UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 7, 2011

Mr. Edward D. Halpin
President and Chief Executive Officer/
Chief Nuclear Officer
STP Nuclear Operating Company
South Texas Project
P. O. Box 289
Wadsworth, TX 77483

SUBJECT: SOUTH TEXAS PROJECT, UNITS 1 AND 2 - REQUEST FOR RELIEF RR-ENG-3-03 FROM ASME CODE REQUIREMENTS FOR PUMP CASING INSERVICE INSPECTION EXAMINATION (TAC NOS. ME4762 AND ME4763)

Dear Mr. Halpin:

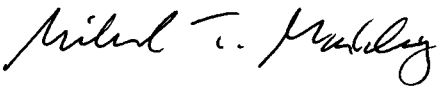
By letter dated September 20, 2010, STP Nuclear Operating Company (the licensee) submitted a request for relief from certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements at South Texas Project (STP), Units 1 and 2. Specifically, the licensee proposed visual examination in lieu of surface examination on selected portions of containment spray, low head safety injection, and high head safety injection pump casing welds. The request is for the third 10-year inservice inspection (ISI) interval for both units. For STP, Unit 1, the ISI interval began on September 25, 2010, and is scheduled to end on September 24, 2020. For STP, Unit 2, the ISI interval began on October 19, 2010, and is scheduled to end on October 18, 2020.

The U.S. Nuclear Regulatory Commission (NRC) staff has completed the review of the subject relief request. Based on the enclosed safety evaluation, the NRC staff concludes that the licensee's proposed alternative provides reasonable assurance of structural integrity of the subject welds and that the code compliance would result in hardship or unusual difficulty for the licensee without a compensating increase in the level of quality and safety. Therefore, the licensee's proposed alternative is authorized pursuant to paragraph 50.55a(a)(3)(ii) of Title 10 of the *Code of Federal Regulations* for the third 10-year ISI interval 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.

If you have any questions, please contact the project manager, Balwant Singal, at 301-415-3016 or via e-mail at Balwant.singal@nrc.gov.

Sincerely,



Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-498 and 50-499

Enclosure:
As stated

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**UNITED STATES**
**NUCLEAR REGULATORY COMMISSION**
**WASHINGTON, D.C. 20555-0001**

# SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

# REQUEST FOR RELIEF FROM ASME CODE REQUIREMENTS FOR PUMP CASING

# INSERVICE INSPECTION EXAMINATION

# DURING THIRD 10-YEAR INSERVICE INSPECTION INTERVAL

# SOUTH TEXAS PROJECT, UNITS 1 AND 2

# STP NUCLEAR OPERATING COMPANY

# DOCKET NOS. 50-498 AND 50-499

## 1.0 INTRODUCTION

By letter dated September 20, 2010 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML102700175), STP Nuclear Operating Company, (the licensee) submitted a request for relief RR-ENG-3-03 from certain examination requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements at the South Texas Project (STP), Units 1 and 2. Specifically, the licensee proposed using visual examination in lieu of surface examination on selected portions of containment spray, low head safety injection, and high head safety injection pump casing welds. The request is for the third 10-year inservice inspection (ISI) interval for both units. For STP, Unit 1, the ISI interval began on September 25, 2010, and is scheduled to end on September 24, 2020; for STP, Unit 2, the ISI interval began on October 19, 2010, and is scheduled to end on October 18, 2020.

## 2.0 REGULATORY EVALUATION

The ISI of ASME Code Class 1, 2, and 3 components is to be performed in accordance with Section XI of the ASME Code and applicable edition and addenda as required by paragraph 50.55a(g) of Title 10 of the *Code of Federal Regulations* (10 CFR), except where specific relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). The regulations in 10 CFR 50.55a(a)(3) state, in part, that alternatives to the requirements of paragraph (g) may be used when authorized by the U.S. Nuclear Regulatory Commission (NRC), if the applicant demonstrates that: (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.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the ASME Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components," to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein. 10 CFR 50.55a(g)(4)(iv) states that inservice examination of components and system pressure tests may meet the requirements set forth in subsequent editions and addenda that are incorporated by reference in paragraph 10 CFR 50.55a(b), subject to the limitations and modification listed in 10 CFR 50.55a(b) and subject to Commission approval. Portions of editions or addenda may be used provided that all related requirements of the respective editions or addenda are met. The ASME Code of record for the third 10-year ISI interval at both STP units is the 2004 Edition with no Addenda.

## 3.0 TECHNICAL EVALUATION FOR RELIEF REQUEST RR-ENG-3-03

### 3.1 Affected Components (as stated by the licensee)

- Containment Spray (CS) Pumps 1A (Unit 1) and 2A (Unit 2): longitudinal seam weld PCW5 and circumferential weld PCW3
- Low Head Safety Injection (LHSI) Pumps 1A (Unit 1) and 2A (Unit 2): longitudinal seam weld PCW5 and circumferential weld PCW3
- High Head Safety Injection Pumps (HHSI) 1A (Unit 1) and 2A (Unit 2): longitudinal seam weld PCW5 and circumferential weld PCW3

### 3.2 ASME Code Requirements (as stated by the licensee)

Table IWC-2500-1, Examination Category C-G, Item No. C6.10 of ASME Code Section XI, 2004 Edition, no addenda, requires surface examination of 100% of the welds in all pumps in each piping run examined under Examination Category C-F. As stated in footnotes:

1. In case of multiple pumps or valves of similar design, size, function, and service in a system, required weld examinations may be limited to all the welds in one pump or one valve in the same group or distributed among any of the pumps or valves of that same group.
2. The examination may be performed from either the inside or outside surface of the component.
3. The pumps and valves originally selected for examination shall be reexamined in the same sequence over the service lifetime of the component, to the extent practical.

Pursuant to 10 CFR 50.55a(a)(3), the licensee has proposed an alternative to the requirements of ASME Code, Section XI, Table IWC-2500-1, Examination Category C-G, Item No. C6.10.

3.3 Licensee's Basis for Requesting Relief (as stated by the licensee)

The subject outer barrel (pump casing) welds of the affected pumps are located in pump pits. In order to perform a surface examination on the subject casing welds, either the pump would have to be pulled from the associated pit, or the pump motor and pump internals would have to be removed to allow access to the interior of the pump casing.

The CS, LHSI, and HHSI pumps are of a similar centrifugal multiple stage vertical design, and are manufactured by Pacific Pumps. There are five pressure-retaining casing welds associated with each of the subject pump casings: three circumferential casing welds; one suction nozzle weld; and one longitudinal casing weld. Of these welds, only the lower circumferential weld and the lower portion of the longitudinal casing weld are inaccessible for surface examination while a pump is in its pit. The remaining welds are accessible for the required Section XI surface examination.

The CS and LHSI pump casings are 24 inches in diameter with approximately a three-inch annular clearance between the casing and the pit wall. The HHSI pump casing is 18 inches in diameter with approximately a 6-inch annular clearance. A debris seal covers the annular opening between each pump casing and the edge of the pit. The lower circumferential weld in each pump casing, located approximately 10 feet down in the pump pit, is inaccessible for surface examination. The 10-foot length of each longitudinal casing weld located inside the pump pit is also inaccessible for surface examination. The upper portion of each longitudinal casing weld is accessible for Section XI surface examination for approximately 50 to 55 inches of its overall length. A sketch depicting the typical pump casing and pump pit configuration is attached [Attachment 1 to the letter dated September 20, 2010].

The subject pumps are approximately 30 feet tall with the driver mounted. Alignment of the shaft along the multiple vertical stages to the driver coupling is critical to proper operation. Improper rigging or alignment can result in a bent pump shaft or vibration and subsequent impaired operation and pump damage. Therefore, removal of the pump casing from the pit or removal of the pump internals to gain access to the specified welds to perform a surface examination would present an undue hardship without a compensating increase in quality and safety. Removal could also have a negative impact on quality and safety if the precise alignment required for these vertical pumps is not achieved when they are returned to their positions.

If one of the subject welds should leak, the leakage should be detected quickly because of the following design considerations (as stated by the licensee):

- The outer barrel (pump casing) is exposed to relatively low system suction pressure.

- Detection of excessive leakage from the Safety Injection System and Containment Spray System and rooms in the Fuel Handing Building is provided by level instrumentation in the appropriate sump. Each train of the Safety Injection System and Containment Spray System and located in a separate room with its own sump and duplex sump pumps. The sump pumps and associated piping from the Safety Injection System and Containment Spray System equipment rooms are designated as non-seismic equipment. The leak detection level instrumentation is seismic Category I and Class 1E.

- Failure of the non-seismic pumps or piping would not affect the functional integrity of the equipment in the room because the equipment is located such that sufficient time is available for operator action.

- Leakage and flooding into Safety Injection System and Containment Spray System pump compartments are alarmed on the Qualified Display Processing System by switches on the level instrumentation for the collection sumps in these compartments. Two independent Class 1E high level alarms are provided. Only one alarm must remain functional to provide the minimum leak detection capability.

3.4 Licensee's Proposed Alternative Examination (as stated by the licensee)

Due to the small annular space between the pump casing and the pit wall and the distance of the welds from the access opening at the top of the pit (i.e., up to ten feet), performing a complete surface examination of these welds in the installed condition is not practical. However, this configuration is compatible with a boroscopic visual examination of these welds. Boroscopic VT-1 visual examination will verify welds and adjacent base material are free of significant service-induced degradation.

The accessible welds (or accessible portions of welds) in these pump casings will be examined with a surface examination technique as required by Section XI code requirements. If a CS, LHSI, or HHSI pump is disassembled during the third inspection interval, the licensee will perform the Code-required surface examination of the pump casing welds within the pump pit.

3.5 NRC Staff Evaluation

The licensee proposed using a boroscopic VT-1 visual examination in lieu of surface examinations of the inaccessible portions of pump casing welds, and will include the base

material surfaces adjacent to the inaccessible pump casing welds. All accessible welds and portions of accessible welds will be surface examined as required by the ASME Code.

A surface examination identifies surface indentions or cracks of a minimum opening width. The difference between surface examinations and visual examinations is that a visual examination needs a wider minimum opening width. The actual width is dependent on the specific visual technique. Visual techniques are discussed extensively in NUREG/CR-6860, "An Assessment of Visual Testing," November 2004 (ADAMS Accession No. ML043630040), and NUREG/CR-6943, "A Study of Remote Visual Methods to Detect Cracking in Reactor Components," October 2007 (ADAMS Accession No. ML073110060). As discussed in the NUREGs, indentions or cracks of a minimum opening width can be detected using remote visual examination techniques like a boroscope. Degradations such as stress-corrosion cracks, irregular wear, corrosion pitting, and mechanical damage are visually detectable. In addition to the VT-1, the pits are monitored for water levels. Although a visual examination may need a wider minimum crack/indention opening width than a surface examination, any degradation should be detected by the leakage monitoring systems in the pits prior to becoming structurally significant.

The alignment of the shaft along the multiple vertical stages to the driver coupling is critical to proper operation. Improper rigging or alignment can result in a bent pump shaft or vibration and subsequent impaired operation and pump damage. Removal of the pump casing from the pit or removal of the pump internals to gain access to the specified welds to perform a surface examination could have a negative impact if the precise alignment required for these vertical pumps is not achieved when they are returned to service. Based on the above, the NRC staff concludes that removing the pump casing to achieve an incremental improvement with a surface examination creates a hardship or unusual difficulty.

The NRC staff determined that the licensee's proposed alternative provides reasonable assurance of structural integrity of the subject welds and that the code compliance would result in hardship or unusual difficulty for the licensee without a compensating increase in the level of quality and safety.

## 4.0 CONCLUSION

The NRC staff concludes that the ASME Code, Section XI examination requirements for the subject welds in Relief Request RR-ENG-3-03 would result in hardship or unusual difficulty for the licensee without a compensating increase in the level of quality and safety. Therefore, the proposed alternative is authorized pursuant to 10 CFR 50.55a(a)(3)(ii) for the third 10-year ISI interval 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: Don Naujock

Date: April 7, 2011

If you have any questions, please contact the project manager, Balwant Singal, at 301-415-3016 or via e-mail at Balwant.singal@nrc.gov.

Sincerely,

/RA/

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-498 and 50-499

Enclosure:
As stated

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