August 8, 2003

LICENSEE: STP Nuclear Operating Company

FACILITY: South Texas Project, Unit 1

SUBJECT: SUMMARY OF THE STAFF's PUBLIC OUTREACH ACTIVITIES ADDRESSING ISSUES RELATED TO DISCOVERY OF LEAKAGE FROM BOTTOM-MOUNTED INSTRUMENTATION PENETRATIONS AT SOUTH TEXAS PROJECT, UNIT 1

The enclosed summary served as a guide for planning and conducting public outreach activities and communicating a consistent message to our stakeholders regarding the actions taken by the U.S. Nuclear Regulatory Commission (NRC) and the STP Nuclear Operating Company (STPNOC) to address the discovery of leakage from the reactor vessel bottom-mounted instrumentation (BMI) penetrations 1 and 46 at South Texas Project (STP), Unit 1. As explained in the enclosure, our communication strategy addressed such tasks as: (1) the assessment of the issues, (2) progress in determining the root cause of the leakage, (3) repair plans, and (4) the risk associated with the leakage. The underlying purpose of this strategy was to sustain public confidence throughout the resolution of the issues.

In addition, as part of our communication strategy, the NRC staff posted a web page to provide the public with current information regarding the event. This web page contains a brief background discussion, applicable correspondence, a list of related public meetings, schematics of the reactor vessel at STP, Unit 1, and other public outreach material.

/RA/

Mohan C. Thadani, Senior Project Manager, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No.: 50-498

Enclosure: As stated

cc: See next page

August 8, 2003

LICENSEE: STP Nuclear Operating Company

FACILITY: South Texas Project, Unit 1

SUBJECT: SUMMARY OF THE STAFF's PUBLIC OUTREACH ACTIVITIES ADDRESSING ISSUES RELATED TO DISCOVERY OF LEAKAGE FROM BOTTOM-MOUNTED INSTRUMENTATION PENETRATIONS AT SOUTH TEXAS PROJECT, UNIT 1

The enclosed summary served as a guide for planning and conducting public outreach activities and communicating a consistent message to our stakeholders regarding the actions taken by the U.S. Nuclear Regulatory Commission (NRC) and the STP Nuclear Operating Company (STPNOC) to address the discovery of leakage from the reactor vessel bottom-mounted instrumentation (BMI) penetrations 1 and 46 at South Texas Project (STP), Unit 1. As explained in the enclosure, our communication strategy addressed such tasks as: (1) the assessment of the issues, (2) progress in determining the root cause of the leakage, (3) repair plans, and (4) the risk associated with the leakage. The underlying purpose of this strategy was to sustain public confidence throughout the resolution of the issues.

In addition, as part of our communication strategy, the NRC staff posted a web page to provide the public with current information regarding the event. This web page contains a brief background discussion, applicable correspondence, a list of related public meetings, schematics of the reactor vessel at STP, Unit 1, and other public outreach material.

/RA/

Mohan C. Thadani, Senior Project Manager, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No.: 50-498

Enclosure: As stated

cc: See next page

<u>Distribution:</u>
Public/Non-Sensitive
LPDIV-1 R/F
RidsNrrAdpt (BSheron/MKotzalas)
RidsNrrDlpm (LMarsh/ELeeds)
RidsNrrDe (RBarrett)
RidsNrrDeEmcb (BBateman/SCoffin)
RidsNrrDlpmLpdiv (HBerkow)
RidsNrrDlpmLpdiv1 (RGramm)
RidsNrrPMMThadani
RidsNrrLAMMcAllister
RidsOpaMailCenter (SBurnell/BHayden/VDricks)
RidsRgn4MailCenter (WJohnson)
TMensah
MMitchell

ADAMS Accession No: ML032020197 *See previous concurrences NRR-106

OFFICE	PM:PDIV:DLPM	LA:PDIV-1:DLPM	SC:PDIV:DLPM*	RIV:BC*
NAME	MThadani:sab	MMcAllister	RGramm	WJohnson
DATE	8/08/2003	8/08/2003	07/25/03	07/30/03

OFFICIAL RECORD COPY

SUMMARY OF THE STAFF's PUBLIC OUTREACH ACTIVITIES ADDRESSING ISSUES RELATED TO DISCOVERY OF LEAKAGE FROM BOTTOM-MOUNTED INSTRUMENTATION PENETRATIONS AT SOUTH TEXAS PROJECT, UNIT 1

GOALS

One of the strategic performance goals defined by the U.S. Nuclear Regulatory Commission (NRC) is to maintain safety and protect the environment. Another goal is to increase public confidence. With the discovery of leakage from the reactor vessel bottom-mounted instrumentation (BMI) penetrations at South Texas Project (STP), Unit 1, it was important that we take actions to ensure public health and safety, while clearly and consistently communicating with our stakeholders. Through open lines of communication, we strived to increase the public's confidence in our ability to carry out our mission of protecting public health and safety. This document describes the messages, schedule, and tools employed for communicating both internally and externally.

BACKGROUND

On April 12, 2003, during the refueling outage at STP, Unit 1, the licensee (STP Nuclear Operating Company, or STPNOC) performed a bare metal inspection of the reactor vessel bottom head under the boric acid inspection program established in response to the NRC's Generic Letter (GL) 88-05, "Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants," dated March 17, 1988. The licensee discovered a small amount of white deposit around the outer circumference of two BMI penetrations (Nos. 1 and 46). STP, Unit 1, has 58 BMI penetrations with an inside diameter of 0.6" for housing flux monitoring instrumentation. The tube material is Alloy 600 with J-groove weld configuration and weld material (Alloy 82/182) similar to that of control rod drive mechanism (CRDM) penetration. The licensee collected samples of residue taken from the BMI penetrations and sent them to laboratories for analysis. The results of the analysis indicated that the residue could have originated from a reactor coolant system (RCS) leak.

The STPNOC proceeded with a nondestructive examination (NDE) program, established a root cause analysis team, and selected vendors to support the NDE activities and design and repair evaluations. Based on the results of those evaluations and analyses, STPNOC found that the leakage was apparently caused by a single through-wall, axially-oriented crack in each of the two leaking penetrations' tubes. The licensee found other crack indications within the body of the tube walls. Those cracks did not contribute to the leakage. STPNOC has examined the remaining 56 penetrations for crack indications, and found none.

Knowing the extent of condition, STPNOC selected a half-nozzle repair design to repair the leaks. The repairs have now been completed. STPNOC stated the repairs will enable STP, Unit 1, to restart and operate safely.

The NRC staff performed comprehensive evaluations, and completed them in time before the STP, Unit 1, restart. The licensee had committed not to start the heat-up of STP, Unit 1, until it receives written confirmation from the NRC that all necessary NRC actions are complete. The Unit 1 is currently undergoing restart activities.

AUDIENCE

The external and internal stakeholders included the following:

- **External Stakeholders**
  - General public
  - Media
  - Public interest groups
  - Nuclear industry organizations
  - STPNOC
  - Local governments
  - State of Texas
  - Congress
  - International community

- **Internal Stakeholders**
  - Chairman and Commissioners
  - NRR Executive Team and Leadership Team, and RIV management
  - Office of Public Affairs
  - Office of Congressional Affairs
  - RIV employees
  - RES employees
  - NRR employees

KEY MESSAGES

The intended messages of the NRC staff were:

- The licensee for STP, Unit 1, has inspected the reactor vessel bottom head and discovered leakage at two instrumentation penetrations.

- The licensee has taken appropriate actions to understand the root cause of the leakage.

- The NRC staff have evaluated the licensee's plan to repair the damaged penetrations to ensure that the repair will be effective and safe. The NRC staff found that STP, Unit 1, complies with all regulatory requirements necessary to support the restart of STP, Unit 1. On July 31, 2003, the NRC informed the licensee in writing of the conclusions.

- To ensure that all nuclear power plants are safe, the NRC staff is developing generic communications to address the need for other pressurized-water reactor (PWR) licensees to inspect the reactor pressure vessel (RPV) bottom heads for evidence of leakage.

- The licensee's and the NRC's latest status material is available on the NRC web page.

COMMUNICATION TEAM

The NRC established a team to address the issues. This team, comprised of the individuals listed in the following table, has the responsibility to coordinate the NRC response and convey a clear, consistent, accurate, and timely message to our stakeholders.

TEAM MEMBER(S)	ROLE	CONTACT INFORMATION
Mohan Thadani	PM, Team Leader	(NRR/DLPM) 301-415-1476
Matt Mitchell	NRR Technical Lead	(NRR/DE) 301-415-3303
Steve Bloom Robert Gramm	Web Page Update Coordinators	(NRR/DLPM) 301-415-1313 (NRR/DLPM) 301-415-1010
Tanya Mensah	Sr. Communication Analyst	(NRR/PMAS) 301-415-3610
Scott Burnell	Public Affairs Officer (HQ)	(OPA) 301-415-8200
Victor Dricks	Public Affairs Officer (RIV)	(OPA) 817-860-8128
Bill Johnson	Branch Chief	(RIV) 817-860-8148
Russ Bywater	Special Inspection Team Leader	(RIV) 817-860-8182

COMMUNICATION ACTIVITIES

The NRC staff's significant communication activities are listed below:

COMMUNICATION ACTIVITIES	DATE
Public Meeting	5/01/03 (Completed)
Public Meeting	6/05/03 (Completed)
ACRS Meeting	7/11/03 (Completed)
EDO Briefing	7/23/03 (Completed)
Public Meeting	7/17/03 (Completed)
Special Inspection Team Exit Meeting	7/28/03 (Completed)

QUESTIONS AND ANSWERS

1. Who is addressing this issue for the NRC?

The NRC team assigned to the event at STP, Unit 1, consists of regional and resident inspectors, a risk assessment specialist, and management support from the NRC's Region IV Office, as well as engineering and project management support from NRC Headquarters. The NRC has also acquired contractor assistance to aid the staff in evaluating the licensee's findings.

2. How is the NRC informing other plant licensee about this issue?

The NRC is considering several generic communication options, including an information notice to inform the industry of the findings at STP, Unit 1, and a bulletin designed to gather information from those plants that may be susceptible to problems similar to those identified at STP. The STP issues have also been discussed at the NRC's 2003 Regulatory Information Conference and other meetings to keep industry officials informed.

3. Where is the leakage located?

The licensee identified leakage from 2 bottom-mounted instrumentation (BMI) penetrations, which are among the 58 penetrations in the bottom head of the reactor vessel. One of the leaking penetrations (designated No. 1) is located in the center of the bottom head, while the other (designated No. 46) is located near the periphery. Testing indicated that the leaking BMI tubes had through-wall, axially-oriented cracks that accounted for the boron deposits found during the licensee's inspection of the area.

4. What are the safety implications?

The NRC staff postulated three cases to consider the complete range of safety implications associated with the failure of a BMI penetration. The first case, representing the "as found" condition of the BMI penetrations at STP, Unit 1, consisted of through-wall, axially-oriented cracks in the BMI tube in the vicinity of the weld that attaches the BMI tube to the vessel. Although leakage from the reactor coolant pressure boundary is considered to be a "failure" of the component, it is very unlikely for axial cracks in this location to immediately lead to a loss of reactor coolant from the vessel at a rate that could have any impact on the safety of the reactor.

The second case postulated by the NRC staff is a "double-ended" (complete) tube break of a BMI tube at or below the location where the weld attaches the tube to the reactor vessel. In this case, the rate of loss of reactor coolant from the vessel would be limited by the inside diameter of the guide tube and will be considerably greater than the rate associated with leakage from a through-wall, axially-oriented crack. However, analyses have demonstrated that the facility's high-pressure safety injection (HPSI) emergency core cooling system (ECCS) can compensate for the loss of coolant in this postulated case. The plant would then be shut down, cooled down, and depressurized.

The final case postulated by the NRC staff was the failure of the weld that attaches the BMI tube to the vessel, resulting in ejection of the guide tube from the vessel bottom. In this case, the rate of coolant loss from the vessel would be greater than that associated with the postulated double-ended break of the BMI tube. Analyses have demonstrated that the facility's HPSI ECCS would not be able to compensate for the loss of coolant associated with this failure scenario, and that operator action would be required to place the plant in a condition that would allow the plant's higher-capacity low-pressure safety injection (LPSI) ECCS to be used to compensate for the loss of coolant from the vessel. Again, the plant would be placed in a shutdown condition.

5. What tests has the licensee performed to determine the extent of the leakage?

The licensee performed an extensive nondestructive examination (NDE) program on the BMI tubes at STP, Unit 1. The licensee subjected all of the BMI tubes to ultrasonic testing (UT) and performed eddy current testing (ECT) on a subset of the penetrations. In addition, the licensee performed enhanced visual examinations of the surface of all of the welds that attach the BMI tubes to the bottom head of the reactor vessel. The UT and ECT examinations revealed through-wall, axially-oriented cracks, which appeared to penetrate the reactor coolant pressure boundary in the two BMI tubes that exhibited boron deposits.

The licensee also performed other inspections and tests of the BMI tubes that had exhibited signs of leakage. Specifically, these included UT exams to look for wastage of the ferritic vessel head, helium bubble testing to confirm leakage paths, ECT profilometry to evaluate the potential for BMI tube distortion attributable to weld residual stresses, visual inspections of the tube inside diameter, and visual inspections of the vessel bore. In addition, the licensee performed chemical and isotopic analyses of the corrosion products found on the exterior of the BMI tubes to identify the source of the leakage (i.e., from the RCS) and the approximate age of the deposits. The licensee is currently in the process of obtaining metallurgical samples (i.e., "boat samples") from the cracked BMI tubes for further analysis.

6. The licensee has determined that the observed leakage is attributable to cracking of the BMI penetration tubes. What actions will be taken next?

The facility's technical specifications preclude plant operation with any amount of reactor coolant pressure boundary leakage. In this case, leakage through cracks in the lower head penetration would be classified as leakage of the reactor coolant pressure boundary and would have to be repaired before the plant is restarted from its current outage.

The licensee has chosen to use a repair technique called a "half-nozzle repair" for the two tubes that exhibited leakage. Using this technique, a portion of the penetration tubing is removed and replaced. The NRC's role is to review the licensee's proposed repair (prior to plant restart) to ensure that it meets the requirements of NRC regulations, the American Society for Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, the facility's license, and other relevant standards.

7. If the inspection that identified the corrosion is part of the licensee's boric acid corrosion control program, has it not been conducted before? Why were the deposits not found during a previous inspection?

The licensee has conducted similar inspections in the past. Isotopic analyses of the deposits indicate that the residue is approximately 4 years old, leading the staff to conclude that the residue came from slow leakage through relatively small, tight cracks in the affected tubes. Given the age of the boric acid deposits found on the bottom head during the inspection on April 12-13, 2003, it appears that the deposits had not yet been extruded to the surface of the bottom head at the time of the last inspection, or were sufficiently small to be overlooked during the last inspection.

8. How do the (November 2002) inspections that were conducted at STP, Unit 1, which led to the discovery of these boric acid deposits, compare to the quality of inspections of the lower head which are carried out at other U.S. facilities?

On the basis of the limited information available to the NRC staff at this time regarding the inspections that were conducted at STP, Unit 1, and the information that the staff has collected from all pressurized-water reactor (PWR) licensees regarding the boric acid corrosion control programs, it appears that the inspections conducted at STP, Unit 1, are among the best in the U.S. nuclear industry. In many cases, inspection quality directly relates to ease of accessibility and the efficiency with which an inspection can be conducted. This is particularly true of visual inspections (like this one) in a high-radiation area of the plant, where the time spent by plant personnel should be minimized.

The NRC staff is in the process of evaluating information regarding licensees' bottom head inspection programs. The staff has obtained this information from licensees' responses to recent requests for additional information associated with Bulletin 2002-01, which the staff sent to all PWR licensees, concerning their boric acid corrosion control programs.

9. If the leakage is the result of cracks in the lower head penetrations, couldn't there be cracking in other lower head penetrations at STP, Unit 1, which are not showing signs of leakage?

Yes, such cracking is possible; however, the licensee verified (through its NDE program) that the other BMI penetrations did not exhibit any indications of cracking. Specific information about the scope and breadth of the NDE testing performed on each BMI penetration is contained in the response to Question 5. These inspections offer better information than was available when the vessel was constructed, and provide a high degree of confidence regarding the integrity of the penetrations through the bottom head of the reactor vessel.

10. Models developed as part of the upper head penetration cracking issue to establish a "susceptibility ranking" related to primary water stress corrosion cracking (PWSCC) for upper heads based on time and temperature. If the lower head penetration cracking at STP, Unit 1, is the result of this same mechanism, what does this mean for those "susceptibility ranking" models?

While the licensee has not yet determined the root cause of the penetration tube cracking in the unit's lower head temperature is less than the upper head temperature at any U.S. PWR. In addition, STP, Unit 1, is a relatively young plant, having operated for only about 15 years. In combination, these factors support the conclusion that the PWSCC susceptibility ranking for the STP, Unit 1, bottom head would be in the same range as the lowest susceptibility rankings for the upper head in any U.S. PWR.

However, it should be noted that there may be fabrication differences between the BMI penetrations and those of the upper vessel head, which render them uncomparable based on the existing time-at-temperature susceptibility model. These differences may include the geometry of the penetrations, weld residual stresses, operating stresses, residual surface cold-working levels, and so forth. Therefore, if the boric acid deposits at STP, Unit 1, are eventually linked to PWSCC, the industry and the NRC may need to reevaluate the adequacy of the current PWSCC susceptibility models or develop new PWSCC susceptibility models that are specific to the BMI penetrations, thereby separating them from those currently used for the upper head penetrations.

11. What is the implication of this cracking at STP, Unit 1, with regard to the safety of the facility? Was the potential for failure of these penetrations considered when the plant was designed and licensed?

The NRC staff did not explicitly consider the failure of penetrations in the lower head of the reactor vessel as part of the design and licensing bases for STP, Unit 1. Moreover, a failure in the lower head would be a more challenging scenario than a break of similar size that occurs at the level of the reactor coolant loops. However, systems designed to address other loss-of-coolant accidents would also be available to mitigate the effects of breaks in the vicinity of the lower head.

Over the years, the NRC and the industry have conducted analyses to assess the likely response of a typical PWR in the event of a break in the reactor coolant pressure boundary as a result of lower head penetration failure. These analyses have shown that emergency core cooling systems would successfully mitigate the failure of a single bottom head penetration without the ejection of the guide tube. If multiple head penetrations were to fail simultaneously (or nearly so), some operator action may be required to keep the core adequately cooled.

12. Considering the evidence of potential lower head PWSCC at an otherwise low-susceptibility plant like STP, Unit 1, why is it acceptable for the PWRs in the United States to continue to operate until the NRC has verified that licensees have performed adequate inspections of the lower heads?

At this time, the NRC has not yet assessed the adequacy of lower head inspections by each U.S. PWR licensee. The NRC staff is developing generic communication to address the need for PWR licensees to inspect the RPV heads for leakage and report it to NRC. The NRC must also evaluate all of the information that will emerge from the STP, Unit 1, root cause evaluation before drawing any conclusion regarding the impact that this experience will have on our evaluation of the continued safe operation of other facilities.

13. If PWSCC is identified as the cause of the leakage at STP, Unit 1, what will this mean for the nuclear industry as a whole with regard to how the nuclear industry as a whole will address this issue?

If the licensee determines that the cracking of the BMI penetration tubes at STP, Unit 1, resulted from PWSCC, both the nuclear industry and the NRC may need to reexamine how susceptibility to PWSCC is modeled and perhaps revise prior susceptibility rankings. [For additional discussion, see the answer to Question 11.] The industry and the NRC may also need to reevaluate what constitutes an acceptable inspection for the lower head region of these facilities.

14. Does the safety analysis for nuclear power plants consider cracks or holes located in the reactor vessel head?

The design basis for nuclear power plants does not explicitly consider cracks or holes in the reactor vessel head. However, the design basis does consider the effects of cracks and holes in other locations that would bound the effects of cracks and holes in the reactor vessel head.

15. What is pressure boundary leakage?

Pressure boundary leakage is leakage that occurs at welded joints or through the metal itself, as a result of a crack or other defect in the metal that prevents a leak-tight configuration. This leakage is distinguished from leakage at bolted joints or from seals.

16. What components are affected?

The licensee identified cracks in 2 of the 58 BMI penetration tubes located on the bottom head of the reactor vessel at STP, Unit 1. These penetration tubes are used for flux monitoring instrumentation. The tube material consists of Alloy 600 and the weld material consists of Alloy 82/182. The J-groove weld configurations are similar in configuration to those located in the CRDMs. The licensee successfully completed NDE of the BMI penetration tubes. The NDE of the two penetration tubes exhibiting indications of leakage revealed axial cracks in these tubes, and the data confirmed the leakage paths. The licensee is repairing these two BMI penetration tubes.

17. Why did the licensee inspect the bottom head and how did the licensee find the boric acid deposits?

The licensee conducted a visual examination of the exterior of the bottom head of the reactor vessel as part of the boric acid corrosion control program addressed in GL 88-05, “Boric Acid Corrosion of Carbon Steel Reactor Pressure Boundary Components in PWR Plants” dated March 17, 1988. At STP, Unit 1, the insulation on the bottom head is actually mounted several feet from the head, and “portals” in the insulation can be opened to permit visual inspection of the bottom head. Licensee personnel were inspecting the bottom head through these portals when they identified the boric acid deposits.

The licensee typically inspects the bottom head of the reactor vessel during refueling outages and any other outages that exceed 72 hours. The most recent inspection was conducted in November 2002 following an automatic reactor shutdown. Neither that inspection nor any previous inspection had identified any leakage.

18. What are the current inspection requirements for the bottom head?

In GL 88-05 the NRC staff requested information about reactor coolant system (RCS) leakage below technical specification limits and the impact of this leakage on low alloy carbon steel components. Specifically, GL 88-05 asked licensees to develop procedures for locating RCS leaks that are less than the technical specifications limits, and to perform the RPV lower head visual examination called VT-2 to meet ASME Code requirements, without removing insulation from around the head and the penetrations to determine the location where these RCS leaks can occur. In addition, GL 88-05 asked licensees to determine the impact of RCS leakage on the reactor coolant pressure boundary components, and to establish corrective actions to prevent the recurrence of corrosion attributable to RCS leakage.

19. Has there been any evidence of PWR RPV lower head penetration cracking at any other facility in the United States?

There have been no confirmed occurrences of reactor pressure vessel lower head penetration cracking in any U.S. plant. Some U.S. licensees have found boric acid deposits in the vicinity of the lower head. However, in each case, the licensee evaluated the deposits and determined that the source of the boric acid was not throughwall cracking of the reactor pressure vessel lower head penetrations. Rather, the licensees attributed the boric acid deposits to other sources, such as spillage of refueling water during normal reactor refueling operations.

20. Has there been any evidence of PWR RPV lower head penetration leakage at any of the foreign facilities that have been inspected?

To date, there have been no confirmed reports of foreign nuclear power plants of the PWR types having discovered any evidence of leakage at the reactor pressure vessel lower head penetrations.

21. Why is the NRC permitting this plant to restart if a final root cause determination of the problem has not been made?

The NRC staff expects the licensee will identify a list of potential root causes. However, before restarting the plant, a final root cause determination is not necessary in this instance to ensure STP, Unit 1, may be safely restarted and operated. In making this determination, the NRC staff considered the following facts:

(a) The cracks in the degraded penetrations (identified as No. 1 and No. 46) were axially-oriented and of insufficient extent to pose a significant risk of gross reactor coolant pressure boundary failure (i.e., loss of coolant at a rate greater than a “leak”).

(b) The degradation had existed for some time (based on the age of the deposits, which was determined to be approximately 3-4 years) and had not propagated to a size or orientation that could lead to gross reactor coolant pressure boundary failure.

(c) Although the mechanism that caused the degradation is unknown at this time, the repairs to the degraded penetrations are expected to be effective regardless of the type of degradation mechanism that is ultimately determined. In addition, the licensee plans to implement long-term monitoring of these penetrations.

(d) The licensee thoroughly inspected the other 56 BMI penetrations at STP, Unit 1, using ultrasonic (UT), visual, eddy current, and other testing techniques, and did not find any other evidence of degradation. Therefore, the integrity of these penetrations is not in question. Notwithstanding, the licensee will continue to monitor these penetrations for degradation in a manner consistent with how the licensee initially identified the deposits on penetrations No. 1 and No 46. In addition, the penetrations at STP, Unit 1, will be subject to enhanced nondestructive testing techniques (e.g., UT) in the future.

For these reasons, the staff concludes that degradation of the BMI penetrations will not compromise the health and safety of the public during either the restart or subsequent operation of STP, Unit 1. Operation of STP, Unit 1, is justified based on the satisfactory repairs to the degraded penetrations, together with the testing performed on the remaining penetrations that ensures the structural integrity of the reactor coolant pressure boundary and justifies future operation of the plant. Moreover, the planned monitoring of the lower head penetrations provides added assurance that the licensee will quickly identify any future degradation that may occur.

22. Why is the NRC permitting the licensee to move the reactor coolant pressure boundary (RCPB)?

The licensee has demonstrated that the proposed repair, which involves moving the RCPB to the outside of the reactor pressure vessel (RPV) lower head, is adequate to meet the existing regulatory requirements for ensuring the integrity of the RCPB. The NRC staff has reviewed the design of the repair and found it to be acceptable. The repair design is similar to half-nozzle repairs installed at other locations in the reactor coolant pressure boundary at other facilities. The NRC staff anticipates that the repair design will be effective in mitigating the potential for recurrence of degradation in these penetrations, regardless of which potential degradation mechanism is ultimately determined to be active. Moreover, the licensee will implement long-term monitoring and inspection of the repaired penetrations to look for evidence of future degradation.

In summary, the licensee has demonstrated the technical and regulatory acceptability of the proposed repair. There is no regulatory basis to require the licensee to locate the RCPB welds associated with the BMI penetrations on the inside the RPV lower head (rather than the outside, as in the licensee's proposed repair methodology).

23. What is the NRC's response to concerns raised by the Union of Concerned Scientists that moving the RCPB creates additional risk?

As part of the licensee's repair design, the licensee evaluated the potential for boric acid corrosion of ferritic material exposed to the reactor coolant (i.e., the reactor vessel wall material adjacent to the annulus around the penetration). Based on laboratory data and operating experience with similar half-nozzle repairs installed at other locations in the RCPB at other facilities, the potential for corrosion extensive enough to cause the failure of the RPV is extremely low. The licensee will monitor the repaired penetrations during inservice inspections to identify any signs of excessive corrosion in the area of the repair. In the unlikely event that degradation occurs in the repaired area to the extent that it causes leakage of the RCPB, the leakage would manifest itself in the form of boric acid deposits on the surface of the nozzle/weld/temper bead weld pad, which the licensee would identify using the same inspection techniques that were used to identify the existing deposits around penetrations No. 1 and No. 46.

24. Why isn't the NRC insisting that the licensee perform destructive testing to determine the root cause of the problem?

While many of the tests performed by the licensee were nondestructive, the licensee is taking material samples from penetrations No. 1 and No. 46 for destructive evaluation in order to support the final root cause determination. The results of the destructive testing are expected in early October 2003.

25. Why is the NRC permitting the licensee to perform the repair it chose, rather than insisting they replace the entire nozzles where cracking was found?

The NRC staff is permitting the licensee to determine its preferred repair method, provided that it is demonstrated to be acceptable, is consistent with the NRC's emphasis on performance-based regulation. Since the identification of the problem at STP, Unit 1, the NRC staff has worked closely with the licensee through out development of the plan to repair the lower head nozzles. The NRC staff is not aware of an existing repair technique to replace the entire nozzle, and does not believe that such an approach would be any safer than the licensee's proposed half-nozzle repair technique. The NRC staff has reviewed the licensee's plan for repairing the nozzles and found it to be acceptable.

cc:

Mr. Cornelius F. O'Keefe
Senior Resident Inspector
U.S. Nuclear Regulatory Commission
P. O. Box 910
Bay City, TX 77414

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

Mr. L. K. Blaylock
Mr. W. C. Gunst
City Public Service Board
P. O. Box 1771
San Antonio, TX 78296

Mr. C. A. Johnson/A. C. Bakken
AEP Texas Central Company
P. O. Box 289
Mail Code: N5022
Wadsworth, TX 77483

INPO
Records Center
700 Galleria Parkway
Atlanta, GA 30339-3064

Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011

D. G. Tees/R. L. Balcom
Texas Genco, LP
P. O. Box 1700
Houston, TX 77251

Judge, Matagorda County
Matagorda County Courthouse
1700 Seventh Street
Bay City, TX 77414

A. H. Gutterman, Esq.
Morgan, Lewis & Bockius
1111 Pennsylvania Avenue, NW
Washington, DC 20004

Mr. T. J. Jordan, Vice President
Engineering & Technical Services
STP Nuclear Operating Company
P. O. Box 289
Wadsworth, TX 77483

S. M. Head, Manager, Licensing
Nuclear Quality & Licensing Department
STP Nuclear Operating Company
P. O. Box 289, Mail Code: N5014
Wadsworth, TX 77483

Environmental and Natural Resources
Policy Director
P. O. Box 12428
Austin, TX 78711-3189

Jon C. Wood
Matthews & Branscomb
112 East Pecan, Suite 1100
San Antonio, TX 78205

Arthur C. Tate, Director
Division of Compliance & Inspection
Bureau of Radiation Control
Texas Department of Health
1100 West 49th Street
Austin, TX 78756

Brian Almon
Public Utility Commission
William B. Travis Building
P. O. Box 13326
1701 North Congress Avenue
Austin, TX 78701-3326

cc:

Susan M. Jablonski
Office of Permitting, Remediation
and Registration
Texas Commission on
Environmental Quality
MC-122
P.O. Box 13087
Austin, TX 78711-3087

Mr. Terry Parks, Chief Inspector
Texas Department of Licensing
and Regulation
Boiler Division
P. O. Box 12157
Austin, TX 78711

Mr. Ted Enos
4200 South Hulen
Suite 630
Ft. Worth, Texas 76109

Mr. James J. Sheppard
President and Chief Executive Officer
STP Nuclear Operating Company
South Texas Project Electric
Generating Station
P. O. Box 289
Wadsworth, TX 77483