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NOV 25 2014

10 CFR 50.55a

LR-N14-0234

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

Hope Creek Generating Station
Renewed Facility Operating License No. NPF-57
NRC Docket No. 50-354

Subject: Request for Relief from American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code

In accordance with 10 CFR 50.55a(a)(3), "Codes and standards," PSEG Nuclear LLC (PSEG), hereby requests NRC approval of proposed Relief Request HC-I3R-07 for Hope Creek. Hope Creek is requesting relief from Section XI of American Society of Mechanical Engineers (ASME); subparagraph IWA-4221(c) for four Safety Auxiliary Cooling System (SACS) valves. Specifically, the post-weld heat treatment exemption of ASME Section III, Table ND-4622.1-1 was not met and no post-weld heat treatment was performed by the valve manufacturer for the welding of the valve seat.

PSEG requests approval of the proposed request within 12 months. The duration of relief request HC-I3R-07 is for the life of the valve seat.

The Code of Record for the Hope Creek Third Inservice Inspection (ISI) interval is ASME Code, Section XI, 2001 Edition through 2003 Addenda. The proposed relief request is provided in Attachment 1.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this matter, please contact Mr. Brian Thomas at 856-339-2022.

Sincerely,

Paul R. Duke, Jr.
Manager - Licensing

NOV 25 2014

Attachment 1: 10 CFR 50.55a Relief Request HC-I3R-07

cc: Mr. David Lew, Acting Administrator, Region I, NRC
NRC Senior Resident Inspector, Hope Creek
Ms. Carleen Sanders-Parker, Project Manager, Hope Creek, USNRC
Mr. Pat Mulligan, Manager IV, NJBNE
Mr. Lee Marabella, Corporate Commitment Tracking Coordinator
Mr. Thomas MacEwen, Hope Creek Commitment Tracking Coordinator

Attachment 1

10 CFR 50.55a Relief Request HC-I3R-07

ATTACHMENT 1

Hope Creek Generating Station, Unit No. 1
Renewed Facility Operating License No. NPF-57
NRC Docket No. 50-354

Relief Request - HC-I3R-07

Proposed Alternative in Accordance with 10 CFR 50.55a(a)(3)(ii)
Hardship or Unusual Difficulty without Compensating
Increase in Level of Quality or Safety

1. ASME Code Component(s) Affected

Code Class:	3
Description:	H1EG -1EGV-544, S/N 1-11938-01, Station Auxiliary Cooling System (SACS) to Fuel Pool Cooling cross connection valve H1EG -1EGV-545, S/N 2-11938-01, SACS to Fuel Pool Cooling cross connection valve H1EG -1EGV-546, S/N 3-11938-01, SACS to Fuel Pool Cooling cross connection valve H1EG -1EGV-547, S/N 4-11938-01, SACS to Fuel Pool Cooling cross connection valve
Unit/Inspection:	Hope Creek /Third 10-Year Interval

2. Applicable Code Edition and Addenda

The Hope Creek Third 10-Year Inservice Inspection (ISI) interval began on December 13, 2007, and is scheduled to end on December 12, 2017. The Code of Record for the Third 10-Year interval is the American Society of Mechanical Engineers (ASME) Section XI, 2001 Edition through 2003 Addenda.

The applicable code of construction for the valves listed in section 1 is ASME Section III, 1974 Edition through 1975 Summer Addenda and is applicable for this relief request.

3. Applicable Code Requirement

IWA-4221(b) (1) states, "When replacing an existing item, the new item shall meet the Construction Code to which the original item was constructed."

IWA-4221(c) states in part, "As an alternative to (b), the item may meet all or portions of the requirements of different Editions and Addenda of the Construction Code, or Section III when the Construction Code was not Section III.... Construction Code Cases may also be used."

ND-4600 of ASME Section III requires Post-Weld Heat Treatment (PWHT) of all ASME Class 3 welds, including repair welds, to the temperature ranges and holding times of Table ND-4622.1-1 except as otherwise permitted in ND-4622.7. ND-4622.7 allows for exemption from PWHT of fillet welds in P-Number 1 material having a nominal thickness of ¾ inch or less provided a minimum preheat of 200 degrees F is applied.

4. Reason for Request

In April 2000, Hope Creek Generating Station (HCGS) installed four ASME Class 3, 8 inch TRICENTRIC valves from Weir Valves and Controls Company USA, Inc. (WVCC), in the SACS. The valves are normally closed and act as a cross tie between the Fuel Pool Cooling and Cleanup (FPCC) heat exchangers. Installed valves are stamped and certified to be in compliance with ASME Section III 1974 Edition through 1975 Summer Addenda. The installed valves have been functioning satisfactorily since installation.

In 2011, WVCC informed PSEG that, during fabrication, the welding process used to install stainless steel (P-Number 8) seats to carbon steel (P-Number 1) bodies of the subject valves did not fully comply with ASME Section III, Subsection ND Class III components Table ND-4622.1-1.

The condition noted was that the base material was not preheated to 200 degrees F (minimum) for applying the valve seat fillet weld as required by Table ND-4622.1-1 paragraph ND-4622.1 to allow the exemption from post-weld heat treatment. The WVCC welding procedure required a minimum preheat of 60 degrees F instead of 200 degrees F. These seat rings are welded to the valve body wall by applying 3/16-inch fillet weld using Shielded Metal Arc Welding (SMAW), and WVCC welding procedure 90-61-009 Rev 4.

WVCC indicated that testing was performed to support continued operation of the installed valves without the prescribed heat treatment required by the code.

Replacing the four FPCC heat exchanger cross tie valves would cause the station the following hardships without an increase in level of quality or safety:

Dose Exposure
Two of the FPCC SACS cross tie valves can be replaced by isolating a FPCC heat exchanger from its SACS loop, and draining the isolated heat exchanger and related piping. The process would then be repeated for the remaining valves. The dose rate for the area is approximately 4 mRem/hr. The time to replace all four valves is approximately 273 person-hours of which 113 person-hours will be spent in the 4 mRem/hr field. As such, personnel performing the work necessary to support removal and installation of the four new valves will receive an approximate total exposure of 452 mRem (113 person-hours times 4 mRem/hour). This unnecessary dose would not be consistent with the site's ALARA (As Low As Reasonably Achievable) Program.

Station Risk Impact /Availability
Qualitatively, the unavailability of one FPCC heat exchanger reduces the defense-in-depth and the cooling capacity of the system. This makes the station vulnerable to a loss of FPCC with one additional failure and the subsequent increase in pool temperatures until the system function is restored. If maintenance is performed online, recommended compensatory actions would be to protect the redundant train of FPCC and to perform the maintenance at a time when fuel pool heat load is low. During shutdown conditions, ORAM (Outage Risk Assessment and Management) is used as the primary risk assessment tool. ORAM is a defense-in-depth model used to maintain Key Safety Functions (KSF). Unavailability of a FPCC heat exchanger would impact the Fuel Pool Cooling KSF and the Shutdown Cooling KSF.

While the risk associated with the replacement of the identified valves would be manageable, when assessed against the high confidence that the valves can perform their specified service without restriction as discussed in Section 5 of this request, the replacement of the valves does not support a corresponding increase in quality or safety. The resources to replace these valves are better allocated to other work that will improve the quality or safety of the plant.

5. Proposed Alternative and Basis for Use

HCGS proposes to continue service with the valves listed in Section 1 without replacement. Pursuant to 10 CFR 50.55a(3)(ii), HCGS requests relief from ASME Section XI requirements. Specifically, HCGS proposes an alternative to the Construction Code requirements of IWA-4221(c). As permitted by IWA-4221(c), replacement components may comply with later Edition/Addenda of the original Construction Code (e.g., ASME Section III). However, contrary to IWA-4221(c), four replacement ASME Class 3 valves certified as complying with ASME Section III,

Subsection ND requirements were later found to be in noncompliance with the post-weld heat treatment exemptions of Table ND-4622.1-1. More specifically, the post-weld heat treatment requirements applicable to fillet and partial penetration welds in base materials over 1-1/2 inch and with nominal thicknesses ¾ inch or less in Table ND-4622.1-1 were not met.

By letter dated August 19, 2013 (Reference 1), as supplemented by letter dated October 17, 2013 (Reference 2), Entergy Operations, Inc., requested relief from the requirements of the ASME Boiler and Pressure Vessel Code (Code) to permit standby service water system valves not meeting the PWHT requirements of the construction code to remain in service for the life of each valve seat at River Bend Station (RBS), Unit 1.

RBS purchased and installed valves from WVCC. Valves installed at RBS contain the same condition as discussed for HCGS WVCC valves. During fabrication, the welding process used to install stainless steel (P-Number 8) seats to carbon steel (P-Number 1) bodies of the subject valves did not fully comply with Table ND-4622.1-1 of the ASME Code Section III. The base material was not preheated to 200 degrees F (minimum) as required by Table ND-4622.1-1 for exemption from post-weld heat treatment. RBS demonstrated that the installed valves are capable of satisfactory performance without the application of elevated preheat or post-weld heat treatment and further proposed to allow the valves to remain in service for the life of each valve seat.

The NRC staff concluded that RBS could leave the installed valves in service without replacement as documented in the RBS safety evaluation report (Reference 3).

Structural Integrity (SI) Report No. 1300615.401 (Reference 1, Attachment 2) provided the technical basis that demonstrated the installed valves are capable of satisfactorily performing their function without the application of elevated preheat or post-weld heat treatment.

Applicability of SI Report No. 1300615.401 to HCGS Valves

To demonstrate applicability of the SI report to HCGS, a comparison between WVCC valves installed at RBS and HCGS is shown in tabular form below:

	RBS	HCGS
Code of construction for valve	ASME section III 1974, 1975 addenda	ASME section III 1974, 1975 addenda
Valve Manufacturer	WVCC	WVCC
Valve body material	SA216 WCB	SA216 WCB
Carbon equivalent of valve body (CEq)	0.37 – 0.43	0.38
Carbon content valve body	0.19 - 0.23	0.21
Seat ring material	ASTM A240-97A 316	ASTM A240-97A 316
Weld Rod (WR)	ARCOS 309L-16	ARCOS 309L-16
WR. Lot No	9E24E-24A Used on 8 inch TRICENTRIC valve	9E24E-24A
WVCC Weld Procedure	90-61-009 Rev 4	90-61-009 Rev 4
WVCC Weld Method	SMAW	SMAW

Carbon equivalency is a tool developed by the industry to help sort material compositions that will be likely to form the stronger and harder phases. There are numerous formulas available that have been developed for different applications but the one adopted for welding considerations by Section IX of the ASME Code is the International Institute of Welding (IIW) formula given in Article IV Welding Data. The CEq formula is as follows:

$$CEq = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$$

This is the formula used to compute the CEq values reported in table above and is the same formula used in SI report (Reference 1, Attachment 2).

The table above demonstrates that the HCGS valves are bounded by the valve used by SI in the analysis performed for RBS. The carbon equivalency of the RBS valve sacrificed for testing was 0.46. The carbon equivalency, CEq, is lower in the HCGS valves making them less susceptible to hardenability. Having a lower CEq reduces the potential to form martensite. Martensite is a strong microstructure that improves strength but at the expense of ductility.

As stated in the safety evaluation report (SER) for RBS-R&R-2013-001, hardenability of the valve seat to valve body fillet welds is critical to this alternative. Based on certified materials test reports, the valve used by SI had a higher carbon equivalent than any of the valves in service at RBS. The NRC staff concluded that this valve represented the bounding case as the most hardenable material. Since the HCGS valves have a lower carbon equivalent then the RBS valve sacrificed for testing, the HCGS valves are bounded by the SI evaluation.

Reference 1, Attachment 2, Section 4.5, Weir Stress Analysis Results, (including Table A-2) documents an independent review by SI of a stress analysis performed by WEIR Valve concluding that significant conservatism exists with the valve design with respect to the valve seat ring to valve body fillet weld and that this conservatism increases with decreasing valve size. All four HCGS valves for which relief is being sought are 8 inch (8-150) valves and are consistent (relative to materials, construction, and configuration) with the 8-150 valves accepted via the RBS SER.

CONCLUSION

The valves installed at HCGS are bounded by the analysis performed by RBS, and a low level of risk and sufficient level of quality and safety are maintained. The studies and tests (discussed in Reference 1, Attachment 2) show that the expected Heat Affected Zone (HAZ) properties would be adequate to meet the requirements for the installed valves, thus proving their continued use is acceptable and that replacement is an unnecessary hardship. Therefore, HCGS requests that the NRC staff authorize the requested hardship and allow continued use of all four installed valves in accordance with 10 CFR 50.55a(a)(3)(ii).

6. Duration of Proposed Alternative

The duration is for the life of the valve seats for the four identified valves.

7. Precedents

A similar relief request was approved by the NRC for River Bend Station (Reference 3).

8. References

1) Letter from Entergy to NRC, "River Bend Station, Unit 1 – Requests for Relief, Request for Relief from ASME Boiler & Pressure Vessel Code Section III," dated August 19, 2013 (ADAMS Accession No. ML13239A074)

2) Letter from Entergy to NRC, "River Bend Station, Unit 1 – Request for Relief RBS-R&R-2013-001, Request for Relief from ASME Boiler & Pressure Vessel Code," dated October 17, 2013 (ADAMS Accession No. ML13295A421)

3) Letter NRC to Entergy, "River Bend Station, Unit 1 – Relief Request RBS-R&R-2013-001 Proposed Alternative to 10 CFR 50.55a Post-Weld Heat Treatment (TAC No. MF2733)," dated January 28, 2014 (ADAMS Accession No. ML13353A608)