Boyce H. Grier, Director
Office of Inspection & Enforcement
Region I
U. S. Nuclear Regulatory Commission
631 Park Avenue
King of Prussia, PA 19406

Dear Mr. Grier:

This letter is in reply to your letter of February 10, 1978, which transmitted IE Bulletin No. 78-03 concerning potential explosive gas mixture accumulations associated with BWR offgas system operations. The "Actions to Be Taken by Licensees," are restated and addressed below.

Item 1:

Review the operations and maintenance procedures related to the offgas system to assure proper operation in accordance with all design parameters. Include in this review measures you have taken or will take to prevent inadvertent actions (such as arc strikes) which might cause ignition of the mixture of gases contained in the offgas piping.

Response

A review of the offgas system operating and maintenance procedures has shown them to be adequate to ensure proper operation in accordance with all design parameters. Administrative Procedure A-12 "Ignition Source Control Procedure", implemented in 1975, controls the use of ignition sources in the proximity of the offgas system and other systems where flammable materials exist.

Item 2:

Review the adequacy of the ventilation of spaces and areas through which offgas system piping containing explosive mixtures of gases pass. The review should consider ventilation losses and off-normal offgas system operation, such as lack of dilution steam, lost loop seals, blown rupture disks, bypassing recombiners, and leakage of offgas into isolated portions of systems.

Response

The adequacy of the ventilation of spaces and areas through which offgas system piping containing explosive mixtures of gases pass was analyzed. Calculations were performed in a conservative manner to determine the minimum leakage rate in each area necessary to produce an explosive mixture. In addition, the leakage necessary to produce a noticeable response on the vent stack monitor was determined. The leak rate necessary to produce an explosive mixture in the most marginal area was more than twice the detectable rate. Ventilation flow is therefore considered sufficient to preclude an undetectable explosive mixture. The following design features further mitigate the potential for an explosion.

a. In the event the air ejector fails to operate, the subsequent reactor scram and turbine trip will reduce the hazard.

b. Malfunctions of the recombiner will be detected by the recombiner outlet hydrogen analyzer resulting in an automatic trip of the mechanical compressor

to prevent an explosive mixture in the offgas discharge pipe.

c. Loss of jet compressor steam dilution flow will cause the automatic closure of the gas valves on the jet compressor and air ejector.

d. High pressure in the recombiner condenser will trip the steam to jet compressor valve to prevent a further increase in pressure that may open the relief valve.

e. Leakage of offgas into isolated portions of the system is considered to be no more hazardous than in an operable portion of the system. All isolable portions are in the same rooms as the operating units, and therefore adequate ventilation is present.

f. Leakage resulting from a lost loop seal would be detected by the radiation monitoring system.

g. The recombiner bypass line provided in the original design will not be used.

Item 3:

For those spaces and areas identified, describe what action you have taken or plan to take to assure that explosive mixtures cannot accumulate, that monitoring equipment will warn of such an accumulation, and that disposal of such mixtures will be controlled without resulting in a damaging explosion.

Response

As discussed in the response to Item 2 above, the vent stack radiation monitor will detect an offgas system leak prior to the buildup of an explosive concentration. The following actions have been taken to further minimize the potential for an explosion.

a. The offgas blow out disc has been removed and a cap welded in place, as recommended in General Electric Company Service Information Letter No. 38.

b. The Unit 3 recombiner bypass line was blank flanged to prevent operation without the recombiner. The Unit 2 recombiner bypass line has been removed from

service administratively until the blank flange is installed.

c. Instrumentation associated with trip systems that initiate automatic action during off normal offgas system operation will be calibrated under the surveillance testing program.

Item 4:

Loop seals are potential offgas leakage paths following a pressure transient in the offgas system piping. Describe your design features to minimize and detect the loss of liquid from loop seals and describe operating procedures which assure prompt detection and reseal of the blown loop seals.

Response

The offgas system contains three loop seals. Two loop seals drain the air ejector after-condensers. These seals are filled by plant operators on a routine basis, and are protected from continuous gas release following a pressure transient by the automatic isolation of the air ejector. The third loop seal drains the air ejector discharge line and receives adequate makeup from condensation and moisture carryover. This loop seal has been designed to be resealing to prevent any continued release of radioactivity or hydrogen. The seal is constructed of a 1 1/2" pipe within a 4" pipe. The inlet to the seal (1 1/2") extends to the bottom of the 4" pipe. The 4" pipe extends 7 feet above the outlet connection. If a pressure transient were to occur in the air ejector discharge, part of the water forming the seal would be forced upward into this 7 feet of additional pipe. When the initial pressure surge is relieved, the water will return to the bottom of the 4" pipe resealing the loop seal thus preventing any continued release from the seal.

Loss of liquid from loop seals would be detected by an increase in airborne activity in the local area and at the ventilation stack monitor.

Item 5:

Review operating and emergency procedures to assure that your operating staff has

adequate guidance to respond properly to offgas system explosions.

Response

Operating procedure OT-11 "Explosion-Air Ejector Discharge" has been reviewed and does provide the guidance necessary for proper response should an offgas explosion occur.

If you require further information or have any questions on this topic, please do not hesitate to contact us.

Very truly yours,

cc: Director
Office of Inspection and Enforcement
Division of Reactor Operations Inspection
U.S. Nuclear Regulatory Commission
Washington, DC 20555

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-010/78-25; 50-237/78-22; 50-249/78-24

Docket No. 50-010; 50-237; 50-249 License No. DPR-02, DPR-29; DPR-25

Licensee: Commonwealth Edison Company
P.O. Box 767
Chicago, IL. 60690

Facility Name: Dresden Units 1, 2, and 3

Inspection At: Dresden Site, Morris, IL

Inspection Conducted: July 5-6, 11-12, 19-20, August 17, 23-25, 29-31 and September 1, 1978

Inspector: J. L. Barker 9/19/78

Approved By: R. C. Knop, Chief 9/19/78
Reactor Projects Section 1

Inspection Summary

Inspection on July 5-6, 11-12, 19-20, August 17, 23-25, 29-31 and September 1, 1978
(Report No. 50-010/78-25; 50-237/78-22; 50-249/78-24)
Areas Inspected: Routine, unannounced inspection of followup on items of noncompliance/deviations; followup on outstanding inspection items, tests, and special reports; onsite review of licensee event reports; IE Bulletins/Circular followup; 10 CFR Part 21; and review of plant operations. The inspection involved 97 inspector-hours onsite by one NRC inspector
Results: No items of noncompliance or deviations were identified.

Commonwealth Edison NRC Docket Nos. 50-10
50-237
50-249

ATTACHMENT

DRESDEN STATION

Listed below is our response to the five (5) Staff questions.

1. Units 1, 2 and 3

The Operating Procedures relating to the off-gas systems have been reviewed and determined acceptable, based on past experience, to assure proper operation of the system within the Design Parameters. Maintenance Procedure DMP-508, Fire Prevention Procedures for Welding and Cutting, provides instructions for fire prevention when using welding and/or cutting equipment in the presence of an explosive or otherwise hazardous atmosphere.

2. Unit 1

The ventilation of spaces and areas through which off-gas system piping pass have been reviewed and are considered to be adequate with the possible exception of the rooms which contain rupture discs. In the chimney, the offgas is diluted with the discharge of the reactor building, filter building, and turbine building ventilation fans. Complete loss of dilution ventilation is an extremely unlikely off normal operating condition which is addressed in the operating and abnormal procedures.

Units 2 and 3

The ventilation of spaces and areas through which off-gas system piping pass have been reviewed and are considered to be adequate with the exception of the Steam Jet Air Ejector Rooms located in the Turbine Building and the Radwaste Building basement. In the event of blown rupture discs or blown loop seals, offgas would be released to the above areas, respectively. The loss of a loop seal in radwaste would be minimized with the recombiner in service since the final hydrogen generation is less than 1% by volume. The off-gas discharge is released to the chimney at the 554'-6" elevation (36' above ground level) where it is immediately diluted by the Turbine Building and Radwaste Building ventilation exhausts. Complete loss of all

dilution flow is unlikely. These items, as well as other abnormal conditions of system operation, are addressed in existing procedures.

3. Unit 1

The Station Nuclear Engineering Department (SNED) has been requested to review the adequacy of the ventilation to dilute and remove any hazardous mixture created from a blown rupture disc. Appropriate action will be taken following SNED's review.

Units 2 and 3

The loss of loop seals in the Radwaste Building or blown rupture discs would be detected by area radiation monitors which initiate an alarm in the Control Room. To minimize the chance of an explosion in the Radwaste Building, the loop seals will be properly labeled and a sign posted in the appropriate area identifying the potential of an explosive atmosphere. In addition, a continuous air monitor will be located in the area to identify the blown loop seal as soon as possible. A possible alternate to the rupture disc will be evaluated by SNED. Appropriate action will be taken following SNED's review.

4. Unit 1

All loop seals discharge to either the main condenser or the chimney. Although there is no direct means of detecting of loss liquid from loop seals, system performance provides efficient indication of proper operation.

Units 2 and 3

Station abnormal procedures exist for action to be taken in the event of an off-gas over pressurization. These were reviewed and found adequate. Station annunciator procedures associated with an off-gas over pressurization will be revised to reflect the possible loss of loop seals.

5. Units 1, 2 and 3

The Operating, Abnormal, and Commonwealth Edison Generating Station Emergency Procedures have been reviewed and found to provide adequate guidance for the operating personnel in the event of an off-gas explosion.

Unit 2

LER 78-20, Unit 2/3 Diesel Generator Failed to Start
LER 78-28, Spurious Closure of Recirculation Suction Valve During a LOCA

Regarding LER 78-20, an update report was forwarded to the NRC on June 30, 1978. The cause of the failure to start was determined to be a bad lug on the air start solenoid.

Regarding LER 78-28, the inspector found that the cause code and cause subcode on the May 5, 1978 event report to the NRC were incorrect. An update report on August 28, 1978 corrected the cause codes identified. The item will be followed up again when the final modification to the LPCI logic has been completed.

Unit 3

LER 78-03, LLRT Failure of Valves 1601-21, 22, 55, and 56
LER 78-17, Spurious Close of Recirculation Suction Valve During a LOCA

Regarding LER 78-17, inspector's comments are the same as Unit 2, LER 78-20. No items of noncompliance or deviations were identified.

5. IE Circular/Bulletin Followup

Concerning the following IE Circulars, the inspector verified that the circular was received by licensee management, that a review for applicability was performed, and that when applicable, further action taken or planned was appropriate.

IEC 77-16, Emergency Diesel Generator Lockout Features

IEC 78-03, Packing Greater than Type A Quantities of Low Specific Activity Radioactive Material

IEC 78- , Installation Errors that Could Prevent Closing of Fire Doors

IEC 78-09, Arcing of GE Company Size 2 Contractors

IEC 78-11, Recirculation MG Set Overspeed Stops

Concerning the followup IE Bulletins, the inspector verified by record review, observation, and discussion with licensee personnel that licensee management forwarded copies of the response to the bulletin to appropriate onsite management representatives, that information discussed in the licensee's reply was accurate, that corrective action taken was effected as described in the reply, and that the licensee's reply was prompt and within the time period described in the bulletin.

IEB 78-03, Potential Gas Mixture Accumulations Associated with BWR Offgas System Operations

IEB 78-05, Malfunctioning of Circuit Breaker Auxiliary Contact Mechanism - GE CR 105X

IEB 78-06, Defective Cutler-Hammer Type M Relays with DC Coils

IEB 78-07, Protection Afforded by Air-Line Respirators and Supplied Air-Hoods

IEB 78-08, Radiation Levels from Fuel Element Transfer Tubes

IEB 78-09, BWR Drywell Paths Associated with Inadequate Drywell Closure

IEB 78-10, Bergen-Patterson Hydraulic Shock Suppressor Accumulator Spring Coils

IEB 78-11, Examination of Mark-1 Containment Torus Welds

Regarding IEB 78-03, since April 1976 the licensee has been studying possible causes of offgas explosions and corrective action to minimize their possibility. The licensee has determined that the major causes of explosions are: (1) valve seat friction, (2) ionic discharge in the laminer flow layer of the offgas flow stream, and (3) static discharge due to improper grounding. The licensee appears to have corrected the grounding problems. In order to minimize valve friction, the licensee has implemented procedures which require: (1) all valving operations be eliminated except for emergencies during system operation, (2) all shutdown maintenance be performed with the system off-line, and (3) the flow lines be air sparged a minimum of one-hour prior to any maintenance being performed on the system. The last offgas explosion occurred on April 28, 1976. The licensee plans to place continuous air monitors (CAM) on the Unit 1 north corridor and on the Unit 2/3 radwaste building basement. The licensee's Station Nuclear Engineering Department (SNED) has recommended that relief valves (in accordance with GE SIL-38) be installed at the discharge of rupture discs to minimize pressure buildup. The station management has determined they will implement SNED recommendations.

No items of noncompliance or deviations were identified.

6. 10 CFR Part 21 Inspection

The purpose of the inspection was to ascertain whether the licensee and individuals subject to Part 21 regulations have established and are implementing procedures and controls to assure the reporting of defects and noncompliance. Corporate office implementation was verified and documented in NRC Inspection Report No. 50-254/78-19 and No. 50-265/78-20. The inspector verified proper implementation onsite. The inspector found that no program exists for tracking and maintaining Part 21 reports and documentation generated by the licensee's contractors and subcontractors. This item will be reviewed during a future inspection.

No items of noncompliance or deviations were identified.

Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

March 23, 1978

Mr. James G. Keppler, Director
Directorate of Inspection and
Enforcement - Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Subject: Dresden Station Units 1, 2 and 3
Quad-Cities Station Units 1 and 2
Response to IE Bulletin No. 78-03
NRC Docket Nos. 50-10/237/249 and
50-254/265

Reference (a): J. G. Keppler letter to B. Lee, Jr.
dated February 10, 1978

Dear Mr. Keppler:

Reference (a) transmitted IE Bulletin No. 78-03 concerning potential explosive gas mixture accumulations associated with BWR off-gas system operations. Attached is our response to this Bulletin for Dresden Station Units 1, 2 & 3 and Quad-Cities Station Units 1 & 2.

Please address any questions you may have on this matter to this office.

Very truly yours,

M. S. Turbak

M. S. Turbak
Nuclear Licensing Administrator
Boiling Water Reactors

attachment

cc: Dr. Ernst Volgenau

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