



Union of Concerned Scientists

Citizens and Scientists for Environmental Solutions

November xx, 2010

Joseph G. Giitter, Director
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

**SUBJECT Comments on Proposed Director's Decision for the
10 CFR 2.206 Petition on Recurring Safety Problems
at Davis-Besse**

Dear Mr. Giitter:

On behalf of the Union of Concerned Scientists, I am submitting the enclosed comments on the proposed director's decision for our 10 CFR 2.206 petition (document not currently publicly available in ADAMS but available online at http://www.ucsusa.org/nuclear_power/nuclear_power_risk/safety/petition-to-nrc-about.html). These comments are in response to your letter dated November 10, 2010 (ADAMS Accession No. ML103020411).

As detailed in the comments, the NRC failed to address key elements of our petition and acted to deprive UCS of our legal rights. We are providing the NRC's Inspector General with copies of the proposed director's decision and our comments with the hope that he will initiate an investigation into the staff's improper behavior.

Sincerely,

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Enclosure:

Comments on Proposed Director's Decision

Comments on Proposed Director's Decision

1. On pages 1 and 2 of the proposed director's decision, the NRC staff accurately characterized the action requested by UCS via our 2.206 petition as follows:

The Petitioner requested that the NRC take the following actions: issuance of a Show Cause Order, or comparable enforcement action, to the licensee for the DBNPS in the state of Ohio, preventing the reactor from restarting until such a time that the NRC determines that applicable adequate protection standards have been met and reasonable assurance exists that these standards will continue to be met after operation is resumed.

On pages 2 through 6 of Enclosure 1 to our April 5th petition, we explained that “adequate protection” was not defined by what we felt was safe or what the plant's owner thought was safe or even what the NRC deemed to be safe – “adequate protection” was defined by the objective standards in federal regulations and individual plant operating licenses.

The final paragraph on page 3 of the proposed director's decision cites the NRC's confirmatory action letter (CAL) for Davis-Besse dated June 23, 2010 (ADAMS Accession No. ML101740519) and specifically mentioned one of the four commitments contained in the CAL – namely, the commitment by the plant's owner to shut down Davis-Besse no later than October 1, 2011, for replacement of the reactor pressure vessel head. The proposed director's decision fails to mention a more pertinent commitment from the CAL. The third commitment in the CAL stated:

Beginning with reactor startup (Mode 2) and until RPV [reactor pressure vessel] head replacement, upon reaching Action Level 3 of EN-DP-01171, “Engineering Implementation of the RCS [reactor coolant system] Integrated Leakage Program,” the plant shall be shutdown in 30 days if RPV Head leakage cannot be ruled out.

In other words, the plant's owner has a leakage monitoring procedure (EN-DP-01171) that will raise a flag upon detection of an increase in the unidentified leakage rate inside containment. If the ensuing evaluation cannot rule out leaks from control rod drive mechanism (CRDM) nozzles as a source, the reactor must be shut down within 30 days.

On pages 12 and 13 of our April 5th petition, we provided three viable options “...to provide reasonable assurance that the adequate protection standards embodied in NRC's regulations and Davis-Besse's technical specifications will be met.” The CAL's third commitment was directly related to these options. The CAL's third commitment was essentially a modification of the second viable option stated in our petition: “To use existing leakage monitoring equipment, but assume that any unidentified leakage is pressure boundary leakage.” The CAL's third commitment relied on existing leakage monitoring equipment and provided the plant's owner up to 30 days to establish that the detected leakage was not coming from the reactor pressure vessel (RPV) head and its CRDM nozzles.

The CAL's third commitment was also associated with the third viable option stated in our petition: “To revise technical specifications to permit pressure boundary leakage.” The CAL's third commitment was either a *de facto* technical specification change or a *de facto* NRC order, but without

the attendant legal protections these processes guarantee. In our opinion, the CAL's third commitment illegally circumvented established legal processes and, in so doing, deprived us of our legal rights.

As detailed on page 5 of Enclosure 1 to our petition, existing technical specification limiting condition for operation 3.4.13 for Davis-Besse does not allow any pressure boundary leakage and requires the reactor to be shut down within 6 hours if such leakage occurs. The CAL's third commitment had the effect of modifying this technical specification to implicitly provide a REQUIRED ACTION to perform an evaluation when Action Level 3 of procedure EN-DP-01171 is reached with an associated COMPLETION TIME of 30 days. Or, the CAL's third commitment had the effect of an order issued by the NRC.

However, a license amendment or an order entail legal opportunities for stakeholders like UCS to contest measures considered insufficient. The NRC staff denied us our legal rights by using the CAL in lieu of a license amendment or order.

We respectfully challenge the legal authority of the NRC staff in replacing technical specification limiting condition for operation 3.4.13 with the less onerous (and in our opinion, less safe) provisions of the CAL's third commitment.

We offer the following plausible scenario to illustrate our position:

Between now and October 1, 2011, workers at Davis-Besse detect an increase in the unidentified leakage rate from below the detection capability of the detection equipment to 0.92 gallon per minute. This rate remains below the 1 gallon per minute limit of limiting condition for operation 3.4.13.b for unidentified leakage, but above the 0 gallon per minute limit of limiting condition for operation 3.4.13.a. In the ensuing 30 days, workers are unable to rule out the reactor pressure vessel head as a source of the leakage, so the reactor is shut down to comply with the CAL's third commitment. Workers inspect the control rod drive mechanisms (CRDMs) and discover a through-wall leak. The plant's owner would have once again violated technical specification 3.4.13.a by operating Davis-Besse for longer than 6 hours with pressure boundary leakage. But the plant's owner would have satisfied the CAL's third commitment by not operating for longer than 30 days. The NRC's CAL would have enabled the plant's owner to violate an adequate protection standard formally embodied in the NRC-issued operating license.

A confirmatory action letter is an inappropriate, and illegal, means to lessen the adequate protection standards embodied in the technical specifications.

A technical specification is a legally binding obligation upon the licensee to meet. On the other hand, according to the NRC staff, the licensee has no legally binding obligation to meet a commitment. On May 14, 2004, UCS was one of three parties to a petition (ADAMS Accession No. ML041450224) submitted under regulation 10 CFR 2.206 seeking to transform licensing commitments into legally binding obligations. That petition cited NRC correspondence including a letter dated April 22, 2004 (ADAMS Accession No. ML040980367) in which James Dyer, then the NRC's Director of the Office of Nuclear Reactor Regulation, stated:

Reasonable assurance of adequate protection of public health and safety is, as a general matter, defined by the Commission's health and safety regulations themselves.¹ In most cases, the agency cannot take formal enforcement action solely on the basis of whether licensees fulfill commitments, as failure to meet a commitment in itself does not constitute a violation of a legally binding requirement.

By letter dated August 30, 2004 (ADAMS Accession No. ML042380536), the NRC staff conveyed its decision not to treat the petition via its 2.206 petition process. The NRC staff did reaffirm its position that commitments are not enforceable:

As documented in the references above, our policy development over the years has consistently defined "regulatory commitments" as matters in which the staff has significant interest, but which do not warrant either legally binding requirements, or inclusion in Updated Final Safety Analysis Reports (UFSARs) or programs subject to a formal regulatory change control mechanism.

In other words, the Davis-Besse licensee could revise procedure EN-DP-01171 without NRC review and approval to raise Action Level 3 to some point, like one million gallons per minute leak rate, that could not be reached and would therefore never invoke the 30-day evaluation "required" by the CAL's third commitment. Or, the Davis-Besse licensee could leave the procedure as-is and simply fail to honor the CAL's third commitment. After all, the NRC staff has repeatedly stated (e.g., signaled to licensees) that commitments are neither legally binding obligations nor enforceable.

This plant owner has twice exposed the public to inadequate protection by operating Davis-Besse in violation of technical specification limiting condition for operation 3.4.13. This requirement is an enforceable, legally binding obligation and yet the plant's owner violated it twice. Having shown no compunction about violating federal safety standards, this plant's owner must not now be trusted to adequately protect public health and safety by satisfying an unenforceable promise.

The three viable options stated in our petition were legal ways to ensure that the adequate protection standards embodied in the NRC's regulations and Davis-Besse's technical specifications would be met during reactor operation. The CAL's third commitment is neither legal nor does it provide reasonable assurance that the public will be protected from pressure boundary leakage at Davis-Besse should it occur again.

With the CAL's third commitment, the NRC staff has implicitly conceded that the status quo for pressure boundary leakage at Davis-Besse is untenable. To its credit, the NRC staff sought to better manage the risk from pressure boundary leakage. On at least two prior occasions, the Davis-Besse reactor operated longer than 6 hours, and likely longer than 30 days, with pressure boundary leakage.² The CAL's third commitment seeks to prevent such long duration periods of operation with pressure boundary leakage. But the CAL's third commitment is defective in many respects – respects we

¹ This sentence reinforces our position that "reasonable assurance of adequate protection" is met by compliance with the requirements of the NRC-issued operating license, specifically technical specification limiting condition for operation 3.4.13.

² See licensee event report 02-002-00, "Davis-Besse Nuclear Power Station, Unit 1, Reactor Coolant System Pressure Boundary Leakage Due to Primary Water Stress Corrosion Cracking of Control Rod Drive Mechanism Nozzles and Reactor Pressure Vessel Head Degradation" (ADAMS Accession No. ML021220082) and licensee event report 10-002-00, "Control Rod Drive Nozzle Primary Water Stress Corrosion Cracking and Pressure Boundary Leakage," (ADAMS Accession No. ML101340128).

would have used to legally oppose the staff's plans had we not been deprived of our legal right to do so. As mentioned above, the informal and unenforceable nature of commitments rather than formal and enforcement nature of license amendments or orders is one of the defects. The lack of an effective trigger due to small leak rates is another defect detailed further in Comment No. 2 below.

2. The CAL's third commitment is defective because it (a) is only triggered when Action Level 3 in a non-publicly available licensee procedure is reached and (b) allows continued reactor operation for up to 30 days beyond attainment of Action Level 3. We presume, based on experience with leak detection systems and procedures at other operating nuclear plants, that Action level 3 involves exceeding an absolute unidentified leak rate limit (e.g., 0.25 gallon per minute) and/or a step increase in the unidentified leak rate (e.g., 0.1 gallon per minute increase in the leak rate within the past 24 hours). The inadequacy of unidentified leak rate limits to protect against pressure boundary leakage is undeniably illustrated by experience from Davis-Besse. Figure 1 provides, among other things, the unidentified leak rate measured for operating cycles 11, 12, and 13 at Davis-Besse spanning the years 1996 and 2002 when CRDM nozzle #3 was believed to have cracked through-wall and leaked. No one knows with certainty when this CRDM nozzle began leaking or when the football-sized hole formed in the reactor vessel head. Even the leakage attributed to the pressurizer relief valve³ in late 1998 and early 1999 did not cause the unidentified leak rate to exceed 1.0 gallon per minute – the limit established in technical specification limiting condition for operation 3.4.13.b for sustained reactor operation. Otherwise, the unidentified leak rate (that inherently included leakage through the crack in CRDM nozzle #3) remained below 0.2 gallon per minute. Figure 2 plotted the identified and unidentified leak rates measured at Davis-Besse from May 2000 until February 2002. One of the color-coded thresholds (likely either the Red limit at 0.25 gallon per minute or the Yellow limit at 0.15 gallon per minute) indicated to the right of the graph may correspond to Action Level 3 in procedure EN-DP-01171. Unless the football-sized hole was largely formed during the few weeks after October 2001 when the unidentified leak rate rose above and generally remained above the Yellow limit (0.15 gallon per minute), this graph shows that reliance on unidentified leak rate does not provide adequate protection against reactor pressure vessel head wastage. If the head degradation occurred during more than one operating cycle as is generally believed, unidentified leak rates are simply too low to raise a timely flag. There is no scientific basis supporting the NRC staff's notion in the CAL's third commitment that allowing Davis-Besse to operate for up to 30 days after Action Level 3 is reached will protect against reactor vessel head degradation. The evidence from Davis-Besse's past strongly suggests that any such reliance is misplaced. Even if legal, the CAL's third commitment does not provide reasonable assurance of adequate protection of public health.
3. On page 4 of the proposed director's decision, the NRC staff stated:

*The NRC reviewed the root cause analysis of the event and RCS leakage data from previous operating cycles, and concluded that the equipment failure (cracked CRDM nozzles), **could not have been avoided** or detected by the licensee's quality assurance program or other related control measures. The direct cause of this event was PWSCC of the CRDM nozzles and J-groove welds, and the licensee identified and repaired a total of 24 CRDM nozzles with PWSCC in the nozzle or J-groove welds. [Emphasis added]*

³ The pressurizer, like the reactor vessel, is located within the containment building. Leakage from the pressurizer relief valve could not and did not cause damage to the reactor vessel head.

The equipment failure (of leaking CRDM nozzles rather than the far less benign cracked CRDM nozzles) could and should have been avoided, if for no other reason than that UCS explicitly called NRC's attention to the problem nearly 7 years ago. By letter dated December 18, 2003 (ADAMS Accession No. ML033640613), UCS conveyed the concern that the plant owner's root cause evaluation for the cracked and leaking CRDM nozzles was flawed because it failed to properly account for the unique configuration of the head vent (CRDM nozzle #14) at Davis-Besse. The second page of our 2003 letter contained this paragraph:

Our concern is that the root cause analysis submitted by FirstEnergy casually dismissed the potential contribution of nozzle #14 to CRDM nozzle cracking and may have underestimated the temperature conditions. This concern has more than historical significance. If the unique vent line arrangement at Davis-Besse makes its CRDM nozzles more vulnerable to cracking than other B&W reactors, then the inspection scope and frequency for the CRDM nozzles on the replacement head may be inadequate to prevent future problems.

Page 18 of the NRC's special inspection report (ADAMS Accession No. ML102930380) for the most recent CRDM nozzle leakage event at Davis-Besse explained how the CRDM nozzles cracks propagated so much faster than anticipated:

The licensee's previous "best estimated" RVCH [reactor vessel closure head] operating temperature was based on the average of the narrow range hot leg recirculation loop temperature instruments. The RCT [root cause team] identified that RVCH operating temperature was higher than previously known and was significant contributor to the relatively early onset of PWSCC [primary water stress corrosion cracking] at Davis-Besse. The RCT conclusions were based in part, on the analysis of head vent line temperature data recorded during the previous operating cycle. A continuous head vent line is installed at a spare head penetration [CRDM Nozzle #14] for venting of non-condensable gases. This line allows 0.5 percent of the total core flow to exit the RVCH and return to the RCS [reactor coolant system]. This vent line is instrumented with Type K thermocouple temperature elements that feed two computer data points (T012 and T013) that are monitored and recorded. Because these instruments are not calibrated, the licensee performed a calibration and calculation C-ICE- 062.01-001 to estimate the actual temperature for the continuous head vent line. The licensee concluded that computer points T012 and T013 had -2.6°F and -0.7°F degree errors respectively and vent line temperature had reached a maximum of approximately 615.4°F during operating cycle No. 16. Therefore, portions of the RVCH near the vent line may have operated nine degrees higher than the previously assumed (606.4°F) hot leg temperature.

Thus, the very inadequacy UCS pinpointed in December 2003 remained unresolved until after it contributed significantly to the cracked and leaking CRDM nozzles at Davis-Besse in 2010. Had our 2003 concerns been properly addressed by the NRC staff and the licensee, the depth (literally and figuratively) and breadth of the CRDM nozzle cracking in 2010 could very easily have been avoided.

But UCS does not present this history as an "I told you so" moment. (Well, at least not *just* for that reason.) Most important, this history strongly indicates why the actions requested in our petition are necessary. Analyses of CRDM nozzle crack initiation and growth rates rely on many assumptions that have repeatedly been shown to be uncertain except in hindsight. Material parameters, configurations, and temperatures are among the assumptions later shown to be erroneous. Despite the fact that invalid assumptions have twice – repeat, twice – in the past decade misled the NRC staff into the false belief that CRDM nozzle leakage would not likely occur at Davis-Besse, the NRC staff once again wanders out on that flimsy limb on page 3 of the proposed director's decision:

Further, based on crack growth analyses and the shortened reactor vessel closure head (RVCH) operating period (confirmed in Confirmatory Action Letter (CAL) 3-10-001 issued on June 23, 2010), the NRC concluded that margins existed such that the likelihood for PWSCC induced nozzle leakage would remain low for the remaining planned RVCH operating service period.

Rather than debating whether the NRC staff is using a crystal ball or bowling ball when predicting the future, the actions requested in our petition provide the safety net that the public legally deserves.

Existing technical specification 3.4.13 requires Davis-Besse to be shut down within 6 hours after the onset of pressure boundary leakage. If a crystal ball foretold the future and no CRDM nozzle leakage develops, Davis-Besse can operate without undue harm to the public. If, however, a bowling ball was used and CRDM nozzle leakage once again develops, compliance with the technical specification protects the public from undue harm. Very shortly after pressure boundary leakage began and adequate protection was lost, the reactor's operation would be terminated.

When the NRC issued an operating license for Davis-Besse with this requirement explicitly stated in the technical specifications, the public had every right to expect that the NRC would enforce this safety requirement. It is unjust, unfair, and illegal for the NRC to allow this licensee to scoff at this federal requirement and, by doing so, place the public at elevated and unnecessary risk of harm.

The actions requested by our petition contained an option to cover the situation where the NRC staff feels the existing technical specification requirement is too onerous. If so, we pointed out that there exists a mechanism to revise the requirement to the "Goldilocks" level – neither too onerous nor too lax. A license amendment could be submitted per regulation 10 CFR 50.90 by the plant's owner and approved by the NRC per regulation 10 CFR 50.92 to revise technical specification 3.4.13 to something that protects the public yet is not too burdensome for the licensee. Along the way, the public would be afforded an opportunity per regulation 10 CFR 50.91 to comment on the proposed amendment change.

4. The NRC staff position expressed in the proposed director's decision contradicts previously established and not abandoned⁴ staff positions. For example, Section 5.2.5, "Reactor Coolant Pressure Boundary Leakage Detection," dated May 2008 of the agency's Standard Review Plan (NUREG-0800 available online at <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr0800/ch5/>) stated that the acceptance criterion for General Design Criterion (GDC) 30 is "*Means shall be provided for detecting, and to the extent practical, identifying the location of the source of reactor coolant leakage.*" Section 5.2.5 further stated that satisfying the GDC 30 acceptance criterion "*is based on meeting the guidelines of RG 1.45.*" Regulatory Guide (RG) 1.45 (available online at <http://www.nrc.gov/reading-rm/doc-collections/reg-guides/power-reactors/rg/>), also revised in May 2008, contained this paragraph on page 8:

Plants should monitor critical components of the RCPB for leakage. This will ensure prompt identification of a leak that could potentially compromise safety. Critical components are those that are risk significant or potentially susceptible to material degradation. In currently operating

⁴ The NRC has formally withdrawn positions. The agency's Safety Guide 1 for decades had prevented reliance on containment overpressure to ensure performance of emergency core cooling systems. The NRC recently withdrew this safety guide after it was discovered that many reactors relied on containment overpressure.

reactors, the critical RCPB components include, but may not be limited to, the reactor vessel head, control rod penetration nozzles, pressurizer nozzles, and dissimilar metal weld regions. *The critical components may change over time as a result of operating experience, improvements in the understanding of corrosion mechanisms, and mitigative actions (e.g., pipe replacement). Timely identification of the source of leakage is necessary to determine its safety significance.* [Emphasis added]

This fairly recently articulated NRC position (May 2008) is more consistent with the action requested in our April 2010 petition than in the proposed director's decision for the following reasons:

- a. The 2002 and 2010 detections of through-wall leakage of reactor coolant through CRDM nozzles in the reactor vessel heads at Davis-Besse indicate that existing monitoring systems for pressure boundary leakage are inadequate. If detected at all, past CRDM nozzle leakage was considered unidentified leakage. Existing safety requirements (i.e., the Davis-Besse technical specifications) place a distinction between pressure boundary leakage and unidentified leakage with the former being more significant.
- b. The NRC staff in the proposed director's decision contends that a small amount of leakage from the CRDM nozzles can be tolerated without posing an undue threat to either CRDM nozzle structural integrity or reactor vessel head degradation.
- c. The first option stated in our petition involved installation of new equipment to directly monitor pressure boundary leakage. If adopted, this option would inherently entail submittal of information by the licensee to the NRC on the science behind the technology. The minimum size leak that would be detectable along with justification for safety despite leakage below that detectability limit would very likely be described. Thus, the NRC staff would obtain a scientific basis for a configuration conforming to RG 1.45 and NUREG-0800 Section 5.2.5.
- d. The second option stated in our petition involved using existing detection equipment but conservatively assuming that any unidentified leakage was coming from the pressure boundary rather than from a more benign source. While not addressing safety with pressure boundary leakage lower than the unidentified leakage detectability limit, this option at least avoids recurrence of the 2002 and 2010 surprise findings.
- e. The third and final option stated in our petition involved amending the operating license (i.e., revising the technical specifications) to permit pressure boundary leakage. As in the discussion for petition option 1 above, this effort inherently entails submittal by the licensee to the NRC the scientific basis for the pressure boundary leakage limit being sought. To date, the NRC staff has tolerated pressure boundary leakage without any technical basis for doing so, other than "past leakage events haven't killed anyone yet."

Unless the recently revised Standard Review Plan section is one of those "do as I say, not as I do" things, the NRC staff's position expressed in the proposed director's decision simply must be replaced with one that relies on science and the law rather than convenience. The NRC staff's position expressed in the proposed director's decision contradicts recently issued NRC positions on leakage detection systems.

The NRC staff's position likens the Davis-Besse licensee to the driver of a car lacking a speedometer. When pulled over by a law enforcement officer for travelling in excess of the posted speed limit, the driver points to the dashboard and honestly says, "I had no way of knowing that, officer." The officer would be remiss at best and in dereliction of duty at worst to tolerate that driver's recurring speeding antics merely because no one had yet been harmed. The NRC is being equally remiss to tolerate the Davis-Besse licensee's recurring lawbreaking. And by doing so, the public is forced to shoulder an undue and unwarranted burden.

Comments on Proposed Director's Decision

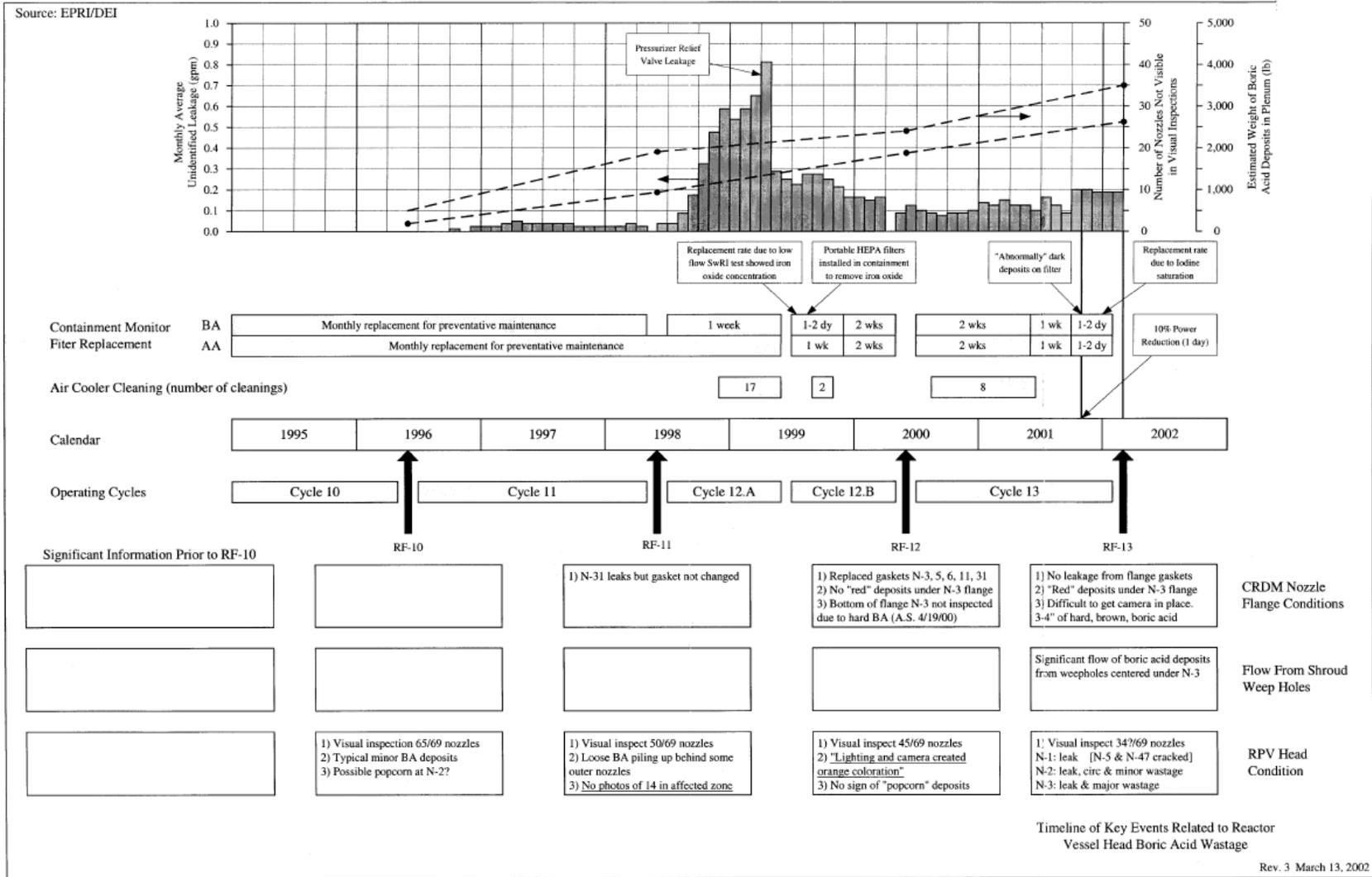


Figure 1

Source: ADAMS Accession No. ML053070368

RCS Leakage Cycle 13

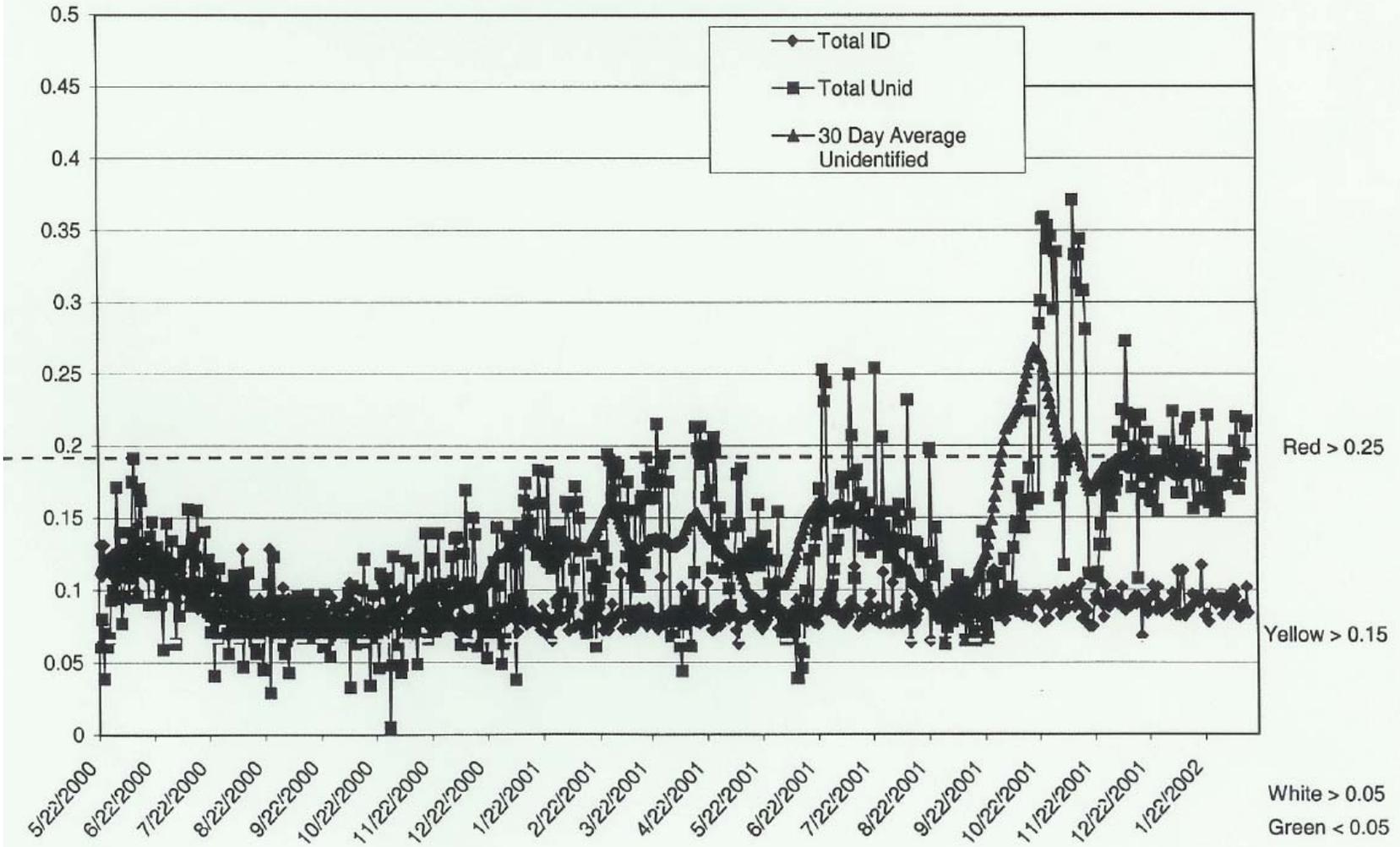


Figure 2

Source: Discovery Document AJS01-04114