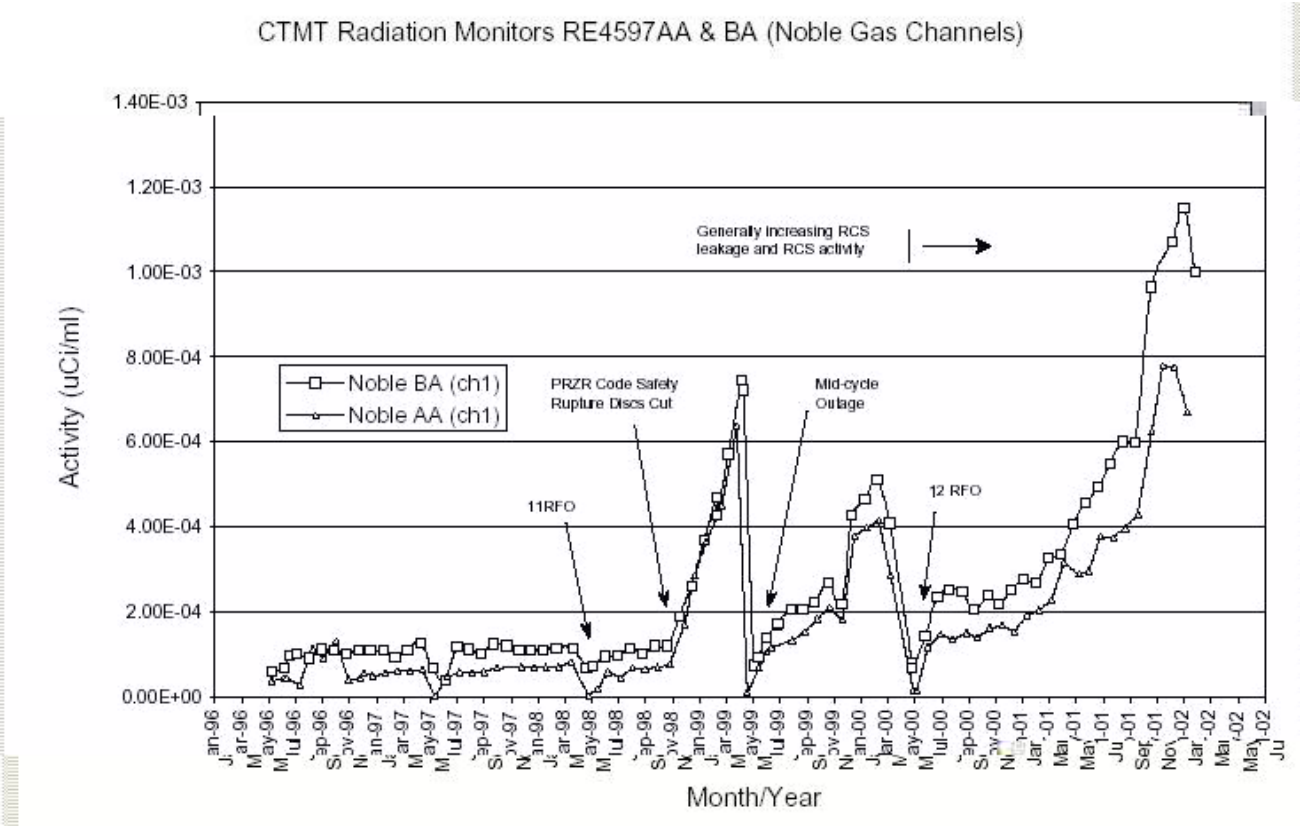
Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions
issue brief

Focus on One of Davis-Besse's Many Missed Opportunities

In the months since workers found the hole in the reactor vessel head at Davis-Besse, NRC officials and FirstEnergy representatives have ruefully admitted that many opportunities were missed to have detected the problem much sooner. This issue brief focuses in on just one of these many missed opportunities — the failure to diagnose steadily rising radiation levels inside containment.



As shown in this chart from FirstEnergy's root cause report, the air sampling radiation levels monitored by detectors RE4597AA and BA inside containment steadily trended upward from the startup after the refueling outage in May 2000 to the shutdown for refueling in February 2002. This upward trend is not normal, as evidenced by the level readings between May 1996 and May 1998 and the rise beginning in November 1998 that required a shut down in April 1999 to remedy. An upward trend is compelling evidence that something is wrong.

The information presented in the chart was not compiled after the fact. This information was continuously available to the operators in the control room at Davis-Besse. They recorded several times each day on their rounds sheets.

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Thus, the information was available all along. More importantly, so was knowledge of the potential impact of rising containment radiation levels. Here is verbatim text from a report submitted to the Nuclear Regulatory Commission by the owner of Oconee Unit 2, one of Davis-Besse's sister plants, in June 2001:

> *Primary coolant leakage from the [CRDM nozzle] cracks was minimal due to the relatively tight cracks. The total leakage from the four CRDM nozzles did not exceed Technical Specification limits for unidentified RCS [reactor coolant system] inventory loss nor were there obvious increases in Reactor Building Normal Sump levels or increases in Reactor Building air sampling radiation activity. No reactor building or area radiation alarms sounded.*[1]

If workers at Oconee Unit 2 knew in June 2001 that significant CRDM nozzle leakage causes air sampling radiation readings to increase, workers at Davis-Besse should have at least suspected that their increasing containment radiation readings might be caused by significant CRDM nozzle leakage. But they did not.

The CRDM nozzles are bolted to the Control Rod Drive Mechanisms as shown at the top portion of the schematic. FirstEnergy repeatedly had difficulty establishing and maintaining leak-tight seals at these bolted flange connections. This chronic problem has often been cited as the excuse for workers missing opportunity after opportunity. Could workers have reasonably thought that CRDM nozzle flange leakage was responsible for the increasing containment radiation levels?

They had little basis for this conclusion. After all, the CRDM nozzle flange leakage from May 1996 through May 1998 did <u>not</u> cause containment radiation levels to increase.

The steadily rising containment radiation levels raised a warning flag. It alone did not pinpoint leaking CRDM nozzles as the source of the radiation. But it was an important clue that should have prompted further investigation. That investigation should have collected all the other clues. Collectively, these clues painted a picture so disturbing that it could not be overlooked. But it was overlooked nonetheless.

This is one of the many missed opportunities to have detected the problem at Davis-Besse sooner. A single manager or a single operator or a single NRC inspector asking the simple question "Why is containment radiation increasing?" would have triggered the sequence of events leading to discovery of the problem. But that question was neither asked in this case nor in any of the other cases.

Why was this question never asked?

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[1] Letter dated June 25, 2001, from W. R. McCollum Jr., Vice President, Duke Energy, to Nuclear Regulatory Commission, "Oconee Nuclear Station, Unit 2 / Docket Nos. 50-270 / Licensee Event Report 270/2001-002, Revid /qdEj 0 Ej 5 Td 0 Tf 2.64 0 Td Tj -468 -12.6 Td A Tj 7q2