Nuclear Operating Company

South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

September 1, 2011

NOC-AE-11002705
File No.: G25
10 CFR 50.55a

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
One White Flint North
11555 Rockville Pike
Rockville, MD 20852-2746

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, 50-499
Request for Relief to Apply an Alternative to the ASME Section XI Code
Requirements for Examination of Class 1 and Class 2 Piping Welds
(Relief Request RR-ENG-3-04)

In accordance with the provisions of 10 CFR 50.55a(a)(3)(i), the South Texas Project requests relief from the ASME Section XI code examination requirements for inservice inspection of Class 1 and Class 2 piping welds. As an alternative to the Code requirements, a Risk-Informed process will continue to be applied in selecting Class 1 and Class 2 piping welds for examination during the third inspection interval. The proposed alternative provides an acceptable level of quality and safety as required by 10 CFR 50.55a(a)(3)(i).

There are no commitments in this letter.

STPNOC requests NRC review and approval of this relief request by March 1, 2012, to support implementation of the Unit 1 and Unit 2 ten-year Inservice Inspection Plan during the third inspection interval, ending September 24, 2020 (Unit 1) and October 18, 2020 (Unit 2).

If there are any questions, please contact either Mr. Philip L. Walker at (361) 972-8392 or me at (361) 972-7904.

Marco Ruvalcaba
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PLW/
Attachment: Request for Relief to Apply an Alternative to the ASME Section XI Code Requirements for Examination of Class 1 and Class 2 Piping Welds

STI: 32905093

A047
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SOUTH TEXAS PROJECT
UNITS 1 AND 2
REQUEST FOR RELIEF TO APPLY AN ALTERNATIVE TO THE ASME SECTION XI CODE REQUIREMENTS FOR EXAMINATION OF CLASS 1 AND CLASS 2 PIPING WELDS
(RELIEF REQUEST RR-ENG-3-04)

1. **REFERENCE CODE:** ASME Code Section XI, 2004 Edition, No Addenda

2. **COMPONENTS AFFECTED:** Class 1 and Class 2 Piping Welds

3. **APPLICABLE CODE REQUIREMENTS:**

- Table IWB-2500-1, Examination Category B-F and Category B-J

  ASME Section XI Examination Categories B-F and B-J contain the requirements for nondestructive examination of Class 1 piping components. Category B-F applies to pressure-retaining dissimilar metal welds in vessel nozzles. Category B-J applies to pressure-retaining welds in piping.

- Table IWC-2500-1, Examination Category C-F-1 and Category C-F-2

  ASME Section XI Examination Categories C-F-1 and C-F-2 contain the requirements for nondestructive examination of Class 2 piping components. Category C-F-1 applies to pressure-retaining welds in austenitic stainless steel or high alloy piping. Category C-F-2 applies to pressure-retaining welds in carbon or low alloy steel piping.

4. **BASIS FOR RELIEF FROM CODE REQUIREMENTS:**

ASME Section XI code requirements do not allow for selection of inspection locations using consideration of degradation mechanisms that are potentially active, the relative severity of each degradation mechanism at an inspection location, and the inspection methods to be applied. Focusing inspection activities on risk-significant piping segments enables reduction of pipe leak and rupture frequencies, reducing core damage frequency (CDF) and large early release frequency (LERF).

5. **ALTERNATIVE EXAMINATION:**

The alternative risk-informed inservice inspection (RI-ISI) program for piping is described in Electric Power Research Institute (EPRI) Topical Report TR-112657, "Revised Risk-Informed Inservice Inspection Evaluation Procedure," Revision B-A. TR-112657 provides the requirements for defining the relationship between the risk-informed examination program and the remaining unaffected portions of ASME Section XI. The risk-informed ISI program applied during the second inspection interval was submitted in references 8.1 and 8.2, and approved by the NRC in references 8.3 and 8.4.

Review of the current RI-ISI program in accordance with NEI 04-05, "Living Program Guidance to Maintain Risk-Informed Inservice Inspection Programs for Nuclear Piping Systems," led to the following proposed changes:

- During the third ISI interval, the ISI program is in accordance with the 2004 Edition of ASME Section XI. One of the changes in the new edition and addenda of the Code is that the exemption size for Class 2 auxiliary feedwater piping is decreased from 4" NPS to 1 ½" NPS. As a result, the 4" NPS Class 2 auxiliary feedwater lines from the outboard isolation valves to where they connect to the four main feedwater lines were added to the ISI program and consequently added to the RI-ISI program.

- The South Texas Project (STP) probabilistic risk assessment model revision used to evaluate the consequences of pipe rupture for the RI-ISI assessment for the second inspection interval was the Level 2 Probabilistic Safety Assessment and Individual Plant Examination submittal, dated August 1992, supplemented by PRA model STP_1997. The current PRA Model of Record is STP_REV6. Segments in the following systems changed their consequence ranking:

  - CVCS: consequence rank from Low to Medium
  - RCS: consequence rank from Low to High
  - SIS: consequence rank from Medium to Low.

- Replacement of the steam generators and other repair/replacement activities resulted in numerous welds being deleted, added, or re-designated.

In accordance with the guidance provided by NEI 04-05, Tables 3 and 4 identify the number of welds added to and deleted from the originally approved RI-ISI program. Table 5 defines the risk categories assigned to the systems listed in Tables 3 and 4.

6. JUSTIFICATION FOR GRANTING RELIEF

6.1 Consequence Evaluation

The consequences of pressure boundary failures are ranked based on their effect on core damage and containment performance (isolation, bypass, and large early release). Consequences considering both direct and indirect effects were considered using TR-112657 as guidance.

6.2 Degradation Mechanism Evaluation

Failure potential estimates were generated utilizing industry failure history, plant-specific failure history, and other relevant information. These failure estimates were determined using TR-112657 as guidance. Tables 3 and 4 summarize the failure potential assessment by system for each potential degradation mechanism.

6.3 Risk Characterization

As a risk-informed application, this submittal meets the intent and principles of Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis," and RG 1.178, "An Approach for Plant-Specific Risk-Informed Decisionmaking Inservice Inspection of Piping."

Each run of piping within the scope of the program was evaluated to determine its impact on core damage and containment performance (isolation, bypass, and large, early release) as well as its potential for failure. Piping segments are then defined as continuous runs of piping potentially susceptible to the same type of degradation and whose failure will result in similar consequence. Segments are then ranked based upon their risk significance as defined in TR-112657.

The base core damage frequency (CDF) from the STP_1997 model is 1.17E-05 per year. The original RI-ISI program represented a negligible increase of 1.06E-07 for Unit 1 and 1.11E-07 for Unit 2 in regards to CDF. A new risk impact analysis found that the revised program represents a risk reduction when compared to the last deterministic Section XI inspection program. The revised program represents a reduction of 7.0E-11 for Unit 1 and 6.0E-11 for Unit 2 in regards to CDF. A risk-informed ISI program does not have an impact on LERF.

6.4 Inspection Location Selection and NDE Selection

Tables 1 and 2 list the systems included in the RI-ISI program and the number of affected locations. The risk-informed evaluation boundaries are defined consistent with the system boundaries established in the plant ISI program previously approved by the NRC.

The intent of the inspections mandated by ASME Section XI for piping welds is to identify conditions such as flaws or indications that may be precursors to leaks or ruptures in a system's pressure boundary. Currently, the process for picking inspection locations is based upon structural discontinuity and stress analysis results. As depicted in ASME White Paper 92-01-01 Rev. 1, "Evaluation of Inservice Inspection Requirements for Class 1, Category B-J Pressure Retaining Welds," this method has been ineffective in identifying leaks or failures. TR-112657 provides a more robust selection process founded on actual service experience with nuclear plant piping failure data.

This process has two key independent components: determination of each location's susceptibility to degradation; and secondly, independent assessment of the consequence of the piping failure. These two ingredients assure defense-in-depth is maintained. First, by evaluating a location's susceptibility to degradation, the likelihood of finding flaws or indications that may be precursors to leaks or ruptures is increased. Secondly, the consequence assessment effort has a single failure criterion. As such, no matter how unlikely a failure scenario, it is ranked "High" in the consequence assessment, and at worst "Medium" in the risk assessment (i.e., Risk Category 4) if, as a result of the failure, there is no mitigative equipment available to respond to the event. In addition, the consequence assessment takes into account equipment reliability, and less credit is given to less reliable equipment.

In-scope piping components, regardless of risk classification, continue to receive Code-required pressure testing as part of the current ASME Section XI program. VT-2 visual examinations are scheduled in accordance with the station's pressure test program, which remains unaffected by the RI-ISI program. The STP RI-ISI Program was subjected to an internal evaluation at the end of the second period of the ISI second interval. An additional RI-ISI program periodic evaluation was conducted in accordance

with the recommendations of NEI 04-05. This review evaluated any possible changes that could affect the RI-ISI Program from September 2007 through October 2010, which corresponds with the third period of the second interval for the two units. The updated program resulting from these reviews is the subject of this proposed alternative.

6.5 PRA Quality

The NRC has reviewed STP's program for implementation of risk-informed Technical Specifications for compliance with RG 1.174, RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking Regarding Technical Specifications," RG 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," and NEI 06-09, "Risk-Informed Technical Specifications Initiative." The NRC safety evaluation dated July 13, 2007, "South Texas Project, Units 1 and 2 - Issuance of Amendments Re: Broad-Scope Risk-Informed Technical Specifications Amendments," (ML071780186), in addressing the risk-informed program implemented during the second inspection, stated the following:

- Staff Findings and Conditions

  The staff finds that the licensee's proposed implementation of RMTS for the identified scope of TS LCO action requirements is consistent with the guidance of the staff-approved NEI 06-09, Revision 0. The licensee's methodology for assessing the risk impact of extended CTs, including the individual CT extension impacts in terms of ICDP and ILERP, and the overall program impact in terms of CDF and LERF, is accomplished using a full-scope PRA model of sufficient technical adequacy as described in NEI 06-09, Revision 0, and based on consistency with the guidance of RG 1.200, Revision 1. The assessment of configuration-specific risk to support the extension of CTs, and the RMTS program requirement to reassess configuration changes in a timely manner, and to implement compensatory measures and RMAs at the appropriate risk thresholds, are acceptable. The licensee's proposed implementation of RMTS is consistent with Tier 1, Tier 2 and Tier 3 guidelines of RG 1.177. The licensee has not proposed to use any conservative or bounding analyses in lieu of quantitative PRA models. The implementation of the RMTS program will therefore use the full-scope plant-specific PRA models, maintained to reasonably reflect the as-built, as-operated plant, and will conform to the guidance of RG 1.200, Revision 1.

- Conclusions of Technical Evaluations

  The potential risk impacts for STP implementation of the RMTS program are determined consistent with the staff-approved NEI 06-09, Revision 0, methodology, and are reasonably expected to be small and consistent with the guidance of RG 1.174 and RG 1.177. The licensee's CRMP is consistent with NEI 06-09, Revision 0, guidance with regard to its scope and technical adequacy, and therefore satisfies RG 1.177 CRMP guidelines. The application of the CRMP for the RMTS program will assure timely identification of any risk-significant configurations, and prompt implementation of appropriate compensatory measures and RMAs, satisfying Tier 2 and Tier 3 of RG 1.177. The staff therefore concludes that the proposed changes satisfy the key

principles of risk-informed decision making identified in RG 1.1 74 and RG 1.177, and therefore the requested adoption of the broad-scope risk-informed TS license amendments request by STP is acceptable.

6.6 Conclusion

The RI-ISI program, as a substitute for the ASME Section XI Code 2004 Edition examination program for Class 1 and Class 2 welded piping in accordance with 10 CFR 50.55a(a)(3)(i), provides an acceptable level of quality and safety.

7. IMPLEMENTATION

The alternative will be applied for the STP Unit 1 and 2 third ten-year ISI program inspection interval, subject to the review and update guidance of NEI 04-05. The third inspection interval is currently scheduled to end September 24, 2020 for Unit 1 and October 18, 2020 for Unit 2. STPNOC requests NRC approval of the proposed alternative by March 1, 2012, to support continuation of risk-informed inservice inspection practices.

8. REFERENCES

8.1 T. J. Jordan, STP Nuclear Operating Company, to NRC Document Control Desk, "Relief Request for Application of an Alternative to the ASME Boiler and Pressure Vessel Code Section XI Examination Requirements for Class 1 Piping Welds (RR-ENG-2-16)," dated December 30, 1999 (ML003676903)

8.2 T. J. Jordan, STP Nuclear Operating Company, to NRC Document Control Desk, "Relief Request for Application of an Alternative to the ASME Boiler and Pressure Vessel Code Section XI Examination Requirements for Class 1 Socket-Welded Piping and Class 32Piping Welds (RR-ENG-2-23)," dated February 27, 2001 (ML010650285)

8.3 Robert A Gramm, NRC Office of Nuclear Reactor Regulation, to William T. Cottle, STP Nuclear Operating Company, "South Texas Project, Units 1 and 2 - Request for Relief From ASME Code Requirements for the Second 10-Year Interval Inservice Inspection Program Based on Risk-Informed Alternative Approach (Relief Request RR-ENG-2-16) (TAC NOS. MA7789 AND MA7790)," dated September 11, 2000 (ML003749167)

8.4 Robert A Gramm, NRC Office of Nuclear Reactor Regulation, to William T. Cottle, STP Nuclear Operating Company, "Approval of Relief Request for Application of Risk-Informed Inservice Inspection Program for American Society of Mechanical Engineers Boiler and Pressure Vessel Code Class 1 and 2 Piping for South Texas Project, Units 1 and 2 (TAC NOS. MB1277 AND MB1278)," dated March 5, 2002 (ML020390041)

TABLE 1
UNIT 1 - SYSTEM SELECTION AND SEGMENT / ELEMENT DEFINITION

System	ASME Code Class	Number of Segments	Number of Elements
RCS – Reactor Coolant System	Class 1	13	21
SIS – Safety Injection System	Class 2	56	736
RHRS – Residual Heat Removal System	Class 2	29	364
CSS – Containment Spray System	Class 2	9	126
AFW – Auxiliary Feedwater System	Class 2	23	167
FWS – Feedwater System	Class 2	20	144
MSS – Main Steam System	Class 2	40	197
SLS – Sludge Lancing System	Class 2	1	12
CVCS – Chemical and Volume Control System	Class 2	0	0
		Total: 191	**Total: 1767**

TABLE 2
UNIT 2 - SYSTEM SELECTION AND SEGMENT / ELEMENT DEFINITION

System	ASME Code Class	Number of Segments	Number of Elements
RCS – Reactor Coolant System	Class 1	11	30
SIS – Safety Injection System	Class 2	55	693
RHRS – Residual Heat Removal System	Class 2	28	361
CSS – Containment Spray System	Class 2	9	118
AFW – Auxiliary Feedwater System	Class 2	24	162
FWS – Feedwater System	Class 2	20	120
MSS – Main Steam System	Class 2	40	201
SLS – Sludge Lancing System	Class 2	1	8
CVCS – Chemical and Volume Control System	Class 2	0	0
		Total: 188	**Total: 1693**

TABLE 3

COMPARISON BETWEEN ORIGINAL APPROVED AND UPDATED RI-ISI PROGRAMS BY RISK CATEGORY - STP UNIT 1

System[1]	Risk		Consequence Rank	Failure Potential		Original			Interval 3 Update		
	Category	Rank		Degradation Mechanism	Rank	Weld Count	RI-ISI	Other[2]	Weld Count	RI-ISI	Other[2]
RCS	2	High	High	TASCS	Medium	152	46		30	8	
RCS	2	High	High	TASCS, TT	Medium				39	9	
RCS	2 2	High High	High	TASCS, TT PWSCC	Medium Medium				1	1	
RCS	2	High	High	TT	Medium				71	17	
RCS	2 2	High High	High	TT PWSCC	Medium Medium				1	1	
RCS	4	Medium	High	None	Low	198	10		199	19	
RCS	4 2	Medium High	High	None PWSCC	Low Medium				12	2	
RCS	5a	Medium	Medium	TASCS	Medium	8	1		3	1	
RCS	5a	Medium	Medium	TASCS, TT	Medium				2		
RCS	5a	Medium	Medium	TT	Medium				3		
RCS	6a	Low	Medium	None	Low	18	0		18		
RCS	6b	Low	Low	TT	Medium	2					
RCS	7a	Low	Low	None	Low	8			8		
SIS	5a	Medium	Medium	TT, IGSCC	Medium	3	1		3	1	
SIS	6a	Low	Medium	None	Low	704			447		
SIS	6b	Low	Low	TT, IGSCC	Medium	3			3		
SIS	7a	Low	Low	None	Low	88			345		
RHRS	5a	Medium	Medium	TT	Medium	12	2		12	2	
RHRS	6a	Low	Medium	None	Low	413			413		
RHRS	7a	Low	Low	None	Low	26			26		
CSS	6a	Low	Medium	None	Low	126			106		
CSS	7a	Low	Low	None	Low	47			20		
AFW	5a 3	Medium High	Medium	TASCS FAC	Medium High	14	3		26	2	

TABLE 3 (continued)

COMPARISON BETWEEN ORIGINAL APPROVED AND UPDATED RI-ISI PROGRAMS BY RISK CATEGORY - STP UNIT 1

System[1]	Risk		Consequence Rank	Failure Potential		Original			Interval 3 Update		
	Category	Rank		Degradation Mechanism	Rank	Weld Count	RI-ISI	Other[2]	Weld Count	RI-ISI	Other[2]
AFW	5a 3	Medium High	Medium	TASCS, TT FAC	Medium High	4			4	1	
AFW	5a 3	Medium High	Medium	TT FAC	Medium High	8			8	1	
AFW	6a 3	Low High	Medium	None FAC	Low High	141			335		
FWS	5a 3	Medium High	Medium	TASCS FAC	Medium High	16	2		18	2	
FWS	6a 3	Low High	Medium	None FAC	Low High	128			128		
MSS	6a	Low	Medium	None	Low	197			197		
SLS	7d	Low	None	None	Low	12			12		
CVCS	5a	Medium	Medium	TT	Medium	0			2	1	
CVCS	6a	Medium	Low	TT	Medium	0			2		
CVCS	6b	Low	Low	TT	Medium	0			7		
CVCS	7a	Low	Low	None	Low	0			47		
TOTAL NUMBER OF WELDS						2328	65		2548	68	
								change from original:	220	3	

Notes

1 System designations are defined in Table 1.

2 This column is generally used to identify augmented inspection program locations that are credited beyond those locations selected per the RI-ISI process, as addressed in Section 3.6.5 of EPRI TR-112657. This option is not applicable for the STP RI-ISI application. The "Other" column is retained in this table solely for uniformity purposes with other RI-ISI application template submittals.

PWSCC = pressurized water stress corrosion cracking
TASCS = thermal stratification, cycling, and striping
TT = thermal transient
FAC = flow-accelerated corrosion

TABLE 4

COMPARISON BETWEEN ORIGINAL APPROVED AND UPDATED RI-ISI PROGRAMS BY RISK CATEGORY - STP UNIT 2

System[1]	Risk		Consequence Rank	Failure Potential		Original			Interval 3 Update		
	Category	Rank		Degradation Mechanism	Rank	Weld Count	RI-ISI	Other[2]	Weld Count	RI-ISI	Other[2]
RCS	2	High	High	TASCS	Medium	147	46		30	8	
RCS	2	High	High	TASCS, TT	Medium				38	9	
RCS	2 2	High High	High	TASCS, TT PWSCC	Medium Medium				1	1	
RCS	2	High	High	TT	Medium				67	16	
RCS	2 2	High High	High	TT PWSCC	Medium Medium				1	1	
RCS	4	Medium	High	None	Low	202	11		203	20	
RCS	4 2	Medium High	High	None PWSCC	Low Medium				12	2	
RCS	5a	Medium	Medium	TASCS	Medium	0	0		5	2	
RCS	5a	Medium	Medium	TASCS, TT	Medium				2		
RCS	5a	Medium	Medium	TT	Medium				5		
RCS	6a	Low	Medium	None	Low	20	0		35		
RCS	7a	Low	Low	None	Low	10	0		10		
SIS	5a	Medium	Medium	TT, IGSCC	Medium	0	0		3	1	
SIS	6a	Low	Medium	None	Low	553	0		348		
SIS	6b	Low	Low	TT, IGSCC	Medium	0	0		3		
SIS	7a	Low	Low	None	Low	140	0		401		
RHRS	5a	Medium	Medium	TT	Medium	12	2		12	2	
RHRS	6a	Low	Medium	None	Low	328	0		393		
RHRS	7a	Low	Low	None	Low	21	0		26		
CSS	6a	Low	Medium	None	Low	118	0		97		
CSS	7a	Low	Low	None	Low	0	0		21		
AFW	5a 3	Medium High	Medium	TASCS FAC	Medium High	17	3		28	2	

TABLE 4 (continued)

COMPARISON BETWEEN ORIGINAL APPROVED AND UPDATED RI-ISI PROGRAMS BY RISK CATEGORY - STP UNIT 2

System[1]	Risk		Consequence Rank	Failure Potential		Original			Interval 3 Update		
	Category	Rank		Degradation Mechanism	Rank	Weld Count	RI-ISI	Other[2]	Weld Count	RI-ISI	Other[2]
AFW	5a 3	Medium High	Medium	TASCS, TT FAC	Medium High	4			4	1	
AFW	5a 3	Medium High	Medium	TT FAC	Medium High	8			8	1	
AFW	6a 3	Low High	Medium	None FAC	Low High	133	0		337		
FWS	5a 3	Medium High	Medium	TASCS FAC	Medium High	13	2		18	2	
FWS	6a 3	Low High	Medium	None FAC	Low High	107	0		133		
MSS	6a	Low	Medium	None	Low	201	0		201		
SLS	7d	Low	None	None	Low	8	0		8		
CVCS	5a	Medium	Medium	TT	Medium	0	0		2	1	
CVCS	6a	Medium	Low	TT	Medium	0	0		2		
CVCS	6b	Low	Low	TT	Medium	0	0		8		
CVCS	7a	Low	Low	None	Low	0	0		36		
TOTAL NUMBER OF WELDS						2042	64		2498	69	
								change from original:	456	5	

Notes

1 System designations are defined in Table 2.

2 This column is generally used to identify augmented inspection program locations that are credited beyond those locations selected per the RI-ISI process, as addressed in Section 3.6.5 of EPRI TR-112657. This option is not applicable for the STP RI-ISI application. The "Other" column is retained in this table solely for uniformity purposes with other RI-ISI application template submittals.

PWSCC = pressurized water stress corrosion cracking
TASCS = thermal stratification, cycling, and striping
TT = thermal transient
FAC = flow-accelerated corrosion

TABLE 5

DEFINITION OF RISK CATEGORIES
(ASME CODE CASE N-578-1)

RISK CATEGORY	RISK RANK	PIPE RUPTURE POTENTIAL	CORE MELT POTENTIAL
1	HIGH	HIGH	HIGH
2	HIGH	MEDIUM	HIGH
3	HIGH	HIGH	MEDIUM
4	MEDIUM	LOW	HIGH
5a	MEDIUM	MEDIUM	MEDIUM
5b	MEDIUM	HIGH	LOW
6a	LOW	LOW	MEDIUM
6b	LOW	MEDIUM	LOW
7a	LOW	LOW	LOW
7b	LOW	HIGH	NONE
7c	LOW	MEDIUM	NONE
7d	LOW	LOW	LOW