RAS 14021

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:
E. Roy Hawkens, Chair
Dr. Paul B. Abramson
Dr. Anthony J. Baratta

In the Matter of:	August 17, 2007
AmerGen Energy Company, LLC	Docket No. 50-219
(License Renewal for Oyster Creek Nuclear Generating Station)	

AMERGEN'S PRE-FILED REBUTTAL TESTIMONY
PART 4
SOURCES OF WATER

I. WITNESS BACKGROUND

Q. 1: Please state your names and current titles. The Board knows that a description of your current responsibilities, background and professional experience was provided in Parts 1 and 4 of AmerGen's Pre-Filed Direct Testimony on July 20, 2007, so there is no need for you to repeat that information here.

A. 1: (JFO) My name is John F. O'Rourke. I am a Senior Project manager, license Renewal, for Exelon, AmerGen Energy Company, LLC's ("AmerGen") parent company.

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(AO) My name is Ahmed Ouaou. I am a registered Professional Engineer specializing in civil/structural design and an independent contractor.

(FHR) My name is Francis H. Ray. I am the Engineering Programs Manager at Oyster Creek Nuclear Generating Station ("OCNGS").

II. KNOWN SOURCES OF WATER IN THE SAND BED REGION

Q. 2: What is the purpose of this Rebuttal Testimony?

A. 2: (All) The purpose of this Rebuttal Testimony is to respond to the information provided in Citizens' Initial Statement Regarding Relicensing of Oyster Creek Nuclear Generating Station ("Statement") and in the Pre-Filed Direct Testimony of Dr. Rudolf H. Hausler, regarding the sources of water in the sand bed region.

Q. 3: Please summarize your conclusion.

A.3: We have reviewed Citizens' Statement and Dr. Hausler's testimony. These documents conclude that "it has not been established that the only source of water is the reactor fueling cavity." (Citizens' Statement at 21). This conclusion is based on a lack of knowledge of the subject matter and a lack of understanding of the available documents. Nothing in Dr. Hausler's testimony or Citizens' Statement contradicts our previous conclusion that AmerGen has identified and eliminated the potential sources of water in the sand bed region.

Q. 4: What is the basis for your previous conclusion?

A. 4: (All) As we described in our Direct Testimony (Part 4, A.13) and discuss further in this Rebuttal Testimony, the evaluations that took place in the 1980s and 1990s essentially ruled out other components as potential sources of water. Thus, "the only known source of water on the exterior of the drywell shell in the sand bed

region is the reactor cavity liner . . . ." (Part 4, A.4) Further, "[o]bservation of the exterior of the drywell shell in the sand bed region and the sand bed drains during the 2006 refueling outage[] confirms that the use of metal tape and strippable coating on the reactor cavity liner during outages can eliminate the presence of water from the exterior sand bed region." (Part 4, A.4)

Q. 5: Are there documents that support your conclusions?

A. 5: (All) Yes. Citizens' Exhibit 21, Attachment III; page 6-3 of Applicant's Exhibit 3; and portions of the transcripts of AmerGen's meetings with the ACRS license renewal subcommittee on October 3, 2006 and January 18, 2007, all discuss the historical investigations. The relevant portions of the ACRS transcripts are attached as Applicant's Exhibits 30 and 31.

Q. 6: Is there other evidence that the only known source of water is the refueling cavity?

A. 6: (All) Yes. During inspections, no new water has been found in the plastic bottles that are connected to the sand bed drains. This includes the quarterly inspections during operations that resumed in March 2006, and daily inspections while the reactor cavity was filled with water during the 2006 outage. Thus, these inspections provide additional confirmation that the only known source of leakage is the reactor cavity liner.

Q. 7: Citizens have submitted, as their Exhibit 21, a December 5, 1990 letter from OCNGS to the NRC. Attachment III to that letter describes past actions to "investigate, identify, and correct leak paths into the drywell gap . . . ." Are you familiar with this document?

A. 7: (All) Yes.

Q. 8: What does that document discuss?

A. 8: (All) It discusses the extensive investigations undertaken in the 1980s and early 1990s to identify the sources of water in the sand bed region and it reports the results of those investigations to the NRC.

Q. 9: On page 21 of their Statement, Citizens cite their Exhibit 21, Attachment III, at 4 in support of the claim that "the equipment pool has also leaked." What is your opinion regarding this statement?

A. 9: (All) The passage cited by Citizens has nothing to do with leakage on the drywell shell. The discussion of equipment pool leaks on page 4 of Citizens' Exhibit 21, Attachment III describes "[e]vidence of leakage" on both the floor and wall of the equipment pool and in the reactor cavity wall," and "water stains on the underside of the equipment pool." The leakage described is isolated from the drywell shell and, based on the physical configuration of OCNGS, there is no credible leakage path from the underside of the equipment pool to the drywell shell.

Tellingly, this passage is part of a discussion of "actions [that have] also been taken to address the potential impact of leakage on *other* structures and equipment." Citizens' Exhibit 21, Attachment III at 4 (emphasis added). The cited passage *comes after* a description of the licensee's "thorough program for managing leakage that could affect drywell integrity," and is not part of the cited description. Citizens' Exhibit 21, Attachment III, at 4.

Q. 10: Dr. Hausler also has testified on the topic of equipment pool leakage. He states, in A.17, that there "are a number of potential sources of water that have been

identified by the reactor operator, including . . . the equipment pool." What is your opinion regarding this statement?

A. 10: (All) OCNGS historically identified a number of potential sources of water, including the equipment pool, but investigations in the 1980s and 1990s eliminated the equipment pool as a source of water leakage onto the external drywell shell. Further, to the extent Dr. Hausler is relying on the "reactor operator," then we can only assume that he relies on the conclusions documented in Citizens' Exhibit 21, Attachment III, which are that, with respect to leakage "into the drywell gap" (page 2), "no leaks have been found related to the equipment pool. Preventively, the equipment pool will be protectively coated similar to the refueling cavity. Drains from the leak detection system are monitored on a periodic basis to detect any changes" (page 3).

Further, there is no potential for water from the equipment pool to reach the external sand bed region. The equipment pool is filled with water during outages when it is utilized to store reactor components for shielding purposes during their disassembly. During this period, the water in the equipment pool can mix with the water in the reactor cavity. Prior to plant restart the equipment pool is drained down, eliminating the potential for water from the equipment pool to provide a source of leakage into the sand bed region.

Q. 11: Citizens also have submitted TDR 964, dated March 3, 1989, as Citizens' Exhibit 22. Are you familiar with this document?

A. 11: (All) Yes.

Q. 12: Please summarize the purpose and contents of the document.

A. 12: (All) TDR 964 describes the clearing of the sand bed drains that took place in 1988 and recommends further corrective actions to monitor sand bed leakage.

Q. 13: On page 21 of Citizens' Statement, Citizens cite to page 3 of TDR 964, to support the statement that "fuel pool water that did not originate from the reactor cavity has been found in the sand bed region." Does the citation support Citizens' Statement?

A. 13: (All) No. Citizens' conclusion is *not* supported by this citation. The cited passage in TDR 964 states,

> On Oct 26, 1988 during the cathodic protection core bore operation . . . it was noted that hole 2 in bay 11 was filled with standing water. This water when tested by O.C. chemistry was found not to be core bore water used during the drilling operation but rather it had the characteristics of "old" fuel pool water.
>
> Since the reactor cavity had not been filled with fuel pool water for the "upcoming refueling" it was postulated that this entrapped water could be "old" fuel pool water.

This document simply does not support the conclusion Citizens draw from it (*i.e.*, that fuel pool water that did not originate from the reactor cavity has been found in the sand bed region). The author of TDR 964 proposes that the water discovered might have been "old" fuel pool water, *i.e.*, water left over from a previous refueling outage, when the reactor cavity was filled with water. There is no basis upon which Citizens can then jump to the conclusion that there is some source of water in the sand bed region *other than the reactor cavity*. TDR 964 offers no support for this leap of logic. Ultimately, on page 5, the conclusion

reached is that "[w]ater samples were collected from each bay drain and analysis proved to be inconclusive."

Also, following this TDR, the licensee conducted extensive investigations to determine the source of leakage into the sand bed region. As documented in Citizens' Exhibit 21, Attachment III, those investigations ultimately found no source of leakage other than the reactor cavity liner. There is nothing in TDR 964 that contradicts these later findings.

III. REFUELING CAVITY LEAKAGE

Q. 14: Dr. Hausler has testified, in A.17, that "AmerGen has not managed to devise a method to ensure that the refueling cavity will not leak in the future . . . ." Is this correct?

A. 14: (All) This is correct, but irrelevant. Leakage from the reactor cavity is not relevant unless it exceeds the capacity of the trough drain. As we explained in Part 4, A.9 of our Direct Testimony, the use of metal tape and strippable coating has "drastically reduced the amount of reactor cavity liner leakage" to a level that is "well within the capacity of the reactor cavity trough drain system." Moreover, the trough drain is inspected during each outage. Thus, it is mere speculation to assume that leakage at the trough drain equates to undetected water on the exterior of the drywell shell.

IV. CONDENSATION

Q. 15: Dr. Hausler has testified, in A.18, that "small droplets of condensation . . . would likely not cause observable flow in the sand bed drains." What is your response to this statement?

A. 15: (All) We would first point out that, as we testified on direct, "[c]ondensation on the exterior of the drywell shell in the sand bed region during normal operations is not credible," and even during outages, "the potential for condensation is entirely speculative." (Part 4, A.17) Direct visual observation during the 2006 outage in all ten bays did not identify condensation.

Next, relying on Ed Hosterman's testimony in Part 6 of AmerGen's Direct Testimony, we understand that any water that might condense on the drywell shell during an outage "would evaporate in a couple of hours" following start-up at the end of the outage. Also, the potential future corrosion calculations of Barry Gordon in Part 6 of AmerGen's Direct and Rebuttal Testimony conservatively assume that water from the reactor cavity is present for the entire 30-day period of a refueling outage, once every 24 months. Thus, even if Dr. Hausler's testimony is correct, condensation already is accounted for in AmerGen's potential future corrosion analysis.

Q. 16: Dr. Hausler has testified, in A.17, that "AmerGen has [not] been able to definitively trace the source of water found most recently in the drains from the drywell," so "it is not possible to rule out the potential for water from other sources to enter during operation."

A. 16: (All) Dr. Hausler is referring to the water found in early 2006 in three of the five plastic bottles in the Torus Room that collect leakage from the sand bed drains. As explained in Part 1 of AmerGen's Direct Testimony, water from the sand bed drains "is diverted through plastic tubing where it is collected in five-gallon plastic bottles." (A.10) There is no evidence that this water "enter[ed]" the sand

bed region "during operation," as Dr. Hausler speculates. Instead, as we testified in Part 4, A.12, the presence of water in these bottles "is consistent with the failure to apply strippable coating during past refueling outages." The fact that AmerGen cannot "definitively trace the source" of this water does not mean that the water came from a source other than the refueling cavity. Again, the fact that no water has been identified in these bottles since inspections resumed in March 2006, and the fact that no water was found in any portion of the sand bed region during the 2006 outage inspections, provides additional support that there are no other sources of water reaching the sand bed region during operations or outages.

Q. 17: On page 21 of Citizens' Statement, they cite to Citizens' Exhibit 23 (an AmerGen e-mail) for the fact that "no activity" was detected in the water found in the plastic bottles in March 2006. They conclude, therefore, that "some water will result from condensation during outages." Are Citizens correct?

A. 17: (All) No. The reference to "no activity" refers to no gamma radioactivity. However, the sample was not analyzed for tritium. Analytical results from prior samples taken from the sand bed region, identified in Citizen's Exhibit 22, also have no gamma radioactivity but still exhibited tritium at concentrations that are consistent with water from the primary cooling system. Thus, the fact that "no activity" was detected in the water sample taken in March 2006 does not prove that the water came from condensation. In addition, no condensation was observed during visual inspections of the exterior sand bed region during the 2006 outage. At best, that analytical result is inconclusive.

Furthermore, as we testified on direct, the temperature differential between the "hotter drywell interior" and the "cooler external sand bed region. . . . will prevent condensation from forming on the exterior of the drywell shell." (Part 4, A.14.) Although condensation is "theoretically possible" during outages (Part 4, A.15.), "[t]here was no evidence of condensation on the exterior of the drywell shell" during the 2006 outage. (Part 4, A.16.) "Qualified NDE [non-destructive examination] visual inspectors examined each individual bay during the 2006 refueling outage and their reports did not identify any condensation or other moisture." (Part 4, A.16.)

V. CRACKS IN THE EPOXY FLOOR

Q. 18: Dr. Hausler has testified, in A.18, that if "defects in the floor coating recur, water could run down into those defects, rather than running to the [sand bed] drains" leading to "a failure to detect corrosive conditions." Do you agree with this statement?

A. 18: (All) No. Once again, Dr. Hausler is speculating and does not understand the facts. Dr. Hausler is assuming that water would run down the shell, onto the floor, and into cracks that would have to be present between each of the sand bed drains and the shell, thereby preventing water from reaching the sand bed drains. This is speculation. Past defects in the floor were not in locations that would permit the scenario Dr. Hausler assumes to take place. The defects were primarily at the interface between the concrete shield wall and the floor, on the opposite side of the sand bed floor from the drywell shell. Those that were not at this interface were small defects that could not prevent water from reaching the

drains. Further, as described in Applicant's Exhibit 3, at 7-3, no defects were found in the seal between the drywell shell and the concrete floor. Thus, Dr. Hausler's statement is best characterized as speculation that is based on a misunderstanding of the geometry and drainage design of the external sand bed region and the configuration of the floor defects.

VI. CLOGGED DRAINS

Q. 19: Dr. Hausler has testified, in A.18, that "in the past the [sand bed] drains have clogged and it is reasonable to assume that this situation could recur." Do you agree?

A. 19: (All) No. Dr. Hausler argues that the drains could become totally blocked so that no water can pass through them. This is total speculation, because the sand bed region drains were historically clogged with sand. That sand was removed during the 1992 refueling outage. This is described in Applicant's Exhibit 3, at 6-3. In the 2006 outage, as described in Applicant's Exhibit 3, at 4-7, some solid debris was found in two of the sand bed drains, but the debris would not have prevented flow. The debris was removed from both of these drains. Further, the sand bed drains are verified to be clear during each refueling outage. Applicants' Exhibits 32 and 33. Thus, there is no reason to "assume" that the sand bed drains will ever prevent drainage.

Q. 20: Dr. Hausler concludes, in A.17, that "it appears likely that some water will be present on the surface of the drywell during refueling outages, and it is not possible to rule out the potential for water from other sources to enter during operations." Do you agree?

A. 20: (All) No. Leakage from the reactor cavity is the only known source of water on the exterior of the drywell shell in the sand bed region. Moreover, AmerGen's commitments effectively eliminate the potential for water leakage from the refueling cavity onto the drywell shell exterior, during the only time when the reactor cavity is filled with water. Furthermore, the 2006 outage inspections clearly demonstrate that with these commitments in place, water is not expected to enter the external sand bed region. Nothing in Dr. Hausler's Direct Testimony or Citizens' Statement demonstrates anything to the contrary.

Q. 21: Does this conclude your testimony?

A. 21: (All) Yes.

In accordance with 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct:

John J. O'Rourke — 8-15-2007

John F. O'Rourke — Date

Ahmed Ouaou — 8/15/2007

Ahmed Ouaou — Date

Francis H. Ray — Date

In accordance with 28 U.S.C. § 1746, I state under penalty of perjury that the foregoing is true and correct:

John F. O'Rourke	Date
Ahmed Ouaou	Date
Francis H. Ray	8/15/07 Date

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ATOMIC SAFETY AND LICENSING BOARD

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AmerGen Energy Company, LLC	)	Docket No. 50-219
(License Renewal for Oyster Creek Nuclear Generating Station)	)	

CERTIFICATE OF SERVICE

I hereby certify that corrected copies of Part 4 of the testimony supporting "AmerGen's Rebuttal Statement of Position" were served this day upon the persons listed below, by e-mail and first class mail, unless otherwise noted.

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