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Dear Regional Administrator Mark Satorius:

I have read the complete Special Inspection Team report on FirstEnergy/Davis-Besse's 2nd reactor closure head/CRDM nozzle boric acid appearance problem. I have a number of comments/observations.

A Different Event

I now understand your statements that both events were different. The first time, (early 2002), there were 2 cavities in the head (plus, I think, CRDM nozzle indications or cracking) due to a very concentrated liquid boric acid. Extensive residue (most or all of reddish color) had also existed for a long period of time due to non-promptly repaired leaking gaskets at the CRDM nozzle flanges above, and incomplete removal efforts.

This time, (2010 with a second reactor vessel closure head), no liquid boric acid was reported as being found: the residue was solid in character and white in color.

A Mind-set Problem

Boric acid leakage is not dangerous or a problem, the theory went, because the liquid acid droplets, hitting the very hot metal surface, will turn into a white, popcorn-like substance that does not react with metal. And, apparently that theory is true IF small droplets do hit a very hot metal surface and completely change to a (white) solid. Unfortunately, that did not always happen with the first reactor head. Instead, it appears that boric acid collected in pools and became increasingly concentrated. This resulted in the loss of carbon steel from the reactor vessel closure head and the appearance of a reddish colored substance over the upper surface of the head. So much was produced that it appeared at those surveillance holes commonly called "mouse" holes.

Since we, (at that time), "knew" boric acid leakage resulted in harmless popcorn-like deposits, there was no serious concern about that red stuff on the reactor vessel closure head in and prior to early 2002.

Today, that same mindset continues to exist. My notes of the 9-9-2010 meeting at 6:19 p.m. say: "flashes & leaves boric acid crystals? on the head". This misleads listeners into thinking there is no danger. Actually, it appears to me from reading the SIT report that

boric acid in liquid or concentrated liquid form already started attacking the 2nd reactor vessel closure head at nozzle #4. This would be the reason that they couldn't repair weld it as planned. In fact, they had to go back to using the originally specified weld metal (and higher heat) for the first pass so that they could weld across the boric-acid-residue contaminated gap.

I want to talk about gaps a little later but let me finish up here with this observation. The leaked boric acid needs to be considered as resulting in 1 of 4 or more forms: one form is white, solid "popcorn-like" residue; one form is liquid; one form results in a white tightly adhering solid, and another form may be gasous.

So when we look at residue, we need to identify that some types may be more dangerous than others, and maybe different in cause as well. We also need to realize that leakage has already occurred when we can identify residue of it.

The Annular Gap

Who says these CRDM nozzles were all shrunk fit? Did you ever drill a hole through wood with a dull drill bit? What happens to the hole diameter? It gets bigger. Who says this did not happen to at least some of the holes in the reactor vessel closure head for some of the nozzles?

In fact I believe that I have pointed out to NRC Region III by e-mail (dated April11, 2010) this possibility, especially since I also referenced a slide from an NRC, NEI, and PWR Owners Group meeting which actually identified such a gap.

Recently, no such gap has been admitted to. For example, look at the section through a non-repaired nozzle, (Picture No. 8), provided at the back of this report on page 94 of 101.

To me, it appears that the existence of annular gap between the CRDM nozzle outer diameter and the surface of the hole through the reactor closure head, for at least some penetrations and during at least some temperature/time transients, has been missed.

The detrimental effect that I would consider is the possibility that, then, the CRDM nozzle could wiggle back and forth, fatiguing the J groove weld. (Note on page 42 of 101, (about 20 lines down), the comment about annulus gap between nozzle and head bore.)

Heat Treating

I believe that, between 7:20 and the 8:20 end of the 9-9-2010 meeting, one telephone listener asked if the heat treating on the nozzles was adequate. And, my assessment of the answer was this: applicable code and standard requirements were met but they did NOT provide adequate heat treatment.

To me this could actually be the basic root cause: the material that was provided could not perform as required because of inferior heat treating. Has anybody looked into this? In any event, I feel that the NRC should show the initiative in informing all involved code and standard organizations of this problem.

If inadequate codes and standards are the cause of these problems on the second head, I do not think it is fair to blame FirstEnergy as if they caused the problem. It could have happened to anybody else and might again, this time to an owner of a next generation plant.

Is Nozzle #4 the sole source of all that residue?

I don't think so. Think back 9 or more years. Didn't Davis-Besse then have lots of leaking gaskets from CRDM nozzle flanges above the reactor vessel closure head? I remember reading in the (very nicely done) NRC-prepared Lessons Learned report that such leaking gaskets were scheduled to be replaced as far as 10.0 years into the future. So, the question is, why can I read this entire SIT report without even the suggestion that some of the white residue around some of the nozzles came from somewhere other than a J weld or nozzle crack?

SIT Report Timeliness

If a report on serious conditions (such as were identified this year at Davis-Besse) is issued after the plant starts up, (which is the case here), its value is greatly reduced. My feeling is this: if the SIT report can't be issued before it is desired to start up the plant, don't let the plant start up until the report is issued.

Operating without stainless steel cladding

I feel that the nozzle repair should have included covering all the newly exposed carbon steel (where some of the nozzle was removed) with stainless steel cladding. Here is the explanation I received: the low concentration boric acid in the primary coolant won't attack that steel very much. This is probably true, but I do not believe it should be the primary consideration. Suppose concentrated acid pools above the new weld (in an annular gap). Last time, (2002), it was the stainless steel cladding that prevented a serious accident. What is your protection now?

FLUS System

Why have I not seen a specific statement that the FLUS system, if it had been installed on the (upper) reactor vessel closure head, where problems had existed in the past, would or would not have indicated violation of their existing Technical Specifications?

Reverse Logic

The inability of existing leakage detection systems is being used as justification for a Technical Specification violation of the requirement for no primary coolant system leakage. Isn't this backwards? How about requiring improved leakage detection so that the Technical Specification 3.4.13 requirement can be met?

Guessing Reactor Vessel Closure Head Temperature

Nobody knows a necessary and accurate reactor vessel closure head temperature and nobody suggests drilling a hole in the head and installing a temperature sensor (except one person who called in to the 9-9-2010 meeting.) Doesn't Problem Identification and (PROMPT) RESOLUTION apply here? Why can't you do what the EPRI Project Manager wants AND obtain that additional temperature information as well?

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Nozzle 33 could not be leaking (even though it had boric acid deposits) because no UT backwall leakage pattern was identified? Does it make sense that the deposits MUST come from only that place?

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For Head surface area, 2008, the statement is made that several nozzles had as-found boric acid deposits. However, if you look at the earlier, previous pages, no nozzle has individually been identified as having evidence of leakage. Anybody interested in where that stuff came from?

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What does "based on review of zero degree search unit data" mean? In particular, how does it limit the value of this review: what wouldn't it have shown, that might have been important?

Inappropriate use of the term "triple point"

"Triple point" is defined in Webster's II New College Dictionary as: "A point on a phase diagram that represents a set of conditions in which the liquid, gaseous, and solid phases of a substance such as water can exist in a state of equilibrium." It does not seem to apply to an area where 3 different substances (nozzle material, weld material, and reactor head material) meet.

Indication or Crack?

I would define a crack, (either on the metal surface, under the metal surface, or completely through the metal), as also being an indication. However, indications are not always of cracks. Although I don't think this was confusing in the report, I do feel it is important to understand the difference. (It would also be interesting to know who set the acceptance standards for rejecting or accepting indications, and what they were.)

Knowledge Transfer from "Lessons Learned"

I would also be interested in knowing if any (or all) members of this current boric acid residue investigation team were requested to reread the NRC Davis-Besse Lessons Learned report on the 2002 reactor head/boric acid problem.

Thank you.

Thomas Gurdziel