March 26, 2004

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

SUBJECT: SOUTH TEXAS PROJECT (STP), UNITS 1 AND 2 - RE: REQUEST FOR RELIEF FROM THE REQUIREMENTS OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS BOILER AND VESSEL CODE (ASME CODE) (TAC NOS. MC0219 AND MC0220)

Dear Mr. Sheppard:

By letter dated May 29, 2003, STP Nuclear Operating Company (STPNOC) submitted a relief request, RR-ENG-2-28, for the use of alternatives to certain ASME Code, Section XI requirements at the South Texas Project, Units 1 and 2. Specifically, RR-ENG-2-28 requested relief from the ASME Code, Section XI, requirements to perform an open flow test of the Containment Spray System (CSS) to demonstrate that the open ended portions of discharge lines beyond the last shutoff valve are performing as designed at the South Texas Project, Units 1 and 2.

The ASME Code requires that the open flow test be performed each 10-year inservice inspection (ISI) interval to demonstrate that the open ended portions of discharge lines beyond the last shutoff valve are performing as designed. STPNOC proposed to test the open ended portions of the discharge lines of the CSS only when maintenance activities that could result in spray nozzle blockage have been performed on the CSS. The proposed relief would be applicable to the current (second) 10-year ISI interval ending September 24, 2010, for Unit 1, and October 18, 2010, for Unit 2. STPNOC stated that the reduced testing is justified because operating experience has demonstrated that the spray nozzles have routinely passed surveillance tests. Specifically, the CSS nozzles were tested in 1986 and 1996 (Unit 1) and 1987 and 1993 (Unit 2) to confirm that there are no obstructions. The tests were performed as part of pre-operational testing and after the first 5 years of operation. The results of each test demonstrated unobstructed flow through each nozzle and confirmed that the spray nozzles did not become obstructed over a period of normal reactor operation.

STPNOC also stated that the current surveillance test may affect refueling activities in the reactor containment building, presents a personal safety risk for the individuals required to access the top of containment to check the nozzle air flow, and is expensive to implement. STPNOC concluded that the effort and potential consequences associated with performing the tests are not commensurate with the safety benefit unless there has been a maintenance activity that could introduce foreign materials that could block the spray nozzles.

The Nuclear Regulatory Commission (NRC) staff reviewed STPNOC's reasoning in support of its request for relief and concurs with your conclusions that the CSS should be tested only when

there has been a maintenance activity that could result in spray nozzle blockage. Further, requiring STPNOC to comply with the requirements of the Code would result in hardship without a compensating increase in the level of quality or safety because the test is expensive to perform and because a significant personal safety risk exists for plant personnel required to access the top of the containment to check the nozzle air flow. Therefore, Relief Request RR-ENG-2-28 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the second 10-year ISI intervals at South Texas Project, Units 1 and 2.

The NRC staff's safety evaluation is enclosed.

Sincerely,

/RA/

Robert Gramm, Chief, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-498 and 50-499

Enclosure: Safety Evaluation

cc w/encls: See next page

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Docket Nos. 50-498 and 50-499

Enclosure: Safety Evaluation

cc w/encls: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST NO. RR-ENG-2-28

STP NUCLEAR OPERATING COMPANY, ET AL.

SOUTH TEXAS PROJECT, UNITS 1 AND 2

DOCKET NOS. 50-498 AND 50-499

1.0 INTRODUCTION

The regulations of the Nuclear Regulatory Commission (NRC or the Commission) specify, in Title 10 of the *Code of Federal Regulations* (10 CFR 50.55a(g)), that inservice inspection (ISI) of nuclear power plant components shall be performed in accordance with the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). The regulations further state, at 10 CFR 50.55a(a)(3), that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (i) the proposed alternatives would provide an acceptable level of quality and safety or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. 10 CFR 50.55a(g)(5)(iii) states that if the licensee has determined that conformance with certain Code requirements is impractical for its facility, then the licensee shall notify the Commission and submit, as specified in 10 CFR 50.4, “Written communications,” information to support the determinations.

By letter dated May 29, 2003, South Texas Project (STP) Nuclear Generating Company (STPNOC or the licensee) submitted Relief Request RR-ENG-2-28. Relief Request RR-ENG-28 sought relief from the requirements of ASME Code, Section XI to perform an open flow test of the Containment Spray System (CSS) to demonstrate that the open ended portions of discharge lines beyond the last shutoff valve are performing as designed at its STP, Units 1 and 2. The proposed relief will be applicable to the current (second) 10-year ISI intervals ending September 24, 2010 (Unit 1) and October 18, 2010 (Unit 2). The STP second 10-year ISI program plan meets the requirements of ASME Code, Section XI, 1989 Edition with no Addenda.

Enclosure

2.0 REGULATORY EVALUATION

2.1 Licensee's Evaluation

Affected Components (as stated):

(a) Component: Containment Spray System

(b) Function: Maintain Reactor Containment Building pressure within design limits, reduce the quantity of airborne iodine, and establish the sump pH to retain elemental iodine.

(c) Class: ASME Code Class 3

Applicable Code (as stated):

ASME Boiler & Pressure Vessel Code, Section Xl, 1989 Edition

Code Requirements from Which Relief is Requested (as stated):

IWC-5000, "System Pressure Test," describes the test criteria to be applied to the Containment Spray System. This submittal addresses the following subparagraph: IWC-5222, "System Hydrostatic Test."

(d) For open ended portions of discharge lines beyond the last shutoff valve in nonclosed systems (e.g., containment spray header), demonstration of an open flow path test shall be performed in lieu of the system hydrostatic test.

Pursuant to ASME Section Xl Table IWC-2500-1, the test is to be conducted at least once in each test interval (ten-year period).

Basis for Request (as stated):

Reduced testing is justified where operating experience has shown that routinely passing a surveillance test performed at a specified interval has no apparent connection to overall component reliability. In this case, routine surveillance testing at the specified interval is not connected to any activity that may initiate reduced component reliability, and therefore is of limited value in ensuring component reliability. Therefore, the proposed change is not significant from a reliability standpoint.

The current surveillance test may affect refueling activities in the reactor containment building, presents a personal safety risk for the individuals required to access the top of containment to check the nozzle air flow, and is expensive to implement. The effort and potential consequences associated with performing this test are not commensurate with

the safety benefit unless there has been an activity that could result in nozzle blockage due to foreign material.

Proposed Alternative (as stated):

Pursuant to 10 CFR 50.55a(a)(3)(ii), South Texas Project requests approval to apply an alternative inspection requirement from the criteria specified in ASME [Code,] Section Xl Table IWC-2500-1 and Subsection IWC-5222(d) for demonstrating that the Containment Spray System has an open flow path. The proposed alternative approach will demonstrate the Containment Spray System nozzles are operable following maintenance activities that could result in spray nozzle blockage.

Basis for Use (as stated):

System Description

The Containment Spray System is an Engineered Safety Feature used in response to a postulated Loss of Coolant Accident (LOCA). In response to a LOCA, the CSS is designed to:

- Maintain Reactor Containment Building pressure within design limits.
- Reduce the quantity of airborne iodine.
- Establish the sump pH for retention of elemental iodine.

These functions are performed by subcooled water sprayed into the Containment atmosphere through nozzles from spray headers located in the containment dome. The large ratio of spray drop surface-to-Containment volume enables the spray to effectively remove fission products from the Containment atmosphere. The major benefit of the Containment Spray System (CSS) is removal of iodine from the Containment atmosphere. (Radioiodine in its various forms is the fission product of primary concern in evaluating the consequences of a LOCA.)

The Containment Spray System consists of three independent and identical trains. Two of the three trains are assumed to be available to provide 100 percent of the required water flow to the spray headers mounted in the Containment dome.

- Spray Headers

  Four concentric spray headers are located in the domed roof of the Containment building, providing 360-degree coverage over the Containment volume. The spray headers are located as high as possible without interruption of the spray pattern by impingement on the inside of the Containment dome. Piping to the spray headers assures delivery of 100 percent of the required spray flow assuming any single active failure.

- Spray Nozzles

  The Containment Spray System nozzles are distributed on four concentric spray ring headers located in the uppermost part of the Containment. The ring headers have 12, 50, 60, and 120 nozzles, respectively.

Containment spray nozzles are SPRACO Type-1713A. The spray nozzles are hollow-cone, with a 3/8-inch-diameter orifice, and are fabricated from stainless steel. These nozzles have a swirl chamber design (referred to as "ramp bottom" by SPRACO) with no internal parts, such as swirl vanes, that may become clogged. The 3/8-inch nozzle discharge orifice is sufficiently large to preclude clogging by particles that pass through the 1/4-inch mesh of the fine sump screens.

Nozzle Test Schedule

The Containment Spray System nozzles were initially tested at five-year intervals. As approved by the Nuclear Regulatory Commission in South Texas Project, license amendments 91 (Unit 1) and 84 (Unit 2) dated March 11, 1998, the surveillance interval is currently 10 years.

Results from Previous Tests

The Containment Spray System nozzles have been tested to confirm that there are no obstructions. Airflow tests were conducted as part of pre-operational testing and after the first five years of operation.

Test	Unit 1	Unit 2
Pre-Operational	1986	1987
TS Surveillance	1992	1993

The results of each test demonstrated unobstructed flow through each nozzle. These tests confirmed that the nozzles are free from construction debris, and also free from obstructions that could have occurred following startup and operation of the units. Also, the tests show that the spray nozzles did not become obstructed over a period of normal reactor operations.

Corrosion

The Containment Spray System header and nozzles are passive devices that are not normally exposed to fluids or debris. The spray ring headers are maintained dry. Standing water is present in system piping up to the 43-foot elevation compared to the 228-foot peak elevation inside containment.

Formation of significant corrosion products is unlikely because the components are stainless steel. Conditions for stainless steel corrosion, i.e., stress, temperature, and chlorides, are not present. Therefore, the nozzles are unlikely to become obstructed due to corrosion.

Maintenance

A review of the maintenance and modification history since the last airflow test indicates that work orders and modifications have been applied to Containment Spray isolation valves and pumps. Modifications associated with the valves were for operator adjustments and would not have affected system cleanliness. Cleanliness control practices, including post-work inspections, ensure system cleanliness requirements are met. There has been no maintenance or modification of the nozzles or spray rings.

Applicable Regulatory Requirements

NUREG-1366, "Improvements to Technical Specification Requirements," is a review of industry operating history to determine the cause of problems discovered when performing this surveillance. In all cases, the problems discovered were related to construction, and not the result of normal operation.

Generic Letter 93-05, "Line-Item Technical Specifications Improvements to Reduce Surveillance Requirements for Testing During Power Operation," dated March 8, 1993, described a problem that was caused during operation because sodium silicate, a coating material applied to the Containment Spray System carbon steel piping, clogged seven nozzles. The South Texas Project Containment Spray System piping and nozzles are stainless steel and are not coated. Therefore, that concern is not applicable to South Texas Project.

The Containment Spray System nozzles for both South Texas Project units have been tested satisfactorily twice since completion of construction, demonstrating that the construction problems identified in NUREG-1366 have not occurred at South Texas Project.

Foreign Material Exclusion

The South Texas Project Foreign Material Exclusion Program describes the measures to be taken to ensure foreign material is not introduced into a component or system, or to recover if foreign material is introduced. The Foreign Material Exclusion program requires that an inspection be performed when closing a system or component to ensure that all foreign material is removed. This requirement applies to all work activities and inspection activities on plant systems and components performed by any group at South Texas Project. If foreign material exclusion is not maintained as required, a Condition Report is to be initiated requiring assessment of the circumstances

and implementation of appropriate corrective actions to ensure the spray nozzles continue to be operable.

When maintenance requires a breach of a fluid system or associated component integrity, implementation of procedural guidelines for station housekeeping will prevent inadvertent introduction of foreign material into the system/component. Any fluid system/component breach is to be covered when access for maintenance or inspection is not required.

Due to the spray header's location at the top of the containment, introduction of foreign material into the spray header is unlikely. Foreign material introduced as a result of maintenance is the most likely source of an obstruction; therefore, verification following such maintenance would confirm the nozzles are not subject to blockage. Consequently, the potential for unidentified nozzle obstruction is very low.

In general, once tested after construction, containment spray systems have not been subject to blockage. Routine maintenance activities with effective application of foreign material exclusion controls should not require subsequent inspection or testing of the spray nozzles. Normal plant operation and maintenance practices are not expected to trigger this surveillance requirement.

Risk Analysis

Accident Analyses are based on two of the three Containment Spray trains operating. Two operable Containment Spray pumps assure that the pressure across the upper spray ring nozzles is adequate to provide the design flowrate. The calculated spray coverage inside the containment ensures that after a design-basis accident the offsite dose is within 10 CFR Part 100, "Reactor Site Criteria", limits and the 30-day control room dose is within design guidelines. However, these criteria are not applicable to the Probabilistic Safety Assessment, and neither is the conservatism applied to the design-basis analysis. The best estimate one-pump flowrate is nearly as great as the design two pump flow rate, and one pump can provide adequate pressure across the lower ring nozzles.

The Probabilistic Safety Assessment does not address reduction of containment spray capability as a result of nozzle blockage.

Summary

Reduced testing is justified where operating experience has shown that routinely passing a surveillance test performed at a specified interval has no apparent connection to overall component reliability. In this case, routine surveillance testing at the specified frequency is not connected to any activity that may initiate reduced component reliability, and therefore is of limited value in ensuring component reliability. Therefore, the proposed change is not significant from a reliability standpoint.

The surveillance affects refueling activities in the reactor containment building, presents a personal safety risk for the individuals required to access the top of containment to check the nozzle air flow, and is expensive to implement. The cost associated with performing this test is not commensurate with the safety benefit unless there has been an activity that could result in nozzle blockage due to foreign material. Performing the open flow test of IWC-5222(d) on an as-needed basis, instead of once in each test interval (10-year period), will not decrease the level of quality and safety.

DURATION OF PROPOSED ALTERNATIVE (as stated):

The South Texas Project Nuclear Operating Company requests Nuclear Regulatory Commission approval by December 31, 2003. Implementation of the proposed change will require procedure changes and rescheduling of affected surveillances. Approval by that date is consistent with the requested approval schedule for the companion Technical Specification change referenced previously. The approved alternative will be applicable to the current 10-year intervals ending September 24, 2010 (Unit 1) and October 18, 2010 (Unit 2).

2.2 Staff Evaluation

By letter dated May 29, 2003, the licensee requested, pursuant to 10 CFR 50.55a(a)(3)(ii), relief from the requirements of ASME Code, Section XI to perform an open flow test of the CSS at its STP, Units 1 and 2. The Code requires that the open flow test be performed each 10-year ISI to demonstrate that the open ended portions of discharge lines beyond the last shutoff valve are performing as designed. The licensee proposed to test the open ended portions of the discharge lines of the CSS only when maintenance activities that could result in spray nozzle blockage have been performed on the CSS. The proposed relief will be applicable to the current (second) 10-year ISI interval ending September 24, 2010 (Unit 1) and October 18, 2010 (Unit 2). The STP second ten-year ISI program plan meets the requirements of ASME Code, Section XI, 1989 Edition with no Addenda.

The licensee stated that the reduced testing is justified because operating experience has demonstrated that the spray nozzles have routinely passed surveillance tests. Specifically, the CSS nozzles have been tested in 1986 and 1996 (Unit 1) and 1987 and 1993 (Unit 2) to confirm that there are no obstructions. The tests were performed as part of pre-operational testing and after the first 5 years of operation. The results of each test demonstrated unobstructed flow through each nozzle and confirmed that the spray nozzles did not become obstructed over a period of normal reactor operation.

According to the licensee, the CSS header and nozzles are passive devices that are not normally exposed to fluids or debris. The STP, Units 1 and 2, spray ring headers are maintained dry and are made of stainless steel. Standing water is present in system piping up to the 43-foot elevation compared to the 228-foot peak elevation inside containment. Formation of significant corrosion products is unlikely because the

components are made of stainless steel and conditions for stainless steel corrosion are not present. Therefore, the nozzles are unlikely to become obstructed due to corrosion. Also, the stainless steel spray nozzles are hollow-cone, with a 3/8-inch-diameter orifice. These nozzles have a swirl chamber design with no internal parts, such as swirl vanes, that may become clogged. The 3/8-inch nozzle discharge orifice is sufficiently large to preclude clogging by particles that pass through the 1/4-inch mesh of the fine sump screens.

Each unit has four concentric spray headers which are located in the dome of the containment building, providing 360-degree coverage over the containment volume. The spray headers are located as high as possible without interruption of the spray pattern by impingement on the inside of the containment dome. Piping to the spray headers assures delivery of 100 percent of the required spray flow assuming any single active failure. The CSS nozzles are distributed on four concentric spray ring headers located in the uppermost part of the containment. The ring headers have 12, 50, 60, and 120 nozzles, respectively.

The licensee also stated that the current surveillance test may affect refueling activities in the reactor containment building, presents a personal safety risk for the individuals required to access the top of containment to check the nozzle air flow, and is expensive to implement. The licensee concluded that the effort and potential consequences associated with performing the tests are not commensurate with the safety benefit unless there has been a maintenance activity that could introduce foreign materials that could block the spray nozzles.

The NRC staff reviewed the licensee's reasoning in support of its request for relief and concurs with the licensee's conclusions that the CSS should be tested only when there has been a maintenance activity that could result in spray nozzle blockage. This finding is based on the fact that the spray nozzles are made of stainless steel which is not susceptible to corrosion or other degradation mechanisms in the environment present at the open ended portion of the CSS. As stated by the licensee, standing water is present in system piping only up to the 43-foot elevation, as compared to the 228-foot peak elevation inside containment and the spray ring headers are maintained dry. These conditions ensure that the spray nozzles will not be affected by corrosion or other materials degradation mechanisms and thus the CSS spray nozzles will function as designed. Further, the NRC staff agrees that requiring the licensee to comply with the requirements of the Code would result in hardship without a compensating increase in the level of quality or safety because the test is expensive to perform and because a significant personal safety risk exists for plant personnel required to access the top of the containment to check the nozzle air flow. Therefore, Relief Request RR-ENG-2-28 is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the second 10-year ISI intervals at STP, Units 1 and 2.

3.0 CONCLUSIONS

Based on the above evaluation, the NRC staff concludes that the proposed alternative as discussed in Relief Request RR-ENG-2-28 is acceptable, and therefore, is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the second 10-year ISI intervals at STP, Units 1 and 2. All other ASME Code, Section XI requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: George Georgiev

Date: March 26, 2004

South Texas Project, Units 1 & 2

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