From: Steven West
To: Bruce Burgess
Date: Thu, May 31, 2007 1:43 PM
Subject: FYI : Fwd: Questions Regarding Exponent Report

>>> Geoffrey Grant 05/30/2007 1:03 PM >>>
as I mentioned after the 8:15 meeting

>>> Sunny Bozin 05/30/2007 7:33:10 AM >>>

>>> Sunny Bozin 5/25/2007 9:54 AM >>>

>>> William Kane 5/25/2007 8:44 AM >>>

Please run a copy for me. Color.
>>> Martin Virgilio 05/24/2007 6:01 PM >>>
FYI

F-239

From: Guy Caputo
To: Cynthia Carpenter; Martin Virgilio
Date: Thu, May 24, 2007 9:15 AM
Subject: FYI : Fwd: Questions Regarding Exponent Report

Release

DOJ requesting information from FENOC via Morgan Lewis.

>>> Joseph Ulie 05/23/2007 4:07 PM >>>
Guy/Sandra, fyi as requested. Attached is the subject letter I mentioned on the telephone that DOJ just sent to Morgan Lewis requesting a response from FENOC by June 13th.

From: "Poole, Richard (ENRD)" <Richard.Poole@usdoj.gov>
To: "Joseph Ulie" <JXU@nrc.gov>, "James Gavula" <JAG1@nrc.gov>, "Michele Janicki" <MFJ1@nrc.gov>
Date: Wed, May 23, 2007 2:50 PM
Subject: FW: Questions Regarding Exponent Report.pdf

Release

> _____
> From: Ballantine, Thomas (ENRD)
> Sent: Wednesday, May 23, 2007 2:25 PM
> To: tmatthews@morganlewis.com; wgardner@morganlewis.com
> Cc: Poole, Richard (ENRD); Stickan, Christian (USAOHN)
> Subject: Questions Regarding Exponent Report.pdf
>
>
> Dear Messers. Gardner and Mattews:
>
> Attached please find a letter regarding the Wastage Event Report. It
> includes several questions the prosecution team in U.S. v. Geisen has
> regarding the report. We are aware that the NRC has sent FENOC a
> demand for information regarding the report; we expect and hope that
> you will be able to answer there questions and ours in parallel.
>
> Please do not hesitate to call us at 202.514.2956 (Tom Ballantine) or
> 202.514.0838 (Richard Poole), if you have any questions. I will send
> the letter by U.S. mail as well -- I've e-mailed it because it
> includes color photographs.
>
> Warm regards,
>
> Tom Ballantine
> Trial Attorney
> (202)514-2956
>
>
> <<Questions Regarding Exponent Report.pdf>>

CC: "Ballantine, Thomas (ENRD)" <Thomas.Ballantine@usdoj.gov>

U.S. Department of Justice

Environment and Natural Resources Division

Environmental Crimes Section
P.O. Box 23985
L' Enfant Plaza Station
Washington, DC 20026-3985

Telephone (202) 305-0321
Facsimile (202) 305-0397

May 23, 2007

Release

William Gardner, Esq.
Timothy Matthews, Esq.
1111 Pennsylvania Avenue, NW
Washington, D.C. 20004

and via electronic mail
tmatthews@morganlewis.com
wgardner@morganlewis.com

Re: FirstEnergy Nuclear Operating Company's (FENOC's) Wastage Event Report

Dear Messrs. Gardner and Matthews:

We are writing to follow up on a telephone conversation we held with Mr. Matthews in April 2007 regarding a report prepared for FENOC by Exponent Failure Analysis Associates and Altran Solutions Corporation. The report was titled "Review and Analysis of the Davis-Besse March 2002 Reactor Pressure Vessel Head Wastage Event" ("Wastage Event Report").

When we spoke with Mr. Mathews, we expressed concerns about whether that report complied with the terms of the Deferred Prosecution Agreement entered into by FENOC on January 19, 2006, and what impact it would have on the trial of U.S. v. Geisen et al. We agreed that the implications of the Wastage Event Report required further study, and Mr. Mathews offered to seek answers to questions which we might pose. This letter transmits those questions and we ask that you respond by Wednesday, June 13, 2007.

Background

Presently, we are preparing for the trial of U.S. v. Geisen et al, with a Daubert hearing scheduled for mid-August. The trial court has ruled that the cavity in the Davis-Besse reactor vessel head, discovered in March of 2002, is relevant evidence in the case. We expect that the question of whether the cavity could have been found by visual examination of the head during the April 2000 inspection will be contested at trial. Based on our review of the facts of the case and FENOC's "Root Cause Analysis Report, Significant Degradation of the Reactor Pressure Vessel Head, Revision 1" (Aug. 27, 2002) (the "Technical Root Cause Report"), we have concluded that the leak that led to the cavity began before the 1996 refueling outage. Further, we have concluded that the new boric acid found on the head during head inspections in 1998 and 2000–beyond what is evident in the 1996 as-left video record–came from cracks in one or more CRDM nozzles.

Some conclusions of the Wastage Event Report contradict our understanding of the development of the head cavity, yet we note that it fails to substantively address critical evidence that led us to our conclusions. Since we expect the report to be cited by defendants at the trial, we would appreciate FENOC's answers to the following questions.

Questions Concerning Boric Acid Found on the Davis-Besse Reactor Vessel Head

Large amounts of boric acid were found on the reactor vessel head at the start of the 2000 refueling outage.[1] The Wastage Event Report states that the boric acid came from flange leakage.[2] What is the basis for this assumption?[3] We note that the flange inspection videos from the 1998 refueling outage, the 1999 mid-cycle outage, and the 2000 refueling outage do not show the signs of flange leakage that were evident at Davis-Besse in prior outages when such leakage was a significant problem.[4] If the boric acid was not from flange leakage,[5] how would

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[1] Davis-Besse Condition Reports 2000-0781, 2000-0782, and 2000-1037.

[2] Wastage Event Report, at 2-13, 7-27.

[3] If the basis for the assumption is Davis-Besse Condition Report 00-0995, was the video record of the 2000 flange inspection also reviewed? If not, why not? Please note that page 22 of the Technical Root Cause Report states that "industry experience does not suggest that leakage from the nozzle 31 flange would have resulted in extensive deposits on the vessel head at 12RFO." Please address what has changed about the relevant industry experience.

[4] Please compare Figure 1 of Attachment A (video capture from 1993 Davis-Besse flange inspection showing flange leakage at flange E9) with Figure 2 of Attachment A (flange interface of D10 flange in 2000) and also with Attachment B (video captures from the 1998, 1999, and 2000 flange inspections, showing a consistent pattern of boric acid left on the nozzle surface from outage to outage). The remainder of the 1998, 1999, and 2000 flange inspection video records show nothing like the flange leakage found at Davis-Besse previously, i.e., nothing similar to what is shown at Figure 1 of Attachment A.

[5] As stated above, we have concluded that new boric acid on the reactor head in 2000 was not from flange leakage. There are multiple bases for this conclusion. With respect to the Wastage Event Report, the most telling reason is the following: The Wastage Event Report suggests that there was substantial flange leakage from the D10 flange, which corresponds to nozzle 31, a nozzle relatively close to nozzle 3. During the 1998, and 2000 refueling outages, FENOC recorded video inspections of the control rod drive mechanism flanges. The video records of those inspections show no indications of recent flange leakage. In 1999, in an effort to account for unidentified reactor coolant system leakage, the flanges were inspected during a mid-cycle outage. Documentation from that inspection states that no flange leakage was found. See PCAQR 1998-0649, Corrective Action Items 1, 2, and 3. Thus, none of the three flange inspections that are relevant to the Wastage Event Report's assumption about the source of the boric acid showed new indications of leakage. Although images from the D10 flange inspection do show a pattern of boric acid on the D10 nozzle, that pattern is essentially

that affect the conclusions of the Wastage Event Report?

Questions Concerning Rusty Boric Acid Found in Containment

FENOC first recorded brown boric acid on the radiation element filters on May 19, 1999.[6] The Wastage Event Report treats the plugging of the radiation element filters as a significant harbinger of accelerated nozzle leakage and wastage,[7] but fails to acknowledge the existence and importance of such deposits before April 2001. On July 29, 1999, an analysis of a radiation element filter showed it contained iron oxide deposits (rust), consistent with corrosion of an iron-based component.[8] Further, on November 5, 1999, a review of the above analysis concluded that the fineness of the iron oxide particulate indicated a small steam leak, and noted the uniform settlement of iron oxide particles on horizontal surfaces in containment.[9] In light of these contemporaneous findings by FENOC, please indicate where FENOC believes that corrosive leak was located, if not through a CRDM nozzle. If FENOC concludes that the source of the leak and the rust was a cracked CRDM nozzle, does it not follow that head corrosion was well underway by May 19, 1999.[10]

Questions Concerning Crack Initiation Dates

The Wastage Event Report states that "from the actual Davis-Besse Nozzle 2 and 3 experience, it is evident that the Davis-Besse [crack growth rates] were in fact much higher than at Oconee-3, which had the same M3935 heat of Alloy 600 material." Wastage Event Report at 8-12. Crack size depends on both the initiation time and crack growth rate. Did the Wastage Event Report's authors consider that Davis-Besse most likely had relatively early crack

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unaltered from outage to outage. Attachment B. The remainder of that nozzle and flange appear clean. This repeated pattern suggests that there was no leakage from the D10 flange during the relevant time period. In comparison, past flange leakage at Davis-Besse showed obvious deposits on the flanges themselves. See Attachment A, Figures 1 and 3 (video captures from the Davis-Besse flange inspection in 1993).

[6] Technical Root Cause Report at 145.

[7] Wastage Event Report at 7-20.

[8] Southwest Research Institute, Analysis of Filter Deposits, August 1999. (Part of CR1999-1300).

[9] Sargent & Lundy Memorandum from E. Dille to F. Berry, dated November 5, 1999.

[10] In addressing questions concerning rusty boric acid deposits found in containment, please note and consider that: (1) the stainless steel CRDM flanges could not have produced the iron-oxide particles that clogged the radiation element filters, but the carbon steel head could; (2) the filters were plugging about every other day during August and September of 1999, accumulating iron oxide particles at a rate of approximately 0.2 milligrams per hour; and (3) during the same time, the boric acid deposits fouling the containment air coolers were noted to be rust colored, as well. These facts lead us to conclude that a leak at the reactor head was spreading rusty coolant into the containment atmosphere during this time period and that the corrosion process was well underway.

initiation? We base this conclusion on information that Davis-Besse ran with hot-leg temperatures that exceeded 605°F and may have had a higher head temperature near the J-groove welds, because of unusual reactor coolant circulation caused by its unique-to-the-industry continuous head vent line[11]?

Questions Concerning Gap Analysis

Section 2.6 (page 2-10) of the Wastage Event Report noted that nozzles 2 and 3 at Davis-Besse had metal to metal interference fits that "were calculated to remain closed at operating conditions." Did the authors of the Wastage Event Report consider that, although Davis-Besse's initial gap analysis did conclude that those nozzles would not show a gap, a followup analysis concluded that they would?[12] If not, please explain why the existence of this normally occurring gap was not considered and what effect it would have on the report's conclusions about degradation.

Should you have questions about this inquiry, please call us at (202)514-2956.

Yours sincerely,

/s/ Thomas T. Ballantine

Thomas T. Ballantine
Trial Attorney

Richard Poole
Senior Trial Attorney

Christian Stickan
Assistant United States Attorney

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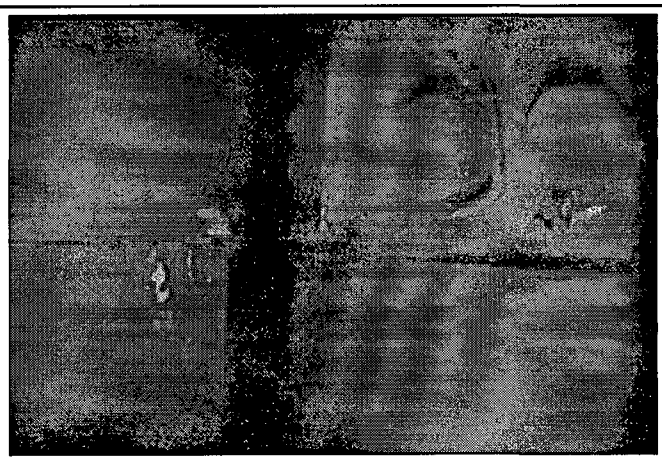
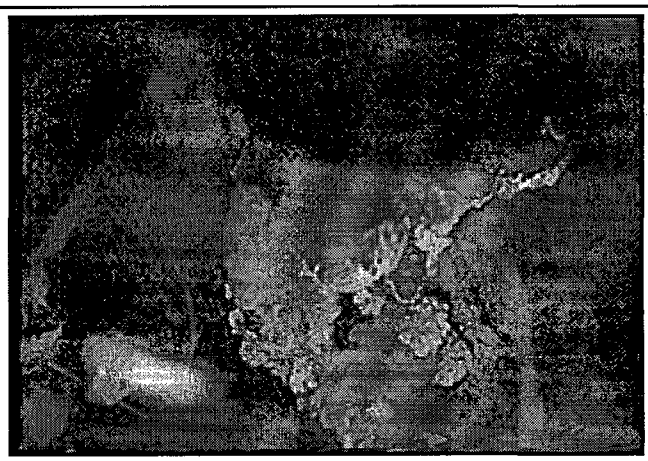
[11] Letter from Union of Concerned Scientists to the NRC, Dec. 18, 2003 (ADAMS accession No. ML033640613) and letter from FENOC to the NRC, May 25, 2004, addressing issues raised in Dec. 18, 2003 letter (ADAMS accession No. ML041480352).

[12] Please see Structural Integrity Associates, Inc., Calculation Package, beginning at your bates No. 2S2-01826.

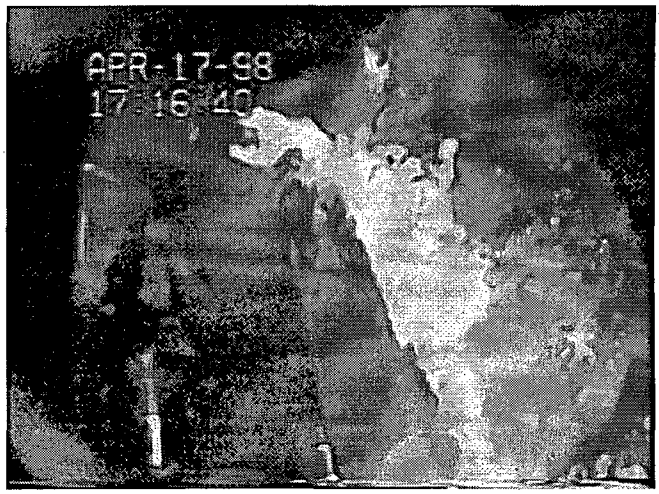
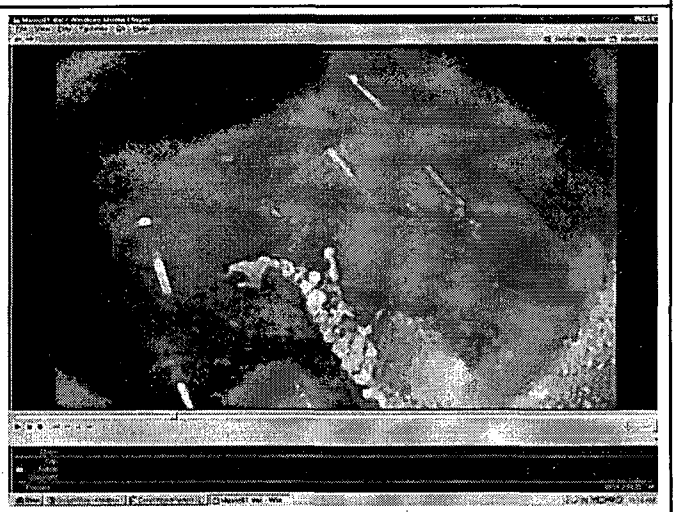
ATTACHMENT A

Flange Leakage Examples

Figure 1 shows an example of flange leakage from 1993 at Davis-Besse. Specifically, it shows Flange E9 from the z-axis, from below. The control rod drive housing is visible; the CRDM nozzle is below it, covered with boric acid. This image is from Tape 3/7 of the 1993 flange inspection video records, frame 31374 (approx.).	 **Figure 1**: 1993 Flange Leakage at E9
Figure 2 shows the C9 flange interface on the left (new gasket in 1990) and the D10 flange interface on the right (new gasket in 1993). This area is directly above the portion of the CRDM nozzle where boric acid residue was seen in 1998, 1999, and 2000, as shown in Attachment B. This image is from tape DB#0002 of the 2000 flange inspection video records, time 7:54, Frame 14225 (approx.).	 **Figure 2**: 2000 Flange Inspection of D10
Figure 3 shows the D10 flange from the Y-axis, from below, in 1993. No evidence of leakage like this can be seen in any view of D10 from the 1998, 1999, and 2000 flange inspection video records. This image is from Tape 2/7 of the 1993 flange inspection video records, frame 5135 (approx.).	 **Figure 3**: 1993 Flange Inspection, D10 from Below

ATTACHMENT B

1998, 1999, and 2000 Inspections of Flange D10

Figure 4 shows a video capture of the 1998 flange inspection video record. This image, **Figure 5** and **Figure 6** each show the view of flange D10 from the D10, C9, B10, C11 hole. The views are from the 3 o'clock position. All the other views of this flange in 1998 showed a clean nozzle or a clean flange interface. This image is from Tape 98-01, CD Part I, time 38:44 (approx.).	 **Figure 4**: 1998 Flange Inspection (Beneath D10)
Figure 5 shows the same view as **Figure 4**, as found during the 1999 mid-cycle outage. All the other views of this flange in 1999 showed a clean nozzle or a clean flange interface. This image is from 1999 Flange Inspection, Tape 99-01, CD time 8:35 (approx.).	 **Figure 5**: 1999 Flange Inspection (Beneath D10)
Flange 6 shows the same view as **Figures 4 and 5**, as found during the 2000 flange inspection. All the other views of this flange in 2000 showed a clean nozzle or a clean flange interface. The only boric acid visible on flange D10 was essentially unchanged between 1998 and 1999 and again between 1999 and 2000. Flange D10 was not leaking. This image is from 2000 Flange Inspection, Tape 00-02, CD time 8:24 (approx.).	 **Figure 6**: Flange Inspection (Beneath D10)