

EDO Principal Correspondence Control

FROM: DUE: 06/11/02 EDO CONTROL: G20020302  
DOC DT: 05/17/02  
FINAL REPLY:

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TO:

Travers, EDO

FOR SIGNATURE OF : \*\* GRN \*\*

CRC NO:

Collins, NRR

DESC:

ROUTING:

Inability to Detect Reactor Coolant Leakage

Travers  
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DATE: 05/20/02

ASSIGNED TO: CONTACT:  
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SPECIAL INSTRUCTIONS OR REMARKS:

Template: EDO-001

E-RIDS: EDO-01

May 17, 2002

Dr. William Travers  
Executive Director for Operations  
Nuclear Regulatory Commission  
Washington, DC 20555-0001

Subject: Inability to Detect RCS Leakage

Dear Dr. Travers,

Reactor Coolant System leaks at Davis Besse and V.C. Summer reinforce the need to detect RCS leakage. Not only does it make sense, it is also a legal requirement: "Means shall be provided for detecting and, to the extent practical, identifying the location of the source of the reactor coolant leakage."<sup>1</sup> The NRC's Regulatory Guide 1.45 is how this requirement is implemented and it provides very clear limits – detect a 1 gpm leak within 1 hour. It also requires diverse methods of leak detection and that at least one of the means be seismically qualified. Accepted methods are by measuring the concentration of radioactivity in the containment atmosphere and measuring sump levels or flows. Critical to the success of the radioactivity method is that there be enough gaseous or particulate material in the RCS to register on the detector.

A review of NRC correspondence found several examples of problems with leak detection systems. For example,

*In recent years, plants have exhibited better fuel performance and improved chemistry resulting in less primary coolant radioactivity concentrations than was assumed when plants were originally licensed<sup>2</sup>.*

Does the above mean the NRC has been aware for the last 4 years that plants are operating outside the conditions of their licenses? Although later in the document the staff hints at upcoming generic activities, I have been unable to find results in the public domain.

As a result of the VC Summer hot leg crack, "the NRC identified several generic issues to be addressed ... 3) potential weaknesses in RCS leak detection systems"<sup>3</sup>. Again, NRC has identified a generic issue with leak detection systems but is silent on actions to address it.

An evaluation of other publicly available data<sup>4</sup> shows that all is not well with the capability to detect RCS leakage. Attached are summaries of 15 Licensee Event Reports where plants have been unable to meet the requirements of Regulatory Guide 1.45. In some cases, the failure was

<sup>1</sup> 10 CFR 50, Appendix A, Criterion 30

<sup>2</sup> Safety Assessment of Region II Concerns Regarding Discrepancies of Containment Radiation Monitor Sensitivities at St Lucie and Turkey Point, June 24, 1998 ML011760038

<sup>3</sup> NRC Information Notice 2000-17, Supplement 2, Crack in Weld Area of Reactor Coolant System Hot Leg Piping at V. C. Summer, Feb 28, 2001

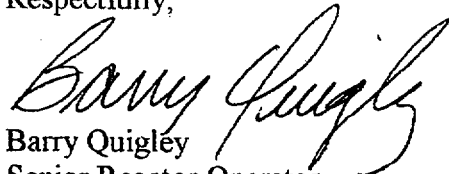
<sup>4</sup> It is unknown if the inability of the Byron and Braidwood plants to detect leakage consistent with Reg Guide 1.45 will be reported.

due to ignorance of design requirements, in others because instruments lack the required sensitivity.

Considering the above examples, what reasonable assurances, based on objective data, can NRC provide the public that General Design Criterion 30 is being met?

An associated issue is a non-conservative assumption in most plants' Technical Specifications related to RCS leakage. A small amount of unidentified leakage is allowed, typically 1 gpm. However, no pressure boundary leakage is allowed. The non-conservatism is that even though plants have unidentified leakage, licensees assume that it is not pressure boundary leakage. In other words, since it is unidentified how do they know it is not pressure boundary leakage?

Respectfully,



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cc: Dave Lochbaum, Union of Concerned Scientists

### RCS Leak Detection LERs

Plant	Date	Title -- (Abbrev)	System	Cause	Corrective Action	Accession
Cook	4/1/99	RCS Leak Detection Sensitivity not IAW Design Requirements	Sump level/flow	Inadequate original Design	None substantial	9905050105
Millstone 3	2/6/98	Rad Monitor Non-Conservative Setpoint WRT RG 1.45	Particulate & Gaseous	Historical	Revised Setpoint	9803310291
Byron	2/28/98	RCS Leak Detection Inop due to Inadequate Communication	Sump level/flow	Plugged floor drain not properly communicated	Requirements from 3/15/97 not clear to workers	9803300441
Farley	10/7/97	RCS Leak Detection Inop due to Defective Procedure	Containment Fan Cooler Condensate Flow	Defective Procedure (drain vlvs open vs throttled)	Throttled vlvs, revised procedure	9710140260
Crystal River	7/30/97	Inadequate Engineering Eval Results in Loss of Diverse RCS leakage detection	Gaseous	Historical personnel error	Revised Tech Spec	9806190155
LaSalle	5/12/97	Undrainable Areas Cause Increased Delays in RCS Leak Detection	Sump level/flow	Original Design/Poor equipment choice	Revised design/Modified equipment	9803040393
Byron	3/15/97	Containment Drain System Clogged due to Debris	Sump level/flow	Drains not installed per design	New design/Increased hydrolazing of drain lines	9704220096
North Anna	9/10/96	Seismic Concerns with Leak Detection Rad Monitors	Particulate & Gaseous	Historical Personnel error	Upgraded Piping to Seismic	9706180225
Byron	8/15/96	Cnmt Rad Monitor Setpoints do not meet design criteria	Particulate & Gaseous	Unknown	Revised Setpoints	9609250180
McGuire	8/21/95	Failure to Comply with Tech Spec for RCS Leak Detection	Particulate	Monitor ran out of filter paper	Repaired low filter paper alarm	9509220160
Callaway	7/8/94	Failure to Meet Tech Spec due to lack of knowledge of Commitment	Gaseous	Took Credit for non-safety related display	Revised procedures to specify proper display	9409220118
McGuire	4/6/94	Failure to Comply with Tech Spec for RCS Leak Detection	Sump level/flow Gaseous	Omission of relevant information from Original design	Multiple	9405120089
Brunswick	1/21/93	Cnmt Rad Monitors not Seismically Qualified	Particulate & Gaseous	Inaccurate statement in original SER	Upgraded design	9309220033
Comanche Peak	8/22/90	Failure to Comply with Tech Specs due to non-conservative setpoints	Containment Air Cooler Condensate Flow	Original Design contained unverified assumptions	Revised setpoints	9010250245
Harris	6/20/88	Tech Spec Violation due to RCS Leakage Detection Inoperable	Particulate/Gaseous/Sump level/flow	Transferring water to containment sump masked RCS leakage	Revised procedures	8807290137