UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
Washington, D.C. 20555

INSPECTION AND ENFORCEMENT MANUAL

DEPER

TEMPORARY INSTRUCTION 2515/88

INSPECTION OF LICENSEE'S ACTIONS TAKEN TO IMPLEMENT NRC GUIDELINES FOR PROTECTION FROM FLOODING OF EQUIPMENT IMPORTANT TO SAFETY

2515/88-01 PURPOSE

To verify that equipment important to safety will not be damaged by flooding caused by the rupture of a non-Class I system component or pipe to the extent that engineered safety features will not perform their design functions. This temporary instruction (TI) is one of a series that describes NRC inspection requirements and guidance needed to verify satisfactory completion of licensee actions in response to multi-plant action (MPA item B-11).

2515/88-02 OBJECTIVES

To compare the actions of the licensee with the 1972 NRC guidelines (Enclosures 1-3) for protection from flooding of equipment important to safety.

2515/88-03 RESPONSIBILITIES AND AUTHORITIES

03.01 Associate Director for Inspection and Technical Assessment, NRR

a. Coordinate with the regional offices to obtain specific information and identify items to be inspected.

b. Coordinate with regions as required to complete the requirements of this TI.

c. When requested by the regions, conduct a review of the results of the inspections. Determine whether further generic action needs to be taken after the completion of the effort directed by this TI.

03.02 Region Management

a. Coordinate with NRR as needed to perform the inspection requirements of this TI.

b. At most facilities, this inspection effort is expected to verify satisfactory licensee implementation of the requirements imposed under this MPA. In such cases, the regional offices will be able to

verify satisfactory completion and report MPA verification as complete. However, if the inspection produce results which are unclear and require additional technical resolution, the regional offices should contact the Associate Director for Inspection and Technical Assessment, NRR for resolution. Recommendations for additional action should be provided, if appropriate.

2515/88-04 BACKGROUND

A technical issue was identified concerning the failure of non-safety grade equipment such as condenser bellows which could lead to flooding of safety-related equipment and loss of safety functions. Plants licensed before March 1, 1974 were required to review their facilities and make modifications, as necessary. For plants licensed after that date this issue was addressed as part of the licensing review process. This item is identified by NRR as MPA item B-11 and is applicable to all plants.

Modifications such as water tight doors, curbs, and changes to floor drains may be needed for some plants to solve potential flooding problems. All modifications are plant specific.

2515/88-05 BASIC REQUIREMENTS

For each of the categories listed below, perform examinations in areas susceptible to flooding or water impingement. This may be accomplished by visual inspections or reviews of engineering drawings, operating procedures, and surveillance records. Some examples of equipment and components whose functions may be affected by flooding are motor control centers, electrical switchgear, batteries, diesel generators, and pump and valve controls. Areas susceptible to flooding or water impingement may be adjacent to water supplies for fire suppression, general service and cooling.

05.01 Separation for Redundancy. Determine that redundant equipment important to safety is separated and protected to ensure operability in the event a non-Class I system or component fails and causes flooding or water impingement.

05.02 Access Doors and Alarms. Determine that the watertight barriers for protection from flooding of equipment important to safety have access doors and hatches fitted with switches that annunciate in the control room when the access is open. The access doors should be watertight and functional. Determine the date of the most recent verification of the seal integrity, including a check for watertightness.

05.03 Sealed Water Passages. Determine that penetrations through walls of rooms containing equipment important to safety are sealed against water leakage from a failure of non-Class I water systems. Determine that openings between floors do not create a potential for flooding. For example, there may be unsealed pipe sections in the horizontal structure.

05.04 Floor Drains and Curbs. Determine that floor drains are not obstructed, that screen covers are in place, and that curbs are continuous. Assure that the area served by the floor drains are free from objects which may migrate during water flow to the drain and obstruct the drain (such as poly bags or sheets, paper, etc). Where applicable, determine that floor drain check valves open and close correctly without sticking.

05.05 Water Level Alarms and Trips. Determine that the level alarms and pump trips in rooms containing non-Class I system components and pipes whose rupture could result in flood damage to equipment important to safety alarm in the control room and limit flooding. Determine the date of the most recent verification of the functioning and calibration of the level alarms. Redundance of switches is required; critical trip circuits should be redundant.

05.06 Equipment Location and Protection. Determine that Class I equipment is located or protected such that rupture of a non-Class I system that is a portion of a pumped system or is connected to a cooling tower containing water will not result in failure of the equipment from flooding. For example, water impingement shielding may be used for electric motors.

05.07 Loss of Offsite Power. Determine that the simultaneous loss of offsite power with the rupture of a non-Class I system component or pipe will not affect the operation of the annunciators, alarms, switches, trips, etc.

05.08 Integrity of Class 1E Electrical Systems. Determine that enclosures in harsh environments including high-energy line breaks that contain Class 1E electrical terminals and terminations are sealed/gasketed to prevent moisture intrusion which may cause power system shorting or inoperability of the instrument or component served by the Class 1E source.

05.09 Administrative Control. It is important to maintain protection from flooding of equipment and the licensee may have established administrative control programs to ensure that measures taken in each of the above categories are effective and include periodic surveillances to verify the adequate continuation of such measures. Determine the methods or programs used to keep this protection effective and current. For example, it may be found in portions of repair, maintenance, and inspection procedures or it may be part of design reviews.

2515/88-06 REPORTING REQUIREMENTS

06.01 Regional inspection results shall be transmitted to the Associate Director for Inspection and Technical Assessment, NRR. The inspection effort shall be documented in a routine inspection report.

06.02 Some or all of the inspection requirements of this TI may have been previously accomplished as part of inspections conducted at a particular facility. In such cases where the basis for findings resulting from these inspection requirements is adequately documented in an earlier inspection report, enter the inspection report number, completion date, and other pertinent data in the SIMS data base for the affected facility.

06.03 This TI may serve as a substitute for the applicable portions of the following inspection procedures (IP):

a. IP 62702 Maintenance Program
b. IP 62703 Monthly Maintenance Observations

06.04 When inspection activities required by this TI are completed, enter the status of these activities in the following SIMS data fields. The SIMS issue number for this TI is MPA-B-11.

a. Inspection Report Number. Up to five inspection report numbers may be entered to identify those instances where the inspection activities are documented in more than one inspection report.

b. Inspection Report Date. This data field lists either the date of the final inspection report on this item, the date of the most recent inspection report on this item, or a projected final inspection date for this item.

c. Comments. This data field contains 300 characters and can be used to describe the status of NRC inspection activities for this item at each plant. Useful information in this field would include mentioning of outstanding open items or future licensee action needed to close the item, if applicable.

2515/88-07 EXPIRATION

The TI shall remain in effect until April 1, 1988.

2515/88-08 CONTACT

Questions regarding this TI should be addressed to Paul Cortland, (301) 492-4175.

2515/88-09 STATISTICAL DATA REPORTING

Record actual time spent to perform the inspection and the time spent on followup items identified in the inspection report against module number 25588.

END

Enclosure

Enclosure 1

August 3, 1972

Docket Nos. 50-10, 50-237,
and 50-249

Commonwealth Edison Company
ATTN: Mr. L. D. Butterfield, Jr.
Nuclear Licensing Administrator
Post Office Box 767
Chicago, Illinois 60690

Gentlemen:

FLOODING OF CRITICAL EQUIPMENT

As a result of a failure of an expansion bellows in the circulating water line at Quad-Cities Unit 1, you experienced flooding and resultant degradation of some of the engineered safety features. You have reported that interim corrective action has been taken and more permanent corrective measures are planned at Quad-Cities 1 and 2 to prevent recurrence, however, similar action has not been reported for your other facilities.

You are, therefore, requested to review the Dresden station facilities to determine (1) whether failure of any equipment which does not meet the criteria of Class I seismic construction, particularly the circulating water system, could cause flooding sufficient to adversely affect the performance of engineered safety systems and (2) whether failure of any equipment could cause flooding such that common mode failure of redundant safety related equipment would result. The integrity of barriers to protect critical equipment from flood waters should be assumed only when the barrier meets the seismic requirements for Class I structures. If your review determines that engineered safety features could be so affected, provide your plans and schedule for corrective action together with the justification for continued operation of Dresden station facilities pending completion of the corrective action.

The results of your review are requested within sixty days. This information should be provided with one signed original and thirty-nine additional copies.

Sincerely,

(signed)

Donald J. Skovholt
Assistant Director for
Operating Reactors
Directorate of Licensing

cc: John W. Roe, Esquire
Isham, Lincoln & Beale
Counselors at Law
One First National Plaza
Chicago, Illinois 60670

Enclosure 2

May 9, 1973

Docket Nos. 50-10, 50-237,
and 50-249

Commonwealth Edison Company
ATTN: Mr. L. D. Butterfield, Jr.
Nuclear Licensing Administrator
Post Office Box 767
Chicago, Illinois 60690

Gentlemen:

In our evaluation of your response dated October 13, 1972, to our letter dated August 3, 1972, regarding flooding of critical equipment, it has become apparent that additional information is required before we can continue our review. The additional information should provide assurance that the plants do or will meet the guidelines set forth in the enclosed Attachment A. Some information addressing the guidelines has been included in your October 13, 1972 letter and may be incorporated by reference where appropriate.

If your analysis identifies system or components that require additional changes in your plant to meet the guidelines, submit the results of your safety analysis regarding the changes, a description of the required changes (including appropriate drawings and sketches), and schedule for completion of the changes. Where temporary protective measures are to be taken to protect equipment or systems important to safety, submit your analysis, description, and justification for these measures and your installation and test schedule. Also describe and discuss the status of investigations and modifications reported to be in progress in your October 13, 1972 letter.

Your response for temporary protective measures should be submitted as soon as practicable but in not more than 30 days. Other information requested above should be submitted within 60 days. It is expected that

all required corrections will be performed as expeditiously as is practicable.

One signed original and thirty-nine additional copies of your submittals are required.

Sincerely,

(signed)

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Directorate of Licensing

Enclosure:
Attachment A - Guidelines

cc w/enclosure:
John W. Rowe, Esquire
Isham, Lincoln & Beale
Counselors at Law
One First National Plaza
Chicago, Illinois 60670

Morris Public Library
604 Liberty Street
Morris, Illinois 60451

Enclosure 3

NRC GUIDELINES FOR PROTECTION FROM FLOODING OF EQUIPMENT

Licensees are required to investigate their facilities or review their designs to assure that equipment important to safety will not be damaged by flooding due to rupture of a non-Class I system component or pipe such that engineered safety features will not perform their design function. No single incident of a non-Class I system component or pipe failure shall prevent safe shutdown of the facility.

Further guidelines:

1. Separation for redundancy - single failure of non-Class I system components or pipes shall not result in loss of a system important to safety. Redundant safety equipment shall be separated and protected to assure operability in the event a non-Class I system or component fails.

2. Access doors and alarms - watertight barriers for protection from flooding of equipment important to safety shall have all access doors or hatches fitted with reliable switches and circuits that provide an alarm in the control room when the access is open.

3. Sealed water passages - passages or piping and other penetrations through walls of a room containing equipment important to safety shall be sealed against water leakage from any postulated failure of non-Class I water systems. The seals shall be designed for the SSE, including seismically indicated wave action of water inside the affected compartments during the SSE.

4. Class 1 watertight structures - walls, doors, panels, or other compartment closures designed to protect equipment important to safety from damage due to flooding from a non-Class I system rupture shall be designed for the SSE, including seismically induced wave action of water inside the affected compartment during the SSE.

5. Water level alarms and trips - rooms containing non-Class I system components and pipes whose rupture could result in flood damage to equipment important to safety shall have level alarms and pump trips (where necessary) that alarm in the control room and limit flooding within the design flood volume. Redundance of switches is required. Critical pump (i.e., high volume flow, such as condenser circulating water pumps) trip circuits should meet IEEE 279 criteria.

6. Class 1 equipment should be located or protected such that rupture of a non-Class I system connected to a tower containing water or body of water (river, lake, etc.) will not result in failure of the equipment from flooding.

7. The safety analysis shall consider simultaneous loss of offsite power with the rupture of a non-Class I system component or pipe.

The licensees responses should include a listing of the non-Class I systems considered in their analysis. There should include at least the following systems:

Firewater	Demineralized Water
Service Water	Drains
Condensate	Heating Boiler Condensate
Feedwater	Condenser Circulating
Reactor Building Cooling Water	Makeup
Turbine Building Cooling Water	Potable Water