RAS 11181

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)	)	February 7, 2006
	)	

MOTION FOR LEAVE TO ADD CONTENTIONS OR SUPPLEMENT THE BASIS OF THE CURRENT CONTENTION

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 "Petitioners") submit this Motion because the staff of the Nuclear Regulatory Commission ("N.R.C.") divulged critical new information regarding the need for monitoring and analysis of corrosion problems as part of license renewal on January 31, 2006. Thus, Petitioners seek leave to add contentions, to the extent necessary, or supplement the basis of the current contention.

The new information clearly shows that the technical basis of the current contention is sound. Further, if the ASLB should conclude, as urged by AmerGen Energy Co. LLC ("AmerGen") and N.R.C. staff, that the current contention failed to properly

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allege that the proposed monitoring of inaccessible areas of the drywell liner is inadequate, the new information supports the addition of a new contention alleging precisely that. Finally, the new information revealed that AmerGen has failed to carry out an adequate root cause analysis for the corrosion problem, and that N.R.C. technical staff have now concluded that this is essential.

BACKGROUND

Petitioners have already contended that the testing of the extent of corrosion at all levels of the drywell liner proposed in AmerGen's license renewal application ("LRA") is inadequate to assure the continued integrity of this safety-critical structure for the period of the license extension. Petition at 3. To support this contention, Petitioners showed that the drywell liner is a safety-critical structure that acts both as a pressure boundary and as a structural support. Id. at 4. Petitioners then showed that water leakage into the drywell liner has caused significant corrosion, particularly in the sand bed region, where the N.R.C. regarded the corrosion as a "threat to drywell integrity." Id. at 4-6. Petitioners showed further that N.R.C. in 1986 regarded ultra-sonic testing of the sand bed region and other accessible areas of the drywell liner as "essential . . . for the life of the plant." Id. at 7.

Petitioners asserted that the potential for ongoing corrosion means that ongoing comprehensive testing is required to ensure the remaining razor-thin safety margins are met throughout the extended life of the plant. Indeed, Petitioners' Exhibit 5 at pages 8 and 12 showed that while AmerGen reported the "current thinnest" area to be 0.8 inches in December 1992, the actual thinnest areas are *less* than 0.736 inches, which is the basis for evaluation. Disturbingly, *multiple* measurements in bays 1 and 13 and isolated measurements in bays 11, 15, and 17 were below 0.736 inches. Id. at 12. It is currently

unclear how AmerGen changed the evaluation basis to evaluate the acceptability of the next round of measurements, which Petitioners have been unable to obtain, despite diligent efforts.

NEW INFORMATION AVAILABLE

On January 17, 2006 N.R.C. gave notice of a conference call scheduled for January 31, 2006 to discuss the proposed interim staff guidance for license renewal associated with the corrosion of the Mark I steel containment drywell shell. Ex. A. Prior to the call, Ms. Linh Tran of the N.R.C. distributed a power point presentation. Ex. B. During the call Ms. Tran gave a presentation and numerous N.R.C. staff members concerned with the license renewal process participated by answering questions. Ms. Tran's presentation made clear that N.R.C. staff have concluded that corrosion of the Mark I reactor drywell liner is a major safety-related issue that has not received sufficient attention to date. During the call it became clear that drywell corrosion is an issue at a number of Mark I reactors, including Oyster Creek, Dresden, Browns Ferry, and Peach Bottom. Ms. Tran explained that the Generic Aging Lesson Learned ("GALL") report does not provide sufficient guidance for detecting and monitoring potential corrosion in the drywell shell, particularly in inaccessible areas.

The staff proposed a number of modifications to GALL, highlighting the need to carefully evaluate both the corrosion itself and potential sources of water, including cracks in the concrete containment and the refueling seal at the top of the drywell liner. Ex. B at 7-8. Ms. Tran explained that some license applicants have failed to include the refueling seal in the scope of their license renewal, but that staff believes that this component must be brought within the scope of license renewal. Ex. B at 9-10. N.R.C. staff stated that one

goal is to detect and monitor corrosion in the inaccessible areas of the drywell shell and find the root cause of the corrosion. Ex. B at 10-11.

Staff proposed adding the following text to NUREG-1800:

> Operating experience in Mark I steel containments indicate that when water is discovered in the bottom outside areas of the drywell (including that in sand-pocket areas), the likely cause is the water seeping through the space between the drywell shell and the shield concrete. The source of water has been shown to be the seal between the refueling cavity and the drywell. GALL Report recommends root cause analysis and further evaluation, when potential for corrosion is indicated in the inaccessible areas of the drywell.

Ex. B at 12.

During questions after the presentation Mr. Hans Asher of the N.R.C. clarified that for the inaccessible areas where there was a potential for corrosion, ultrasound testing ("UT") of the thickness of the drywell would be required. The industry representatives on the call, including Exelon, did not dispute that Oyster Creek has a corrosion problem in its drywell liner. However, the industry representative suggested that this problem is not common to all Mark I reactors. N.R.C. representatives responded that they felt all reactors of this design have a potential problem and require evaluation.

ARGUMENT

I. Legal Requirements For Contentions

This section summarizes the four legal requirements for each contention; a specific statement of the contention, an explanation of basis, a demonstration that it is within the scope of the proceedings, and a demonstration of materiality. In addition, this section shows that the proposed new contentions are both within the scope of the proceeding and

meet the requirements for amended or new contentions, because they were triggered by highly significant new information.

A. Specific Statement of the Contention

In order to bring a contention before the Commissioners, Petitioners must "provide a specific statement of the issue of law or fact to be raised or controverted." 10 C.F.R. § 2.309(f)(1)(i).

B. Explanation of Basis

At this preliminary stage, Petitioners do not have to submit admissible evidence to support their contention, rather they have to "provide a brief explanation of the basis for the contention," 10 C.F.R. § 2.309(f)(1)(ii), and "a concise statement of the alleged facts or expert opinions which support the petitioner's position." 10 C.F.R. § 2.309(f)(1)(v).

As AmerGen's answer to the initial petition acknowledged, this rule ensures that "full adjudicatory hearings are triggered only by those able to offer minimal factual and legal foundation in support of their contentions." Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3), 49 N.R.C. 328, 334 (1999) (emphasis added). The Commission has clarified that, "an intervener need not . . . prove its case at the contention stage . . . . The factual support necessary to show a genuine dispute exists need not be in affidavit or formal evidentiary form, or be the quality necessary to withstand a summary disposition motion." In the Matter of Georgia Institute of Technology, 42 N.R.C. 111 (October 12, 1995).

Thus, although the Commission has stated that it "is unwilling to throw open its hearing doors to petitioners who have done little in the way of research or analysis, provide no expert opinion, and rest merely on unsupported conclusions," Duke Energy

Corporation (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-02-17, 56 N.R.C. 1, 8 (2002), it has indicated that where petitioners make technically meritorious contentions based upon diligent research and supported by valid information and expert opinion, the requirement for an adequate basis is more than satisfied.

C. The Scope of License Renewal Includes Corrosion Of The Drywell Liner

Both potential new contentions concern corrosion of the drywell liner. Although Petitioners are required to demonstrate that the issues raised in their contentions are within the scope of the proceeding, 10 C.F.R. § 2.309(f)(1)(iii), this scope of these proceeding has already been fully briefed. During that briefing, AmerGen conceded that the original contention is within the scope of this proceeding.

N.R.C. staff conceded that aging of the drywell liner was within the scope of the proceeding, but attempted to draw a distinction between aging and corrosion. The new information presented by the N.R.C. technical staff negates this argument. It shows that N.R.C. technical staff regard corrosion of the drywell liner as within the scope of the renewal process, because corrosion is an aging process. E.g. Ex. B at 7-10.

D. Showing of Materiality

The regulations require Petitioners to "[d]emonstrate that the issue raised in the contention is material to the findings the N.R.C. must make to support the action that is involved in the proceeding." 10 C.F.R. § 2.309(f)(1)(iv). In this case, a renewed license may be issued by the Commission if it finds that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the CLB. 10 C.F.R. § 54.29. As part of making such a finding the Commission must

conduct a full review of a number of issues, including management of the effects of aging during the period of extended operation on structures including the drywell liner. Id. Thus, contentions that raise a contested issue about drywell liner corrosion are material.

Furthermore, a showing of materiality is not an onerous requirement, because all that is needed is a "minimal showing that material facts are in dispute, indicating that a further inquiry is appropriate." Georgia Institute of Technology, 42 N.R.C. 111 (October 12, 1995), citing Gulf States Utilities Company, (River Bend Station, Unit 1), 40 N.R.C. 43, 51 (1994); Final Rule, Rules of Practice for Domestic Licensing Proceedings – Procedural Changes in the Hearing Process, 54 Fed. Reg. 33,171 (Aug. 11, 1989).

The Commission has stated explicitly that the decision to admit a contention "does not intimate any view on the merits of a particular issue." Duke Energy Corp. (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), 56 N.R.C. 1 (2002). Thus, so long as the Commission sees a material issue, it may admit the contention, without being required to make a judgment on the matter. Specifically, in Duke Energy Corporation, the Commission admitted the contentions that concerned the possibility of a severe accident occurring. Id. The interveners argued that alternative measurements should be used in the "analyses of mitigation alternatives for hydrogen control during station blackout." Id. at 26. The Commission did not examine the merits of the issues raised, but merely permitted the interveners to continue to challenge the license renewal, in part because the issue was material.

E. This Request Is Timely

Petitioners may add new contentions after filing their initial petition, so long as they act in accordance with 10 CFR 2.309(f)(2). Entergy Nuclear Vermont Yankee, LLC

and Entergy Nuclear Operations, Inc., 2005 N.R.C. LEXIS 207 (Dec. 2, 2005). There is no need for Petitioners who file a timely contention to meet the more stringent requirements of 10 C.F.R. § 2.309(c). Id. Thus, in order to obtain permission to amend or add a safety-related contention, petitioners must show that:

> (i) The information upon which the amended or new contention is based was not previously available;
>
> (ii) The information upon which the amended or new contention is based is materially different than information previously available; and
>
> (iii) The amended or new contention has been submitted in a timely fashion based on the availability of the subsequent information.

The Commission interprets "timely fashion," for the purposes of adding a contention based on newly available information, as being anywhere from twenty to thirty days. In the Matter of Louisiana Energy Services, L.P., 2005 N.R.C. LEXIS 100 (June 30, 2005).

More specifically, like the proposed new contentions at issue here, the Entergy matter cited above concerned structural safety contentions based on new information; a "structural and seismic analysis of the cooling towers, and the Alternate Cooling System." 2005 N.R.C. LEXIS 207 at *2. The interveners were concerned because the license application did not provide analysis "to demonstrate that the . . . system, in its current actual physical condition . . . will be able to withstand the effects of an earthquake and other natural phenomena without loss of capability to perform its safety functions." Id. at *5. The Commission allowed the new contention to proceed because the information was

not previously available and was materially different than the information that was previously available. Id.

Similarly, the information upon which this Motion is based became available for the first time on January 31, 2006, less than ten days ago. Thus, the first and third prongs are clearly met. In addition, the information meets the second prong because it is materially different from that previously available. In the new information, N.R.C. proposed for the first time to impose more stringent requirements on management of corrosion of the drywell liner as part of the license renewal process. These more stringent N.R.C. proposals deal with issues that are at the heart of the basis for the original contention and show that N.R.C. technical staff believe that the original contention has technical merit. N.R.C.'s previous stance was that the part of the contention regarding inaccessible areas lacked sufficient technical basis and a one-time measurement and ongoing visual inspection of accessible areas would be sufficient to monitor drywell corrosion. N.R.C. Answer at 15-17. Because the new information is materially different from N.R.C.'s previous position, it allows Petitioners to amend or add to their contention.

II. The New Information Confirms That The Original Contention Had An Adequate Basis

Petitioners originally contended that all parts of the drywell liner needed to be tested for corrosion, including the sand bed region and "additional UT measurements [must] be greatly expanded into areas not previously inspected." Intervention Petition at 3-4. Further, Petitioners presented extensive information on the corrosion in the sand bed region and stated that testing should include areas beyond the sand bed region. Id. at 5-13. As discussed above, Petitioners further stated that water had found its way onto the drywell liner and the temperatures were conducive to corrosion.

AmerGen and N.R.C. staff have argued that the original contention should be limited to corrosion in the sand bed region of the drywell liner. AmerGen Answer at 22-23, N.R.C. Answer at 12-15. Thus, AmerGen and the N.R.C. clearly understood that Petitioners intended to include area beyond the sand bed region in their initial contention. However, in their reply, Petitioners refuted the attempt to limit the term critical areas to the sand bed region by offering a logical counter-argument. Because the embedded portion of the drywell liner is immediately adjacent to the sand bed, water could have reached into this area and caused similar corrosion to that already observed in the sand bed region. Reply at 14. Thus, Petitioners argued that this should be a critical area subject to long-term testing. Id.

Now, N.R.C. technical staff in the license renewal branch have reached similar conclusions and have decided that not only is corrosion of the drywell liner within the scope of license renewal proceedings, but the sources of the water which is the root cause of this corrosion are also included. The concern of N.R.C. staff demonstrates that Petitioners raised a significant concern about the need to monitor corrosion of inaccessible areas. Petitioners request that this previously unavailable information be added to the basis originally submitted for the initial contention.

In the alternative, should the ASLB decide that the information originally submitted did not provide sufficient basis for including inaccessible areas within the initial contention, and that it cannot supplement the basis with the new information, Petitioners seek leave to add a new contention alleging that the proposed corrosion management of inaccessible areas of the drywell liner is inadequate. Furthermore, because the N.R.C. staff have now indicated that root cause analysis is necessary to adequately deal with corrosion

in inaccessible areas, Petitioners seek to add a second new contention alleging that such a root cause analysis is necessary, but has not been done.

III. First Proposed New Contention

If the ALSB finds that corrosion of inaccessible areas is not a sub-issue of Petitioners' initial contention, Petitioners seek leave to add a contention that the monitoring regime for the inaccessible areas of the drywell liner is inadequate, and must at least include ongoing, regular, direct measurements of thickness at all areas where corrosion could have occurred for the life of the plant and clear acceptance criteria for the measurements.

A. Explanation of Basis for the First New Contention

The basis for the first new contention is the new information presented by N.R.C. on January 31, 2006, a new memorandum from Dr. R.H. Hausler, Ex. C, and all the information previously submitted to support the initial contention. As discussed above, N.R.C.'s technical staff have now concluded that, where corrosion is a possibility, ultrasonic ("UT") testing of the drywell liner in inaccessible areas is required to detect and monitor corrosion that is potentially occurring in these areas. Dr. Hausler points particularly to the interface between the concrete at the bottom of the liner and the steel liner as an area where corrosion is likely to be occurring and where no monitoring for corrosion has been carried out. Ex. C at 2-3. Dr Hausler has also noted that the removal of the sand probably shifted the location where the highest rate of corrosion is occurring to the embedded area of the liner below the concrete floor. Ex. C at 1. This is because the water penetrating into the sand bed region will no longer be trapped by the sand, but will

continue running down into cracks and crevices in the concrete floor, creating conditions that are conducive to corrosion.

The contention is also supported by the Exhibits to the original Petition, and, in particular Petition Ex. 5, page 9, which shows that the concrete floor adjacent to the drywell liner was in poor condition when the sand was removed and was subject to corrosion:

> Upon sand removal the concrete floor was found to be unfinished in all bays.
>
> - drainage channel, as shown in drawing, was completely missing
> - drain pipes were 6 to 8 inches above floor level and some were clogged
> - floor was cratered with some craters adjacent to shell. A few craters were big, about 12 -13 feet long and 12-20 inches deep, and 8-12 inches wide
> - Concrete reinforcement bars for the floor could be seen bare in many bays.
>
> In summary, the concrete floor condition prevented proper drainage of water, which, in turn, aggravated the corrosion of the drywell shell.

Furthermore, as discussed above, the original acceptance criterion for the thickness measurements was 0.736 inches, but some measurements taken in 1992 were less than than that. Thus, new acceptance criteria must be developed to ensure that the currently unacceptable areas do not grow to levels where they threaten the structural integrity of the drywell liner.

Finally, as the original Petition showed, no UT testing in inaccessible areas has been carried out, and none has been proposed. Because the need for such testing is supported by both N.R.C. staff, Dr. Hausler, and the information filed with the original Petition, Petitioners have an adequate basis for their first new contention.

B. Materiality of the First New Contention

The first new contention is material, because, if correct, additional requirements would have to be included in the license renewal conditions. In the absence of these conditions there is danger that the drywell liner could lose functionality either through buckling or through its inability to adequately contain gases resulting from an accident.

Materiality is further demonstrated by the proposals of N.R.C. staff to amend the GALL report to include requirements for detecting corrosion in inaccessible areas. N.R.C.'s proposal to include these requirements in GALL shows that N.R.C. technical staff consider them to be potentially significant at all Mark I plants and inadequately addressed at present. Because Oyster Creek has the worst drywell corrosion problems of any reactor of this design, it follows that N.R.C. staff believe that the corrosion issues at Oyster Creek are highly significant and warrant treatment in accordance with the proposed changes in the GALL report. On the conference call announcing these proposals, even the industry representative did not dispute the need for such evaluations at Oyster Creek. Instead, they asserted that corrosion of the drywell was only a problem at some Mark I plants.

IV. Second Proposed New Contention

Petitioners also seek leave to contend that in addition to direct testing of the thickness of the drywell liner, AmerGen must conduct a root cause analysis of the corrosion problem and implement a verifiable program to eliminate leakage of water onto the drywell liner.

A. Explanation of Basis for the Second New Contention

The basis for the second new contention is the new information presented by N.R.C. on January 31, 2006, together with a new affidavit from Dr. Hausler, Ex. C, and all the information previously submitted to support the initial contention. As discussed above, N.R.C.'s technical staff have recommended that root cause analysis of corrosion problems in inaccessible areas be carried out in addition to aging management programs. Ex. B at 11 & 12. This recommendation is heartily seconded by Dr. Hausler. Ex. C at 3. Dr. Hausler adds that because direct testing might miss some areas of corrosion, a verifiable program to prevent water reaching the drywell liner must supplement the requirement for direct monitoring and root cause analysis.

Because the need for root cause analysis is supported by both N.R.C. staff, and Dr. Hausler, and because Dr. Hausler also opines that a program to prevent water reaching the drywell liner is required, Petitioners have an adequate basis for their second new contention.

B. Materiality of the Second New Contention

The second new contention is material, because, if correct, additional requirements would have to be included in the license renewal conditions, which to date do not contain a requirement for root cause analysis of the corrosion problem. In the absence of these conditions there is danger that the drywell liner could corrode in a manner undetected by direct testing regime, leading to potential loss of functionality either through buckling or through its inability to adequately contain gases resulting from an accident.

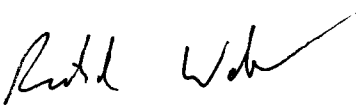
Once again, materiality is further demonstrated by the proposals of N.R.C. staff to amend the GALL report to include requirements for root cause analysis when potential for

corrosion is indicated in inaccessible areas. N.R.C.'s proposal to include these requirements in GALL shows that N.R.C. technical staff consider them to be potentially significant at all Mark I plants. Because Oyster Creek has the worst drywell corrosion problems of any reactor of this design, it follows that N.R.C. staff believe that the corrosion issues at Oyster Creek are highly significant and warrant treatment in accordance with the proposed changes in the GALL report. On the conference call announcing these proposals, even the industry did not dispute the need for root cause analysis at Oyster Creek, even though none has been proposed to date.

CONCLUSION

For the forgoing reasons, the ASLB should grant leave for Petitioners to add the proposed new contentions, to the extent necessary to include all the issues raised by these new contentions in this proceeding.

Respectfully submitted



Richard Webster, Esq
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LAW CLINIC
Attorneys for Petitioners

Dated: February 7, 2006

UNITED STATES OF AMERICA
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Nuclear Generating Station)	)	February 7, 2006
	)	

CERTIFICATE OF SERVICE

I hereby certify that the foregoing motion with exhibits was sent this 7th day of February, 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: February 7, 2006

Exhibit A

January 17, 2006

MEMORANDUM TO: Jacob I. Zimmerman, Branch Chief
License Renewal Branch B
Division of License Renewal
Office of Nuclear Reactor Regulation

FROM: Linh Tran, Project Manager /RA/
License Renewal Branch B
Division of License Renewal
Office of Nuclear Reactor Regulation

SUBJECT: FORTHCOMING LICENSE RENEWAL TELEPHONE CONFERENCE AND MEETING BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION (NRC) STAFF AND THE NUCLEAR ENERGY INSTITUTE (NEI)

DATE & TIME: Tuesday, January 31, 2006
10:00 a.m. - 11:00 a.m.

LOCATION: U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike, Room 0-14B10
Rockville, Maryland 20852

PURPOSE: To discuss the proposed interim staff guidance for license renewal associated with the corrosion of Mark I steel containment drywell shell.

CATEGORY 2:* This is a Category 2 Meeting. The public is invited to participate in this meeting by discussing regulatory issues with the NRC staff at designated times.

CONTACTS:

Linh Tran, NRR
301-415-4103
LNT@nrc.gov

Tomeka Terry, NRR
301-415-1488
TLT2@nrc.gov

*Commission's Policy Statement on "Enhancing Public Participation in NRC Meetings," 67 *Federal Register* 36920, May 28, 2002.

TELECONFERENCE: **NEI will participate in this meeting by teleconference.** Interested members of the public can participate via a toll-free telephone number or in person at the designated location. To participate by telephone, please call Ms. Linh Tran, NRC meeting contact, at 301-415-4103 at least four business days prior to the meeting to allow sufficient time to make arrangements.

ACCOMMODATIONS: If special equipment or accommodations are needed to attend or present information at the public meeting, the need should be brought to the attention of Ms. Tran at least four business days prior to the meeting to provide the NRC staff adequate notice to determine whether the request can be accommodated.

PARTICIPANTS: Participants include members from the NRC's Office of Nuclear Reactor Regulation (NRR), NEI, and other industry representatives.

NRC/NRR	NEI
L. Tran	J. Ross
T. Terry	et al.
H. Ashar	
J. Davis	
et al.	

Project No. 690

cc: See next page

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NRC/NRR	NEI
L. Tran	J. Ross
T. Terry	et al.
H. Ashar	
J. Davis	
et al.	

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NUCLEAR ENERGY INSTITUTE

Project No. 690

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NE-42
Washington, DC 20585

Ms. Christine S. Salembier Commissioner
State Liaison Officer
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Memo to Jacob Zimmerman from Linh Tran dated January 17, 2005

SUBJECT: FORTHCOMING LICENSE RENEWAL TELEPHONE CONFERENCE AND MEETING BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION (NRC) STAFF AND THE NUCLEAR ENERGY INSTITUTE (NEI)

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LTran

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Project No. 690

cc:
Robert A. Vincent
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Exhibit B

Potential License Renewal – Interim Staff Guidance (LR-ISG) on Corrosion of Mark I Steel Containment Drywell Shell

Teleconference

Between Staff and Stakeholders

January 31, 2006

Purpose

To discuss the potential of a LR-ISG on corrosion of the Mark I steel containment drywell shell

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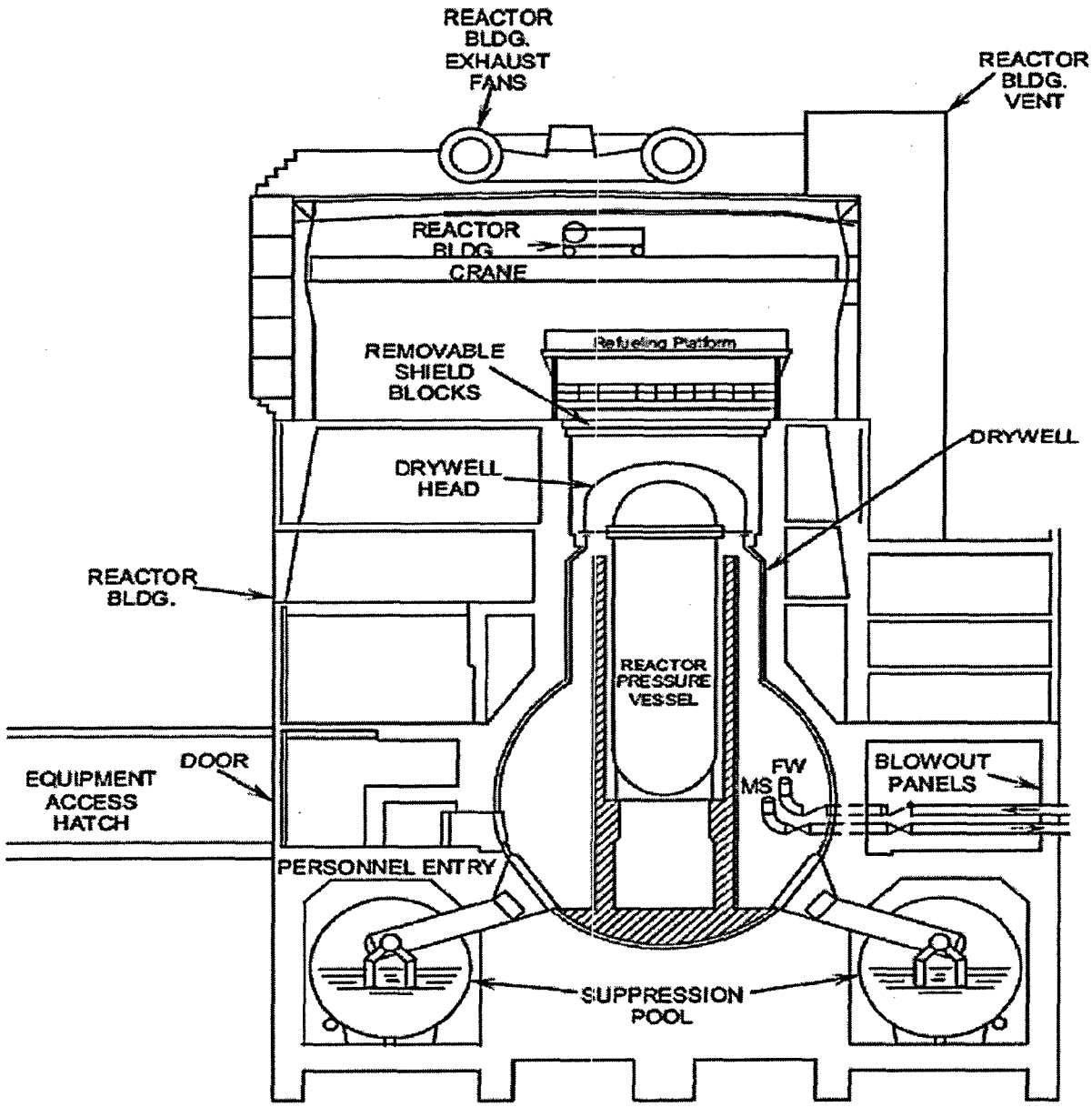

Typical Reactor Building

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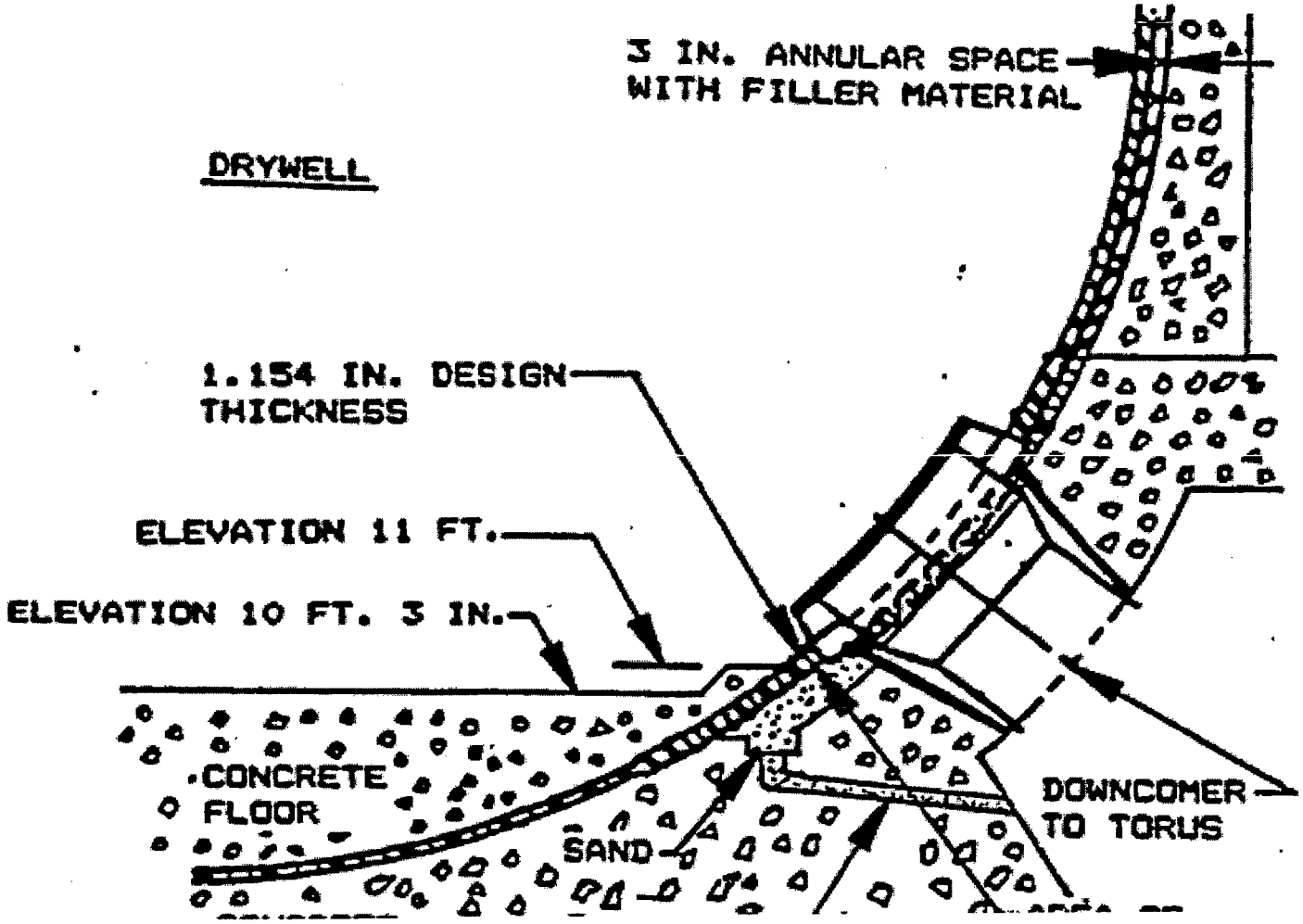

Sketch of Typical Drywell

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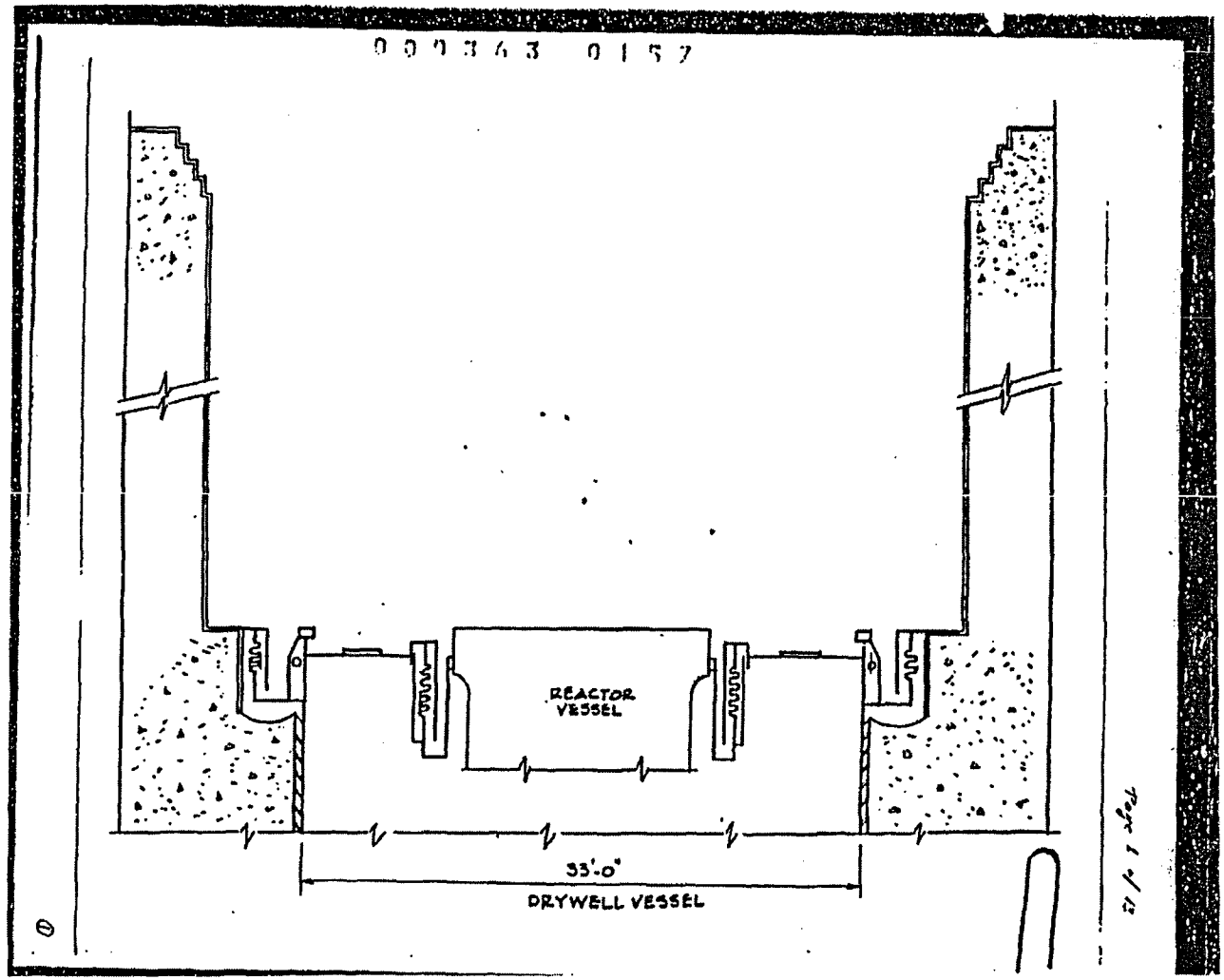

Sketch of Typical Refueling Seals

Background

- For inaccessible areas of the drywell, NUREG-1801, Revision 1, Generic Aging Lesson-Learned (GALL) Report only addresses embedded steel containment shell or liner.

- The GALL Report does not provide sufficient guidance when the drywell shell area is surrounded by concrete structure and the distance between the shell and the surrounding concrete is too small for performing visual examination (VT).

II CONTAINMENT STRUCTURES B1.1 Mark I Steel Containments							
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
II.B1.1-1 (C-23)	II.B1.1.1-e	Steel elements: Drywell head; Downcomers	Steel	Air – indoor uncontrolled	Fretting or lockup/ mechanical wear	Chapter XI.S1, "ASME Section XI, Subsection IWE"	No
II.B1.1-2 (C-19)	II.B1.1.1-a	Steel elements: Drywell; torus; drywell head; embedded shell and sand pocket regions; drywell support skirt; torus ring girder; downcomers; ECCS suction header NOTE: Inspection of containment supports is addressed by ASME Section XI, Subsection	Steel	Air – indoor uncontrolled or treated water	Loss of material/ general, pitting, and crevice corrosion	Chapter XI.S1, "ASME Section XI, Subsection IWE" For inaccessible areas (embedded containment steel shell or liner), loss of material due to corrosion is not significant if the following conditions are satisfied: Concrete meeting the specifications of ACI 318 or 349 and the guidance of 201.2R was used for the containment concrete in contact with the embedded containment shell or liner. The concrete is monitored to ensure that it is free of penetrating cracks that provide a path for water seepage to the surface of the containment shell or liner. The moisture barrier, at the junction where the shell or liner becomes embedded, is subject to aging management activities in accordance with ASME Section XI, Subsection IWE requirements. Water ponding on the containment concrete floor are not common and when detected are cleaned up in a timely manner.	Yes, if corrosion is significant for inaccessible areas

NUREG-1801, Revision 1 (Con't)

II B1.1	CONTAINMENT STRUCTURES Mark I Steel Containments						
Item	**Link**	**Structure and/or Component**	**Material**	**Environment**	**Aging Effect/ Mechanism**	**Aging Management Program (AMP)**	**Further Evaluation**
		IWF (see III.B1.3)				If any of the above conditions cannot be satisfied, then a plant-specific aging management program for corrosion is necessary. Chapter XI.S4, "10 CFR Part 50, Appendix J"	No

Basis for Proposing a LR-ISG

- Staff has been requesting applicants to bring the refueling seal within the scope of license renewal (if the seal has been identified as the cause of the leakage.)

- Some applicants claimed that as the seal is required only during refueling activities, it does not have to be within the scope of license renewal.

Basis for Proposing a LR-ISG

- However, the staff believes that leakage through the seal which, although a non-safety related component, can impair the capability of primary containment to mitigate the consequences of an accident. Therefore, the seal needs to be brought into the scope of license renewal, pursuant to 10 CFR 54.4(a)(2).

- The goal is to detect and monitor corrosion in the inaccessible areas of the drywell shell.

Proposed Changes for NUREG-1801, Revision 1

- Add a new line item to address drywell shell and sand pocket region as:

Item	Link	Structure and/or Component	Material	Environment	Aging Effect/ Mechanism	Aging Management Program (AMP)	Further Evaluation
II.B1.1-xx		Steel elements: Drywell; shell and sand pocket region	Steel	Air indoor, uncontrolled		Chapter XI.S1, "ASME Section XI, Subsection IWE." For inaccessible areas, where shell surface is embedded in sand, or separated from concrete by moisture barrier or insulation, operating experience indicate propensity for corrosion. Such areas need further evaluation that includes root cause analysis and an aging management program that would detect and monitor corrosion.	Yes

Proposed Changes for NUREG-1800, Revision 1

Table 3.5.1 Summary of Aging Management Evaluations in Chapters II and III of NUREG-1801 for Structures and Component Supports

ID	Type	Component	Aging Effect/ Mechanism	Aging Management Program	Further Evaluation Recommend ed	Related Items
3.5.1-13	BWR/PWR	Steel elements: liner plate, containment shell downcomers, drywell support skirt, ECCS suction header	Loss of material due to general, pitting and crevice corrosion in accessible and inaccessible areas	Containment ISI and Containment leak rate test	Yes, if corrosion is significant for inaccessible areas (see Subsection 3.5.2.2.1.6)	C-09 C-19

Add the following paragraph to Subsection 3.5.2.2.1.6 of NUREG-1800:

Operating experience in Mark I steel containments indicate that when water is discovered in the bottom outside areas of the drywell (including that in sand-pocket areas), the likely cause is the water seeping through the space between the drywell shell and the shield concrete. The source of water has been shown to be the seal between the refueling cavity and the drywell. GALL Report recommends root cause analysis and further evaluation, when potential for corrosion is indicated in the inaccessible areas of the drywell.

Exhibit C

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MEMORANDUM

To: Mr. Paul Gunter, Director
Reactor Watchdog Project
Nuclear Information and Resource Service
Washington DC 10036

February 6, 2006

Mr. Richard Webster, Esq.
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From: Dr. Rudolf H. Hausler, President
Corro-Consulta

Subject: Oyster Creek Drywell Liner Corrosion

I. Background

This memorandum is prompted by the information put forth by NRC for a conference call on corrosion on January 31, 2005 and is a follow-up to my earlier communication regarding the subject of the Oyster Creek Nuclear Reactor Drywell corrosion in the area of the sand bed, also called the sand pocket region [1)]. The earlier Memorandum essentially focused on severe localized corrosion, which had been first observed in 1980, and was quantitatively assessed in the accessible areas of the sand bed region during the period of 1992 to 1993. This corrosion has resulted in the need for extensive direct assessment of the extent of corrosion in the sand bed region prior to re-licensing the Oyster Creek Nuclear Plant for an additional 20 years and ongoing monitoring thereafter.

The reactor operator removed the sand during the period of 1988 to 1992, and coated the outer surface of the liner in this area with an epoxy coating. As a consequence of these actions the area with the highest rate of corrosion very likely shifted from the upper sand bed region to the lower sand bed region or the area of the drywell liner that is embedded in concrete. Because NRC has now determined that past guidance relating to

[1)] Memorandum to Mr. Paul Gunter, Director, Nuclear Information and Research Service, Washington DC, November 10, 2005.

deterioration of the steel containment shell or liner was insufficient,[2] it is timely to revisit the question of corrosion in the critical areas of concern.

II. Details

The attached Figure 1 shows a schematic of the lower part of the drywell liner and details of the structure sitting in a concrete (bed) foundation. This schematic is an abstraction of a similar schematic shown in the notes of Reference 2. The abstraction was made to clarify the areas of concern. The liner essentially sits in a concrete foundation and is filled with concrete on the inside (the concrete floor). The level of the concrete on the inside is higher than the level of concrete on the outside. This difference in height necessitated the sand pocket in order to reduce stress on the liner and lower the chance that the liner would bulge outward (buckle).

As long as the sand bed was present, the bulk of the corrosion occurred at the top of, or just below, the sand bed region and could be monitored by UT measurements from the inside above the concrete floor (see Fig. 1). However, corrosion occurring on the outside in the sand bed region below the level of the inside concrete floor, could only be observed visually, and only to the extent that the corroded areas were accessible to visual inspection. It was basically assumed that the corrosion in the inaccessible areas on the outside of the liner in the sand bed region would be equal and no more severe than what had been assessed with the UT measurements in the accessible region (see Fig.1). In order to prevent further corrosion on the outside of the liner in the sand bed region this area was coated with an epoxy coating, presumably in all areas that were accessible to this operation.

It is now proposed to verify the integrity of the coating and its prevention of further corrosion with renewed UT inspections. However, as can be seen from Fig. 1, this can only be done for a fraction of the area in question, and the limited usefulness of visual inspection from the outside has been discussed earlier (ref. 1).

However, a potentially more dangerous situation has developed through the removal of the sand bed. Corrosion always occurred in the sand bed region through leakage of water from various sources above in the cylindrical portion of the liner. According to the NRC no root cause analysis of the sources of this water has been carried out. Thus, there is every reason to believe that such leakage is still occurring; meaning that it is equally reasonable to believe that water is still penetrating into the sand bed region. There is no assurance that the drainage channels are entirely effective to remove this water. As a consequence, corrosion has probably developed at the concrete/steel boundary on the outside of the liner in the area, which has never been accessible to UT inspection from the inside (see Fig. 1) or visual inspection from the outside. Although the outside of the liner had originally been coated with corrosion-preventive red lead paint, such corrosion protection was not effective over time, as the corrosion in the sand bed area demonstrated.

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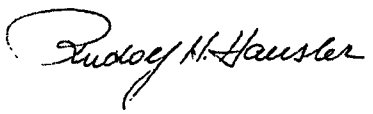
[2] Teleconference between Staff and Stakeholders, Jan. 31, 2006, re. "Potential License Renewal – Interim Staff Guidance (LR-ISG) on Corrosion of Mark I Steel Containment Drywell Shell".

It is therefore submitted that localized corrosion probably occurred on the outside of the liner at the concrete-steel boundary. It is well known that steel in contact with concrete, water and air, will start to corrode fairly rapidly, particularly if cracks develop in the concrete. This is known from the fact that rebar embedded in concrete will start to corrode if water can penetrate the concrete through cracks. Thermal expansion at the location indicated in Fig. 1 as the "UT inaccessible areas" will cause the concrete to disbond from the steel, resulting in cracks and crevices, and thus initiate local corrosion. Since the volume of the resulting iron oxide is larger than the volume of the steel from which it grew, the corrosion products will force the crack to widen, hence accelerating the process. It is well known that concrete thus affected by corrosion of rebar will eventually spall off and expose the rebar to the environment. It can reasonably be expected that the same thing has happened on the outside of the liner in this three-phase boundary (steel/concrete/water-air) designated as the "inaccessible areas."

If in fact these processes occurred, and this is precisely the subject of much needed verification, the entire structure is not only in danger of buckling, but indeed of collapse from the weight of the liner and the weight of the concrete floor, much aggravated by the absence of the sand bed, i.e. additional support on the outside of the liner. Clearly such inspection requires the most sophisticated tools and is a challenge to the industry. However, the technical difficulty of the inspection task cannot justify failing to undertake a potentially safety critical direct inspection.

Furthermore, in addition to direct inspection, the corrosion problem must be addressed through root cause analysis. Without such analysis, it is impossible to eliminate the water, which is the cause of the corrosion. Although direct inspection is a necessary part of aging management, it is not sufficient, because there is always the danger that measurements will miss areas of corrosion. This danger is particularly pronounced for inaccessible areas, where visual inspection is not possible. Thus, as the NRC technical staff recognized in the January 31, 2006 telephone call, corrosion management for inaccessible areas must include root cause analysis. To date I understand that no root cause analysis has been carried out. NRC should not issue the license renewal until after the root cause analysis has been done and the water, which is the cause of the corrosion, has been verifiably removed.

Respectfully submitted by



Rudolf H. Hausler

Figure 1

Schematic of Lower Drywell Construction and Areas of Corrosion and Potential Corrosion