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U.S. Nuclear Regulatory Commission
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**SUSQUEHANNA STEAM ELECTRIC STATION
PROPOSED RELIEF REQUEST NO. 3RR-14 TO
THE THIRD 10-YEAR IN-SERVICE INSPECTION
PROGRAM FOR SUSQUEHANNA SES UNITS 1 AND 2
PLA-6159**

**Docket Nos. 50-387
and 50-388**

This letter requests NRC approval of PPL Susquehanna, LLC (PPL) Relief Request No. 3RR-14, in support of the Third 10-Year In-service Inspection interval for Susquehanna SES Units 1 and 2.

This relief request is submitted in accordance with 10 CFR 50.55a(a)(3)(i) and applies to the use of an alternate program for the inspection of the RPV shell-to-flange weld and head-to-flange weld. The alternative program will be implemented through the Performance Demonstration Initiative (PDI) program.

This relief request is similar to one approved for the Edwin I. Hatch Nuclear Plant on January 3, 2006 (Accession Number ML 053470091). Approval is requested by January 1, 2008.

Should you have any questions, please contact Mr. C. T. Coddington at (610) 774-4019.

B. T. McKinney

Enclosure - Relief Request No. 3RR-14

Copy: NRC Region I
Mr. A. J. Blamey, NRC Sr. Resident Inspector
Mr. R. V. Guzman, NRC Sr. Project Manager
Mr. R. R. Janati, DEP/BRP

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PPL SUSQUEHANNA, LLC
SUSQUEHANNA SES, UNITS 1 AND 2
THIRD 10-YEAR INTERVAL
RELIEF REQUEST NO. 3RR-14

**PPL SUSQUEHANNA, LLC
SUSQUEHANNA SES, UNITS 1 AND 2
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SYSTEM/COMPONENT(S) FOR WHICH RELIEF IS REQUESTED

Category B-A, reactor pressure vessel (RPV) shell-to-flange weld AF (Item B1.30) and head-to-flange weld AG (Item B1.40).

CODE REQUIREMENTS

Third interval examinations will be performed per the requirements of ASME Section XI, 1998 Edition through the 2000 Addenda, as amended by 10 CFR 50.55a.

The NRC amended the use of the 1998 Edition through the 2000 Addenda in Paragraph 10 CFR 50.55a(b)(2)(xxiv), which states, "*The use of Appendix VIII and the supplements to Appendix VIII and Article I-3000 of Section XI of the ASME BPV Code, 2002 Addenda through the latest edition and addenda incorporated by reference in paragraph (b)(2) of this section, is prohibited.*" Therefore, when referencing Appendix VIII, licenses are limited to using the 2001 Code.

The RPV shell-to-flange weld and the head-to-flange weld are currently required to be examined per Appendix I, I-2100(b) of the 1998 Edition of the ASME Section XI through the 2000 Addenda, which requires that the examination be conducted in accordance with Article 4, except that alternative beam angles may be used. Additionally, there is a requirement to supplement the Section V examinations with Table I-2000-1. Section T-472.1 of the 1998 Edition of Section V with the 2000 Addenda defines the ultrasonic scanning criteria for the examination of reactor vessel-to-flange welds and closure head-to-flange welds. These are:

- (T-472.1.1) The beam angle shall be appropriate for the configuration being examined and that the beam angle shall be capable of detecting the calibration reflectors, over the required angle beam paths.
- (T-472.1.2) When scanning for reflectors parallel to the weld seam, the angle beam shall be directed at approximate right angles to the weld axis from both sides of the weld (i.e., from two directions) on the same surface when possible. The search unit shall be manipulated so that the ultrasonic energy passes through the required volume of weld and adjacent base material.

- (T-472.1.3) When scanning for reflectors transverse (perpendicular) to the weld seam, the angle beam shall be directed essentially parallel to the weld axis. The search unit shall be manipulated so that the ultrasonic energy passes through the required volume of weld and adjacent base material. The search unit shall be rotated 180 degrees and the examination repeated.
- (T-472.2) Welds that cannot be fully examined from two directions using the angle beam techniques shall also be examined if possible with a straight beam technique.
- (T-472.3) Welds that cannot be examined from at least one side (edge) using the angle beam technique shall be noted in the examination report. For flange welds, the weld may be examined with a straight beam or low angle longitudinal waves from the flange surface provided the examination volume can be covered.

RELIEF REQUESTED

In lieu of the Article 4 of Section V angle beam examination, PPL proposes to use an angle beam examination that will be performed using examination procedures, personnel, and equipment qualified in accordance with Appendix VIII, Supplements 4 and 6, as amended by the conditions set forth in 10 CFR 50.55a..

BASIS FOR RELIEF

Appendix VIII requirements were developed to ensure the effectiveness of UT examinations within the nuclear industry by means of a rigorous, item-specific performance demonstration. The performance demonstration (through PDI) was conducted on RPV mockups containing flaws of various size and allocations. The demonstration established the capability of equipment, procedures, and personnel to find flaws that could be detrimental to the integrity of the RPV. The performance demonstration showed that for the detection of flaws in RPV welds, the UT techniques were equal to or surpassed the requirements of the Section V, Article 4 of the ASME Code. Additionally, the PDI qualified sizing techniques are considered to be more accurate than the techniques used in Article 4 of Section V.

Although Appendix VIII is not required for the RPV shell-to-flange weld and RPV head-to-flange weld, the use of Appendix VIII criteria for detection and sizing of flaws in these welds will be equal to or will exceed the requirements established by Article 4 of Section V. Therefore, the use of this proposed alternative will continue to provide an

acceptable level of quality and safety, and approval is requested pursuant to 10 CFR 50.55a(a)(3)(i).

ALTERNATIVE EXAMINATION

In lieu of the Article 4 of Section V angle beam examination, PPL proposes to use an angle beam examination that will be performed using examination procedures, personnel, and equipment qualified in accordance with Appendix VIII, Supplements 4 and 6, as amended by the conditions set forth in 10 CFR 50.55a. Examination of each weld is described below: (See Figure 1)

AF – Vessel-to-Flange

The Section XI required examination volume will be scanned for flaws from the outside of the vessel using a 60-degree refracted longitudinal wave; however, the curvature of the flange surface above the weld will limit transducer travel such that examinations can only be performed from the shell side. Additionally, the refueling bellows prevent examinations from being performed from the vertical portion of the flange surface located directly above the curvature. The projected single-side coverage for flaws located parallel to the weld is shown in Figures 2 and 3.

Since the examination will be from a single side, the requirements of 10 CFR 50.55a (b)(2)(xvi)(A) apply. Therefore, examinations will be conducted with equipment, procedures, and personnel that have demonstrated proficiency with single-side examinations. To demonstrate equivalency to two-sided examinations, the demonstration must be performed to the requirements of Appendix VIII as modified by this paragraph and 10 CFR 50.55a(b)(2)(xv)(B) through (G), on specimens containing flaws with non-optimum sound energy reflecting characteristics or flaws similar to those in the vessel being examined. Examination of the Section XI required volume will be performed as follows:

Per 10 CFR 50.55a(b)(2)(xv)(G)(1), the clad-to-base metal interface, including a minimum of 15 percent T (measured from the clad-to-base metal interface), shall be examined from four orthogonal directions using procedures and personnel qualified in accordance with Supplement 4 to Appendix VIII.

Per 10 CFR 50.55a(b)(2)(xv)(G)(2), if the clad-to-base-metal-interface procedure demonstrates detectability of flaws with a tilt angle relative to the weld centerline of at least 45 degrees, the remainder of the examination volume is considered fully examined if coverage is obtained in one parallel and one perpendicular direction. This must be accomplished using a procedure and personnel qualified for single-side examination in accordance with Supplement 6. Subsequent examinations of

this volume may be performed using examination techniques qualified for a tilt angle of at least 10 degrees.

Per 10 CFR 50.55a(b)(2)(xv)(G)(3), the examination volume not addressed by 10 CFR 50.50a(b)(2)(xv)(G)(1) is considered fully examined if coverage is obtained in one parallel and one perpendicular direction, using a procedure and personnel qualified for single-sided examination when the provisions of 10 CFR 50.55a(b)(2)(xv)(G)(2) are met.

AG – Closure Head-to-Flange Weld

The Section XI required examination volume will be scanned for flaws using a 60-degree refracted longitudinal wave. Examinations will be performed from both the head and flange side of the weld; however, the short distance from the weld to the flange limits the examination on the flange side weld. The RPV head is not clad; therefore, when applying Appendix VIII, only Supplement 6 would normally be required. However, instead of using Supplement 6 to perform the examination of the entire examination volume, guidance will be taken from Code Case N-664 (which applies to unclad vessel welds, excluding flanges), to perform the examination of the inner 15% of the examination volume per Supplement 4 of Appendix VIII. The outer 85% of the examination volume will be examined using Supplement 6. The application of Code Case N-664 (and thus the use of Supplement 4 for the inner 15% on this flange configuration) is considered to be an acceptable practice because the PDI qualification using Supplement 4 clad specimens is considered to be more difficult than the qualification using Supplement 6 specimens. By using this approach, weld AG will be examined using the same requirements as specified above for weld AF. The projected coverage for flaws located parallel to the weld is shown in Figures 4 and 5.

JUSTIFICATION FOR GRANTING RELIEF

Pursuant to 10 CFR 50.55a(a)(3)(i), approval is requested to use the proposed alternatives described above in lieu of the ASME Code Article 4 of Section V. Compliance with the proposed alternatives will provide an adequate level of quality and safety for examination of the affected welds.

IMPLEMENTATION SCHEDULE

The alternative program will be applicable to the Third 10-Year In-service Inspection Interval for Susquehanna SES Units 1 and 2.

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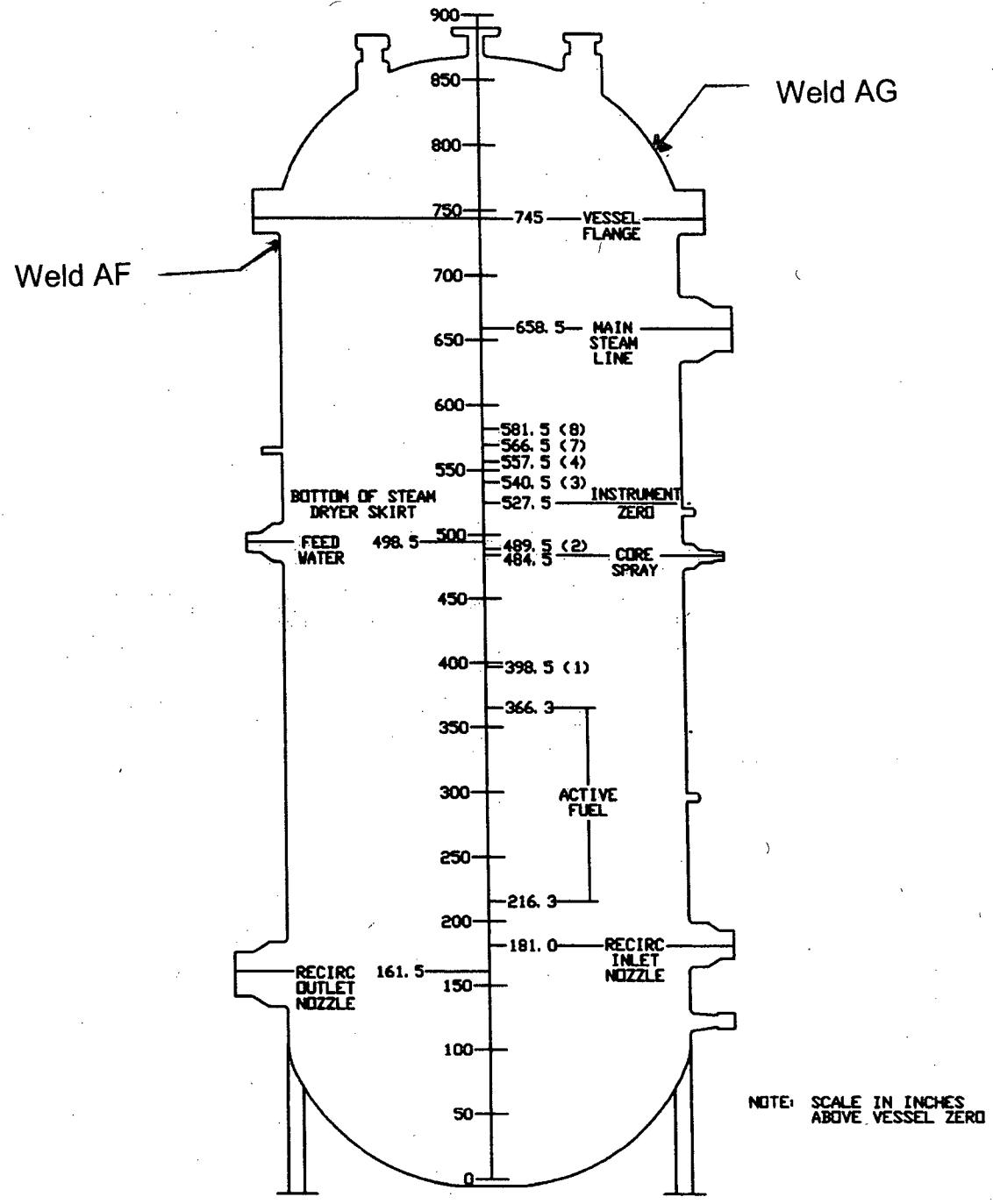
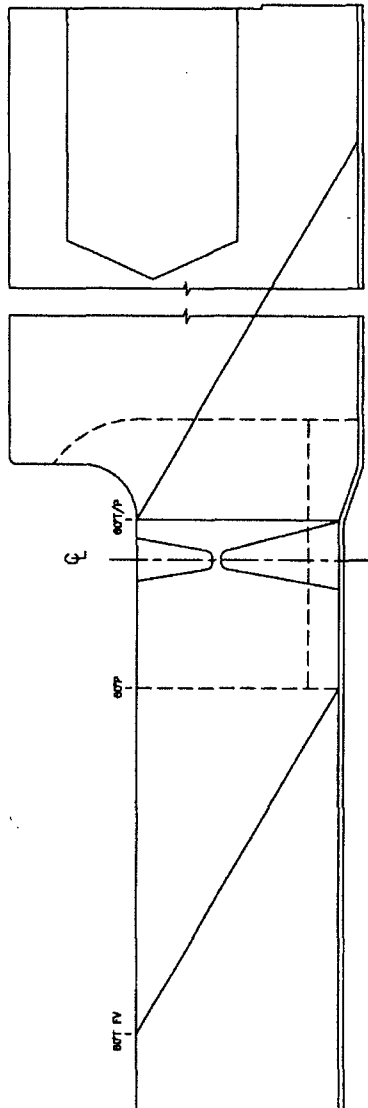


Figure 1
Location of Welds

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Weld AF

60° S6 Exam Volume = 64.2 Sq. In.
60° S4 Exam Volume = 12.4 Sq. In.

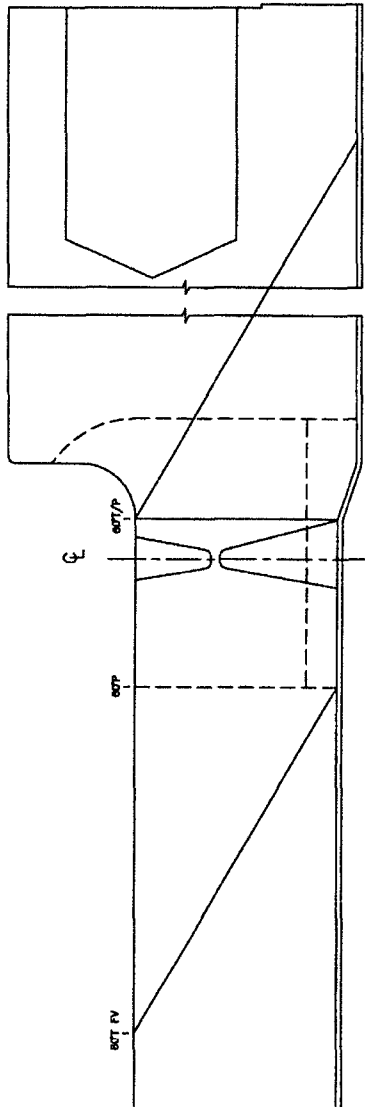
60° T-Scan achieved = 56.1 Sq. In.
60° S4 T-Scan achieved = 12.4 Sq.

60° S6 P-Scan achieved = 37.6 Sq.
60° S4 P-Scan achieved = 6.6 Sq.

100% of the weld nugget examined
single sided demonstrated techniques
for flaws parallel to the weld axis.

Figure 2
Susquehanna SES Unit 1
AF - Vessel-to-Flange Weld

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Weld 'AF

60° S6 Exam Volume = 64.2 Sq. In.
60° S4 Exam Volume = 12.4 Sq. In.

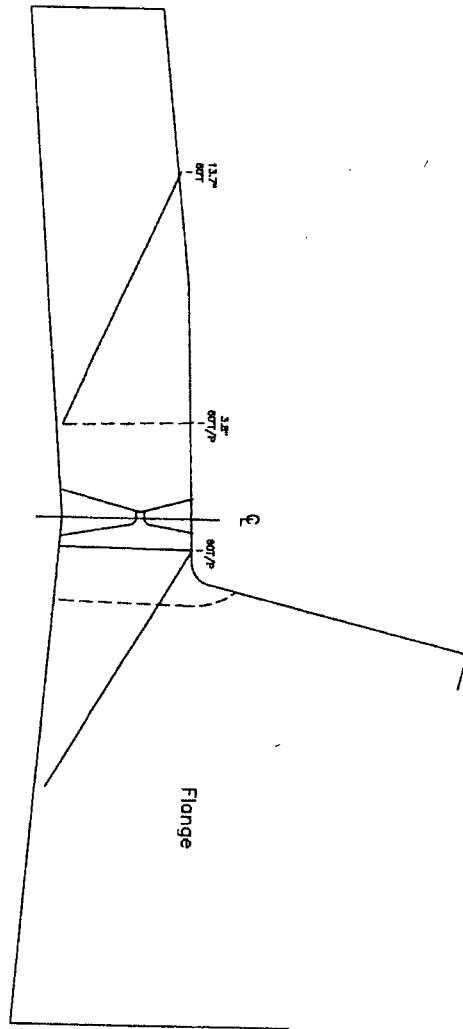
60° T-Scan achieved = 56.1 Sq. In.
60° S4 T-Scan achieved = 12.4 Sq.

60° S6 P-Scan achieved = 37.6 Sq.
60° S4 P-Scan achieved = 6.6 Sq.

100% of the weld nugget examined
single sided demonstrated techniques
for flaws parallel to the weld axis.

Figure 3
Susquehanna SES Unit 2
AF - Vessel-to-Flange Weld

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Weld AG

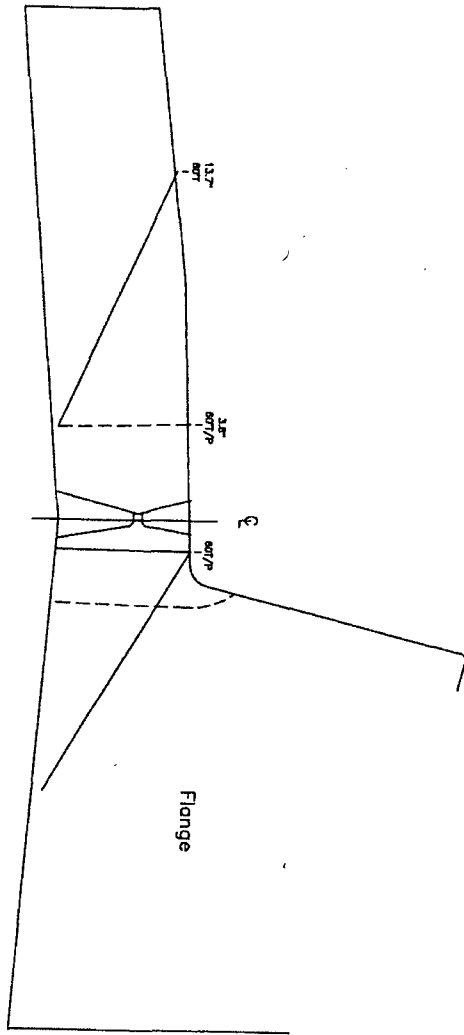
60° S6 Exam Volume = 37.4 Sq. In.
60° S4 Exam Volume = N/A Unclad

60° S6 T-Scan achieved = 34.7 Sq. In.
60° S4 T-Scan achieved = N/A Unclad

60° S6 P-Scan achieved = 25 Sq. In.
60° S4 P-Scan achieved = N/A Unclad

Figure 4
Susquehanna SES Unit 1
AG – Closure Head-to-Flange Weld

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Weld AG

60° S6 Exam Volume = 37.4 Sq. In.
60° S4 Exam Volume = N/A Unclad

60° S6 T-Scan achieved = 34.7 Sq. In.
60° S4 T-Scan achieved = N/A Unclad

60° S6 P-Scan achieved = 25. Sq. In.
60° S4 P-Scan achieved = N/A Unclad

Figure 5
Susquehanna SES Unit 2
AG – Closure Head-to-Flange Weld