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

February 7, 2013
NOC-AE-12002939
10 CFR 50.55a

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

South Texas Project
Unit 2
Docket No. STN 50-499
Request for Relief from ASME Section XI Code Requirements for Periodic Inspection of Reactor Coolant Pressure Boundary Check Valves with Seal Cap Enclosures
(Relief Request RR-ENG-3-12)

References:
1. Letter, W. C. Walker to D. Koehl, "South Texas Project Electric Generating Station - NRC Integrated Inspection Report 05000498/2012004 and 05000499/2012004," dated November 8, 2012 (ML12313A345)
2. NRC Information Notice 2012-15, "Use of Seal Cap Enclosures to Mitigate Leakage from Joints That Use A-286 Bolts," dated August 9, 2012 (ML121740012)

In accordance with the provisions of 10 CFR 50.55a(a)(3)(ii), the STP Nuclear Operating Company (STPNOC) requests relief for South Texas Project (STP) Unit 2, for the third inspection interval, from the ASME Section XI Code requirements for periodic inspection of reactor coolant pressure boundary (RCPB) check valves with installed seal cap enclosures. Seal cap enclosures restrict access to the pressure boundary at the bolted joint of the body to bonnet as discussed in References 1 and 2. STPNOC has determined that compliance with the code inspection requirements for the affected RCPB check valves, for the interim period until the remaining seal caps are removed, would result in unnecessary hardship without a compensating increase in the level of quality and safety. As an alternative to the code requirements, STPNOC proposes to perform inspections at the seal cap enclosures. The details of the relief request are provided in the attachment to this letter.

STPNOC requests NRC review and approval by May 31, 2013, to support use of the proposed alternative when authorized, as required by 10 CFR 50.55a(a)(3), until removal of the remaining seal caps. These activities are planned to be completed during the next scheduled STP Unit 2 refueling outage in 2013.

There are no commitments in this letter.

AD47
NRR

STI: 33635004

If there are any questions, please contact Coley Chappell at 361-972-4745, or me at 361-972-7867.

D. W. Rencurrel
Senior Vice President

ccc

Attachment: Request for Relief from ASME Section XI Code Requirements for Periodic Inspection of Reactor Coolant Pressure Boundary Check Valves with Seal Cap Enclosures (Relief Request RR-ENG-3-12)

cc: (paper copy)

Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
1600 East Lamar Boulevard
Arlington, TX 76011-4511

Balwant K. Singal
Senior Project Manager
U.S. Nuclear Regulatory Commission
One White Flint North (MS 8 B1)
11555 Rockville Pike
Rockville, MD 20852

NRC Resident Inspector
U. S. Nuclear Regulatory Commission
P. O. Box 289, Mail Code: MN116
Wadsworth, TX 77483

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

(electronic copy)

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

Balwant K. Singal
U. S. Nuclear Regulatory Commission

John Ragan
Chris O'Hara
Jim von Suskil
NRG South Texas LP

Kevin Pollo
Richard Peña
City Public Service

Peter Nemeth
Crain Caton & James, P.C.

C. Mele
City of Austin

Richard A. Ratliff
Alice Rogers
Texas Department of State Health Services

SOUTH TEXAS PROJECT
UNIT 2
REQUEST FOR RELIEF FROM ASME SECTION XI CODE REQUIREMENTS
FOR PERIODIC INSPECTION OF REACTOR COOLANT PRESSURE BOUNDARY
CHECK VALVES WITH SEAL CAP ENCLOSURES
(RELIEF REQUEST RR-ENG-3-12)

In accordance with the provisions of 10 CFR 50.55a(a)(3)(ii), the STP Nuclear Operating Company (STPNOC) requests relief for South Texas Project (STP) Unit 2, for the third inspection interval, from the ASME Section XI Code requirements for periodic inspection of reactor coolant pressure boundary (RCPB) check valves with installed seal cap enclosures. The enclosures restrict access to the pressure retaining boundary (at the bolted joint of the body to bonnet) for required code inspections. STPNOC has determined that compliance with the code inspection requirements, for the interim period until the remaining seal caps are removed, would result in unnecessary hardship without a compensating increase in the level of quality and safety. As an alternative to the code requirements, STPNOC proposes to perform inspections at the seal cap enclosures. The details of the relief request are provided below.

1. Components for Which Relief is Requested

The components affected are STP Unit 2 chemical and volume control system (CVCS) and safety injection system (SIS) check valves with seal cap enclosures installed:

- 1R172XCV0001 (CV-0001)
- 1R172XCV0002 (CV-0002)
- 1R172XCV0004 (CV-0004)
- 1R172XCV0005 (CV-0005)
- 1R172XSI0010A (SI-0010A)

The components are ASME Section III Class 1 and act as part of the RCPB. The CVCS check valves, SI-0010A, and connections from CVCS and SIS to the reactor coolant system (RCS) are shown on the following figures (from Reference 1):

- Figure 9.3.4-1, "Piping & Instrumentation Diagram Chemical and Volume Control System," Drawing 5R179F05005#2, Revision 27
- Figure 6.3-1, "Piping and Instrument Diagram Safety Injection System," Drawing 5N129F05013#2, Revision 32
- Figure 5.1-1, "Piping and Instrumentation Diagram RCS Primary Coolant Loop," Drawing 5R149F05001#2, Revision 33

CV-0001, CV-0002, CV-0004 and CV-0005 are 4-inch swing check valves located in 4-inch nominal diameter CVCS piping. CV-0001 and CV-0002 are located in series in the normal charging line to the cold leg of RCS Loop 1. CV-0004 and CV-0005 are located in series in the alternate charging line to the cold leg of RCS Loop 3. There are no isolation valves between these valves and the RCS. Although the two sets of valves are located in different parts of the CVCS (normal and alternate charging lines), their safety functions are the same and include:

- Prevent backflow from the RCS into their respective CVCS lines
- Act as part of the pressure boundary of the RCS for isolation of the Class 1 RCS pressure boundary from the upstream Class 2 portion of the CVCS charging line (refer to Reference 1, Section 5.2.4.1, "System Boundary Subject to Inspection")
- Support the overall design functions of the CVCS during normal and postulated plant accident conditions (refer to Reference 1, Section 9.3.4.1, "Chemical and Volume Control System")

The CVCS check valves are part of the flowpaths used to provide safety grade boration and makeup capabilities for cold shutdown. The valves support the normal function of the charging flowpaths, required to pass flow during all normal plant operating conditions which use the charging lines (normal charging line alternated with the alternate charging line).

The CVCS check valves are constructed from austenitic stainless steel body (SA182, Type 316) and bonnet (SA240, Type 316 or alternate material SA182 Type F316) joined using type SA453 Grade 660 studs and SA194 Grade 6 nuts. The design code for these valves is the ASME Boiler and Pressure Vessel (B&PV) Code, Section III, 1974 Edition through the Winter of 1975 Addenda.

SI-0010A is an 8-inch swing check valve located in the 8-inch nominal diameter SIS piping. The valve is located in the SIS discharge to the hot leg of RCS Loop 1 from the high head safety injection (HHSI) pump 2A and the low head safety injection (LHSI) pump 2A. The valve is the first check valve from the RCS hot leg that separates RCS from HHSI and LHSI pumping systems. The safety functions are to provide pressure isolation and prevent RCS back leakage into the HHSI and LHSI pumping systems.

SI-0010A is constructed from an austenitic stainless steel body (SA182, Type 316) and bonnet (SA240, Type 316, or alternate material SA182 Type F316) joined using SA453 Grade 660 studs and nuts. The design code for this valve is ASME B&PV Code, Section III, 1974 Edition through the Winter of 1975 Addenda.

2. Applicable Code Edition and Addenda

ASME Boiler and Pressure Vessel (B&PV) Code Section XI, 2004 Edition (no addenda).

3. Applicable Code Requirements

- IWA-1400 OWNER'S RESPONSIBILITY states that the responsibilities of the Owner of the nuclear power plant shall include the design and arrangement of system components to include allowances for adequate access and clearances for conduct of the examination and tests.

- IWA-1500 ACCESSIBILITY states that provisions for accessibility shall include considerations for access for the Inspector, examination personnel, and equipment necessary to conduct the examinations.

- IWA-5240 VISUAL EXAMINATION, IWA-5241 Insulated and Non-insulated Components, requires:
  (a) The VT-2 visual examination shall be conducted by examining the accessible external exposed surfaces of pressure retaining components for evidence of leakage.
  (b) For components whose external surfaces are inaccessible for direct VT-2 visual examination, only the examination of the surrounding area (including floor areas or equipment surfaces located underneath the components) for evidence of leakage shall be required.

- Table IWB-2500-1, Category B-P (all Class 1 pressure retaining components) requires a system leakage test frequency of every refueling outage.

- IWB-5220 SYSTEM LEAKAGE TEST, IWB-5221 Pressure, requires:
  (a) The system leakage test shall be conducted at a pressure not less than the pressure corresponding to 100% rated reactor power.
  (b) The system test pressure and temperature shall be attained at a rate in accordance with the heat-up limitations specified for the system.

Additional discussion regarding the requirements for ASME Section III Class 1 components is provided in Reference 1, Section 5.2.4.2, "Access Provisions," and Section 5.2.4.2.6, "Valve Pressure Boundaries."

4. Reason for Request

In accordance with the provisions of 10 CFR 50.55a(a)(3)(ii), STPNOC requests relief from the code requirement to periodically inspect the pressure retaining boundary (at the bolted joint of the body to bonnet of each affected RCPB check valve), for the interim period until the remaining seal cap enclosures are removed.

STPNOC has determined that removal of the installed seal cap enclosures in order to comply with the code requirement, prior to the permanent removal of the seal caps, would result in unusual difficulty without a compensating increase in the level of quality and safety. The affected RCPB check valves are located in the reactor containment building bio-shield area and are not normally accessible for inspection except during outage conditions. No inspection techniques have been identified to permit detection of stud bolt failure without first removing the enclosure. In order to perform the code required inspections, the unit would be required to be shutdown and the seal cap enclosures removed to inspect the stud bolts. To perform these inspections would require the removal of insulation, removal of seal cap enclosures, inspections of the check valve pressure retaining boundary at the bolted joint of the body to bonnet, and reinstallation of the seal cap enclosures and insulation that would result in additional dose to personnel. Recent inspections on a majority of the studs on the affected valves have identified no structural degradation and provide reasonable assurance of structural integrity for the interim period until the seal cap enclosures are permanently removed. Activities to remove all the seal cap enclosures on the affected RCPB check valves are planned to be completed during the next scheduled STP Unit 2 refueling outage in 2013 (2RE16).

5. Proposed Alternative and Basis for Use

As an alternative to the code examination requirements, STPNOC proposes to inspect the RCPB check valves with the seal cap enclosures installed, at normal operating temperature and pressure. The inspections will be performed at the valve seal cap enclosures, rather than at the pressure retaining boundary at the bolted joint of the body to bonnet, and will follow the ASME Section XI code requirements for accessibility to allow for inspections to be performed without removal of insulation. Inspections will be performed at the Unit 2 refueling outage frequency. Use of the alternate examination method will continue until the seal cap enclosures are removed.

Detection of failures of the welds joining the valve to enclosure may be possible by detection of leaks. In previous examples (see References 2 and 3), failures were detected by insulation removal and identification of boric acid deposits (see Figure 2). Any significant leakage in this condition would be expected to clearly exhibit boric acid accumulation that would be discernible during the required VT-2 visual examinations. RCS leakage would be evident on the insulation on the valves, as indicated by water and boric acid crystals.

6. Technical Justification

Background

Seal cap enclosures had been previously welded over the bonnets and studs to address external valve leakage at the body to bonnet flange such as a gasket leak. Modifications to the CVCS valves were completed in the late 1980's. The seal cap enclosure was originally installed on SI-0010A in 1997 due to identified leakage from the body-to-bonnet gasket. Figure 1 shows a typical seal cap enclosure. As discussed in References 2 and 3, a concern with the installation of seal cap enclosures as mitigation for non-pressure boundary leakage is the potential for unmanaged degradation, since direct inspection of the pressure-retaining bolted joint enclosed by the valve seal cap is prevented.

During the STP Unit 2 refueling outage in 2011 (2RE15), leakage from the SI-0010A seal cap was discovered on October 30, 2011. The weld attaching the cap to the bonnet had several defects which were removed and re-welded during the outage. The NRC raised a question regarding the structural integrity of the studs encapsulated by the seal cap, stemming from the potential for corrosion of the studs due to the environment inside the seal cap and the fact that inspection of the studs was not possible with the cap installed.

To address regulatory concerns regarding stress corrosion cracking, STPNOC has removed the seal caps from the STP Unit 1 CVCS check valves and is planning to remove the seal caps from all of the affected valves on STP Unit 2 at the next scheduled refueling outage in 2013.

Reasonable Assurance of Structural Integrity

Inspections performed during recent Unit 1 and Unit 2 outages have been performed of nearly two-thirds (63%, or 60 of 96) of the studs on the affected STP Unit 1 and Unit 2

CVCS check valves and 100% (16/16) of the Unit 2 SIS check valve studs. Inspections have identified no damage to the bolted joint (studs and nuts) or degradation on the studs.

- During the STP Unit 1 planned refueling outage October-November 2012 (1RE17), seal caps on CV-0001, CV-0002, CV-0004 and CV-0005 were removed and replaced with a modified bonnet design from the Original Equipment Manufacturer (Westinghouse) which incorporates a seal weld provision (Reference 4). The original CVCS check valves were of a vintage of Westinghouse check valves which are not configured to accept a seal weld of the main flange joint. The intent of seal welding this joint is to prevent external leakage in the event of gasket degradation and to allow access to perform inspection of the bolting material (studs and nuts). Prior to the actual bonnet replacement the original stud bolts and nuts (twelve per valve) were individually removed, cleaned, visually inspected, and reinstalled applying the full operational torque value. No damage was observed on the original stud bolts or nuts during the visual inspection, and any damage would have resulted in a failure during the torquing process. Subsequently as part of the bonnet replacement, the original stud bolts and nuts were replaced with new longer studs and new nuts. This process was performed with the reactor head removed and refueling cavity flooded.

- In April 2012, during the STP Unit 2 forced outage that commenced in late 2011 (2F1102), the top portions of the seal caps on check valves CV-0005 and SI-0010A were removed. All the stud bolts were ultrasonically inspected for stress corrosion cracking with no indications of any degradation. The seal caps were then welded back in place prior to Unit 2 restart.

These inspection results, with no findings of any degradation of the check valve studs and nuts supporting the pressure retaining function, provide reasonable assurance that the remaining studs on the affected Unit 2 check valves are acceptable for continued use and that the pressure boundary will continue to perform its intended safety function.

Planned Repairs

All of the stud bolts and nuts for the affected STP Unit 2 check valves are scheduled to be replaced as part of the permanent valve repairs and removal of seal cap enclosures planned for the next scheduled refueling outage in 2013 (2RE16). Similar to the repairs previously completed on Unit 1 CVCS check valves, the work planned to be completed includes:

- For each affected CVCS check valve, replacing the existing studs and bonnets with new studs and new bonnet designed to apply a body to bonnet seal weld within the bolting circle of the joint; and
- For the SI-0010A valve, replacing the existing studs and reusing the existing bonnet which already allows a seal weld of the body to bonnet joint within the bolting circle of the joint.

With permanent removal of the existing seal cap enclosures and the installation of seal welds within the bolting circle of the joint, inspection of the valve body to bonnet joints may then be performed with no accessibility restrictions if leakage is identified during system pressure test, in accordance with the code requirements.

6. Duration of Proposed Alternative

STPNOC requests NRC review and approval of this relief request by May 31, 2013, to support use of the proposed alternative when authorized, as required by § 50.55a(a)(3). Relief is requested during the third ten-year inservice inspection interval for STP Unit 2 for the interim period until all seal cap enclosures are removed from the affected RCPB check valves. These activities are planned to be completed during the scheduled refueling outage in 2013 (2RE16). The third interval for STP Unit 2 began October 19, 2010, and ends October 18, 2020.

7. References

(1) South Texas Project Electric Generating Station (STPEGS) Updated Final Safety Analysis Report (UFSAR)

(2) Letter, W. C. Walker to D. Koehl, "South Texas Project Electric Generating Station - NRC Integrated Inspection Report," dated November 8, 2012 (ML12313A345)

(3) NRC Information Notice 2012-15, "Use of Seal Cap Enclosures to Mitigate Leakage from Joints That Use A-286 Bolts," dated August 9, 2012 (ML121740012)

(4) STPNOC Design Change Package (DCP) Number 12-2110-2, "Remove the Seal Caps from XCV0001, XCV0002, XCV0004, and XCV0005"

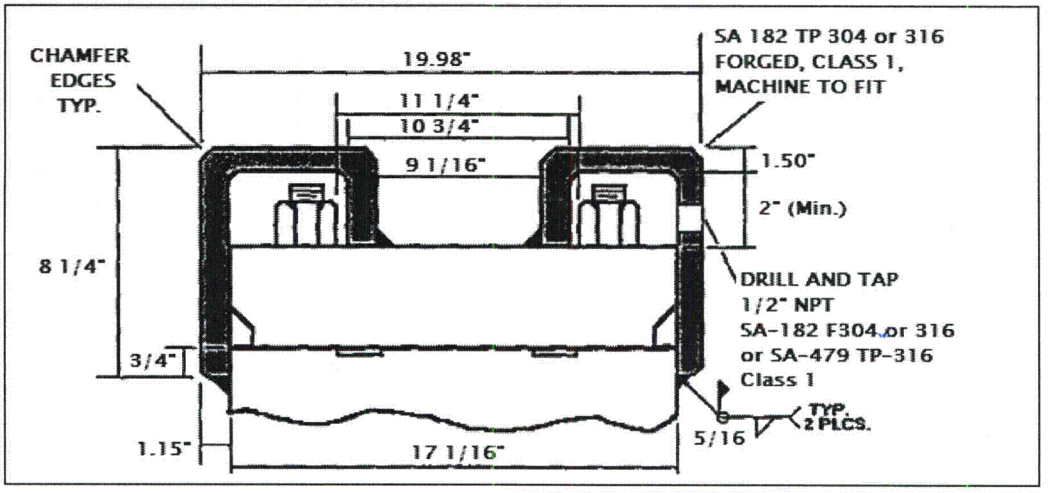

Figure 1. Diagram of seal cap enclosure for SI-0010A, typical for affected RCPB check valves

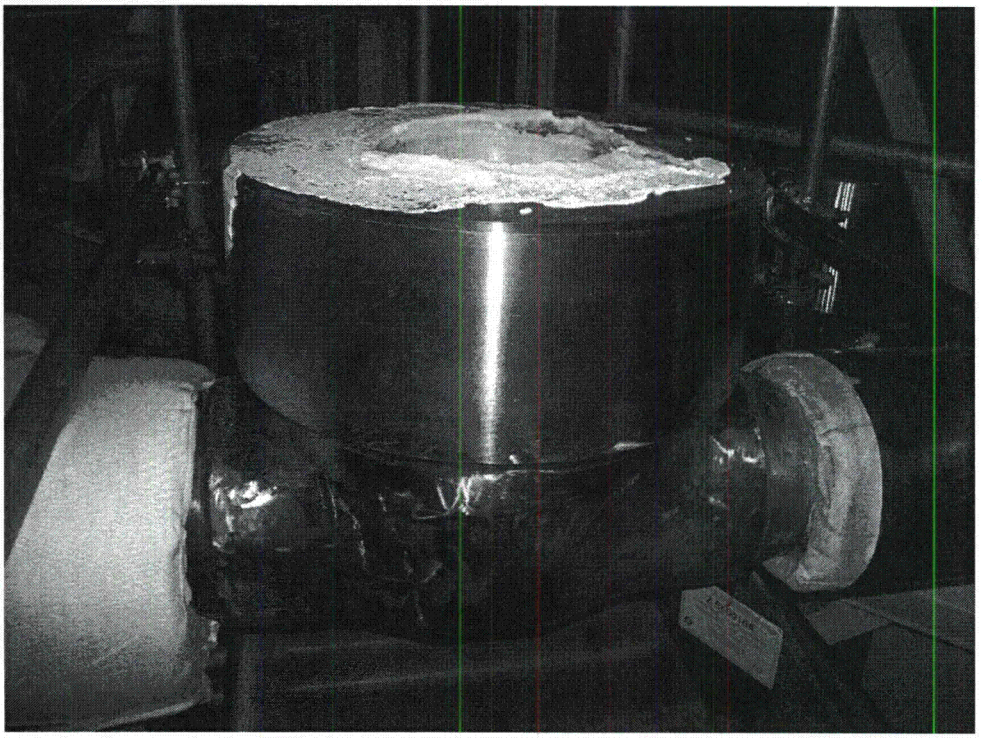

Figure 2. Seal cap enclosure for SI-0010A exhibiting boric acid deposits as a result of seal weld leakage (not pressure boundary leakage)