

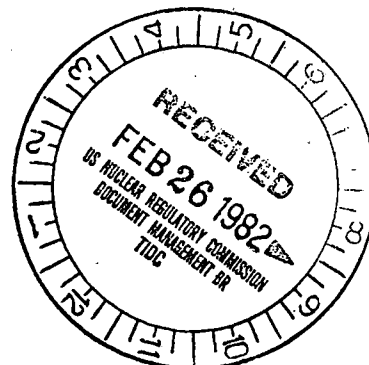


UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

February 24, 1982

Docket No. 50-237  
LS05-82- 02-119

Mr. L. Del George  
Director of Nuclear Licensing  
Commonwealth Edison Company  
Post Office Box 767  
Chicago, Illinois 60690



Dear Mr. Del George:

SUBJECT: SEP TOPIC V-5, REACTOR COOLANT PRESSURE BOUNDARY LEAKAGE  
DETECTION - DRESDEN NUCLEAR POWER STATION UNIT NO. 2

Enclosed is a copy of our draft evaluation of SEP Topic V-5 for Dresden Nuclear Power Station, Unit No. 2. This assessment was based on a comparison of the facility, as described in Docket No. 50-237, with the criteria currently used by the regulatory staff for licensing new facilities. This draft evaluation factors in the information contained in the September 2, 1980 letter from Commonwealth Edison to the NRC on this subject, and information contained in SEP Topic V-10.A and available 10 CFR 50, Appendix I submittals for Dresden. Please inform us within 30 days whether or not the as-built facility differs from the licensing basis assumed in our assessment. Also, please supply the missing information in Tables 1, 2 and 3 of the evaluation that is pertinent to this facility.

This evaluation will be a basic input to the integrated safety assessment for your facility unless you identify changes needed to reflect the as-built conditions at your facility. This assessment may be revised in the future if your facility design is changed or if NRC criteria relating to this subject are modified before the integrated assessment is completed.

Sincerely,

SE04  
1/1

DS4 USE (16)

ADD:  
G. Staley  
G. Cwalina

Paul W. O'Connor, Project Manager  
Operating Reactors Branch No. 5  
Division of Licensing

Enclosure:  
As stated

cc w/enclosure:  
See next page

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OFFICE	SEP B <i>MJB</i>	SEP B <i>mc</i>	SEP B <i>WR</i>	ORB #5 <i>post</i>	ORB # <i>pm</i>	AD-SA:DL <i>DL</i>
SURNAME	MBoyle:bl	GWalina	WRussell	PO'Connor	DCrutchfield	GLucas
DATE	2/22/82	2/22/82	2/22/82	2/22/82	2/23/82	2/13/82

Mr. L. DelGeorge

cc

Isham, Lincoln & Beale  
Counselors at Law  
One First National Plaza, 42nd Floor  
Chicago, Illinois 60603

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

Natural Resources Defense Council  
917 15th Street, N. W.  
Washington, D. C. 20005

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

Mary Jo Murray  
Assistant Attorney General  
Environmental Control Division  
188 W. Randolph Street  
Suite 2315  
Chicago, Illinois 60601

Morris Public Library  
604 Liberty Street  
Morris, Illinois 60451

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

John F. Wolf, Esquire  
3409 Shepherd Street  
Chevy Chase, Maryland 20015

Dr. Linda W. Little  
500 Hermitage Drive  
Raleigh, North Carolina 27612

Judge Forrest J. Remick  
The Carriage House - Apartment 205  
2201 L Street, N. W.  
Washington, D. C. 20037

Illinois Department of Nuclear Safety  
1035 Outer Park Drive, 5th Floor  
Springfield, Illinois 62704

U. S. Environmental Protection Agency  
Federal Activities Branch  
Region V Office  
ATTN: Regional Radiation Representative  
230 South Dearborn Street  
Chicago, Illinois 60604

The Honorable Tom Corcoran  
United States House of Representatives  
Washington, D. C. 20515

James G. Keppler, Regional Administrator  
Nuclear Regulatory Commission, Region III  
Office of Inspection and Enforcement  
799 Roosevelt Street  
Glen Ellyn, Illinois 60137

SYSTEMATIC EVALUATION PROGRAM

TOPIC V-5

DRESDEN 2

TOPIC: V-5, Reactor Coolant Pressure Boundary (RCPB) Leakage Detection

I. INTRODUCTION

The safety objective of Topic V-5 is to determine the reliability and sensitivity of the leak detection systems which monitor the reactor coolant pressure boundary to identify primary system leaks at an early stage before failures occur.

II. REVIEW CRITERIA

The acceptance criteria for the detection of leakage from the reactor coolant pressure boundary is stated in the General Design Criteria of Appendix A, 10 CFR Part 50. Criterion 30, "Quality of Reactor Coolant Pressure Boundary", requires that means shall be provided for detecting and, to the extent practical, identifying the location of the sources of leakage in the reactor coolant pressure boundary.

III. REVIEW GUIDELINES

The acceptance criteria are described in the Nuclear Regulatory Commission Standard Review Plan Section 5.2.5, "Reactor Coolant Pressure Boundary Leakage Detection". The areas of the Safety Analysis Report and Technical Specifications are reviewed to establish that information submitted by the licensee is in compliance with Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems".

IV. EVALUATION

Safety Topic V-5 was evaluated in this review for compliance of the information submitted by the licensee with Regulatory Guide 1.45, "Reactor Coolant Pressure Boundary Leakage Detection Systems". The information in the Safety Analysis Report, Technical Specifications, the March 13, 1979 CECO letter to the NRC regarding SEP Topic V-10.A, the September 2, 1980 CECO letter to the NRC on this subject and the available 10 CFR 50, Appendix I review information for Dresden 2 was reviewed.

Regulatory Guide 1.45 recommends that at least three separate detection systems be installed in a nuclear power plant to detect unidentified leakage from the reactor coolant pressure boundary to the primary containment of one gallon per minute within one hour. Leakage from identified sources must be isolated so that the flow rates may be monitored separately from unidentified leakage. The detection systems should be capable of performing their functions following certain seismic events and capable of being checked in the control room. Of the three separate leak detection methods recommended, two of the methods should be (1) sump level and flow monitoring and (2) airborne particulate radioactivity monitoring. The third method may be either monitoring of condensate flow rate from air coolers or monitoring of airborne gaseous radioactivity. Other detection methods, such as humidity, temperature and pressure, should be considered to be alarms of indirect indication of leakage to the containment. In addition, provisions should be made to monitor systems interfacing with the reactor coolant pressure boundary for signs of intersystem leakage through methods such as radioactivity and water level or flow monitors. Plant incorporated systems and their corresponding features are tabulated in Enclosure 1. Detailed guidance for the leakage detection system is contained in Regulatory Guide 1.45.

Based upon our review of the referenced documents and the summaries presented in Enclosure 1, we have determined:

- 1) The systems employed for the detection of leakage from the reactor coolant pressure boundary to the containment do not meet the recommendations of Regulatory Guide 1.45. Specifically, all of the recommended types of detection systems are not employed and for those systems employed, the system sensitivity, seismic qualification, indication and testing specifications do not meet the recommendations of the Guide.
- 2) Provisions are made to monitor reactor coolant in-leakage to those systems listed in Table 2. However, from the review of the referenced information it is not clear that this table includes all systems which interface with the reactor coolant pressure boundary.
- 3) Information concerning the use of reactor coolant inventory balances, for RCPB leakage detection as indicated in Table 3, is incomplete, therefore, its contribution to overall detection system effectiveness cannot be determined.

#### V. CONCLUSIONS

Our review indicated that the systems employed at Dresden 2 to measure reactor coolant pressure boundary leakage do not meet the recommendations given in Regulatory Guide 1.45. Specifically, our review concludes that:

- 1) The types of leakage detection systems incorporated for measurement of leakage from the reactor coolant pressure boundary to the containment do not meet the minimum recommendations of Regulatory Guide 1.45.
- 2) Information concerning the leakage detection systems for the detection of inter-system reactor coolant pressure boundary leakage is incomplete. Therefore, we cannot determine the extent to which Regulatory Guide 1.45 is met.
- 3) Information concerning the use of the primary coolant system inventory balance leak rate sensitivity and time required to achieve sensitivity is incomplete. Therefore, we cannot determine the contribution of this technique to the overall leak detection sensitivity.

The necessity for any leakage detection system modification will be considered during the integrated safety assessment.

REACTOR COOLANT PRESSURE BOUNDARY LEAKAGE DETECTION SYSTEMS  
Regulatory Guide 1.45 Requirements

Table 1:

Plant: DRESDEN 2

RCPB to Containment System	Incorporated	Leak Rate Sensitivity	Time Req'd to Achieve Sensitivity	Earthquake For Which Function Is Assured	Control Room Indication For Alarms & Indicators	Documentation Reference	Testable During Normal Operation
1) Sump Level Monitoring (Inventory)	YES		24 hrs.			FSAR Sec. 4 T.S. 3.6.D	
2) Sump Pump Actuations Monitoring (Time Meters)	NO						
3) Airborne Particulate Radioactivity Monitoring (Stack gas)	YES		24 hrs.		YES	FSAR § 7.6 T.S. 3.6.D	
4) Airborne Gaseous Radioactivity Monitoring (Air Sampling System)	YES				YES	Question B.14 FSAR § 7.6	
5) Condensated Flow Rate from Air Coolers	NO						
6) Containment Atmosphere Pressure Monitoring							
7) Containment Atmosphere Humidity Monitoring							
8) Containment Atmosphere Temperature Monitoring							
9) Acoustical Emissions							
10) Moisture Sensitive Tape							
11) Thermocouple Leak Detection (valves)	YES				YES	Question B.14	
12) Air Conditioner Coolant Temp.	YES					FSAR § 4	

REACTOR COOLANT PRESSURE BOUNDARY LEAKAGE DETECTION SYSTEMS  
Regulatory Guide 1.45 Requirements

Table 2:

Plant: DRESDEN 2

Inter-System Leakage	Methods to Measure RCPB In-Leakage	Leak Rate Sensitivity	Time Req'd to Achieve Sensitivity	Earthquake For Which Function Is Assured	Control Room Indication For Alarms & Indicators	Documentation Reference	Testable During Normal Operation
Systems Which Interface w/ RCPB							
1) Reactor Building Closed Cooling Water System	Radiation Monitor				YES	FSAR Sec. 7.6 & 10.10	
2) Service Water System Discharge	Radiation Monitor				YES	FSAR Sec. 7.6	
3)							
4)							
5)							
6)							
7)							
8)							
9)							
10)							
11)							
12)							

REACTOR COOLANT PRESSURE BOUNDARY LEAKAGE DETECTION SYSTEMS  
Regulatory Guide 1.45 Requirements

Table 3:

Plant: DRESDEN 2

RCS Inventory Balance

Leak Rate Sensitivity							
Corresponding Time Required to Achieve Sensitivity							

\*Normal Inventory Check

Instrumentation Required with Corresponding Location:

Earthquake For Which Instrumentation Hardware Functioning Is Assured:

Testable During Normal Operation:

Documentation Reference:



REACTOR COOLANT PRESSURE BOUNDARY LEAKAGE DETECTION SYSTEMS  
Regulatory Guide 1.45 Requirements

Table 1:

Plant: DRESDEN 2

<u>RCPB to Containment</u> System	Incorporated	Leak Rate Sensitivity	Time Req'd to Achieve Sensitivity	Earthquake For Which Function Is Assured	Control Room Indication For Alarms & Indicators	Documentation Reference	Testable During Normal Operation
1) Sump Level Monitoring (Inventory)	YES		24 hrs.			FSAR Sec. 4 T.S. 3.6.D	
2) Sump Pump Actuations Monitoring (Time Meters)	NO						
3) Airborne Particulate Radioactivity Monitoring (Stack gas)	YES		24 hrs.		YES	FSAR § 7.6 T.S. 3.6.D	
4) Airborne Gaseous Radioactivity Monitoring (Air Sampling System)	YES				YES	Question B.14 FSAR § 7.6	
5) Condensated Flow Rate from Air Coolers	NO						
6) Containment Atmosphere Pressure Monitoring							
7) Containment Atmosphere Humidity Monitoring							
8) Containment Atmosphere Temperature Monitoring							
9) Acoustical Emissions							
10) Moisture Sensitive Tape							
11) Thermocouple Leak Detection (valves)	YES				YES	Question B.14	
12) Air Conditioner Coolant Temp.	YES					FSAR § 4	

REACTOR COOLANT PRESSURE BOUNDARY LEAKAGE DETECTION SYSTEMS  
Regulatory Guide 1.45 Requirements

Table 2:

Plant: DRESDEN 2

Inter system Leakage Systems Which Interface w/ RCPB	Methods to Measure RCPB In-Leakage	Leak Rate Sensitivity	Time Req'd to Achieve Sensitivity	Earthquake For Which Function Is Assured	Control Room Indication For Alarms & Indicators	Documentation Reference	Testable During Normal Operation
1) Reactor Building Closed Cooling Water System	Radiation Monitor				YES	FSAR Sec. 7.6 & 10.10	
2) Service Water System Discharge	Radiation Monitor				YES	FSAR Sec. 7.6	
3)							
4)							
5)							
6)							
7)							
8)							
9)							
10)							
11)							
12)							

REACTOR COOLANT PRESSURE BOUNDARY LEAKAGE DETECTION SYSTEMS  
Regulatory Guide 1.45 Requirements

Table 3:

Plant: DRESDEN 2

RCS Inventory Balance

Leak Rate Sensitivity							
Corresponding Time Required to Achieve Sensitivity							

\*Normal Inventory Check

Instrumentation Required with Corresponding Location:

Earthquake For Which Instrumentation Hardware Functioning Is Assured:

Testable During Normal Operation:

Documentation Reference: