From: <john.hufnagel@exeloncorp.com>
To: <dja1@nrc.gov>, <rkm@nrc.gov>
Date: 04/03/2006 6:11:03 PM
Subject: Drywell Q & As

Donnie & Roy,

Attached are five PDF files, each with one of the responses to AMP/AMR questions associated with the Drywell issue. The items being provided are: AMP-072, AMP-141, AMP-209, AMP-357 and AMR-164.

Providing these five questions gets us down to two (2) questions remaining to be answered. I believe these will be sent to you tomorrow. Please let me know if you have any problems with opening these files, which are now included in the Audit database.

We hope this helps with getting the information that you need for constructing the Audit report. We have expedited these answers as much as possible, given the just-completed Regional Inspection activities at the site.

And Donnie, if you would, please let Louise know that we have provided these and hope to send the remaining two tomorrow, as she expressed particular interest in this last week. Thanks.

- John.

<<Q & A Database Response AMP-072.pdf>> <<Q & A Database Response AMP-141.pdf>> <<Q & A Database Response AMP-209.pdf>> <<Q & A Database Response AMP-357.pdf>> <<Q & A Database Response AMR-164.pdf>>

CC: <donald.warfel@exeloncorp.com>, <michaelp.gallagher@exeloncorp.com>, <fred.polaski@exeloncorp.com>, <ahmed.ouaou@exeloncorp.com>

Mail Envelope Properties (44319D5D.36C : 9 : 13164)

Subject: Drywell Q & As
Creation Date: 04/03/2006 6:10:14 PM
From: <john.hufnagel@exeloncorp.com>

Created By: john.hufnagel@exeloncorp.com

Recipients
nrc.gov
OWGWPO01.HQGWDO01
DJA1 (D. Ashley)

nrc.gov
TWGWPO01.HQGWDO01
RKM (Roy Mathew)

exeloncorp.com
ahmed.ouaou CC
fred.polaski CC
michaelp.gallagher CC
donald.warfel CC

Post Office	Route
OWGWPO01.HQGWDO01	nrc.gov
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	exeloncorp.com

Files	Size	Date & Time
MESSAGE	1983	03 April, 2006 6:10:14 PM
TEXT.htm	3032	
Q & A Database Response AMP-072.pdf		71528
Q & A Database Response AMP-141.pdf		79373
Q & A Database Response AMP-209.pdf		74779
Q & A Database Response AMP-357.pdf		59814
Q & A Database Response AMR-164.pdf		69800
Mime.822	495313	

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

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Security: Standard

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Item No	*Date Received:*	*Source*
AMP-141	10/ 6/2005	AMP Audit

Topic: IWE

Status: Open

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).

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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 will also be transmitted to the NRC Staff in response to RAI 4.7.2-1(d)

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.

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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.

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

IR#:

Approvals:

Prepared By:	Ouaou, Ahmed	4/ 1/2006
Reviewed By:	Getz, Stu	4/ 3/2006
Approved By:	Warfel, Don	4/ 3/2006

NRC Acceptance (Date):

NRC Information Request Form

Item No	*Date Received:*	*Source*
AMP-209	1/24/2006	AMP Audit

Topic: IWE

Status: Open

Document References:
B.1.27

NRC Representative Morante, Rich

AmerGen (Took Issue): Hufnagel, Joh

Question

P. 17 of the PBD states
As discussed with NRC Staff during the AMP audit, Oyster Creek will perform one-time UT thickness measurements of the drywell shell, in the sand bed region, to confirm that the protective coating is effective. The UT measurements will be taken from inside the drywell at the same or approximate locations measured in 1996. This constitutes a new commitment that will implemented prior to entering the period of extended operation.
Has this been added to the scope of the One Time Inspection program? How will this commitment be tracked and implemented? Are the locations selected for one-time inspection those that had the minimum remaining thickness based on prior UT results? If not, explain why the selected locations are adequate. What steps will be taken if the current conclusion, that corrosion has been arrested, is not confirmed by the one-time inspection?
Also, please discuss the scope of the current coating inspection program and the LR commitment. What % of the total circumference is inspected during each inspection? How many years and how many inspections does it take to complete a 360 degree inspection of the sandbed region? Has a complete 360 degree inspection been completed yet? How many will be completed during the LR period?

Assigned To: Ouaou, Ahmed

Response:

No, the One-Time inspection of the sand bed region commitment has not been added to One-Time Inspection. As discussed with NRC Staff on 1/26/2006, Oyster Creek will perform periodic UT inspections during the period of extended operation instead of One-Time inspection. The initial UT inspections will occur prior to entering the period of extended operation and every 10 years thereafter. Refer to AMP Audit Question No. 141 for additional details. This revised commitment will be tracked in accordance with Oyster Creek commitment tracking process. Additionally the commitment will be included in a revision to Appendix A.5 Commitment List, item #27, which will be submitted to the NRC and incorporated in the UFSAR Supplement. Implementation of the commitment will be through the Oyster Creek ASME Section IX, Subsection IWE.

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The locations selected for UT measurements are the same as those inspected using UT measurements in 1996 and include the thinnest measured area.

If the current conclusion that corrosion has been arrested is not confirmed by UT measurements taken prior to entering the period of extended operation, Oyster Creek is committed to take corrective actions defined in response to NRC Question #AMP-357.

Protective coatings on the exterior surfaces of the drywell shell in the sand bed region are monitored in accordance with the Protective Coating Monitoring and Maintenance Program (B.1.33). The current program requires visual inspection of the coating in accordance with engineering specification IS-328227-004. Inspection criteria is not specifically provided by the specification. However inspections are performed by individuals qualified to perform coating inspections. Acceptance criteria provided in the specification is that any identified coating defects shall be submitted for engineering evaluation. The inspection frequency is every other refueling outage.

As discussed with NRC Staff, the existing Protective Coating Monitoring and Maintenance aging management program does not currently invoke the requirements of ASME Section XI, Subsection IWE. Oyster Creek is committed to enhancing the program to incorporate coated surfaces inspection requirements specified in ASME Section XI, Subsection IWE. In response to NRC Question AMP-188, Oyster Creek provided specific enhancements that will be made to the program as follows:

Sand bed Region external coating inspections will be per Examination Category E-C (augmented examination) and will require VT-1 visual examinations per IWE-3412.1.

a. The inspected area shall be examined (as a minimum) for evidence of flaking, blistering, peeling, discoloration, and other signs of distress.

b. Areas that are suspect shall be dispositioned by engineering evaluation or corrected by repair or replacement in accordance with IWE-3122.

c. Supplemental examinations in accordance with IWE-3200 shall be performed when specified as a result of engineering evaluation."

The coated surface of the drywell shell in the sand bed region is divided into 10 bays that constitute 360 degrees. The current program requires inspection of coatings in at least 2 bays every other refueling outage. Certain bays were considered critical and have been inspected more than once. Inspection of 5 out of 10 bays (50%) has been completed to date.

For license renewal Oyster Creek is committed to inspect the remaining 5 bays prior to entering the period of extended operation. This will result in a complete (100%) coating inspection of all the 10 bays (360 degree) prior to entering the period of extended operation. Oyster Creek is also committed to inspect the coating in accordance with ASME Section XI, Subsection IWE. Thus inspection of 100% of the coating will be completed during each Containment ISI 10-Year Interval. Inspections will be conducted every other refueling outage during which at least 3 bays (30% of the coating min) will be examined. We therefore expect to inspect 100% of the coating twice during the period of extended operation. The inspections will be conducted in accordance with the enhanced Protective Coating Monitoring and Maintenance Program (B.1.33), including enhancements discussed in NRC Audit Question AMP-188.

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General revision of the response to add and clarify commitments. (AMO 4/2/06)

LRCR #: 229/263 ***LRA A.5 Commitment #:*** 27

IR#:

Approvals:

Prepared By:	Ouaou, Ahmed	4/ 2/2006
Reviewed By:	Muggleston, Kevin	4/ 2/2006
Approved By:	Warfel, Don	4/ 3/2006

NRC Acceptance (Date):

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Item No	*Date Received:*	*Source*
AMP-357	2/16/2006	AMP Audit
Topic:	*Status:*	Open
IWE		

Document References:

NRC Representative Morante, Rich

AmerGen (Took Issue):

Question

(1) When a new set of point thickness readings is taken is the former sandbed region, prior to entering the LR period, what will be the quantitative acceptance criteria for concluding that corrosion has or has not occurred since the last inspection in 1996.

(2) If additional corrosion is detected in the upcoming inspection, describe in detail the augmented inspections and other steps that will be taken to evaluate the extent of the corrosion, and describe the approach to ensuring the continued structural adequacy of the containment.

Assigned To: Ouaou, Ahmed

Response:

(1).The new set of UT measurements for the former sand bed region will be analyzed using the same methodology used to analyze the 1992, 1994, and 1996 UT data. The results will then be compared to the 1992, 1994,1996 UT results to confirm the previous no corrosion trend. Because of surface roughness of the exterior of the drywell shell, experience has shown that UT measurements can vary significantly unless the UT instrument is positioned on the exact point as the previous measurements. Thus acceptance criteria will be based on the standard deviation of the previous data (+/-11 mils) and instrument accuracy of (+/-10 mils) for a total of 21 mils. Deviation from this value will be considered unexpected and requires corrective actions described in item (2) below.

(2). If additional corrosion is identified that exceeds acceptance criteria described above, Oyster Creek will initiate corrective actions that include one or all of the following, depending on the extent of identified corrosion.
a. Perform additional UT measurements to confirm the readings
b. Notify NRC within 48 hours of confirmation of the identified condition
c. Conduct inspection of the coatings in the sand bed region in areas where the additional corrosion was detected.
d. Perform engineering evaluation to assess the extent of the condition and to determine if additional inspections are required to assure drywell integrity.
e. Perform operability determination and justification for continued operation until next scheduled

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inspection.

These actions will be completed before restarting from an outage

LRCR #: 293 ***LRA A.5 Commitment #:***

IR#:

Approvals:

Prepared By:	Ouaou, Ahmed	4/ 1/2006
Reviewed By:	Muggleston, Kevin	4/ 3/2006
Approved By:	Warfel, Don	4/ 3/2006

NRC Acceptance (Date):

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Item No	*Date Received:*	*Source*
AMP-072	9/23/2005	AMP Audit

Topic: ASME Section XI, Subsection IWE

Status: Open

Document References:
B.1.27-4

NRC Representative Morante, Rich

AmerGen (Took Issue): Hufnagel, Joh

Question

(B.1.27-4):In the OCGS AMP B.1.27 discussion of operating experience, the applicant discusses three (3) areas where containment degradation has been observed. These are the upper region of the drywell shell; the sand bed region at the base of the drywell; and the suppression chamber (Torus) and vent system.Suppression chamber (Torus) and vent system – The applicant states that the coating is inspected every outage and repaired, as required, to protect the torus shell and the vent system from corrosion, and refers the reader to program B.1.33 for additional details. Under operating experience in LRA B.1.33, the applicant states that Torus and vent header vapor space Service Level I coating inspections performed in 2002 found the coating in these areas to be in good condition. Inspection of the immersed coating in the Torus identified blistering. The blistering occurred primarily in the shell invert but was also noted on the upper shell near the water line. The majority of the blisters remained intact and continued to protect the base metal. However, several blistered areas included pitting damage where the blisters were fractured. A qualitative assessment of the identified pits was performed and concluded that the measured pit depths were significantly less than the established acceptance criteria. The fractured blisters were repaired to reestablish the protective coating barrier.Please provide the following information pertaining to past operating experience and LR aging management for the suppression chamber (Torus) and vent system:
(a) Please provide the plant documentation that describes the blistering and pitting, the qualitative assessment performed, the established acceptance criteria, and the corrective action taken, preferably in both hard copy and electronic format.
(b) Was ASME Section XI, Subsection IWE applied, to develop the acceptance criteria?
(c) Was the inspection that discovered the blistering and cracking conducted under IWE, a coatings monitoring and maintenance program, or another program? If another program, please identify the program.
(d) Are both the IWE and Coatings AMPs credited to manage loss of material due to corrosion for the suppression chamber (Torus) and vent system, for the extended period of operation? If not, please provide the technical basis for concluding that both AMPs do not need to be credited.

Assigned To: Ouaou, Ahmed

Response:

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a) Inspection of the suppression chamber (Torus) and vent system coating is conducted by divers every other outage in accordance with engineering specification SP-1302-52-120. The specification provides inspection and acceptance criteria for the coating. It also provides inspection and acceptance criteria for pitting, as a contingency to be used in the event failure of the coating results in pitting. The coating is monitored for cracks, sags, runs, flaking, blisters, bubbles, and other defects described in the Protective Coating Monitoring and Maintenance Program (B.1.33).

The specification requires inspection of the torus and vent system surfaces for coating integrity. If pitting is observed, then 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 pits and neighboring isolated pits or areas of pitting corrosion is greater that 20 inches. Multiple pits that can be encompassed by a 2.5-inch diameter circle are limited to a maximum depth of 0.141 inches provided the center to center distance between the subject pitted area and neighboring isolated pits or areas of pitting corrosion is greater that 20 inches. Pits that do not meet these criteria are documented and sent to engineering for evaluation and acceptance.

Plant documentation that describes the blistering and pitting, and qualitative assessment performed, the established acceptance criteria, and corrective actions taken, is included in PBD-AMP-B.1.27 Notebook and available for Staff review.

b) The Torus and Vent System coating is classified Service Level I Coating as described in the Protective Coating Monitoring and Maintenance Program (B.1.33). The Program was evaluated against the 10 Element of NUREG-1801 XI.S8, Protective Coating Monitoring and Maintenance Program and found consistent without enhancements or exceptions. Acceptance criteria are evaluated in element 3.6 of the Oyster Creek Protective Coating Monitoring and Maintenance Program (PBD-AMP-B.1.33). The inspection is performed by ASME Section XI Level II and Level III inspectors.

Acceptance criteria for pits is based on engineering analysis that uses the method of Code Case N597 as guidance for calculation of pit depths that will not violate the local stress requirements of either ASME Section III, 1977 Edition or Section VIII, 1962 Edition.

c) The Inspection that discovered the blistering was conducted under the Protective Coating Monitoring and Maintenance Program. Examinations are performed by ASME Section XI Level II and Level III inspectors.

d) Yes, both IWE and Coatings AMPs are credited to manage loss of material due to corrosion for the suppression chamber (Torus) and the vent system for the extended period of operation.

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

IR#:

Approvals:

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Prepared By:	Ouaou, Ahmed	12/20/2005
Reviewed By:	Miller, Mark	12/20/2005
Approved By:	Warfel, Don	12/21/2005
NRC Acceptance (Date):		

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Item No	*Date Received:*	*Source*
AMR-164	10/31/2005	AMR Audit

Topic: *Status:* Open

Inaccessible Portion of the Drywell Shell

Document References:

3.5.2.2.1

NRC Representative Morante, Rich

AmerGen (Took Issue): Hufnagel, Joh

Question

The applicant has not addressed aging management of the portion of the drywell shell embedded in the drywell concrete floor. This area is inaccessible for inspection, but is potentially subject to wetting on both the inside and outside surfaces. The applicant is requested to submit its AMR for this inaccessible portion of the drywell shell.

Assigned To: Ouaou, Ahmed

Response:

The embedded portion of the drywell shell is exempt from visual examination in accordance with IWE-1232. Pressure testing in accordance with 10 CFR Part 50 Appendix J, Type A test, is credited for managing aging effects of inaccessible portions of the drywell shell consistent with NUREG-1801.

NUREG-1801 Vol. 2 Item Number II.B1.1-2, Aging Management Program (AMPs) column states that 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 containment shell or liner. The concrete is monitored to ensure that it is free of cracks that provide 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.

If any of the above conditions cannot be satisfied, then a plant-specific aging management program for corrosion is necessary."

AMR results concluded that Oyster Creek satisfies the above requirements and a plant-specific aging management program is not required for corrosion of the embedded drywell shell. The Oyster Creek concrete meets the requirements of ACI 318 and the guidance of ACI 201.2R. The drywell concrete floor will be monitored for cracks under the Structures Monitoring aging management program (B.1.31). Oyster Creek design does not include a moisture barrier. However the design provides a 9"

high curb (min) around the entire drywell floor (except at the two trenches discussed below) to prevent any water accumulated on the floor from being in contact with the drywell shell. The curb is considered part of the drywell concrete floor and inspected for cracking under the Structures Monitoring Program (B.1.31). The drywell floor is designed to slope away from the drywell shell towards the drywell sump for proper drainage. The sump level is monitored in the main control room in accordance with Technical Specifications, and actions are taken to ensure Technical Specifications limits are not violated. Should the sump fill and overflow leak rate cannot be monitored and a plant shutdown will be required to regain leak rate monitoring capability and determine the source of the leak.

During the investigative period to determine the extent of corrosion in the exterior surfaces of the sand bed region, two trenches were excavated in the drywell concrete floor. The purpose of the trenches was to expose the embedded drywell shell so that UT thickness measurements can be taken from inside the drywell in the sand bed region. Visual inspection and UT measurements did not identify corrosion as a concern on the exposed embedded drywell shell inside the drywell within the excavated trenches. The two trenches were sealed with an elastomer to prevent water intrusion into the embedded shell.

Prior to entering the period of extended operation a one-time visual inspection of the embedded drywell shell, within the two trenches, will be performed by removing the sealant and exposing the embedded shell. If visual inspection reveals corrosion that could impact drywell integrity, corrective actions will be initiated in accordance with the corrective action process to ensure that the drywell remains capable of performing its intended function. Following these inspections, the trenches will be resealed to continue protecting the embedded shell.

The inaccessible drywell shell in the sand bed region became accessible after removal of sand in 1992. The interface of the shell and the sand bed floor was cleaned, coated, and sealed with silicon sealant. The periodic coating inspection has not identified any coating degradation at the shell/concrete interface that would indicate that corrosion is occurring in the embedded portion of the shell.

Clarified the commitment for inspecting the embedded shell inside the drywell. (AMO 4/1/06)

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

IR#:

Approvals:

Prepared By:	Ouaou, Ahmed	4/ 1/2006
Reviewed By:	Quintenz, Tom	4/ 3/2006
Approved By:	Warfel, Don	4/ 3/2006

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NRC Acceptance (Date):