



South Texas Project Electric Generating Station PO Box 289 Wadsworth, Texas 77483

September 11, 2002
NOC-AE-02001386
STI 31481078
10CFR50

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
30 Day Response to NRC Bulletin 2002-02,
"Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs"

In accordance with 10CFR50.54(f), attached is the STP Nuclear Operating Company (STPNOC) 30 day response to U.S. Nuclear Regulatory Commission (NRC) Bulletin 2002-02, "Reactor Pressure Vessel Head and Vessel Head Penetration Nozzle Inspection Programs" dated August 9, 2002.

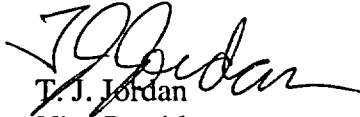
STPNOC coordinated preparation of this response with the other participants in the Strategic Teaming and Resource Sharing (STARS) group.

Licensing commitments are identified in Attachment 2 to this letter. If you should have any questions regarding this submittal, please contact me at 361-972-7902 or Mr. Michael Lashley at 361-972-7523.

A096

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 9/11/02


T. J. Jordan
Vice President,
Engineering and
Technical Services

AWH

Attachments:

1. Response to Bulletin 2002-02
2. List of Commitments

cc:

(paper copy)

Ellis W. Merschoff
Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, Texas 76011-8064

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Richard A. Ratliff
Bureau of Radiation Control
Texas Department of Health
1100 West 49th Street
Austin, TX 78756-3189

Cornelius F. O'Keefe
U. S. Nuclear Regulatory Commission
P. O. Box 289, Mail Code: MN116
Wadsworth, TX 77483

C. M. Canady
City of Austin
Electric Utility Department
721 Barton Springs Road
Austin, TX 78704

(electronic copy)

A. H. Gutterman, Esquire
Morgan, Lewis & Bockius LLP

M. T. Hardt/W. C. Gunst
City Public Service

Mohan C. Thadani
U. S. Nuclear Regulatory Commission

R. L. Balcom
Reliant Energy, Inc.

A. Ramirez
City of Austin

C. A. Johnson
AEP - Central Power and Light Company

Jon C. Wood
Matthews & Branscomb

**30 Day Response to NRC Bulletin 2002-02
Reactor Pressure Vessel Head and Vessel Head Penetration Inspection Programs**

Below is the STP Nuclear Operating Company (STPNOC) 30 day response to Nuclear Regulatory Commission (NRC) Bulletin 2002-02, Reactor Pressure Vessel Head and Vessel Head Penetration Inspection Programs, dated August 9, 2002. The Bulletin's "Required Information" is shown in **bold**.

NRC Requirement:

Required Information

1. **Within 30 days of the date of this bulletin:**
 - A. **PWR addressees who plan to supplement their inspection programs with non-visual NDE methods are requested to provide a summary discussion of the supplemental inspections to be implemented. The summary discussion should include EDY, methods, scope, coverage, frequencies, qualification requirements, and acceptance criteria.**
 - B. **PWR addressees who do not plan to supplement their inspection programs with non-visual NDE methods are requested to provide a justification for continued reliance on visual examinations as the primary method to detect degradation (i.e., cracking, leakage, or wastage). In your justification, include a discussion that addresses the reliability and effectiveness of the inspections to ensure that all regulatory and technical specification requirements are met during the operating cycle, and that addresses the six concerns identified in the Discussion Section of this bulletin. Also, include in your justification a discussion of your basis for concluding that unacceptable vessel head wastage will not occur between inspection cycles that rely on qualified visual inspections. You should provide all applicable data to support your understanding of the wastage phenomenon and wastage rates.**

STP Response:

STPNOC has evaluated the expected status of Units 1 & 2 with regard to accrued Effective Full Power Years (EFPY) and Effective Degradation Years (EDY) calculated in accordance with MRP-48 (Equation 2.2). This was performed and summarized on each cycle using the actual measured maximum temperature (EDY_{actual}) and using the actual measured maximum temperature plus a margin for uncertainty (EDY_{margin}). The results for both Units is < 8 EDY and are presented in the following table referenced to the next scheduled refueling outage for each unit:

Unit	As of Date	EDY_{actual}	EDY_{margin}
1	Mar 26, 2003	<4.5	<6.30
2	Oct 2, 2002	<5.25	<7.50

STPNOC determined the head temperatures and resultant EDY via an Engineering evaluation that considered the maximum measured temperatures using the Reactor Vessel Water Level Systems un-heated thermocouple junction. This evaluation utilized power history, core loading pattern, head flow model, and also included uncertainty. Temperature readings were reviewed over the life of the plant at 100% power as well as hot 0% power. An independent review of this work was conducted by Messrs. Bob Hermann and Art Deardorff of Structural Integrity Associates who agreed with the approach taken. This evaluation is documented within our Corrective Action Program.

Previous evaluations of susceptibility were contained in EPRI Report, "PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48)". In this report, Reactor Pressure Vessel Head temperatures were obtained from design literature. WCAP-13493, "Reactor Vessel Closure Head Penetration Key Parameters Comparison" summarized the various plants head operating temperatures in 1992. As stated in the WCAP, "For conservatism, the highest estimated temperature for each plant is reported..." STP Units 1 and 2 listed a head operating temperature in MRP-48 of >604°F. The current evaluation concludes the actual time weighted average temperature to be < 583°F. Additional margin was added for uncertainty.

STPNOC previously committed in its 60 day response to Bulletin 2002-01 (NOC-AE-02001317, dated May 16, 2002) to perform a bare metal visual inspection of Units 1 & 2. The inspection of Unit 2 will be completed during 2RE09 starting in October 2002 and the inspection of Unit 1 is scheduled during 1RE11 to start in March 2003 as reported in that bulletin response.

The STPNOC responses to Bulletin 2002-01 (NOC-AE-02001290, dated April 2, 2002) addressed the adequacy of visual inspection for compliance with the design and licensing basis of the plants. Those responses are still applicable. Additional technical justification for the adequacy of the inspections is provided in this response to Bulletin 2002-02.

STPNOC will implement the MRP Inspection Plan and will comply with its requirements for the next refueling outage beginning with the conduct of the planned bare metal visual (BMV) inspection of each Unit. As described in STP's 60 day response mentioned above, the inspections will be performed on a best-effort basis with a goal of 100% coverage of the reactor vessel head under the insulation, but as a minimum, sufficient to support an engineering evaluation of the condition of the vessel head outer surface. The MRP Inspection Plan complements the inspection commitments STPNOC made in our responses to Bulletin 2001-01 and Bulletin 2002-01. Our planned inspection exceeds the requirements of both the MRP Inspection Plan and those listed in Bulletin 2002-02 for a plant < 8 EDY. STPNOC will carefully review the generic activities underway and determine its future inspection activities beyond the upcoming refueling outage predicated on data from inspections being performed and from the generic inspection plans agreed to by the NRC and industry.

The MRP Inspection Plan has been developed, reviewed, and approved by the PWR utilities (Refs 1 and 2). It presents a technically credible inspection regimen that assures to a high degree of certainty that degradation will be detected at an early stage long before wastage or circumferential cracking can challenge the structural integrity of the RCS pressure boundary.

Furthermore, implementation of the MRP Inspection Plan will assure continued compliance with the Regulatory Requirements cited within NRC Bulletin 2002-02.

Accordingly, STPNOC provides the following responses as justification for continued reliance on visual examinations as the primary method to detect degradation in the RPV head. Included in these responses are discussions on the reliability and effectiveness of visual examinations as they relate to the six concerns cited in Bulletin 2002-02 and the basis for concluding that unacceptable wastage will not occur between refueling outages.

Concern 1: Circumferential cracking of CRDM nozzles was identified by the presence of relatively small amounts of boric acid deposits. This finding increases the need for more effective visual and non-visual NDE inspection methods to detect the presence of degradation in CRDM nozzles before nozzle integrity is compromised.

Response: Since the initial discovery of circumferential cracks above the J-groove weld in 2001, visual inspection techniques and approaches employed have been dramatically improved and a heightened sense of awareness exists for the range in size and appearance of visual indications that must be further investigated. Non-visual techniques similarly have and continue to evolve to more effectively examine the penetration tube and associated welds for evidence of cracks. Nothing in the recent events at Davis-Besse has altered the fundamental inspection capability requirements previously established as necessary to identify the presence of PWSCC and subsequent associated wastage. The effectiveness of inspection techniques continues to be evaluated and improved.

EPRI MRP has published detailed guidance for performing visual examinations of RPV heads (Ref 3). A utility workshop was recently conducted to discuss this guidance and lessons learned from recent field experience (including Davis-Besse). RPV head bare metal visual inspections at STP will be performed and documented in accordance with written procedures and acceptance criteria that comply with the guidance of the MRP Inspection Plan. Evaluations and corrective actions will be rigorous and thoroughly documented.

In order for outside diameter (OD) circumferential cracks above the J-groove weld to initiate and grow, a leak path must first be established to the CRDM annulus region from the inner wetted surface of the reactor vessel head (RVH). If primary water does not leak to the annulus, the environment does not exist to cause circumferential OD cracking. Axial cracks in the CRDM nozzles or cracks in J-groove welds must first initiate and grow through-wall. Experience has shown that through-wall axial cracks will result in observable leakage at the base of the penetration on the outer surface of the vessel, even with interference fits. Alloy 600 steam generator drain pipes at Shearon Harris (1988) and pressurizer instrument nozzles at Nogent 1 and Cattenom 2 (1989) were all roll expanded but still developed leaks during operation (Ref 4). Plant specific upper head gap analyses have been performed for a large number of plants, with nozzle initial interference fits ranging from 0 to 0.0034". These analyses have confirmed the presence of a physical leak path in essentially all nozzles under normal operating pressure and temperature conditions (Ref 4).

The probability of detecting small control rod drive mechanism (CRDM) leaks by visual inspections alone is high. "Visual inspections of the reactor coolant system pressure boundary have proven to be an effective method for identifying leakage from primary water stress corrosion cracking (PWSCC) cracks in Alloy 600 base metal and Alloy 82/182 weld metal. Specifically, visual inspections have detected leaks in reactor pressure vessel (RPV) head CRDM nozzles, RPV head thermocouple nozzles, pressurizer heater sleeves, pressurizer instrument nozzles, hot leg instrument nozzles, steam generator drain lines, a RPV hot leg nozzle weld, a power operated relief valve (PORV) safe end and a pressurizer manway diaphragm plate" (Ref 5). To date, no leaking (CRDM) nozzles have been discovered by non-visual NDE examinations except for the three nozzles at Davis-Besse. In the case of Davis-Besse, there is a high level of confidence that the leakage would have been detected visually had there been good access for visual inspections and the head had been cleaned of pre-existing boric acid deposits from other sources (Ref 4).

Finally, as described under Concern 3 below, detailed probabilistic fracture mechanics (PFM) analyses have been performed to demonstrate the effectiveness of visual inspections in protecting the CRDM nozzles against failure due to circumferential cracking (Ref 6). Even though the above discussion illustrates that visual inspections performed in accordance with MRP recommendations have a high probability of detecting through-wall leakage, a very low probability of detection was assumed in the PFM analyses. The PFM analyses assume only a 60% probability that leakage will be detected if a CRDM nozzle is leaking at the time a visual inspection is performed. Furthermore, if a nozzle has been inspected previously and leakage was missed, subsequent visual inspections are assumed to have only a 12% probability of detecting the leak. Even with these conservative probability of detection assumptions, the PFM analyses show that visual inspection every outage reduces the probability of a nozzle ejection to an acceptable level for plants with 18 or more EDY. Visual inspections of plants with fewer than 18 EDY in accordance with the MRP Inspection Plan will maintain the probability of nozzle ejection for these plants more than an order of magnitude lower than that for the greater than 18 EDY plants.

In summary, the industry has responded to the need to detect small amounts of leakage by increased visual inspection sensitivity, increased inspection frequencies, and improved inspection capabilities. Small amounts of leakage can be detected visually and it has been shown that timely detection by visual examination will ensure the structural integrity of the RPV head penetrations with respect to circumferential cracking.

Concern 2: Cracking of 82/182 weld metal has been identified in CRDM nozzle J-groove welds for the first time and can precede cracking of the base metal. This finding raises concerns because examination of weld metal material is more difficult than base metal.

Response: Cracks in the J-groove weld do not pose an increased risk regarding nozzle ejection when compared to penetration base metal cracks. J-groove weld cracks that initiate and grow through-wall will leak the same as cracks in the penetration base metal. Therefore, weld cracks pose a similar risk as cracks in the base material and are equally detectable by visual examination. Although higher crack growth rates have been observed in laboratory testing of weld metal, the industry model of time-to-leakage includes plants that have had weld metal

cracking as well as base metal cracking. The visual examination frequencies from the MRP Inspection Plan have been conservatively established based on the risk informed analyses considering leakage due to both weld metal and base metal cracking.

Concern 3: Through-wall circumferential cracking from the outside diameter of the CRDM nozzle has been identified for the first time. This raises concerns about the potential for failure of CRDM nozzles and control rod ejection, causing a LOCA.

Response: Probabilistic fracture mechanics (PFM) analyses using a Monte-Carlo simulation algorithm were performed to estimate the probability of nozzle failure and control rod ejection due to through-wall circumferential cracking (Ref 6). The PFM analyses conservatively assume that, once a leak path has extended to the annulus region, an OD circumferential crack develops instantaneously, with a length encompassing 30° of the nozzle circumference. Fracture mechanics crack growth calculations were then performed for this initially assumed crack, using material crack growth rate data from EPRI Report MRP-55 (Ref 7). The parameters used in the PFM model were benchmarked against the most severe cracking found to date in the industry (B&W Plants) and produced results that are in agreement with experience to date. The analyses were used to determine probability of nozzle failure versus EFPY for various head operating temperatures. Analyses were then performed to estimate the effect of visual and non-visual (NDE) inspections of the plants in the most critical inspection category, using the conservative assumption discussed above (see Concern #1 response) for probability of leakage detection by visual inspection. These analyses demonstrate that performing visual inspections significantly reduces the probability of nozzle ejection, and that performing such examinations on a regular basis (in accordance with the inspection schedule prescribed in the MRP Inspection Plan) effectively maintains the probability of nozzle ejection at an acceptably low level indefinitely.

In the extremely unlikely event that nozzle failure and rod ejection were to occur due to an undetected circumferential crack, an acceptable margin of safety to the public would still be maintained. The consequences of such an event are similar to that of a medium-break LOCA, which is a design-basis event. The probability of core damage given a nozzle failure (assuming that failure leads to ejection of the nozzle from the head) has been estimated to be 1×10^{-3} for the PWR fleet. The STP plant specific conditional core damage probability (CCDP) is 4×10^{-4} (Ref 13). The PFM analyses demonstrate that periodic visual inspections are capable of maintaining the probability of nozzle failure due to circumferential cracking well below 1×10^{-3} . Therefore, the PFM analyses demonstrate that the resulting incremental change in core damage frequency due to CRDM nozzle cracking and the CCDP can be maintained at less than 1×10^{-6} (i.e., 1×10^{-3} times 1×10^{-3} equals 1×10^{-6}) per plant year, through a program of periodic visual examinations performed in accordance with the MRP inspection plan. This result is consistent with NRC Regulatory Guide 1.174 that defines an acceptable change in core damage frequency (1×10^{-6} per plant year) for changes in plant design parameters, technical specifications, etc.

Concern 4: The environment in the CRDM housing/RPV head annulus will likely be more aggressive after any through-wall leakage because potentially highly concentrated borated primary water may become oxygenated. This raises concerns about the technical basis for current crack growth rate models.

Response: Prior to the Davis-Besse incident, a MRP panel of international experts on SCC (including representatives from ANL/NRC Research) gave extensive consideration to the likely environment in the annulus between a leaking CRDM nozzle and the RPV head. The panel revisited this issue after the Davis-Besse event (Ref 7). The relevant arguments remain valid for leak rates that are less than 1 liter/h or 0.004 gpm, which plant experience has shown to be the usual case. The conclusions were:

1. An oxygenated crevice environment is highly unlikely because:
 - Back diffusion of oxygen is too low compared to counterflow of escaping steam (two independent assessments based on molecular diffusion models were examined),
 - Oxygen consumption by the metal walls would further reduce its concentration,
 - Presence of hydrogen from leaking water and diffusion through the upper head results in a reducing environment,
 - Even if the concentration of hydrogen was depleted by local boiling, coupling between low alloy steel and Alloy 600 would keep the electrochemical potential low,
 - Corrosion potential will be close to the Ni/NiO equilibrium, resulting in PWSCC susceptibility similar to normal primary water.
2. The most likely crevice environments are either hydrogenated steam or PWR primary water within normal specifications and both would result in similar, i.e. non-accelerated, susceptibility of the Alloy 600 penetration material to PWSCC.
3. If the boiling interface happens to be close to the topside of the J-weld, itself a low probability occurrence, concentration of PWR primary water solutes, lithium hydroxide and boric acid, can in principle occur. Of most concern here would be the accelerating effect of elevated pH on SCC, but calculations and experiments show that any changes are expected to be small, in part because of the buffering effect of precipitates. A factor of 2x on the crack growth rate (CGR) conservatively covers possible acceleration of PWSCC, even up to a high-temperature pH of around 9.

For larger leakage rates, which could lead to local cooling of the head, concentration of boric acid, and development of a sizeable wastage cavity adjacent to the penetration, the above arguments no longer directly apply. However, limited data (Ref 12) on SCC in concentrated boric acid solutions indicate that:

- Alloy 600 is very resistant to transgranular SCC (material design basis),
- High levels of oxygen and chloride are necessary for intergranular cracking to occur at all,
- The effects are then worse at intermediate temperatures, suggesting that the mechanism is different from PWSCC.

The above considerations show that there is no basis for assuming that any post-leakage, crevice environment in the CRDM housing/RPV head annulus would be significantly more aggressive with regard to SCC of the Alloy 600 penetration material than normal PWR primary water, irrespective of the assumed leakage rate and/or annulus geometry. The current industry model

(Ref 7), which includes a factor of 2x on CGR to cover residual uncertainty in the composition of the annulus environment, remains valid.

Concern 5: The presence of boron deposits or residue on the RPV head, due to leakage from mechanical joints, could mask pressure boundary leakage. This raises concerns that a through-wall crack may go undetected for years.

Response: The experience at Davis-Besse has clearly demonstrated that effective visual inspection for leakage from CRDM nozzle and weld PWSCC requires unobstructed inspection access and that the head surface be free of pre-existing boric acid deposits. Accumulations of debris and boric acid deposits from other sources can interfere with a determination as to the presence or absence of boric acid deposits extruding from the tube-to-head annulus. Therefore, to effectively perform a visual examination of the RPV head outer surface for penetration leakage, such deposits and debris accumulations must be carefully inspected, removed, and the area re-inspected. Evaluation may show that it is necessary to perform a non-visual examination to establish the source of the leakage.

Accordingly, each inspection at STPNOC will be conducted with a questioning attitude and any boric acid deposit on the vessel head will be evaluated to determine its source in accordance with existing industry guidance, supplemented by appropriate consideration of recent industry experience at the time of the inspection. These requirements are incorporated in the visual inspection guidance contained in the MRP Inspection Plan. Implementation of these requirements will preclude the cited condition of a through-wall crack remaining undetected for years.

As described in our response to Bulletin 2002-01 (NOC-AE-02001290, dated April 2, 2002), STP is confident that the RPV head is clean and free of previous leakage residue that would potentially mask the identification of pressure boundary leakage.

Concern 6: The causative conditions surrounding the degradation of the RPV head at Davis-Besse have not been definitively determined. The staff is unaware of any data applicable to the geometries of interest that support accurate predictions of corrosion mechanisms and rates.

Response: The causes of the Davis-Besse degradation are sufficiently well known to avoid significant wastage. The root cause evaluation performed by the utility (Ref 8) clearly identifies the root cause as PWSCC of CRDM nozzles followed by boric acid corrosion. The large extent of degradation has been attributed to failure of the utility to address evidence that had been accumulating over a five year period of time (Figure 26 of Ref 8).

The industry has provided utilities with guidance for vessel top head visual inspections to ensure that conditions approaching that which existed at Davis-Besse will not occur. Visual inspection guidelines have been provided (Ref 3), and a workshop was conducted to thoroughly review industry experience, regulatory requirements, leakage detection, and analytical work performed to understand the causes of high wastage rates (Ref 9).

Subsequent to significant wastage being discovered on the Davis-Besse RPV head, the industry has performed analytical work to determine how a small leak such as seen at several plants can progress to the significant amounts of wastage discovered at Davis-Besse. This work is referenced within the basis for the MRP Inspection Plan (Ref 10) and was previously presented to the NRC (Ref 11).

The analytical work shows that the corrosion rate is a strong function of the leakage rate. Finite element thermal analyses show that leak rates must reach approximately 0.1 gpm for there to be sufficient cooling of the RPV top head surface to support concentrated liquid boric acid that will produce high corrosion rates. The leak rate is in turn a strong function of the crack length. The effect of crack length above the J-groove weld on crack opening displacement and area has been confirmed by finite element modeling of nozzles including the effects of welding residual stresses and axial cracks. Leak rates have been calculated using crack opening displacements and areas determined by the finite element analyses and leak rate models based on PWSCC cracks in steam generator tubes.

Cracks that just reach the annulus through the base metal or weld metal will result in small leaks such as those that produced small volumes of boric acid deposits on several vessel heads at locations where the CRDM nozzles penetrate the RPV head outside surface. These leaks are typically on the order of 10^{-6} to 10^{-4} gpm. There is no report of any of these leaks resulting in significant corrosion. A leak rate of 10^{-3} gpm will result in the release of about 500 in³ of boric acid deposits in an 18-month operating cycle, which will be detectable by visual inspections.

The time for a crack to grow from a length that will produce a leak rate of 10^{-3} gpm to a leak rate of 0.1 gpm has been estimated by deterministic analyses based on the MRP crack growth models to be 1.7 years for plants with 602°F head temperatures. Probabilistic analyses show that there is less than a 1×10^{-3} probability that corrosion will proceed to the point that the inside surface cladding of the head would be uncovered over a significant area before the wastage would be detected by supplemental visual inspections as required under the MRP Inspection Plan. During the transition from leak rates of 10^{-3} gpm to 0.1 gpm, loss of material will be by relatively slow processes (Ref 10).

The ability to detect leakage prior to the risk of structural failure is illustrated by Figure 26 of the Davis-Besse root cause analysis report. There was visual evidence of boric acid deposits on the vessel head for five years prior to the degradation being detected. Guidance provided in the MRP Inspection Plan would not permit these conditions to exist without determining the source of the leak, including nondestructive examinations if necessary.

Therefore, while the exact timing of the event progression at Davis-Besse cannot be definitively established, the probable durations can be predicted with sufficient certainty to conclude that a visual inspection regimen can ensure continued structural integrity of the RCS pressure boundary.

NRC Requirement:

2. **Within 30 days after plant restart following the next inspection of the RPV head and VHP nozzles to identify the presence of any degradation, all PWR addressees are requested to provide:**
 - A. **the inspection scope and results, including the location, size, extent, and nature of any degradation (e.g., cracking, leakage, and wastage) that was detected; details of the NDE used (i.e., method, number, type, and frequency of transducers or transducer packages, essential variables, equipment, procedure and personnel qualification requirements, including personnel pass/fail criteria); and criteria used to determine whether an indication, “shadow,” or “backwall anomaly” is acceptable or rejectable.**
 - B. **the corrective actions taken and the root cause determinations for any degradation found.**

STP Response:

STP will provide the requested 30 day response.

REFERENCES

1. EPRI Letter MRP 2002-086, "Transmittal of "PWR Reactor Pressure Vessel (RPV) Upper Head Penetrations Inspection Plan, Revision 1, August 6, 2002", from Leslie Hartz, MRP Senior Representative Committee Chairman, August 15, 2002.
2. EPRI Document MRP-75, Technical Report 1007337, "PWR Reactor Pressure Vessel (RPV) Upper Head Penetrations Inspection Plan, (MRP-75), Revision 1", August 2002
3. EPRI Technical Report 1006899, "Visual Examination for Leakage of PWR Reactor Head Penetrations on Top of the RPV Head: Revision 1", March 2002
4. Appendix B of EPRI Document MRP-75, Technical Report 1007337, "Probability of Detecting Leaks in RPV Top Head Nozzles," August 2002
5. EPRI TR-103696, "PWSCC of Alloy 600 Materials in PWR Primary System Penetrations", July 1994.
6. Appendix A of EPRI Document MRP-75, Technical Report 1007337, "Technical Basis for CRDM Top Head Penetration Inspection Plan," August 2002.
7. EPRI Document MRP-55, "Crack Growth Rates for Evaluating Primary Water Stress Corrosion Cracking (PWSCC) of Thick-Wall Alloy 600 Material," July 2002.
8. Davis-Besse Nuclear Power Station Report CR2002-0891, "Root Cause Analysis Report – Significant Degradation of the Reactor Pressure Vessel Head," April 2002.
9. EPRI Technical Report 1007336, "Proceedings of the EPRI Boric Acid Corrosion Workshop, July 25–26, 2002 (MRP-77)", September 2002, Baltimore, Maryland, to be published by EPRI.
10. Appendix C of EPRI Document MRP-75, Technical Report 1007337, "Supplemental Visual Inspection Intervals to Ensure RPV Closure Head Structural Integrity," August 2002.
11. Glenn White, Chuck Marks and Steve Hunt, Technical Assessment of Davis-Besse Degradation, Presentation to NRC Technical Staff, May 22, 2002.
12. Berge, P., D. Noel, J-M. Gras, and B. Prioux. "Chloride Stress Corrosion Cracking of Alloy 600 in Boric Acid Solutions," Eight International Symposium on Environmental Degradation of Materials in Nuclear Power Systems – Water Reactors (Amelia Island, FL, August 10-14, 1997), Edited by S. M. Bruemmer, American Nuclear Society (ANS), La Grange Park, IL, 1997, pp.189-199.
13. STP Nuclear Operating Office Memo from A.C. Moldenhauer to C.R. Grantom, "Summary Documentation for STP_1999", ST-NOC-NOC-01005082

LIST OF COMMITMENTS

The following table identifies those actions committed to by STP in this document. Any other statements in this submittal are provided for information purposes and are not considered to be commitments. Please direct questions regarding these commitments to Mr. Wayne Harrison at 361-972-7298.

COMMITMENT	Due Date/Event
STPNOC will implement the MRP Inspection Plan and will comply with its requirements for the next refueling outage beginning with the conduct of the planned bare metal visual (BMV) inspection of each Unit.	2RE09, 1RE11