RAS 11641

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
OFFICE OF THE SECRETARY

ATOMIC SAFETY AND LICENSING BOARD

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

In the Matter of	)	
	)	Docket No. 50-0219-LR
AMERGEN ENERGY COMPANY, LLC	)	
	)	ASLB No. 06-844-01-LR
(License Renewal for the Oyster Creek	)	
Nuclear Generating Station)	)	May 5, 2006

MOTION TO APPLY SUBPART G PROCEDURES

PRELIMINARY STATEMENT

In this Motion, Nuclear Information and Resource Service, Jersey Shore Nuclear Watch, Inc., Grandmothers, Mothers and More for Energy Safety, New Jersey Public Interest Research Group, New Jersey Sierra Club, and New Jersey Environmental Federation (collectively "Citizens") show that AmerGen's credibility, and the credibility of its parent, Exelon, is in question. Citizens submit this Motion to request that the Atomic Safety Licensing Board ("ASLB" or "Board") order this proceeding to be conducted pursuant to the rules of 10 C.F.R. Part 2, Subpart G, in accordance with 10 C.F.R.§ 2.310(d). This Section states that a formal Subpart G proceeding will be used "where the credibility of an eyewitness may reasonably be expected to be at issue." At other plants, AmerGen/Exelon has failed to disclose critical information to regulators and has submitted false data to the NRC. With regard to Oyster Creek, AmerGen/Exelon made misleading statements about various issues to this Board, to the press, and to elected officials, has used unjustifiable excuses to conceal the 1996 UT results for as long

as possible, and has accepted and relied upon the 1996 UT results, despite obvious deficiencies in the data that were rapidly identified by Citizens' expert.

Unless the ASLB grants a Subpart G hearing, Citizens will be placed in a catch-22. Under the curtailed discovery allowed by Subpart L, Citizens will not be able to tell if witnesses are telling the whole truth or if documents have been falsified. If the ASLB were to require that the credibility of each individual witness or document must be shown to be at issue before granting a Subpart G hearing and allowing full discovery, it would mean that Citizens would be deprived of the very means of testing the credibility of the witnesses and documents.

AmerGen/Exelon has put its credibility and the credibility of its employees and agents at issue through its pattern of questionable conduct related to this proceeding and at other plants. Even Exelon's President has admitted that it has lost credibility. Therefore, Citizens no longer have the confidence, which is required by Subpart L proceedings, that AmerGen's employees and agents have and will conduct themselves in an appropriate manner in this proceeding and related matters. Thus, the ASLB should grant this motion, and require that this proceeding go forward under Part 2, Subpart G.

HISTORICAL BACKGROUND

AmerGen, and its parent company Exelon, have a long history of making false or misleading statements and being less than credible to the public in general, and to Citizens. Thus, relevant information abounds. Citizens present several instances, both in general, and specific to Oyster Creek, where AmerGen exemplified its lack of credibility.

Undisclosed Tritium Leaks at Exelon's Braidwood Nuclear Facility

The State of Illinois filed suit on March 16, 2006 against Exelon for its failure to properly maintain its Braidwood nuclear power plant. The State of Illinois alleges that Exelon allowed its

power plant to repeatedly leak radioactive wastewater contaminated with tritium, in violation of the Illinois Clean Water Act, and without any authorizing permit. Ex. A at p. 2-4. The alleged leaks of contaminated wastewater began in at least 1996, and totaled at least several million gallons. Id. at ¶ 15-20. The contaminated water affected the surrounding groundwater. Id. at ¶ 12. Illinois also alleges that Exelon had knowledge of the releases, but that it failed to notify the Illinois EPA. Id. at ¶¶ 17, 19, 21. Exelon's violations are made even more egregious by the fact that some of the releases occurred while Exelon was undergoing a discharge permit renewal process with the Illinois EPA. Ex. B at 1. James Glasgow, the Will County State Attorney representing Will County as a plaintiff in the litigation, characterized Exelon's handling of the spills and inadequate maintenance of its facility as stemming from a "culture of greed and deception." Ex. C at 1.

Further, Citizens cannot be expected to assume the credibility of AmerGen and its documents when Exelon's own President and Chief Nuclear Officer, Mr. Christopher Crane admitted that Exelon has suffered a loss of credibility. Despite the high monetary price that Exelon will have to pay as a result of the tritium spills in Illinois, Mr. Crane stated that, "[t]he more damaging issue here is the credibility loss." Ex. D at 1.

Falsification of Records at Exelon's Quad Cities Nuclear Power Station

The NRC Office of Investigations initiated an investigation on March 8, 2004, in which it determined that two Exelon technicians "deliberately falsified inspection documentation while calibrating local instrumentation." Ex. E, Synopsis. More specifically, Exelon personnel "falsified maintenance alteration logs to indicate that required concurrent or independent verifications were performed on torus temperature indicators, residual heat removal (RHR) suction and discharge pressure indicators, RHR service water pump discharge indicators, and secondary containment differential

pressure indicators after the alteration and restoration of these instruments." Id. at 1. The report of the NRC Office of Investigations states that the "matter was identified and immediately investigated by Exelon," and that Exelon took numerous "[c]orrective actions" after uncovering the falsification. Id. While Citizens acknowledge Exelon's actions to identify and correct the falsification, this does not change the fact that Exelon employees falsified maintenance records, such as the ones upon which Citizens would be forced to rely in a Subpart L hearing. The veracity of documents submitted by AmerGen cannot be ascertained by Citizens without an opportunity to engage in full discovery, which is only afforded by a proceeding under the Part 2, Subpart G regulations.

Lack of Candor at AmerGen's Oyster Creek Nuclear Generating Station

Citizens also observe that AmerGen has been untruthful on several occasions in the statements it has made regarding Oyster Creek. First, within the confines of this proceeding, AmerGen has submitted misleading information for the Board's consideration. In its Answer, AmerGen stated that it "concluded that corrosion of the drywell shell has been arrested, including in the sand bed region." Answer at 21. However, this representation was in direct conflict with the record, which clearly shows that corrosion is ongoing in the upper drywell, above the sand bed region. E.g. License Renewal Application at 3.5-20 to 21. On March 23, 2006, AmerGen notified Citizens that it agreed with Citizens position that a statement in AmerGen's Answer to the initial Petition "could cause confusion" and subsequently notified the Board of the need to correct the pleading. See Ex. F.

Second, AmerGen has inconsistently represented to Citizens the character of certain information. On September 6, 2005, Citizens requested copies of the 1996 inspections of the Oyster Creek drywell liner. Ex. G. On October 10, 2005, AmerGen refused Citizens' information request, claiming that the request was for "proprietary business information." Ex. H. However, on April 6,

2006, AmerGen submitted the averaged results of the 1996 inspections to the NRC, and did not include any claim that the information was proprietary. Ex. I. AmerGen did not make this claim to the NRC, because the information is not proprietary. AmerGen's initial claim was made as an excuse to deny Citizens' information request. While Citizens acknowledge that they now have access to some the requested information, they note that AmerGen's behavior, claiming that certain information is proprietary when Citizens have no ability to contest the claim, but then later not even attempting to make the claim when Citizens could challenge it, is one more example of its lack of credibility.

Third, the 1996 Oyster Creek dry well measurements that AmerGen submitted to the NRC show a systematic bias in AmerGen's favor. Ex. J at 2. In 1994, nineteen areas in the sand bed region were measured. Id. at 1. Then, two years later in 1996, similar measurements were taken at the same locations on the dry well. Id. at 2. Incredibly, the records submitted show that while the thickness of the dry well at most measured locations decreased from 1992 to 1994, as would be anticipated if corrosion was occurring, the thickness at these locations then *increased* between 1994 and 1996. Id. at 2. These records are troubling for a number of reasons. First the measurements reported are "physically impossible," as "metal simply does not spontaneously get thicker." Id. at 2. Second, the deviation from the previous results exceeded AmerGen's own estimate of random error by large margins. Id.. Third, AmerGen neither noted this systematic error nor made any effort to correct it. Id.

Finally, AmerGen claims that at Oyster Creek "it is highly unlikely that the crash [of an airplane into the reactor building] would cause any significant damage to the used fuel pool," Ex. M, and that "a study . . . found that even if such an event [an aircraft impact] did occur . . . there would not be a catastrophic release of radioactivity." Ex. K at 2. In sharp contrast, the National Academy of Sciences ("NAS") found that a direct hit by an aircraft on a reactor like Oyster Creek could cause "severe

damage of the pool wall" that "could have severe consequences," such as "2,000 to 6,000 cancer deaths." Ex. L at 2. Further, NAS cautioned that "[t]errorist attacks on spent fuel pools are . . . a credible threat," and fuel pools "cannot be dismissed as targets for such attacks because it is not possible to predict the behavior and motivations of terrorists." Id. at 1. While AmerGen has asserted that they are "certainly able to defend the facility," Ex. K at 2, NAS stated "there are currently no requirements in place to defend against the kind of . . . attacks that were carried out on September 11, 2001." Ex. L at 6.

Instead of the NAS Report, AmerGen cites to a National Energy Institute and Electric Power Research Institute ("NEI-EPRI") study to support its assurances that "[t]hese structures are designed for safety with multiple barriers to protect the fuel." Ex. K at 2. Again, in direct contradiction, the NAS cautioned "the spent fuel pool [in GE Mark I Boiling Water Reactors like Oyster Creek] is located well above ground level. Most designs have thin steel superstructures. The superstructures and pools were not, however, specifically designed to resist terrorist attacks." Ex. L at 2.

In another effort to downplay the significant security concerns, on April 7, 2006, AmerGen issued a public relations package to mayors in the local townships surrounding the Oyster Creek facility. Ex. M (excerpt). In it, AmerGen insists that "it is highly unlikely that [an airplane] crash would cause any significant damage to the fuel stored in the Used Fuel pool," as the "steel framing, the pool's massive concrete structure and supporting columns would protect the pool from impact damage and the contained water would provide protection to the fuel from impact and fire effects." Id.

AmerGen made similar assertions based on the NEI-EPRI study stating that "[the NEI-EPRI] study . . . found that even if such an event [an aircraft impact] did occur . . . there would not be a catastrophic release of radioactivity." Ex. K at 2. However, AmerGen failed to discuss or note the

several serious shortcomings of this study that erode support for its claims that there would be no serious consequences. For example, the State of New Jersey stated that "the [NEI-EPRI] study does not appear to have taken into account the thermal and structural consequences and collateral damage of the explosion and resulting fire that would also occur from the impact of a commercial aircraft." Ex. N at 1. Further, "it appears that the structural models used to evaluate impact damage were based on 'representative' (not site-specific), structures, which were considered by NEI to be typical to those that exist across the nuclear power industry." Id. at 2.

In addition to contradicting the NAS study, AmerGen completely disregards the study by Robert Alvarez (the "Alvarez Study") whose conclusions were supported by the NAS. Ex. O (providing an excerpt from the NAS Report). According to the NAS, the Alvarez Study concluded that the consequences of a fire resulting from a "loss-of-pool-coolant event that drained the spent fuel pool" would result in "long-term contamination consequences that were worse than those from the Chernobyl accident." Id. at 45. The State of New Jersey has repeatedly quoted the Alvarez Study when it expresses its concerns about Oyster Creek's vulnerability to aircraft attack. E.g. Ex. N at 2.

ARGUMENT

I. AmerGen's Credibility Is At Issue

The Nuclear Regulatory Commission regulations require that a formal proceeding be conducted when the credibility of a witness may reasonably expected to be at issue.[1] The Part 2 rules were

[1] 10 C.F.R. § 2.310(d) states, in pertinent part, that:

> In proceedings for the grant, renewal, licensee-initiated Amendment, or termination of licenses or permits for nuclear power reactors, where the presiding officer by order finds that resolution of the contention or contested matter necessitates resolution of issues of material fact relating to the occurrence of a past activity, *where the credibility of an eyewitness may reasonably be expected to be at issue*, and/or issues of motive or intent of the party or eyewitness material to the resolution of the contested matter, the hearing for resolution of that contention or contested matter will be conducted under

promulgated in 2004. The Board has already recognized its authority to grant motions for Subpart G hearings under the current Part 2 rules. In the Matter of Entergy Nuclear Vermont Yankee LLC (Vermont Yankee Nuclear Power Station), 2005 NRC LEXIS 52 (2005). The Board also recognizes that when a party finds that its adversary is "shown to be of questionable veracity under oath," generally behaving in a way that puts its credibility at issue, such behavior poses a challenge. Id. at 3. The Board has acknowledged these challenges in the past and recently stated that, "[t]his situation demonstrates the difficulty the petitioner faces under the new rules in demonstrating, in its initial request for hearing, that a specific contention raises reasonable concerns about the credibility of an eyewitness to a material past activity. See 10 C.F.R. §§ 2.309(g) and 2.310(d). At this stage, the petitioners do not even know the identity of the witnesses that Entergy may call." In the Matter of Entergy Nuclear Vermont Yankee, LLC, (Vermont Yankee Nuclear Power Station), 2004 NRC LEXIS 263, *31 (2004). In the present case, even Exelon's President has conceded that it has "lost credibility." Ex. D at 1. Therefore, the Board should recognize that Citizens have done more than raise a reasonable concern as to AmerGen's credibility and direct this proceeding to move forward under the procedures provided by Subpart G.

The Board has also acknowledged that petitioners may rely on past experiences with the other party to form the basis for credibility concerns. 2004 NRC LEXIS 263 at *31. The Board stated, "we reject the notion that the demonstration of questions about an eyewitness's credibility cannot be historical, [as] [a]t this early juncture in the proceeding, historical information is one of the few bases upon which a petitioner can argue, and this Board assess, the credibility of a potential eyewitness" Id. at *31-2. In this case, Citizens have demonstrated that questions as to credibility arise from both

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subpart G of this part. (emphasis added).

historical information and current events. In light of AmerGen's mountain of mistakes, falsifications, and general lack of candor, the Board should find that AmerGen's credibility is at issue, and conduct a Subpart G hearing.

II. Denying Citizens' Request for a Subpart G Hearing Would Impinge on Citizens Statutory Rights

One of the primary purposes of the Subpart G rules is to allow full discovery when the curtailed discovery allowed under Subpart L may be insufficient. Curtailed discovery is insufficient when a party lacks credibility. A petitioner cannot be reasonably expected to properly build its case by relying solely on paper discovery from an untrustworthy source. In this case, statements of witnesses and accuracy of documents cannot be deemed presumptively true.

Citizens acknowledge that the Subpart L rules, allowing reduced formality, limited discovery, and limited right to cross-examination, may be facially valid and in accordance with Administrative Procedure Act ("APA"). Citizens Awareness Network, Inc. v. Nuclear Regulatory Commission, 391 F.3d 338, 344 (2004). Citizens are aware that these rules reflect the "NRC's commitment to expeditious adjudication," and are intended to simplify the hearing process in order to increase efficiency. Id. at 344. However, if the practical effect of the Part 2 rules is to keep every petitioning party from accessing a formal hearing, they would be invalid as applied. As the First Circuit duly noted, "[s]hould the agency's administration of the new rules contradict its present representations or otherwise flout this principle, nothing in this opinion will inoculate the rules against future challenges." Id. In this case, where AmerGen's lack of credibility is at issue, the desire for simplicity and speed afforded by Subpart L proceedings do not outweigh the need to properly adjudicate facts material to the resolution of this matter. Thus, a Subpart G hearing is required for the proceedings to meet the requirements of the APA.

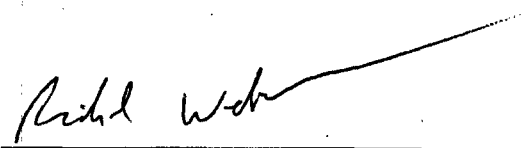
III. AmerGen's Lack of Credibility Requires the Board to Conduct a Subpart G Hearing

AmerGen's actions, both within this proceeding and in other fora, demonstrate that its credibility is at issue, thus, it is imperative that the Board grant the motion and conduct a Subpart G hearing. In the absence of cross-examination and full discovery, Citizens will be unable to discern whether AmerGen's witnesses and documents are truthful. The resolution of the issues at the core of the contention can only done under the auspices of a hearing conducted under the Subpart G rules, which "resemble those associated with judicial proceedings," including traditional rules of discovery, and the ability to cross-examine witnesses. 391 F.3d at 344 (2004).

AmerGen's untruthfulness is not an isolated incident. Citizens present the Board with several instances from AmerGen's history, and the current proceeding, which together illustrate a pattern demonstrating that the credibility of eyewitnesses in this proceeding, namely AmerGen employees, "may reasonably be expected to be at issue." 10 C.F.R. § 2.310(d). The Board, in light of the information provided by Citizens, must find that AmerGen's lack of credibility is sufficient to warrant that "the hearing for resolution of [this] contention or contested matter [ ] be conducted under subpart G." 10 C.F.R. § 2.310(d).

CONCLUSION

For all of the forgoing reasons, the ASLB should grant Citizens' motion, find AmerGen's credibility to be at issue, and order the hearing to proceed under Subpart G.



Richard Webster, Esq.
RUTGERS ENVIRONMENTAL LAW CLINIC
Attorneys for Citizens

Dated: May 5, 2006

EXHIBIT A

IN THE CIRCUIT COURT FOR THE TWELFTH JUDICIAL CIRCUIT
WILL COUNTY, ILLINOIS
CHANCERY DIVISION

PEOPLE OF THE STATE OF ILLINOIS, *ex rel.* LISA MADIGAN, Attorney General of the State of Illinois, and *ex rel.* JAMES W. GLASGOW, State's Attorney for Will County, Illinois,	)	
Plaintiff,	)	
v.	)	No. 06 MR 240
EXELON CORPORATION, a Pennsylvania corporation, COMMONWEALTH EDISON COMPANY, an Illinois corporation and EXELON GENERATION COMPANY, LLC, a Pennsylvania limited liability company,	)	
Defendants.	)	

FILED
06 MAR 16 AM 8:01
CLERK, CIRCUIT COURT
WILL COUNTY, ILLINOIS

COMPLAINT

NOW COMES the PLAINTIFF, PEOPLE OF THE STATE OF ILLINOIS, *ex rel.* LISA MADIGAN, Attorney General of the State of Illinois, and *ex rel.* JAMES W. GLASGOW, State's Attorney for Will County, and complains of the Defendants EXELON CORPORATION, COMMONWEALTH EDISON COMPANY and EXELON GENERATION COMPANY, LLC, and in support thereof states and alleges as follows:

I. VIOLATIONS BY DEFENDANTS EXELON CORPORATION, COMMONWEALTH EDISON COMPANY AND EXELON GENERATION COMPANY, LLC RELATED TO RELEASES OF TRITIUM TO THE ENVIRONMENT

Initial case management set for
7/20/06 at: 8:30 am
At River Valley Justice Center

COUNT I

WATER POLLUTION

1. This Count is brought on behalf of the people of the State of Illinois, by Lisa Madigan, Attorney General of the State of Illinois, and James W. Glasgow, State's Attorney for Will County, on their own motion and at the request of the Illinois Environmental Protection Agency ("Illinois EPA"), pursuant to the terms and provisions of Section 42(d) and (e) of the Illinois Environmental Protection Act (the "Act"), 415 ILCS 5/42(d) and (e)(2004).

2. The Illinois EPA is an agency of the State of Illinois created by the Illinois General Assembly in Section 4 of the Act, 415 ILCS 5/4 (2004), and charged, *inter alia*, with the duty of enforcing the Act.

3. Defendant EXELON CORPORATION, is a Pennsylvania corporation authorized to do business in Illinois with its principal place of business in Chicago, Illinois. Since 2000, EXELON CORPORATION has been the parent company of both COMMONWEALTH EDISON COMPANY and EXELON GENERATION COMPANY, LLC, and conducts its nuclear power generation business and electrical distribution business through these entities.

4. Defendant COMMONWEALTH EDISON COMPANY ("ComEd") is an Illinois corporation with its principle place of business in Chicago, Illinois. ComEd was the owner and operator of the facility that is the subject matter of this Complaint until a precise time, better known to the Defendants, in 2000, when it became a subsidiary of EXELON CORPORATION.

5. Defendant EXELON GENERATION COMPANY, LLC ("Exelon Generation") is a Pennsylvania limited liability company with its principle place of business in Kennett Square, Pennsylvania. Exelon Generation was formed in 2000 to conduct the power generation portion of EXELON CORPORATION's business.

6. Defendants owned and operated as further described in this Complaint the Braidwood Nuclear Generating Station a nuclear power generating facility located in Braceville, Will County, Illinois. (Hereinafter, all property owned by the Defendants in and around Braceville shall be referred to as the "Facility" and that portion of the Facility encompassing the power generation plant, including the nuclear reactors, shall be referred to as the "Station".) The Station includes, among other things, two pressurized water nuclear reactors. The Facility includes a cooling pond, as well as property for pipeline access extending to the Kankakee River. The Village of Godley, population approximately 687, is located just to the west and south of the Station. The Village of Braidwood, population approximately 5,965, is located approximately two miles to the north of the Station.

7. Operations at the Station generate tritium, a radioactive isotope of hydrogen.

8. Tritium atoms can replace the non-radioactive hydrogen atoms in ordinary water (H_20) to form tritiated water (HTO). Human exposure to tritium occurs primarily through ingestion of tritiated water. Tritiated water, when ingested, is distributed through the human body in the same manner as ordinary water.

9. Human exposure to tritium increases the risk of developing cancer.

10. At the Facility, Defendants own and operate an underground pipe that runs approximately four and one half miles from the Station to the Kankakee River, and is known to the Defendants as the blowdown line. The blowdown line is located on property owned by the Defendants, but runs adjacent to private and public property including a forest preserve and nature area.

11. The blowdown line operates as a conduit, at various times, for discharges of tritiated water directly to the Kankakee River as authorized by the Nuclear Regulatory Commission ("NRC"). Defendant ComEd possesses a National Pollutant Discharge Elimination System ("NPDES") permit applicable to the blowdown line (Permit No. IL0048321) originally issued on August 24, 1995 by Illinois EPA ("NPDES Permit"). See Exhibit 1, attached to and hereby incorporated by reference into this Complaint. The NPDES Permit authorizes and regulates the discharge from the blowdown line of wastewater treatment plant effluent, sewage treatment plant effluent, radwaste treatment system effluent, and demineralizer regenerant wastes to an outfall in the Kankakee River. As of the filing of this Complaint, NPDES Permit No. IL0048321 remains in full force and effect.

12. At various times since at least 1996, tritiated water and other wastewaters have leaked and discharged from the Facility including the blowdown line, into the groundwater beneath the Facility as well as groundwater outside the property boundary of the Facility. The release and discharge of tritiated water and other wastewaters to the groundwater beneath the Facility and groundwater outside the property boundaries is not authorized by Defendants' NPDES Permit or by any regulatory agency.

13. The blowdown line incorporates eleven vacuum breakers, which, in the ordinary course of operation, function to admit air into the blowdown line to prevent the formation of a vacuum within the pipe. These vacuum breakers are numbered from one to eleven, in ascending order from the Station to the Kankakee River. See vacuum breaker map, Exhibit 2, attached to and hereby incorporated by reference into this Complaint.

14. Due to the Defendants' inadequate maintenance and operational procedures in both maintaining the vacuum breakers and operating the blowdown line, the vacuum breakers have, at various times, failed, causing the release of liquids flowing through the blowdown pipe, including tritiated water and other contaminants. These releases have entered the vacuum breaker housing and flowed through the unlined bottom of the housing into groundwater and have also flowed up through the manhole onto the surrounding land surface, which allowed it to percolate into the groundwater.

15. Tritiated releases from vacuum breakers occurred at least in 1996, 1998 and 2000, and at other times better known to the Defendants.

16. In 1996, a release estimated by Defendants to be at least 40,000 gallons of tritiated waste water and other contaminants occurred from vacuum breaker number 1 ("VB1"). VB1 is located nearest to the nuclear reactor and is adjacent to a ditch which runs along the east, north and west perimeters of the Station. This ditch flows to the north, around the reactor facility and then south toward the town of Godley. Tritiated wastewaters and other contaminants from this release flowed around VB1 on the surface, migrated to groundwater and also entered the ditch. Tritiated water remains in the groundwater around VB1.

17. Defendant ComEd was aware of the release described in paragraph 16 on or about the time of its occurrence, but did not notify Illinois EPA or local officials or agencies of the release at that time. Nor did ComEd undertake any measures to contain or remediate this release.

18. In 1998 a release of water, including tritiated water and other contaminants, estimated by Defendants to be at least 3 million gallons occurred at vacuum breaker 3 ("VB3"). This release resulted in ponded tritiated water and other contaminants on the ground near VB3, and on lands adjacent thereto. Tritiated water remains in the groundwater near this release.

19. Defendant ComEd was aware of the release described in paragraph 18 on or about the time of its occurrence, but did not notify Illinois EPA or local officials or agencies of the release at that time. Nor did ComEd undertake any measures to contain or remediate this release.

20. In 2000, a release estimated by Defendants to be 3 million gallons, including tritiated water and other contaminants, occurred from vacuum breaker 2 ("VB2"). Defendants recovered some of the released water, but an unknown amount soaked into the groundwater. Tritiated water remains in the groundwater near this release.

21. Defendants did not notify Illinois EPA or local officials or agencies of the release at that time. A citizen advised the Illinois EPA of ponded water near VB2 and the Illinois EPA notified Defendants of the release. At no time did Defendants tell Illinois EPA that the release contained tritiated water.

22. As a result of releases from VB2 and VB3, a plume of tritiated water is present near those vacuum breakers. This plume has extended through the groundwater to the north through a surface water pond, resulting in the presence of tritiated waters in the pond, and from there into groundwater to the north and west off of the Facility. This tritium groundwater contaminant plume extends under property owned by private citizens.

23. At times better known to Defendants, four additional areas have been impacted by releases of tritium near vacuum breakers 4, 6 and 7, as well as near and to the west of the Station. The release from vacuum breaker 4 ("VB4") has resulted in tritium contamination of the groundwater in excess of 20,000 pCi/L (picocuries per liter) within property owned by the Will County Forest Preserve District.

24. The Defendants did not investigate potential groundwater impacts resulting from the any of the releases alleged above until 2005, when requested to do so by the Illinois EPA. Illinois EPA learned of the potential groundwater impacts during the Defendants' renewal process for the NPDES permit.

25. Sampling conducted by Defendants on or about December 12, 2005 at a location outside the property boundary of the Facility indicated elevated levels of tritium contained in the groundwater, at the following locations that are indicated on the map attached to and hereby incorporated by reference into this Complaint as Exhibit 3:

RW-2	10.5 ft. depth	58,621 pCi/L
RW-2	20.5 ft. depth	170,024 pCi/L
RW-2	25 ft. depth	223,888 pCi/L

Detection limits = 200 pCi/L

26. Sampling conducted by Defendants on or about December 6, 2005 at five locations outside the property boundary of the Facility and one (P-4) within property boundaries, indicated elevated levels of tritium in the groundwater. Samples, showing the following results, were taken at the locations as indicated on Exhibit 3, as follows:

VB-3-4	58,489 pCi/L
VB-3-3	43,894 pCi/L
VB-3-2	32,830 pCi/L
VB-3-6	53,572 pCi/L
P-4	33,736 pCi/L
RW-2	33,736 pCi/L

Detection limits = 200 pCi/L

27. As of the filing of this Complaint, at least one private well on a horse farm located to the north of the Facility boundary has been impacted by these releases. Sampling conducted by Defendants on December 6, 2005 at that well indicated an elevated level of tritium contained in the well water, measuring 1,550 pCi/L. The contamination in the private well located off site is a result of the plume of tritium extending from the 1998 release from VB3.

28. Section 12(a) and (d) of the Act, 415 ILCS 5/12(a) and (d) (2004), provides as follows:

No person shall:

a) Cause or threaten or allow the discharge of any contaminants into the environment in any State so as to cause or tend to cause water pollution in Illinois, either alone or in combination with matter from other sources, or so as to violate regulations or standards adopted by the Pollution Control Board under this Act.

d) Deposit contaminants upon the land in such place or manner so as to create a water pollution hazard.

29. Section 3.165 of the Act, 415 ILCS 5/3.165 (2004), defines "contaminant" as follows:

> "CONTAMINANT" is any solid, liquid or gaseous matter, any odor or any form of energy, from whatever source.

Tritium is a "contaminant" as that term is defined in section 3.165 of the Act, 415 ILCS 5/3.165 (2004).

30. Section 3.315 of the Act, 415 ILCS 5/3.315 (2004), defines "person" as follows:

> "PERSON" is any individual, partnership, co-partnership, firm, company, limited liability company, corporation, association, joint stock company, trust, estate, political subdivision, state agency, or any other legal entity, or their legal representative, agent or assigns.

31. Defendants are each a "person" as that term is defined in Section 3.315 of the Act, 415 ILCS 5/3.315 (2004).

32. Section 3.550 of the Act, 415 ILCS 5/3.550 (2004), defines "waters" as follows:

> "WATERS" means all accumulations of water, surface and underground, natural, and artificial, public and private, or parts thereof, which are wholly or partially within, flow through, or border upon this State.

33. The groundwater beneath the Facility, the pond, the water in the private well, and the groundwater outside the property boundary of the Facility are accumulations of waters, surface and underground, and constitute a water of the State as that term is defined in Section 3.550 of the Act, 415 ILCS 5/3.550 (2004).

34. Section 3.545 of the Act, 415 ILCS 5/3.545 (2004), defines "water pollution" as follows:

"WATER POLLUTION" is such alteration of the physical, thermal, chemical, biological or radioactive properties of any water of the State, or such discharge of any contaminant into any waters of the State, as will or is likely to create a nuisance or render such waters harmful or detrimental or injurious to public health, safety or welfare, or to domestic, commercial, industrial, agricultural, recreational, or other legitimate uses, or to livestock, wild animals, birds, fish, or other aquatic life.

35. The tritium released from the Facility percolated to and entered groundwater in aquifers at and around the Facility. The tritium has moved through and will continue to move through the groundwater.

36. Tritium entering the groundwater as alleged herein altered the radioactive and other properties of the groundwater, created a nuisance, is harmful, detrimental or injurious to public health, safety or welfare and to the environment and thus constitutes water pollution within the meaning of Section 12(a) of the Act, 415 ILCS 5/12(a)(2004).

37. From on or before 1996, on dates better known to the Defendants and continuing to the date of the filing of this Complaint, the Defendants violated Section 12(a) of the Act, by causing and allowing tritium from their operations to enter the groundwater from the time the tritium was released to the environment to the present. Furthermore, the violation of Section 12(a) will continue until such time as the tritium is removed from the groundwater.

38. From on or before 1996, on dates better known to the Defendants and continuing to the date of the filing of this Complaint, the Defendants violated Section 12(d) of the Act by depositing contaminants upon the land in such place and manner so as to create a water pollution hazard. Furthermore, the violation of Section 12(d) will continue until such time as the contaminants are removed from the groundwater.

39. Plaintiff is without an adequate remedy at law. Plaintiff will be irreparably injured, and violation of the pertinent environmental statutes will continue unless and until this Court grants equitable relief in the form of preliminary, and, after a trial, permanent injunctive relief.

WHEREFORE, Plaintiff, PEOPLE OF THE STATE OF ILLINOIS, respectfully requests that this Court enter an order granting a preliminary injunction and, after trial, a permanent injunction, in favor of Plaintiff and against Defendants on this Count I:

1. Finding that Defendants have violated Section 12(a) and (d) of the Act;

2. Enjoining Defendants from any future violations of Section 12(a) and (d) of the Act;

3. Entering an injunction ordering the Defendants to:

a. Cease use of the blowdown line for the discharge of tritiated water until further order of the Court; and,

In accordance with a plan acceptable to the Plaintiff and this Honorable Court:

b. Prevent further migration of the contaminants released by the Defendants present in the groundwater at and near the Facility;

c. Implement measures to prevent the release of any contaminant from the Facility;

d. Fully characterize the nature and extent of all soil and groundwater contamination caused by the releases, including identifying background contaminant levels and the future flow of contaminant plumes in groundwater;

e. Immediately provide at Defendant's expense a potable drinking water source to all people affected by the violations alleged herein in an amount and quality sufficient to meet the daily needs of said people; and,

f. Eliminate any threat to the use of groundwater by citizens in the area impacted by releases from the plant.

4. Assessing a civil penalty of Fifty Thousand Dollars ($50,000.00) against Defendants for each violation of the Act and Board Regulations, and an additional civil penalty of Ten Thousand Dollars ($10,000.00) per day for each day of each violation;

5. Assessing all costs against Defendants including expert witness, consultant, and attorney fees; and

6. Granting such other relief as this Court deems appropriate and just.

COUNT II

EXCEEDING GROUNDWATER STANDARDS

1-36. The Plaintiff realleges and incorporates herein by reference paragraphs 1 through 36 of Count I and paragraphs 1 through 36 of this Count II.

37. Section 620.115 of the Illinois Pollution Control Board ("Board") Groundwater Regulations, 35 Ill. Adm. Code 620.115, provides as follows:

> No person shall cause, threaten or allow a violation of the Act, the IGPA or regulations adopted by the Board thereunder, including but not limited to this Part.

38. Section 620.401 of the Board Groundwater Regulations, 35 Ill. Adm. Code 620.401, provides as follows:

> Groundwaters must meet the standards appropriate to the groundwater's class as specified in this Subpart and the nondegradation provisions of Subpart C.

39. Section 620.405 of the Board Groundwater Regulations, 35 Ill. Adm. Code 620.405, provides as follows:

> No person shall cause, threaten or allow the release of any contaminant to groundwater so as to cause a groundwater quality standard set forth in this Subpart to be exceeded.

40. The groundwater underneath and surrounding the Facility is a Class I Potable Resource Groundwater, subject to the standards at 35 Ill. Adm. Code 620.410.

41. Section 620.410 of the Board Groundwater Regulations, 35 Ill. Adm. Code 620.410, which contains the Groundwater Quality Standards for Class I (Potable Resource Groundwater) provides, in pertinent part, as follows:

e) Beta Particle and Photon Radioactivity

1) Except due to natural causes, the average annual concentration of beta particle and photon radioactivity from man-made radionuclides shall not exceed a dose equivalent to the total body organ greater than 4 mrem/year in Class I groundwater. If two or more radionuclides are present, the sum of their dose equivalent to the total body, or to any internal organ shall not exceed 4 mrem/year in Class I groundwater except due to natural causes.

2) Except for the radionuclides listed in subsection (e)(3), the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalent must be calculated on the basis of a 2 liter per day drinking water intake using the 168-hour data in accordance with the procedure set forth in NCRP Report Number 22, incorporated by reference at Section 620.125(a).

3) Except due to natural causes, the average annual concentration assumed to produce a total body or organ dose of 4 mrem/year of the following chemical constituents shall not be exceeded in Class I groundwater:

Constituent	Critical Organ	Standard (pCi/L)
Tritium	Total body	20,000.0

42. The groundwater concentrations of tritium, as alleged in paragraph 25 and paragraph 26, above, each exceeded the standard of 20,000 pCi/L for tritium as promulgated in 35 Ill. Adm. Code 620.410(e)(3).

43. By causing or allowing the exceedance of the groundwater standard promulgated in 35 Ill. Adm. Code 620.410(e)(3), the Defendant violated 35 Ill. Adm. Code 620.115, 35 Ill. Adm. Code 620.405, and 35 Ill. Adm. Code 620.410(e)(3) and, thereby, violated Section 12(a) of the Act, 415 ILCS 5/12(a)(2004).

44. Plaintiff is without an adequate remedy at law. Plaintiff will be irreparably injured, and violation of the pertinent environmental statutes will continue unless and until this Court grants equitable relief in the form of preliminary, and, after a trial, permanent injunctive relief.

WHEREFORE, Plaintiff, PEOPLE OF THE STATE OF ILLINOIS, respectfully requests that this Court enter an order granting a preliminary injunction and, after trial, a permanent injunction, in favor of Plaintiff and against Defendants on this Count II:

1. Finding that Defendants have violated Section 12(a) of the Act , 35 Ill. Adm. Code 620.115, 35 Ill. Adm. Code 620.405, and 35 Ill. Adm. Code 620.410(e)(3);

2. Enjoining Defendants from any future violations of Section 12(a) of the Act, 35 Ill. Adm. Code 620.115, 35 Ill. Adm. Code 620.405, and 35 Ill. Adm. Code 620.410(e)(3);

3. Entering an injunction ordering the Defendants to:

a. Cease use of the blowdown line for the discharge of tritiated water until further order of the Court; and,

In accordance with a plan acceptable to the Plaintiff and this Honorable Court:

b. Prevent further migration of the contaminants released by the Defendants present in the groundwater at and near the Facility;

c. Implement measures to prevent the release of any contaminant from the Facility;

d. Fully characterize the nature and extent of all soil and groundwater contamination caused by the releases, including identifying background contaminant levels and the future flow of contaminant plumes in groundwater;

e. Immediately provide at Defendant's expense a potable drinking water source to all people affected by the violations alleged herein in an amount and quality sufficient to meet the daily needs of said people; and,

f. Eliminate any threat to the use of groundwater by citizens in the area impacted by releases from the plant.

4. Assessing a civil penalty of Fifty Thousand Dollars ($50,000.00) against Defendants for each violation of the Act and Board Regulations, and an additional civil penalty of Ten Thousand Dollars ($10,000.00) per day for each day of each violation;

5. Assessing all costs against Defendants including expert witness, consultant, and attorney fees; and

6. Granting such other relief as this Court deems appropriate and just.

COUNT III

VIOLATION OF NONDEGREDATION PROVISIONS

1 - 41. The Plaintiff realleges and incorporates by reference herein paragraphs 1 through 38, 40 through 42 of Count II as paragraphs 1 through 41 of this Count III.

42. Section 620.301 of Board Groundwater Regulations, 35 Ill. Adm. Code 620.301, provides, in pertinent part, as follows:

a) No person shall cause, threaten or allow the release of any contaminant to a resource groundwater such that:

1) Treatment or additional treatment is necessary to continue an existing use or to assure a potential use of such groundwater; or

2) An existing or potential use of such groundwater is precluded.

43. Because of the entry of the tritium into groundwater and the resulting potential threat to human health and the environment, treatment is necessary to continue the existing use of the groundwater and to assure potential use of the groundwater.

44. Because of the entry of the tritium into the groundwater and the resulting potential threat to human health, existing uses of the groundwater and potential uses of the groundwater have been precluded.

45. By causing or allowing the tritium to enter the groundwater so as to require treatment and impair existing and potential uses of the groundwater, the Defendants have violated 35 Ill. Adm. Code 620.115 and 620.301(a)(1) and (2) and, thereby, also violated Section 12(a) of the Act, 415 ILCS 5/12(a)(2004).

46. Plaintiff is without an adequate remedy at law. Plaintiff will be irreparably injured, and violation of the pertinent environmental statutes will continue

unless and until this Court grants equitable relief in the form of preliminary, and, after a trial, permanent injunctive relief.

WHEREFORE, Plaintiff, PEOPLE OF THE STATE OF ILLINOIS, respectfully requests that this Court enter an order granting a preliminary injunction and, after trial, a permanent injunction, in favor of Plaintiff and against Defendants on this Count III:

1. Finding that Defendants have violated Section 12(a) of the Act, 35 Ill. Adm. Code 620.115, and 35 Ill. Adm. Code 620.301(a)(1) and (2);

2. Enjoining Defendants from any future violations of Section 12(a) of the Act, 35 Ill. Adm. Code 620.115, and 35 Ill. Adm. Code 620.301(a)(1) and (2);

3. Entering an injunction ordering the Defendants to:

a. Cease use of the blowdown line for the discharge of tritiated water until further order of the Court; and,

In accordance with a plan acceptable to the Plaintiff and this Honorable Court:

b. Prevent further migration of the contaminants released by the Defendants present in the groundwater at and near the Facility;

c. Implement measures to prevent the release of any contaminant from the Facility;

d. Fully characterize the nature and extent of all soil and groundwater contamination caused by the releases, including identifying background contaminant levels and the future flow of contaminant plumes in groundwater;

e. Immediately provide at Defendant's expense a potable drinking water source to all people affected by the violations alleged herein in an amount and quality sufficient to meet the daily needs of said people; and,

f. Eliminate any threat to the use of groundwater by citizens in the area impacted by releases from the plant.

4. Assessing a civil penalty of Fifty Thousand Dollars ($50,000.00) against Defendants for each violation of the Act and Board Regulations, and an additional civil penalty of Ten Thousand Dollars ($10,000.00) per day for each day of each violation;

5. Assessing all costs against Defendants including expert witness, consultant, and attorney fees; and

6. Granting such other relief as this court deems appropriate and just.

II. VIOLATIONS BY DEFENDANTS EXELON CORPORATION, COMMONWEALTH EDISON COMPANY AND EXELON GENERATION COMPANY, LLC RELATED TO RELEASES OF NONRADIOACTIVE WASTES INTO THE ENVIRONMENT

COUNT IV

DISCHARGING WASTEWATERS WITHOUT AN NPDES PERMIT

1. This Count is brought against Defendants on behalf of the people of the State of Illinois, by Lisa Madigan, Attorney General of the State of Illinois, and James W. Glasgow, State's Attorney for Will County, on their own motion, pursuant to the terms and provisions of Section 42(d) and (e) of the Illinois Environmental Protection Act (the "Act"), 415 ILCS 5/42(d) and (e)(2004).

2 - 36. The Plaintiff realleges and incorporates by reference herein paragraphs 2 through 36 of Count I as paragraphs 2 through 36 of this Count IV.

37. Section 12(f) of the Act, 415 ILCS 5/12(f)(2004), provides, in pertinent part, as follows:

> No person shall:
>
> Cause, threaten or allow the discharge of any contaminant into the waters of the State, as defined herein, including but not limited to, waters to any sewage works, or into any well or from any point source within the State, without an NPDES permit for point source discharges issued by the Agency under Section 39(b) of this Act, or in violation of any term or condition imposed by such permit, or in violation of any NPDES permit filing requirement established under Section 39(b), or in violation of any regulations adopted by the Board or of any order adopted by the Board with respect to the NPDES program.

38. Section 309.102(a) of the Board Water Pollution Control Regulations, 35 Ill. Adm. Code 309.102(a), provides, in pertinent part, as follows:

> a) Except as in compliance with the provisions of the Act, Board regulations, and the CWA, and the provisions and conditions of the NPDES permit issued to the discharger, the discharge of any contaminant or pollutant by any person into the waters of the State from a point source or into a well shall be unlawful.

39. In addition to the tritiated waters, the discharges from the vacuum breakers and other discharges, as alleged herein, contained wastewaters regulated by the Facility's NPDES Permit.

40. Each discharge of wastewater from the vacuum breakers was a discharge of contaminants into waters of the State.

41. At no time did the Illinois EPA issue any permit to any of the Defendants for any of the discharges from the vacuum breakers as alleged herein.

42. The discharge of wastewaters at points other than the permitted outfall in the Kankakee River was a discharge without an NPDES permit that constituted a

violation of 35 Ill. Adm. Code 309.102 and Section 12(f) of the Act, 415 ILCS 5/12(f)(2004), by Defendant ComEd for discharges prior to 2000 and by all Defendants in 2000.

43. Plaintiff is without an adequate remedy at law. Plaintiff will be irreparably injured, and violation of the pertinent environmental statutes will continue unless and until this Court grants equitable relief in the form of preliminary, and, after a trial, permanent injunctive relief.

WHEREFORE, Plaintiff, PEOPLE OF THE STATE OF ILLINOIS, respectfully requests that this Court enter an order granting a preliminary injunction and, after trial, a permanent injunction, in favor of Plaintiff and against Defendants on this Count IV:

1. Finding that Defendants violated Section 12(f) of the Act and 35 Ill. Adm. Code 309.102;

2. Enjoining Defendants from any future violations of Section 12(f) of the Act and 35 Ill. Adm. Code 309.102;

3. Entering an injunction ordering Defendants to cease discharges without an NPDES permit;

4. Assessing a civil penalty of Ten Thousand Dollars ($10,000.00) against Defendants for each violation of the Act and Board Regulations, and an additional civil penalty of Ten Thousand Dollars ($10,000.00) per day for each day of each violation;

5. Assessing all costs against Defendants including expert witness, consultant, and attorney fees; and

6. Granting such other relief as this Court deems appropriate and just.

III. VIOLATIONS BY DEFENDANT COMMONWEALTH EDISON COMPANY RELATED TO RELEASES OF NONRADIOACTIVE WASTES INTO THE ENVIRONMENT

COUNT V

FAILURE TO COMPLY WITH NPDES PERMIT REPORTING REQUIREMENTS

1. This Count is brought against Defendant COMMONWEALTH EDISON COMPANY on behalf of the people of the State of Illinois, by Lisa Madigan, Attorney General of the State of Illinois, and James W. Glasgow, State's Attorney for Will County, on their own motion, pursuant to the terms and provisions of Section 42(d) and (e) of the Illinois Environmental Protection Act (the "Act"), 415 ILCS 5/42(d) and (e)(2004).

2 - 38. The Plaintiff realleges and incorporates by reference herein paragraphs 2 through 38 of Count IV and paragraphs 2 through 38 of this Count V.

39. The NPDES Permit applicable to the discharge from the blowdown pipe, as referenced in paragraph 11, contains Standard Conditions that provide, in pertinent part, as follows:

> 12. Reporting requirements.
>
> (e) Twenty-four hour reporting. The permittee shall report any non-compliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time that the permitee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permitee becomes aware of the circumstances. The written submission shall contain a description of the non-compliance and its cause, the period of non-compliance, including exact dates and times, and if the non-compliance has not been corrected, the anticipated time it is expected to continue, and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the non-compliance. The

following shall be included as information which must be reported within 24 hours:

(1) Any unanticipated bypass which exceeds any effluent limitation in the permit;

(2) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Agency in the permit to be reported within 24 hours[.]

(f) Other noncompliance. The permittee shall report all instances of non-compliance not reported under paragraphs 12(c),(d) or (e)at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph 12(a).

40. The NPDES permit was in full force and effect at the time of the discharges from the vacuum breakers on the blowdown line in 1996, 1998 and 2000.

41. In addition to the tritiated waters, the discharges from the vacuum breakers, as alleged herein, contained wastewaters regulated by the Facility's NPDES Permit.

42. The discharge of wastewaters at points other than the permitted outfall in the Kankakee River constituted non-compliance with the NPDES Permit.

43. The NPDES Permittee, Defendant ComEd, did not make any notification to the Illinois EPA as required under Standard Condition 12 of the NPDES Permit.

44. By failing to report discharges of wastewaters regulated by the NPDES Permit, Defendant ComEd violated Standard Condition 12 of the NPDES Permit and, thereby, violated 35 Ill. Adm. Code 309.102 and Section 12(f) of the Act, 415 ILCS 5/12(f)(2004).

45. Plaintiff is without an adequate remedy at law. Plaintiff will be irreparably injured, and violation of the pertinent environmental statutes will continue

unless and until this Court grants equitable relief in the form of preliminary, and, after a trial, permanent injunctive relief.

WHEREFORE, Plaintiff, PEOPLE OF THE STATE OF ILLINOIS, respectfully requests that this Court enter an order granting a preliminary injunction and, after trial, a permanent injunction, in favour of Plaintiff and against Defendant ComEd on this Count V:

1. Finding that Defendant ComEd violated Section 12(f) of the Act, 35 Ill. Adm. Code 309.102, and Standard Condition 12 of the NPDES Permit;

2. Enjoining Defendant ComEd from any future violations of Section 12(f) of the Act, 35 Ill. Adm. Code 309.102, and Standard Condition 12 of the NPDES Permit;

3. Entering an injunction ordering Defendant ComEd to comply with the terms of its NPDES Permit;

4. Assessing a civil penalty of Ten Thousand Dollars ($10,000.00) against Defendant ComEd for each violation of the Act and Board Regulations, and an additional civil penalty of Ten Thousand Dollars ($10,000.00) per day for each day of each violation;

5. Assessing all costs against Defendant ComEd including expert witness, consultant, and attorney fees; and

6. Granting such other relief as this Court deems appropriate and just.

COUNT VI

FAILURE TO ENSURE PROPER OPERATION AND MAINTENANCE AND FAILURE TO MITIGATE

1 - 42. Plaintiff realleges and incorporates by reference herein paragraphs 1 through 42 of Count V as paragraphs 1 through 42 of this Count VI.

43. Section 306.102 (Systems Reliability) of the Board Water Pollution Control Regulations, 35 Ill. Adm. Code 306.102, provides as follows:

a) Malfunctions: All treatment works and associated facilities shall be so constructed and operated as to minimize violations of applicable standards during such contingencies as flooding, adverse weather, power failure, equipment failure, or maintenance, through such measures as multiple units, holding tanks, duplicate power sources, or such other measures as may be appropriate.

b) Spills: All reasonable measures, including where appropriate the provision of catchment areas, relief vessels or entrapment dikes, shall be taken to prevent any spillage of contaminants from causing water pollution.

44. Section 306.304 (Overflows) of the Board Water Pollution Control Regulations, 35 Ill. Adm. Code 306.304, provides as follows:

Overflows from sanitary sewers are expressly prohibited.

45. Standard condition 4 of the NPDES Permit provides as follows:

Duty to mitigate. The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

46. Standard condition 5 of the NPDES Permit provides as follows:

Proper operation and maintenance. The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including appropriate

ancillary facilities, or similar systems only when necessary to achieve compliance with the conditions of the permit.

47. Defendant ComEd's failure to construct and operate the blowdown line in a manner so as to minimize violations during equipment malfunctions, as alleged herein, was a violation of 35 Ill. Adm. Code 306.102(a).

48. Defendant ComEd's failure to take all reasonable measures to prevent the spillage as alleged herein, was a violation of 35 Ill. Adm. Code 306.102(b).

49. The release of wastewaters, including sewage treatment plant effluent, from the vacuum breakers as alleged herein was a sanitary sewer overflow in violation of 35 Ill. Adm. Code 306.304.

50. The Defendant ComEd's failure in 1996 and 1998 to contain and remove any of the discharged wastewaters, as alleged in paragraphs 16 and 18, above, and the failure to prevent future discharges constituted a failure to mitigate in violation of Standard Condition 4 of the NPDES Permit and, thereby, violated 35 Ill. Adm. Code 309.102 and Section 12(f) of the Act, 415 ILCS 5/12(f)(2004).

51. Defendant ComEd's failure to perform adequate operation and maintenance on the blowdown line resulted in the discharges as alleged in this Count.

52. Defendant ComEd's failure to perform adequate operation and maintenance on the blowdown line was a violation of Standard Condition 5 of the NPDES Permit, and thereby violated 35 Ill. Adm. Code 309.102 and Section 12(f) of the Act, 415 ILCS 5/12(f)(2004).

53. Plaintiff is without an adequate remedy at law. Plaintiff will be irreparably injured, and violation of the pertinent environmental statutes will continue

unless and until this Court grants equitable relief in the form of preliminary, and, after a trial, permanent injunctive relief.

WHEREFORE, Plaintiff, PEOPLE OF THE STATE OF ILLINOIS, respectfully requests that this Court enter an order granting a preliminary injunction and, after trial, a permanent injunction, in favour of Plaintiff and against Defendant ComEd on this Count VI:

1. Finding that Defendant ComEd violated Section 12(f) of the Act, 35 Ill. Adm. Code 309.102, 35 Ill. Adm. Code 306.102(a) and (b), 35 Ill. Adm. Code 306.304 and Standard Conditions 4 and 5 of the NPDES Permit;

2. Enjoining Defendant ComEd from any future violations of Section 12(f) of the Act, 35 Ill. Adm. Code 309.102, 35 Ill. Adm. Code 306.102(a) and (b), 35 Ill. Adm. Code 306.304 and Standard Conditions 4 and 5 of the NPDES Permit;

3. Entering an injunction ordering Defendant ComEd to comply with the terms of its NPDES Permit;

4. Assessing a civil penalty of Ten Thousand Dollars ($10,000.00) against Defendant ComEd for each violation of the Act and Board Regulations, and an additional civil penalty of Ten Thousand Dollars ($10,000.00) per day for each day of each violation;

5. Assessing all costs against Defendant ComEd including expert witness, consultant, and attorney fees; and

6. Granting such other relief as this Court deems appropriate and just.

IV. VIOLATIONS BY DEFENDANTS EXELON CORPORATION, AND EXELON GENERATION COMPANY, LLC RELATED TO RELEASES OF TRITIUM TO THE ENVIRONMENT

COUNT VII

WATER POLLUTION HAZARD

1. This Count is brought against Defendants, Exelon Corporation and Exelon Generation Company, LLC, on behalf of the people of the State of Illinois, by Lisa Madigan, Attorney General of the State of Illinois, and James W. Glasgow, State's Attorney for Will County, on their own motion, pursuant to the terms and provisions of Section 42(d) and (e) of the Illinois Environmental Protection Act (the "Act"), 415 ILCS 5/42(d) and (e)(2004).

2 – 34. Plaintiff realleges and incorporates by reference herein paragraphs 2 through 34 of Count I as paragraphs 2 through 34 of this Count VII.

35. Since a specific date in November 2005 better known to the Defendants, Defendants have ceased discharging tritium through the blowdown pipe to the Kankakee River, and have instead stored tritiated water in tanks located in an area of the Station. As of March 14, 2006, Defendants are using approximately 13 tanks which are approximately 20,000 gallons each in capacity. The tanks are connected to one another, and to the nuclear reactors, by piping and valves. The tanks are located within a lined bermed area.

36. The tritiated water stored within the tanks and transferred between the tanks is as high as 100,000,000 pCi/L.

37. At various times better known to the Defendants, amounts of tritiated water have been released from the valves and pipes connecting the tanks and have discharged amounts of tritiated water into the bermed area.

38. On or about March 13, 2006, during a rainfall event, a portion of the berm collapsed, allowing tritiated water mixed with rainwater to be released from the bermed area and discharged onto surrounding land.

39. As of March 14, 2006, sampling of water inside the bermed area indicated tritiated water of 255,000 pCi/L. As of March 14, 2006, sampling of water puddles outside of the bermed area indicated tritiated water of 183,000 pCi/L.

40. The Defendants removed some of the ponded tritiated water outside the bermed area, but not all of the tritiated water was recovered from the ground and pavement adjacent to the berms.

41. The tritiated water outside the bermed area posed and continues to pose a significant risk to impact groundwater through infiltration.

42. The continued presence of the tritiated water outside the bermed area poses a threat to groundwater in the area in violation of Section 12(a) of the Act, 415 ILCS 5/12(a)(2004).

43. The continued presence of the tritiated water outside the bermed area constitutes a water pollution hazard in violation of Section 12(d) of the Act, 415 ILCS 5/12(d)(2004).

44. Plaintiff is without an adequate remedy at law. Plaintiff will be irreparably injured, and violation of the pertinent environmental statutes will continue

unless and until this Court grants equitable relief in the form of preliminary, and, after a trial, permanent injunctive relief.

WHEREFORE, Plaintiff, PEOPLE OF THE STATE OF ILLINOIS, respectfully requests that this Court enter an order granting a preliminary injunction and, after trial, a permanent injunction, in favor of Plaintiff and against Defendants on this Count VII:

1. Finding that Defendants have violated Section 12(a) and (d) of the Act;

2. Enjoining Defendants from any future violations of Section 12(a) and (d) of the Act;

3. Entering an injunction ordering the Defendants to:

In accordance with a plan acceptable to the Plaintiff and this Honorable Court:

a. Prevent further migration of the contaminants released by the Defendants present in the groundwater at and near the Facility;

b. Implement measures to prevent the release of any contaminant from the Facility;

c. Fully characterize the nature and extent of all soil and groundwater contamination caused by the releases, including identifying background contaminant levels and the future flow of contaminant plumes in groundwater;

d. Immediately provide at Defendant's expense a potable drinking water source to all people affected by the violations alleged herein in an amount and quality sufficient to meet the daily needs of said people; and,

e. Eliminate any threat to the use of groundwater by citizens in the area impacted by releases from the plant.

4. Assessing a civil penalty of Fifty Thousand Dollars ($50,000.00) against Defendants for each violation of the Act and Board Regulations, and an additional civil penalty of Ten Thousand Dollars ($10,000.00) per day for each day of each violation;

5. Assessing all costs against Defendants including expert witness, consultant, and attorney fees; and

6. Granting such other relief as this Court deems appropriate and just.

V. ALLEGATIONS AGAINST EXELON CORPORATION, COMMONWEALTH EDISON COMPANY AND EXELON GENERATION COMPANY, LLC FOR CREATING A COMMON LAW PUBLIC NUISANCE

COUNT VIII

COMMON LAW PUBLIC NUISANCE

1. This count is brought on behalf of the PEOPLE OF THE STATE OF ILLINOIS by LISA MADIGAN, Attorney General of the State of Illinois and JAMES W. GLASGOW, State's Attorney for Will County. The Attorney General is the chief legal officer of the State of Illinois having the powers and duties prescribed by the law, ILL. CONST. Article V, Section 15 (1970). The Will County State's Attorney is an elected county officer having the powers and duties prescribed by the law, ILL. CONST. Article VI, Section 19 and Article VII, Section 4 (1970). This Count is brought pursuant to the power of the Attorney General and State's Attorney to institute an action on behalf of the People of the State of Illinois to abate a public nuisance and to protect the health, safety and welfare of the People of the State of Illinois.

2 - 38. Plaintiff realleges and incorporates by reference herein paragraphs 2 through 38 of Count I as paragraphs 2 through 38 of this Count VIII.

39 - 45. Plaintiff realleges and incorporates by reference herein paragraphs 37 through 43 of Count II as paragraphs 39 through 45 of this Count VIII.

46 - 49. Plaintiff realleges and incorporates by reference herein paragraphs 42 through 45 of Count III as paragraphs 46 through 49 of this Count VIII.

50 - 55. Plaintiff realleges and incorporates by reference herein paragraphs 37 through 42 of Count IV as paragraphs 50 through 55 of this Count VIII.

56 - 61. Plaintiff realleges and incorporates by reference herein paragraphs 39 through 44 of Count V as paragraphs 56 through 61 of this Count VIII.

62 - 71. Plaintiff realleges and incorporates by reference herein paragraphs 43 through 52 of Count VI as paragraphs 62 through 71 of this Count VIII.

72 - 80. Plaintiff realleges and incorporates by reference herein paragraphs 35 through 43 of Count VII as paragraphs 72 through 80 of this Count VIII.

81. From at least 1996 and continuing to the filing of this Complaint, as alleged herein, the Defendants engaged in a course of conduct that included causing, threatening and allowing groundwater pollution from the blowdown line and the tritiated water tanks, failing to ensure adequate maintenance and operating procedures in the operation of the blowdown line and the tritiated water tanks, failing to report noncompliance pursuant to the conditions of the NPDES Permit, failing to follow operational requirements of the NPDES Permit, and discharging of wastewater without an NPDES Permit.

82. The acts and omissions of the Defendants as alleged herein threatened adverse health effects and inconvenience to persons in the vicinity of the Facility, and caused damage to real and personal property.

83. The Defendants, by their actions and omissions, prejudiced the public health and welfare and the environment.

84. As a consequence of the foregoing, the Defendants created and maintained a public nuisance at common law.

85. Said nuisance will continue unabated unless abated by order of this court.

WHEREFORE, plaintiff, PEOPLE OF THE STATE OF ILLINOIS, requests that this court grant a preliminary injunction, and after a trial, a permanent injunction in favor of plaintiff and against defendants EXELON CORPORATION, COMMONWEALTH EDISON COMPANY and EXELON GENERATION COMPANY, LLC:

1. Finding that Defendants' actions alleged herein constitute a common law public nuisance;

2. Enjoining Defendants from further acts constituting a common law public nuisance;

3. Entering an injunction ordering the Defendants to:

a. Cease use of the blowdown line for the discharge of tritiated water until further order of the Court; and,

In accordance with a plan acceptable to the Plaintiff and this Honorable Court:

b. Prevent further migration of the contaminants released by the Defendants present in the groundwater at and near the Facility;

c. Implement measures to prevent the release of any contaminant from the Facility;

d. Fully characterize the nature and extent of all soil and groundwater contamination caused by the releases, including identifying background contaminant levels and the future flow of contaminant plumes in groundwater;

e. Immediately provide at Defendant's expense a potable drinking water source to all people affected by the violations alleged herein in an amount and quality sufficient to meet the daily needs of said people; and,

f. Eliminate any threat to the use of groundwater by citizens in the area impacted by releases from the plant.

4. Assessing all costs against Defendants including expert witness, consultant, and attorney fees; and

5. Granting such other relief as this Court deems appropriate and just.

PEOPLE OF THE STATE OF ILLINOIS,
ex rel. LISA MADIGAN, Attorney General of the State of Illinois, and *ex rel.* JAMES W. GLASGOW, State's Attorney for Will County, Illinois

MATTHEW J. DUNN, Chief, Environmental Enforcement/Asbestos Litigation Division

ROSEMARIE CAZEAU, Chief,
Environmental Bureau North
Assistant Attorney General

JAMES W. GLASGOW, State's Attorney
for Will County, Illinois

OF COUNSEL

CHRISTOPHER P. PERZAN
ANN ALEXANDER
Assistant Attorneys General
Environmental Bureau
188 W. Randolph Street, 20th Floor
Chicago, IL 60601
312 814-3532

EXHIBIT 1

NPDES Permit No. IL0048321

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

Modified (NPDES) Permit

Expiration Date: September 1, 2000

Issue Date: August 24, 1995
Effective Date: September 1, 1995
Modification Date: August 28, 1997

Name and Address of Permittee:

Commonwealth Edison Company
Post Office Box 767, 35 FNW
Chicago, Illinois 60690-0767

Facility Name and Address:

Commonwealth Edison Company
Braidwood Nuclear Power Station
Rural Route #1, Box 84
Braceville, Illinois 60407
(Will County)

Discharge Number and Name:	Receiving Waters:
No. 001 Cooling Pond Blowdown Line No. 001(a) Wastewater Treatment Plant Effluent No. 001(b) Sewage Treatment Plant Effluent No. 001(c) Radwaste Treatment System Effluent No. 001(d) Demineralizer Regenerant Wastes No. 001(e) Intake Screen Backwash	Kankakee River
No. 002 North Site Stormwater Runoff Basin No. 003 South Site Stormwater Runoff Basin No. 004 Switchyard Area Runoff	Mazon River

In compliance with the provisions of the Illinois Environmental Protection Act, Subtitle C, Rules and Regulations of the Illinois Pollution Control Board, and the FWPCA the above-named permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the standard conditions and attachments herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.

Thomas G. McSwiggin, P.E.
Manager, Permit Section
Division of Water Pollution Control

TGM:DEL\97041003.DLK

EXHIBIT 1

NPDES Permit No. IL0048321

Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS lbs/day 30 DAY AVG.	LOAD LIMITS lbs/day DAILY MAX.	CONCENTRATION LIMITS mg/l 30 DAY AVG.	CONCENTRATION LIMITS mg/l DAILY MAX.	SAMPLE FREQUENCY	SAMPLE TYPE

1. From the effective date of this permit until September 1, 2000, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:

Outfall(s): 001 Cooling Pond Blowdown Line*

This discharge consists of:	Approximate Flow
1. Condenser cooling water	11.31 MGD
2. House service water	1.3 MGD
3. Essential service water	1.3 MGD
4. Demineralizer regenerant waste	0.028 MGD
5. Wastewater treatment plant effluent	0.079 MGD
6. Radwaste treatment system effluent	0.032 MGD
7. House service water strainer backwash	0.03 MGD
8. Essential service water strainer backwash	0.017 MGD
9. Sewage treatment plant effluent	0.017 MGD
10. Water treatment system filter backwashes	0.03 MGD
11. River intake screen backwash	0.112 MGD
12. Cooling pond intake screen backwash	0.4 MGD

Flow			Daily	Continuous
pH	See Special Condition No. 1		1/Week	Grab
Temperature	See Special Condition No. 3		Daily	Continuous
Total Residual Chlorine**		0.2	1/Month	Grab**
Total Residual Oxidant**		0.05	1/Month	Grab**

*See Special Condition No. 12
**See Special Condition No. 4

NPDES Permit No. IL0048321

Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS lbs/day 30 DAY AVG.	LOAD LIMITS lbs/day DAILY MAX.	CONCENTRATION LIMITS mg/l 30 DAY AVG.	CONCENTRATION LIMITS mg/l DAILY MAX.	SAMPLE FREQUENCY	SAMPLE TYPE

1. From the effective date of this permit until September 1, 2000, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:

Outfall(s): 001(a) Wastewater Treatment Plant Effluent

This discharge consists of:	Approximate Flow
1. Turbine building fire and oil sump*	0.079 MGD
a. Turbine building floor drain tank*	
i. Turbine building floor drain sumps ii. Essential service water drain sumps iii. Condensate pit sumps	
b. Turbine building equipment drain tank*	
c. Units 1 and 2 tendon tunnel sumps	
d. Auxiliary boiler blowdown	
e. Units 1 and 2 diesel fuel storage tank sumps	
f. Oil-water separator No. 1 effluent	
g. Secondary-Side Drain Water	
2. Water treatment area floor and equipment drain sumps	Intermittent
3. Water treatment lime-softening clarator blowdown	Intermittent
4. Wastewater treatment system sand filter backwash	0.002 MGD
5. Condensate polisher regenerant wastes (Alternate Route)	Intermittent
6. Demineralizer Regenerant Waste Drains (Alternate Route)	Intermittent

Flow				Daily	24 Hour Total
Total Suspended Solids	15.0	30.0		1/Week	24 Hour Composite
Oil and Grease	15.0	20.0		1/Month	Grab

These wastestreams may be directed to the Radwaste Treatment System depending on the results of the process radiation monitors.

NPDES Permit No. IL0048321

Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS lbs/day 30 DAY AVG.	LOAD LIMITS lbs/day DAILY MAX.	CONCENTRATION LIMITS mg/l 30 DAY AVG.	CONCENTRATION LIMITS mg/l DAILY MAX.	SAMPLE FREQUENCY	SAMPLE TYPE
1. From the effective date of this permit until September 1, 2000, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:						
Outfall(s): 001(b) Sewage Treatment Plant Effluent**						
				Approximate Flow 0.017 MGD (DMF 0.078 MGD)		
Flow					Daily	Continuous
pH	See Special Condition No. 1				1/Week	Grab
Total Suspended Solids	19.5	39.0	30.0	60.0	1/Week	24 Hour Composite
BOD_5	19.5	39.0	30.0	60.0	1/Week	24 Hour Composite
Outfall(s): 001(c) Radwaste Treatment System Effluent						
This discharge consists of:				Approximate Flow: 0.032 MGD		
1. Steam generator condensate blowdown				Intermittent		
2. Cooling jacket blowdown				Intermittent		
3. Auxiliary building and turbine building floor drains				Intermittent		
4. Laundry waste treatment system drains				0.001 MGD		
5. Chemical and volume control system drains				Intermittent		
6. Boron recycle system blowdown				Intermittent		
7. Radwaste demineralizer regenerant wastes and filter backwash				0.002 MGD		
8. Reactor building floor and equipment drains				Intermittent		
9. Turbine building floor drain tank (Alternate Route)				Intermittent		
10. Turbine building fire and oil sump (Alternate Route)				Intermittent		
11. Turbine building equipment drain tank (Alternate Route)				Intermittent		
12. Evaporator wastewater				Intermittent		
Flow					Daily	Continuous
Total Suspended Solids			15.0	30.0	1/Week	Discharge Tank Composite
Oil and Grease			15.0	20.0	1/Month	Grab

**Outfall No. 001(b) Sewage Treatment Plant Effluent will normally be discharged to the Kankakee River via the cooling pond blowdown line. The existing outfall to the Mazon River will be maintained as an emergency backup. The permittee shall give notice to the Agency of any emergency discharge to the Mazon River. Applicable effluent limitations shall apply.

Modification Date: August 28, 1997

NPDES Permit No. IL0048321

Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS lbs/day 30 DAY AVG.	LOAD LIMITS lbs/day DAILY MAX.	CONCENTRATION LIMITS mg/l 30 DAY AVG.	CONCENTRATION LIMITS mg/l DAILY MAX.	SAMPLE FREQUENCY	SAMPLE TYPE

1. From the effective date of this permit until September 1, 2000, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:

Outfall(s): 001(d) Demineralizer Regenerant Wastes

This discharge consists of

Approximate Flow
0.028 MGD

1. Make-up demineralizer regenerant waste***
2. Condensate polisher regenerate waste***
3. Regenerant chemical area drains
4. Portable Demineralizer Regenerant Wastes

Flow			Daily	Continuous	
Total Suspended Solids	15.0	30.0	1/Week	8 Hour Composite	

***This wastestream may be alternately routed to the wastewater treatment system.

Outfall(s): 001(e) River Intake Screen Backwash

There shall be no discharge of collected debris.

NPDES Permit No. IL0048321

Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS lbs/day 30 DAY AVG.	LOAD LIMITS lbs/day DAILY MAX.	CONCENTRATION LIMITS mg/l 30 DAY AVG.	CONCENTRATION LIMITS mg/l DAILY MAX.	SAMPLE FREQUENCY	SAMPLE TYPE

1. From the effective date of this permit until September 1, 2000, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:

Outfall(s): 002 North Site Stormwater Runoff Basin

This discharge consists of:	Approximate Flow:
1. Parking lot runoff	Intermittent
2. Transformer area runoff	Intermittent
3. North station area runoff	Intermittent
4. Turbine building, auxiliary building and waste treatment building roof drains	Intermittent

See Special Condition No. 8

Outfall(s): 003 South Site Stormwater Runoff Basin

Approximate Flow

Intermittent

See Special Condition No. 8

Outfall(s): 004 Switchyard Area Runoff

Approximate Flow

Intermittent

See Special Condition No. 8

NPDES Permit No. IL0048321

Special Conditions

SPECIAL CONDITION 1. The pH shall be in the range 6.0 to 9.0.

SPECIAL CONDITION 2. Samples taken in compliance with the effluent monitoring requirements shall be taken at a point representative of the discharge, but prior to entry into the receiving stream.

SPECIAL CONDITION 3. Discharge of wastewater from this facility must not alone or in combination with other sources cause the receiving stream to violate the following thermal limitations at the edge of the mixing zone which is defined by Section 302.211, Illinois Administration Code, Title 35, Chapter 1, Subtitle C, as amended:

A. Maximum temperature rise above natural temperature must not exceed 5°F (2.8°C).

B. Water temperature at representative locations in the main river shall not exceed the maximum limits in the following table during more than one (1) percent of the hours in the 12-month period ending with any month. Moreover, at no time shall the water temperature at such locations exceed the maximum limits in the following table by more than 3°F (1.7°C). (Main river temperatures are temperatures of those portions of the river essentially similar to and following the same thermal regime as the temperatures of the main flow of the river.)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
°F	60	60	60	90	90	90	90	90	90	90	90	60
°C	16	16	16	32	32	32	32	32	32	32	32	16

SPECIAL CONDITION 4. Chlorine or bromine may not be discharged from each unit's main cooling condensers for more than two hours per day. The reported mean concentration and maximum concentration of Total Residual Chlorine/Total Residual Oxidant (TRC/TRO) shall be based on a minimum of three grab samples taken at approximately five minute intervals at Outfall 001. The time samples were collected, the time and duration of oxidant dosing period plus the monthly average and daily maximum amount of oxidant applied shall be reported on the Discharge Monitoring Reports. The reported average concentration of TRC/TRO is the average of all values measured for a sampling event and the reported maximum concentration is the highest value measured for a single grab sample. Discharge Monitoring Reports shall indicate whether bromine and/or chlorine compounds were used during the month. A discharge limit, as measured at the blowdown to the Kankakee River, of 0.05 mg/l (instantaneous maximum) shall be achieved for total residual oxidant (total residual chlorine/total residual halogen) when bromine biocides are used for condenser

EXHIBIT B

Illinois Environmental Protection Agency
www.epa.state.il.us
Rod R. Blagojevich, Governo

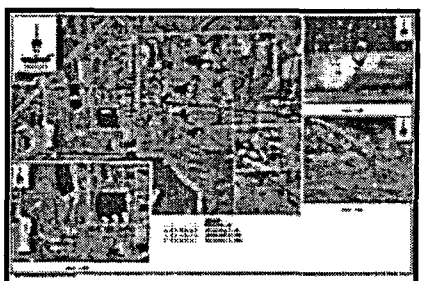
Community Relations - Fact Sheets

Exelon Braidwood Nuclear Facility
Tritium Releases and Groundwater Impacts

Fact Sheet 1
February 2006

Braceville, Illinois

While working with the Exelon Dresden nuclear power plant in the fall of 2004, where tritium was detected in some on-site wells, Illinois EPA became aware of the potential for tritium contamination in groundwater at this type of facility. At the same time, the Agency was involved in the pending renewal of the industrial discharge permit for the Braidwood facility. Comments received from the Godley Park District alerted Illinois EPA to tritium detected in a shallow sand point well at the Park District.



- View Larger Image (JPG, 119K file)
- View Printable Map (PDF, 615K file)

In the spring of 2005, Illinois EPA contacted Exelon to investigate the storm water ditch that carries water to the west side of the site as a possible tritium source to groundwater. The shallow sand point well at the Godley Park District was sampled again in April of 2005. The result was below the detection limit for tritium (200 picocuries per liter (pCi/L)). At the time, tritium in the surface water in the ditch measured about 600 pCi/L. A picocurie is one trillionth of a curie. By comparison, 20,000 pCi/L is the maximum contaminant level that is allowed in public drinking water by federal regulations. During the summer of 2005, Illinois EPA tested four private wells in Godley west of the ditch. All those results were below the detection limit for tritium.

In discussions with Exelon, Illinois EPA was made aware of a November 2000 release from Vacuum Breaker #2 (VB2) on the pipeline that carries process water east to the Kankakee River. In 2005, three monitoring wells in the area of that vacuum breaker tested clean and one other tested at 400 pCi/liter. The Agency wanted to know whether this might be the source of the tritium found in the storm water ditch. We requested and received, in the fall of 2005, a work plan from Exelon for a complete investigation to define the source of tritium in the ditch.

On November 30, 2005, Exelon informed Illinois EPA that they would be sampling private wells in the area of Vacuum Breaker #3 (VB3) on the north side of the plant, where it was disclosed that another large release occurred in 1998.

On December 16, 2005, Illinois EPA issued a violation notice to Exelon for the release at VB3 where observed contamination levels that either exceeded groundwater standards in some site monitoring wells, or threatened the use of area private wells. The Agency met with representatives from Exelon on December 20th. Exelon made a presentation of the information they had developed at that time and future investigation plans to define the extent of contamination from pipeline releases. Exelon indicated that tritium has not been introduced to the pipeline since November 23, 2005 and will not be introduced to the line until the line has been tested for leaks.

A second meeting was held between Illinois EPA and Exelon on January 23, 2006. Illinois EPA asked for information to assess the potential future threat to nearby wells through computer modeling.

On February 2, 2006, Illinois EPA received a report from Exelon as part of the compliance commitment agreement. There will be an official compliance meeting on February 17 to evaluate the results of the investigation and decide on the appropriate course of action.

Private wells sampled to date:

(In most cases, Exelon split samples with the Illinois Emergency Management Agency and the Nuclear Regulatory Commission, and levels of tritium were independently confirmed by those agencies.)

1. 14 private wells tested in December north of the plant along Smiley Road: All were non-detects for tritium except one well that showed 1524 pCi/liter. This is about eight percent of U.S. EPA's comparison value for a safe level in public drinking water, which is 20,000 pCi/liter.

2. In mid-January, Exelon began contacting private well owners within 1000 feet north and south of the pipeline east to the Kankakee River to obtain access to sample their wells. To date, they have sampled 19 of 29 wells, and all results are non-detects for tritium.

3. Ditch area on the west side of the plant – Surface water samples in March, April and May 2005 showed levels of 539, 582 and 550 pCi/liter tritium, respectively. This was at the northernmost point of the ditch near a main entrance to the plant. Exelon has sampled standing water in the ditch weekly since early December 2005 – all non-detects. In addition, the Godley Park District shallow well was tested in March 2005 and four private water wells in Godley nearest the ditch were tested in June 2005 – all non-detects.

The Illinois Department of Public Health has been provided with and has reviewed analytical results from private well tests near the Braidwood plant. They have not seen tritium levels in the well tests to date that pose a health hazard. Illinois EPA will continue to work with IDPH to evaluate any potential health impacts and keep area residents informed.

The Illinois EPA is committed to protecting the groundwater of the state as a future drinking water resource. To this end, the Agency will use available enforcement tools, as appropriate, to assure that non-compliance issues are resolved with this site.

For more information:

General questions about the site, Illinois EPA Office of Community Relations:

Kurt Neibergall
Manager, OCR
217/785-3819

Carol Fuller
Community Relations Coordinator
217/524-8807

Technical Questions:

Bill Buscher, Bureau of Water
Hydrogeology and Compliance Mgr.
217/524-7922

Media Inquiries:

Maggie Carson, Communications Manager
217/558-1536

Health-related Questions:

Joe O'Connor
Illinois Department of Public Health
West Chicago Regional Office
245 W. Roosevelt Road
630/293-6800

Illinois EPA plans to work with the Godley Park District to establish an Information Repository for the convenience of area residents.

Exelon has more information on a web site about the tritium issue at www.BraidwoodTritium.info

EXHIBIT C

FOCUS - 2 of 3 DOCUMENTS

Chicago Tribune

Distributed by Knight/Ridder Tribune News Service

March 17, 2006 Friday

SECTION: STATE AND REGIONAL NEWS

ACC-NO: 20060317-TB-0317-Exelon-Sued-Over-Leaks

LENGTH: 921 words

HEADLINE: Exelon sued over leaks: Will County, state allege 8 tritium spills

BYLINE: Hal Dardick, Chicago Tribune

BODY:

Mar. 17—Radioactive tritium was released from a Will County nuclear power plant at least eight times, three more occasions than Exelon Corp. officials disclosed in recent weeks, according to a lawsuit filed Thursday.

The most recent release, which occurred Monday and was disclosed the next day, pointed to the potential for a "mind-boggling" environmental disaster if a tornado hit Braidwood Generating Station, Will County State's Atty. James Glasgow said.

Glasgow and Illinois Atty. Gen. Lisa Madigan filed suit in Will County Circuit Court against Exelon Corp., Commonwealth Edison and Exelon Generation Co., LLC, which comprises Exelon Nuclear. ComEd built and ran the Braidwood plant until late 2000.

"Exelon has polluted the groundwater under and around the Braidwood facility in Will County," Madigan said. "Faulty maintenance led to this situation and this lawsuit. ... Exelon has not been maintaining and operating this nuclear plant as it should be.

"Like exposure to any radioactive material, exposure to tritium increases the risk of developing cancer and increases the risk of birth defects," she said.

Tritium, a byproduct of nuclear generation, can enter the body through ingestion, absorption or inhalation. Exelon and state and federal regulatory officials have said the groundwater contamination at Braidwood poses no health threat, but critics of federal tritium standards question that blanket assessment.

The suit seeks fines that could reach $36.5 million for a 1996 spill alone, Glasgow said. If fines are collected, they could be used for the very expensive process of removing water with tritium from the ground, Madigan said.

Exelon Nuclear officials said in a statement that they were reviewing the lawsuit and that the company "takes full responsibility for the low-level tritium contamination" and is working on plans to clean it up.

"We have an aggressive remediation plan that the state is evaluating now," said Thomas O'Neill, the firm's vice president of regulatory and legal affairs. "We expected [the suit], and the positive aspect is that we can now focus on removing the tritiated groundwater and move on."

Madigan and Glasgow tried to negotiate a settlement before the suit was filed, Glasgow said. "What I've encountered, basically, is a culture of greed and deception in my dealings with them," he said.

Glasgow noted the lack of disclosures until late last year for all of the releases, except one in 2000. The recent disclosures came after the detection of groundwater contamination, after the Illinois Environmental Protection Agency told Exelon to look for it, Glasgow said.

He said Exelon thus far has failed to provide bottled water to nearby residents as promised more than two weeks ago.

"It looks like until we put them against a wall in a courtroom, we are not going to get to the truth, and we are not going to get the things done necessary for remediation that are going to protect the people in that area," he said.

Exelon Nuclear spokesman Craig Nesbit disagreed. "We've been very open, very honest, worked very, very hard to over-inform people" since confirming groundwater contamination last year, he said.

The bottled water will be distributed through a local store by early next week, and a machine to recycle water with tritium should be put into operation relatively soon, Nesbit said.

The suit alleges ComEd and Exelon should have reported within 24 hours to the Illinois Environmental Protection Agency the spills in 1996, 1998 and 2000 from valves on an underground pipe that carries tritium 4 1/2 miles to the Kankakee River, where it is legally dumped. The pipe also carries wastewater, putting it under the purview of the state EPA.

"We did not violate the letter of any regulations," Nesbit said. The suit states that elevated levels of tritium exceed state standards in groundwater at eight spots beneath the plant site, under land outside its boundaries and in a nearby pond.

All of the groundwater contamination resulted from spills from valves on the pipe, particularly a 1998 spill of about 3 million gallons that was never cleaned up, Exelon officials have said. They have disclosed five spills in recent months.

Glasgow said the underground pipe was built inadequately and had no alarms or detection devices built into it.

The suit alleges tritium spilled at least eight times, saying three were at "unknown times" and in unknown quantities. The most recent occurred Monday, when a lined berm surrounding 13 tanks being used to temporarily store water with very high concentrations of tritium broke in high winds, releasing rainwater that had been contaminated from an apparent leak in one of the tanks.

The tanks, which each hold 20,000 gallons, began to be used after Exelon last November quit sending tritium into the underground pipe while it researches alternative disposal methods.

"If a tornado hits these things, it will launch them," Glasgow said.

"When these things hit the ground, they will explode and send" tritium at levels 100 times the federal groundwater limit into the environment, he said.

But Nesbit said the tanks weigh 24,000 pounds when empty and about 185,000 pounds when full. "There's no tornado that could pick up a 185,000-pound object," he said. " We think they are very safe."

hdardick@tribune.com

LOAD-DATE: March 17, 2006

EXHIBIT D

4 of 100 DOCUMENTS

Chicago Tribune

April 26, 2006 Wednesday
South-Southwest Final Edition

SECTION: METRO ; ZONE SSW; Pg. 1

LENGTH: 684 words

HEADLINE: Leaks costly, Exelon says;
Tritium spills create credibility problem, leader says

BYLINE: By Hal Dardick, Tribune staff reporter.

BODY:

Dealing with radioactive tritium spills at nuclear power plants will cost Exelon Corp. a great deal of money, but the larger loss to the firm comes in the form of public trust, a top company official said Tuesday.

"By the time it's done, it's going to be tens of millions of dollars" to pay for testing, cleanups, repairs, new infrastructure, lawyers and other expenses related to the tritium spills, said Christopher Crane, president of Exelon Nuclear. "The more damaging issue here is the credibility loss."

In a meeting with the Tribune editorial board, Crane detailed Exelon's response to the spills, particularly those at Braidwood Generating Station in southwest Will County.

Exelon last year found tritium, a byproduct of nuclear generation, in groundwater outside the Braidwood plant. It then disclosed tritium spilled from an underground pipe more than four times between 1996 and 2003.

Area residents blasted the company for not earlier disclosing the spills, which led to four lawsuits, one filed by Illinois Atty. Gen. Lisa Madigan and Will County State's Atty. James Glasgow.

Exelon launched an internal probe, discovering a new tritium leak at Dresden Generating Station in Grundy County where groundwater was contaminated from an earlier spill. It found smaller amounts of tritium had leaked at Byron Nuclear Generating Station, about 25 miles southwest of Rockford.

None of the spills, according to government oversight agencies, poses a health threat. But by all accounts, they did damage Exelon's credibility.

Crane said Exelon, which took over Commonwealth Edison's nuclear plants in late 2000, had worked hard to regain credibility after years of what was widely considered poor management by ComEd.

"We had a terrible reputation," which Exelon did much to repair, he said. "I was proud of the organization, proud of the work we got done. This has been one big slap, and we are trying to do everything as well as we can do, as open as we can do, to fix this, put it behind us, learn from it."

Part of the problem was the industry's perception of tritium, considered one of the least harmful of radioactive substances, Crane said.

"There was not, in ComEd or early on when we became Exelon, or in the industry, a large sensitivity to tritium," he said. "It's just the nature of tritium. We handle some very hazardous materials, and tritium is very low on that spectrum."

David Lochbaum, director of the Union of Concerned Scientists' Nuclear Safety Project, said the industry's attitude about tritium has changed in recent months, partly because Braidwood groundwater contamination migrated off site.

"That basically forced the industry to deal with that in a different manner because it has not done much good for

their image," Lochbaum said. "It's come at a high price, a harder PR [public relations] lesson than Exelon would have wanted."

Industry watchdogs, including Lochbaum, note that tritium leaked or spilled at no less than 10 sites across the nation, four of which are in Illinois, in the last decade. The Nuclear Regulatory Commission has established a task force to probe the issue.

The industry trend is toward zero tolerance of spills, even small ones that are confined to plant grounds, Lochbaum said.

Steve Kerekes, a spokesman for the Nuclear Energy Institute, a trade group, said chief officers from nuclear facilities across the country recently met to start considering a voluntary industry policy that would include groundwater monitoring.

Exelon is sinking wells to monitor groundwater at all 10 of its nuclear stations, which comprise 17 reactors. Crane said he would be surprised if they did not find tritium leakage at another site.

In addition to groundwater monitoring, Exelon plans to install monitoring equipment on underground pipe valves, like the ones that malfunctioned and caused almost all the spills and leaks at Braidwood and Byron.

Exelon has pledged to help the small village of Godley, just west of the Braidwood plant, fund a public water system. Crane said tests thus far have found no tritium in the shallow wells used by Godley residents.

hdardick@tribune.com

GRAPHIC: PHOTO: Christopher Crane, president of Exelon Nuclear, says radioactive spills will cost firm tens of millions of dollars
PHOTO

LOAD-DATE: April 26, 2006

EXHIBIT E

February 28, 2005

EA-04-228

Mr. Christopher M. Crane
President and Chief Nuclear Officer
Exelon Nuclear
Exelon Generation Company, LLC
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: QUAD CITIES NUCLEAR POWER STATION NON-CITED VIOLATION
[NRC OFFICE OF INVESTIGATIONS REPORT NO. 3-2004-011]

Dear Mr. Crane:

This refers to information provided to the U.S. Nuclear Regulatory Commission (NRC), by the staff at Exelon Generation Company's (Exelon) Quad Cities Nuclear Power Station (Quad Cities). The Quad Cities staff indicated that two former instrument maintenance technicians at Quad Cities falsely documented the completion of concurrent or independent verifications while calibrating instrumentation. The matter was investigated by the NRC Office of Investigations (OI). The synopsis from the OI Report is enclosed.

Based on the information developed during investigations by the Quad Cities staff and OI, the NRC has concluded that a violation of NRC requirements occurred. In summary, at various times from January 28 to April 16, 2003, two instrument maintenance technicians at Quad Cities falsified maintenance alteration logs to indicate that required concurrent or independent verifications were performed on torus temperature indicators, residual heat removal (RHR) suction and discharge pressure indicators, RHR service water pump discharge indicators, and secondary containment differential pressure indicators after the alteration and restoration of these instruments. This instrumentation was used to verify the operability of equipment in accordance with technical specifications. The concurrent or independent verifications were required by the Quad Cities Procedure MA-AA-716-100, "Maintenance Alterations Process." The actions of these two instrument maintenance technicians placed Exelon in violation of 10 CFR 50.9, "Completeness and Accuracy of Information," and were categorized in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600, at Severity Level IV.

This matter was identified and immediately investigated by Exelon. Corrective actions taken by Exelon included, but were not limited to: (1) reviewing previous work performed by the two individuals; (2) taking disciplinary action against the two individuals; (3) conducting awareness briefings for the maintenance shop staff, departmental stand-downs, and an "All Hands" meeting concerning this event; and (4) performing an extent-of-condition review of pertinent plant documents from other departments such as operations, radiation protection, chemistry,

engineering, and maintenance to ensure that record falsification was limited to the two individuals involved. Therefore, after considering the circumstances of this case and after consulting with the Director, Office of Enforcement, this violation is being treated as a non-cited violation (NCV), consistent with Section VI.A.1.d of the Enforcement Policy.

Please feel free to contact Mr. Julio Lara, Chief, Electrical Engineering Branch, NRC Region III office, if you have any questions. Mr. Lara can be reached at telephone number (630) 829-9731.

You are not required to respond to this letter unless the description herein does not reflect your corrective actions or your position. If you contest the NCV, you should provide a response within 30 days of the date of this letter, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Regional Administrator and Enforcement Officer, Region III, the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and the NRC Resident Inspector at the Quad Cities Nuclear Power Station. The response should be clearly marked as a "Reply to EA-04-228."

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and your response (should you choose to respond) will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system (ADAMS), accessible from the NRC Web site at http://www.nrc.gov/reading-rm/ADAMS.html. To the extent possible, your response should not include any personal privacy, proprietary, or safeguards information so that it can be made available to the Public without redaction.

Sincerely,

/RA/

Cynthia D. Pederson, Director
Division of Reactor Safet

Docket No. 50-254: 50-265
License No. DPR-29; DRP-30

Enclosure: OI Report Synopsis

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SYNOPSIS

This investigation was initiated by the U.S. Nuclear Regulatory Commission, Office of Investigations, Region III, on March 8, 2004, to determine if Instrument Maintenance (IM) personnel deliberately falsified inspection documentation while calibrating local instrumentation and if the IM Superintendent concealed the record falsification.

Based upon the evidence developed, this investigation did substantiate the allegation that two technicians deliberately falsified inspection documentation while calibrating local instrumentation.

Based upon the evidence developed, this investigation did not substantiate the allegation that the former IM Superintendent concealed the record falsification.

Case No. 3-2004-011

Enclosure

EXHIBIT F

From: <apolonsky@morganlewis.com>
To: <rwebster@kinoy.rutgers.edu>
Date: 3/23/06 10:00AM
Subject: Oyster Creek

Richard,
You asked me whether there is a discrepancy between a "Fact Sheet" that discusses the upper region of the drywell at the Oyster Creek Nuclear Generating Station, and a sentence in AmerGen's December 12, 2005, Answer to your clients' Petition.

The Fact Sheet that you faxed to me states that, "[t]here is no additional corrosion at two of the four regions in the upper region of the drywell that previously experienced corrosion. Corrosion at the other two elevations in the upper region is very minor, continues to decrease and would not impact the structural integrity of the drywell through 2029." These statements are consistent with AmerGen's License Renewal Application, which states that "corrosion in the sand bed region has been arrested and no further loss of material is expected" (Application at 3.5-20), and "recent UT measurements (2004) [in the upper region] confirmed that the corrosion rate continues to decline" (Application at 3.5-21).

The sentence at issue is on page 21 of AmerGen's Answer. It states: "Based on these measurements and inspections, AmerGen concluded that corrosion of the drywell shell has been arrested, including in the sand bed region. Application at 3.5-20 to -21." Your concern with this sentence is that it suggests that corrosion in the upper region of the drywell has been arrested.

We agree with you that the sentence in the Answer could cause confusion. The word "including" should be deleted from the sentence at issue. The Board, however, did not rely on the condition of the drywell shell in the upper region when it rejected that portion of the contention. See Memorandum and Order at 33 n.27 ("We limit NIRS's contention to the sand bed region because, contrary to NIRS's assertion, AmerGen is performing, and will continue to perform during the renewal period, UT measurements at critical locations in the upper region of the drywell liner"). In addition, all parties had a copy of the Application which stated that corrosion in the upper region "continues to decline."

In any event, to ensure that there is no confusion in the record, we will be notifying the Board, the Commission, and the parties.

We thank you for bringing this issue to our attention and hope that this clarification is helpful.

Alex S. Polonsky
Morgan Lewis & Bockius LLP
1111 Pennsylvania Ave., NW
Washington, DC 20004
Direct dial: 202.739.5830
Fax: 202.739.3001

CC: <ksutton@morganlewis.com>, <dsilverman@morganlewis.com>, <Bradley.Fewell@exeloncorp.com>

EXHIBIT G

----- Original Message -----
From: Paul Gunter
To: gbur1@comcast.net
Sent: Tuesday, September 06, 2005 3:44 PM
Subject: resend of request to AmerGen on Oyster Creek inspections

TO: Jhansi Kandasamy, Oyster Creek Site Regulatory Assurance Manager
FROM: Paul Gunter, Nuclear Information and Resource Service and
Edith Gbur, Jersey Shore Nuclear Watch
RE: Oyster Creek Drywell Liner Corrosion Monitoring Program

Dear Ms. Kandasamy:

Per request of Nuclear Information and Resource Service and Jersey Shore Nuclear Watch dated July 19, 2005 to New Jersey Department of Environmental Protection Commissioner Bradley Campbell and Commissioner Campbell's reply dated August 25, 2005, we are requesting information from AmerGen with regard to the Oyster Creek Drywell Liner Corrosion Monitoring Program.

Requested Documents and Related Questions:

1) Please provide the1996, 2000, 2004 inspection results of Ultrasonic Tests (UT) at all locations on the Drywell Liner including the sand bed region.
2) If no UT inspections were conducted at the sand bed region after 1994, how is the performance of the coating at the sand bed region determined to be effective in arresting corrosion in this region? Please provide the original documentation of this analysis.
3) Has the base of the Drywell Liner below the sand bed region to 0° ever been inspected by UT or any other means? If so, what were the results? If not, why not?
4) Please provide GPUN's original analysis for the revision of Technical Specification 5.2.A which reduced the Drywell Liner pressure rating from 62 psig to 44 psig and raised its temperature rating from 175 ° F to 292° F.
5) Is there any evidence of corrosive pitting in the Drywell Liner? If so, what inspection methods are being employed to assess the effects of corrosive pitting on the structural integrity of the Drywell Liner?
6) Is there any evidence of cracking in the Drywell Liner? If so, please make all Condition Reports and/or other documents regarding any cracks in the liner available for review.
7) If cracking has occurred, please provide the analysis of the root cause.
8) Have welding repairs been made to the Drywell Liner for any reason? If so, please provide the results of those repairs.

Thank you,
Paul Gunter, Director
Reactor Watchdog Project
Nuclear Information and Resource Service
1424 16th Street NW Suite 404
Washington, DC 20036
Tel. 202 328 0002

EXHIBIT H

From: pete.resler@exeloncorp.com [mailto:pete.resler@exeloncorp.com]
Sent: Monday, October 10, 2005 4:22 PM
To: gbur1@comcast.net; Paul Gunter
Cc: CommissionerCampbell@dep.state.nj.us
Subject: Response to 9/6 request for information

Ms. Gbur, Mr. Gunter:

In response to your request for information dated Sept. 6, 2005, concerning the Oyster Creek drywell liner, AmerGen will not provide proprietary business information. The results of equipment testing, analysis and other operational and regulatory documentation are available at the station to the U.S. Nuclear Regulatory Commission and the New Jersey Bureau of Nuclear Engineering for review at any time.

Much of the information you have requested is available to the public in the Oyster Creek license renewal application available on the NRC web site, as well as in a summary of this issue that was provided to the NJ BNE. I have attached that document below for your information.

In addition, the NRC approved the initial analysis and corrective actions taken after corrosion was discovered in 1980, as well as the ongoing inspection and evaluation program to ensure the corrective actions continue to be effective. Regular inspections and analyses of the drywell liner have confirmed that corrosion is managed effectively and that the drywell liner can perform its intended function.

<<drywell corrosion issue summary.doc>>

Peter C. Resler
Manager, Nuclear Communications
Exelon Corporation
610-765-5530

EXHIBIT I

From: <George.Beck@exeloncorp.com>
To: <dja1@nrc.gov>, <rkm@nrc.gov>
Date: 04/05/2006 5:02:53 PM
Subject: FW: Audit Q & A (Question Numbers AMP-141, 210, 356)

Note: As originally transmitted this email was undeliverable to the NRC; it exceeded the size limit. It is being retransmitted without the AMP-210.pdf. This file will be reconstituted and sent in smaller ".pdf"s; the first 11 pages are attached.

George

> -----Original Message-----
> From: Beck, George
> Sent: Wednesday, April 05, 2006 4:39 PM
> To: Donnie Ashley (E-mail); 'Roy Mathew (E-mail) ' (E-mail)
> Cc: Ouaou, Ahmed; Hufnagel Jr, John G; Warfel Sr, Donald B; Polaski, Frederick W
> Subject: Audit Q & A (Question Numbers AMP-141, 210, 356)
>
> Donnie/Roy,
>
> Attached are the responses to AMP-210 and AMP-356 in an updated version of the reports from the AMP/AMR Audit database. Also included is a revised version of AMP-141. These answers have been reviewed and approved by Technical Lead, Don Warfel.
>
> Regarding AMP-210, please note:
> As pointed out in our response to NRC Question AMP-210, (8a)(1), "The 0.806" minimum average thickness verbally discussed with the Staff during the AMP audit was recorded in location 19A in 1994. Additional reviews after the audit noted that lower minimum average thickness values were recorded at the same location in 1991 (0.803") and in September 1992 (0.800"). However, the three values are within the tolerance of +/- 0.010" discussed with the Staff."
>
> Regarding AMP-141, please note:
> Our response to AMP-141 has been revised to reflect additional information developed during the ongoing preparation of RAI responses.
>
> Please let John Hufnagel or me know if you have any questions.
>
> George
>
>
>
> >> <<Pages from AMP-210.pdf>>
> >> <<AMP-141.pdf>>
>
>> <<AMP-356.pdf>>
>
>

CC: <ahmed.ouaou@exeloncorp.com>, <john.hufnagel@exeloncorp.com>, <donald.warfel@exeloncorp.com>, <fred.polaski@exeloncorp.com>

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Subject:	FW: Audit Q & A (Question Numbers AMP-141, 210, 356)
Creation Date:	04/05/2006 5:01:46 PM
From:	<George.Beck@exeloncorp.com>
Created By:	George.Beck@exeloncorp.com

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Pages from AMP-210.pdf	64593	
AMP-141.pdf	47353	
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Expiration Date:	None
Priority:	Standard
Reply Requested:	No
Return Notification:	None
Concealed Subject:	No
Security:	Standard

NRC Information Request Form

Item No	*Date Received:*	*Source*
AMP-210	1/24/2006	AMP Audit
Topic:	*Status:*	Open
IWE		

Document References:
B.1.27

NRC Representative Morante, Rich

AmerGen (Took Issue): Hufnagel, Joh

Question

Pages 25 through 31 of the PBD present a discussion of the OCGS operating experience.

(8a)The following statements related to drywell corrosion in the sand bed region need further explanation and clarification:
As a result of the presence of water in the sand bed region, extensive UT thickness measurements (about 1000) of the drywell shell were taken to determine if degradation was occurring. These measurements corresponded to known water leaks and indicated that wall thinning had occurred in this region.
Please explain the underlined statement. Were water leaks limited to only a portion of the circumference? Was wall thinning found only in these areas?
After sand removal, the concrete surface below the sand was found to be unfinished with improper provisions for water drainage. Corrective actions taken in this region during 1992 included; (1) cleaning of loose rust from the drywell shell, followed by application of epoxy coating and (2) removing the loose debris from the concrete floor followed by rebuilding and reshaping the floor with epoxy to allow drainage of any water that may leak into the region. UT measurements taken from the outside after cleaning verified loss of material projections that had been made based on measurements taken from the inside of the drywell. There were, however, some areas thinner than projected; but in all cases engineering analysis determined that the drywell shell thickness satisfied ASME code requirements.
Please describe the concrete surface below the sand that is discussed in paragraph above.
Please provide the following information:
(1) Identify the minimum recorded thickness in the sand bed region from the outside inspection, and the minimum recorded thickness in the sand bed region from the inside inspections. Is this consistent with previous information provided verbally? (.806 minimum)
(2) What was the projected thickness based on measurements taken from the inside?
(3) Describe the engineering analysis that determined satisfaction of ASME code requirements and identify the minimum required thickness value. Is this consistent with previous information provided verbally? (.733 minimum)
(4) Is the minimum required thickness based on stress or buckling criteria?
(5) Reconcile and compare the thickness measurements provided in (1) and (3) above with the .736 minimum corroded thickness that was used in the NUREG-1540 analysis of the degraded Oyster

Creek sand bed region.

Evaluation of UT measurements taken from inside the drywell, in the in the former sand bed region, in 1992, 1994, and 1996 confirmed that corrosion is mitigated. It is therefore concluded that corrosion in the sand bed region has been arrested and no further loss of material is expected. Monitoring of the coating in accordance with the Protective Coating Monitoring and Maintenance Program, will continue to ensure that the containment drywell shell maintains its intended function during the period of extended operation.
NUREG-1540, published in April 1996, includes the following statements related to corrosion of the Oyster Creek sand bed region: (page vii) However, to assure that these measures are effective, the licensee is required to perform periodic UT measurements. and (page 2) As assurance that the corrosion rate is slower than the rate obtained from previous measurements, GPU is committed to make UT measurements periodically. Please reconcile the aging management commitment (one-time UT inspection and monitoring of the condition of the coating) with the apparent requirement/commitment documented in NUREG-1540.

(8b)The following statement related to drywell corrosion above the sand bed region needs further explanation and clarification:

Corrective action for these regions involved providing a corrosion allowance by demonstrating, through analysis, that the original drywell design pressure was conservative. Amendment 165 to the Oyster Creek Technical Specifications reduced the drywell design pressure from 62 psig to 44 psig. The new design pressure coupled with measures to prevent water intrusion into the gap between the drywell shell and the concrete will allow the upper portion of the drywell to meet ASME code requirements.

Please describe the measures to prevent water intrusion into the gap between the drywell shell and the concrete that will allow the upper portion of the drywell to meet ASME code requirements". Are these measures to prevent water intrusion credited for LR? If not, how will ASME code requirements be met during the extended period of operation?

(8c)The following statements related to torus degradation need further explanation and clarification: Inspection performed in 2002 found the coating to be in good condition in the vapor area of the Torus and vent header, and in fair condition in immersion. Coating deficiencies in immersion include blistering, random and mechanical damage. Blistering occurs primarily in the shell invert but was also noted on the upper shell near the water line. The fractured blisters were repaired to reestablish the protective coating barrier. This is another example of objective evidence that the Oyster Creek ASME Section XI, Subsection IWE aging management program can identify degradation and implement corrective actions to prevent the loss of the containment's intended function.
While blistering is considered a deficiency, it is significant only when it is fractured and exposes the base metal to corrosion attack. The majority of the blisters remain intact and continues to protect the base metal; consequently the corrosion rates are low. Qualitative assessment of the identified pits indicate that the measured pit depths (50 mils max) are significantly less than the criteria established

NRC Information Request Form

in Specification SP-1302-52-120 (141- 261 mils, depending on diameter of the pit and spacing between pits).

Please confirm or clarify (1) that only the fractured blisters found in this inspection were repaired; (2) pits were identified where the blisters were fractured; (3) pit depths were measured and found to 50 mils max; (4) the inspection Specification SP-1302-52-120 includes pit-depth acceptance criteria for rapid evaluation of observed pitting; (5) the minimum pit depth of concern is 141 mils (.141) and pits as deep as 261 mils (.261) may be acceptable.

Please also provide the following information: nominal design, as-built, and minimum measured thickness of the torus; minimum thickness required to meet ASME code acceptance criteria; the technical basis for the pitting acceptance criteria include in Specification SP-1302-52-120

Assigned To: Ouaou, Ahmed

Response:

(8a) Question: Please explain the underlined statement. Were water leaks limited to only a portion of the circumference? Was wall thinning only in these area?

Response:
This statement was not meant to indicate that water leaks were limited to only a portion of the circumference. The statement is meant to reflect the fact that water leakage was observed coming out of certain sand bed region drains and those locations were suspect of wall thinning.
No. Wall thinning was not limited to the areas where water leakage from the drains was observed. Wall thinning occurred in all areas of the sand bed region based on UT measurements and visual inspection of the area conducted after the sand was removed in 1992. However the degree of wall thinning varied from location to location. For example 60% of the measured locations in the sand bed region (bays 1, 3, 5, 7, 9, and 15) indicate that the average measured drywell shell thickness is nearly the same as the design nominal thickness and that these locations experienced negligible wall thinning; whereas bay 19A experienced approximately 30% reduction in wall thickness.

Question: Please discuss the concrete surface below the sand that is discussed in paragraph above.

Response:
The concrete surface below the sand was intended to be shaped to promote flow toward each of the five sand bed drains. However once the sand was removed it was discovered that the floor was not properly finished and shaped as required to permit proper drainage. There were low points, craters, and rough surfaces that could allow moisture to pool instead of flowing smoothly toward the drains. These concrete surfaces were refurbished to fill low areas, smooth rough surfaces, and coat these surfaces with epoxy coating to promote improved drainage. The drywell shell at juncture of the concrete floor was sealed with an elastomer to prevent water intrusion into the embedded drywell shell.

Question: Please provide the following information:

NRC Information Request Form

(1) Identify the minimum recorded thickness in the sand bed region from the outside inspection, and the minimum recorded thickness in the sand bed region from the inside inspections. Is this consistent with previous information provided verbally? (.806 minimum)
(2) What was the projected thickness based on measurements taken from the inside?
(3) Describe the engineering analysis that determined satisfaction of ASME code requirements and identify the minimum required thickness value. Is this consistent with previous information provided verbally? (.733 minimum)
(4) Is the minimum required thickness based on stress or buckling criteria?
(5) Reconcile and compare the thickness measurements provided in (1) and (3) above with the .736 minimum corroded thickness that was used in the NUREG-1540 analysis of the degraded Oyster Creek sand bed region.

Response:
1. The minimum recorded thickness in the sand bed region from outside inspection is 0.618 inches. The minimum recorded thickness in the sand bed region from inside inspections is 0.603. These minimum recorded thicknesses are isolated local measurement and represent a single point UT measurement. The 0.806 inches thickness provided to the Staff verbally is an average minimum general thickness calculated based on 49 UT measurements taken in an area that is approximately 6"x 6". Thus the two local isolated minimum recorded thicknesses cannot be compared directly to the general thickness of 0.806".

The 0.806" minimum average thickness verbally discussed with the Staff during the AMP audit was recorded in location 19A in 1994. Additional reviews after the audit noted that lower minimum average thickness values were recorded at the same location in 1991 (0.803") and in September 1992 (0.800"). However, the three values are within the tolerance of +/- 0.010" discussed with the Staff.

2. The minimum projected thickness depends on whether the trended data is before or after 1992 as demonstrated by corrosion trends provided in response to NRC Question #AMP-356. For license renewal, using corrosion rate trends after 1992 is appropriate because of corrosion mitigating measures such as removal of the sand and coating of the shell. Then, using corrosion rate trends based on 1992, 1994, and 1996 UT data; and the minimum average thickness measured in 1992 (0.800"), the minimum projected average thickness through 2009 and beyond remains approximately 0.800 inches. The projected minimum thickness during and through the period of extended operation will be reevaluated after UT inspections that will be conducted prior to entering the period of extended operation, and after the periodic UT inspection every 10 years thereafter.

3.The engineering analysis that demonstrated compliance to ASME code requirements was performed in two parts, Stress and Stability Analysis with Sand, and Stress and Stability Analyses without Sand. The analyses are documented in GE Reports Index No. 9-1, 9-2, 9-3, and 9-4, were transmitted to the NRC Staff in December 1990 and in 1991 respectively. Index No. 9-3 and 9-4, were revised later to correct errors identified during an internal audit and were resubmitted to the Staff in January 1992 (see attachment 1 & 2). The analyses are briefly described below.

The drywell shell thickness in the sand bed region is based on Stability Analysis without Sand. As

described in detail in attachment 1 & 2, the analysis is based on a 36-degree section model that takes advantage of symmetry of the drywell with 10 vents. The model includes the drywell shell from the base of the sand bed region to the top of elliptical head and the vent and vent header. The torus is not included in this model because the bellows provide a very flexible connection, which does not allow significant structural interaction between the drywell and the torus. The analysis conservatively assumed that the shell thickness in the entire sand bed region has been reduced uniformly to a thickness of 0.736 inches.

As discussed with the Staff during the AMP audit, the basic approach used in the buckling evaluation follows the methodology outlined in ASME Code Case N-284 revision 0 that was reconciled later with revision 1 of the Code Case. Following the procedure of this Code Case, the allowable compressive stress is evaluated in three steps. In the first step, a theoretical buckling stress is determined, and secondly modified using appropriate capacity and plasticity reduction factors. In the final step, the allowable compressive stress is obtained by dividing the buckling stress calculated in the second step by a safety factor of 2.0 for Design and Level A & B service conditions and 1.67 Level C service conditions.

Using the approach described above, the analysis shows that for the most severe design basis load combinations, the limits of ASME Section III, Subsection NE 3213.10 are fully met. For additional details refer to Attachment 1 & 2.

As described above, the buckling analysis was performed assuming a uniform general thickness of the sand bed region of 0.736 inches. However the UT measurements identified isolated, localized areas where the drywell shell thickness is less than 0.736 inches. Acceptance for these areas was based on engineering calculation C-1302-187-5320-024.

The calculation uses a Local Wall Acceptance Criteria". This criterion can be applied to small areas (less than 12" by 12"), which are less than 0.736" thick so long as the small 12" by 12" area is at least 0.536" thick. However the calculation does not provide additional criteria as to the acceptable distance between multiple small areas. For example, the minimum required linear distances between a 12" by 12" area thinner than 0.736" but thicker than 0.536" and another 12" by 12" area thinner than 0.736" but thicker than 0.536" were not provided.

The actual data for two bays (13 and 1) shows that there are more than one 12" by 12" areas thinner than 0.736" but thicker than 0.536". Also the actual data for two bays shows that there are more than one 2 ½'" diameter areas thinner than 0.736" but thicker than 0.490". Acceptance is based on the following evaluation.

The effect of these very local wall thickness areas on the buckling of the shell requires some discussion of the buckling mechanism in a shell of revolution under an applied axial and lateral pressure load.

To begin the discussion we will describe the buckling of a simply supported cylindrical shell under the influence of lateral pressure and axial load. As described in chapter 11 of the Theory of Elastic Stability, Second Edition, by Timoshenko and Gere, thin cylindrical shells buckle in lobes in both the

axial and circumferential directions. These lobes are defined as half wave lengths of sinusoidal functions. The functions are governed by the radius, thickness and length of the cylinder. If we look at a specific thin walled cylindrical shell both the length and radius would be essentially constants and if the thickness was changed locally the change would have to be significant and continuous over a majority of the lobe so that the compressive stress in the lobe would exceed the critical buckling stress under the applied loads, thereby causing the shell to buckle locally. This approach can be easily extrapolated to any shell of revolution that would experience both an axial load and lateral pressure as in the case of the drywell. This local lobe buckling is demonstrated in The GE Letter Report "Sandbed Local Thinning and Raising the Fixity Height Analysis" where a 12 x 12 square inch section of the drywell sand bed region is reduced by 200 mils and a local buckle occurred in the finite element eigenvalue extraction analysis of the drywell. Therefore, to influence the buckling of a shell the very local areas of reduced thickness would have to be contiguous and of the same thickness. This is also consistent with Code Case 284 in Section –1700 which indicates that the average stress values in the shell should be used for calculating the buckling stress. Therefore, an acceptable distance between areas of reduced thickness is not required for an acceptable buckling analysis except that the area of reduced thickness is small enough not to influence a buckling lobe of the shell. The very local areas of thickness are dispersed over a wide area with varying thickness and as such will have a negligible effect on the buckling response of the drywell. In addition, these very local wall areas are centered about the vents, which significantly stiffen the shell. This stiffening effect limits the shell buckling to a point in the shell sand bed region which is located at the midpoint between two vents.

The acceptance criteria for the thickness of 0.49 inches confined to an area less than 2½ inches in diameter experiencing primary membrane + bending stresses is based on ASME B&PV Code, Section III, Subsection NE, Class MC Components, Paragraphs NE-3213.2 Gross Structural Discontinuity, NE-3213.10 Local Primary Membrane Stress, NE-3332.1 Openings not Requiring Reinforcement, NE-3332.2 Required Area of Reinforcement and NE-3335.1 Reinforcement of Multiple Openings. The use of Paragraph NE-3332.1 is limited by the requirements of Paragraphs NE-3213.2 and NE-3213.10. In particular NE-3213.10 limits the meridional distance between openings without reinforcement to 2.5 x (square root of Rt) . Also Paragraph NE-3335.1 only applies to openings in shells that are closer than two times their average diameter.

The implications of these paragraphs are that shell failures at these locations from primary stresses produced by pressure cannot occur provided openings in shells have sufficient reinforcement. The current design pressure of 44 psig for drywell requires a thickness of 0.479 inches in the sand bed region of the drywell. A review of all the UT data presented in Appendix D of the calculation indicates that all thicknesses in the drywell sand bed region exceed the required pressure thickness by a substantial margin. Therefore, the requirements for pressure reinforcement specified in the previous paragraph are not required for the very local wall thickness evaluation presented in Revision 0 of Calculation C-1302-187-5320-024.

Reviewing the stability analyses provided in both the GE Report 9-4 and the GE Letter Report Sand bed Local Thinning and Raising the Fixity Height Analysis and recognizing that the plate elements in the sand bed region of the model are 3" x 3" it is clear that the circumferential buckling lobes for the

drywell are substantially larger than the 2 ½ inch diameter very local wall areas. This combined with the local reinforcement surrounding these local areas indicates that these areas will have no impact on the buckling margins in the shell. It is also clear from the GE Letter Report that a uniform reduction in thickness of 27% to 0.536" over a one square foot area would only create a 9.5% reduction in the load factor and theoretical buckling stress for the whole drywell resulting in the largest reduction possible. In addition, to the reported result for the 27% reduction in wall thickness, a second buckling analysis was performed for a wall thickness reduction of 13.5% over a one square foot area which only reduced the load factor and theoretical buckling stress by 3.5% for the whole drywell resulting in the largest reduction possible. To bring these results into perspective a review of the NDE reports indicate there are 20 UT measured areas in the whole sand bed region that have thicknesses less than the 0.736 inch thickness used in GE Report 9-4 which cover a conservative total area of 0.68 square feet of the drywell surface with an average thickness of 0.703" or a 4.5% reduction in wall thickness. Therefore, to effectively change the buckling margins on the drywell shell in the sand bed region a reduced thickness would have to cover approximately one square foot of shell area at a location in the shell that is most susceptible to buckling with a reduction in thickness greater than 25%. This leads to the conclusion that the buckling of the shell is unaffected by the distance between the very local wall thicknesses, in fact these local areas could be contiguous provided their total area did not exceed one square foot and their average thickness was greater than the thickness analyzed in the GE Letter Report and provided the methodology of Code Case N284 was employed to determine the allowable buckling load for the drywell. Furthermore, all of these very local wall areas are centered about the vents, which significantly stiffen the shell. This stiffing effect limits the shell buckling to a point in the shell sand bed region, which is located at the midpoint between two vents.

The minimum thickness of 0.733" is not correct. The correct minimum thickness is 0.736".

4. The minimum required thickness for the sand bed region is controlled by buckling.

5. We cannot reconcile the difference between the current (lowest measured) of 0.736" in NUREG-1540 and the minimum measured thickness of 0.806 inches we discussed with the Staff. Perhaps the value in NUREG-1540 should be labeled minimum required by the Code, as documented in several correspondences with the Staff, instead of lowest measured. In a letter dated September 15, 1995, GPU provided the Staff a table that lists sand bed region thicknesses. The table indicates that nominal thickness is 1.154". the minimum measured thickness in 1994 is 0.806", and the minimum thickness required by Code is 0.736". These thicknesses are consistent with those discussed with the Staff during the AMP/AMR audit.

Question: NUREG-1540, published in April 1996, includes the following statements related to corrosion of the Oyster Creek sand bed region: (page vii) However, to assure that these measures are effective, the licensee is required to perform periodic UT measurements. and (page 2) As assurance that the corrosion rate is slower than the rate obtained from previous measurements, GPU is committed to make UT measurements periodically. Please reconcile the aging management commitment (one-time UT inspection and monitoring of the condition of the coating) with the apparent requirement/commitment documented in NUREG-1540.Please reconcile the aging management commitment (one-time UT inspection and monitoring of the condition of the coating) with the apparent requirement/commitment documented in NUREG-1540.

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Response:

Our review of NUREG-1540, page 2 indicates that the statements appear to be based on 1991, or 1993 GPU commitment to perform periodic UT measurements. In fact UT thickness measurements were taken in the sand bed region from inside the drywell in 1992, and 1994. The trend of the UT measurements indicates that corrosion has been arrested. As results GPU informed NRC in a letter dated September 15, 1995 (ref. 2) that UT measurements will be taken one more time, in 1996, and the epoxy coating will be inspected in 1996 and, as a minimum again in 2000. The UT measurements were taken in 1996, per the commitment, and confirmed corrosion rate trend of 1992 and 1994. The results of 1992, 1994, and 1996 UT measurements were provided to the Staff during the AMP/AMR audits.

In response to GPU September 15, 1995 letter, NRC Staff found the proposed changes to sand bed region commitments (i.e. no additional UT measurements after 1996) reasonable and acceptable. This response is documented in November 1, 1995 Safety Evaluation for the Drywell Monitoring Program.

For license renewal, Oyster Creek was previously committed to perform One-Time UT inspection of the drywell shell in the sand bed region prior to entering the period of extended operation. However, in response to NRC Question #AMP-141, Oyster Creek revised the commitment to perform UT inspections periodically. The initial inspection will be conducted prior to entering the period of extended operation and additional inspections will be conducted every 10 years thereafter. The UT measurements will be taken from inside the drywell at same locations as 1996 UT campaign

(8b) Question: Please describe the measures to prevent water intrusion into the gap between the drywell shell and the concrete that will allow the upper portion of the drywell to meet ASME code requirements. Are these measures to prevent water intrusion credited for LR? If not, how will ASME code requirements be met during the extended period of operation?

Response:
The measures taken to prevent water intrusion into the gap between the drywell shell and the concrete that will allow the upper portion of the drywell to maintain the ASME code requirements are,
1. Cleared the former sand bed region drains to improve the drainage path.
2. Replaced reactor cavity steel trough drain gasket, which was found to be leaking.
3. Applied stainless steel type tape and strippable coating to the reactor cavity during refueling outages to seal identified cracks in the stainless steel liner.
4. Confirmed that the reactor cavity concrete trough drains are not clogged
5. Monitored former sand bed region drains and reactor cavity concrete trough drains for leakage during refueling outages and plant operation.

Oyster Creek is committed to implement these measures during the period of extended operation.

(8c) Please confirm or clarify (1) that only the fractured blisters found in this inspection were repaired; (2) pits were identified where the blisters were fractured; (3) pit depths were measured and found to

50 mils max; (4) the inspection Specification SP-1302-52-120 includes pit-depth acceptance criteria for rapid evaluation of observed pitting; (5) the minimum pit depth of concern is 141 mils (.141) and pits as deep as 261 mils (.261) may be acceptable.

Response:
(1) Specification SP-1302-52-120, Specification for Inspection and Localized Repair of the Torus and Vent System Coating, specifies repair requirements for coating defects exposing substrate and fractured blisters showing signs of corrosion. The repairs referred to in the inspection report included fractured blisters, as well as any mechanically damaged areas, which have exposed bare metal showing signs of corrosion. Therefore, only fractured blisters would be candidates for repair, not those blisters that remain intact. The number and location of repairs are tabulated in the final inspection report prepared by Underwater Construction Corporation.
(2) Coating deficiencies in the immersion region included blistering with minor mechanical damage. Blistering occurred primarily in the shell invert but was also noted on the upper shell near the water line. The majority of the blisters were intact. Intact blisters were examined by removing the blister cap exposing the substrate. Corrosion attack under non-fractured blisters was minimal and was generally limited to surface discoloration. Examination of the substrate revealed slight discoloration and pitting with pit depths less than 0.001. Several blistered areas included pitting corrosion where the blisters were fractured. The substrate beneath fractured blisters generally exhibited a slightly heavier magnetite oxide layer and minor pitting (less than 0.010") of the substrate.

(3) In addition to blistering, random deficiencies that exposed base metal were identified in the torus immersion region coating (e.g., minor mechanical damage) during the 19R (2002) torus coating inspections. They ranged in size from 1/16" to ½" in diameter. Pitting in these areas was qualitatively evaluated and ranged from less than 10 mils to slightly more than 40 mils in a few isolated cases. Three quantitative pit depth measurements were taken in several locations in the immersion area of Bay 1. Pit depths at these sites ranged from 0.008" to 0.042" and were judged to be representative of typical conditions found on the shell.

Prior to 2002 inspection 4 pits greater than 0.040" were identified. The pits depth are 0.058" (1 pit in 1988), 0.05" (2 pits in 1991), and 0.0685" (1 pit in 1992). The pits were evaluated against the local pit depth acceptance criteria and found to be acceptable.

(4) Specification SP-1302-52-120, Specification for Inspection and Localized Repair of the Torus and Vent System Coating, includes the pit-depth acceptance criteria for rapid evaluation of observed pitting. The acceptance criteria are supported by a calculation C-1302-187-E310-038. Locations that do not meet the pit-depth acceptance criteria are characterized based on the size of the area, center to center distance between corroded areas, the maximum pit depth and location in the Torus based on major structural features. These details are sent to Oyster Creek Engineering for evaluation.

(5) The acceptance criteria for pit depth is as follows:
-Isolated Pits of 0.125" in diameter have an allowed maximum depth of 0.261" anywhere in the shell provided the center to center distance between the subject pit and neighboring isolated pits or areas of pitting corrosion is greater than 20.0 inches. This includes old pits or old areas of pitting corrosion that have been filled and/or re-coated.

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-Multiple Pits that can be encompassed by a 2-1/2" diameter circle shall be limited to a maximum pit depth of 0.141" provided the center to center distance between the subject pitted area and neighboring isolated pits or areas of pitting corrosion is greater than 20.0 inches. This includes old pits or old areas of pitting corrosion that have been filled and/or recoated.

Question: Please also provide the following information: nominal design, as-built, and minimum measured thickness of the torus; minimum thickness required to meet ASME code acceptance criteria; the technical basis for the pitting acceptance criteria include in Specification SP-1302-52-120

Response:
Submersed area:
(a) The nominal Design thickness is 0.385 inches
(b) The as-built thickness is 0.385 inches
(c) The minimum uniform measured thickness is,
- 0.343 inches - general shell
- 0.345 inches - shell - ring girders
- 0.345 inches - shell - saddle flange
- 0.345 inches - shell - torus straps

(d) The minimum general thickness required to meet ASME Code Acceptance is 0.337 inches.

Technical basis for pitting acceptance criteria included in Specification SP-1302-52-120 is based on engineering calculation C-1302-187-E310-038. At the time of preparation of calculation C-1302-187-E310-038 in 2002 there were no published methods to calculate acceptance standards for locally thinned areas in ASME Section III or Section VIII Pressure Vessel codes. Therefore, the approach in Code Case N-597 was used as guidance in assessing locally thinned areas in the Torus. This is based on the similarity in approaches between Local Thinning Areas described in N597 and Local Primary Stress areas described in Paragraph NE3213.10 of the ASME B&PV Code Section III, particularly small areas of wall thinning which do not exceed 1.0 x (square root of Rt). In addition, the ASME B&PV Code Section III, Subsection NB, Paragraph NB-3630 allows the analysis of pipe systems in accordance with the Vessel Analysis rules described in Paragraph NB-3200 of the same Subsection as an alternate analysis approach. Therefore, the approach used in N597 for local areas of thinning was probably developed using the rules for Local Primary Membrane Stress from paragraph NB-3200 in particular Subparagraph 3213.10. The Local Primary Stress Limits in NB-3213.10 are similar to those discussed in Subsection NE, Paragraph NE-3213.10.

Since the Code Case had not yet been invoked in to the Section XI program, the calculation provided a reconciliation of the results obtained from the code case against the ASME Section III code requirements as discussed above. This reconciliation demonstrated that the approach in N597 used on a pressure vessel such as the Torus would be acceptable since the results are conservative compared to the previous work performed in MPR-953 and Lm(a) (defined in N597 Table- 3622-1) £ (Rmintmin)1/2.

Currently, the maximum pit depth measured in the Torus is a 0.0685" (measured in 1992 in bay 2). It was evaluated as acceptable using the design calculations existing at that time and was not based on

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Calculation C-1302-187-E310-038. This remains the bounding wall thickness in the Torus. The criterion developed in 2002 for local thickness acceptance provides an easier method for evaluating as-found pits. The results were shown to be conservative versus the original ASME Section III and VIII Code requirements for the Torus.

The Torus inspection program is being enhanced per IR 373695 to improve the detail of the acceptance criteria and margin management requirements using the ASME Section III criteria. The approach used in C-1302-187-E310-038 will be clarified as to how it maintains the code requirements. If Code Case N-597-1 is required to develop these criteria for future inspections, NRC review and approval will be obtained. It should also be noted that the program has established corrosion rate criteria and continues to periodically monitor to verify they remain bounded.

LRCR #: ***LRA A.5 Commitment #:***

IR#:

Approvals:

Prepared By:	Ouaou, Ahmed	4/ 5/2006
Reviewed By:	Miller, Mark	4/ 5/2006
Approved By:	Warfel, Don	4/ 5/2006

NRC Acceptance (Date):

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Item No	*Date Received:*	*Source*
AMP-356	2/16/2006	AMP Audit
Topic:	*Status:*	Open
IWE		

Document References:

NRC Representative Morante, Rich

AmerGen (Took Issue):

Question

IWE AMP
Question 4 IWE AMP Revised Feb. 17, 2006 R. Morante (AMP-356)

(1) Identify the specific locations around the circumference in the former sandbed region where UT thickness readings have been and will be taken from inside containment. Confirm that all points previously recorded will be included in future inspections.

(2) Describe the grid pattern at each location (meridional length, circumferential length, grid point spacing, total number of point readings), and graphically locate each grid pattern within the former sandbed region.

(3) For each grid location, submit a graph of remaining thickness versus time, using the UT readings since the initiation of the program (both prior to and following removal of the sand and application of the external coating).

(4) Clearly describe the methodology and acceptance criteria that is applied to each grid of point thickness readings, including both global (entire array) evaluation and local (subregion of array) evaluation.

Assigned To: Ouaou, Ahmed

Response:

Response:
1. The circumference of the drywell is divided into 10 bays, designated as Bays 1, 3, 5, 7, 9, 11,13, 15, 17, and 19. UT thickness readings have been taken in each bay at one or more locations. The specific locations around the circumference in the former sand bed region where UT thickness reading have been taken from inside containment are Bay 1D, 3D, 5D, 7D, 9A, 9D, 11A, 11C, 13A, 13C, 13D, 15A, 15D, 17A, 17D, 17/19 Frame, 19A, 19B, and 19C. For each location, UT measurements were taken centered at elevation 11'-3". These represent the locations where UT measurements were taken in 1992, 1994, and 1996.

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In addition UT measurements were taken one time inside 2 trenches excavated in drywell floor concrete. The purpose of these UT measurements is to determine the extent of corrosion in the lower portions of the sand bed region prior to removing the sand and making accessible for visual inspection.

Future UT thickness measurements will be taken at the same locations as those inspected in 1996 in accordance with Oyster Creek commitment documented in NRC Question #AMP-209.

2. For locations where the initial investigations found significant wall thinning (9D, 11A, 11C, 13A, 13D, 15D, 17A, 17D, 17/19 Frame, 19A, 19B, and 19C) the grid pattern consists of 7 x 7 grid centered at elevation 11'-3 (meridian) and centered at the centerline of the tested location within each bay, which consists of 6"x 6" square template. The grid spacing is 1" on center. There are 49 point readings. For graphical location of the grid, refer to attachment 1.

For locations where the initial investigations found no significant wall thinning (1D, 3D, 5D, 7D, 9A, 13C, and 15A) the grid pattern consists of 1 x 7 grid centered at elevation 11'-3" (meridian) on 1" centers. There are 7 point readings. For graphical location of the grid, refer to attachment 1.

3. A graph representing the remaining thickness versus time using UT reading since the initiation of the program (both prior to and following removal of the sand and application of the external coating) for location 9D, 11A, 11C, 13A, 13D,15D,17A,17D,17/19, 19A, 19B, and 19C is included in the attached graph. Other locations (i.e. 1D, 3D, 5D, 7D, 9A, 13C, and 15A) are not included because wall thinning is not significant and the trend line will be essentially a straight line.

4. The methodology and acceptance criteria that is applied to each grid of point thickness readings, including both global (entire array) evaluation and local (subregion of array) is described in engineering specification IS-328227-004 and in calculation No. C-1302-187-5300-011. These documents were submitted to the NRC in a letter dated November 26, 1990 and provided to the Staff during the AMP/AMR audit. A brief summary of the methodology and acceptance criteria is described below.

The initial locations where corrosion loss was most severe in 1986 and 1987 were selected for repeat inspection over time to measure corrosion rate. For location where the initial investigations found significant wall thinning UT inspection consists of 49 individual UT data points equally spaced over a 6"x 6" area. Each new set of 49 values was then tested for normal distribution.

The mean values of each grid were then compared to the required minimum uniform thickness criteria of 0.736. In addition each individual reading is compared to the local minimum required criteria of 0.49. The basis for the required minimum uniform thickness criteria and the local minimum required criteria is provided in response to NRC Question #AMP-210.

A decrease in the mean value over time is representative of corrosion. If corrosion does not exist, the mean value will not vary with time except for random variations in the UT measurements.

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If corrosion is continuing, the mean thickness will decrease linearly with time. Therefore the curve fit of the data is tested to determine if linear regression is appropriate, in which case the corrosion rate is equal to the slope of the line. If a slope exists, then upper and lower 95% confidence intervals of the curve fit are calculated. The lower 95% confidence interval is then projected into the future and compared to the required minimum uniform thickness criteria of 0.736.

A similar process is applied to the thinnest individual reading in each grid. The curve fit of the data is tested to determine if linear regression is appropriate. If a slope exists, then the lower 95% confidence interval is then projected into the future and compared to the required minimum local thickness criteria of .49.

LRCR #: ***LRA A.5 Commitment #:***

IR#:

Approvals:

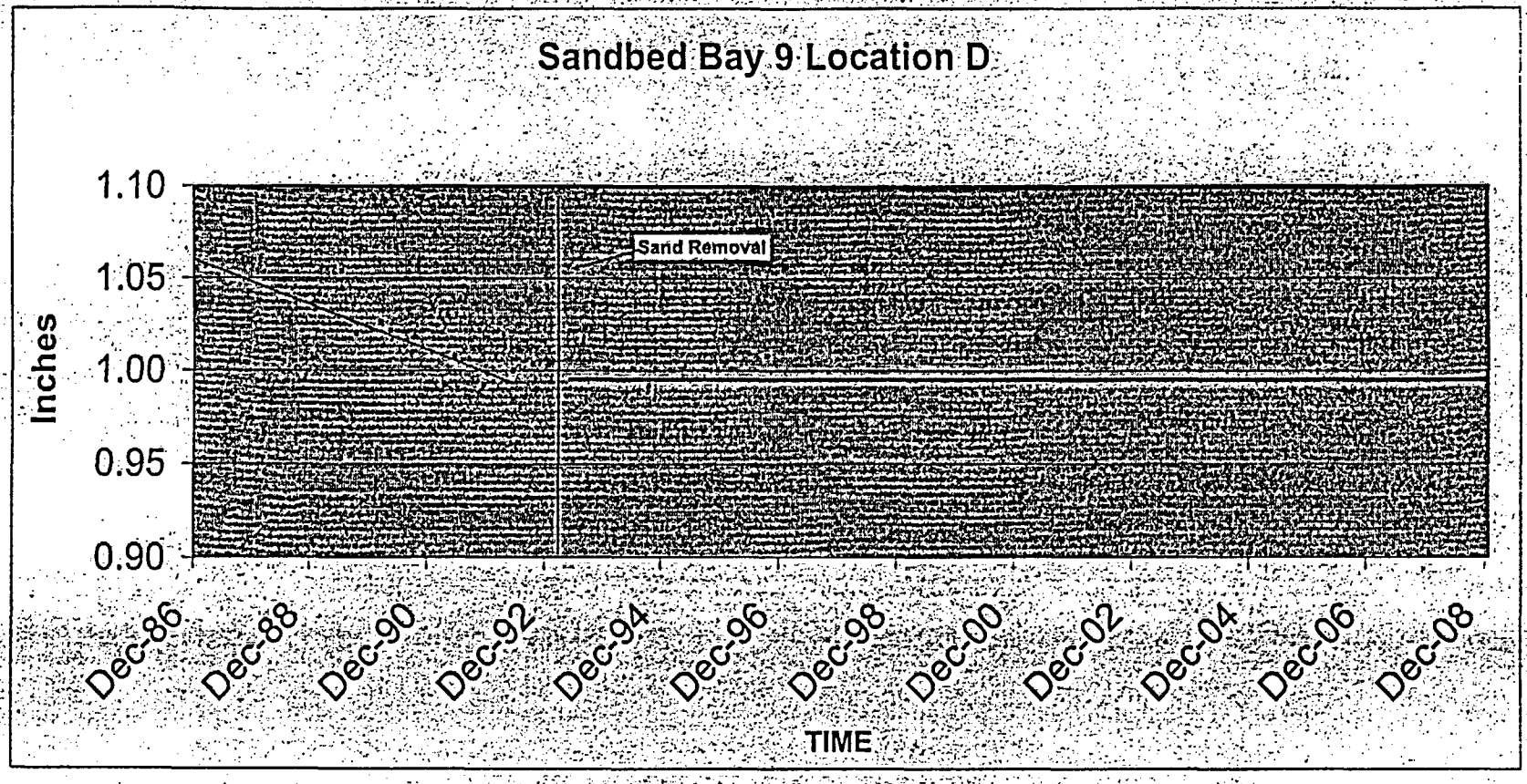
Prepared By:	Ouaou, Ahmed	4/ 4/2006
Reviewed By:	Getz, Stu	4/ 5/2006
Approved By:	Warfel, Don	4/ 5/2006

NRC Acceptance (Date):

Oyster Ceek Drywell Vessel Corrosion Rate Trending Program

Average Measured Thicknesses

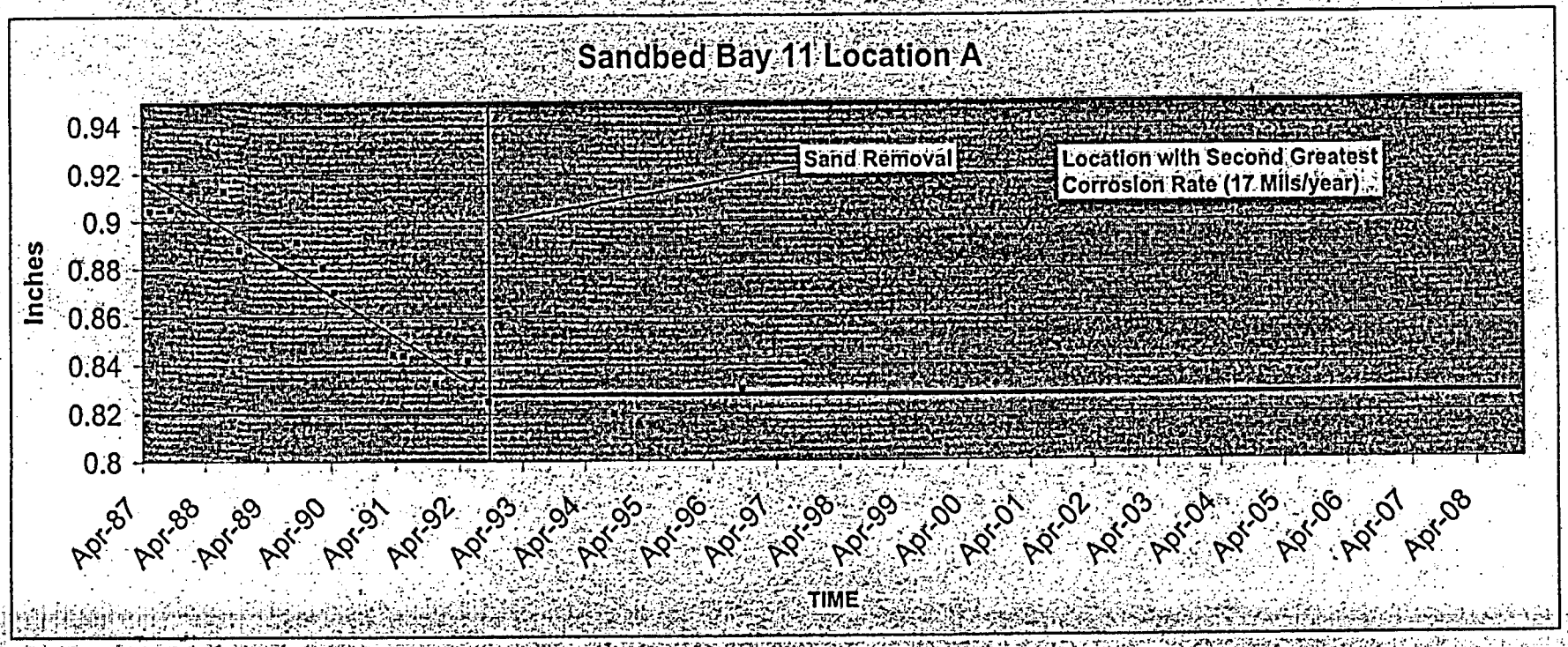
Bay	Data	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
1D									1.115										1.191	1.151
3D									1.178										1.184	1.181
5D									1.174										1.164	1.173
7D									1.135										1.136	1.138
9A									1.155										1.157	1.155
9D		1.072							1.021	1.054	1.020	1.026	1.022	0.993	1.006	0.992	1.000	1.004	0.992	1.004
11A				0.819	0.905	0.922	0.905	0.913	0.888	0.881	0.892	0.881	0.870	0.845	0.844	0.833	0.842	0.825	0.826	0.830
11C	Bottom				0.917	0.954	0.916	0.906	0.891	0.877	0.891	0.870	0.865	0.858	0.863	0.856	0.882	0.854	0.850	0.853
	Top				1.046	1.109	1.079	1.045	1.009	1.016	1.005	0.952	0.977	0.982	1.018	0.964	1.010	0.970	0.984	1.042
13A		0.819							0.905	0.883	0.883	0.862	0.853	0.855	0.853	0.849	0.855	0.834	0.826	0.843
13C	Bottom													0.909	0.901	0.900	0.931	0.904	0.895	0.933
	Top													1.072	1.049	1.046	1.088	1.055	1.037	1.059
13D									0.962				0.932					1.001	0.954	0.990
15A									1.120										1.114	1.127
15D		1.060							1.056	1.060	1.061	1.059	1.057	1.060	1.052	1.042	1.065	1.050	1.053	1.060
17A	Bottom	0.999							0.957	0.965	0.955	0.954	0.951	0.935	0.942	0.933	0.948	0.941	0.934	0.997
	Top	0.999							1.133	1.130	1.131	1.128	1.128	1.131	1.129	1.123	1.125	1.125	1.129	1.144
17D			0.922		0.895	0.891	0.895	0.878	0.862	0.857	0.847	0.836	0.829	0.825	0.829	0.822	0.823	0.817	0.810	0.845
17/19	Bottom								1.004	0.999	0.955	1.010	1.006	0.987	0.982	0.971	0.990	0.989	0.975	0.991
	Top								0.982	1.019	1.131	0.990	0.986	0.975	0.969	0.954	0.972	0.976	0.963	0.967
19A			0.884		0.873	0.859	0.858	0.849	0.837	0.829	0.825	0.840	0.808	0.817	0.803	0.803	0.809	0.804	0.806	0.815
19B					0.898	0.892	0.888	0.864	0.857	0.826	0.845	0.812	0.837	0.853	0.844	0.846	0.847	0.840	0.824	0.837
19C					0.901	0.888	0.888	0.873	0.856	0.845	0.845	0.831	0.825	0.843	0.823	0.822	0.832	0.819	0.826	0.848



Based on Calculation C-1302-187-5300-021

Slope	Best Est	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.0125	0.9932	05/01/92	1.00012	1.154"	0.736"

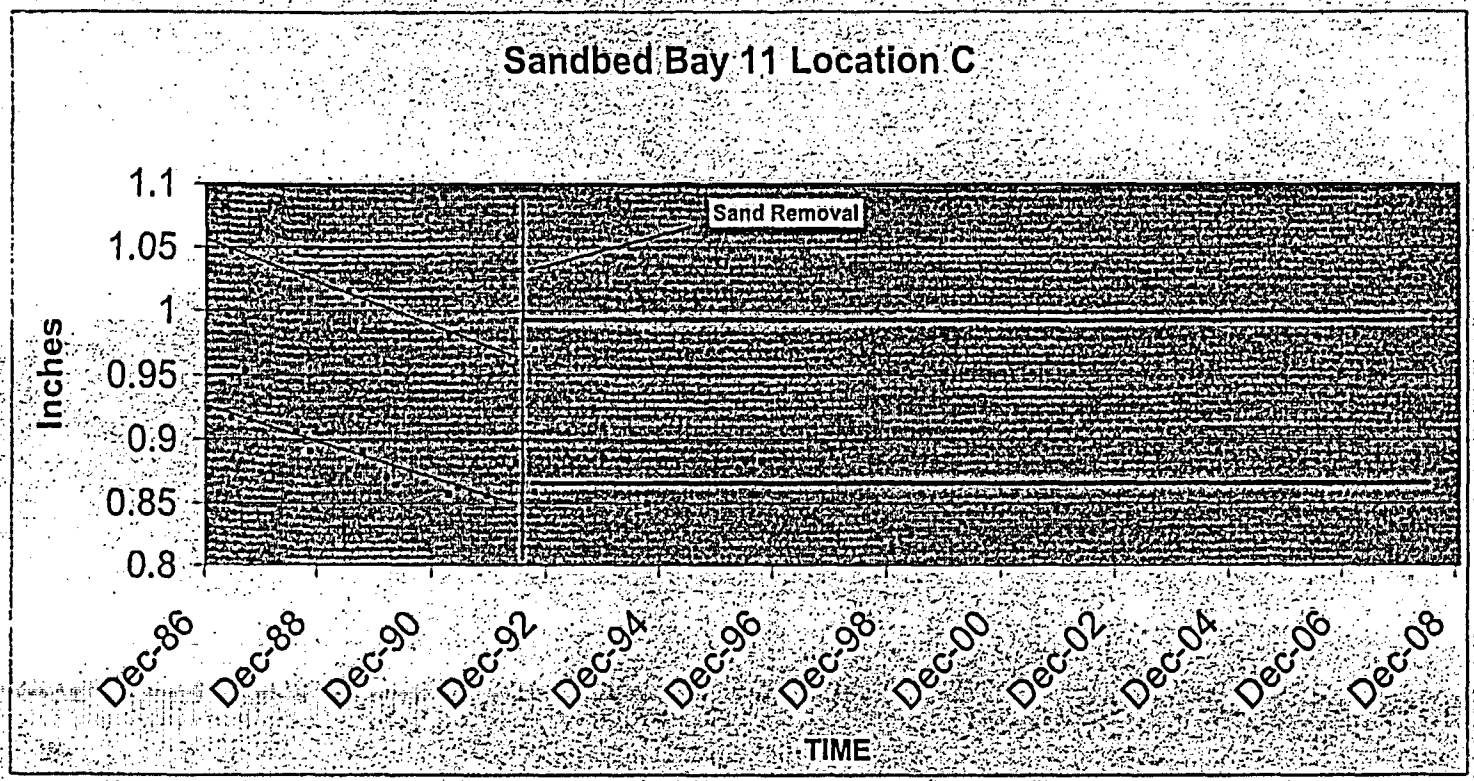
Dates	Dec-86	Feb-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jan-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
9D	1.0715						1.0214	1.0540	1.0200	1.0260	1.0217	0.9926	1.0075	0.9914	1.0000	1.0036	0.9920	1.0080



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.0171	0.83311	05/01/92	0.8251	1.154"	0.736"

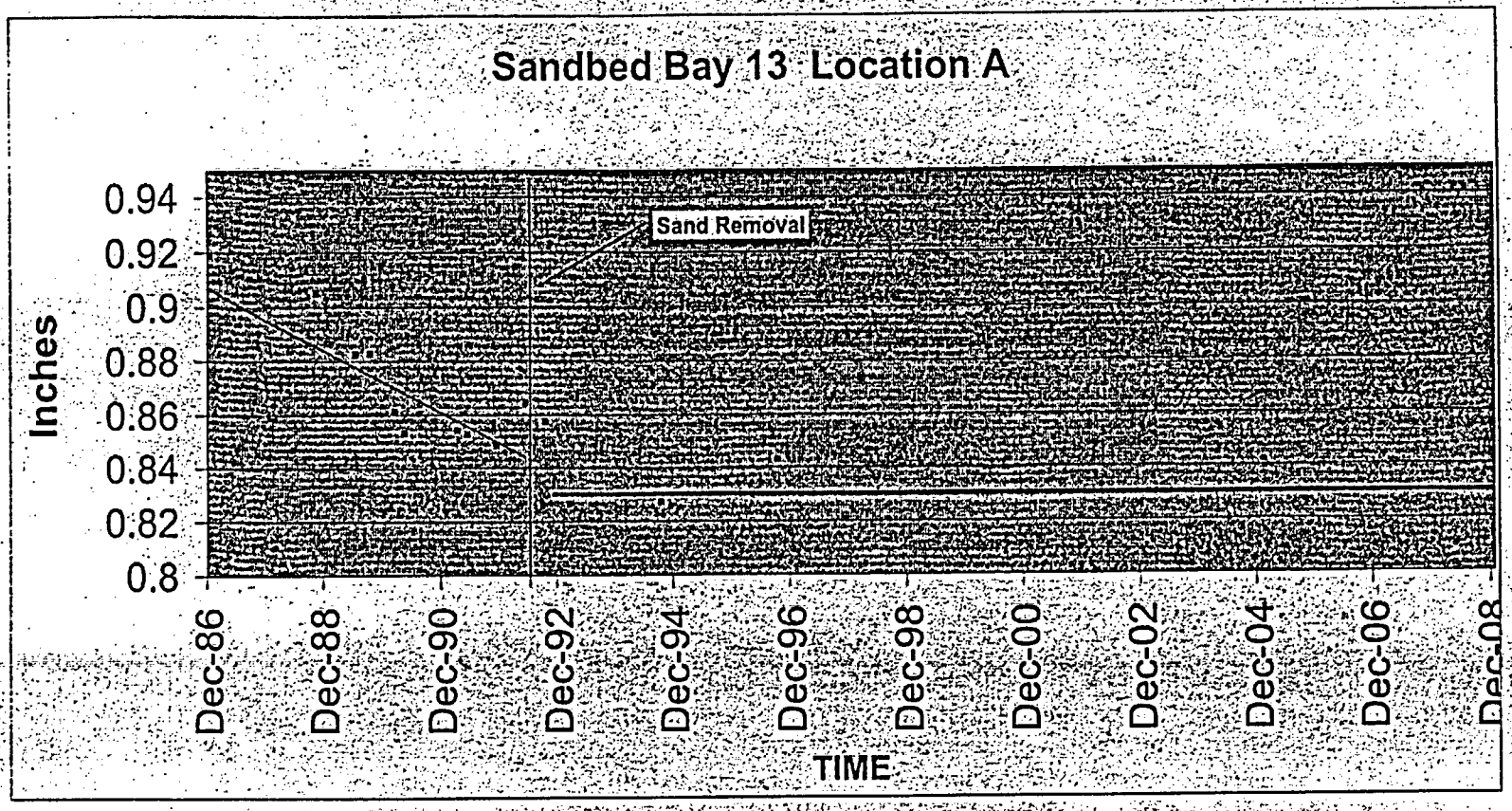
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
11A			0.9187	0.90464	0.92209	0.9052	0.913	0.8882	0.881	0.8916	0.8808	0.8704	0.8446	0.844	0.8326	0.842	0.8252	0.82	0.83



Based on Calculation C-1302-187-5300-021

Slope	Slope	Best Est. Low	Best Est. High	Date	Average Since 1992	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.0143	-0.0171	0.8498	0.9642	05/01/92	0.8641	0.9984	1.154"	0.736"

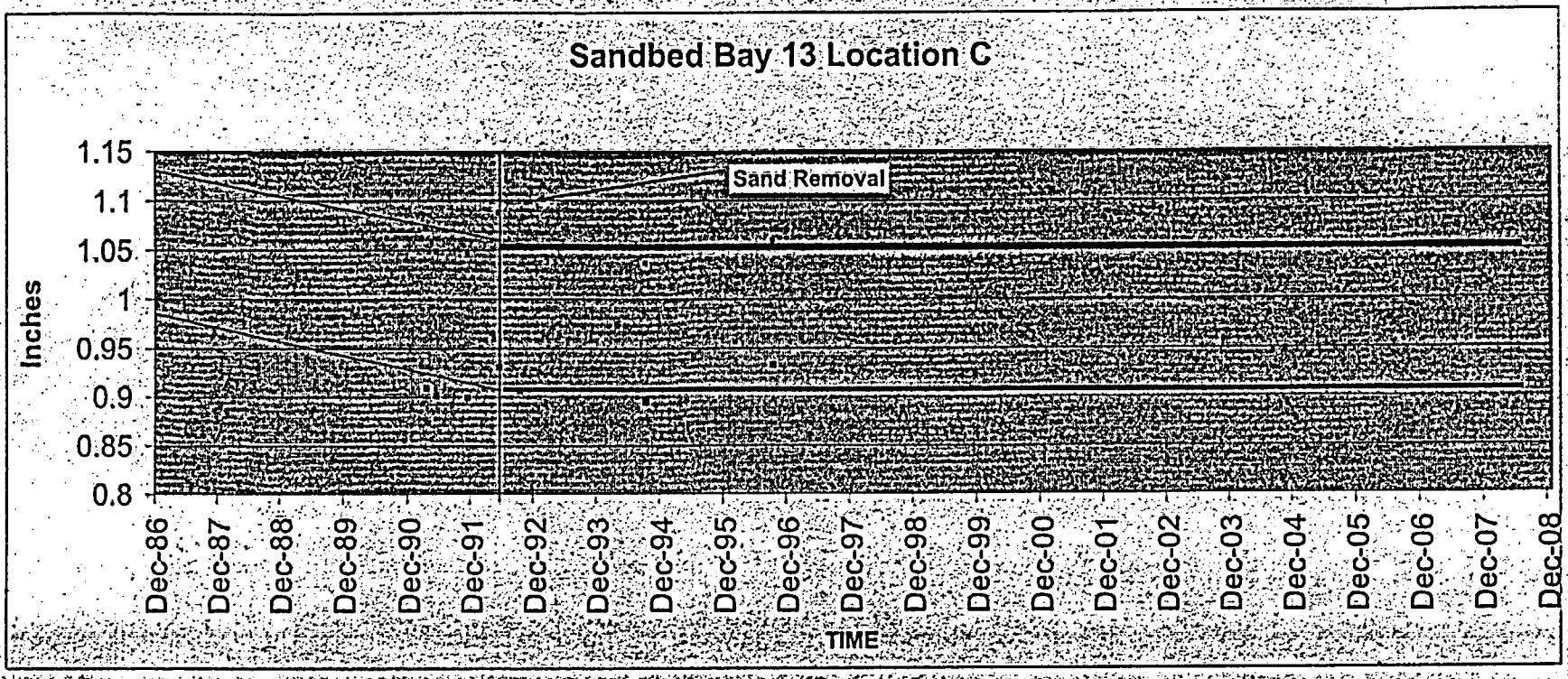
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
11C Bottom				0.91679	0.95364	0.91571	0.9061	0.8907	0.8788	0.8907	0.8703	0.865	0.8575	0.8626	0.8563	0.882	0.8591	0.8503	0.883
11C Top				1.046	1.1086	1.0791	1.0454	1.0089	1.0158	1.005	0.9522	0.977	0.9817	1.018	0.9643	1.01	0.9697	0.9836	1.0418



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.012	0.8442	05/01/92	0.8386	1.154"	0.736"

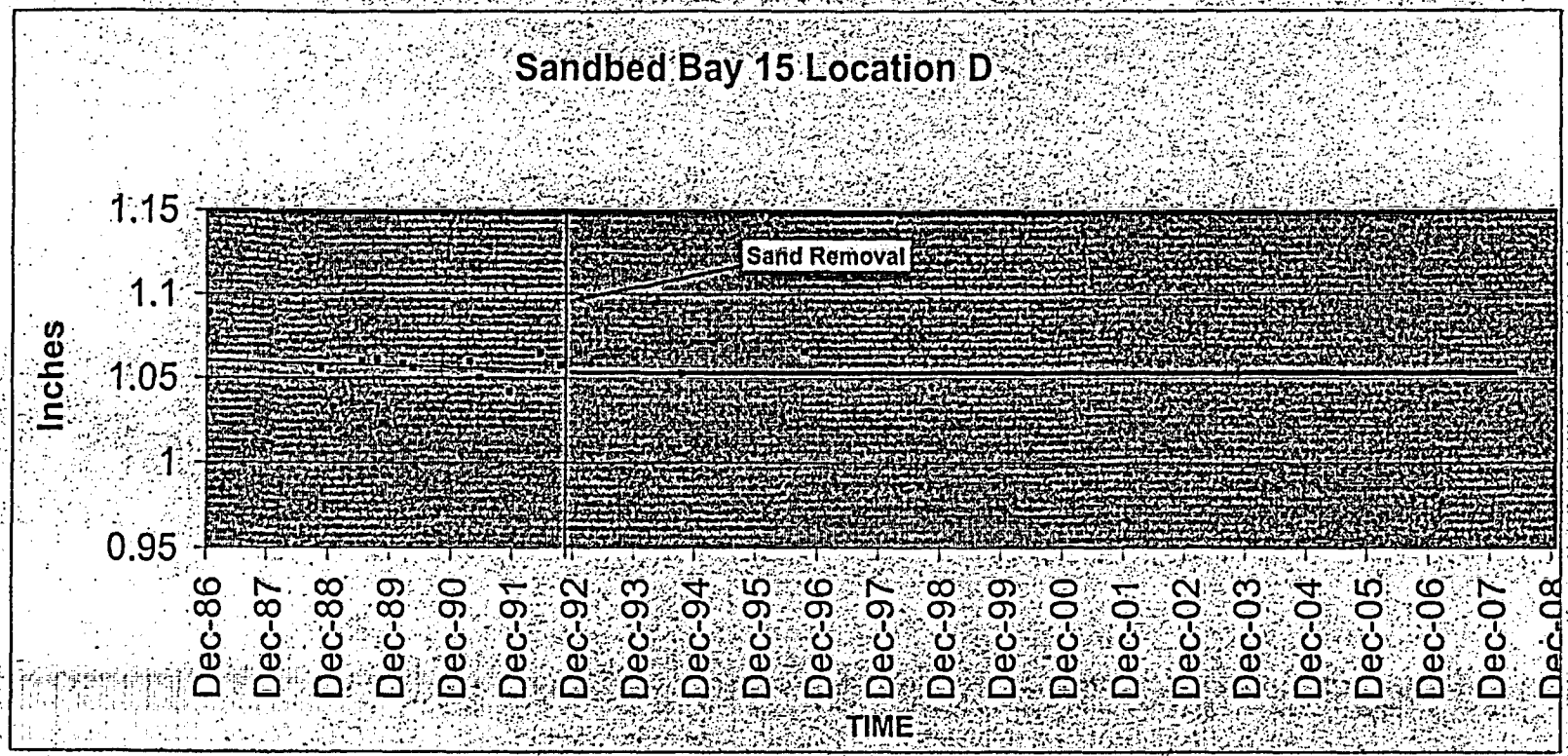
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
	0.91908							0.9053	0.8828	0.883	0.8615	0.8531	0.8545	0.8529	0.8486	0.8645	0.8576	0.8275	0.843



Based on Calculation C-1302-187-5300-021

Slope	Slope	Best Est. Low	Best Est. Hig	Date	Average Since 1992	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.013	-0.0146	0.9073	1.06	05/01/92	1.0505	0.9114	1.154"	0.736"

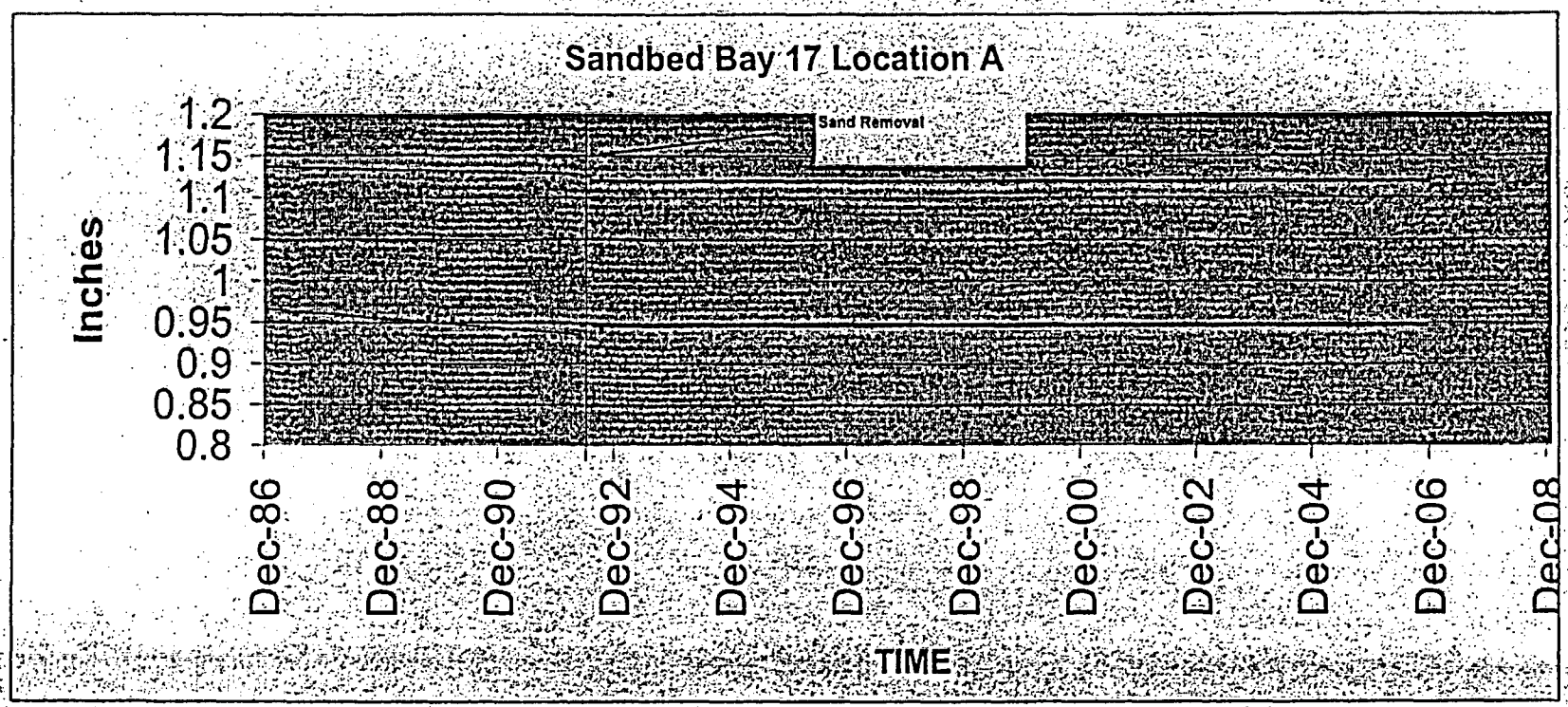
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
13C Bottom													0.9094	0.9013	0.8996	0.9305	0.906	0.8953	0.933
13C Top													1.0722	1.0488	1.0479	1.0882	1.0546	1.037	1.0593



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.001	1.055	05/01/92	1.0588	1.154"	0.736"

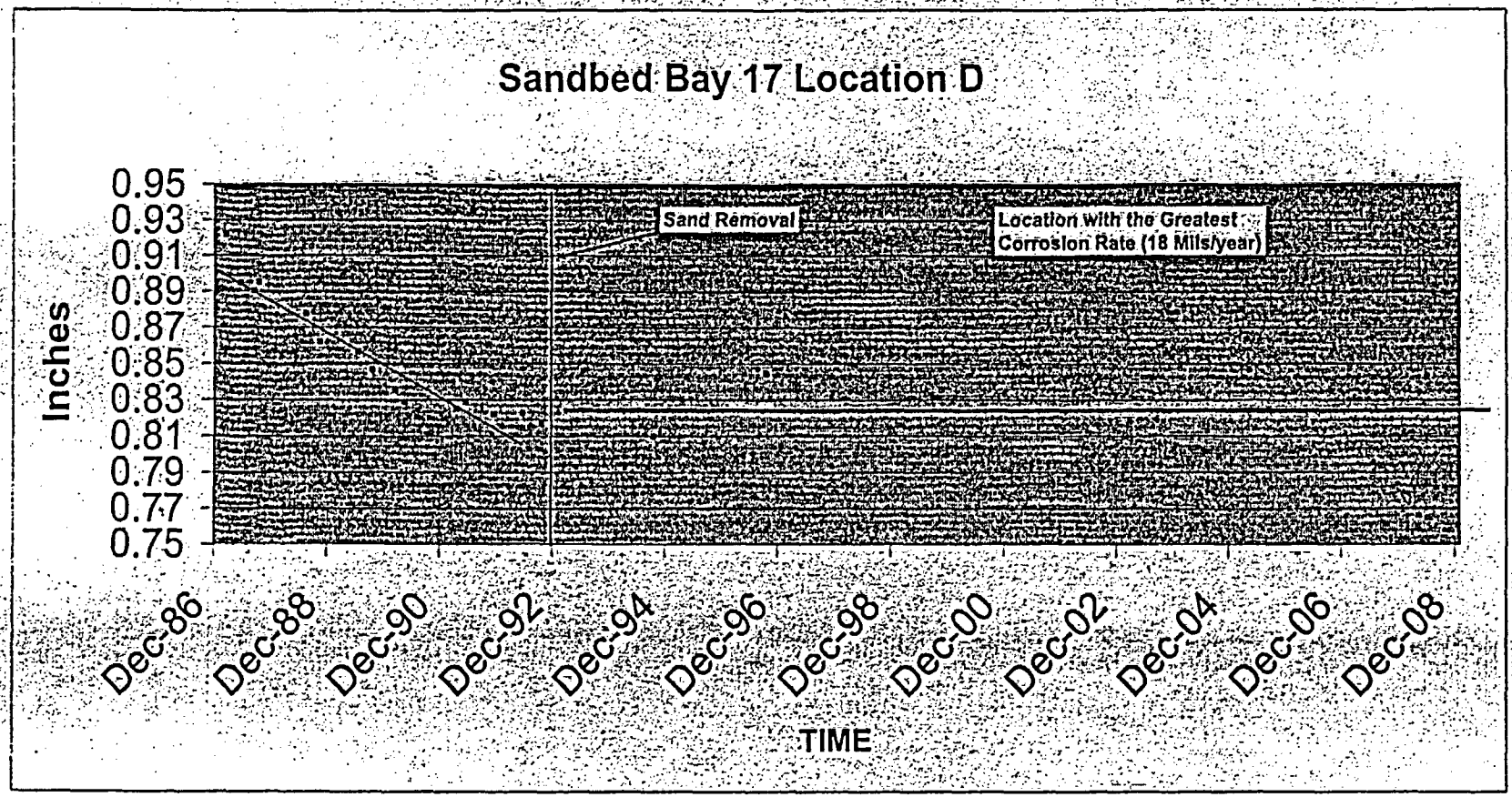
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
	1.089							1.056	1.06	1.0609	1.0586	1.0565	1.0598	1.0502	1.0417	1.0652	1.0577	1.053	1.066



Based on Calculation C-1302-187-5300-021

Slope	Slope	Best Est. Low	Best Est. High	Date	Average Since 1992	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.0058	-0.0017	0.9352	1.1276	05/01/92	1.1328	0.9573	1.134"	0.736"

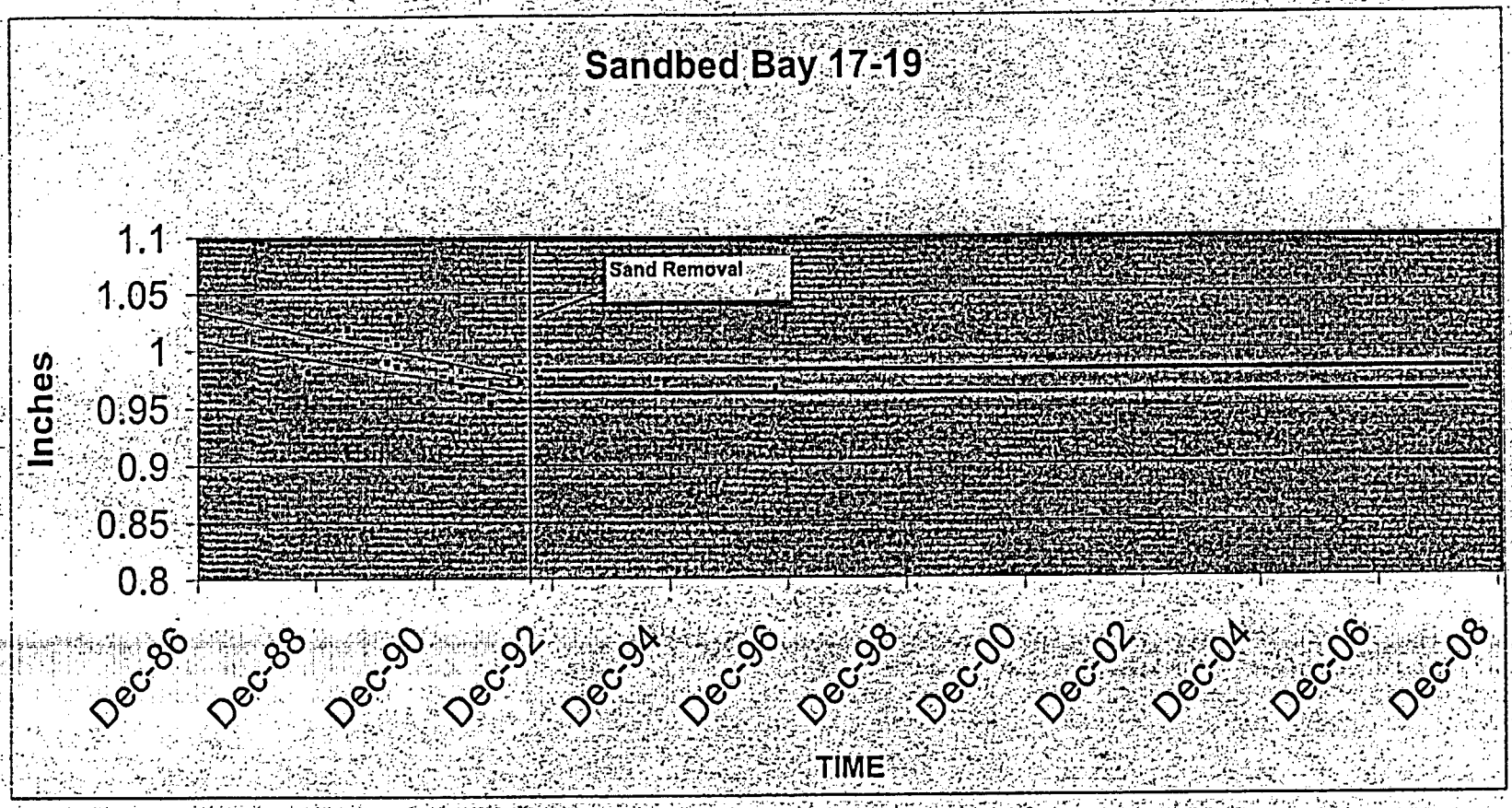
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
17A bottom	0.999							0.9574	0.9645	0.9552	0.9536	0.9508	0.9347	0.9424	0.9328	0.9481	0.9419	0.9338	0.9969
17A Top	0.999							1.1331	1.13	1.1308	1.128	1.1293	1.1309	1.1293	1.1226	1.1254	1.1248	1.1299	1.1441



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.018	0.8057	05/01/92	0.8239	1.154"	0.736"

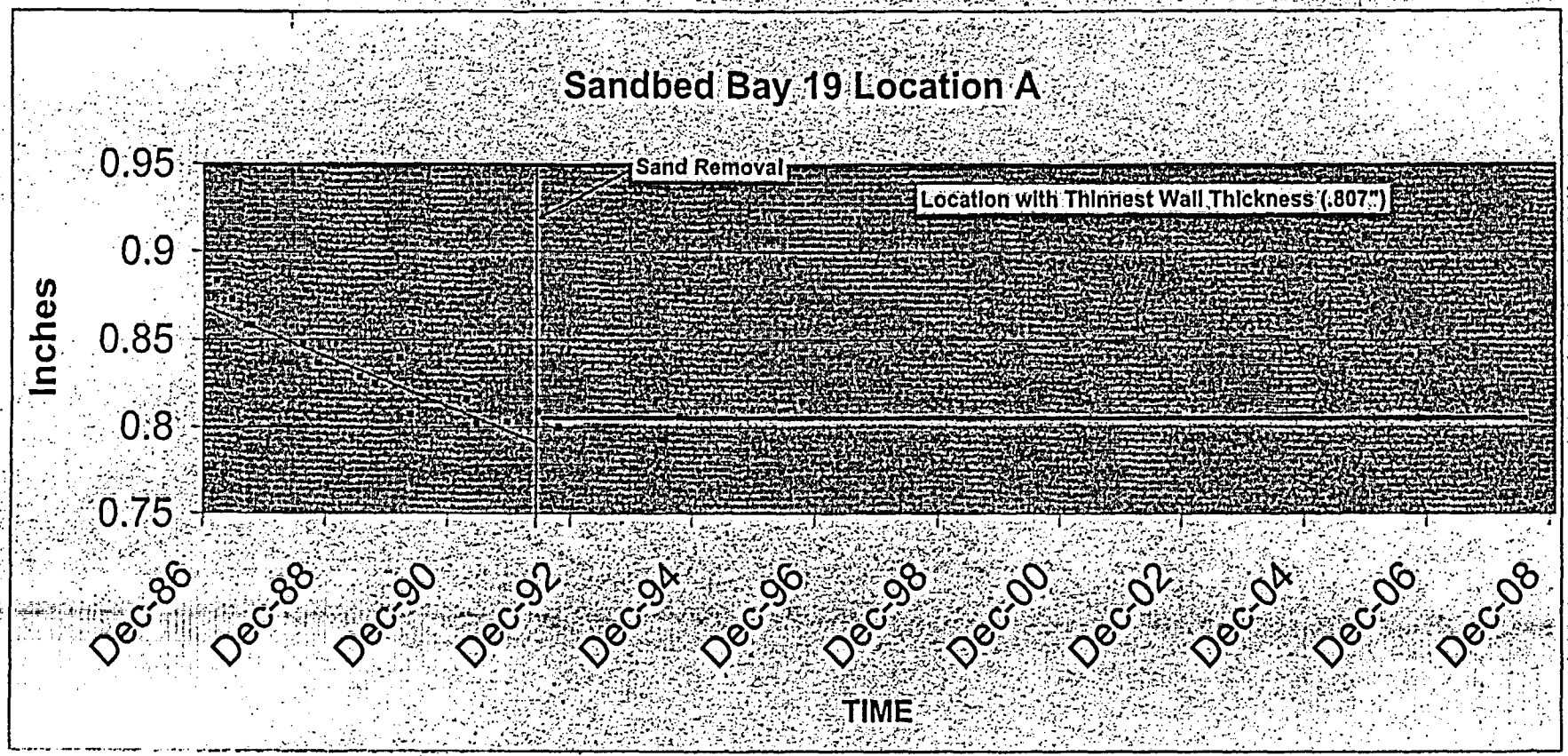
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
17D		0.92217		0.89507	0.89069	0.89528	0.8779	0.8622	0.8568	0.8471	0.8358	0.829	0.8253	0.8291	0.8222	0.823	0.8172	0.81	0.845



Based on Calculation C-1302-187-5300-021

Slope	Slope	Best Est. Low	Best Est. High	Date	Average Since 1992	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.0087	-0.0107	0.9621	0.9761	05/01/92	0.9871	0.9689	1.154"	0.736"

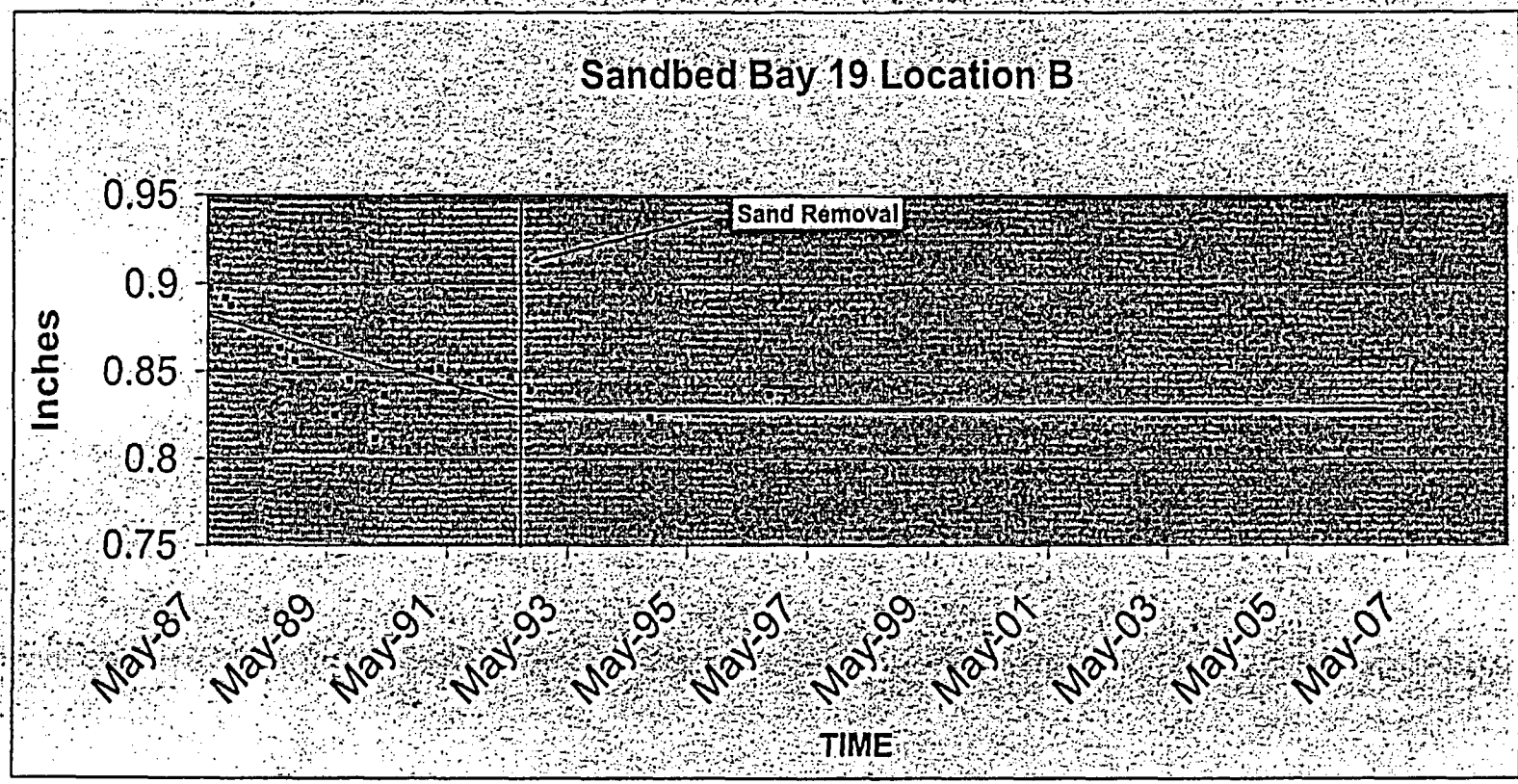
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
17/19 Top								0.9817	1.0191	1.1308	0.9898	0.986	0.9746	0.9693	0.9542	0.9722	0.976	0.963	0.9674
17/19 Bottom								1.0038	0.9988	0.9552	1.01	1.0057	0.987	0.9824	0.9711	0.99	0.9887	0.9748	0.9914



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.015	0.7911	05/01/92	0.8071	1.154"	0.736"

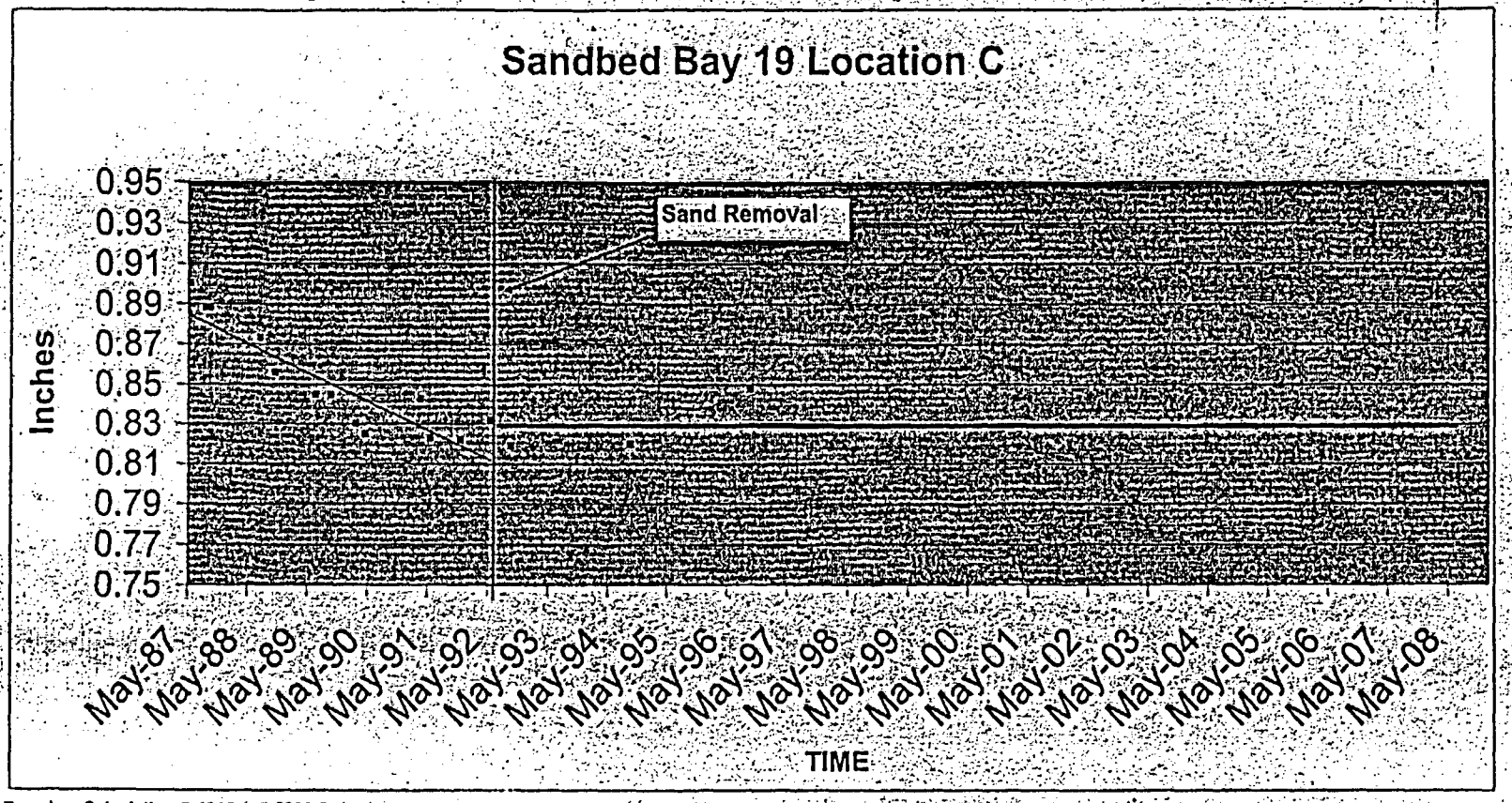
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
19A		0.88364		0.87293	0.8586	0.85829	0.8486	0.8369	0.8288	0.8254	0.8399	0.8076	0.8167	0.8028	0.8032	0.8091	0.8002	0.808	0.815



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.0099	0.8330	05/01/92	0.8337	1.154"	0.736"

Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
19B				0.89763	0.89221	0.8876	0.864	0.8565	0.8256	0.84549	0.812	0.8369	0.8525	0.8444	0.8463	0.8472	0.8396	0.824	0.837



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.015	0.8117	05/01/92	0.829	1.154"	0.736"

Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
I9C			0.90051	0.88818	0.88831	0.8735	0.8563	0.845	0.8447	0.8305	0.8251	0.8428	0.8232	0.8223	0.8319	0.8192	0.82	0.848	

NRC Information Request Form

Item No	*Date Received:*	*Source*
AMP-141	10/ 6/2005	AMP Audit
Topic:	*Status:*	Open
IWE		

Document References:
B.1.27

NRC Representative Morante, Rich

AmerGen (Took Issue): Hufnagel, Joh

Question

AMP B.1.27 IWE

a. Visual inspection of the coatings in the former sandbed region of the drywell is currently conducted under the applicant's protective coatings monitoring and maintenance program; only this AMP is credited for managing loss of material due to corrosion for license renewal. Visual inspection of the containment shell conducted in accordance with the requirements of IWE is typically credited to manage loss of material due to corrosion.

The applicant is requested to provide its technical basis for not also crediting its IWE program for managing loss of material due to corrosion in the former sandbed region of the drywell.

B. During discussions with the applicant's staff on 10/04/05 about augmented inspection conducted under IWE, the applicant presented tabulated inspection results obtained from the mid 1980s to the present, to monitor the remaining drywell wall thickness in the cylindrical and spherical regions where significant corrosion of the outside surface was previously detected.

The applicant is requested to provide (1) a copy of these tabulated inspection results, (2) a list of the nominal design thicknesses in each region of the drywell, (3) a list of the minimum required thicknesses in each region of the drywell, and (4) a list of the projected remaining wall thicknesses in each region of the drywell in the year 2029.

AMP B.1.27 IWE Question on Remaining Wall Thickness in the Former Sandbed Region of the Drywell

c. During discussions with the applicant's staff on 10/05/05, the applicant described the history and resolution of corrosion in the sandbed region. After discovery, thickness measurements were taken from 1986 through 1992, to monitor the progression of wall loss. Remedial actions were completed in early 1993. At that time, the remaining wall thickness exceeded the minimum required thickness. The applicant concluded that it had completely corrected the conditions which led to the corrosion, and terminated its program to monitor the remaining wall thickness. At that time, the remaining years of operation was expected to be no more than 16 years (end of the current license term).

NRC Information Request Form

The applicant's aging management commitment for license renewals is limited to periodic inspection of the coating that was applied to the exterior surface of the drywell as part of the remedial actions. The applicant has not made a license renewal commitment to measure wall thickness in the sandbed region in order to confirm the effectiveness of the remedial actions taken.

Assigned To: Ouaou, Ahmed

Response:

a) Visual inspection of the containment drywell shell, conducted in accordance with ASME Section XI, Subsection IWE, is credited for aging management of accessible areas of the containment drywell shell. Typically this inspection is for internal surfaces of the drywell. The exterior surfaces of the drywell shell in the sand bed region for Mark I containment is considered inaccessible by ASME Section XI, Subsection IWE, thus visual inspection is not possible for a typical Mark I containment including Oyster Creek before the sand was removed from the sand bed region in 1992. After removal of the sand, an epoxy coating was applied to the exterior surfaces of the drywell shell in the sand bed region. The region was made accessible during refueling outages for periodic inspection of the coating. Subsequently Oyster Creek performed periodic visual inspection of the coating in accordance with an NRC current licensing basis commitment. This commitment was implemented prior to implementation of ASME Section XI, Subsection IWE. As a result inspection of the coating was conducted in accordance with the Protective Coating Monitoring and Maintenance Program. Our evaluation of this aging management program concluded the program is adequate to manage aging of the drywell shell in the sand bed region during the period of extended operation consistent with the current licensing basis commitment, and that inclusion of the coating inspection under IWE is not required. However we are amending this position and will commit to monitor the protective coating in the exterior surfaces of the drywell in the sand bed region in accordance with the requirements of ASME Section XI, Subsection IWE during the period of extended operation. For details related to implementation of this commitment, refer to the response to NRC AMP Question #188.

b) A tabulation of ultrasonic testing (UT) thickness measurement results in monitored areas of the drywell spherical region above the sand bed region and in the cylindrical region is included in ASME Section XI, Subsection IWE Program Basis Document (PBD-AMP-B.1.27) Notebook. The tabulation contains information requested by the Staff and is available for review during AMP audit. The tabulation is also provided in Table -1, and Table-2 below.

c) In December 1992, with approval from the NRC a protective epoxy coating was applied to the outside surface of the drywell shell in the sand bed region to prevent additional corrosion in that area. UT thickness measurements taken in 1992, and in 1994, in the sand bed region from inside the drywell confirmed that the corrosion in the sand bed region has been arrested. Periodic inspection of the coating indicates that the coating in that region is performing satisfactorily with no signs of deterioration such as blisters, flakes, or discoloration, etc. Additional UT measurements, taken in 1996 from inside the drywell in the sand bed region showed no ongoing corrosion and provided objective evidence that corrosion has been arrested.

NRC Information Request Form

As a result of these UT measurements and the observed condition of the coating, we concluded that corrosion has been arrested and monitoring of the protective coating alone, without additional UT measurements, will adequately manage loss of material in the drywell shell in the sand bed region. However to provide additional assurance that the protective coating is providing adequate protection to ensure drywell integrity, Oyster Creek will perform periodic confirmatory UT inspections of the drywell shell in the sand bed region. The initial UT measurements will be taken prior to entering the period of extended operation and then every 10 years thereafter. The UT measurements will be taken from inside the drywell at the same locations where the UT measurements were taken in 1996. This revises the license renewal commitment communicated to the NRC in a letter from C. N. Swenson Site Vice President, Oyster Creek Generating Station to U. S. Nuclear Regulatory Commission, "Additional Commitments Associated with Application for renewed Operating License - Oyster Creek Generating Station", dated 12/9/2005. This letter commits to one-time inspection to be conducted prior to entering the period of extended operation. The revised commitment will be to conduct UT measurements on a frequency of 10 years, with the first inspection to occur prior to entering the period of extended operation.

This response was revised to incorporate additional commitments on UT examinations for the sand bed region discussed with NRC Audit team on 1/26/2006.
This response was revised to reference response to NRC Question #AMP-188 and RAI 4.7.2-1(d). AMO 4/1/2006.
The response was revised to add Table-1, and Table-2, and delete reference to RAI 4.7.2-1(d) AMO 4/5/2006.

LRCR #: 229 ***LRA A.5 Commitment #:*** 27

IR#:

Approvals:

Prepared By:	Ouaou, Ahmed	4/ 5/2006
Reviewed By:	Getz, Stu	4/ 5/2006
Approved By:	Warfel, Don	4/ 5/2006

NRC Acceptance (Date):

Table –1. UT Thickness measurements for the Upper Region of the Drywell Shell

Monitored Elevation	Location	Minimum Required Thickness, inches [5]	Average Measured Thickness [1,2,3], inches											Projected Lower 95% Confidence Thickness in 2029
			1987	1988	1989	1990	1991	1992	1993 [3]	1994	1996	2000	2004	
Elevation 50' 2"		0.541"												
	Bay 5–D12					0.743 0.745 0.746	0.742 0.745 0.748	0.747 0.747		0.741	0.748	0.741	0.743	No Ongoing Corrosion
	Bay 5–5H					0.761 0.761	0.755 0.758 0.760	0.758 0.758		0.754	0.757	0.754	0.756	0.7384
	Bay 5–5L					0.706 0.703	0.703 0.705 0.706	0.703 0.707		0.702	0.705	0.706	0.701	No Ongoing Corrosion
	Bay 13–31H					0.762 0.779	0.760 0.758 0.765	0.765 0.763		0.759	0.766	0.762	0.758	No Ongoing Corrosion
	Bay 13–31L					0.687 0.684	0.689 0.678 0.688	0.685 0.688		0.683	0.690	0.682	0.693	No Ongoing Corrosion
	Bay 15–23H					0.758 0.764	0.762 0.762 0.765	0.767 0.763		0.758	0.760	0.758	0.757	0.738
	Bay 15–23L					0.726 0.728	0.726 0.729 0.725	0.726 0.724		0.728	0.724	0.729	0.727	No Ongoing Corrosion
Elevation 51' 10"		0.541"												

Table –1. UT Thickness measurements for the Upper Region of the Drywell Shell

Monitored Elevation	Location	Minimum Required Thickness, inches [5]	Average Measured Thickness [1,2,4], inches											Projected Lower 95% Confidence Thickness in 2029
			1987	1988	1989	1990	1991	1992	1993 [3]	1994	1996	2000	2004	
	Bay 13–32H					0.716	0.715 0.715 0.719	0.717 0.717		0.714	0.715	0.715	0.713	No Ongoing Corrosion
	Bay 13–32L					0.686	0.683 0.683 0.682	0.683 0.676		0.680	0.684	0.679	0.687	No Ongoing Corrosion
Elevation 60' 10"		0.518"												
	Bay 1–5-22								0.693	0.711	0.692	0.689	0.689	No Ongoing Corrosion
Elevation 87' 5"		0.452"												
	Bay 9–20		0.619	0.622 0.620	0.619	0.620	0.614 0.612	0.629 0.614		0.613	0.613	0.604	0.612	0.604.
	Bay 13–28		0.643	0.641 0.642	0.645	0.643	0.635 0.629	0.641 0.637		0.640	0.636	0.635	0.640	No Ongoing Corrosion
	Bay 15–31		0.638	0.636 0.636	0.638	0.642	0.628 0.627	0.631 0.630		0.633	0.632	0.628	0.630	0.615

Notes:

1. The average thickness is based on 49 Ultrasonic Testing (UT) measurements performed at each location
2. Multiple inspections were performed in the years 1988, 1990, 1991, and 1992.
3. The 1993 elevation 60' 10" Bay 5-22 inspection was performed on January 6, 1993. All other locations were inspected in December 1992.
4. Accuracy of Ultrasonic Testing Equipment is plus or minus 0.010 inches.
5. Reference SE-000243-002.

Table –1. UT Thickness measurements for the Upper Region of the Drywell Shell

Conclusion:

Summary of Corrosion Rates of UT measurements taken through year 2004

- There is no ongoing corrosion at two elevations (51' 10" and 60' 10")
- Based on statistical analysis, one location at elevation 50' 2" is undergoing a minor corrosion rate of 0.0003 inches per year,
- Based on statistical analysis, two locations at elevation 87' 5" are undergoing minor corrosion rates of 0.0005 and 0.00075 inches per year

Table –2 UT Thickness measurements for the Sand Bed Region of the Drywell Shell

Location Bay	Sub Location	Dec 1986	Feb 1987	Apr 1987	May 1987	Aug 1987	Sep 1987	Jul 1988	Oct 1988	Jun 1989	Sep 1989	Feb 1990	Apr 1990	Mar 1991	May 1991	Nov 1991	May 1992	Sep 1992	Sep 1994	Sep 1996
1D									1.115										1.101	1.1514
3D									1.178										1.184	1.181
5D									1.174										1.168	1.173
7D									1.135										1.136	1.138
9A									1.155										1.157	1.155
9D		1.072							1.021	1.054	1.020	1.026	1.022	0.993	1.008	0.992	1.000	1.004	0.992	1.008
11A				0.919	0.905	0.922	0.905	0.913	0.888	0.881	0.892	0.881	0.870	0.845	0.844	0.833	0.842	0.825	0.820	0.830
11C	Bottom				0.917	0.954	0.916	0.906	0.891	0.877	0.891	0.870	0.865	0.858	0.863	0.856	0.882	0.859	0.850	0.883
	Top				1.046	1.109	1.079	1.045	1.009	1.016	1.005	0.952	0.977	0.982	1.018	0.964	1.010	0.970	0.984	1.042
13A		0.919							0.905	0.883	0.883	0.862	0.853	0.855	0.853	0.849	0.865	0.858	0.828	0.843
13C	Bottom													0.909	0.901	0.900	0.931	0.906	0.895	0.933
	Top													1.072	1.049	1.048	1.088	1.055	1.037	1.059
13D									0.962				0.932					1.001	0.959	0.990
15A									1.120										1.114	1.127
15D		1.089							1.056	1.060	1.061	1.059	1.057	1.060	1.050	1.042	1.065	1.058	1.053	1.066
17A	Bottom	0.999							0.957	0.965	0.955	0.954	0.951	0.935	0.942	0.933	0.948	0.941	0.934	0.997
	Top	0.999							1.133	1.130	1.131	1.128	1.128	1.131	1.129	1.123	1.125	1.125	1.129	1.144
17D			0.922		0.895	0.891	0.895	0.878	0.862	0.857	0.847	0.836	0.829	0.825	0.829	0.822	0.823	0.817	0.810	0.845
17/19	Top								0.982	1.019	1.131	0.990	0.986	0.975	0.969	0.954	0.972	0.976	0.963	0.967
	Bottom								1.004	0.999	0.955	1.010	1.006	0.987	0.982	0.971	0.990	0.989	0.975	0.991
19A			0.884		0.873	0.859	0.858	0.849	0.837	0.829	0.825	0.840	0.808	0.817	0.803	0.803	0.809	0.800	0.806	0.815
19B					0.898	0.892	0.888	0.864	0.857	0.826	0.845	0.812	0.837	0.853	0.844	0.846	0.847	0.840	0.824	0.837
19C					0.901	0.888	0.888	0.873	0.856	0.845	0.845	0.831	0.825	0.843	0.823	0.822	0.832	0.819	0.820	0.848

EXHIBIT J

CORRO-CONSULTA

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MEMORANDUM

MAY 3, 2006

To: Richard Webster, Esq.
Rutgers Environmental Law Clinic
123 Washington Street
Newark, NJ 07102-5695

Paul Gunter
Reactor Watchdog Project
Nuclear Information and Resource Service
Washington, DC 10036

Subject: **Oyster Creek Dry Well Corrosion**
Comments regarding "Audit Q&A (Question Numbers AMP –141, 210, 356) dated 4/5/06, Ref. ML060960563

I. Summary

The referenced document, which is attached, makes statements with regards to future corrosion and the presence or absence of a need for future inspections of the damaged areas in the sandbed region. After having examined the data presented we find that the conclusions are at odds with good or best corrosion practice. In general, predicting future corrosion based on data collected over the past is perhaps judicious only if a) the corrosion (or deterioration) mechanism is well known, and b) if assurances can be given that the circumstances (environment) under which prior corrosion occurred can and will be maintained in the future. Neither of these two imperatives can be assured at this time. Furthermore, it would seem that for meaningful predictions, the data set, on the basis of which extrapolations are carried out, needs to be consistent. I have found serious concerns in this respect as well. I, therefore, believe that the proposed long inspection intervals are totally unjustified.

II. Details

Following the removal of the sand bed in September of 1992 two sets of UT measurements were recorded in September 1994 and September of 1996. For twelve locations where initial investigations found significant wall thinning, these measurements were made over a 6" x 6" grid at 1 inch spacings, hence 49 individual UT measurements were gathered over an individual grid.[1] Identical grids were

[1] For seven other areas only seven readings were taken at one inch intervals.

surveyed in each of the bays in the sandbed area, and in some instances more than one grid was surveyed in the same bay. The clusters of individual UT measurements were evaluated by calculating the average of the 49 measurements, and naming the resulting averages "average minimum general thickness (AMGT)". The terminology "average minimum general thickness" is misleading because another shape or size of grid could have resulted in lower results.

Presumably the identical grid locations, which were surveyed in September of 1992, were again surveyed in September of 1994 and September of 1996. This generated three data points (AMGT) in each of the various bay locations as a function of time. Plots were then generated to show the AMGT as a function of time. These plots are shown in the Figure 1 below for 8 different bay locations, correlating the measurements as a function of time. Exelon drew straight horizontal lines through these points with extrapolation over the next 10 years to demonstrate the absence of continued corrosion.

This procedure and the subsequent evaluation and interpretation of the data warrant a number of comments.

First, it is noted that with unfailing regularity (even in the cases not shown in Figure 1 below) the AMGT for each grid decreases from 1992 to 1994, ,but then *increases* in 1996. This is of course physically impossible; metal simply does not spontaneously get thicker. Furthermore, statistically, UT measurements in general are accurate within a standard deviation of 2% of wall thickness (modern methodologies can do better). Assuming for a moment that all 49 measurements within a grid measured the same wall thickness, then the average would have had a standard deviation of 2/7 % or about 0.3% of wall thickness which corresponds to +/- 2.5 mils or 95% confidence limits of +/- 5 mils. Since however, not all measurements within the grid were of the same wall thickness, the variability of individual measurements within the grid must have been larger than the standard deviation derived from instrument capability. Exelon assures us that "the tolerance is or the order of +/- 10 mils. As it turns out, the variability of the AMGT for the three measurements for a particular grid expressed as a standard deviation in almost all cases exceeds the +/- 10 mils by a large margin. **I interpret this as a systematic error in the UT methodology employed.**

Moreover, the repeated trends over time observed in Fig. 1 below from high to low to high values underlines the unreliability to these UT measurements. Clearly, the methodology chosen by Exelon to monitor corrosion in the sandbed area is difficult in practice for a number of reasons. **However, these difficulties do not excuse the improper extrapolation of sporadic data obtained over a four-year period to another 10 years and the untenable and irresponsible conclusion that corrosion in the sandbed area therefore is under control.**

There is no doubt that the application of the epoxy coating has slowed the corrosion over the four years from 1992 to 1996. However, no assurances have been given that in the following years the environmental conditions in the sand bed area remained the

same. Neither have there been any assertions that the epoxy coating did not deteriorate over time. Nor does one have any information about the rate of deterioration. It is well known that coatings (generally speaking) perform well for a period of time, but then deteriorate rapidly. In light of such knowledge, coupled with the reliability of the UT data submitted by Exelon, we find an inspection schedule stretched out over 10 years as proposed in ref. document totally irresponsible.

Dr. Rudolf H. Hausler

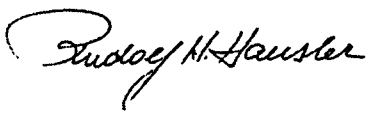


Figure 1

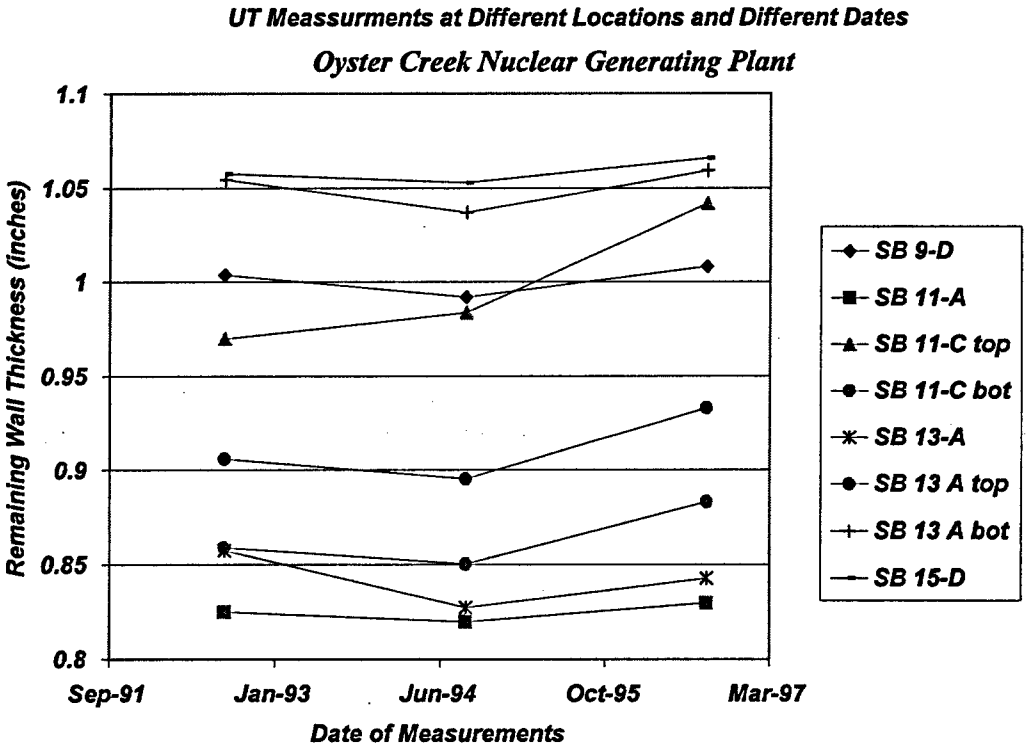
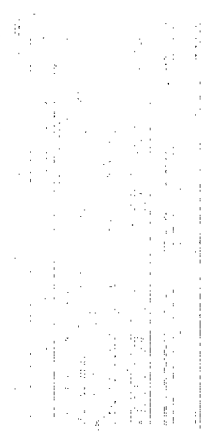

UT Meassurments at Different Locations and Different Dates
Oyster Creek Nuclear Generating Plant
Remaining Wall Thickness (inches)
1.1
1.05
1
0.95
0.9
0.85
0.8
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Date of Measurements
SB 9-D
SB 11-A
SB 11-C top
SB 11-C bot
SB 13-A
SB 13 A top
SB 13 A bot
SB 15-D

EXHIBIT K



1 of 100 DOCUMENTS

Christian Science Monitor

April 19, 2006, Wednesday

SECTION: USA; Pg. 3

LENGTH: 987 words

HEADLINE: Should oldest US nuke plant stay on line?

BYLINE: Alexandra Marks Staff writer of The Christian Science Monitor

DATELINE: NEW YORK

HIGHLIGHT:

New Jersey says the plant is too vulnerable to terrorist attack to have its license renewed.

BODY:

In what could be a precedent-setting case, New Jersey and a coalition of citizens are fighting renewal of the license for the nation's oldest operating nuclear power plant.

Their concern: The structural design of the 1960s-era Oyster Creek nuclear generating station is a security risk because, among other things, it stores highly radioactive spent fuel rods above ground. They argue that makes it vulnerable in the event of a terrorist attack from the air.

Their contention, if proved, could lead the Nuclear Regulatory Commission to deny for the first time a nuclear generating station's request for a license renewal after its original 40-year license expires. It could also set a new standard for the NRC, which currently does not take terrorism into account when it decides whether to renew a nuclear plant's license.

In fact, the NRC recently ruled the "possibility of a terrorist attack ... is speculative" and therefore "beyond the scope" of relicensing proceedings.

The state of New Jersey is appealing that ruling, arguing that the threat of terrorism is not speculative at all but a danger that must be addressed. Terrorism experts agree.

"From a policy perspective, it's absolutely critical that the relicensing procedures take into account the vulnerability from man-made attacks," says Michael Greenberger, director of the University of Maryland's Center for Health and Homeland Security in Baltimore. "It's the height of folly ... for the [NRC] to say that it's not going to consider seriously the vulnerability of the oldest plants when everybody knows these facilities are high-level targets."

Oyster Creek is located in the densely populated Jersey Shore, a fast-growing area in the most densely populated state. That's one of the things that prompted Janet Tauro to join the fight to close the plant when its license expires in 2009.

"It's an obsolete design," she says. "There are almost 3,000 pounds of highly radioactive rods stored 70 feet in the air in a cooling pool of water protected only by a thin metal roof. It's way too vulnerable."

The owners of Oyster Creek, who have applied for a license renewal to operate another 20 years, deny the plant is obsolete and note the metal roof above the spent fuel rods is "a heavily reinforced steel structure."

"Oyster Creek is required to meet every single safety standard and regulation as every plant, no matter what the age," says Oyster Creek spokesman Pete Resler. "The station has been continually upgraded: We put in the most

modern safety systems and equipment."

The clash hints at the challenge of addressing electricity needs as well as environmental concerns about greenhouse gases, which nuclear power plants don't emit. It also shows the challenges faced in this post-9/11 world by the NRC, which has recently come under fire from some members of Congress for what they see as not taking the threat of terrorism seriously enough.

NRC officials say they do take the threat extremely seriously and since 9/11 have taken "numerous steps" to ensure all plants are secure. It's something that is dealt with on a daily basis, they say, not in the context of whether a plant is too old to operate safely - which is what the relicensing procedure is designed to address.

"The fact remains that security at a nuclear power plant is independent of the length of its license. It doesn't matter if a plant operates for five years, 15, or 20: It will have to meet the security requirements that are placed upon it by the NRC," says Scott Brunell, an NRC spokesman. "To attempt to address security for a plant that is seeking relicensing is an attempt to judge a plant on a snapshot that is not going to apply in the future one way or another."

The State of New Jersey sees things very differently. It argues that Oyster Creek's age and design are the very things that present serious security risks, and that those issues can best be addressed during the relicensing process. In its appeal of the NRC ruling, New Jersey's attorney general calls the design "comparatively unreliable and vulnerable." The appeal also argues that a terrorist attack is not just speculative and that the NRC's own actions prove that.

"There would be no need for the Commission to require extensive steps to guard against terrorist attack if the chances of an attack were only speculative," the appeal states.

The NRC has yet to rule on the appeal. In the meantime, a coalition of citizens' groups is lending its support to the state's stand.

"Security's not just a day-to-day concern. In this case, it is a structural issue as well," says Richard Webster, an attorney at the Rutgers Environmental Law Clinic in Newark, which represents the citizens' coalition. "The structure of the plant doesn't protect against this type of attack. If it was being built from scratch today, it could be designed to protect against one."

Oyster Creek officials disagree, saying their plant can sustain a direct hit by an aircraft.

"We're certainly able to defend the facility," says Mr. Resler. "The Electric Power Research Institute [a nonprofit company backed by the power industry] also did a study and found that even if such an event did occur, which is an extremely remote possibility, that there would not be a catastrophic release of radioactivity. These structures are designed for safety with multiple barriers to protect the fuel."

But Ms. Tauro is not convinced. She points to a recent study by the National Academy of Sciences' National Research Council, done at the request of Congress. It found that "successful terrorist attacks on spent fuel pools [at some nuclear power plants,] though difficult, are possible" and that "a propagating fire in a pool could release large amounts of radioactive materials."

"Oyster Creek is within 10 minutes of seven airports, both local and major," she says. "This plant should be retired. Its time has come."

LOAD-DATE: April 19, 2006

EXHIBIT L

Safety and Security of Commercial Spent Nuclear Fuel Storage
Public Report, National Academy of Sciences, April 2005

Report's Highlights

Prepared by the Nuclear Security Coalition, April 2005

The U.S. Congress asked the National Academies to analyze the safety and security of commercial spent nuclear storage in the United States. The highlights of the report are as follows. The full report is on their website http://www.nap.edu/books/0309096472/html/

VULNERABILITY TO ATTACK & CONSEQUENCES

1. Spent fuel pools are necessary at all operating nuclear reactors to store recently discharged fuel. Freshly discharged spent fuel generates too much decay heat to be passively air cooled in casks. This fuel must be stored in a pool of cold water for at least one year before being moved to dry casks.

2. Terrorist attacks on spent fuel pools are possible —a credible threat.

"Finding 2A: Spent fuel storage facilities cannot be dismissed as targets for such attacks because it is not possible to predict the behavior and motivations of terrorists, and because of the attractiveness of spent fuel as a terrorist target given the well known public dread of radiation...The committee judges that attacks by knowledgeable terrorists with access to appropriate technical means are possible."[1]

"Terrorists view nuclear power plant facilities as desirable targets because of the large inventories of radionuclides they contain. The committee believes that knowledgeable terrorists might choose to attack spent fuel pools because: (1) at U.S. commercial nuclear power plants, these pools are less well protected structurally than reactor cores; (2) they typically contain inventories of medium – and long-lived radionuclides that are several times greater than those in individual reactor cores[2]*."*

"A loss-of-pool-coolant event resulting from damage or collapse of the pool could have severe consequences. Severe damage of the pool wall could potentially result from several types of terrorist attacks, for instance: (1) Attacks with large civilian aircraft; (2) Attacks with high-energy weapon; Attacks with explosive charges[3]*."*

3. If a terrorist attack on the spent fuel pool leads to a zirconium cladding fire, it could result in large amounts of radioactive material spreading hundreds of miles.

"Finding 3B –... a terrorist attack that partially or completely drained a spent fuel pool could lead to a propagating zirconium cladding fire and the release of large quantities of radioactive materials to the environment. Details are provided in the committee's classified report[4]*."*

"Such (zirconium cladding) fires would create thermal plumes that could potentially transport radioactive aerosols hundreds of miles downwind under appropriate atmospheric conditions.[5]*"*

"The excess cancer estimates ...to between 2,000 and 6,000 cancer deaths"[6]

GE BOILING WATER MARK I & MARK II UNITS –MORE VULNERABLE

4. Vulnerability to attack differs according to the plant's design; GE Boiling Water Mark I and Mark II Units are more vulnerable to attack.

"The potential vulnerabilities of spent fuel pools to terrorist attack are plant specific ... there are substantial differences in the designs of spent fuel pool that make them more or less vulnerable to certain types of attack.[7]"

"The spent fuel pool, (GE Mark I BWR reactors) is located in the reactor building well above ground level. Most designs have thin steel superstructures. The superstructures and pools were not, however, specifically designed to resist terrorist attacks[8]."

"The vulnerability of a spent fuel pool to terrorist attack depends in part on its location with respect to ground level as well as its construction. Pools are potentially susceptible to attacks from above or the sides depending on their elevation with respect to grade and the presence of surrounding shielding structures[9]."

"Mark I and II BWR plants are located above grade and are shielded by at least one exterior building wall. Some pools are also shielded by the reactor buildings. Some pools are also shielded by "significant" surrounding structures, and some have supplemental floor and column supports."[10]

NAS RECOMMENDS TAKING THE FOLLOWING STEPS IMMEDIATELY

5. NAS recommends taking the following steps immediately to reduce the likelihood of zirconium cladding fire: rearranging spent fuel assemblies in the pool; limiting offloads of full reactor cores; and installing water-spray systems capable of operating when high radiation limits worker access and the pool or overlying building are damaged.

"Finding 3C: It appears to be feasible to reduce the likelihood of a zirconium fire following the loss-of-pool-coolant event using readily implemented measures. The following measures appear to have particular merit:

- *Reconfiguring the spent fuel pools (i.e. redistribution of high decay heat assemblies so that they are surrounded by low decay-heat assemblies) to more evenly distribute decay heat loads...The potential for zirconium cladding fires can be reduced substantially by surrounding freshly discharged fuel assemblies with older spent fuel assemblies in "checkerboard" fashion. The analyses suggest that such arrangements might even be more effective for reducing the potential for zirconium cladding fires than removing this older spent fuel from the pools. However, these advantages have not been unequivocally demonstrated by modeling and experiments.*
- *Limiting the frequency of offloads of full reactor cores into the spent fuel pools, requiring longer shut downs of the reactor before any fuel is offloaded, and providing enhanced security when such offloads must be made.*
- *Development of a redundant and diverse response system to mitigate loss-of-pool-coolant events. Any mitigation system, such as a spray cooling system, must be capable of operation even when the pool is drained (which would result in high radiation fields and limit worker access to the pool) and the pool or overlying building, including equipment attached to the roof or walls, are severely damaged.[11]"*

"The (spray cooling system) second measure...may not be needed at all plants, particularly in plants in which the spent fuel pools are located below grade or are protected from external line-of-sight attacks by exterior walls and other structures.[12]"

NAS discusses conditions that would make it difficult to take some of these mitigating steps; hence multiple, redundant and diverse measures required. Page 55 –

"Of course, damage to the pool and high radiation fields could make it difficult to take some of these mitigative measures. Multiple redundant and diverse measures may be required so that more than one remedy is available to mitigate loss-of-pool-coolant event, especially when access to the pool is limited by damage or high radiation fields.[13]"

DRY CASK STORAGE

6. Dry cask storage has inherent security advantages over spent fuel storage, but it can only be used to store older fuel –fuel that has cooled 3-5 years in the pool before placed in dry casks licensed today.

"Safety and Security Advantages of Dry Cask Storage Versus Wet Pool Storage -Finding 4D: Dry cask storage for older, cooler spent fuel has two inherent advantages over pool storage: (1) It is a passive system that relies on natural air circulation for cooling; and (2) it divides the inventory of that spent fuel among a large number of discrete, robust containers. These factors make it more difficult to attack a large amount of spent fuel at one time and also reduce the consequences of such attacks[14]."

7. There are no large security differences among different storage designs; all designs are more secure than pools but still vulnerable.

Findings 4A: "All storage casks designs are vulnerable to some types of terrorist attacks, but the quantity of radioactive material releases predicted from such attacks is relatively small. These releases are not easily dispersed in the environment[15]."

8. Additional steps may be taken to make dry casks less vulnerable

"Finding 4B: Additional steps can be taken to make dry casks less vulnerable to potential terrorist attacks.[16]"

"Recommendation: "The Nuclear Regulatory Commission should consider using the results of the vulnerability analyses for possible upgrades of requirements in 10 CFR 72 for dry casks, specifically to improve their resistance to terrorist attacks.[17]"

"In the committee's opinion, there are several, relatively simple steps that could be taken to reduce the likelihood of releases of radioactive material from dry casks in the event of a terrorist attack.

- *Additional surveillance could be added to dry cask storage facilities to detect and thwart ground attacks.*
- *Certain types of cask systems could be protected against aircraft strikes by partial earthen berms. Such berms also would deflect the blasts from vehicle bombs.*
- *Visual barriers could be placed around storage pads to prevent targeting of individual casks by aircraft or standoff weapons. These would have to be designed so that they would not trap jet fuel in the event of an aircraft attack.*
- *The spacing of vertical casks on the storage pads can be changed, or spacers (shims) can be placed between the casks, to reduce the likelihood of cask-to-cask interactions in the event of an aircraft attack.*
- *Relatively minor changes in the design of newly manufactured casks could be made to improve their resistance to certain types of attack scenarios.[18]"*

9. Based on plant-specific vulnerability analyses, NRC might determine moving spent fuel from pools into dry cask storage to reduce risk. However, NAS was not asked by Congress to recommend whether transfer of spent fuel rods from pools to a system of dry casks should be accelerated; therefore they could not provide specific recommendations on this issue.

"Finding 4E: Depending on the outcome of plant-specific vulnerability analyses described in the committee's classified report, the Nuclear Regulatory Commission might determine that earlier movements of spent fuel from pools into dry cask storage would be prudent to reduce the potential consequences of terrorist attacks on pools at some commercial nuclear plants. The statement of task directs the committee to examine the risks of spent fuel storage options and alternatives for decision makers; not to recommend whether any spent fuel should be transferred from pool storage to cask storage. In fact, there may be some commercial plants that, because of pool designs or fuel loadings, may require some removal of spent fuel from their pools. If there is a need to remove spent fuel from the pools it should become clearer once the vulnerability and consequence analyses described in the classified report are completed[19]."

NAS CALLS FOR MORE ANALYSES

10. NAS expresses concern over NRC's slow pace analyses.

"...the Nuclear Regulatory Commission's analyses of spent fuel storage vulnerabilities have not yet been completed and actions to reduce vulnerabilities ...have not yet been taken. Moreover, some important additional analyses remain to be done. The slow pace in completing this work is of concern given the enormous consequences as described elsewhere in this report[20]"

11. Additional <u>independent</u> analyses are needed to understand more fully the vulnerabilities and consequences of events that could lead to propagating zirconium fires.

"Finding 2C Recommendation: "Although the committee did not specifically investigate the effectiveness and adequacy of improved surveillance and security measures for protecting stored spent fuel, an assessment of current measures should be performed by an independent organization[21]."

12. Because vulnerability is <u>plant specific</u>, the committee recommended that plant-by-plant vulnerability analyses be performed.

"Finding 3 D:The potential vulnerabilities of spent fuel pools to terrorist attacks are plant-design specific. Therefore specific vulnerabilities can only be understood by examining the characteristics of spent fuel storage at each plant. As described in the classified report, there are substantial differences in the designs of PWR and BWR spent fuel pools. PWR pools tend to be located near or below grade, whereas BWR pools typically are located well above grade but are protected by exterior walls and other structures. In addition, there are plant-specific differences among BWRs and PWRs that would increase or decrease the vulnerabilities of the pools to various kinds of terrorist attacks, making generic conclusions difficult.[22]"

13. The report calls on the <u>NRC</u> to conduct additional analyses to obtain better understanding of potential risks to ensure operators take prompt and effective measures to reduce consequences of attacks.

"The analyses carried out for the Nuclear Regulatory Commission (described in the committee's classified report) do not consider maximum credible scenarios... To be judged a "credible" scenario, the terrorist must be able to carry it out as designed.[23]"

"Finding 3E: The NRC and independent analysts have made progress in understanding some vulnerability of spent fuel pools to certain terrorist attacks and the consequences of such attacks for releases of radioactivity to the environment. However, additional work on specific issues is needed urgently...The work to date ...has not been sufficient to adequately understand the vulnerabilities and consequences."

"Recommendation: The Nuclear Regulatory Commission should undertake best -estimate analyses to more fully understand the vulnerabilities and consequences of loss-of-pool-coolant events that could lead to a zirconium cladding fire. Based on these analyses, the Commission should take appropriate actions to address any significant vulnerabilities identified. The committee provides details on additional analyses that should be carried out in the classified report.[24]"

Consequence analyses should address the following questions

"The consequence analyses should address the following questions:

- *To what extent would such attacks damage the spent fuel in the pool, and what would be the thermal consequences of such damage?*
- *Is it feasible to reconfigure the spent fuel within pools to prevent zirconium cladding fires given the actual characteristics (i.e., heat generation) of spent fuel assemblies in the pool, even if the fuel were damaged in an attack? Is there enough space in the pools at all commercial reactor sites to implement fuel reconfiguration?*
- *In the event of a localized zirconium cladding fire, will such rearrangement prevent its spread to the rest of the pool?*
- *How much spray cooling is needed to prevent zirconium cladding fires and prevent propagation of such fires? Which of the different options for providing spray cooling are effective under attack and accident conditions?"[25]*

Analyses must be performed that accounts for the full range of variation in spent fuel pool designs

"Sensitivity analyses should be undertaken to account for the full range in variation in spent fuel pool designs (e.g., rack designs, capacities, spent fuel burn-ups and ages) at U.S. commercial nuclear power plants.[26]"

NAS - SECURITY NEGATIVELY IMPACTED BY NRC'S SECRECY

14. Current classification and security practices are impeding sharing valuable information between the NRC, nuclear reactor operators, and system vendors, negatively impacting constructive feedback and ultimately security.

"Finding 5A: Security restrictions on sharing of information and analyses are hindering progress in addressing potential vulnerabilities of spent fuel storage to terrorist attacks."

Recommendation: "The Nuclear Regulatory Commission should improve the sharing of pertinent information on vulnerability and consequence analyses on spent fuel storage with nuclear power plant operators and dry cask storage system vendors on a timely basis.[27]"

15. More constructive interaction with the public and independent analysts would increase confidence in the NRC and industry and reduce vulnerability.

"The committee also believes that the public is an important audience for the work being carried out to assess and mitigate vulnerabilities to spent fuel storage facilities. While it is inappropriate to share all information publicly, more constructive interaction with the public

and independent analysts could improve the work being carried out, and also increase confidence in the nuclear regulatory Commission and industry decisions and actions to reduce the vulnerability of spent fuel storage to terrorist threats[28]"

16. On several important questions, NAS was unable to obtain enough information from the NRC to assess effectiveness security at commercial nuclear reactors. Therefore the committee recommended assessment of security measures is undertaken by an organization independent of the NRC and industry.

"The Commission staff declined to provide a formal briefing to the committee on the DBT for radiological sabotage, asserting that the committee did not have a need to know this information.[29]"

NRC & NUCLEAR INDUSTRY SAY THEY ARE NOT RESPONSIBLE FOR SECURITY AGAINST TERRRORIST ATTACKS – CITIZENS ASK, WHO IS TAKING RESPONSIBILITY?

"To the committee's knowledge, there are currently no requirements in place to defend against the kinds of larger-scale; premeditated, skillful attacks that were carried out on September 11, 2001, whether or not a commercial aircraft is involved. Staff from the NRC and representatives from the nuclear industry repeatedly told the committee that they view detecting, preventing, and thwarting such attacks as the federal government's responsibility[30]*."*

End Notes

[1] 'Safety and Security of Commercial Spent Fuel Storage," National Research Council of the National Academy of Sciences, Public Version, April, 2005, p. 4
[2] NAS Ibid, p. 36
[3] NAS, Ibid, p. 49
[4] NAS, Ibid, p. 6
[5] NAS, Ibid, p.50
[6] NAS, Ibid, p.45
[7] NAS, Ibid, p. 6
[8] NAS, Ibid, p. 41
[9] NAS, Ibid, p. 43
[10] NAS, Ibid, p. 43
[11] NAS, Ibid, p.6, 57
[12] NAS, Ibid, p. 59
[13] NAS, Ibid, p. 55
[14] NAS, Ibid, p. 8
[15] NAS, Ibid, p.7
[16] NAS, Ibid, p. 7
[17] NAS, Ibid, p. 7
[18] NAS, Ibid, p. 68
[19] NAS, Ibid, p. 8
[20] NAS, Ibid, p. 75
[21] NAS Ibid, p. 5, 36
[22] NAS, Ibid, p. 6, 58
[23] NAS, Ibid, p. 28
[24] NAS, Ibid, p. 6, 58
[25] NAS, Ibid, p. 59
[26] NAS, Ibid, p. 59
[27] NAS, Ibid, p. 8
[28] NAS, Ibid, p. 9
[29] NAS, Ibid, p. 31
[30] NAS, Ibid, p. 47

EXHIBIT M

Powering Our Community
for Today and Tomorrow

Used Fuel Security Fact Sheet

Independent Used Fuel Storage Installation (ISFSI)

Spent nuclear fuel decays over time and is less radioactive than the fuel in the reactor. The Used Fuel can be safely cooled by air circulating through their storage vaults. The radioactive material is contained in ceramic fuel pellets, which have a melting point of 5,000 degrees, and are inside metal rods, with a melting point of 3,000 degrees. The fuel assemblies are placed in thick stainless steel, leak-tight canisters that are welded shut.

The loaded storage canister is transported in a thick steel cask that is tightly sealed and then placed into a reinforced concrete storage vault. The vault walls are approximately three feet thick and are designed to withstand natural or man-made events, including, but not limited to, earthquakes, hurricanes, tornados and tornado generated projectiles, and floods.

The ISFSI facility at Oyster Creek is protected from sabotage and intrusion with measures that are equivalent to those for the plant itself. This "defense in depth" system makes dry fuel storage a safe and secure way to temporarily store spent fuel.

All project planning, construction, and transportation related to Used Fuel management is designed to account for and protect against multiple disaster-level events as well as radiological sabotage. An analysis post 9/11 demonstrates the ISFSI can withstand the impact of a large commercial aircraft without breaching the canister barrier.

The ISFSI would not be an attractive target for terrorists. The vaults are low structures that take up very little space. The high level of security now in effect in the airspace, waterways and ground surrounding all nuclear plants today make it even more secure.

The storage area is designed to hold Used Fuel from Oyster Creek Generating Station alone. NRC regulations and township guidelines prohibit any other generating station from storing fuel at the site.

Congress has mandated that the Department of Energy find a national Used Fuel repository. AmerGen's goal is for Oyster Creek's waste to go to Yucca Mountain when it is approved and constructed by the federal government. The draft schedule has the Yucca Mountain repository receiving Used Fuel in 2010 at the earliest.

Used Fuel Pool

The Used Fuel pool is accessed from the 119-foot elevation at the top of the Reactor Building at Oyster Creek. The walls around this elevation are insulated metal siding mounted to steel framing. It is misleading to consider this as a "thin steel structure" as the steel framing is of substantial I-Beam construction that supports the reactor building gantry crane.

The pool extends down through the reactor building enclosed in massive concrete walls integrated with the reactor containment structure and supported on concrete columns. The pool is approximately 40 feet deep providing in excess of 25 feet of water above the top of the stored fuel.

The crash of an airplane into the reactor building 119-foot elevation would involve damage to the reactor building gantry crane and equipment, both from impact and fire, but it is highly unlikely the crash would cause any significant damage to the fuel stored in the Used Fuel pool. The steel framing, the pool's massive concrete structure and supporting columns would protect the pool from impact damage and the contained water would provide protection to the fuel from impact and fire effects.

oystercreek
Clean, Safe, Reliable Energy For The Future

EXHIBIT N

Division of Environmental Safety and Health
Radiation Protection and Release Prevention Element
PO Box 415
Trenton, NJ 08625-0415
Phone: (609) 984-5636
Fax: (609) 984-7513

July 30, 2004

Mr. Hubert Miller
Regional Administrator
U.S. Nuclear Regulatory Commission
475 Allendale Rd.
King of Prussia, PA 19406-1415

Subject: Effects of Aircraft Impact on Spent Fuel Pools in New Jersey

Dear Mr. Miller:

Since the September 11, 2001 tragedy, nuclear power generation facilities have been the subject of numerous evaluations related to the prevention of and emergency response to possible terrorist actions, including the use of aircraft as a destructive device. The State of New Jersey through our Radiation Protection and Release Prevention Element – Bureau of Nuclear Engineering (BNE) has been studying developments in this area.

Recently, two technical studies related to the effects of aircraft impact on Spent Fuel Pools have been performed by private parties and were reviewed by the NRC. These two studies were the Nuclear Energy Institute (NEI)/Electric Power Research Institute (EPRI) Study: "Deterring Terrorism: Aircraft Crash Impact Analyses Demonstrate Nuclear Power Plant's Structural Strength," issued March 2003 (hereafter referred to as the NEI Study) and the paper, "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States," April 21, 2003, Robert Alvarez, et al., published in Science and Global Security, Spring 2003 (hereafter referred to as the Alvarez Paper).

NEI considers the details of their study, submitted to the NRC for review, to be security sensitive. Accordingly, New Jersey did not have access to the complete report and could not conduct a detailed independent review as to the study's validity for nuclear facilities located in the state. However, NEI has made public sufficient information to conclude that the study was limited to the evaluation of the impact of a Boeing 767-400 airplane into containment buildings, used fuel storage pools, used fuel "Dry" storage facilities and used fuel transportation containers. The NEI Study does not appear to have taken into account the thermal and structural consequences and collateral damage of the explosion and resulting fire that would also occur from the impact of a commercial aircraft. In

addition, it appears that the structural models used to evaluate impact damage were based on "representative" (not site-specific), structures, which were considered by NEI to be typical to those that exist across the nuclear power industry.

The Alvarez Paper was available to New Jersey as was the NRC staff's review and comments. This paper focused on the potential generic vulnerabilities of spent fuel pools to terrorist attack. The paper also details the possible public safety and environmental consequences should such attacks successfully occur. Included in this paper were conservative estimates of the radiological release should a spent fuel zircaloy cladding fire occur due to a significant breach of a spent fuel pool. The paper states, "The long-term land-contamination consequences of such an event could be significantly worse than those from Chernobyl". The paper further states (in reference to Chernobyl), "The total area of this radiation-control zone is huge: 10,000 km^2, equal to half the area of the State of New Jersey. During the following decade, the population of this area declined by almost half because of migration to areas of lower contamination".

As you are aware, New Jersey is the home to four operating nuclear power reactors located at two separate generating sites. Three power reactors, "Hope Creek", "Salem Unit 1" and "Salem 2", are located on the Delaware River at the PSE&G Artificial Island Site and the fourth reactor, "Oyster Creek", is located near Barnegat Bay and the Atlantic coastline at the AmerGen Oyster Creek Site.

New Jersey is especially concerned about the vulnerability of the Oyster Creek spent fuel pool (OCSFP) to a terrorist attack using a commercial aircraft. This concern is based, in part, on the structural design of the superstructure of the building which encloses the OCSFP (metal siding, concrete roof panels, high collapse potential for this scenario), the location of the pool in the building (high elevation, near an outside wall, pool surface open to superstructure), the relatively unimpeded flight path to the fuel pool location (located on an open coastal plane with minimal surrounding obstructions to fuel pool wall), and, most importantly, the lack of a comprehensive site-specific evaluation for this terrorist aircraft impact scenario which addresses the collective consequences of impact and resulting explosion, fire (including thermal gradients through fuel pool concrete), and probable structural collapse on the OCSFP and fuel assemblies.

Additionally, the site-specific radiological release (including a timeline for the expected release) resulting from this terrorist aircraft impact scenario needs to be quantified by the NRC and provided to New Jersey for emergency planning preparation to insure that the safety of the residents of New Jersey and first responders can be maintained. New Jersey requests this information be provided expediently.

Since New Jersey is not aware of any site-specific evaluation of the OCSFP that addresses these issues, it is requesting that the USNRC provide detailed technical assurance documenting the basis that the above mentioned concerns have been rigorously addressed and that the safety of residents of New Jersey and the environment can be maintained should a 9-11 style terrorist attack occur at Oyster Creek.

New Jersey is also requesting that some provision be made so that authorized representatives of the State of New Jersey, Bureau of Nuclear Engineering, can be granted access to review any and all documentation which is used by the NRC as the basis for concluding that terrorist threats to nuclear power facilities do not represent a risk to New Jersey residents.

If you need additional information, please contact Mr. Kent Tosch, Manager of the Bureau of Nuclear Engineering, at (609) 984-7701.

Sincerely,

Jill Lipoti, Ph.D., Assistant Director
Radiation Protection Program and Release Prevention

EXHIBIT O

A paper by Alvarez et al. (2003a; see also Thompson, 2003) took the analyses in NUREG-1738 to their logical ends in light of the September 11, 2001, terrorist attacks: Namely, what would happen if there were a loss-of-pool-coolant event that drained the spent fuel pool? Such an event was not considered in NUREG-1738, but the analytical results in that study were presented in a manner that made such an analysis possible.

Alvarez and his co-authors concluded that such an event would lead to the rapid heat-up of spent fuel in a dense-packed pool to temperatures at which the zirconium alloy cladding would catch fire and release many of the fuel's fission products, particularly cesium-137. They suggested that the fire could spread to the older spent fuel, resulting in long-term contamination consequences that were worse than those from the Chernobyl accident. Citing two reports by Brookhaven National Laboratory (BNL, 1987, 1997), they estimated that between 10 and 100 percent of the cesium-137 could be mobilized in the plume from the burning spent fuel pool, which could cause tens of thousands of excess cancer deaths, loss of tens of thousands of square kilometers of land, and economic losses in the hundreds of billions of dollars. The excess cancer estimates were revised downward to between 2000 and 6000 cancer deaths in a subsequent paper (Beyea et al., 2004) that more accurately accounted for average population densities around U.S. power plants.

Alvarez and his co-authors recommended that spent fuel be transferred to dry storage within five years of discharge from the reactor. They noted that this would reduce the radioactive inventories in spent fuel pools and allow the remaining fuel to be returned to open-rack storage to allow for more effective coolant circulation, should a loss-of-pool-coolant event occur. The authors also discussed other compensatory measures that could be taken to reduce the consequences of such events.

The Alvarez et al. (2003a) paper received extensive attention and comments, including a comment from the Nuclear Regulatory Commission staff (USNRC, 2003a; see Alvarez et al., 2003b, for a response). None of the commentators challenged the main conclusion of the Alvarez et al. (2003a) paper that a severe loss-of-pool-coolant accident might lead to a spent fuel fire in a dense-packed pool. Rather, the commentators challenged the likelihood that such an event could occur through accident or sabotage, the assumptions used to calculate the offsite consequences of such an event, and the cost-effectiveness of the authors' proposal to move spent fuel into dry cask storage. One commentator summarized these differences in a single sentence (Benjamin, 2003, p. 53): "In a nutshell, [Alvarez et al.] correctly identify a problem that needs to be addressed, but they do not adequately demonstrate that the proposed solution is cost-effective or that it is optimal."

The Nuclear Regulatory Commission staff provided a briefing to the committee that provides a further critique of the Alvarez et al. (2003a) analysis that goes beyond the USNRC (2003a) paper. Commission staff told the committee that the NUREG-1738 analyses attempted to provide a bounding analysis of current and conceivable future spent fuel pools at plants undergoing decommissioning and therefore relied on conservative assumptions. The analysis assumed, for example, that the pool contained an equivalent of three-and-one-half reactor cores of spent fuel, including the core from the most recent reactor cycle. The staff also asserted that NUREG-1738 did not provide a realistic analysis of consequences. Commission staff concluded that "the risks and potential societal cost of [a] terrorist attack on spent fuel pools do not justify the complex and costly measures

proposed in Alvarez et al. (2003) to move and store 1/3 of spent fuel pools [sic] inventory in dry storage casks."[8]

The committee provides a discussion of the Alvarez et al. (2003a) analysis in its classified report. The committee judges that some of their release estimates should not be dismissed.

The 2003 Nuclear Regulatory Commission (USNRC, 2003b) staff publication NUREG-0933, *A Prioritization of Generic Safety Issues*,[9] discusses beyond-design-basis accidents in spent fuel pools. The study draws some of the same consequence conclusions as the Alvarez et al. (2003a) paper. It notes that in a dense-packed pool, a zirconium cladding fire "would probably spread to most or all of the spent fuel pool" (p. 1). This could drive what the report refers to as "borderline aged fuel" into a molten condition leading to the release of fission products comparable to molten fuel in a reactor core.

The NUREG-0933 report (USNRC, 2003b) summarizes technical analyses of the frequencies of severe accidents for three BWR scenarios. The report concludes that the greatest risk is from a beyond-design-basis seismic event. While the consequences of such accidents are considerable, the report concludes that their frequencies are no greater than would be expected for reactor core damage accidents due to seismic events beyond the design basis safe shutdown earthquake.

An analysis of spent fuel operating experience by the Nuclear Regulatory Commission staff (USNRC, 1997) showed that several accidental partial-loss-of-pool-coolant events have occurred as a result of human error. Two of these involved the loss of more than 5 feet of water from the pool, but none had serious consequences. Nevertheless, Commission staff suggested that plant-specific analyses and corrective actions should be taken to reduce the potential for such events in the future.

It is important to recognize that with the exception of the Alvarez et al. (2003a) paper, all of the previous U.S. work reviewed by the committee has focused on safety risks, not security risks. The Nuclear Regulatory Commission analyses of spent fuel storage vulnerabilities were not completed by the time the committee finalized its information gathering for this report, but the committee did receive briefings on this work. In addition, analyses have been undertaken of external impacts on power plant structures by aircraft for the few commercial power plants that are located close enough to airports to consider hardening of the plant design to resist accidental aircraft crashes. These analyses were done as part of the plants' licensing safety analyses. The committee did not look further into these few plants because the aircraft considered were smaller and the impact velocities considered were much lower than those that might be brought to bear in a well-planned terrorist attack.

The committee did learn about work to assess the risks of spent fuel storage to terrorist attacks in Germany (see Appendix C for a description). However, the details of this work are classified by the German government and therefore are unavailable to the

[8] The quote is from a PowerPoint presentation made by Nuclear Regulatory Commission staff to the committee at one of its meetings.

[9] NUREG-0933 is a historical record that provides a yearly update of generic safety issues. It does not provide any additional technical analysis of these issues.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
OFFICE OF THE SECRETARY

ATOMIC SAFETY AND LICENSING BOARD

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

In the Matter of	)	
	)	Docket No. 50-0219-LR
AMERGEN ENERGY COMPANY, LLC	)	
	)	ASLB No. 06-844-01-LR
(License Renewal for the Oyster Creek	)	
Nuclear Generating Station)	)	May 5, 2006
	)	

CITIZENS' MOTION TO COMPEL FURTHER MANDATORY DISCLOSURES

PRELIMINARY STATEMENT

Nuclear Information and Resource Service, Jersey Shore Nuclear Watch, Inc., Grandmothers, Mothers and More for Energy Safety, New Jersey Public Interest Research Group, New Jersey Sierra Club, and New Jersey Environmental Federation (collectively "Citizens") have diligently attempted to work out issues regarding mandatory disclosures with the other parties without involving this Board. Unfortunately, while many issues have been resolved, one issue has proved to be incapable of resolution through discussions between the parties. Thus, Citizens are forced to file this motion to compel disclosure of certain documents, that Citizens believe are relevant to the contention but AmerGen believes are not. In addition, Citizens are currently unable to determine whether other relevant documents have been omitted from the disclosures provided by AmerGen, and ask that the Board allow such objections to be heard until after Citizens actually get the chance

to review the disclosed documents and can assess whether other relevant documents have been omitted.

ARGUMENT

This Motion to Compel is brought pursuant to 10 C.F.R. § 2.1204 and 10 C.F.R. § 2.323. It is timely pursuant to the ASLB order in this proceeding, which requires any Motions to Compel to be submitted by May 5, 2006. Order (Extending Time to File Motions Relating to Initial Mandatory Disclosures) (Apr. 12, 2006) (unpublished). Citizens have attempted to resolve the issue addressed by this motion through negotiation, but such resolution has proved impossible. On May 4, 2006, counsel for AmerGen confirmed in writing that it did not disclose documents relating solely to corrosion in the upper drywell on grounds of relevancy:

> I am confirming that AmerGen has excluded documents relating solely to inspection of, or corrosion in, the upper region of the drywell because such documents are outside the scope of the admitted contention and not relevant to the contention. However, if a document contained information about the upper region AND the sand bed region, we did not exclude or excise the information about the upper region, since the sand bed region information would be relevant. So you will likely get some of the information you seek regarding the upper region.

E-mail from D. Silverman to Richard Webster, dated May 4, 2006. Attached as Exhibit MC 1.

Mr. Silverman indicated at that time that AmerGen's position had been carefully formulated and AmerGen did not intend to change its position. Later, Citizens discussed the issue with AmerGen, and were advised to plan on filing this Motion unless Citizens were told otherwise. Because Citizens have heard nothing further from AmerGen, they are filing this Motion.

Citizens agree with AmerGen that corrosion in the upper drywell is outside the scope of the contention, but that does not make it irrelevant. In fact, information about corrosion in the upper drywell is relevant to the contention on multiple grounds.

First, corrosion in the upper drywell is an indicator of whether water is present on the exterior of the drywell. In discussions, AmerGen and Citizens have agreed that documents about the presence of water anywhere on the exterior of the drywell is relevant to the contention, but AmerGen now attempts to split hairs and exclude documents about corrosion in the upper region. AmerGen's absurd approach to relevancy should be rejected by the Board, because all documents that tend to show the presence or absence of water on the exterior of the drywell are relevant. A key issue in this proceeding is whether a corrosive environment could occur in the sand bed region during any license renewal period. AmerGen has already conceded that corrosion is ongoing in the upper drywell. License Renewal Application at 3.5-21. The ongoing corrosion shows that water is present in the upper drywell.[1] The presence of water in the upper drywell tends to indicate that an ongoing leak is probably occurring, because the high temperatures at that region mean that water from a past leak that has been corrected would evaporate relatively quickly, which would not cause ongoing corrosion. Any water in the upper drywell would tend to flow by gravity to the sand bed region. This means that a leak in the upper region could cause a corrosive environment at the sand bed region. Thus, because the ongoing corrosion in the upper drywell indicates that water is present in the upper drywell, it tends to show that water could move down to the sand bed region and create a corrosive environment there.

[1] For a full discussion of these arguments regarding the significance of the upper region corrosion for the sand bed region see Memorandum of Dr. R. H. Hausler, dated April 4, 2006, attached to Citizens Motion to Reconsider, dated April 6. 2006.

On this basis alone, information about ongoing corrosion in the upper drywell is highly relevant to the contention.

Second, as explained in the Citizen's Response to AmerGen's Motion to Dismiss, also filed today, which is incorporated by reference into this Motion, another core issue in this proceeding is whether AmerGen has correctly predicted the potential for corrosion based on three rounds of limited UT testing in the sand bed region from 1992 to 1996. Dr. Hausler has identified erroneous systematic bias in AmerGen's favor in the last round of results in the sand bed region taken in 1996 and has found that the extrapolations based on that data were improper.[2] Thus, at present, AmerGen's predictions are based on erroneous data and extrapolations, which need to be corrected. Documents concerning testing in the upper region, which occurred in 1996 and subsequently in 2000 and 2004, would assist the parties to analyze whether the systematic bias was caused by different testing methodologies or different testing contractors, and would allow the parties better characterize the actual random error observed in UT measurements at Oyster Creek.

Third, documents about the corrosion in the upper drywell are relevant because AmerGen has had to deal with ongoing corrosion in that area. Thus, presumably AmerGen has developed a corrosion prediction model that confirms that the scope and frequency of testing in the upper drywell is adequate. Because more rounds of testing have been carried out in the upper region, this model should have been calibrated and verified. To answer the contention, AmerGen must undertake a similar task for the sand bed region. The approach used for the upper drywell will inform how predicting corrosion should be

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[2] Memorandum of Dr. R.H. Hausler, dated May 3, 2006 at 2, filed with the accompanying Response to AmerGen's Motion to Dismiss.

approached in the sand bed. Therefore, documents relating to the analysis and prediction of future corrosion in the upper drywell are also relevant to the contention.

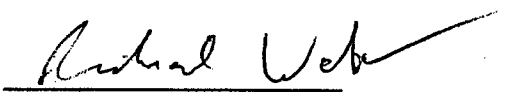
In summary, because the drywell is a safety critical component that is now highly degraded, it is important that decisions about aging management of the drywell in the sand bed are based on analysis of all relevant information. Information concerning the possible presence of water at the sand bed region, about the errors associated with the UT testing methods employed at Oyster Creek, and concerning corrosion analysis and modeling methods used by AmerGen is highly relevant to the contention. Therefore, this Board should compel AmerGen to disclose all documents relating to corrosion in the upper drywell.

Finally, we note that the only reason that Citizens were able identify that this dispute existed is because, when asked, AmerGen candidly informed Citizens about its approach to relevancy of documents concerning the upper drywell. To date, Citizens have not had the chance to review any of the actual records on AmerGen's disclosure list. Citizens asked AmerGen to propose a schedule for full disclosure of the actual records on April 27, 2006, but have not yet received a response to this request. Letter from Webster to Silverman, dated April 27, 2006. Thus, it is impossible to know whether other disputes regarding relevancy may emerge after Citizens review the documents. Citizens therefore request that the Board also grant permission for Citizens to file motions to compel regarding relevancy within a month of AmerGen making all its disclosable documents available for viewing by Citizens.

CONCLUSION

For the forgoing reasons, the ASLB should compel AmerGen to disclose all records relating to corrosion of the upper drywell at Oyster Creek, and should grant permission for Citizens to file further motions to compel within a month of AmerGen making all its disclosable documents available for viewing by Citizens.

Respectfully submitted,



Richard Webster, Esq.
RUTGERS ENVIRONMENTAL
LAW CLINIC
Attorneys for Petitioners

Dated: May 5, 2006

Citizens' Exhibit MC 1

From: <dsilverman@morganlewis.com>
To: "Richard Webster" <rwebster@kinoy.rutgers.edu>
Date: 5/4/06 11:39AM
Subject: Re: Disclosure Issues

Thanks for your prompt response. I am confirming that AmerGen has excluded documents relating solely to inspection of, or corrosion in, the upper region of the drywell because such documents are outside the scope of the admitted contention and not relevant to the contention. However, if a document contained information about the upper region AND the sand bed region, we did not exclude or excise the information about the upper region, since the sand bed region information would be relevant. So you will likely get some of the information you seek regarding the upper region.

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Direct Dial: 202.739.5502

"Richard Webster" <rwebster@kinoy.rutgers.edu>
05/04/2006 10:23 AM

To: dsilverman@morganlewis.com
cc:
Subject: Disclosure Issues

Don,

1) I am happy to provide you with additional affidavits regarding searches at other organizations. I will organize that next week. Previously, we discussed providing one affidavit from Paul Gunter, which we did. I assure you that we have tried to find and list all the relevant documents that we

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ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judges:
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Dr. Anthony J. Baratta

In the Matter of	)	
	)	Docket No. 50-0219-LR
AMERGEN ENERGY COMPANY, LLC	)	
	)	ASLB No. 06-844-01-LR
(License Renewal for the Oyster Creek	)	
Nuclear Generating Station)	)	May 5, 2006
	)	

CITIZENS' BRIEF IN OPPOSITION TO AMERGEN'S MOTION TO DISMISS AND TO SUSPEND MANDATORY DISCLOSURES

PRELIMINARY STATEMENT

After Nuclear Information and Resource Service, Jersey Shore Nuclear Watch, Inc., Grandmothers, Mothers and More for Energy Safety, New Jersey Public Interest Research Group, New Jersey Sierra Club, and New Jersey Environmental Federation (collectively "Citizens") had their contention admitted, AmerGen decided to do two or three rounds of additional testing of metal thickness in the sand bed region of the drywell liner.

However, AmerGen has failed to show that the proposed additional rounds of testing would be sufficient to maintain margins of safety during any extended licensing period. In contrast, in this response Citizens present expert analysis of AmerGen's recent submission to the NRC on drywell corrosion. This analysis shows that the proposed inspection frequency of once every 10 years intervals between tests is "totally irresponsible" because it is based on a fundamentally flawed extrapolation of questionable data. Thus, the commitment to monitor the

drywell once every ten years completely fails to ensure that the current razor-thin safety margins will be maintained, and therefore fails to render Citizens' contention moot. Because the contention is not moot, there is no reason to curtail discovery at this early stage. In any event, suspending discovery would only cause needless delay, which AmerGen can ill-afford, because this license renewal is on a very tight schedule.[1]

ARGUMENT

I. The Contention Requires Safety Margins To Be Maintained

The admitted contention states:

> AmerGen's License Renewal Application fails to establish an adequate aging management plan for the sand bed region of the drywell liner, because its corrosion management program fails to include periodic UT [ultrasonic] measurements in that region throughout the period of extended operation and, thus, *will not enable AmerGen to determine the amount of corrosion in that region and thereby maintain the safety margins during the term of the extended license.*

ASLB Decision Granting Citizens' Petition, LBP-06-7 (April 19, 2006) (emphasis added).

In its initial argument, AmerGen wrongly suggests that *any* periodic UT monitoring in the sand bed region would render the contention moot. AmerGen Mootness Motion at 4. This characterization of the contention overlooks the critical caveat that the UT monitoring regime must enable AmerGen to maintain safety margins during the entirety any extended licensing term. Under AmerGen's absurd approach, a single measurement in the sand bed region once every twenty years would be periodic, and thus would render the contention moot, irrespective of the inability of such a measurement to ensure that safety is maintained throughout the entire relicensing period.

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[1] See http://www.nrc.gov/reactors/operating/licensing/renewal/applications/oystercreek.html

In fact, to render the contention moot, AmerGen would have to demonstrate that its proposed measurement regime will allow safety margins to be maintained throughout the entire relicensing period. Recognizing this requirement, AmerGen admits that Citizens petitioned for "an adequate number of confirmatory UT measurements," but argues that the ad-hoc measurement regime it has proposed in response to NRC audit questions is now adequate. AmerGen Mootness Motion at 7-8. Strangely however, AmerGen fails to present any technical opinion or scientific information to back up the assertions of its legal team. While AmerGen's lawyers may be extremely learned, the assessment of whether the proposed measurement regime is adequate is an analysis that must be done by scientists, not lawyers. Thus, there is not a shred of evidence to support AmerGen's Mootness Motion. Indeed in its response to AmerGen's Mootness Motion, the NRC staff acknowledged that "Staff has yet to determine the adequacy of these commitments as part of the applicant's corrosion management program." NRC Staff Response to AmerGen's Mootness Motion at 5.

II. The Mootness Motion Is Inadequate On Its Face

As movant, AmerGen initially carries the burden of going forward. If that burden is met and contrary facts are presented, the movant also ultimately bears the burden of proof to establish the facts asserted in its motion. Here, AmerGen has completely failed to meet its initial burden, because it has presented no evidence whatsoever on the issue of the adequacy of the proposed monitoring regime. Arguments of counsel are not evidence and cannot substitute for the opinions of experts who are properly qualified to make such assessments. Thus, AmerGen's motion is inadequate on its face and must be rejected by the ASLB.

III. Scientific Analysis Shows That The Proposed Monitoring Is Inadequate

Even though AmerGen has not even attempted to meet its burden of going forward and Citizens, as respondents, have no burden to respond with any evidence, Citizens have obtained another memorandum from corrosion expert Dr. Hausler analyzing AmerGen's latest monitoring proposal. This memorandum is attached as Citizens' Exhibit RM 1. Dr. Hausler finds that the proposal to monitor once every ten years is based on such flimsy evidence that it is "at odds with good or best corrosion practice" and "totally irresponsible." Ex. RM 1 at 1, 3.

Dr. Hausler based these strongly worded conclusions on his analysis of AmerGen's audit response that exposes further deficiencies in AmerGen's monitoring and analysis. Most glaringly, AmerGen failed to even find the obvious systematic error[2] in the 1996 results, even though the results showed the physically impossible, that metal was spontaneously healing, and the deviation from the previous results exceeded AmerGen's own estimate of random error by large margins. Ex. RM 1 at 2. Second, AmerGen assumed that the conditions in the drywell from 1992 to 1996 would continue throughout any extended license renewal period, even through AmerGen knew that the protective epoxy coating applied in 1992 would deteriorate over time and corrosion is ongoing in the upper drywell, indicating the likely presence of a corrosive environment at the exterior of the drywell. Id. at 2-3; see also Memorandum of Dr. R. H. Hausler, dated April 4, 2006, attached to Citizens Motion to Reconsider, dated April 6, 2006.

The graphs presented in AmerGen's audit response make it plain that there is no model of the worst case for potential corrosion in the sand bed region of the drywell. Based on measurements taken in 1992, 1994, and 1996, AmerGen simply assumed that the corrosion rate was zero and that there was no potential for future corrosion and therefore that no further UT

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[2] Systematic error refers to an error which biases the results in one direction, in contrast to random errors, which introduce random fluctuations around a mean value.

measurements were required. Dr. Hausler finds this irresponsible because, as he has previously stated, the visual inspections alone are not adequate to detect corrosion in the sand bed.[3] Furthermore, AmerGen made no effort to find what the worst case *could* be. The appropriate monitoring frequency can only be determined by statistically analyzing periodic UT results, assessing what the worse case corrosion could be under adverse conditions, and then seeing how soon safety margins could be compromised. The next monitoring interval must occur *before* there is any *possibility* that safety margins could be compromised. In its reformulation of the contention, the ASLB properly recognized the need for the scope and frequency of UT monitoring to ensure that safety margins are maintained, but AmerGen attempts to ignore this requirement, once again illustrating its worrying disregard of safety considerations.

It is highly debatable whether it was advisable to allow AmerGen to cease UT monitoring of the sand bed in 1996, when the license still had 13 years to run. However, by agreeing to monitor every ten years starting before any license renewal, AmerGen, prompted by NRC audit comments, has implicitly recognized that its conclusion about the lack of corrosion in the sand bed rested too heavily on potentially flawed assumptions. The proposal to actually do some measurements has injected a small dose of reality into the aging management of the safety-critical drywell liner. While Citizens welcome AmerGen's movement towards a more evidence-based approach, AmerGen has not gone nearly far enough to moot the contention and maintain safety during any license renewal period.

To moot the contention and maintain safety, AmerGen would have to correct the 1996 results for systematic error, take a new round of valid measurements with sufficient coverage, statistically analyze the UT results placing most weight on the extreme results, produce a justifiable corrosion model that estimates what the worst case corrosion *could* be in the interval

[3] Memorandum of Dr. R.H. Hausler dated November 10, 2005, attached to Petition.

between monitoring, and show that the worst case corrosion would not violate rigorous conservative acceptance criteria. The audit response attached to Dr. Hausler's latest memo shows that as recently as a month ago, AmerGen had not even realized that the 1996 results are flawed, or that its analysis is invalid. Ex. RM1 at 2; see also AmerGen Audit Response dated April 5, 2006 (accession number ML060960563), attached to Ex. RM 1 ("Audit Response"). Thus, dismissing the contention as moot would be grossly premature, at best.

The audit response by AmerGen raises many other concerns. For example, it acknowledges that the minimum thickness recorded in the sand bed region ten or more years ago was 0.603 inches, which is 0.133 inches thinner than the initial acceptance criterion of 0.736 inches derived from structural modeling of a uniform sandbed region. Audit Response at 7, 10. The response also confirms that there are "more than one 12" by 12" areas thinner than 0.736" but thicker than 0.536"," but acknowledges that "the calculation does not provide additional criteria as to the acceptable distance between multiple small areas." Id. at 8.

These statements reveal that AmerGen has failed to rigorously derive the most critical acceptance criterion, and has not adjusted the scope of UT monitoring to allow valid comparison of the results to the acceptance criterion. For example, the choice of a 12" by 12" geometry is not justified, and is questionable, because the corrosion occurred in a "bath tub ring" around the sphere at the level of the sand bed region. Furthermore, because the monitoring areas were only 6" by 6", Ex. RM 1 at 1, AmerGen could not tell whether the areas that were below 0.736" on average are greater than 12" by 12". Thus, even if the 12" by 12" acceptance criterion were the most critical, the scope of the monitoring is insufficient to compare against that criterion. Because these issues will be dealt with at the hearing after discovery is complete, Citizens have not presented expert evidence at this stage on the structural issues, but look forward to doing so

in the future. Citizens present this preliminary preview of these issues in this response to further illustrate to the ASLB that resolution of the contention will be complex and technical, not simplistic and legalistic, as AmerGen seems to imagine.

IV. The Legal Authorities Cited by AmerGen Are Inapposite

AmerGen cites authorities concerning mootness of what it terms "contentions of omission." AmerGen Mootness Motion at 5 and FN 7. All the decisions cited by AmerGen deal with situations where existing information was not incorporated into an application, or an analysis was alleged to be missing. The decisions held that when an applicant remedies such problems by subsequently incorporating the missing information or analysis into the application documents, the contentions may became moot. However, in this case, AmerGen cannot merely supply a commitment to generate information in the future through further testing; it must instead justify why the additional testing it has proposed is sufficient to maintain safety margins.

Contentions may challenge an application's adequacy by alleging that the information in the application is invalid, or that some information has been omitted, or a combination of both. Private Fuel Storage (Independent Spent Fuel Storage Installation), 54 NRC, 163, 170-71 (2001). Further, to determine which of these three forms is involved in any contention, the Board should look first to the language of the contention. Id. at 171. If that proves unavailing, the language of the bases provided to support the contention may be examined to discern the sponsor's intent relative to the contention's scope and meaning. Id.

Here the language of the contention and the Petition show that Citizens' challenge is to the validity of the information and conclusions in the Application. The Application asserted that safety would have been maintained with only visual monitoring of the sand bed region, whereas the Petition alleged that periodic UT monitoring of sufficient scope was needed to maintain

safety. In part, Citizens are challenging the validity of the statement in the license application that "[t]he inspections [in 1992, 1996, 2000, and 2004] showed no coating failure or signs of deterioration. It is therefore concluded that corrosion in the sand bed region has been arrested, and no further loss of material is expected." License Renewal Application at 3.5-20.

Thus, the contention is not based on the lack of information or analysis, it is based on an incorrect conclusion contained in the Application. AmerGen is therefore incorrect when it asserts that Citizens' contention is a contention of omission. The decisions that AmerGen presented in its Motion are therefore irrelevant. Moreover, even if the contention were a contention of omission, AmerGen has not yet supplied any information or analysis to render the contention moot, it has merely supplied a commitment to generate information in the future through further testing.

Because the Contention questions the validity of the conclusion that "corrosion in the sand bed region has been arrested," AmerGen's lack of quantitative monitoring for potential corrosion to ensure safety margins are met also becomes an issue. Thus, the contention is not about information omitted from the Application, it is about AmerGen's erroneous conclusion about the potential for ongoing corrosion and its omission of any proposal to monitor the thickness of the drywell at the sand bed region in a way that ensures safety-margins are met. As discussed above, if AmerGen had indeed carried out a rigorous and complete analysis of all the issues raised by the contention, it could, in theory, become moot. However, for AmerGen to simply propose a monitoring regime based on an arbitrary testing interval and scope without analysis of whether this is sufficient to maintain margins of safety is totally insufficient to moot the contention.

V. There Is No Reason To Suspend Mandatory Disclosures

The filing of a motion to dismiss that does not even meet the required burden of going forward can hardly provide sufficient grounds to suspend mandatory disclosures. AmerGen complains that the disclosure process is burdensome, but fails to note that if it had properly dealt with the drywell corrosion issue in its Application, it would not have to produce documents to Citizens. AmerGen has only itself to blame for its need to spend time and money on document disclosure.

The timing of AmerGen's motion is also notable. It was filed just as Citizens are about to obtain disclosure of actual documents from AmerGen. Fortuitously, Citizens have been able to locate a publicly available document that has enabled them to show that the proposed monitoring is not properly designed to maintain safety margins and raises many issues that related to the contention. Further discovery will no doubt increase Citizens' understanding and knowledge of the issues underlying the contention. The Board should not deny Citizens the right to fully develop its arguments by curtailing discovery at this stage.

Furthermore, the burdens of discovery on AmerGen must be placed in the context of operating a 600 MW nuclear power station at a time when fossil prices are close to an all time high. Because its fuel costs have not risen in the same way as those of its competitors, and AmerGen is operating a merchant power plant, it has the opportunity to make substantial windfall profits from the current high energy prices. It is therefore in an extremely good position to bear the burden of document discovery and eventually reap the benefits of any extended licensing period.

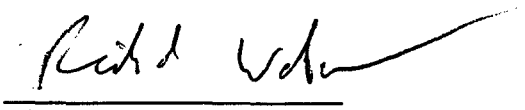
Moreover, AmerGen has expressed the desire to attempt to hold the hearing on the contention in August 2006. Given the volume of document discovery to review, and the dispute about the scope of the discovery, that is an extremely ambitious target even without any delay in

discovery. If discovery is suspended, it will become even more difficult to complete discovery in time to make an expedited hearing possible.

CONCLUSION

For the forgoing reasons, the ASLB should reject AmerGen's Motion to Dismiss and its Motion to Suspend Mandatory Disclosures.

Respectfully submitted



Richard Webster, Esq
RUTGERS ENVIRONMENTAL LAW CLINIC
Attorneys for Petitioners

Dated: May 5, 2006

Citizens' Exhibit RM 1

CORRO-CONSULTA

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MEMORANDUM
MAY 3, 2006

To: Richard Webster, Esq.
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Newark, NJ 07102-5695

Paul Gunter
Reactor Watchdog Project
Nuclear Information and Resource Service
Washington, DC 10036

Subject: **Oyster Creek Dry Well Corrosion**
Comments regarding "Audit Q&A (Question Numbers AMP –141, 210, 356) dated 4/5/06, Ref. ML060960563

I. Summary

The referenced document, which is attached, makes statements with regards to future corrosion and the presence or absence of a need for future inspections of the damaged areas in the sandbed region. After having examined the data presented we find that the conclusions are at odds with good or best corrosion practice. In general, predicting future corrosion based on data collected over the past is perhaps judicious only if a) the corrosion (or deterioration) mechanism is well known, and b) if assurances can be given that the circumstances (environment) under which prior corrosion occurred can and will be maintained in the future. Neither of these two imperatives can be assured at this time. Furthermore, it would seem that for meaningful predictions, the data set, on the basis of which extrapolations are carried out, needs to be consistent. I have found serious concerns in this respect as well. I, therefore, believe that the proposed long inspection intervals are totally unjustified.

II. Details

Following the removal of the sand bed in September of 1992 two sets of UT measurements were recorded in September 1994 and September of 1996. For twelve locations where initial investigations found significant wall thinning, these measurements were made over a 6" x 6" grid at 1 inch spacings, hence 49 individual UT measurements were gathered over an individual grid.[1] Identical grids were

[1] For seven other areas only seven readings were taken at one inch intervals.

surveyed in each of the bays in the sandbed area, and in some instances more than one grid was surveyed in the same bay. The clusters of individual UT measurements were evaluated by calculating the average of the 49 measurements, and naming the resulting averages "average minimum general thickness (AMGT)". The terminology "average minimum general thickness" is misleading because another shape or size of grid could have resulted in lower results.

Presumably the identical grid locations, which were surveyed in September of 1992, were again surveyed in September of 1994 and September of 1996. This generated three data points (AMGT) in each of the various bay locations as a function of time. Plots were then generated to show the AMGT as a function of time. These plots are shown in the Figure 1 below for 8 different bay locations, correlating the measurements as a function of time. Exelon drew straight horizontal lines through these points with extrapolation over the next 10 years to demonstrate the absence of continued corrosion.

This procedure and the subsequent evaluation and interpretation of the data warrant a number of comments.

First, it is noted that with unfailing regularity (even in the cases not shown in Figure 1 below) the AMGT for each grid decreases from 1992 to 1994, but then *increases* in 1996. This is of course physically impossible; metal simply does not spontaneously get thicker. Furthermore, statistically, UT measurements in general are accurate within a standard deviation of 2% of wall thickness (modern methodologies can do better). Assuming for a moment that all 49 measurements within a grid measured the same wall thickness, then the average would have had a standard deviation of 2/7 % or about 0.3% of wall thickness which corresponds to +/- 2.5 mils or 95% confidence limits of +/- 5 mils. Since however, not all measurements within the grid were of the same wall thickness, the variability of individual measurements within the grid must have been larger than the standard deviation derived from instrument capability. Exelon assures us that "the tolerance is or the order of +/- 10 mils. As it turns out, the variability of the AMGT for the three measurements for a particular grid expressed as a standard deviation in almost all cases exceeds the +/- 10 mils by a large margin. **I interpret this as a systematic error in the UT methodology employed.**

Moreover, the repeated trends over time observed in Fig. 1 below from high to low to high values underlines the unreliability to these UT measurements. Clearly, the methodology chosen by Exelon to monitor corrosion in the sandbed area is difficult in practice for a number of reasons. **However, these difficulties do not excuse the improper extrapolation of sporadic data obtained over a four-year period to another 10 years and the untenable and irresponsible conclusion that corrosion in the sandbed area therefore is under control.**

There is no doubt that the application of the epoxy coating has slowed the corrosion over the four years from 1992 to 1996. However, no assurances have been given that in the following years the environmental conditions in the sand bed area remained the

same. Neither have there been any assertions that the epoxy coating did not deteriorate over time. Nor does one have any information about the rate of deterioration. It is well known that coatings (generally speaking) perform well for a period of time, but then deteriorate rapidly. In light of such knowledge, coupled with the reliability of the UT data submitted by Exelon, we find an inspection schedule stretched out over 10 years as proposed in ref. document totally irresponsible.

Dr. Rudolf H. Hausler

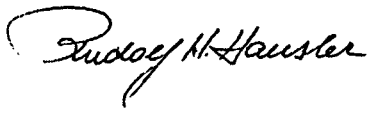
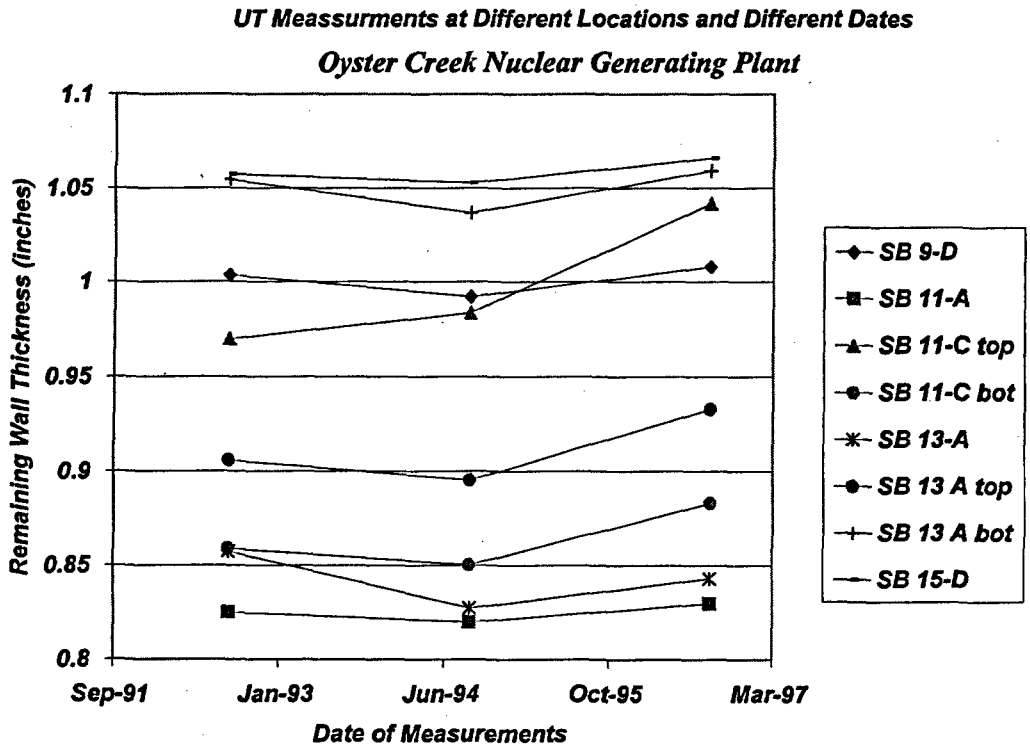


Figure 1


UT Meassurments at Different Locations and Different Dates
Oyster Creek Nuclear Generating Plant
Remaining Wall Thickness (inches)
1.1
1.05
1
0.95
0.9
0.85
0.8
Sep-91
Jan-93
Jun-94
Oct-95
Mar-97
Date of Measurements
SB 9-D
SB 11-A
SB 11-C top
SB 11-C bot
SB 13-A
SB 13 A top
SB 13 A bot
SB 15-D

From: <George.Beck@exeloncorp.com>
To: <dja1@nrc.gov>, <rkm@nrc.gov>
Date: 04/05/2006 5:02:53 PM
Subject: FW: Audit Q & A (Question Numbers AMP-141, 210, 356)

Note: As originally transmitted this email was undeliverable to the NRC; it exceeded the size limit. It is being retransmitted without the AMP-210.pdf. This file will be reconstituted and sent in smaller ".pdf"s; the first 11 pages are attached.

George

> -----Original Message-----
> From: Beck, George
> Sent: Wednesday, April 05, 2006 4:39 PM
> To: Donnie Ashley (E-mail); 'Roy Mathew (E-mail) ' (E-mail)
> Cc: Ouaou, Ahmed; Hufnagel Jr, John G; Warfel Sr, Donald B; Polaski, Frederick W
> Subject: Audit Q & A (Question Numbers AMP-141, 210, 356)
>
> Donnie/Roy,
>
> Attached are the responses to AMP-210 and AMP-356 in an updated version of the reports from the AMP/AMR Audit database. Also included is a revised version of AMP-141. These answers have been reviewed and approved by Technical Lead, Don Warfel.
>
> Regarding AMP-210, please note:
> As pointed out in our response to NRC Question AMP-210, (8a)(1), "The 0.806" minimum average thickness verbally discussed with the Staff during the AMP audit was recorded in location 19A in 1994. Additional reviews after the audit noted that lower minimum average thickness values were recorded at the same location in 1991 (0.803") and in September 1992 (0.800"). However, the three values are within the tolerance of +/- 0.010" discussed with the Staff."
>
> Regarding AMP-141, please note:
> Our response to AMP-141 has been revised to reflect additional information developed during the ongoing preparation of RAI responses.
>
> Please let John Hufnagel or me know if you have any questions.
>
> George
>
>
>
> >> <<Pages from AMP-210.pdf>>
> >> <<AMP-141.pdf>>
>
>> <<AMP-356.pdf>>
>
>

CC: <ahmed.ouaou@exeloncorp.com>, <john.hufnagel@exeloncorp.com>, <donald.warfel@exeloncorp.com>, <fred.polaski@exeloncorp.com>

Mail Envelope Properties (44343066.C5F : 19 : 7263)

Subject:	FW: Audit Q & A (Question Numbers AMP-141, 210, 356)
Creation Date:	04/05/2006 5:01:46 PM
From:	<George.Beck@exeloncorp.com>
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MESSAGE	2679	05 April, 2006 5:01:46 PM
TEXT.htm	5457	
Pages from AMP-210.pdf	64593	
AMP-141.pdf	47353	
AMP-356.pdf	71556	
Mime.822	262768	

Options

Expiration Date:	None
Priority:	Standard
Reply Requested:	No
Return Notification:	None
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Security:	Standard

NRC Information Request Form

Item No	*Date Received:*	*Source*
AMP-210	1/24/2006	AMP Audit
Topic:	*Status:*	Open
IWE		

Document References:
B.1.27

NRC Representative Morante, Rich

AmerGen (Took Issue): Hufnagel, Joh

Question

Pages 25 through 31 of the PBD present a discussion of the OCGS operating experience.

(8a)The following statements related to drywell corrosion in the sand bed region need further explanation and clarification:
As a result of the presence of water in the sand bed region, extensive UT thickness measurements (about 1000) of the drywell shell were taken to determine if degradation was occurring. These measurements corresponded to known water leaks and indicated that wall thinning had occurred in this region.
Please explain the underlined statement. Were water leaks limited to only a portion of the circumference? Was wall thinning found only in these areas?
After sand removal, the concrete surface below the sand was found to be unfinished with improper provisions for water drainage. Corrective actions taken in this region during 1992 included; (1) cleaning of loose rust from the drywell shell, followed by application of epoxy coating and (2) removing the loose debris from the concrete floor followed by rebuilding and reshaping the floor with epoxy to allow drainage of any water that may leak into the region. UT measurements taken from the outside after cleaning verified loss of material projections that had been made based on measurements taken from the inside of the drywell. There were, however, some areas thinner than projected; but in all cases engineering analysis determined that the drywell shell thickness satisfied ASME code requirements.
Please describe the concrete surface below the sand that is discussed in paragraph above.
Please provide the following information:
(1) Identify the minimum recorded thickness in the sand bed region from the outside inspection, and the minimum recorded thickness in the sand bed region from the inside inspections. Is this consistent with previous information provided verbally? (.806 minimum)
(2) What was the projected thickness based on measurements taken from the inside?
(3) Describe the engineering analysis that determined satisfaction of ASME code requirements and identify the minimum required thickness value. Is this consistent with previous information provided verbally? (.733 minimum)
(4) Is the minimum required thickness based on stress or buckling criteria?
(5) Reconcile and compare the thickness measurements provided in (1) and (3) above with the .736 minimum corroded thickness that was used in the NUREG-1540 analysis of the degraded Oyster

Creek sand bed region.

Evaluation of UT measurements taken from inside the drywell, in the in the former sand bed region, in 1992, 1994, and 1996 confirmed that corrosion is mitigated. It is therefore concluded that corrosion in the sand bed region has been arrested and no further loss of material is expected. Monitoring of the coating in accordance with the Protective Coating Monitoring and Maintenance Program, will continue to ensure that the containment drywell shell maintains its intended function during the period of extended operation.
NUREG-1540, published in April 1996, includes the following statements related to corrosion of the Oyster Creek sand bed region: (page vii) However, to assure that these measures are effective, the licensee is required to perform periodic UT measurements. and (page 2) As assurance that the corrosion rate is slower than the rate obtained from previous measurements, GPU is committed to make UT measurements periodically. Please reconcile the aging management commitment (one-time UT inspection and monitoring of the condition of the coating) with the apparent requirement/commitment documented in NUREG-1540.

(8b)The following statement related to drywell corrosion above the sand bed region needs further explanation and clarification:

Corrective action for these regions involved providing a corrosion allowance by demonstrating, through analysis, that the original drywell design pressure was conservative. Amendment 165 to the Oyster Creek Technical Specifications reduced the drywell design pressure from 62 psig to 44 psig. The new design pressure coupled with measures to prevent water intrusion into the gap between the drywell shell and the concrete will allow the upper portion of the drywell to meet ASME code requirements.

Please describe the measures to prevent water intrusion into the gap between the drywell shell and the concrete that will allow the upper portion of the drywell to meet ASME code requirements". Are these measures to prevent water intrusion credited for LR? If not, how will ASME code requirements be met during the extended period of operation?

(8c)The following statements related to torus degradation need further explanation and clarification: Inspection performed in 2002 found the coating to be in good condition in the vapor area of the Torus and vent header, and in fair condition in immersion. Coating deficiencies in immersion include blistering, random and mechanical damage. Blistering occurs primarily in the shell invert but was also noted on the upper shell near the water line. The fractured blisters were repaired to reestablish the protective coating barrier. This is another example of objective evidence that the Oyster Creek ASME Section XI, Subsection IWE aging management program can identify degradation and implement corrective actions to prevent the loss of the containment's intended function.
While blistering is considered a deficiency, it is significant only when it is fractured and exposes the base metal to corrosion attack. The majority of the blisters remain intact and continues to protect the base metal; consequently the corrosion rates are low. Qualitative assessment of the identified pits indicate that the measured pit depths (50 mils max) are significantly less than the criteria established

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In Specification SP-1302-52-120 (141- 261 mils, depending on diameter of the pit and spacing between pits).

Please confirm or clarify (1) that only the fractured blisters found in this inspection were repaired; (2) pits were identified where the blisters were fractured; (3) pit depths were measured and found to 50 mils max; (4) the inspection Specification SP-1302-52-120 includes pit-depth acceptance criteria for rapid evaluation of observed pitting; (5) the minimum pit depth of concern is 141 mils (.141) and pits as deep as 261 mils (.261) may be acceptable.

Please also provide the following information: nominal design, as-built, and minimum measured thickness of the torus; minimum thickness required to meet ASME code acceptance criteria; the technical basis for the pitting acceptance criteria include in Specification SP-1302-52-120

Assigned To: Ouaou, Ahmed

Response:

(8a) Question: Please explain the underlined statement. Were water leaks limited to only a portion of the circumference? Was wall thinning only in these area?

Response:
This statement was not meant to indicate that water leaks were limited to only a portion of the circumference. The statement is meant to reflect the fact that water leakage was observed coming out of certain sand bed region drains and those locations were suspect of wall thinning.
No. Wall thinning was not limited to the areas where water leakage from the drains was observed. Wall thinning occurred in all areas of the sand bed region based on UT measurements and visual inspection of the area conducted after the sand was removed in 1992. However the degree of wall thinning varied from location to location. For example 60% of the measured locations in the sand bed region (bays 1, 3, 5, 7, 9, and 15) indicate that the average measured drywell shell thickness is nearly the same as the design nominal thickness and that these locations experienced negligible wall thinning; whereas bay 19A experienced approximately 30% reduction in wall thickness.

Question: Please discuss the concrete surface below the sand that is discussed in paragraph above.

Response:
The concrete surface below the sand was intended to be shaped to promote flow toward each of the five sand bed drains. However once the sand was removed it was discovered that the floor was not properly finished and shaped as required to permit proper drainage. There were low points, craters, and rough surfaces that could allow moisture to pool instead of flowing smoothly toward the drains. These concrete surfaces were refurbished to fill low areas, smooth rough surfaces, and coat these surfaces with epoxy coating to promote improved drainage. The drywell shell at juncture of the concrete floor was sealed with an elastomer to prevent water intrusion into the embedded drywell shell.

Question: Please provide the following information:

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(1) Identify the minimum recorded thickness in the sand bed region from the outside inspection, and the minimum recorded thickness in the sand bed region from the inside inspections. Is this consistent with previous information provided verbally? (.806 minimum)
(2) What was the projected thickness based on measurements taken from the inside?
(3) Describe the engineering analysis that determined satisfaction of ASME code requirements and identify the minimum required thickness value. Is this consistent with previous information provided verbally? (.733 minimum)
(4) Is the minimum required thickness based on stress or buckling criteria?
(5) Reconcile and compare the thickness measurements provided in (1) and (3) above with the .736 minimum corroded thickness that was used in the NUREG-1540 analysis of the degraded Oyster Creek sand bed region.

Response:
1. The minimum recorded thickness in the sand bed region from outside inspection is 0.618 inches. The minimum recorded thickness in the sand bed region from inside inspections is 0.603. These minimum recorded thicknesses are isolated local measurement and represent a single point UT measurement. The 0.806 inches thickness provided to the Staff verbally is an average minimum general thickness calculated based on 49 UT measurements taken in an area that is approximately 6"x 6". Thus the two local isolated minimum recorded thicknesses cannot be compared directly to the general thickness of 0.806".

The 0.806" minimum average thickness verbally discussed with the Staff during the AMP audit was recorded in location 19A in 1994. Additional reviews after the audit noted that lower minimum average thickness values were recorded at the same location in 1991 (0.803") and in September 1992 (0.800"). However, the three values are within the tolerance of +/- 0.010" discussed with the Staff.

2. The minimum projected thickness depends on whether the trended data is before or after 1992 as demonstrated by corrosion trends provided in response to NRC Question #AMP-356. For license renewal, using corrosion rate trends after 1992 is appropriate because of corrosion mitigating measures such as removal of the sand and coating of the shell. Then, using corrosion rate trends based on 1992, 1994, and 1996 UT data; and the minimum average thickness measured in 1992 (0.800"), the minimum projected average thickness through 2009 and beyond remains approximately 0.800 inches. The projected minimum thickness during and through the period of extended operation will be reevaluated after UT inspections that will be conducted prior to entering the period of extended operation, and after the periodic UT inspection every 10 years thereafter.

3.The engineering analysis that demonstrated compliance to ASME code requirements was performed in two parts, Stress and Stability Analysis with Sand, and Stress and Stability Analyses without Sand. The analyses are documented in GE Reports Index No. 9-1, 9-2, 9-3, and 9-4, were transmitted to the NRC Staff in December 1990 and in 1991 respectively. Index No. 9-3 and 9-4, were revised later to correct errors identified during an internal audit and were resubmitted to the Staff in January 1992 (see attachment 1 & 2). The analyses are briefly described below.

The drywell shell thickness in the sand bed region is based on Stability Analysis without Sand. As

described in detail in attachment 1 & 2, the analysis is based on a 36-degree section model that takes advantage of symmetry of the drywell with 10 vents. The model includes the drywell shell from the base of the sand bed region to the top of elliptical head and the vent and vent header. The torus is not included in this model because the bellows provide a very flexible connection, which does not allow significant structural interaction between the drywell and the torus. The analysis conservatively assumed that the shell thickness in the entire sand bed region has been reduced uniformly to a thickness of 0.736 inches.

As discussed with the Staff during the AMP audit, the basic approach used in the buckling evaluation follows the methodology outlined in ASME Code Case N-284 revision 0 that was reconciled later with revision 1 of the Code Case. Following the procedure of this Code Case, the allowable compressive stress is evaluated in three steps. In the first step, a theoretical buckling stress is determined, and secondly modified using appropriate capacity and plasticity reduction factors. In the final step, the allowable compressive stress is obtained by dividing the buckling stress calculated in the second step by a safety factor of 2.0 for Design and Level A & B service conditions and 1.67 Level C service conditions.

Using the approach described above, the analysis shows that for the most severe design basis load combinations, the limits of ASME Section III, Subsection NE 3213.10 are fully met. For additional details refer to Attachment 1 & 2.

As described above, the buckling analysis was performed assuming a uniform general thickness of the sand bed region of 0.736 inches. However the UT measurements identified isolated, localized areas where the drywell shell thickness is less than 0.736 inches. Acceptance for these areas was based on engineering calculation C-1302-187-5320-024.

The calculation uses a Local Wall Acceptance Criteria". This criterion can be applied to small areas (less than 12" by 12"), which are less than 0.736" thick so long as the small 12" by 12" area is at least 0.536" thick. However the calculation does not provide additional criteria as to the acceptable distance between multiple small areas. For example, the minimum required linear distances between a 12" by 12" area thinner than 0.736" but thicker than 0.536" and another 12" by 12" area thinner than 0.736" but thicker than 0.536" were not provided.

The actual data for two bays (13 and 1) shows that there are more than one 12" by 12" areas thinner than 0.736" but thicker than 0.536". Also the actual data for two bays shows that there are more than one 2 ½" diameter areas thinner than 0.736" but thicker than 0.490". Acceptance is based on the following evaluation.

The effect of these very local wall thickness areas on the buckling of the shell requires some discussion of the buckling mechanism in a shell of revolution under an applied axial and lateral pressure load.

To begin the discussion we will describe the buckling of a simply supported cylindrical shell under the influence of lateral pressure and axial load. As described in chapter 11 of the Theory of Elastic Stability, Second Edition, by Timoshenko and Gere, thin cylindrical shells buckle in lobes in both the

axial and circumferential directions. These lobes are defined as half wave lengths of sinusoidal functions. The functions are governed by the radius, thickness and length of the cylinder. If we look at a specific thin walled cylindrical shell both the length and radius would be essentially constants and if the thickness was changed locally the change would have to be significant and continuous over a majority of the lobe so that the compressive stress in the lobe would exceed the critical buckling stress under the applied loads, thereby causing the shell to buckle locally. This approach can be easily extrapolated to any shell of revolution that would experience both an axial load and lateral pressure as in the case of the drywell. This local lobe buckling is demonstrated in The GE Letter Report "Sandbed Local Thinning and Raising the Fixity Height Analysis" where a 12 x 12 square inch section of the drywell sand bed region is reduced by 200 mils and a local buckle occurred in the finite element eigenvalue extraction analysis of the drywell. Therefore, to influence the buckling of a shell the very local areas of reduced thickness would have to be contiguous and of the same thickness. This is also consistent with Code Case 284 in Section –1700 which indicates that the average stress values in the shell should be used for calculating the buckling stress. Therefore, an acceptable distance between areas of reduced thickness is not required for an acceptable buckling analysis except that the area of reduced thickness is small enough not to influence a buckling lobe of the shell. The very local areas of thickness are dispersed over a wide area with varying thickness and as such will have a negligible effect on the buckling response of the drywell. In addition, these very local wall areas are centered about the vents, which significantly stiffen the shell. This stiffening effect limits the shell buckling to a point in the shell sand bed region which is located at the midpoint between two vents.

The acceptance criteria for the thickness of 0.49 inches confined to an area less than 2½ inches in diameter experiencing primary membrane + bending stresses is based on ASME B&PV Code, Section III, Subsection NE, Class MC Components, Paragraphs NE-3213.2 Gross Structural Discontinuity, NE-3213.10 Local Primary Membrane Stress, NE-3332.1 Openings not Requiring Reinforcement, NE-3332.2 Required Area of Reinforcement and NE-3335.1 Reinforcement of Multiple Openings. The use of Paragraph NE-3332.1 is limited by the requirements of Paragraphs NE-3213.2 and NE-3213.10. In particular NE-3213.10 limits the meridional distance between openings without reinforcement to 2.5 x (square root of Rt) . Also Paragraph NE-3335.1 only applies to openings in shells that are closer than two times their average diameter.

The implications of these paragraphs are that shell failures at these locations from primary stresses produced by pressure cannot occur provided openings in shells have sufficient reinforcement. The current design pressure of 44 psig for drywell requires a thickness of 0.479 inches in the sand bed region of the drywell. A review of all the UT data presented in Appendix D of the calculation indicates that all thicknesses in the drywell sand bed region exceed the required pressure thickness by a substantial margin. Therefore, the requirements for pressure reinforcement specified in the previous paragraph are not required for the very local wall thickness evaluation presented in Revision 0 of Calculation C-1302-187-5320-024.

Reviewing the stability analyses provided in both the GE Report 9-4 and the GE Letter Report Sand bed Local Thinning and Raising the Fixity Height Analysis and recognizing that the plate elements in the sand bed region of the model are 3" x 3" it is clear that the circumferential buckling lobes for the

drywell are substantially larger than the 2 ½ inch diameter very local wall areas. This combined with the local reinforcement surrounding these local areas indicates that these areas will have no impact on the buckling margins in the shell. It is also clear from the GE Letter Report that a uniform reduction in thickness of 27% to 0.536" over a one square foot area would only create a 9.5% reduction in the load factor and theoretical buckling stress for the whole drywell resulting in the largest reduction possible. In addition, to the reported result for the 27% reduction in wall thickness, a second buckling analysis was performed for a wall thickness reduction of 13.5% over a one square foot area which only reduced the load factor and theoretical buckling stress by 3.5% for the whole drywell resulting in the largest reduction possible. To bring these results into perspective a review of the NDE reports indicate there are 20 UT measured areas in the whole sand bed region that have thicknesses less than the 0.736 inch thickness used in GE Report 9-4 which cover a conservative total area of 0.68 square feet of the drywell surface with an average thickness of 0.703" or a 4.5% reduction in wall thickness. Therefore, to effectively change the buckling margins on the drywell shell in the sand bed region a reduced thickness would have to cover approximately one square foot of shell area at a location in the shell that is most susceptible to buckling with a reduction in thickness greater than 25%. This leads to the conclusion that the buckling of the shell is unaffected by the distance between the very local wall thicknesses, in fact these local areas could be contiguous provided their total area did not exceed one square foot and their average thickness was greater than the thickness analyzed in the GE Letter Report and provided the methodology of Code Case N284 was employed to determine the allowable buckling load for the drywell. Furthermore, all of these very local wall areas are centered about the vents, which significantly stiffen the shell. This stiffing effect limits the shell buckling to a point in the shell sand bed region, which is located at the midpoint between two vents.

The minimum thickness of 0.733" is not correct. The correct minimum thickness is 0.736".

4. The minimum required thickness for the sand bed region is controlled by buckling.

5. We cannot reconcile the difference between the current (lowest measured) of 0.736" in NUREG-1540 and the minimum measured thickness of 0.806 inches we discussed with the Staff. Perhaps the value in NUREG-1540 should be labeled minimum required by the Code, as documented in several correspondences with the Staff, instead of lowest measured. In a letter dated September 15, 1995, GPU provided the Staff a table that lists sand bed region thicknesses. The table indicates that nominal thickness is 1.154". the minimum measured thickness in 1994 is 0.806", and the minimum thickness required by Code is 0.736". These thicknesses are consistent with those discussed with the Staff during the AMP/AMR audit.

Question: NUREG-1540, published in April 1996, includes the following statements related to corrosion of the Oyster Creek sand bed region: (page vii) However, to assure that these measures are effective, the licensee is required to perform periodic UT measurements. and (page 2) As assurance that the corrosion rate is slower than the rate obtained from previous measurements, GPU is committed to make UT measurements periodically. Please reconcile the aging management commitment (one-time UT inspection and monitoring of the condition of the coating) with the apparent requirement/commitment documented in NUREG-1540.Please reconcile the aging management commitment (one-time UT inspection and monitoring of the condition of the coating) with the apparent requirement/commitment documented in NUREG-1540.

Response:

Our review of NUREG-1540, page 2 indicates that the statements appear to be based on 1991, or 1993 GPU commitment to perform periodic UT measurements. In fact UT thickness measurements were taken in the sand bed region from inside the drywell in 1992, and 1994. The trend of the UT measurements indicates that corrosion has been arrested. As results GPU informed NRC in a letter dated September 15, 1995 (ref. 2) that UT measurements will be taken one more time, in 1996, and the epoxy coating will be inspected in 1996 and, as a minimum again in 2000. The UT measurements were taken in 1996, per the commitment, and confirmed corrosion rate trend of 1992 and 1994. The results of 1992, 1994, and 1996 UT measurements were provided to the Staff during the AMP/AMR audits.

In response to GPU September 15, 1995 letter, NRC Staff found the proposed changes to sand bed region commitments (i.e. no additional UT measurements after 1996) reasonable and acceptable. This response is documented in November 1, 1995 Safety Evaluation for the Drywell Monitoring Program.

For license renewal, Oyster Creek was previously committed to perform One-Time UT inspection of the drywell shell in the sand bed region prior to entering the period of extended operation. However, in response to NRC Question #AMP-141, Oyster Creek revised the commitment to perform UT inspections periodically. The initial inspection will be conducted prior to entering the period of extended operation and additional inspections will be conducted every 10 years thereafter. The UT measurements will be taken from inside the drywell at same locations as 1996 UT campaign

(8b) Question: Please describe the measures to prevent water intrusion into the gap between the drywell shell and the concrete that will allow the upper portion of the drywell to meet ASME code requirements. Are these measures to prevent water intrusion credited for LR? If not, how will ASME code requirements be met during the extended period of operation?

Response:
The measures taken to prevent water intrusion into the gap between the drywell shell and the concrete that will allow the upper portion of the drywell to maintain the ASME code requirements are,
1. Cleared the former sand bed region drains to improve the drainage path.
2. Replaced reactor cavity steel trough drain gasket, which was found to be leaking.
3. Applied stainless steel type tape and strippable coating to the reactor cavity during refueling outages to seal identified cracks in the stainless steel liner.
4. Confirmed that the reactor cavity concrete trough drains are not clogged
5. Monitored former sand bed region drains and reactor cavity concrete trough drains for leakage during refueling outages and plant operation.

Oyster Creek is committed to implement these measures during the period of extended operation.

(8c) Please confirm or clarify (1) that only the fractured blisters found in this inspection were repaired; (2) pits were identified where the blisters were fractured; (3) pit depths were measured and found to

50 mils max; (4) the inspection Specification SP-1302-52-120 includes pit-depth acceptance criteria for rapid evaluation of observed pitting; (5) the minimum pit depth of concern is 141 mils (.141) and pits as deep as 261 mils (.261) may be acceptable.

Response:
(1) Specification SP-1302-52-120, Specification for Inspection and Localized Repair of the Torus and Vent System Coating, specifies repair requirements for coating defects exposing substrate and fractured blisters showing signs of corrosion. The repairs referred to in the inspection report included fractured blisters, as well as any mechanically damaged areas, which have exposed bare metal showing signs of corrosion. Therefore, only fractured blisters would be candidates for repair, not those blisters that remain intact. The number and location of repairs are tabulated in the final inspection report prepared by Underwater Construction Corporation.
(2) Coating deficiencies in the immersion region included blistering with minor mechanical damage. Blistering occurred primarily in the shell invert but was also noted on the upper shell near the water line. The majority of the blisters were intact. Intact blisters were examined by removing the blister cap exposing the substrate. Corrosion attack under non-fractured blisters was minimal and was generally limited to surface discoloration. Examination of the substrate revealed slight discoloration and pitting with pit depths less than 0.001. Several blistered areas included pitting corrosion where the blisters were fractured. The substrate beneath fractured blisters generally exhibited a slightly heavier magnetite oxide layer and minor pitting (less than 0.010") of the substrate.

(3) In addition to blistering, random deficiencies that exposed base metal were identified in the torus immersion region coating (e.g., minor mechanical damage) during the 19R (2002) torus coating inspections. They ranged in size from 1/16" to ½" in diameter. Pitting in these areas was qualitatively evaluated and ranged from less than 10 mils to slightly more than 40 mils in a few isolated cases. Three quantitative pit depth measurements were taken in several locations in the immersion area of Bay 1. Pit depths at these sites ranged from 0.008" to 0.042" and were judged to be representative of typical conditions found on the shell.

Prior to 2002 inspection 4 pits greater than 0.040" were identified. The pits depth are 0.058" (1 pit in 1988), 0.05" (2 pits in 1991), and 0.0685" (1 pit in 1992). The pits were evaluated against the local pit depth acceptance criteria and found to be acceptable.

(4) Specification SP-1302-52-120, Specification for Inspection and Localized Repair of the Torus and Vent System Coating, includes the pit-depth acceptance criteria for rapid evaluation of observed pitting. The acceptance criteria are supported by a calculation C-1302-187-E310-038. Locations that do not meet the pit-depth acceptance criteria are characterized based on the size of the area, center to center distance between corroded areas, the maximum pit depth and location in the Torus based on major structural features. These details are sent to Oyster Creek Engineering for evaluation.

(5) The acceptance criteria for pit depth is as follows:
-Isolated Pits of 0.125" in diameter have an allowed maximum depth of 0.261" anywhere in the shell provided the center to center distance between the subject pit and neighboring isolated pits or areas of pitting corrosion is greater than 20.0 inches. This includes old pits or old areas of pitting corrosion that have been filled and/or re-coated.

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-Multiple Pits that can be encompassed by a 2-1/2" diameter circle shall be limited to a maximum pit depth of 0.141" provided the center to center distance between the subject pitted area and neighboring isolated pits or areas of pitting corrosion is greater than 20.0 inches. This includes old pits or old areas of pitting corrosion that have been filled and/or recoated.

Question: Please also provide the following information: nominal design, as-built, and minimum measured thickness of the torus; minimum thickness required to meet ASME code acceptance criteria; the technical basis for the pitting acceptance criteria include in Specification SP-1302-52-120

Response:
Submersed area:
(a) The nominal Design thickness is 0.385 inches
(b) The as-built thickness is 0.385 inches
(c) The minimum uniform measured thickness is,
- 0.343 inches - general shell
- 0.345 inches - shell - ring girders
- 0.345 inches - shell - saddle flange
- 0.345 inches - shell - torus straps

(d) The minimum general thickness required to meet ASME Code Acceptance is 0.337 inches.

Technical basis for pitting acceptance criteria included in Specification SP-1302-52-120 is based on engineering calculation C-1302-187-E310-038. At the time of preparation of calculation C-1302-187-E310-038 in 2002 there were no published methods to calculate acceptance standards for locally thinned areas in ASME Section III or Section VIII Pressure Vessel codes. Therefore, the approach in Code Case N-597 was used as guidance in assessing locally thinned areas in the Torus. This is based on the similarity in approaches between Local Thinning Areas described in N597 and Local Primary Stress areas described in Paragraph NE3213.10 of the ASME B&PV Code Section III, particularly small areas of wall thinning which do not exceed 1.0 x (square root of Rt). In addition, the ASME B&PV Code Section III, Subsection NB, Paragraph NB-3630 allows the analysis of pipe systems in accordance with the Vessel Analysis rules described in Paragraph NB-3200 of the same Subsection as an alternate analysis approach. Therefore, the approach used in N597 for local areas of thinning was probably developed using the rules for Local Primary Membrane Stress from paragraph NB-3200 in particular Subparagraph 3213.10. The Local Primary Stress Limits in NB-3213.10 are similar to those discussed in Subsection NE, Paragraph NE-3213.10.

Since the Code Case had not yet been invoked in to the Section XI program, the calculation provided a reconciliation of the results obtained from the code case against the ASME Section III code requirements as discussed above. This reconciliation demonstrated that the approach in N597 used on a pressure vessel such as the Torus would be acceptable since the results are conservative compared to the previous work performed in MPR-953 and Lm(a) (defined in N597 Table- 3622-1) £ (Rmintmin)1/2.

Currently, the maximum pit depth measured in the Torus is a 0.0685" (measured in 1992 in bay 2). It was evaluated as acceptable using the design calculations existing at that time and was not based on

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Calculation C-1302-187-E310-038. This remains the bounding wall thickness in the Torus. The criterion developed in 2002 for local thickness acceptance provides an easier method for evaluating as-found pits. The results were shown to be conservative versus the original ASME Section III and VIII Code requirements for the Torus.

The Torus inspection program is being enhanced per IR 373695 to improve the detail of the acceptance criteria and margin management requirements using the ASME Section III criteria. The approach used in C-1302-187-E310-038 will be clarified as to how it maintains the code requirements. If Code Case N-597-1 is required to develop these criteria for future inspections, NRC review and approval will be obtained. It should also be noted that the program has established corrosion rate criteria and continues to periodically monitor to verify they remain bounded.

LRCR #: ***LRA A.5 Commitment #:***

IR#:

Approvals:

Prepared By:	Ouaou, Ahmed	4/ 5/2006
Reviewed By:	Miller, Mark	4/ 5/2006
Approved By:	Warfel, Don	4/ 5/2006

NRC Acceptance (Date):

NRC Information Request Form

Item No	*Date Received:*	*Source*
AMP-356	2/16/2006	AMP Audit
Topic: IWE	*Status:*	Open

Document References:

NRC Representative Morante, Rich

AmerGen (Took Issue):

Question

IWE AMP
Question 4 IWE AMP Revised Feb. 17, 2006 R. Morante (AMP-356)

(1) Identify the specific locations around the circumference in the former sandbed region where UT thickness readings have been and will be taken from inside containment. Confirm that all points previously recorded will be included in future inspections.

(2) Describe the grid pattern at each location (meridional length, circumferential length, grid point spacing, total number of point readings), and graphically locate each grid pattern within the former sandbed region.

(3) For each grid location, submit a graph of remaining thickness versus time, using the UT readings since the initiation of the program (both prior to and following removal of the sand and application of the external coating).

(4) Clearly describe the methodology and acceptance criteria that is applied to each grid of point thickness readings, including both global (entire array) evaluation and local (subregion of array) evaluation.

Assigned To: Ouaou, Ahmed

Response:

Response:
1. The circumference of the drywell is divided into 10 bays, designated as Bays 1, 3, 5, 7, 9, 11,13, 15, 17, and 19. UT thickness readings have been taken in each bay at one or more locations. The specific locations around the circumference in the former sand bed region where UT thickness reading have been taken from inside containment are Bay 1D, 3D, 5D, 7D, 9A, 9D, 11A, 11C, 13A, 13C, 13D, 15A, 15D, 17A, 17D, 17/19 Frame, 19A, 19B, and 19C. For each location, UT measurements were taken centered at elevation 11'-3". These represent the locations where UT measurements were taken in 1992, 1994, and 1996.

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In addition UT measurements were taken one time inside 2 trenches excavated in drywell floor concrete. The purpose of these UT measurements is to determine the extent of corrosion in the lower portions of the sand bed region prior to removing the sand and making accessible for visual inspection.

Future UT thickness measurements will be taken at the same locations as those inspected in 1996 in accordance with Oyster Creek commitment documented in NRC Question #AMP-209.

2. For locations where the initial investigations found significant wall thinning (9D, 11A, 11C, 13A, 13D, 15D, 17A, 17D, 17/19 Frame, 19A, 19B, and 19C) the grid pattern consists of 7 x 7 grid centered at elevation 11'-3 (meridian) and centered at the centerline of the tested location within each bay, which consists of 6"x 6" square template. The grid spacing is 1" on center. There are 49 point readings. For graphical location of the grid, refer to attachment 1.

For locations where the initial investigations found no significant wall thinning (1D, 3D, 5D, 7D, 9A, 13C, and 15A) the grid pattern consists of 1 x 7 grid centered at elevation 11'-3" (meridian) on 1" centers. There are 7 point readings. For graphical location of the grid, refer to attachment 1.

3. A graph representing the remaining thickness versus time using UT reading since the initiation of the program (both prior to and following removal of the sand and application of the external coating) for location 9D, 11A, 11C, 13A, 13D,15D,17A,17D,17/19, 19A, 19B, and 19C is included in the attached graph. Other locations (i.e. 1D, 3D, 5D, 7D, 9A, 13C, and 15A) are not included because wall thinning is not significant and the trend line will be essentially a straight line.

4. The methodology and acceptance criteria that is applied to each grid of point thickness readings, including both global (entire array) evaluation and local (subregion of array) is described in engineering specification IS-328227-004 and in calculation No. C-1302-187-5300-011. These documents were submitted to the NRC in a letter dated November 26, 1990 and provided to the Staff during the AMP/AMR audit. A brief summary of the methodology and acceptance criteria is described below.

The initial locations where corrosion loss was most severe in 1986 and 1987 were selected for repeat inspection over time to measure corrosion rate. For location where the initial investigations found significant wall thinning UT inspection consists of 49 individual UT data points equally spaced over a 6"x 6" area. Each new set of 49 values was then tested for normal distribution.

The mean values of each grid were then compared to the required minimum uniform thickness criteria of 0.736. In addition each individual reading is compared to the local minimum required criteria of 0.49. The basis for the required minimum uniform thickness criteria and the local minimum required criteria is provided in response to NRC Question #AMP-210.

A decrease in the mean value over time is representative of corrosion. If corrosion does not exist, the mean value will not vary with time except for random variations in the UT measurements.

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If corrosion is continuing, the mean thickness will decrease linearly with time. Therefore the curve fit of the data is tested to determine if linear regression is appropriate, in which case the corrosion rate is equal to the slope of the line. If a slope exists, then upper and lower 95% confidence intervals of the curve fit are calculated. The lower 95% confidence interval is then projected into the future and compared to the required minimum uniform thickness criteria of 0.736.

A similar process is applied to the thinnest individual reading in each grid. The curve fit of the data is tested to determine if linear regression is appropriate. If a slope exists, then the lower 95% confidence interval is then projected into the future and compared to the required minimum local thickness criteria of .49.

LRCR #: ***LRA A.5 Commitment #:***

IR#:

Approvals:

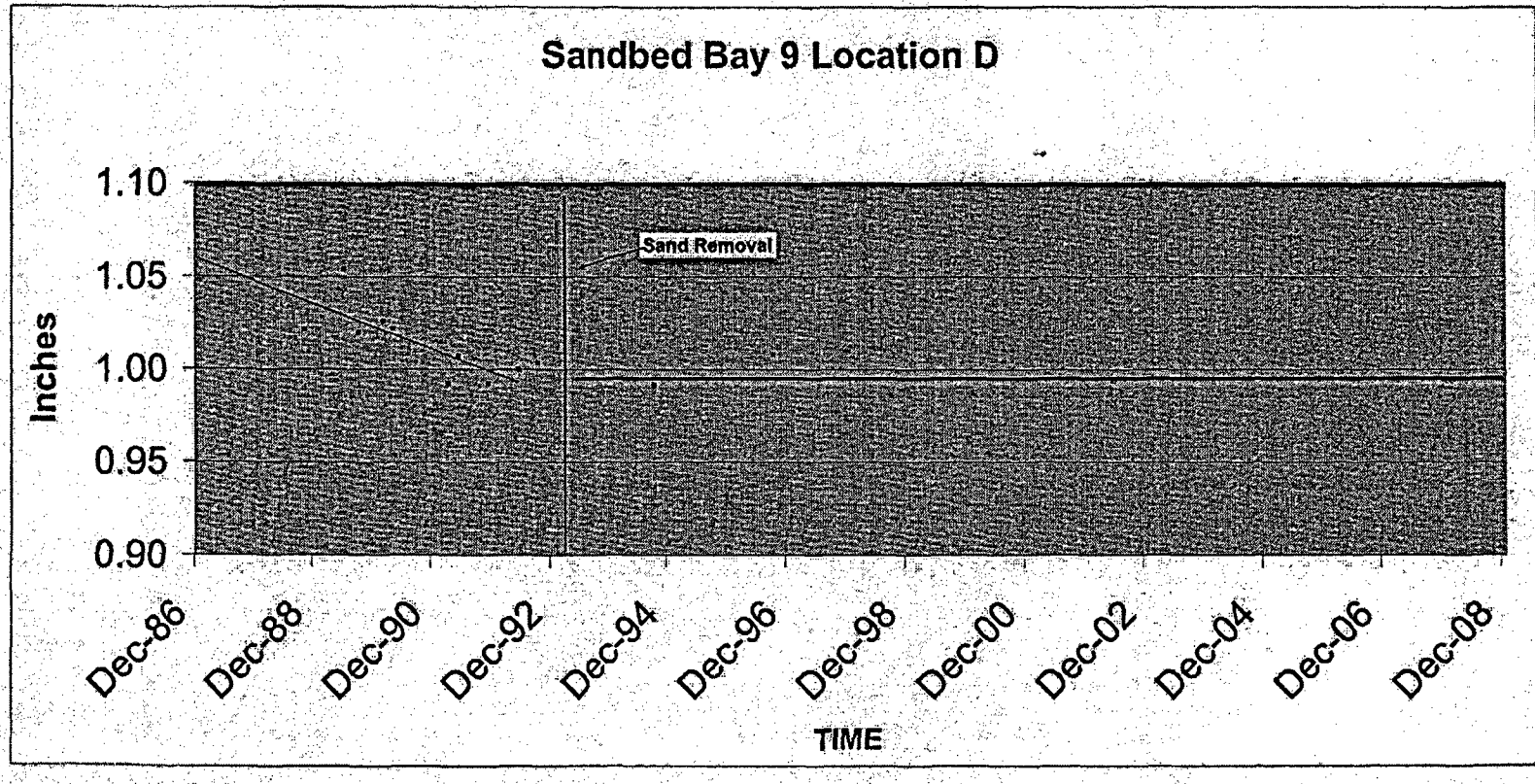
Prepared By:	Ouaou, Ahmed	4/ 4/2006
Reviewed By:	Getz, Stu	4/ 5/2006
Approved By:	Warfel, Don	4/ 5/2006

NRC Acceptance (Date):

Oyster Ceek Drywell Vessel Corrosion Rate Trending Program

Average Measured Thicknesses

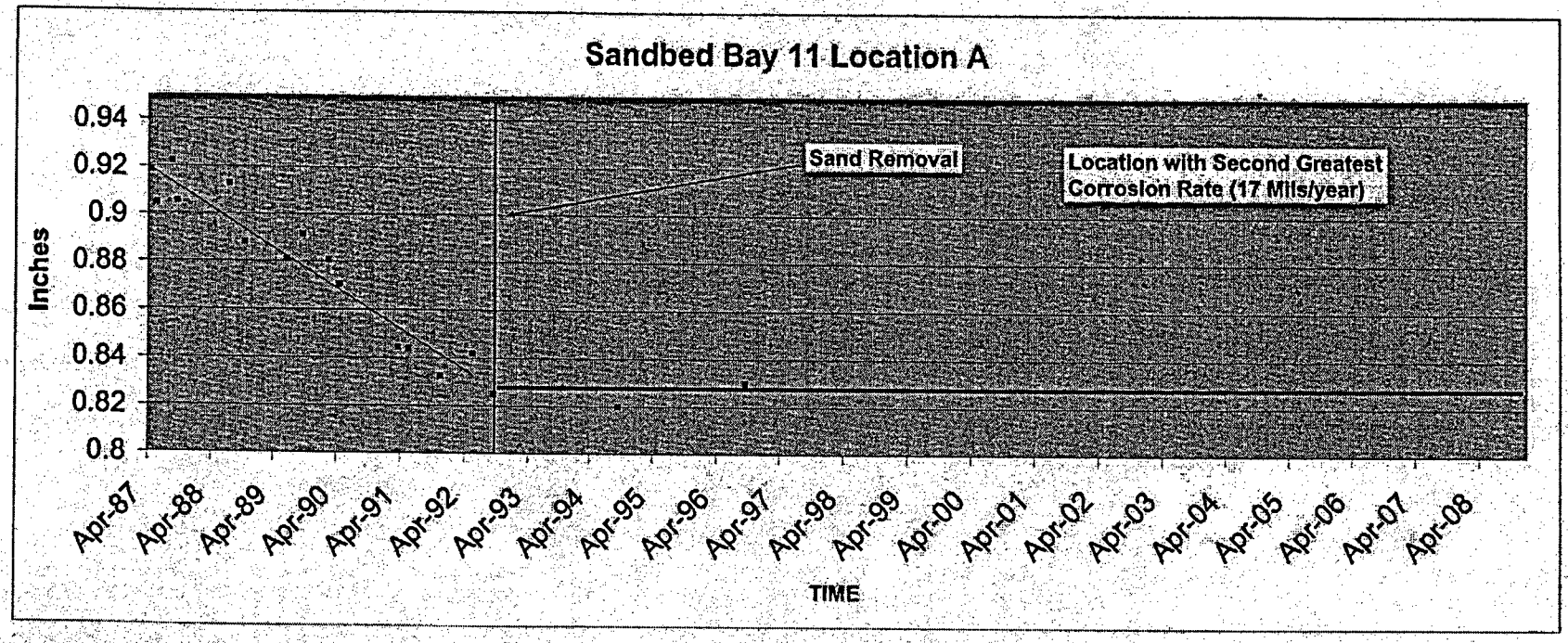
Bay	Date	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
1D									1.115										1.191	1.191
3D									1.178										1.184	1.181
5D									1.174										1.164	1.172
7D									1.135										1.136	1.139
9A									1.155										1.157	1.155
9D		1.072							1.071	1.054	1.020	1.026	1.022	0.993	1.008	0.992	1.000	1.004	0.993	1.004
11A				0.819	0.905	0.922	0.905	0.913	0.888	0.891	0.892	0.881	0.870	0.845	0.844	0.833	0.842	0.829	0.834	0.832
11C	Bottom				0.917	0.954	0.916	0.906	0.891	0.877	0.891	0.870	0.865	0.858	0.863	0.856	0.862	0.854	0.850	0.858
	Top				1.046	1.109	1.079	1.045	1.009	1.016	1.005	0.952	0.977	0.982	1.018	0.954	1.010	0.970	0.984	1.042
13A		0.919							0.905	0.883	0.883	0.862	0.853	0.858	0.853	0.849	0.865	0.834	0.832	0.845
13C	Bottom													0.909	0.901	0.900	0.931	0.904	0.895	0.933
	Top													1.072	1.049	1.048	1.088	1.055	1.037	1.054
13D									0.962				0.932					1.001	0.954	0.990
15A									1.120										1.114	1.122
15D		1.000							1.056	1.050	1.021	1.038	1.037	1.002	1.053	1.042	1.045	1.009	1.003	1.009
17A	Bottom	0.999							0.957	0.965	0.956	0.954	0.951	0.935	0.943	0.933	0.946	0.941	0.934	0.972
	Top	0.999							1.133	1.130	1.131	1.128	1.128	1.131	1.129	1.123	1.125	1.125	1.124	1.144
17D				0.922		0.895	0.891	0.895	0.878	0.862	0.857	0.847	0.836	0.829	0.825	0.829	0.822	0.823	0.817	0.816	0.845
17/19	Bottom									1.004	0.999	0.955	1.010	1.006	0.987	0.982	0.971	0.990	0.984	0.975	0.991
	Top									0.982	1.019	1.131	0.999	0.964	0.975	0.969	0.954	0.972	0.976	0.965	0.965
19A				0.884		0.873	0.859	0.858	0.849	0.837	0.829	0.825	0.840	0.808	0.817	0.803	0.803	0.809	0.806	0.800	0.815
19B						0.898	0.892	0.888	0.884	0.857	0.826	0.845	0.812	0.837	0.853	0.844	0.846	0.847	0.840	0.824	0.837
19C						0.901	0.888	0.888	0.873	0.856	0.845	0.845	0.831	0.825	0.843	0.823	0.822	0.832	0.814	0.824	0.849



Based on Calculation C-1302-187-5300-021

Slope	Best Est	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.0125	0.9932	05/01/92	1.00012	1.154"	0.736"

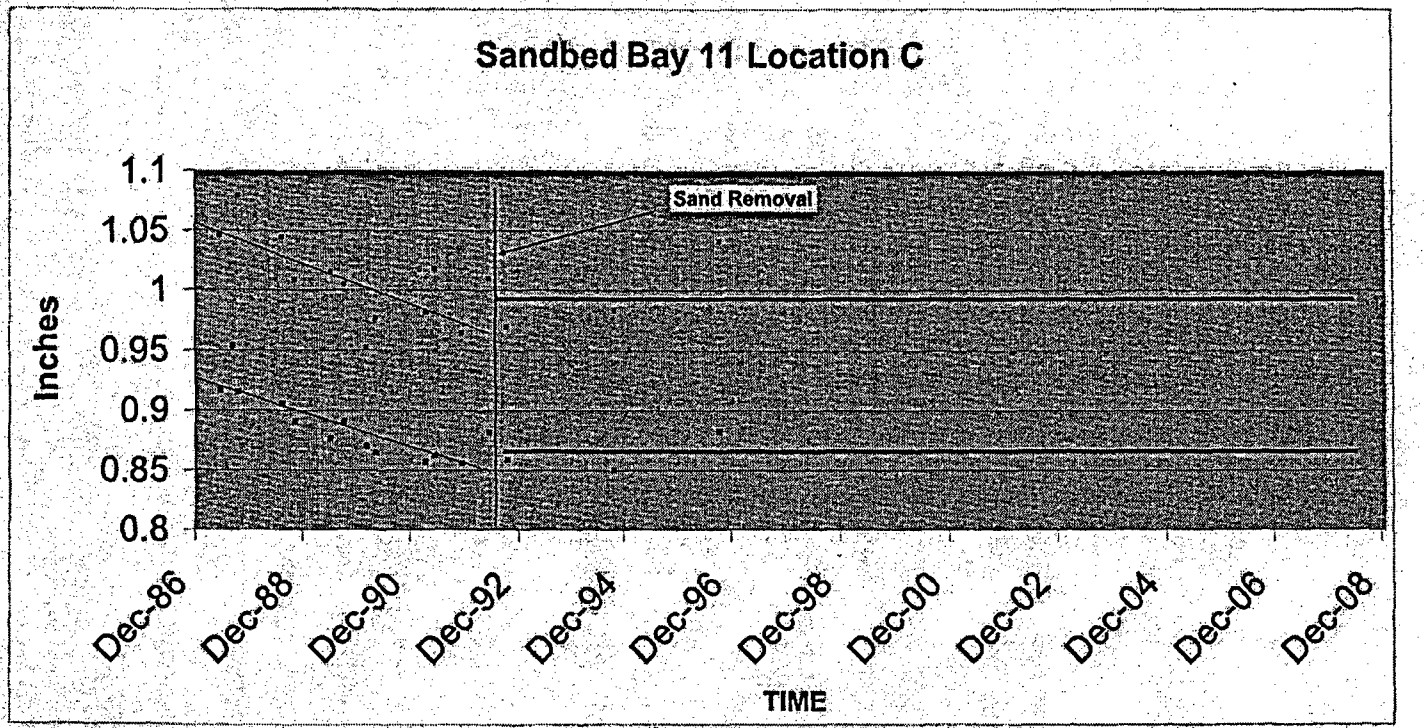
Dates	Dec-86	Feb-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
9D	1.0715						1.0214	1.0540	1.0200	1.0260	1.0217	0.9926	1.0075	0.9924	1.0006	1.0036	0.9920	1.0000



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Unform Required Thickness
-0.0171	0.83311	05/01/92	0.8251	1.154"	0.736"

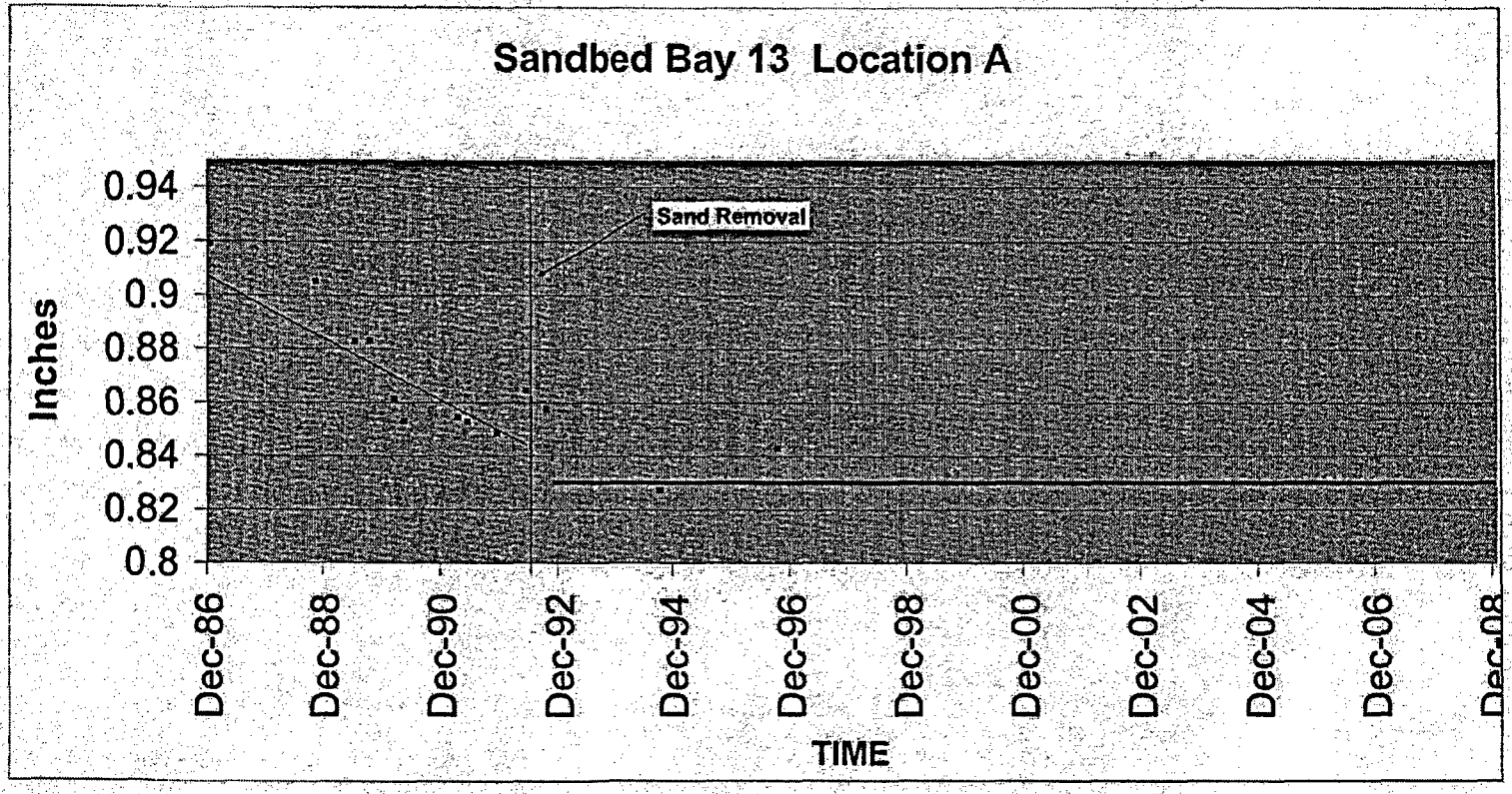
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
11A			0.9187	0.90464	0.92209	0.9052	0.913	0.8882	0.881	0.8916	0.8808	0.8704	0.8446	0.844	0.8326	0.842	0.8252	0.82	0.83



Based on Calculation C-1302-187-5300-021

Slope	Slope	Best Est. Low	Best Est. High	Date	Average Since 1992	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.0143	-0.0171	0.8498	0.9642	05/01/92	0.8641	0.9954	1.154"	0.736"

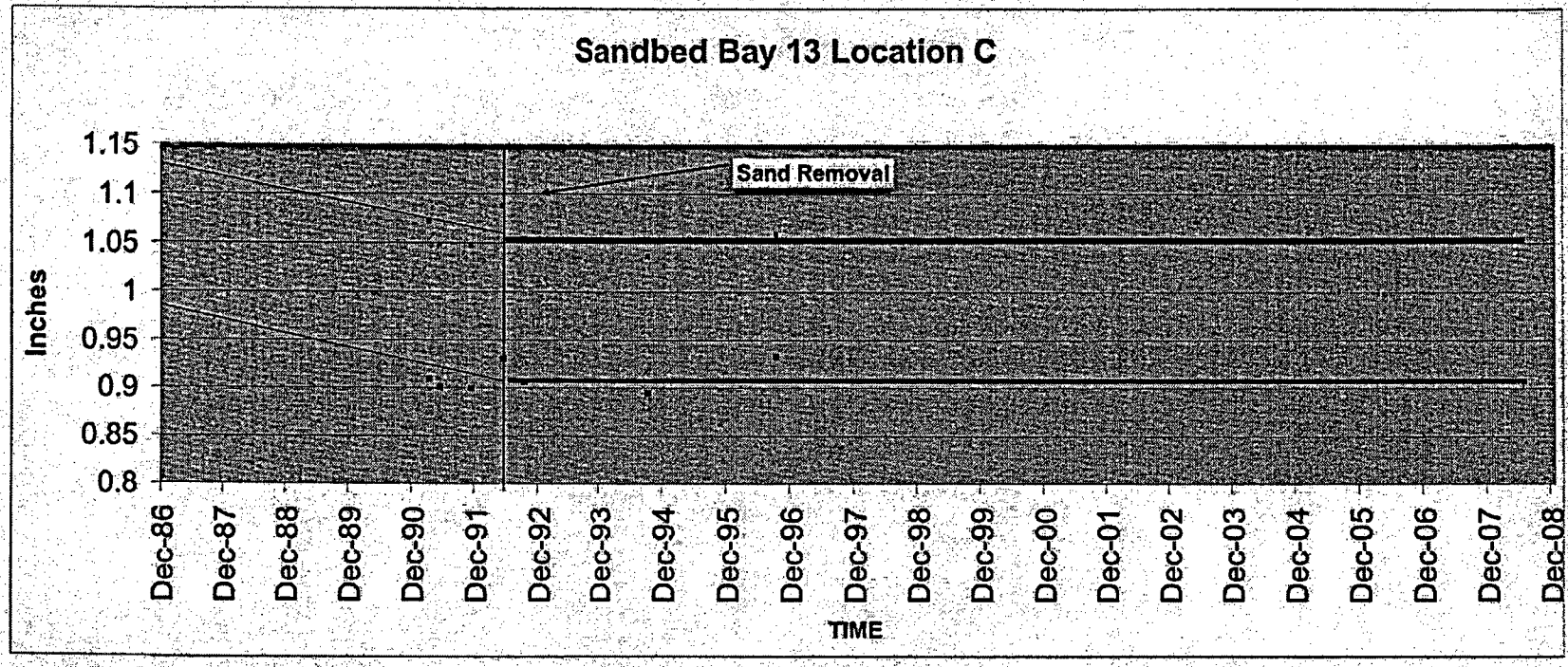
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
11C Bottom				0.91679	0.95364	0.91571	0.9061	0.8907	0.8768	0.8907	0.8703	0.865	0.8575	0.8626	0.8563	0.882	0.8591	0.8503	0.883
11C Top				1.046	1.1086	1.0791	1.0454	1.0089	1.0158	1.005	0.9522	0.977	0.9617	1.018	0.9643	1.01	0.9697	0.9836	1.0418



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.012	0.8442	05/01/92	0.8386	1.154"	0.736"

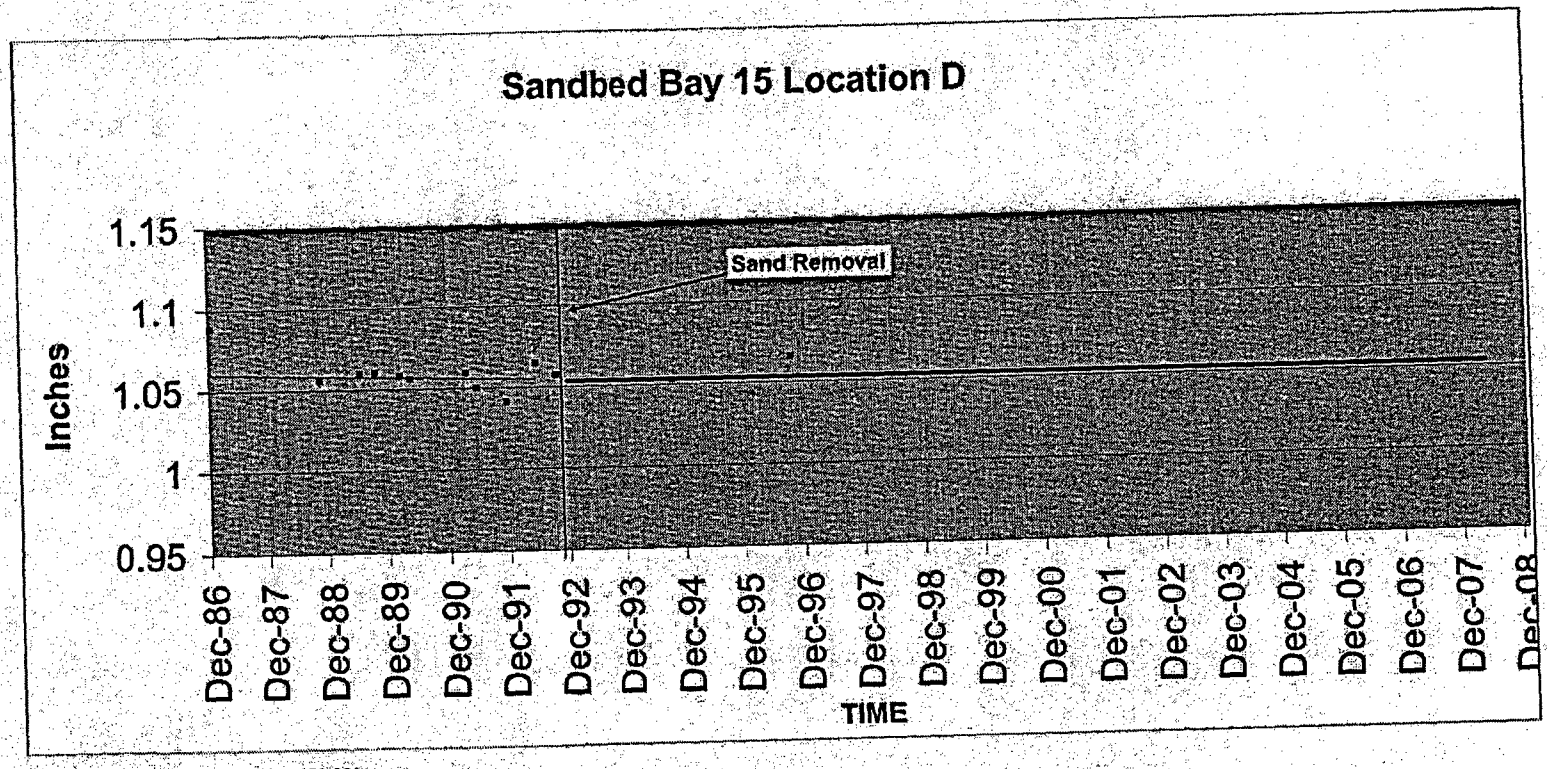
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
	0.91908							0.9053	0.8828	0.883	0.8615	0.8531	0.8545	0.8529	0.8486	0.8645	0.8576	0.8275	0.843



Based on Calculation C-1302-187-5300-021

Slope	Slope	Best Est. Low	Best Est. Hig	Date	Average Since 1992	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.013	-0.0146	0.9073	1.06	05/01/92	1.0505	0.9114	1.154"	0.736"

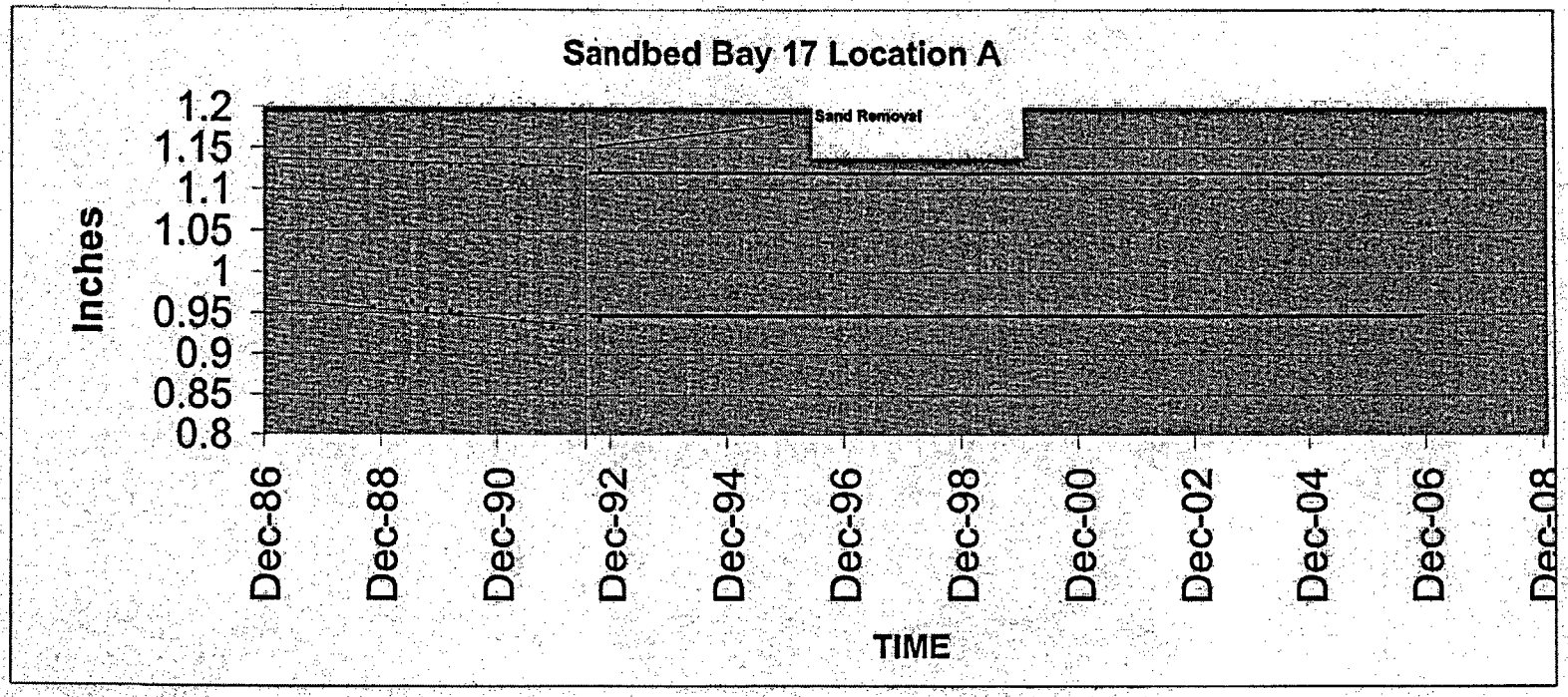
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
I3C Bottom													0.9094	0.9013	0.8996	0.9305	0.906	0.8953	0.933
I3C Top													1.0722	1.0488	1.0479	1.0882	1.0546	1.037	1.0593



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.001	1.055	05/01/92	1.0588	1.154"	0.736"

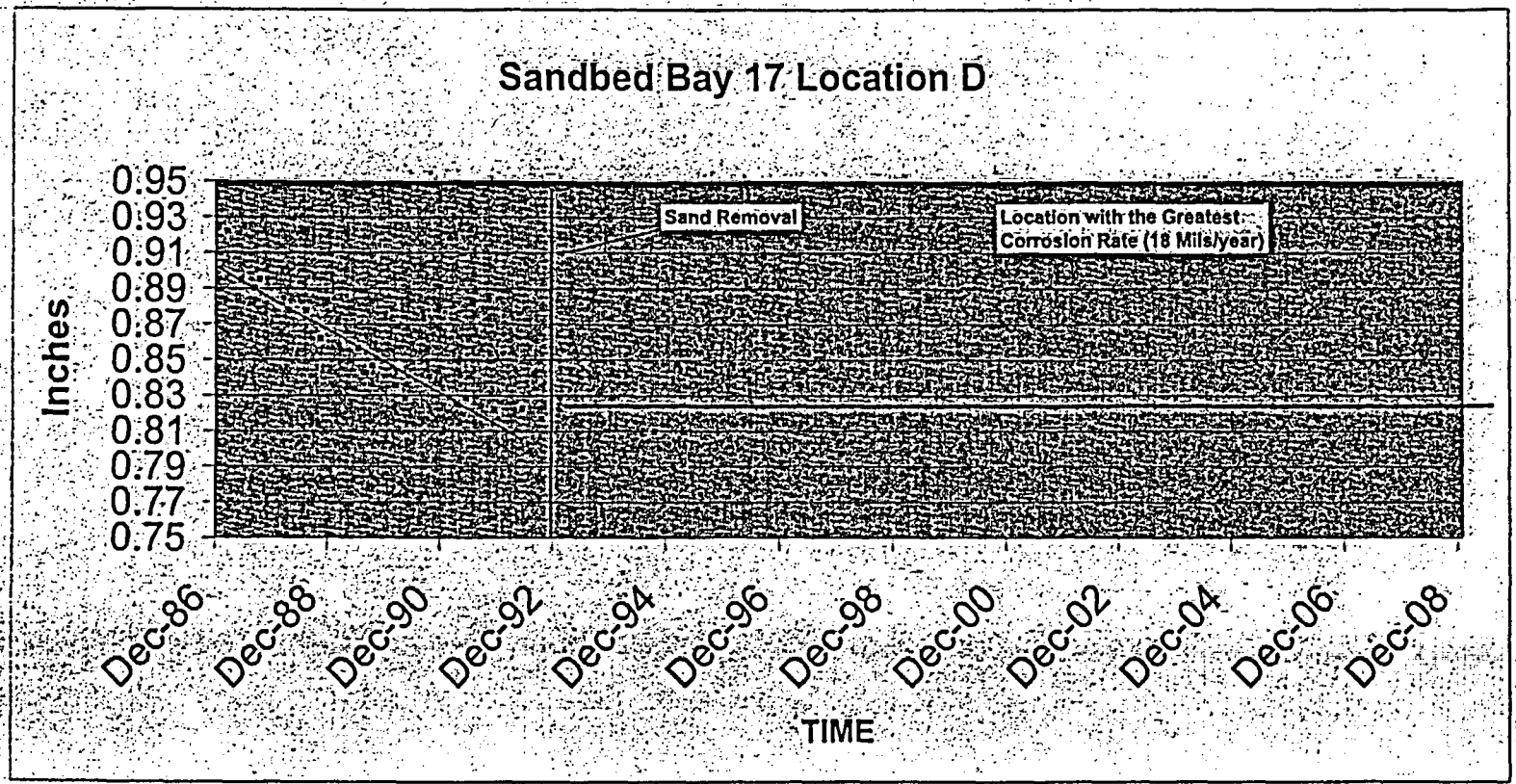
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
	1.089							1.056	1.06	1.0609	1.0586	1.0565	1.0598	1.0502	1.0417	1.0652	1.0577	1.053	1.066



Based on Calculation C-1362-187-5360-021

Slope	Slope	Best Est. Low	Best Est. High	Date	Average Since 1992	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.0056	-0.0017	0.9252	1.1278	05/01/92	1.1126	0.9573	1.154"	0.735"

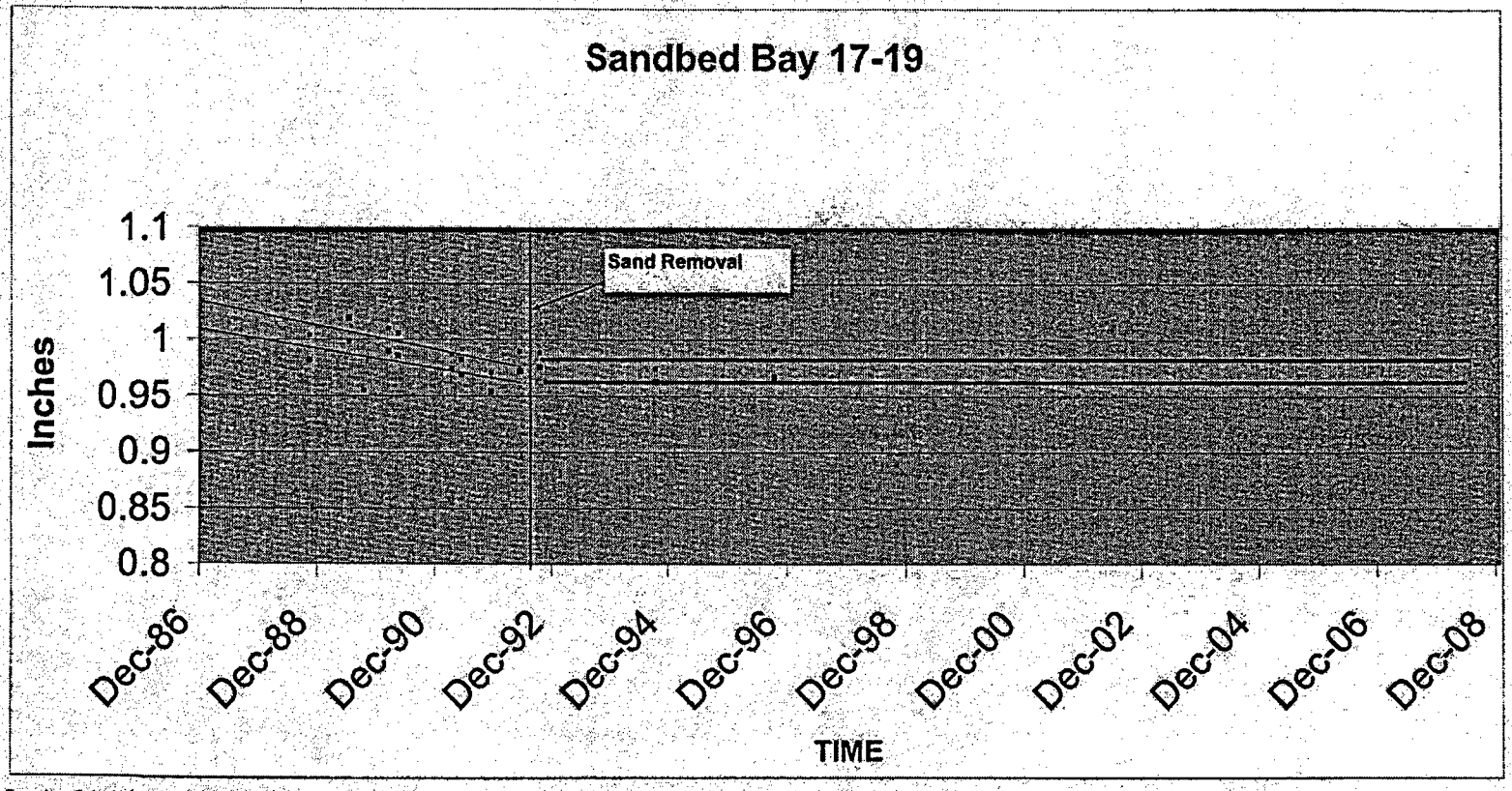
Datum	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
17A Bottom	0.999							0.9574	0.9445	0.9592	0.9536	0.9568	0.9347	0.9424	0.9328	0.9481	0.9413	0.9336	0.9959
17A Top	0.999							1.1331	1.13	1.1388	1.126	1.1283	1.1309	1.1293	1.1226	1.1254	1.1246	1.1209	1.1441



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.018	0.8057	05/01/92	0.8239	1.154"	0.736"

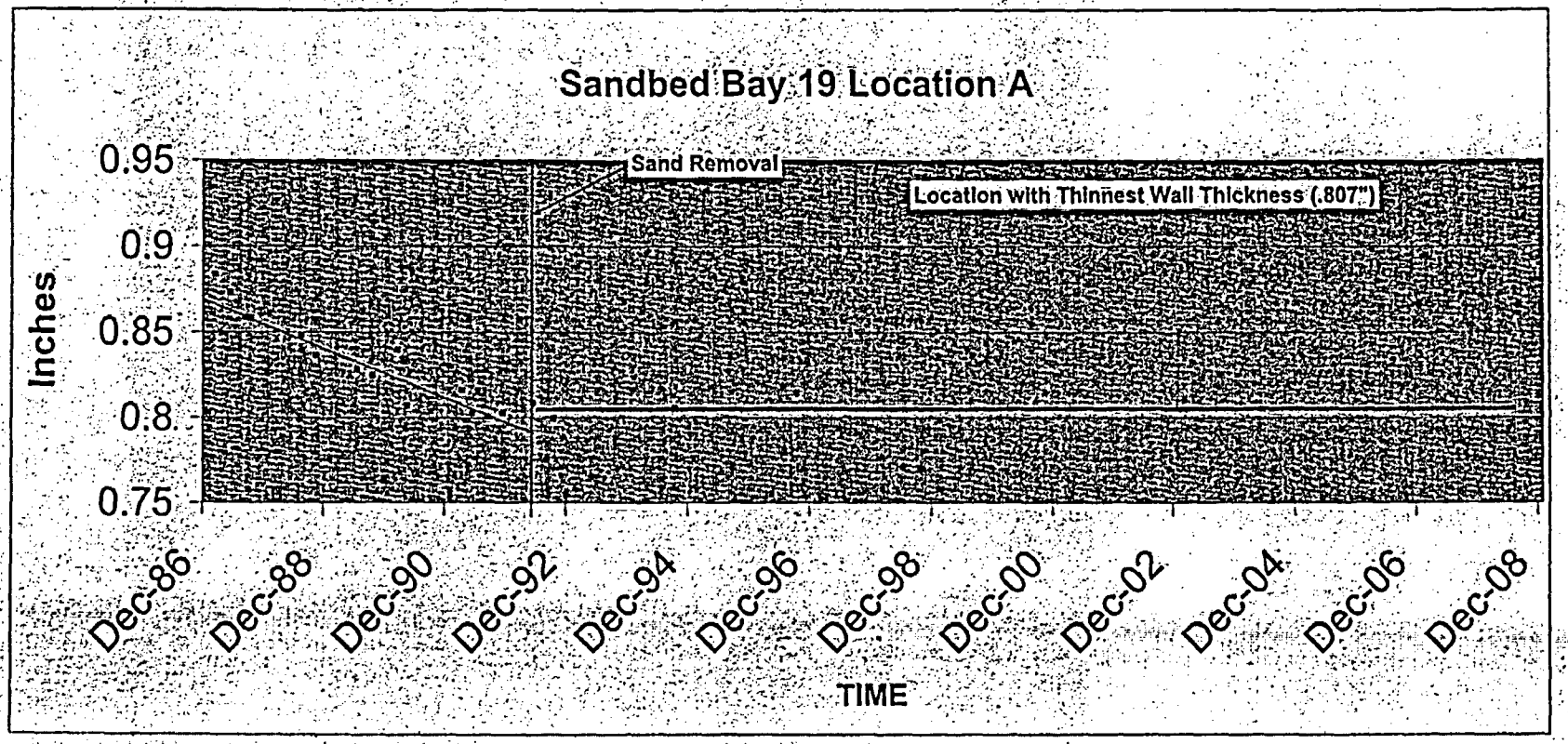
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
17D		0.92217		0.89507	0.89069	0.89528	0.8779	0.8622	0.8568	0.8471	0.8358	0.829	0.8253	0.8291	0.8222	0.823	0.8172	0.81	0.845



Based on Calculation C-1302-187-5300-021

Slope	Slope	Best Est. Low	Best Est. High	Date	Average Since 1992	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.0087	-0.0107	0.9621	0.9761	05/01/92	0.9671	0.9689	1.154"	0.736"

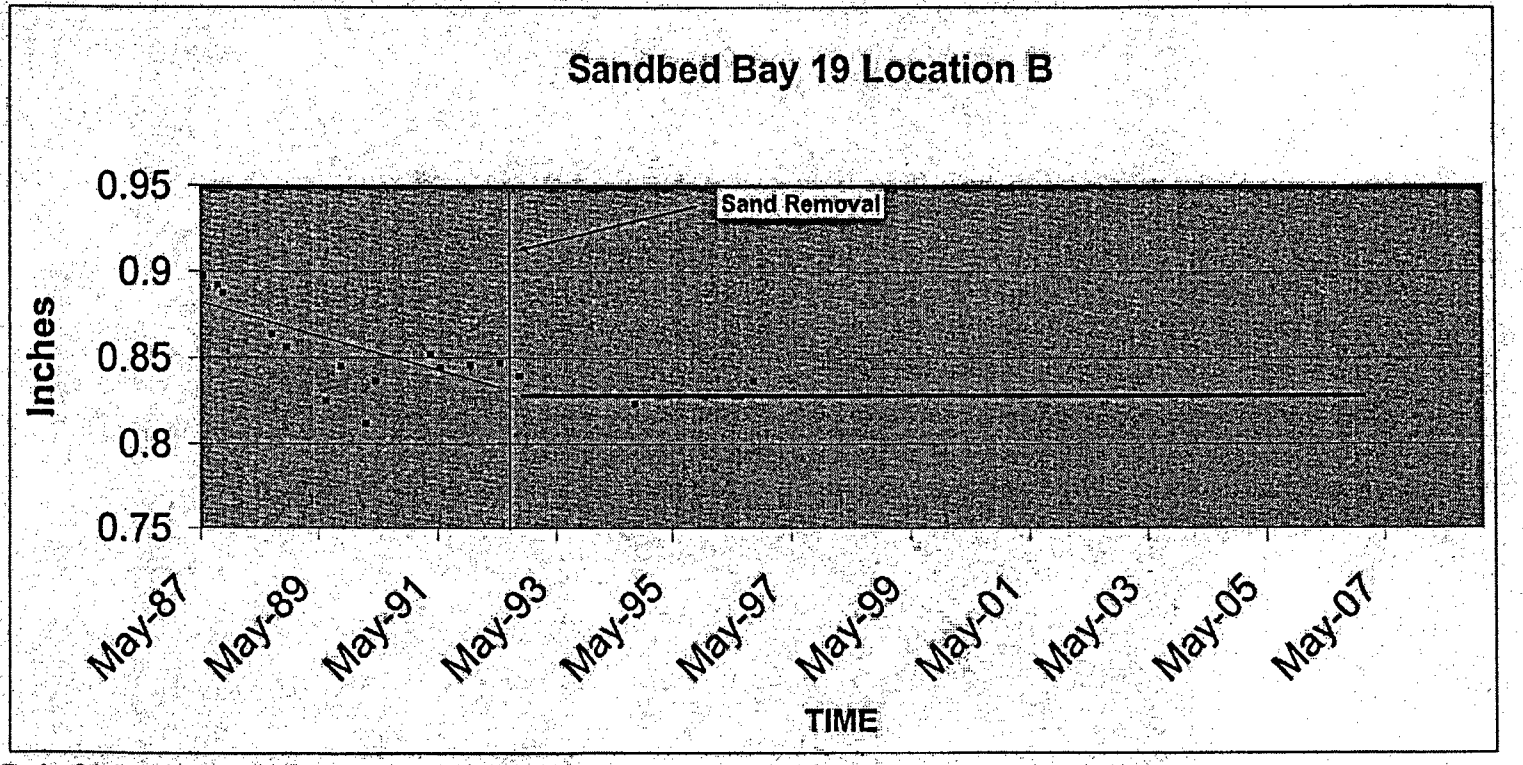
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
17/19 Top								0.9817	1.0191	1.1308	0.9898	0.986	0.9746	0.9693	0.9542	0.9722	0.976	0.963	0.9674
17/19 Bottom								1.0036	0.9988	0.9552	1.01	1.0057	0.987	0.9824	0.9711	0.99	0.9887	0.9748	0.9914



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.015	0.7911	05/01/92	0.8071	1.154"	0.736"

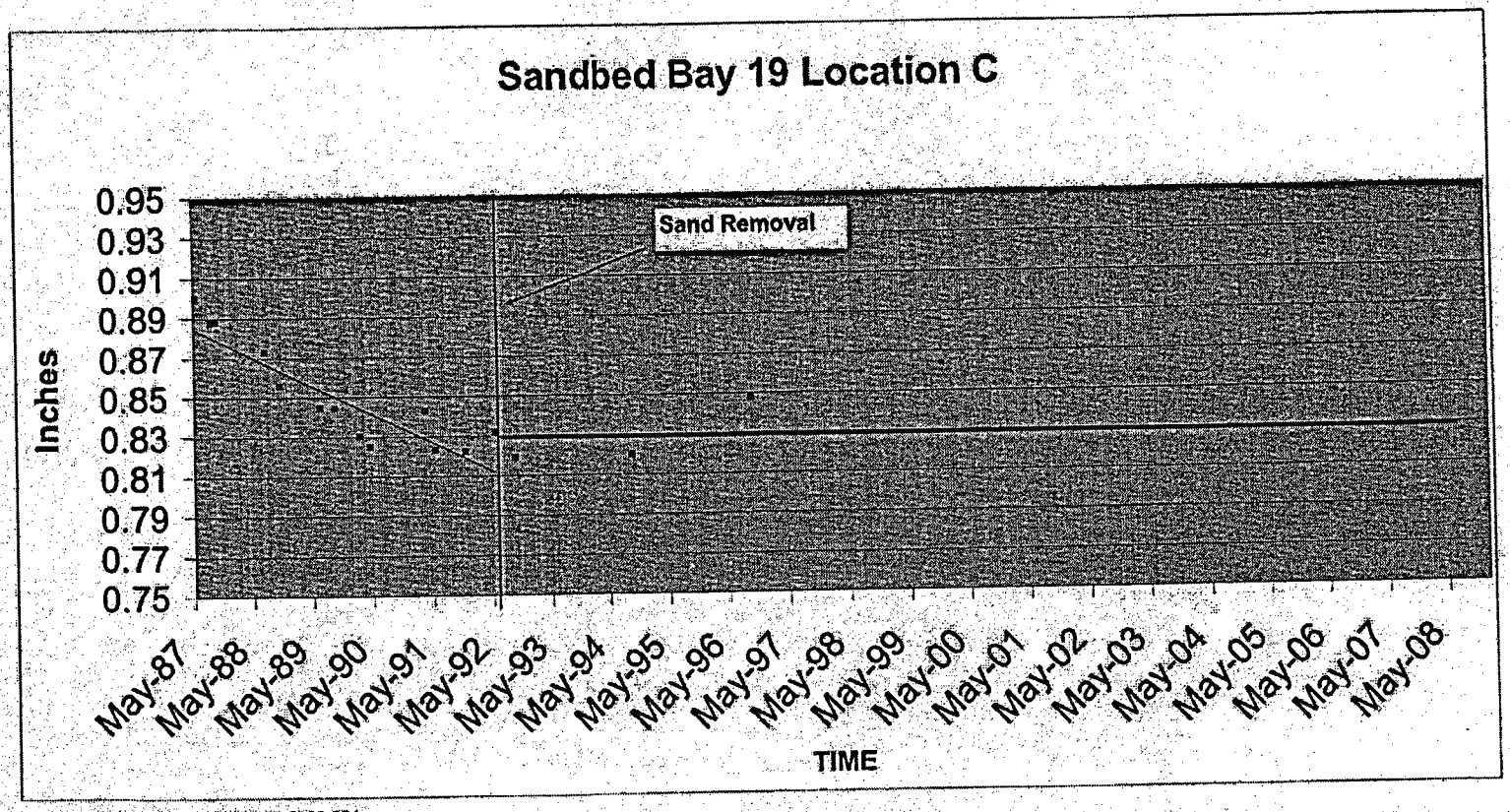
Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
19A		0.88364		0.87293	0.8586	0.85829	0.8486	0.8369	0.8288	0.8254	0.8399	0.8076	0.8167	0.8028	0.8032	0.8091	0.8002	0.806	0.815



Based on Calculation C-1302-187-5308-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.0099	0.8330	05/01/92	0.8337	1.154"	0.736"

Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
19B				0.89763	0.89221	0.8876	0.864	0.8565	0.8256	0.84549	0.812	0.8369	0.8515	0.8444	0.8463	0.8472	0.8396	0.824	0.837



Based on Calculation C-1302-187-5300-021

Slope	Best Est.	Date	Average Since 1992	Original Nominal Thickness	Minimum Uniform Required Thickness
-0.015	0.8117	05/01/92	0.829	1.154"	0.736"

Dates	Dec-86	Feb-87	Apr-87	May-87	Aug-87	Sep-87	Jul-88	Oct-88	Jun-89	Sep-89	Feb-90	Apr-90	Mar-91	May-91	Nov-91	May-92	Sep-92	Sep-94	Sep-96
19C				0.90051	0.88816	0.88831	0.8735	0.8563	0.845	0.8447	0.8305	0.8251	0.8428	0.8232	0.8223	0.8319	0.8192	0.82	0.848

NRC Information Request Form

Item No	*Date Received:*	*Source*
AMP-141	10/ 6/2005	AMP Audit
Topic:	*Status:*	Open
IWE		

Document References:
B.1.27

NRC Representative Morante, Rich

AmerGen (Took Issue): Hufnagel, Joh

Question

AMP B.1.27 IWE

a. Visual inspection of the coatings in the former sandbed region of the drywell is currently conducted under the applicant's protective coatings monitoring and maintenance program; only this AMP is credited for managing loss of material due to corrosion for license renewal. Visual inspection of the containment shell conducted in accordance with the requirements of IWE is typically credited to manage loss of material due to corrosion.

The applicant is requested to provide its technical basis for not also crediting its IWE program for managing loss of material due to corrosion in the former sandbed region of the drywell.

B. During discussions with the applicant's staff on 10/04/05 about augmented inspection conducted under IWE, the applicant presented tabulated inspection results obtained from the mid 1980s to the present, to monitor the remaining drywell wall thickness in the cylindrical and spherical regions where significant corrosion of the outside surface was previously detected.

The applicant is requested to provide (1) a copy of these tabulated inspection results, (2) a list of the nominal design thicknesses in each region of the drywell, (3) a list of the minimum required thicknesses in each region of the drywell, and (4) a list of the projected remaining wall thicknesses in each region of the drywell in the year 2029.

AMP B.1.27 IWE Question on Remaining Wall Thickness in the Former Sandbed Region of the Drywell

c. During discussions with the applicant's staff on 10/05/05, the applicant described the history and resolution of corrosion in the sandbed region. After discovery, thickness measurements were taken from 1986 through 1992, to monitor the progression of wall loss. Remedial actions were completed in early 1993. At that time, the remaining wall thickness exceeded the minimum required thickness. The applicant concluded that it had completely corrected the conditions which led to the corrosion, and terminated its program to monitor the remaining wall thickness. At that time, the remaining years of operation was expected to be no more than 16 years (end of the current license term).

NRC Information Request Form

The applicant's aging management commitment for license renewals is limited to periodic inspection of the coating that was applied to the exterior surface of the drywell as part of the remedial actions. The applicant has not made a license renewal commitment to measure wall thickness in the sandbed region in order to confirm the effectiveness of the remedial actions taken.

Assigned To: Ouaou, Ahmed

Response:

a) Visual inspection of the containment drywell shell, conducted in accordance with ASME Section XI, Subsection IWE, is credited for aging management of accessible areas of the containment drywell shell. Typically this inspection is for internal surfaces of the drywell. The exterior surfaces of the drywell shell in the sand bed region for Mark I containment is considered inaccessible by ASME Section XI, Subsection IWE, thus visual inspection is not possible for a typical Mark I containment including Oyster Creek before the sand was removed from the sand bed region in 1992. After removal of the sand, an epoxy coating was applied to the exterior surfaces of the drywell shell in the sand bed region. The region was made accessible during refueling outages for periodic inspection of the coating. Subsequently Oyster Creek performed periodic visual inspection of the coating in accordance with an NRC current licensing basis commitment. This commitment was implemented prior to implementation of ASME Section XI, Subsection IWE. As a result inspection of the coating was conducted in accordance with the Protective Coating Monitoring and Maintenance Program. Our evaluation of this aging management program concluded the program is adequate to manage aging of the drywell shell in the sand bed region during the period of extended operation consistent with the current licensing basis commitment, and that inclusion of the coating inspection under IWE is not required. However we are amending this position and will commit to monitor the protective coating in the exterior surfaces of the drywell in the sand bed region in accordance with the requirements of ASME Section XI, Subsection IWE during the period of extended operation. For details related to implementation of this commitment, refer to the response to NRC AMP Question #188.

b) A tabulation of ultrasonic testing (UT) thickness measurement results in monitored areas of the drywell spherical region above the sand bed region and in the cylindrical region is included in ASME Section XI, Subsection IWE Program Basis Document (PBD-AMP-B.1.27) Notebook. The tabulation contains information requested by the Staff and is available for review during AMP audit. The tabulation is also provided in Table -1, and Table-2 below.

c) In December 1992, with approval from the NRC a protective epoxy coating was applied to the outside surface of the drywell shell in the sand bed region to prevent additional corrosion in that area. UT thickness measurements taken in 1992, and in 1994, in the sand bed region from inside the drywell confirmed that the corrosion in the sand bed region has been arrested. Periodic inspection of the coating indicates that the coating in that region is performing satisfactorily with no signs of deterioration such as blisters, flakes, or discoloration, etc. Additional UT measurements, taken in 1996 from inside the drywell in the sand bed region showed no ongoing corrosion and provided objective evidence that corrosion has been arrested.

NRC Information Request Form

As a result of these UT measurements and the observed condition of the coating, we concluded that corrosion has been arrested and monitoring of the protective coating alone, without additional UT measurements, will adequately manage loss of material in the drywell shell in the sand bed region. However to provide additional assurance that the protective coating is providing adequate protection to ensure drywell integrity, Oyster Creek will perform periodic confirmatory UT inspections of the drywell shell in the sand bed region. The initial UT measurements will be taken prior to entering the period of extended operation and then every 10 years thereafter. The UT measurements will be taken from inside the drywell at the same locations where the UT measurements were taken in 1996. This revises the license renewal commitment communicated to the NRC in a letter from C. N. Swenson Site Vice President, Oyster Creek Generating Station to U. S. Nuclear Regulatory Commission, "Additional Commitments Associated with Application for renewed Operating License - Oyster Creek Generating Station", dated 12/9/2005. This letter commits to one-time inspection to be conducted prior to entering the period of extended operation. The revised commitment will be to conduct UT measurements on a frequency of 10 years, with the first inspection to occur prior to entering the period of extended operation.

This response was revised to incorporate additional commitments on UT examinations for the sand bed region discussed with NRC Audit team on 1/26/2006.
This response was revised to reference response to NRC Question #AMP-188 and RAI 4.7.2-1(d). AMO 4/1/2006.
The response was revised to add Table-1, and Table-2, and delete reference to RAI 4.7.2-1(d) AMO 4/5/2006.

LRCR #: 229 *LRA A.5 Commitment #:* 27

IR#:

Approvals:

Prepared By:	Ouaou, Ahmed	4/ 5/2006
Reviewed By:	Getz, Stu	4/ 5/2006
Approved By:	Warfel, Don	4/ 5/2006

NRC Acceptance (Date):

Table –1. UT Thickness measurements for the Upper Region of the Drywell Shell

Monitored Elevation	Location	Minimum Required Thickness, inches [5]	Average Measured Thickness [1,2,3], inches											Projected Lower 95% Confidence Thickness in 2029
			1987	1988	1989	1990	1991	1992	1993 [3]	1994	1996	2000	2004	
Elevation 50' 2"		0.541"												
	Bay 5–D12					0.743 0.745 0.746	0.742 0.745 0.748	0.747 0.747		0.741	0.748	0.741	0.743	No Ongoing Corrosion
	Bay 5–5H					0.761 0.761	0.755 0.758 0.760	0.758 0.758		0.754	0.757	0.754	0.756	0.7384
	Bay 5–5L					0.706 0.703	0.703 0.705 0.706	0.703 0.707		0.702	0.705	0.706	0.701	No Ongoing Corrosion
	Bay 13–31H					0.762 0.779	0.760 0.758 0.765	0.765 0.763		0.759	0.766	0.762	0.758	No Ongoing Corrosion
	Bay 13–31L					0.687 0.684	0.689 0.678 0.688	0.685 0.688		0.683	0.690	0.682	0.693	No Ongoing Corrosion
	Bay 15–23H					0.758 0.764	0.762 0.762 0.765	0.767 0.763		0.758	0.760	0.758	0.757	0.738
	Bay 15–23L					0.726 0.728	0.726 0.729 0.725	0.726 0.724		0.728	0.724	0.729	0.727	No Ongoing Corrosion
Elevation 51' 10"		0.541"												

Table –1. UT Thickness measurements for the Upper Region of the Drywell Shell

Monitored Elevation	Location	Minimum Required Thickness, inches [5]	Average Measured Thickness [1,2,3], inches											Projected Lower 95% Confidence Thickness in 2029
			1987	1988	1989	1990	1991	1992	1993 [3]	1994	1996	2000	2004	
	Bay 13–32H					0.716	0.715 0.715 0.719	0.717 0.717		0.714	0.715	0.715	0.713	No Ongoing Corrosion
	Bay 13–32L					0.686	0.683 0.683 0.682	0.683 0.676		0.680	0.684	0.679	0.687	No Ongoing Corrosion
Elevation 60' 10"		0.518"												
	Bay 1–5-22								0.693	0.711	0.692	0.689	0.689	No Ongoing Corrosion
Elevation 87' 5"		0.452"												
	Bay 9–20		0.619	0.622 0.620	0.619	0.620	0.614 0.612	0.629 0.614		0.613	0.613	0.604	0.612	0.604.
	Bay 13–28		0.643	0.641 0.642	0.645	0.643	0.635 0.629	0.641 0.637		0.640	0.636	0.635	0.640	No Ongoing Corrosion
	Bay 15–31		0.638	0.636 0.636	0.638	0.642	0.628 0.627	0.631 0.630		0.633	0.632	0.628	0.630	0.615

Notes:

1. The average thickness is based on 49 Ultrasonic Testing (UT) measurements performed at each location
2. Multiple inspections were performed in the years 1988, 1990, 1991, and 1992.
3. The 1993 elevation 60' 10" Bay 5-22 inspection was performed on January 6, 1993. All other locations were inspected in December 1992.
4. Accuracy of Ultrasonic Testing Equipment is plus or minus 0.010 inches.
5. Reference SE-000243-002.

Table –1. UT Thickness measurements for the Upper Region of the Drywell Shell

Conclusion:

Summary of Corrosion Rates of UT measurements taken through year 2004

- There is no ongoing corrosion at two elevations (51' 10" and 60' 10")
- Based on statistical analysis, one location at elevation 50' 2" is undergoing a minor corrosion rate of 0.0003 inches per year,
- Based on statistical analysis, two locations at elevation 87' 5" are undergoing minor corrosion rates of 0.0005 and 0.00075 inches per year

Table –2 UT Thickness measurements for the Sand Bed Region of the Drywell Shell

Location Bay	Sub Location	Dec 1986	Feb 1987	Apr 1987	May 1987	Aug 1987	Sep 1987	Jul 1988	Oct 1988	Jun 1989	Sep 1989	Feb 1990	Apr 1990	Mar 1991	May 1991	Nov 1991	May 1992	Sep 1992	Sep 1994	Sep 1996
1D									1.115										1.101	1.1514
3D									1.178										1.184	1.181
5D									1.174										1.168	1.173
7D									1.135										1.136	1.138
9A									1.155										1.157	1.155
9D		1.072							1.021	1.054	1.020	1.026	1.022	0.993	1.008	0.992	1.000	1.004	0.992	1.008
11A				0.919	0.905	0.922	0.905	0.913	0.888	0.881	0.892	0.881	0.870	0.845	0.844	0.833	0.842	0.825	0.820	0.830
11C	Bottom				0.917	0.954	0.916	0.906	0.891	0.877	0.891	0.870	0.865	0.858	0.863	0.856	0.882	0.859	0.850	0.883
	Top				1.046	1.109	1.079	1.045	1.009	1.016	1.005	0.952	0.977	0.982	1.018	0.964	1.010	0.970	0.984	1.042
13A		0.919							0.905	0.883	0.883	0.862	0.853	0.855	0.853	0.849	0.865	0.858	0.828	0.843
13C	Bottom													0.909	0.901	0.900	0.931	0.906	0.895	0.933
	Top													1.072	1.049	1.048	1.088	1.055	1.037	1.059
13D									0.962				0.932					1.001	0.959	0.990
15A									1.120										1.114	1.127
15D		1.089							1.056	1.060	1.061	1.059	1.057	1.060	1.050	1.042	1.065	1.058	1.053	1.066
17A	Bottom	0.999							0.957	0.965	0.955	0.954	0.951	0.935	0.942	0.933	0.948	0.941	0.934	0.997
	Top	0.999							1.133	1.130	1.131	1.128	1.128	1.131	1.129	1.123	1.125	1.125	1.129	1.144
17D			0.922		0.895	0.891	0.895	0.878	0.862	0.857	0.847	0.836	0.829	0.825	0.829	0.822	0.823	0.817	0.810	0.845
17/19	Top								0.982	1.019	1.131	0.990	0.986	0.975	0.969	0.954	0.972	0.976	0.963	0.967
	Bottom								1.004	0.999	0.955	1.010	1.006	0.987	0.982	0.971	0.990	0.989	0.975	0.991
19A			0.864		0.873	0.859	0.858	0.849	0.837	0.829	0.825	0.840	0.808	0.817	0.803	0.803	0.809	0.800	0.806	0.815
19B					0.898	0.892	0.888	0.864	0.857	0.826	0.845	0.812	0.837	0.853	0.844	0.846	0.847	0.840	0.824	0.837
19C					0.901	0.888	0.888	0.873	0.856	0.845	0.845	0.831	0.825	0.843	0.823	0.822	0.832	0.819	0.820	0.848

UNITED STATES OF AMERICA
BEFORE THE NUCLEAR REGULATORY COMMISSION
OFFICE OF THE SECRETARY

In the Matter of	)	
	)	Docket No. 50-0219-LR
AMERGEN ENERGY COMPANY, LLC	)	
	)	ASLB No. 06-844-01-LR
(License Renewal for the Oyster Creek	)	
Nuclear Generating Station)	)	May 5, 2006
	)	

CERTIFICATION OF RICHARD WEBSTER IN SUPPORT OF CITIZENS' RESPONSE TO AMERGENS' MOTION TO DISMISS, CITIZENS' MOTION TO APPLY SUBPART G PROCEDURES, AND CITIZENS' MOTION TO COMPEL

I Richard Webster, Esq., being of full age, hereby certify that:

1. I represent a coalition of Citizens' groups in this proceeding. I have consulted with AmerGen and NRC Staff in an attempt to avoid the need to file the accompanying motions. AmerGen objects to both Motions. NRC Staff has not yet taken a position on the Motion to compel, but does not support the Motion for Subpart G procedures and intends to file a written response to that Motion.

2. The document attached as Exhibit A to the Motion for Subpart G procedures ("Subpart G Motion"), Complaint in State of Illinois v. Exelon Corp., Docket No. 06 MR 248 (Ill.,12th Cir. Mar. 16, 2006), is a true and correct copy.

3. The document attached as Exhibit B to the Subpart G Motion, Illinois EPA, "Exelon Braidwood Nuclear Facility Tritium Releases and Groundwater Impacts," Fact Sheet 1 (Feb. 2006), is a true and correct copy.

4. The document attached as Exhibit C to the Subpart G Motion, Hal Dardick, "Exelon Sued Over Leaks: Will County, State Allege 8 Tritium Spills," Chicago Tribune (Mar. 17, 2006), is a true and correct copy.

5. The document attached as Exhibit D to the Subpart G Motion, Hal Dardick, "Leaks Costly, Exelon Says: Tritium Spills Create Credibility Problem, Leader Says," Chicago Tribune (April 26, 2006), is a true and correct copy

6. The document attached as Exhibit E to the Subpart G Motion, Letter from Cynthia D. Pederson, NRC, to Christopher Crane, Exelon, dated Feb. 28, 2005, "Quad Cities Nuclear Power Station Non-Cited Violation [NRC Office of Investigations Report No. 3-2004-011]," is a true and correct copy.

7. The document attached as Exhibit F to the Subpart G Motion, Electronic Mail from Alex Polonsky to Richard Webster, "Oyster Creek," Mar. 23, 2006, is a true and correct copy.

8. The document attached as Exhibit G to the Subpart G Motion, Electronic Mail from Paul Gunther to Jhansi Kandasamy, "Oyster Creek Drywell Liner Corrosion Monitoring Program," Sept. 6, 2005, is a true and correct copy.

9. The document attached as Exhibit H to the Subpart G Motion, Electronic Mail from Peter C. Resler to Paul Gunther, "Response to 9/6 Request for Information," Oct. 10, 2005, is a true and correct copy.

10. The document attached as Exhibit I to the Subpart G Motion, Electronic Mail from George Beck to Donnie Ashley, et al., "Audit Q&A (Question Numbers AMP-141, 210, 356)," Apr. 5, 2006, is a true and correct copy.

11. The document attached as Exhibit J to the Subpart G Motion, and Exhibit RM 1 to the Response to Amergen's Motion to Dismiss, Memorandum by Rudolf H. Hausler, "Oyster Creek Dry Well Corrosion – Comments Regarding "Audit Q & A (Question Numbers AMP – 141, 210, 356) dated 4/5/06, Ref. ML060960563," May 3, 2006, is a true and correct copy. In addition, the attachment to Dr. Hausler's memorandum, provided in Exhibit RM 1, is a true and correct copy of Amergen's response to NRC audit questions, dated April 5, 2005, ADAMS accession number ML060960563.

12. The document attached as Exhibit K to the Subpart G Motion, Alexandra Marks, "Should Oldest US Nuke Plant Stay On Line?," Christian Science Monitor, (Apr. 19, 2006), is a true and correct copy.

13. The document attached as Exhibit L to the Subpart G Motion, Nuclear Security Coalition, "Report's Highlights: Safety and Security of Commercial Spent Nuclear Fuel Storage Public Report," National Academy of Sciences, Apr. 2005, is a true and correct copy.

14. The document attached as Exhibit M to the Subpart G Motion, Oyster Creek Public Relations Document, "Used Fuel Security Fact Sheet," is a true and correct copy.

15. The document attached as Exhibit N to the Subpart G Motion, Letter from Jill Lipoti, Ph.D. State of New Jersey Division of Environmental Safety and Health, to Hubert Miller, NRC "Effects of Aircraft Impact on Spent Fuel Pools in New Jersey," July 30, 2004, is a true and correct copy.

16. The document attached as Exhibit O to the Subpart G Motion is a true and correct copy of an excerpt of Safety and Security of Commercial Spent Nuclear Fuel Storage Public Report," National Academy of Sciences, Apr. 2005.

17. I caused to be sent the foregoing motions, response, and exhibits this 5th day of May, 2006 via email and U.S. Postal Service, as designated below, to each of the following:

Secretary of the Commission (Email and original and 2 copies via U.S Postal Service)
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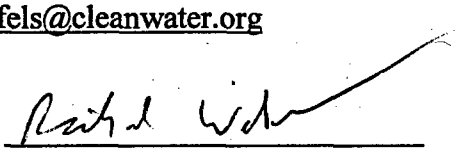
Signed: 

Richard Webster

Dated: May 5, 2006