10 CFR 54

May 31, 2005

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop: OWFN P1-35
Washington, D.C. 20555-0001

Gentlemen:

In the Matter of	)	Docket Nos. 50-259
Tennessee Valley Authority	)	50-260
		50-296

BROWNS FERRY NUCLEAR PLANT (BFN) - UNITS 1, 2, AND 3 - LICENSE RENEWAL APPLICATION (LRA) – RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION CONCERNING FOLLOW UP TO RAI 2.4-3, FOLLOW UP TO RAI 3.5-1, FOLLOW UP TO RAI 3.5-4, FOLLOW UP TO RAI B.2.1.33-1, AND FOLLOW UP TO RAI 2.1.36 (TAC NOS. MC1704, MC1705, AND MC1706)

By letter dated December 31, 2003, TVA submitted, for NRC review, an application pursuant to 10 CFR 54, to renew the operating licenses for the Browns Ferry Nuclear Plant, Units 1, 2, and 3. As part of its review of TVA's LRA, the NRC staff, through a series of informal requests beginning on April 5, 2005, requested additional information in the civil area. This letter addresses concerns in the following areas: follow up to RAI 2.4-3, follow up to RAI 3.5-1, follow up to RAI 3.5-4, follow up to RAI B.2.1.33-1, and follow up to RAI 2.1.36. The remainder of the concerns in this area were previously sent to the NRC in separate correspondence on May 24, 2005.

The enclosure to this letter contains the specific NRC requests for additional information and the corresponding TVA responses.

If you have any questions regarding this information, please contact Ken Brune, Browns Ferry License Renewal Project Manager, at (423) 751-8421.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 31st day of May, 2005.

Sincerely,

Original signed by:

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ENCLOSURE

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
LICENSE RENEWAL APPLICATION (LRA)

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) CONCERNING FOLLOW UP TO RAI 2.4-3, FOLLOW UP TO RAI 3.5-1, FOLLOW UP TO RAI 3.5-4, FOLLOW UP TO RAI B.2.1.33-1, AND FOLLOW UP TO RAI 2.1.36

(SEE ATTACHED)

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 1, 2, AND 3
LICENSE RENEWAL APPLICATION (LRA)

RESPONSE TO NRC REQUEST FOR ADDITIONAL INFORMATION (RAI) CONCERNING FOLLOW UP TO RAI 2.4-3, FOLLOW UP TO RAI 3.5-1, FOLLOW UP TO RAI 3.5-4, FOLLOW UP TO RAI B.2.1.33-1, AND FOLLOW UP TO RAI 2.1.36

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NRC Follow Up to RAI 2.4-3

Supplement 1 of IE Information Notice 86-99 indicates that if leakage from the flooded reactor cavity is not monitored and managed, there is a potential for corrosion of the cylindrical portion of drywell shell. As this corrosion would initiate in the non-inspectible areas of the drywell, it cannot be monitored by IWE inspections. Moreover, this degradation of drywell shell can occur even if there is very little water found in the sand-pocket area of the drywell. Thus, the reactor building to drywell refueling seal becomes a non-safety item, which can affect the integrity of the drywell shell (which is a pressure boundary component) during the period of extended operation, and falls under the requirement of 10 CFR 54.4(a)(2). For two BWR plants, the staff has accepted an alternative to managing the aging of the seal. The alternative is to periodically perform ultrasonic testing (UT) of the cylindrical portion of the drywell shell with an acceptable sampling program, as part of containment ISI program. After reviewing the response to RAI 3.5-4 (in the applicant's letter dated January 31, 2005) related to the

operating experience of drywell shell corrosion at all three units of BFN, the staff came to conclusion that the applicant should mange the aging (leakage) of refueling seals. The applicant is requested to include the refueling seals within the scope of license renewal.

TVA Response to Follow Up to RAI 2.4-3

BFN does not include the refueling seals at the top of the drywell in the scope of license renewal and provides the following technical basis for that conclusion:

The drywell-to-reactor building refueling seal and the reactor pressure vessel (RPV)-to-drywell refueling seal, in conjunction with the refueling bulkhead, provide a watertight barrier to permit flooding above the RPV flange while preventing water from entering the drywell. Providing a watertight barrier to permit flooding above the RPV flange in support of refueling operations is not a safety-related function. 10 CFR 54.4(a) sets forth the criteria that determine whether plant systems, structures, and components are within the scope of license renewal. The refueling seals do not satisfy any of the requirements set forth in 10 CFR 54.4(a)(1). The refueling seals are not safety related and they are not relied upon to remain functional during design basis events to ensure 10 CFR 54.4(a)(1)(i) the integrity of the reactor coolant pressure boundary, 10 CFR 54.4(a)(1)(ii) the capability to shutdown the reactor and maintain it in a safe shutdown condition, or 10 CFR 54.4(a)(1)(iii) the capability to prevent or mitigate potential offsite exposures comparable to those referred to in 10 CFR 50.34(a)(1), 50.67(b)(2), or 100.11. Thus, the refueling seals are not brought into scope of license renewal by 10 CFR 54.4(a)(1).

Additionally, the performance of the drywell-to-reactor building refueling seal and the RPV-to-drywell refueling seal, in conjunction with the refueling bulkhead is not considered a II over I issue. 10 CFR 54.4(a)(2) states, "All non-safety-related systems, structures, and components whose failure could prevent satisfactory accomplishment of any of the functions identified in paragraphs (a)(1)(i), (ii), or (iii) of this section." A postulated failure of the drywell-to-reactor building refueling seal can result in water intrusion into the annulus space around the drywell. This leakage can occur only during refueling outages when the reactor cavity is flooded to allow movement of fuel between the reactor and the fuel pool.

However, water intrusion does not cause failure of the drywell's intended function. Any water leakage resulting from a postulated failure of the drywell-to-reactor building refueling seal could not remain suspended in the annulus region for an indefinite period of time and would eventually be routed to the sandpocket area drains or would evaporate due to the heat generated in the drywell during operation. Also, leakage past the RPV-to-drywell seal would result in cold (<150°F), demineralized water entering the drywell. Leakage of cold, demineralized water into the drywell cannot result in failure of any safety-related equipment because 1) there is no equipment inside the drywell whose safety-related function is credited in support of refueling operations and 2) the drywell contains a drainage system and sumps to collect and monitor unidentified leakage inside the drywell.

The refueling seals are not relied upon in safety analyses or plant evaluations to perform a function that demonstrates compliance with the Commissions regulations for fire protection, environmental qualification, pressurized thermal shock (N/A for BWRs), anticipated transients without scram, or station blackout.

The Browns Ferry refueling seals are not within the scope of license renewal and do not require aging management review.

Reviewing the SERs for Hatch Units 1 & 2 (NUREG-1803), Peach Bottom Units 2 & 3 (NUREG-1769) and Dresden Units 2 & 3 and Quad Cities 1 & 2 (NUREG-1796) did not identify refueling seals to be within the scope of license renewal.

In section 2.4.1.2 of NUREG-1796 for Dresden Units 2 & 3 and Quad Cities 1 & 2, the staff evaluation of technical information in the Application determined the applicant's conclusion that the refueling seals are not within the scope of license renewal as acceptable.

Dresden Unit 2 and 3 had unique operating experience that resulted in the aging management commitment to periodically perform ultrasonic testing of the drywell shell. Section 3.5.2.2.1 of the Dresden and Quad Cities SER (NUREG-1796) provides the following additional plant specific details in the section titled "Loss of Material Due to Corrosion in Inaccessible Areas of Steel Containment Shell or Liner Plate":

- Dresden Unit 3 had significant quantities of water introduced into the drywell annulus to extinguish a fire in the drywell expansion foam. Additionally the sand pocket drains were found to be clogged at Dresden Units 2 & 3 when performing the initial investigation in response to Generic Letter 87-05. When the drains were unclogged, there was water present in the sand pocket regions of both units.

  The Browns Ferry units have not had a fire in the drywell annulus that would have introduced significant quantities of water into that area. Additionally there is no operating experience for BFN that indicated that there were ever any issues with the sand pocket drains being unable to perform their intended function of draining water that may have inadvertently gotten into the drywell annulus.

- In response to Information Notices 86-99 and Generic Letter 87-05, an extensive review was conducted of the potential for drywell steel corrosion in the area of the containment sand pocket at Dresden and Quad Cities. This review included an evaluation of the actual plate thickness at Dresden Unit 3. Ultrasonic Test (UT) results indicated that in over 18 years of operation of Dresden Unit 3, no detrimental corrosion occurred in the drywell steel plate at the sand pocket level. These results have been obtained in spite of the fact that substantial moisture has previously been found in the sand pocket.

  Browns Ferry inspection results in response to Information Notices 86-99 and Generic letter 87-05 also indicated no detrimental corrosion occurred in the drywell steel plate at the sand pocket level. In addition Paragraph IWE-1242 of ASME Section XI requires the Owner to determine containment surface areas requiring augmented examination, in accordance with Paragraph IWE-1241. UT thickness measurements of the drywell shell were obtained during the U2C10 and U3C8 refueling outages for Units 2 and 3, respectively, and in 1999 and 2002 for Unit 1 (0-TI-376, Appendix 9.7, page 4). The data indicates that the condition of the drywell steel liner plate in this area meets code requirements, and that this area should not be categorized for augmented examination. (For additional information on augmented inspection requirements, refer

to the response to Follow-up RAI 3.5-4 in this enclosure)

- No special controls exist at Dresden and Quad Cities for limiting leakage. Formal inspections occur at each station during refueling outages that monitor for leakage from the sand pocket drains following reactor cavity flood-up. Corrective action is taken based on these inspections.

  The Browns Ferry units also inspect the areas where the sand pocket drains are located during routine operator rounds and take corrective actions based on inspection results. Browns Ferry Unit Operators inspect the Reactor Building areas in accordance with plant General Operating Instruction (GOI) 0-GOI-300-1, "Operator Round Logs," to verify no oil or abnormal water leakage is present. If oil or water is found, procedure 0-GOI-300-1 requires notification of the Browns Ferry Unit Operator.

- The augmented UT inspection for Dresden Unit 3 is currently completed every refueling outage. The frequency of future examinations will be evaluated based on inspection results. This inspection was specially configured to accommodate UT inspections by drilling 22 core holes for UT measurements. As long as Dresden Unit 3 remains the bounding condition for corrosion potential, there is no need to drill holes and conduct routine measurements on the remaining three units (Dresden Unit 2, Quad Cities Units 2 & 3).

  The Browns Ferry units did not have operating experience that was consistent with Dresden Unit 3. The Browns Ferry units have not drilled core holes for UT measurements.

Based on Browns Ferry scoping results, Browns Ferry operating experience, and prior industry precedents, the Browns Ferry refueling seals are not in the scope of license renewal, nor are additional drywell inspections warranted at Browns Ferry.

See BFN response to Follow-up RAI 3.5-4 included in this enclosure for additional discussion of aging management of the drywell shell.

NRC Follow Up to RAI 3.5-1

Response to RAI 3.5-1 indicates that the vent line bellows are single ply, and their leakage rates and aging degradation are managed by Appendix J, Type A testing. As Appendix J, Type A testing is generally performed at 10 (+) years interval, it is not quite clear, how the leak tightness and structural integrity of the vent line bellows are maintained. The applicant is requested to provide the frequency at which the Type A testing is performed in each unit, and process by which the integrity of the vent line bellows are maintained, including corresponding operating experience.

TVA Response to Follow Up to RAI 3.5-1

On March 9, 2005, the NRC (letter from Eva A. Brown of the NRC to Karl W. Singer of TVA) granted Technical Specifications amendments 293 and 252 for BFN Units 2 and 3, respectively. These amendments granted a one-time 5 year extension for the Appendix J, Type A test frequency for each unit. Thus, the Appendix J, Type A test frequency is currently 15-years for BFN Units 2 and 3.

There have been no performance based Appendix J, Type A test failures on Unit 2 or Unit 3. The last Unit 2 Type A test performance was November 6, 1994, and the last Unit 3 Type A test performance was October 10, 1998.

An Appendix J, Type A Integrated Leak Rate Test (ILRT) will be performed on Unit 1 prior to restart. The Unit 1 Appendix J, Type A test will be performed at least once per 48 months until test performance is available to justify an extended test interval under Option B.

The vent line bellows have a general visual examination performed each inspection period (3 periods per 10 year interval) per plant procedure 2-TI-173, "Primary Containment Inspection", for Unit 2 and 3-TI-173, "Primary Containment Inspection", for Unit 3. The Unit 1 equivalent procedure is currently being developed and will be performed before the Unit 1 Appendix J, Type A test. The general visual examination satisfies two requirements: Appendix J containment leak test program (10 CFR 50, Appendix J) and containment inservice inspection program (ASME Section XI, Subsection IWE as modified by 10 CFR 50.55a(b)(ix)(E)). A VT-3 visual examination is performed each inspection interval (10 years) in accordance with plant procedure 0-TI-376, "Containment Inservice

Inspection Program." The visual examination criteria are detailed in TVA's NDE procedure N-VT-15, "Visual Examination of Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Plants." This examination is more thorough than the general visual because it requires NDE certified personnel with specific lighting and visual acuity requirements. Additionally, plant procedure 0-SI-4.7.A.2.K, "Primary Containment Drywell Surface Visual Examination," is performed each operating cycle. This procedure includes examination of the torus interior surfaces. The vent line bellows are visible from the torus interior.

The vent line bellows are an integral part of the primary containment vessel and are not designed to be separately tested to verify leak tightness per BFN UFSAR Section 5.2.5.2.

UFSAR Section 5.2.5.2 specifically states:

> "...The drywell to pressure suppression chamber vent pipe expansion bellows are not designed to be separately tested to verify leak tightness. The leak tightness of the drywell to pressure suppression chamber vent pipe expansion bellows is verified during the periodic integrated leak-rate tests of the primary containment. These expansion bellows are an integral part of the primary containment vessel and, therefore, are not considered as penetrations per se … Periodic integrated leak testing of these bellows is sufficient since their normal deflections are only a small fraction of the design values and, also, the number of flexure cycles is only a small fraction of the limiting value. Thus, the likelihood of these bellows developing a leak is extremely small, and the test frequency proposed is the same as for the containment vessel proper…"

As shown in the above quote of UFSAR Section 5.2.5.2, the current licensing basis specifically stipulates that the vent line bellows are tested for leak-tightness during the integrated leak rate test (i.e., the Appendix J, Type A test).

Additionally, in the Safety Evaluation (SE) written by the Office of Nuclear Reactor Regulation authorizing the amendment to the BFN Technical Specification Section 5.5.12 "Primary Containment Leakage Rate Testing Program" for

Units 2 and 3, to allow the one-time 5-year extension to the 10-year frequency of the performance-based leakage testing program of Type A tests, various technical basis were presented to provide assurance that in the absence of an ILRT for 15 years, that the containment structural integrity and leak-tight integrity will be maintained. Section 3.0, "Technical Evaluation" of the SE contains the discussion of the technical basis for concluding that the containment structural integrity and leak-tight integrity will be maintained. Section 3.2 contains a discussion of the monitoring of nitrogen makeup that provides relevant operating experience to assure containment leak tightness and integrity. In the discussion "The NRC staff requested TVA to discuss its past operating experience regarding its use of the monitoring of the nitrogen makeup to the containment as a complimentary means for assuring the leak tightness and structural integrity of the BFN containment, and to elaborate as to why the use of this supplementary approach strengthens its case for requesting a one-time extension of the BFN containment ILRT interval."

"TVA responded that during plant operation, the BFN containment is inerted with nitrogen. Drywell pressure is maintained in the range of 1.1 to 1.35 psid positive pressure with respect to the suppression pool (torus) and consequently positive with respect to the outside atmosphere. The torus air space pressure is typically slightly positive with respect to atmosphere (about 0.1 psig). Although normal operating pressures in the drywell and torus atmosphere are less than that resulting from a Design Basis Accident, the fact that the containment is pressurized provides reliable means of verifying that no large leak path exists in the containment structure. Specifically, any substantial containment leak path will cause operational difficulties in maintaining positive pressure in the containment and the condition will manifest itself in an excessive nitrogen make-up rate. Monitoring for containment leakage is accomplished by monitoring the average daily nitrogen consumption used by the containment inerting system and is determined daily by the performance of Surveillance Instruction, SI-4.A.2.a, "Primary Containment Nitrogen Consumption and Leakage." Significant containment leakage would be identified through increased nitrogen usage needed to maintain the required TS pressure, and would be investigated promptly and addressed within the scope of the plant Corrective Action Program. Excess nitrogen consumption will also be observed if the nitrogen

supply system external to the containment is not tight. There is recent operating experience following a refueling outage where nitrogen make-up use was documented and promptly investigated, which was then determined to be caused by supply leaks. This demonstrated the efficiency of the Corrective Action Program in flagging excess nitrogen use and investigating the cause. Therefore, the nitrogen make-up monitoring procedure supports TVA's position for a one-time extension of the ILRT interval in that it provides an additional means of identifying conditions that would be indicative of containment leakage, and that corrective action would be initiated in a timely manner. The NRC staff finds the above BFN operating experience- based response adequate and acceptable."

The Safety Evaluation documenting the Commission's approval of Browns Ferry's request to change TS Section 5.2.12 is an attachment to the letter from Eva A. Brown of the NRC to Karl W. Singer of TVA dated March 9, 2005, approving TVA's TS change request.

NRC Follow Up to RAI 3.5-4

The response to RAI 3.5-4 emphasizes that the existing degradation of the drywell shells (inside and outside) has not reached the minimum required thickness of one inch. However, the response does not address a number of parameters that are pertinent to the period of extended operation. The applicant is requested to provide; (1) a description of the type of degradation (e.g., a cluster of pits, general corrosion), (2) a description of preventive actions (e.g. stopping the leaks from the refueling cavity seals, monitoring of sand drains), (3) a description of corrective actions (repairing/cleaning and recoating degraded areas), and (4) a description of the extent of degradation, when IWE-1240 requirement for augmented inspection will be implemented.

TVA Response to Follow Up to RAI 3.5-4

Containment Surfaces Requiring Augmented Inspection

In response to the reviewer's question of "… a description of the extent of degradation, when IWE-1240 requirement for augmented inspection will be implemented," TVA has provided a technical basis addressing that issue in Appendix 9.7 of plant procedure 0-TI-376, "ASME Section XI Containment Inservice Inspection Program Units 1, 2 and 3." Appendix 9.7 starts out discussing the purpose of the appendix as "… to document the BFN Units 2 and 3 evaluation of Class MC components for determination of augmented examination requirements in accordance with Table IWE-2500-1, Category E-C, Containment Surfaces Requiring Augmented Examination."

Under the "Background" section of the appendix, it states "… Paragraph IWE-1242 of ASME Section XI requires the Owner to determine containment surface areas requiring augmented examination, in accordance with Paragraph IWE-1241. These areas must be identified in the Owner's Inspection Program. IWE-1241 states, 'surface areas likely to experience accelerated degradation and aging require the augmented examinations identified in Table IWE 2500-1, Examination Category E-C'. Such areas include the following:

(a) 'Interior and exterior containment surface areas that are subject to accelerated corrosion with no or minimal corrosion allowance or areas where the absence or repeated loss of protected coatings has resulted in substantial corrosion and pitting. Typical locations of such areas are those exposed to standing water, repeated wetting and drying, persistent leakage, and those with geometry's that permit water accumulation, condensation, and microbiological attack. Such areas may include penetration sleeves, surfaces wetted during refueling, concrete-to steel shell or liner interfaces, embedment zones, leak chase channels, drain areas, or sump liners.'

(b) 'Interior or exterior containment surface areas that are subject to excessive wear from abrasion or erosion that causes a loss of protective coatings, deformation, or material loss. Typical locations of such areas are those subject to substantial traffic, sliding pads or supports, pins or clevises, shear lugs, seismic restraints, surfaces exposed to water

jets from testing operations or safety relief valve discharges, and areas that experience wear from frequent vibrations.'"

The "Background" section of the appendix further states, "… Subsection IWE is a non-prescriptive subsection of the Code by design, due to the varying containment designs and degradation mechanisms existing in the commercial nuclear industry. The NRC perspective on determination of augmented examination areas is, in part, documented in SECY-96-080, Part II, response to comment 2.8, which states 'A detailed list of every area in each containment type to be included in the augmented examinations would be impractical and probably not inclusive. The Owner is in the best position to determine which areas should be included in this category.' This places the responsibility on each plant to review its specific design, conditions, and experience, along with known industry problems, to make the initial determination of augmented examination areas. The ASME Code has a built-in mechanism to ensure that areas found to be susceptible to augmented requirements during scheduled IWE examinations or repair/replacement activities are added to the Table IWE-2500-1 examination requirements, as detailed in Paragraphs IWE-2420 and IWE-3122.4."

From a review of BFN specific plant design features, operational characteristics, and available industry information, the following areas were identified as requiring evaluation for augmented examination:

- Internal drywell steel containment vessel (SCV) embedment zone
- Drywell SCV at the sand bed region
- Drywell SCV area immediately below the drywell flange
- Sloping penetration sleeves
- Torus interior surfaces, waterline and below
- Hot penetration bellows
- ECCS Ring Header

The evaluation of each of the above areas for determination of augmented examination was performed and documented in Appendix 9.7. These evaluations considered the potential

degradation mechanisms of each area; the adequacy of existing BFN programs and maintenance practices with respect to the monitoring, prevention, and correction of degradation; and industry experience applicable to the area; and then provided a conclusion with respect to augmented examination requirements. The evaluations of each of the above areas for determination of augmented examination requirements are presented below:

Internal Drywell SCV Embedment Zone

This area is subject to corrosion if the drywell floor-to-SCV moisture seal barrier fails, allowing moisture intrusion, or if the concrete floor of the drywell cracks, allowing moisture seepage through to the steel liner. The moisture seal barrier is inspected each refueling outage in accordance with 0-SI-4.7.A.2.K, and sections are replaced when degradation warrants. A VT-3 examination of the moisture barrier will also be performed in accordance with Table IWE-2500-1, Category E-D. During the U2C9 outage, a portion of the moisture seal barrier was replaced. Examination of the exposed drywell SCV area below the moisture seal was performed by engineering personnel. This inspection indicated some minor pitting and localized rust, but nothing approximating a challenge to nominal wall thickness. No propagation of iron oxide to the concrete surface was noted, which would be indicative of SCV corrosion below the concrete. The concrete floor above the embedded SCV is examined as part of the Maintenance Rule Structures Monitoring Program. Based on existing inspection documentation and maintenance practices, this area has not exhibited signs of accelerated degradation and does not appear to warrant augmented examination. The SCV area below the moisture barrier at the concrete-floor interface has been and will continue to be examined during future replacements of the moisture barrier for signs of degradation. Examination will also be performed if the moisture barrier fails.

Drywell SCV at the Sand Bed Region

This area is subject to moisture from leaking penetrations or from the refueling cavity through bellows leakage during refueling. The area is inaccessible for visual examination from the outside surface. Ultrasonic thickness measurements were taken in selected portions of this area on Units 1, 2, and 3 in 1987, in response to Generic Letter 87-05. The results of these examinations indicated that significant corrosion had not occurred in the sand bed

region, and that water had not been observed leaking from the sand bed drains. Since this time there have been no documented UT readings of the subject area. There has been evidence of water leaking from the sand bed drains on both Units 2 and 3 since the previous documented inspection. Based on lack of recent data and known industry problems, this area appears to warrant additional investigation to determine whether it should be included for augmented examination. From drawing 41N720, it can be determined that the sand bed extends from elevation 548.79 to elevation 550.29. The drywell floor is at elevation 549.92, which means there is 0.37 ft of the sand bed extending above the floor. This area is accessible for examination from the inside surface. The horizontal weld connecting the first and second course of drywell liner plates is approximately 8 inches above the floor. UT thickness measurements from the drywell floor up to this weld, around the drywell circumference, would conservatively bound this area. In addition, any unacceptable readings would require engineering evaluation of the inaccessible area below the floor, in accordance with 10 CFR 50.55a requirements. UT thickness measurements of this area, in accordance with IWE-2500 (c)(2), (c)(3), and (c)(4), were obtained during the U3C8 and U2C10 refueling outages. The data indicated that the condition of the drywell steel liner plate in this area is good, and that this area should not be categorized for augmented examination.

Drywell SCV Area Immediately Below the Drywell Flange

This area is exposed to standing water and repeated wetting and drying during refueling operations. The area is not accessible for detailed visual examination from the outside surface. There are no documented UT thickness measurements of this area. No previous problems have been documented relative to degradation of this area. Standing water was observed in this area during the April, 1998, Unit 3 mid-cycle outage, during a walkdown performed immediately following drywell head removal and prior to floodup. Since the true surface condition can not be determined by visual examination or review of existing data, this area appears to warrant additional investigation to determine whether it should be included for augmented examination. PDM Drawing E-66 shows the area in question to extend from elevation 637 ft 4 in. to a point just below the drywell flange (elevation 640 ft 4 in). Inspection from the horizontal plate transition weld at elevation 637 ft - 4 in. to the

drywell ceiling in four locations: at or near AZ 0°, AZ 90°, AZ 180°, and AZ 270°, depending on accessibility; by establishment of three 12 inch square grids at each location, will provide sufficient data to determine the SCV condition. UT thickness measurements were taken in the above selected areas from the inside surface in accordance with IWE-2500 (c)(2), (c)(3), and (c)(4), during U3C9 and U2C11. UT thickness measurements were taken at 0°, 45°, 180°, and 270°. The data indicates that the condition of the drywell steel liner plate in this area is good, and that this area should not be categorized for augmented examination.

Sloping Penetration Sleeves

These areas are potentially subject to corrosion due to moisture collection and fatigue due to thermal cycling, as seen by industry experience. They are inspected each refueling outage in accordance with plant procedure 0-SI-4.7.A.2.K, each ISI inspection period by plant procedures 2(3)-TI-173 Appendix J general visual inspection. They are monitored within the Maintenance Rule Structures Program. There have been no documented problems in these areas through existing inspections. Water accumulation was documented in penetration 2-X-23 (RBCCW) during the U2C9 outage by inspection personnel performing VT-2 visual examinations for leakage, and the penetration was cleaned. Water was again noted in this penetration during performance of the RPV system leak inspection near the end of the outage, and it was again removed. PER 971510 was initiated as a result of this finding. The PER concluded that condensation appeared to be the major contributor to the moisture collection. Penetration X-23 (on both Units 2 and 3) contains the RBCCW inlet cooling water piping to the drywell coolers. During normal operation, moisture collection in penetration sleeves does not present a problem with respect to degradation since the drywell is inerted during this time, and a corrosive environment does not exist in the event of moisture build-up. Based on the results of existing inspections performed in these areas (especially the SI which is performed each refueling outage), there is no reason to suspect that they have experienced accelerated degradation, nor do conditions exist such that they are routinely exposed to a corrosive environment. Therefore, there are no penetration sleeves which warrant augmented examination.

Torus Interior Surfaces, Waterline and Below

This area is subject to corrosion due to moisture and repeated wetting and drying in the waterline region. Accessible portions of the torus inside surface are inspected each refueling outage as required by plant procedure 0-SI-4.7.A.2.K. Additionally, underwater inspections are performed as part of the coatings maintenance program and BFN Technical Instruction (TI) 0-TI-417, "Inspection of Service Level I, II, III Protective Coatings. Underwater coatings processes allow divers to inspect, document, and perform minor coatings repairs as one sequenced activity. These programs have been demonstrated to be effective in prevention of degradation to the torus surface. This is further evidenced by UT thickness measurements taken in torus underwater areas of both Units 2 and 3 (Unit 2 readings per WR C391104), which revealed no evidence of excessive degradation (all readings were within 10% of nominal wall thickness). Readings were taken on the Unit 1 torus in the same time frame. One reading (0.670 inch) was slightly below 10% nominal wall thickness (0.675 inch). PER 980204 was written to document this condition, and engineering analysis performed within the PER concluded that the low reading was not indicative of pitting corrosion or an embedded flaw, but rather appeared to be some type of anomaly associated with fabrication (e.g., grinding). Note that the Unit 1 torus has not been maintained with the same amount of maintenance and inspection as Units 2 and 3 have, yet excessive corrosion was not evidenced in the results of these recent UT thickness measurements. Previous performances of 0-SI-4.7.A.2.K have documented evidence of minor coating degradation at the waterline region, and this area would appear to be within the category of "repeated loss of protective coatings". Based on the above, it is concluded that the underwater region of the torus has not been subjected to accelerated degradation.

Since evidence of repeated loss of coatings has been documented in the waterline region, augmented examination of this area appears to be warranted, as a conservative measure. Drawing 47E812 Sheet 1 shows the low water level to be elevation 536' - 3/4", and high water level to be elevation 536' - 7". Examination of a 2 foot band, from elevation 536 to elevation 538, would conservatively bound this air/water interface area for augmented examination requirements.

Hot Penetration Bellows

These areas are susceptible to atmospheric corrosion, fatigue, and stress cracking due to vibration and repetitive rapid temperature transitions. They have been routinely inspected and tested by the Appendix J program, with no problems documented during previous inspections of these areas. In addition, there has been no abnormal piping vibration identified in these areas. Based on BFN plant experience, these areas do not appear to warrant augmented examination.

ECCS Ring Header - Interior

This area is under water and not accessible for visual examination from the interior. There are no documented thickness readings of the ring header. No previous problems have been documented relative to degradation of this area. Since the true condition can not be determined by visual examination or review of existing data, UT thickness measurements were taken from selected accessible OD surface areas in accordance with IWE-2500 (c)(2), (c)(3), and (c)(4), for the Units 2 and 3 ECCS Ring Headers, during the first period. The data indicated that the condition of the ECCS Ring Header is good, and that this area should not be categorized for augmented examination.

Conclusion

In conclusion, Class MC components have been evaluated for determination of augmented examination requirements. Areas specific to BFN plant design and operating characteristics which were determined to be susceptible to accelerated degradation and aging have been scheduled for examination in accordance with Table IWE-2500-1 Category E-C, as detailed in Appendixes 9.2, 9.3 and 9.4 of 0-TI-376.

This appendix establishes the initial requirements for augmented examination. Additional areas/components may be added as a result of scheduled examination results, repair/replacement activities, changes in plant programs or conditions, additional plant operating experience, or additional industry experience. Conversely, areas/components may be removed in accordance with IWE-2420(c) or Footnote 2 of Examination Category E-C of Table IWE-2500-1 if successive examination results (for three consecutive periods) show that the area has remained essentially unchanged, as allowed by IWE-2420(c).

Browns Ferry will maintain the pressure boundary intended function of the drywell shell by managing the loss of material using the ASME Section XI Subsection IWE aging management program. The following inspection criteria, corrective actions, and operating experience provide additional details of the condition of the drywell shell. This information also confirms that the condition of the drywell steel plate is good and does not require augmented examination in accordance with Section XI Subsection IWE Paragraph IWE-1241.

During each refueling outage since the mid 1980's, a visual inspection has been performed of the interior surface of the Drywell, and the interior and exterior surface of the Drywell Head and Torus (Suppression Chamber). These inspections are performed per BFN Surveillance Instruction (SI) 0-SI-4.7.A.2.K, "Primary Containment Drywell Surface Visual Inspection," and BFN Technical Instruction (TI) 0-TI-417, "Inspection of Service Level I, II, III Protective Coatings." Plant procedure O-SI-4.7.A.2.K originally included the requirements for the visual inspections of the protective coatings but was revised in March 2001 to remove those requirements and add the reference to plant procedure 0-TI-417 for coating inspections. This procedure was written to incorporate the information for performing visual inspections of Service Level I protective coatings (DBA and Non-DBA qualified). These procedural changes were effective March 2001.

The scope of plant procedure 0-SI-4.7.A.2.K as defined in the procedure is as follows:

- Includes provisions for the visual verification of the structural components of the Drywell, Drywell Head, Torus (Suppression Chamber), and the exterior surfaces of the Drywell Head and Torus (Suppression Chamber) (i.e., piping, connections, structural supports, penetrations, platform steel, duct supports, concrete walls, and steel shell) by visually inspecting for deterioration and/or structural damage.
- Provides visual inspection of the Moisture Seal Barrier (MSB) located on Drywell elevation 550'.
- Provides for visual inspection of the interior surfaces of the Drywell and Torus (Suppression Chamber) above the level one foot below the normal water line and exterior

surface of the Torus (Suppression Chamber) below the water line each operating cycle for deterioration and any signs of structural damage with particular attention to piping connections and supports and for signs of distress or displacement.

Following is a summary of the inspection requirements for the major features of Primary Containment contained in plant procedure 0-SI-4.7.A.2.K:

The following note applies to all features:

- Particular care shall be taken to denote any rusting or other indications of protective coating failure or surface corrosion.

Drywell

- Visually inspect all piping connections, supports, weld seams, and penetrations for any signs of displacement, serious distress, structural damage, and/or water leakage.
- Visually verify the MSB at the joint between the concrete floor and Drywell steel liner is not separated from the concrete or steel, deteriorated other than minor surface irregularities, cracked or peeling or hardening.
- Visually inspect all structural supports, platform steel, grating, duct supports, concrete walls, and steel liner for any evidence of distress, displacement, structural damage, pitting, and/or deterioration.
- Visually inspect all cable tray supports for any evidence of distress, displacement, structural damage, pitting, and/or deterioration.

Drywell Head

- Visually inspect the condition of the following areas of the Drywell Head: all welded seams and penetrations (including pipes and bolt holes) for cracking, corrosion, or deterioration.

Torus (Suppression Chamber) Interior

- Visually inspect all piping connection, supports, and penetrations for any evidence of displacement, structural damage, and/or deterioration.

- Visually inspect all structural supports, platform steel, grating, ring girders, and steel liner for any evidence of distress, displacement, structural damage, and/or deterioration.

Torus (Suppression Chamber) Exterior

- Visually inspect the Torus (Suppression Chamber) ring header supports and piping, ring girder supports, penetrations (including piping and hatches) for any evidence of displacement, structural damage, deterioration, and/or water leakage.

The SI has an acceptance criterion of "met/not met" and is based upon engineering evaluations of any discrepancies found during the visual inspections/verifications. All inspection results are documented on the appropriate attachments of the SI. Inspection results that fail to meet the acceptance criteria as defined in Section 6.1 or Attachment 12 for the Moisture Seal Barrier (MSB) of the SI constitute unsatisfactory SI results. Additionally, the unsatisfactory results are documented and dispositioned in accordance with the site corrective action program, SPP-3.1, "Corrective Action Program."

The scope of plant procedure 0-TI-417 as defined in the procedure is as follows:

- Applicable to accessible Service Level I (DBA and Non-DBA qualified) protective coatings on the interior surfaces of the Drywell, Main Vent Lines, Main Vent Header, Drywell Head, Torus (air space or full interior) and components within these areas, as well as exterior surfaces of the Drywell Head.

- Applicable to the Service Level II protective coatings on the Torus exterior and all appurtenances designated as being within the Code Class MC boundaries.

- Applicable to the Service Level III protective coatings on the interior surfaces of the Condensate Storage Tanks (CST) #1, #2, #3, #4 and #5.

- Does not include the inspection of the interior surfaces of the Torus below a point one foot below the normal water, when water is in the Torus.

- Applicable to Units 1, 2, and 3.

Following is a summary of the visual inspection requirements for the Primary Containment pressure boundary contained in plant procedure 0-TI-417:

- Visually inspect the protective coated surfaces on the interior of the Drywell vessel shell and on components and structures for peeling, cracked, blistered, delaminated, flaked, or discolored protective coatings and areas where protective coatings have fallen off.

- Visually inspect the condition of the exterior and interior of the Drywell Head for peeling, delamination, flaking, cracking, blistering, and discoloration.

- Visually inspect the protective coated surfaces on the interior of the Torus (Suppression Chamber) above a point one foot below the normal surface level of the water when the Torus is not fully drained, and over all surfaces when the Torus is drained. All accessible surfaces of the Vent/Downcomer Ring Header and coated surfaces of the ECCS Ring Header will be inspected. The surface shall be inspected to detect peeling, delamination, flaking, cracking, blistering, discoloration and/or other evidence of deteriorated areas or surface corrosion, with emphasis given to the area of the normal surface level water for rust, pitting, or corrosion of the pressure boundary.

- Visually inspect the protective coated surfaces on the exterior of the Torus (Suppression Chamber), the Vent/Downcomer Ring Header and ECCS Ring Header for peeling, delamination, flaking, cracking, blistering, or discoloration of protective coatings and areas where protective coatings have fallen off.

The following note applies to all visual inspections:

- Particular care shall be taken to denote any rusting or other indications of protective coating failure or surface corrosion.

The TI has an acceptance criterion based upon engineering evaluations of the inspection results as defined in Section 9.0. "… Evaluation of the inspection results shall reflect that the protective coatings which have been applied to the surfaces within the Service Level I areas of the Primary Containment and the Service Level II areas of

the Torus exterior, … are qualified for continued service till the next scheduled inspection." Defects determined to be Coating Failures (defined in 3.3 of the TI) are documented in accordance with the site corrective action program, SPP-3.1, "Corrective Action Program" and are evaluated and dispositioned. Minor Coating Defects (defined in 3.13 of the TI) will be repaired or touched up during normal preventative or corrective maintenance and do not require an evaluation by the corrective action program. Site Engineering Mechanical/Nuclear personnel perform the evaluations of the inspection results.

Coating failures that are identified on the Code Class MC equivalent boundary and deficiencies noted during the inspection of the moisture seal barrier (MSB) are further evaluated under the requirements of ASME Section XI when required by Subsection IWE. The Component Engineering section of Site Engineering is charged with the responsibility of implementing the requirements of ASME Section XI and is notified of coating failures and failures with the MSB. Subsequently, inspections (NDE) are performed per BFN Technical Instruction 0-TI-376, "ASME Section XI Containment Inservice Inspection Program Units 1, 2 and 3," of the identified coating failure area(s) when required by IWE. All inspection results that do not meet the acceptance requirements of IWE require a Notification of Indication (NOI) report. Site Engineering evaluates the NOI for disposition.

Attachments 1 through 7 provide a summary of the inspection results from outages for 1998 through 2004.

NRC Follow Up to RAI B.2.1.33-1

By letter dated January 24th, the applicant responded that ASME equivalent supports and component listed in LRA table 2.4.8.1 do not include the drywell lower ring support and the drywell upper lateral support. The staff is not clear regarding the TVA's basis for excluding the supports for Class MC components from the scope of ASME Section XI. Please provide additional information for justifying the above noted exclusion (b item from letter).

TVA Response to Follow up to RAI B2.1.33-1

TVA will manage the Class MC supports per Section XI, Subsection IWF. Table 3.5.2.26 has been revised to reflect this commitment as shown on the next page.

NRC Follow Up to RAI B.2.1.36

The staff had another question regarding evaluation of inspection personnel qualification based on Industry Guidance ACI 349.3R-96 as stated in the structures monitoring program. The staff stated that this industry guidance alone will not be adequate to qualify the inspectors for the examination of steel supports for the AMP B.2.1.36. The staff requested that the applicant reevaluate the program element from previous staff positions and submit the description for staff review. This information will be provided in a formal response to the RAI.

TVA Response to Follow-up RAI B.2.1.36

TVA has committed to manage the aging effects of Class MC supports under ASME Section XI Subsection IWF in its response to Follow-up RAI B.2.1.33-1 included with this submittal. The inspector's qualification will be in accordance with the requirements of ASME Section XI Subsection IWF and not per the BFN Structures Monitoring Program.

Table 3.5.2.26: Structures and Component Supports - Summary of Aging Management Evaluation

Component Type	Intended Function	Material	Environment	Aging effect requiring management	Aging Management Program	NUREG-1801 Vol. 2 Item	Table 1 Item	Notes
Supports for Drywell, Torus, and Vent System	SS	Carbon and Low Alloy Steel	Containment Atmosphere	Loss of material due to general corrosion.	ASME Section XI, Subsection IWF Program (**B.2.1.33**)	III.B1.1.1-a	**3.5.1.32**	B
Supports for Drywell, Torus, and Vent System	SS	Carbon and Low Alloy Steel	Inside Air	Loss of material due to general corrosion.	ASME Section XI, Subsection IWF Program (**B.2.1.33**)	III.B1.1.1-a	**3.5.1.32**	B
Supports for Drywell, Torus, and Vent System	SS	Carbon and Low Alloy Steel	Submerged	Loss of material due to crevice corrosion, general corrosion, pitting corrosion.	Chemistry Control Program (**B.2.1.5**) One Time Inspection (**B.2.1.29**)	III.B1.3.1-a	**3.5.1.32**	E

ATTACHMENT 1 (U3C8 Outage - 1998)

(sheet 1 of 2)

Drywell

During the visual inspection of protective coatings, areas of delamination and mechanical damage on the shell and components inside the drywell were noted in the inspection results. These areas were scraped back until proper coating adhesion (sound coating) was obtained. Scraping back to sound coating ensures that the delaminated or peeling topcoat does not adversely affect operation of the ECCS strainers. The zinc primer was intact and will provide corrosion protection for the Primary Containment boundary. The conditions were documented in the corrective action program as problem evaluation report (PER) 98-010391-00. The corrective action required the repair of the areas with routine or corrective maintenance that was scheduled for the following unit outage.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Drywell Head

The interior and exterior coating conditions found on the Drywell Head were deemed to be acceptable.

Torus Interior – Vapor Area

The coating conditions were inspected and documented in accordance with the SI. The coating conditions found were evaluated by Site Engineering and determined to be acceptable.

Torus Interior – Under Water Area

The coating conditions were inspected and documented in accordance with the SI. The coating conditions found were evaluated by Site Engineering and determined to be acceptable.

Torus Exterior

The coating conditions were inspected and documented in accordance with the SI. Site Engineering evaluated inspection results and twelve conditions were noted for repair based on their engineering evaluation. These twelve conditions were a result of mechanical damage, and therefore were not documented as Test Deficiencies or under the site corrective action program.

Moisture Seal Barrier (MSB) at Drywell El 550.0′

The inspection results identified several conditions that did not meet the acceptance criteria (low spots in the seal, cracked edge or curled edge at liner) of the SI. The inspection results were documented in the site corrective action program as PER 98-011210-000. The corrective action required the repair of the identified deficiencies and was inspected and found acceptable by site quality assurance personnel. The MSB was repaired during the outage under work order (WO) 98-003457-000 to correct the identified deficiencies.

ATTACHMENT 2 (U2C10 Outage - 1999)

Drywell

During the visual inspection of protective coatings, areas of delamination and mechanical damage on the shell and components inside the drywell were noted in the inspection results. These areas were scraped back until proper coating adhesion (sound coating) was obtained. Scraping back to sound coating ensures that the delaminated or peeling topcoat does not adversely affect operation of the ECCS strainers. The zinc primer was intact and will provide corrosion protection for the Primary Containment boundary. The conditions were documented in the corrective action program as PER 99-005256-000. The corrective action required the repair of the areas with routine or corrective maintenance that was scheduled for the following unit outage.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Drywell Head

The interior and exterior coating condition inspection results were documented per the SI. Site Engineering evaluated the inspection results. Areas of mechanical damage were scraped back to sound coating. All areas scraped back were small (less than 1 square inch) and did not require re-coating. This was documented per the site corrective action program as PER 99-005256-000.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

A gouge or undercut of a weld (0.250” long x 0.200” wide x 3/16” deep) was noted on the exterior of the head. This was evaluated by Site Engineering and determined to be acceptable by a technical evaluation (calculation CD-Q0999-970114, Rev 2).

ATTACHMENT 2 (U2C10 Outage - 1999)

(sheet 2 of 2)

Torus Interior – Vapor Area

The coating conditions were inspected and documented in accordance with the SI. The coating conditions found were evaluated by Site Engineering and coating failures were noted. The areas of coating failures were documented in accordance with the site corrective action program as PER 99-005389-000. The coating conditions evaluated to be coating failures were noted to be inaccessible and could not be scraped back to sound coating. They were tracked by the site's Uncontrolled Coating Log (ND-Q2303-940027) and monitored by Site Engineering. The repair of these coatings was scheduled for the next outage (Reference WOs 99-005820-000 and 99-005822-000).

Torus Interior – Under Water Area

No inspections were performed during this outage.

Torus Exterior

The coating conditions were inspected and documented in accordance with the SI. The coating conditions were evaluated by Site Engineering and coating failures were noted. The areas of coating failures were documented in accordance with the site corrective action program as PER 99-005389-000. The corrective action was to repair the coating surfaces by maintenance as permitted by plant Operations.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Moisture Seal Barrier (MSB) at Drywell El 550.0'

The inspection results did not identify any deficiencies.

ATTACHMENT 3 (U3C9 Outage - 2000)

(sheet 1 of 2)

Drywell

During the visual inspection of protective coatings, areas of delamination and mechanical damage on the shell and components inside the drywell were noted in the inspection results. These areas were scraped back until proper coating adhesion (sound coating) was obtained. Scraping back to sound coating ensures that the delaminated or peeling topcoat does not adversely affect operation of the ECCS strainers. The zinc primer was intact and will provide corrosion protection for the Primary Containment boundary. The conditions were documented in the corrective action program as PER 00-004091-00. The corrective action required the repair of the areas with routine or corrective maintenance that was scheduled for the following unit outage.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Drywell Head

During the visual inspection of protective coating on the interior surfaces of the Drywell Head, areas of delamination and mechanical damage were noted in the inspection results. These areas were scraped back until proper coating adhesion (sound coating) was obtained. The conditions were documented in the corrective action program as PER is 00-004091-00. For corrective action, see description noted for Drywell above.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

The exterior coating conditions found on the Drywell Head were deemed to be acceptable.

Torus Interior – Vapor Area

The coating conditions were inspected and documented in accordance with the SI. The coating conditions found were evaluated by Site Engineering and determined to be acceptable.

Torus Interior – Under Water Area

No inspections were performed during this outage.

Torus Exterior

The coating conditions were inspected and documented in accordance with the SI. Site Engineering evaluated inspection results and three conditions were noted for repair based on their engineering evaluation. These three conditions were a result of mechanical damage, and therefore were not documented as Test Deficiencies; however, PER 00-003795-000 was written to document the coating conditions. The corrective action was to repair the coating surfaces by maintenance as permitted by plant Operations.

Moisture Seal Barrier (MSB) at Drywell El 550.0′

The inspection results identified several conditions that did not meet the acceptance criteria (concavity in the seal, lack of bonding at liner and concrete) of the SI. The inspection results were documented in the site corrective action program as PER 00-004163-000. The corrective action required the repair of the identified deficiencies. The MSB was repaired during the outage under WO 98-003457-000 to correct the identified deficiencies and was inspected and found acceptable by site quality assurance personnel.

Inspections were performed where the existing MSB was removed and for the final repaired areas and found to be acceptable.

ATTACHMENT 4 (U2C11 Outage - 2001)

(sheet 1 of 3)

Drywell

During the visual inspection of protective coatings, areas of delamination and mechanical damage on the shell and components inside the drywell were noted in the inspection results. These areas were scraped back until proper coating adhesion (sound coating) was obtained. Scraping back to sound coating ensures that the delaminated or peeling topcoat does not adversely affect operation of the ECCS strainers. The zinc primer was intact and will provide corrosion protection for the Primary Containment boundary. The conditions were documented in the corrective action program as PER 01-003667-000. The corrective action required the repair of the areas with routine or corrective maintenance that was scheduled for the following unit outage.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Drywell Head

The interior and exterior coating condition inspection results were documented per the TI. Site Engineering evaluated the inspection results. Areas of mechanical damage and small blisters were identified and scraped back to sound coating. All areas scraped back were small (less than 3/4 square inch). This condition was documented per the site corrective action program as PER 01-003667-000. Corrective action for this PER was to initiate a work order to re-coat the areas scraped back during the next unit outage as a maintenance activity.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Torus Interior – Vapor Area

The coating conditions were inspected and documented in accordance with the TI. Site Engineering evaluated the coating conditions, and no coating failures were noted.

Torus Interior – Under Water Area

Follow-up inspections were performed of those areas identified in the previous outage that were classified as inaccessible since they were under the water line. These follow-up inspections did not identify any new conditions that were not previously noted in the previous outage, and in some instances the anomaly did not exist upon re-inspection. The site's Uncontrolled Coating Log (ND-Q2303-940027) was not revised based on the inspection results and was considered to be conservative.

Torus Exterior

The coating conditions were inspected and documented in accordance with the TI. Site Engineering evaluated the coating conditions and no coating failures were noted.

Main Vent Lines and Vent Header

The inspection results identified several conditions that did not meet the acceptance criteria of the TI. Evaluations by Site Engineering concluded that coating failures had occurred. This was documented per the site corrective action program as PER 01-003559-000. Corrective action for this PER required the development of a repair plan with the repair of the most severe conditions during the U2C12 outage. Additionally, the corrective action required the remaining failed coatings to be performed during the U2C13 outage as a maintenance activity.

Inspections were performed of the identified coating failure area(s) and found to be acceptable. An area with the most severe rust was inspected using UT examinations. The nominal wall thickness per the design drawing was ¼" (0.25") and the UT measurement readings ranged from 0.277" to 0.285". Therefore, the acceptance criterion was met with no further actions.

Moisture Seal Barrier (MSB) at Drywell El 550.0'

The inspection results identified several conditions that did not meet the acceptance criteria (concavity or low spots in the seal, lack of bonding at liner and concrete or mechanical damage) of the SI.

ATTACHMENT 4 (U2C11 Outage - 2001)

(sheet 3 of 3)

Inspections per plant procedure 0-TI-376 were performed where the existing MSB was removed. Based on a VT-3 examination [in accordance with procedure N-VT-15] of the moisture seal barrier, a NOI report was prepared and evaluated by Site Engineering. The NOI documents the indications noted from the VT-3 examination to satisfy the requirements for examination of the MSB in accordance with Table IWE-2500, Category ED. With the repair of the MSB, this condition was resolved. Additionally, during the VT-3 examination of the steel liner where the MSB had been removed for repair, some areas where noted to have localized pitting. UT measurements were obtained at all locations where a 1/16 inch or greater pit depth had been measured. This examination confirmed only localized pitting was present and not general or uniform wall loss. The most severe wall loss was measured where the liner thickness was 1.107” (Note: liner plate thickness at this location is 1.125”) with a pit depth of 3/32” (0.094”) which was within the 10% ASME allowance and was therefore acceptable with no further action required. This was documented in NOI report number U2C11-002.

ATTACHMENT 5 (U3C10 Outage - 2002)

(sheet 1 of 3)

Drywell

During the visual inspection of protective coatings, areas of delamination and mechanical damage on the shell and components inside the drywell were noted in the inspection results. These areas were scraped back until proper coating adhesion (sound coating) was obtained. Scraping back to sound coating ensures that the delaminated or peeling topcoat does not adversely affect operation of the ECCS strainers. The zinc primer was intact and will provide corrosion protection for the Primary Containment boundary. The conditions were documented in the corrective action program as PER 02-003690-00. The corrective action required the repair of the areas with routine or corrective maintenance that was scheduled for the following unit outage.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Drywell Head

During the visual inspection of protective coating on the exterior surfaces of the Drywell Head, areas of delamination and mechanical damage were noted in the inspection results. These areas were scraped back until proper coating adhesion (sound coating) was obtained. The conditions were documented in the corrective action program as PER 02-003690-00. The corrective action required the repair of the areas with routine or corrective maintenance that was scheduled for the following unit outage.

The exterior coating conditions found on the Drywell Head were deemed to be acceptable.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Torus Interior – Vapor Area

The coating conditions were inspected and documented in accordance with the TI. The coating conditions found were evaluated by Site Engineering and determined to be acceptable.

Torus Interior – Under Water Area

No inspections were performed during this outage.

Torus Exterior

The coating conditions were inspected and documented in accordance with the TI. Site Engineering evaluated the inspection results and noted areas of coating failures and others areas as a result of mechanical damage. These conditions were documented in the site corrective action program as PER 03-003700-000. The corrective action required the repair of the coatings by routine maintenance as permitted by operations.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Main Vent Lines and Vent Header

The inspection results identified several conditions that did not meet the acceptance criteria of the TI. Evaluations by Site Engineering concluded that although rust through conditions had been identified, they were the result of thin coating application. The coating adhesion was sufficient and no coating failures had occurred. Areas of loose coatings were scraped back until proper coating adhesion (sound coating) was obtained. Scraping back to sound coating ensures that the delaminated or peeling topcoat does not adversely affect operation of the ECCS strainers. The zinc primer was intact and will provide corrosion protection for the Primary Containment boundary.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Moisture Seal Barrier (MSB) at Drywell El 550.0′

The inspection results identified several conditions that did not meet the acceptance criteria of the TI. The inspection results were documented in the site corrective action program as PER 02-003692-000. The corrective action required the performance of VT-3 examination of the MSB in accordance with plant procedure 0-TI-376 and repair of the MSB in accordance with site maintenance instructions.

NDE inspections per plant procedure 0-TI-376 were performed where the existing MSB was removed and found to be acceptable. NDE inspections were performed on for the final repaired areas and found to be acceptable.

ATTACHMENT 6 (U2C12 Outage - 2003)

(sheet 1 of 3)

Drywell

During the visual inspection of protective coatings, areas of delamination and mechanical damage on the shell and components inside the drywell were noted in the inspection results. These areas were scraped back until proper coating adhesion (sound coating) was obtained. Scraping back to sound coating ensures that the delaminated or peeling topcoat does not adversely affect operation of the ECCS strainers. The zinc primer was intact and will provide corrosion protection for the Primary Containment boundary. The conditions were documented in the corrective action program as PER 03-003692-000. The corrective action required that a work order be generated and scheduled as a contingency for the U2C13 outage to determine if new coatings would be required after completion of another cycle of operation. Coating inspections are required every outage and controlled by 0-TI-417.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Drywell Head

The interior and exterior coating condition inspection results were documented per the TI. Site Engineering evaluated the inspection results. Areas of mechanical damage and small blisters were scraped back to sound coating. All areas scraped back were small (less than 3/4 square inch). This was documented per the site corrective action program as PER 03-003692-000. The corrective action required that a work order be generated and scheduled as a contingency for the U2C13 outage to determine if new coatings would be required after completion of another cycle of operation. Coating inspections are required every outage and controlled by 0-TI-417.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Torus Interior – Vapor Area

The coating conditions were inspected and documented in accordance with the TI. Site Engineering evaluated the coating conditions and no coating failures were noted.

ATTACHMENT 6 (U2C12 Outage - 2003)

Torus Interior – Under Water Area

No inspections were performed during this outage.

Torus Exterior

The coating conditions were inspected and documented in accordance with the TI. Site Engineering evaluated the coating conditions and areas of coating failures were identified. These were documented per the site corrective action program as PER 01-003700-000. No evidence of gross coating failure were identified that required immediate action. The corrective action of the PER required that Site Engineering evaluate the coating discrepancies and their conclusion was that the coating were similar to the previous outage inspection results and no physical work was required to operate the plant. The coatings were to be monitored during future outages.

Main Vent Lines and Vent Header

The inspection results identified several conditions that did not meet the acceptance criteria of the TI. Evaluations by Site Engineering concluded that coating failures had occurred similar to those noted during U2C11. The rust through and delamination found were the results of improper surface preparation and coating application. The accessible areas were scraped back until proper coating adhesion (sound coating) was obtained. Scraping back to sound coating ensures that the delaminated or peeling topcoat does not adversely affect operation of the ECCS strainers. The zinc primer was intact and will provide corrosion protection for the Primary Containment boundary. All inaccessible areas of blisters and delamination were added to the Uncontrolled Coating Log (ND-Q2303-940027).

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Moisture Seal Barrier (MSB) at Drywell El 550.0′

The inspection results identified several conditions that did not meet the acceptance criteria (concavity or low spots in the seal, lack of bonding at liner and concrete or mechanical damage) of the SI. The inspection results were documented in the site corrective action program as PER 03-003515-000. The moisture seal barrier was repaired (portions cut out and re-poured) per work order 02-010650-000.

Drywell

During the visual inspection of protective coatings, areas of delamination, blisters and mechanical damage on the shell and components inside the drywell were noted in the inspection results. These areas were scraped back until proper coating adhesion (sound coating) was obtained. Scraping back to sound coating ensures that the delaminated or peeling topcoat does not adversely affect operation of the ECCS strainers. The zinc primer was intact and will provide corrosion protection for the Primary Containment boundary. The conditions were documented in the corrective action program as PER 04-002379-00. The corrective action required the repair of the areas with routine or corrective maintenance that was scheduled for the following unit outage.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Drywell Head

During the visual inspection of protective coating on the surfaces of the Drywell Head, there were areas of blisters and mechanical damage noted in the inspection results. Site Engineering evaluated the inspection results and determined these areas were to be scraped back until proper coating adhesion (sound coating) was obtained. No further corrective action is required.

Torus Interior – Vapor Area

The coating conditions were inspected and documented in accordance with the TI. The coating conditions found were evaluated by Site Engineering and determined to be acceptable.

Torus Interior – Under Water Area

The coating conditions were inspected and documented in accordance with the SI. The inspection results noted that there were areas of delamination, sporadic blisters, mechanical damage and pitting on the shell. The coating conditions found were evaluated by Site Engineering and determined there were no accelerated degradation exhibited and the coatings were acceptable. The inspection results were documented in accordance with the site corrective

action program as PER 04-002865-000. The corrective action required that the appropriate areas be scraped back until proper coating adhesion (sound coating) was obtained. Scraping back to sound coating ensures that the delaminated or peeling topcoat does not adversely affect operation of the ECCS strainers. The zinc primer was intact and will provide corrosion protection for the Primary Containment boundary. Pits with a metal loss of 30 mils or greater were repaired with a qualified coating.

Torus Exterior

The coating conditions were inspected and documented in accordance with the TI. Site Engineering evaluated inspection results and noted areas of coating failures and others as a result of mechanical damage. These conditions were documented in the site corrective action program as PER 04-001876-000. The corrective action required the repair of the coatings by routine maintenance as permitted by plant Operations.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Main Vent Lines and Vent Header

The inspection results identified several conditions that did not meet the acceptance criteria of the TI. Evaluations by Site Engineering concluded that although rust through conditions had been identified, they were the result of thin coating application. The coating adhesion was sufficient and no coating failures had occurred. Areas of loose coatings were scraped back until proper coating adhesion (sound coating) was obtained. Scraping back to sound coating ensures that the delaminated or peeling topcoat does not adversely affect operation of the ECCS strainers. The zinc primer was intact and will provide corrosion protection for the Primary Containment boundary.

Inspections were performed of the identified coating failure area(s) and found to be acceptable.

Moisture Seal Barrier (MSB) at Drywell El 550.0′

The inspection results did not identify any conditions that did not meet the acceptance criteria in Attachment 9 of plant procedure 0-SI-4.7.4.A.2.K and was concluded to be in good condition.