



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

November 13, 1991

Docket Nos. 50-237, 50-249, 50-254, 50-265
and 50-295, 50-304, 50-373, 50-374

Mr. Thomas J. Kovach
Nuclear Licensing Manager
Commonwealth Edison Company-Suite 300
OPUS West III
1400 OPUS Place
Downers Grove, Illinois 60515

Dear Mr. Kovach:

SUBJECT: NRC BULLETIN NO. 88-08, "THERMAL STRESSES IN PIPING CONNECTED TO REACTOR COOLANT SYSTEMS" (TAC NOS. 69625, 69626, 69644, 69645, 69675, 69676, 69710 AND 69711)

By letters dated October 3, 1988 and July 17, 1989, Commonwealth Edison Company responded to NRC Bulletin No. 88-08 (Bulletin). Your response stated that the required reviews were performed of piping connected to the reactor coolant system (RCS).

The NRC staff and its consultant, Brookhaven National Laboratories, have completed the review of your response to the Bulletin and its supplements. The staff has determined that your response for Dresden, Units 2 and 3, Quad Cities, Units 1 and 2, Zion, Units 1 and 2, and LaSalle, Units 1 and 2, is consistent with modification or monitoring alternatives stated in the Bulletin. Your response to the Bulletin for the Byron and Braidwood Stations is not consistent with recommended actions and is the subject of additional correspondence.

Although no response was required related to Supplement 3 of the Bulletin, some licensees have addressed it. Those who have not, will not be required to provide a specific response to Supplement 3. However, you are reminded that having been informed of the phenomenon identified in that supplement, you are responsible for adequate review of both its applicability to your plant and any considered actions. The NRC staff may audit or inspect the implementation of NRC Bulletin No. 88-08 and its supplements at a later date. The enclosure contains information that you may use to assess the adequacy of your program with respect to Action 3 of the Bulletin, and Supplement 3.

NRC FILE CENTER COPY

9112060363 911113
PDR ADOCK 05000237
Q PDR

DF
11

AD1

Therefore, you meet the requirements of NRC Bulletin No. 88-08 and no further action is required. This completes our activity on TAC Nos. 69625, 69626, 69644, 69645, 69675, 69676, 69710 and 69711.

Sincerely,

Original Signed By:

Richard J. Barrett, Director
Project Directorate III-2
Division of Reactor Projects - III/IV/V
Office of Nuclear Reactor Regulation

Enclosure:
Evaluation Criteria

cc w/enclosure:
See next page

DISTRIBUTION

Docket File	NRC & Local PDRs
PDIII-2 r/f	BBoger
JZwolinski	RBarrett
RWharton	CMoore
OGC	EJordan, MNBB 3701
ACRS (10)	PDIII-2 Gray File
BClayton, RIII	BSiegel
LOlshan	JHickman
CPatel	RElliott
BMOzafari	

LA PDIII-2
CMOORE
11/8/91

PE:PDIII-2
RWHARTON
11/12/91

D:PDIII-2
RBARRETT
11/13/91

Mr. Thomas J. Kovach
Commonwealth Edison Company

Dresden Nuclear Power Station
Unit Nos. 2 and 3

cc:

Michael I. Miller, Esq.
Sidley and Austin
One First National Plaza
Chicago, Illinois 60690

Mr. J. Eenigenburg
Plant Superintendent
Dresden Nuclear Power Station
Rural Route #1
Morris, Illinois 60450

U. S. Nuclear Regulatory Commission
Resident Inspectors Office
Dresden Station
Rural Route #1
Morris, Illinois 60450

Chairman
Board of Supervisors of
Grundy County
Grundy County Courthouse
Morris, Illinois 60450

Regional Administrator
Nuclear Regulatory Commission, Region III
799 Roosevelt Road, Bldg. #4
Glen Ellyn, Illinois 60137

Illinois Department of Nuclear Safety
Office of Nuclear Facility Safety
1035 Outer Park Drive
Springfield, Illinois 62704

Robert Neumann
Office of Public Counsel
State of Illinois Center
100 W. Randolph
Suite 11-300
Chicago, Illinois 60601

Mr. Thomas J. Kovach
Commonwealth Edison Company

Quad Cities Nuclear Power Station
Unit Nos. 1 and 2

cc:

Mr. Stephen E. Shelton
Vice President
Iowa-Illinois Gas and
Electric Company
P. O. Box 4350
Davenport, Iowa 52808

Michael I. Miller, Esq.
Sidley and Austin
One First National Plaza
Chicago, Illinois 60690

Mr. Richard Bax
Station Manager
Quad Cities Nuclear Power Station
22710 206th Avenue North
Cordova, Illinois 61242

Resident Inspector
U. S. Nuclear Regulatory Commission
22712 206th Avenue North
Cordova, Illinois 61242

Chairman
Rock Island County Board
of Supervisors
1504 3rd Avenue
Rock Island County Office Bldg.
Rock Island, Illinois 61201

Illinois Department of Nuclear Safety
Office of Nuclear Facility Safety
1035 Outer Park Drive
Springfield, Illinois 62704

Regional Administrator, Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road, Bldg. #4
Glen Ellyn, Illinois 60137

Robert Neumann
Office of Public Counsel
State of Illinois Center
100 W. Randolph
Suite 11-300
Chicago, Illinois 60601

Mr. Thomas J. Kovach
Commonwealth Edison Company

Zion Nuclear Power Station
Unit Nos. 1 and 2

cc:

Michael I. Miller, Esq.
Sidley and Austin
One First National Plaza
Chicago, Illinois 60690

Dr. Cecil Lue-Hing
Director of Research and Development
Metropolitan Sanitary District
of Greater Chicago
100 East Erie Street
Chicago, Illinois 60611

Phillip Steptoe, Esq.
Sidley and Austin
One First National Plaza
Chicago, Illinois 60603

Mayor of Zion
Zion, Illinois 60099

Illinois Department of Nuclear Safety
Office of Nuclear Facility Safety
1035 Outer Park Drive
Springfield, Illinois 62704

U.S. Nuclear Regulatory Commission
Resident Inspectors Office
105 Shiloh Blvd.
Zion, Illinois 60099

Regional Administrator, Region III
U.S. Nuclear Regulatory Commission
799 Roosevelt Road, Bldg. #4
Glen Ellyn, Illinois 60137

Robert Neumann
Office of Public Counsel
State of Illinois Center
100 W. Randolph
Suite 11-300
Chicago, Illinois 60601

Mr. Thomas J. Kovach
Commonwealth Edison Company

LaSalle County Station
Unit Nos. 1 and 2

cc:

Phillip P. Steptoe, Esquire
Sidley and Austin
One First National Plaza
Chicago, Illinois 60603

Assistant Attorney General
100 West Randolph Street
Suite 12
Chicago, Illinois 60601

Resident Inspector/LaSalle, NPS
U.S. Nuclear Regulatory Commission
Rural Route No. 1
P. O. Box 224
Marseilles, Illinois 61341

Chairman
LaSalle County Board of Supervisors
LaSalle County Courthouse
Ottawa, Illinois 61350

Attorney General
500 South 2nd Street
Springfield, Illinois 62701

Chairman
Illinois Commerce Commission
Leland Building
527 East Capitol Avenue
Springfield, Illinois 62706

Illinois Department of Nuclear Safety
Office of Nuclear Facility Safety
1035 Outer Park Drive
Springfield, Illinois 62704

Regional Administrator, Region III
U. S. Nuclear Regulatory Commission
799 Roosevelt Road, Bldg. #4
Glen Ellyn, Illinois 60137

Robert Neumann
Office of Public Counsel
State of Illinois Center
100 W. Randolph
Suite 11-300
Chicago, Illinois 60601

Robert Cushing
Chief, Public Utilities Division
Illinois Attorney General's Office
100 West Randolph Street
Chicago, Illinois 60601

Michael I. Miller, Esq.
Sidley and Austin
One First National Plaza
Chicago, Illinois 60690

EVALUATION CRITERIA FOR RESPONSES
TO NRC BULLETIN 88-08, ACTION 3 AND SUPPLEMENT 3

1.0 OBJECTIVE

To provide continuing assurance for the life of the plant that unisolable sections of piping connected to the reactor coolant system (RCS) will not be subjected to thermal stratification and thermal cycling that could cause fatigue failure of the piping.

2.0 PURPOSE

To provide guidelines for evaluation of licensee responses, including acceptable procedures and criteria to prevent crack initiation in susceptible unisolable piping.

3.0 IDENTIFICATION OF POTENTIALLY SUSCEPTIBLE PIPING

- (1) Sections of injection piping systems, regardless of pipe size, which are normally stagnant and have the following characteristics:
 - A. The pressure is higher than the RCS pressure during reactor power operation.
 - B. The piping sections contain long horizontal runs.
 - C. The piping systems are isolated by one or more check valves and a closed isolation valve in series.
 - D. For sections connected to the RCS:
 - a. Water injection is top or side entry.
 - b. The first upstream check valve is located less than 25 pipe diameters from the RCS nozzle.

Examples of such sections in PWRs are the safety injection lines and charging lines between the reactor coolant loop and the first upstream check valve, and the auxiliary pressurizer spray line between the charging line and the main pressurizer spray line.

- (2) Sections of other piping systems connected to the RCS, regardless of pipe size, which are normally stagnant and have the following characteristics:
 - A. The downstream pressure is lower than RCS pressure during reactor power operation.
 - B. The piping systems are isolated by a closed isolation valve, or a check valve in series with a closed isolation valve.
 - C. There is a potential for external leakage from the isolation valve.

Examples of piping containing such unisolable sections in PWRs are the residual heat removal (RHR) lines. Examples of such piping for BWRs are the RHR lines and the core spray injection lines.

4.0 ACCEPTABLE ACTIONS

The following actions are considered as acceptable responses to Bulletin 88-08, Action 3 and Supplement 3, as applicable, provided that the requirements of Bulletin 88-08, Action 2 have been satisfied.

- (1) Revision of system operating conditions to reduce the pressure of the water upstream of the isolation valve below the RCS pressure during power operation.
- (2) Relocation of the check valves closest to the RCS to be at a distance greater than 25 pipe diameters from the nozzle.
- (3) Installation of temperature monitoring instrumentation for detection of piping thermal cycling due to valve leakage.

A. Type and location of sensors.

- a. Temperature sensors should preferably be resistance temperature detectors (RTDs).
- b. RTDs should be located between the first elbow (elbow closest to the RCS), and the first check valve (check valve closest to the RCS).
- c. For the auxiliary pressurizer spray line, RTDs should be installed near the "tee" connection to the main pressurizer spray line or on the cold portion (ambient temperature) of the line.
- d. RTDs should be located within six inches of the welds.
- e. At each pipe cross section, one RTD should be positioned on the top of the pipe and another RTD on the bottom of the pipe.

B. Determination of baseline temperature histories.

After RTD installation, temperature should be recorded during normal plant operation at every location over a period of 24

hours. The resulting temperature versus time records represent the baseline temperature histories at these locations. Baseline temperature histories should meet the following criteria:

- a. The maximum top-to-bottom temperature difference should not exceed 50°F.
 - b. Top and bottom temperature time histories should be in-phase.
 - c. Peak-to-peak temperature fluctuations should not exceed 60°F.
- C. Monitoring time intervals.
- a. Monitoring should be performed at the following times:
 1. At the beginning of power operation, after startup from a refueling shutdown
 2. At least at six-month intervals thereafter, between refueling outages
 - b. During each monitoring period, temperature readings should be recorded continuously for a 24-hour period.
- D. Exceedance Criteria.
- Actions should be taken to modify piping sections or to correct valve leakage if the following conditions occur:
- a. The maximum temperature difference between the top and the bottom of the pipe exceeds 50°F.
 - b. Top and bottom temperature histories are in-phase but the peak-to-peak fluctuations of the top or bottom temperatures exceed 60°F.
 - c. Top and bottom temperature histories are out-of-phase and the bottom peak-to-peak temperature fluctuations exceed 50°F.
 - d. Temperature histories do not correspond to the initially recorded baseline histories.

- (4) Installation of pressure monitoring instrumentation for leakage detection in injection lines.

(Pressure monitoring is not the preferred method since pressure measurements cannot provide a measurement of thermal cycling in the unisolable pipe sections.)

A. Type and location of sensors.

- a. Pressure sensors should preferably be pressure transducers.
- b. Pressure transducers should be installed upstream and downstream of the first check valve.
- c. For systems having a pressure higher than the RCS pressure, pressure transducers may be installed upstream and downstream of the first closed isolation valve. (The downstream section is the pipe segment between the isolation valve and the check valve.)

B. Monitoring time intervals.

- a. Monitoring should be performed at the following times:
 1. At the beginning of power operation, after startup from a refueling shutdown
 2. At least at six-month intervals thereafter, between refueling outages
- b. Pressure readings should be recorded continuously for a 24-hour period.

C. Exceedance criteria.

Actions should be taken to modify piping sections or to correct valve leakage if the following conditions occur:

- a. For pressure measurements across a check valve, the downstream pressure (RCS pressure) is equal to or less than the upstream pressure at any time during power operation.
- b. For pressure measurements across a closed isolation valve, the downstream pressure is equal to or greater than the upstream pressure at any time during power operation.