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APR 26 2007

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Stop OP1-17
Washington, DC 20555

SUSQUEHANNA STEAM ELECTRIC STATION
PROPOSED LICENSE AMENDMENT NO. 285
FOR UNIT 1 OPERATING LICENSE NO. NPF-14
AND PROPOSED LICENSE AMENDMENT NO. 253
FOR UNIT 2 OPERATING LICENSE NO. NPF-22
EXTENDED POWER UPRATE APPLICATION
RE: VESSELS AND INTERNALS TECHNICAL REVIEW
REQUEST FOR ADDITIONAL INFORMATION RESPONSES **Docket Nos. 50-387**
PLA-6186 **and 50-388**

References: 1) *PPL Letter PLA-6076, B. T. McKinney (PPL) to USNRC, "Proposed License Amendment Numbers 285 for Unit 1 Operating License No. NPF-14 and 253 for Unit 2 Operating License No. NPF-22 Constant Pressure Power Uprate," dated October 11, 2006.*

2) *Letter, R. Guzman (NRC) to B. T. McKinney (PPL), "Request for Additional Information (RAI) - Susquehanna Steam Electric Station, Units 1 and 2 (SSES 1 and 2) - Extended Power Uprate Application Re: Vessels and Internals Technical Review (TAC Nos. MD3309 and MD3310)," dated March 29, 2007.*

Pursuant to 10 CFR 50.90, PPL Susquehanna, LLC (PPL) requested in Reference 1 approval of amendments to the Susquehanna Steam Electric Station (SSES) Unit 1 and Unit 2 Operating Licenses (OLs) and Technical Specifications (TS) to increase the maximum power level authorized from 3489 megawatts thermal (MWt) to 3952 MWt, an approximate 13% increase in thermal power. The proposed Constant Pressure Power Uprate (CPPU) represents an increase of approximately 20% above the Original Licensed Thermal Power (OLTP).

The purpose of this letter is to provide responses to the Request for Additional Information transmitted to PPL in Reference 2.

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The Enclosure contains the PPL responses.

There are no new regulatory commitments associated with this submittal.

PPL has reviewed the "No Significant Hazards Consideration" and the "Environmental Consideration" submitted with Reference 1 relative to the Enclosure. We have determined that there are no changes required to either of these documents.

If you have any questions or require additional information, please contact Mr. Michael H. Crowthers at (610) 774-7766.

I declare under perjury that the foregoing is true and correct.

Executed on: April 26, 2007

for B. T. McKinney

Enclosure: Request for Additional Information Responses

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

PPL EPU

Request for Additional Information Responses

NRC RAI 1:

Regarding the section titled "Integrated Surveillance Program (ISP)" of the licensee's submittal which addresses the implementation of the Boiling Water Reactor Vessel and Internals Project (BWRVIP) ISP to meet the requirements of 10 CFR Part 50, Appendix H:

NRC RAI 1a:

What is the projected fluence for the Susquehanna, Unit 1 120 degrees azimuth capsule at its scheduled withdrawal date (2012), taking into account EPU conditions?

PPL Response 1a:

The projected fluence for the Unit 1 120 degrees azimuth capsule at the scheduled withdrawal in 2012 is 5.5E17 n/cm2. This projection was determined using the RAMA code. The analysis includes EPU conditions. The analysis has been submitted to the BWRVIP Project Manager as required by the programmatic requirements of BWRVIP-86A.

NRC RAI 1b:

Provide an evaluation of the acceptability of removing the Susquehanna, Unit 1 120 degrees azimuth capsule in 2012 based upon its updated projected fluence and intended purpose within the BWRVIP ISP. In particular, explain how removing the capsule in 2012 will result in data from the capsule adequately representing those facilities who are identified as relying on it in BWRVIP-78 and BWRVIP-86-A.

PPL Response 1b:

The Unit 1 120 degrees azimuth capsule will be representative of the facilities identified as relying on it in BWRVIP-78 and BWRVIP-86-A when withdrawn in 2012.

The data from the capsule will be representative because PPL will follow the protocols of BWRVIP-86A. The withdrawal, decontamination, and shipping technical and programmatic requirements of BWRVIP-86A will be met.

Note that BWRVIP-78 has been superseded by the NRC approved BWRVIP-86A.

NRC RAI 2:

Regarding the section titled "Upper Shelf Energy (USE)" of the licensee's submittal which addresses the evaluation of reactor pressure vessel (RPV) USE values to demonstrate compliance with 10 CFR Part 50, Appendix G:

NRC RAI 2a:

Provide a table which demonstrates how the end-of-license USE values (or USE drop values where initial USE values are not available) were calculated for all RPV beltline materials considered EPU conditions. Sufficient detail regarding input parameters should be provided to allow the NRC staff to independently verify the results. Based on the present RAMA Code fluence evaluation for 54 EFPY, there are no additional components that fall under the Appendix G requirements.

PPL Response 2a:

Tables 1 through 8 provide the end-of-license USE values and USE drop values (where initial USE values are not available) for SSES Units 1 and 2. The Tables also provide the input parameters to allow the NRC staff to verify independently the results. Note that all plates and welds exposed to fluence greater than 1.0E17 n/cm^2 are evaluated in the Tables.

The USE and Equivalent Margins Analysis (EMA) for SSES Unit 1 materials are shown in Tables 1 through 4. All projected USE values in Table 1 for 54 EFPY are above 50 ft-lbs, except for plates B5083-1, C0803-1 and C0776-1.

For these plates (B5083-1, C0803-1, C0776-1) and C0770-2, the need for an EMA is identified in the NRC's Reactor Vessel Integrity Database version 2.0.1 (RVID). As shown in Tables 2 through 4, the EMA results for these plates are bounded by the BWRVIP-74-A criteria. Therefore, all SSES Unit 1 materials are acceptable from a USE standpoint for 54 EFPY.

The USE and EMA for SSES Unit 2 materials are shown in Tables 5 through 8. All projected USE values in Table 5 for 54 EFPY are above 50 ft-lbs, except for Plates C2421-3 and C2433-2 and Weld 09M057.

For these materials (plates C2421-3 and C2433-2 and weld 09M057), the need for an EMA is identified in the NRC's RVID. As shown in Tables 6 through 8, the EMA's for these materials are bounded by the BWRVIP-74-A criteria. Therefore, all SSES-2 materials are acceptable from a USE standpoint for 54 EFPY.

NRC RAI 2b:

Demonstrate how the requirements of 10 CFR Part 50, Appendix G are directly met, or met through application of equivalent margins analysis of BWRVIP-74-A, for the limiting plate/forging and weld materials for each of the Susquehanna RPVs.

PPL Response 2b:

Demonstration of compliance to 10CFR50 Appendix G requirements has been accomplished in accordance with Regulatory Guide 1.99 "Radiation Embrittlement of Reactor Vessel Materials" Revision 2 for the limiting plate/forging and weld materials for Unit 1 and 2 as demonstrated in Tables 1 and 5.

Table 1 lists the Unit 1 limiting plate (heat # C2433-1) and the limiting weld (heat # is 494K2351). Table 5 lists the Unit 2 limiting plate (heat # C2421-3) and the limiting weld (heat # is 624263).

Table 1: SSES-1 USE Assessment for 54 EFPY

Part Name & Material	ID	Heat	Lot	% Cu	Unirr. C_vUSE [1] (ft-lbs)	1/4t Fluence [2] (10^{19} n/cm^2)	% Drop in C_vUSE	C_vUSE @ 1/4t [3] (ft-lbs)	Requires EMA ? [4]
Lower Shell #1	21-1	B5083-1	---	0.14	48.1 [6]	0.0808	12.8	41.9	YES
Lower Shell #2	21-2	C0770-2	---	0.14	68.9 [6]	0.0808	12.8	60.1	NO (see Note 5)
Lower Shell #3	21-3	C0814-2	---	0.13	78.0 [6]	0.0808	12.2	68.5	NO
Lower-Int. Shell #1	22-1	C0803-1	---	0.09	52.7 [6]	0.0974	10.9	47	YES
Lower-Int. Shell #2	22-2	C0776-1	---	0.12	36.4 [6]	0.0974	12.2	32	YES
Lower-Int. Shell #2	22-3	C2433-1	---	0.10	87.8	0.0974	10.9	78.2	NO
Weld #1	---	629616	L320A27AG	0.04	114.0	0.0808	10.5	102.0	NO
Weld #2	---	411L3071	L311A27AF	0.03	109.0	0.0808	10.5	97.6	NO
Weld #3	---	494K2351	L307A27AD	0.04	192.0	0.0808	10.5	171.8	NO
Weld #4	---	401S0371	B504B27AE	0.03	127.0	0.0808	10.5	113.7	NO
Weld #5	---	402K9171	K315A27AE	0.03	109.0	0.0808	10.5	97.6	NO
Weld #6	---	402C4371	C115A27A	0.02	92.0 [6]	0.0808	10.5	82.3	NO
Weld #7	---	412P3611	J417B27AF	0.03	140.0	0.0808	10.5	125.3	NO

Notes:
1. Unirradiated C_vUSE values are obtained from Table 7-5 of GE Report GE-NE-523-169-1292, which match the values in RVID2, except for Welds, #2 and #5, where the surveillance results from Table 5-5 of that GE report are used.
2. The fluence values are obtained from RAMA Code fluence evaluation on the RPV ID wall data, which includes EPU and is adjusted to ¼ t using Reg. Guide 1.99.
3. C_vUSE at ¼ t computed as (Unirr. C_vUSE)(100 - % Drop in C_vUSE).
4. If C_vUSE < 50 ft-lbs, then "YES", and assessment for this material in accordance with BWRVIP-74-A will be performed.
5. Although EMA is not required for this plate (since C_vUSE > 50 ft-lbs), this plate is identified for EMA in RVID2. Therefore, EMA is conservatively performed.
6. Value is base in 10°F data, since the initial USE value is not available.

Table 2: SSES-1 Equivalent Margins Assessment for Plates B5083-1 and C0770-2 for 54 EFPY

BWR/3-6 PLATE
(SSES-1 PLATE Nos. B5083-1 and C0770-2)

Surveillance Plate USE:

%Cu =	0.09	
Capsule Fluence =	0.14×10^{18} n/cm^2	
Measure % Decrease =	-2 (increase)	(Charpy Curves)
RG1.99 Predicted % Decrease =	6	(RG1.99, Figure 2)

(Refer to pp. 5-5 and 5-10 of GE-NE-523-169-1292 for the above values)

Lower Beltline Plate USE:

%Cu =	0.14	*See Table 1*
54 EFPY Peak ID Fluence =	1.17×10^{18} n/cm^2	*RAMA CODE Fluence Evaluation*
54 EFPY 1/4t Fluence =	0.808×10^{18} n/cm^2	*See Table 1*
RG1.99 Predicted % Decrease =	12.8	
Adjusted % Decrease =	N/A	(RG1.99, Position 2.2)

12.8% ≤ 23.5% so vessel plates are bounded by equivalent margin analysis.

Table 3: SSES-1 Equivalent Margins Assessment for Plates C0803-1 for 54 EFPY

BWR/3-6 PLATE
(SSES-1 PLATE No. C0803-1)

Surveillance Plate USE:

%Cu =	0.09	
Capsule Fluence =	0.14×10^{18} n/cm^2	
Measure % Decrease =	-2 (increase)	(Charpy Curves)
RG1.99 Predicted % Decrease =	6	(RG1.99, Figure 2)

(Refer to pp. 5-5 and 5-10 of GE-NE-523-169-1292 for the above values)

Lower Beltline Plate USE:

%Cu =	0.09	*See Table 1*
54 EFPY Peak ID Fluence =	1.41×10^{18} n/cm^2	*RAMA CODE Fluence Evaluation*
54 EFPY 1/4t Fluence =	0.974×10^{18} n/cm^2	*See Table 1*
RG1.99 Predicted % Decrease =	10.9	
Adjusted % Decrease =	N/A	(RG1.99, Position 2.2)

10.9% ≤ 23.5% so vessel plates are bounded by equivalent margin analysis.

Table 4: SSES-1 Equivalent Margins Assessment for Plates C0776-1 for 54 EFPY

BWR/3-6 PLATE
(SSES-1 PLATE No. C0776-1)

Surveillance Plate USE:

%Cu =	0.09	
Capsule Fluence =	0.14×10^{18} n/cm^2	
Measure % Decrease =	-2 (increase)	(Charpy Curves)
RG1.99 Predicted % Decrease =	6	(RG1.99, Figure 2)

(Refer to pp. 5-5 and 5-10 GE-NE-523-169-1292 for the above values)

Lower Beltline Plate USE:

%Cu =	0.12	*See Table 1*
54 EFPY Peak ID Fluence =	1.41×10^{18} n/cm^2	*RAMA CODE Fluence Evaluation*
54 EFPY 1/4t Fluence =	0.974×10^{18} n/cm^2	*See Table 1*
RG1.99 Predicted % Decrease =	12.2	
Adjusted % Decrease =	N/A	(RG1.99, Position 2.2)

12.2% ≤ 23.5% so vessel plates are bounded by equivalent margin analysis.

Table 5: SSES-2 USE Assessment for 54 EFPY

Part Name & Material	ID	Heat	Lot	% Cu	Unirr. C_vUSE [1] (ft-lbs)	1/4t Fluence [2] (10^{19} n/cm^2)	% Drop in C_vUSE	C_vUSE @ 1/4t [3] (ft-lbs)	Requires EMA ? [4]
Lower Shell #1	21-1	6C956-1-1	---	0.11	125.1 [5]	0.0815	11.1	111.2	NO
Lower Shell #2	21-2	6C980-1-1	---	0.10	93.9 [5]	0.0815	10.5	84.0	NO
Lower Shell #3	21-3	6C1053-1-1	---	0.10	76.1 [5]	0.0815	10.5	68.1	NO
Lower-Int. Shell #1	22-1	C2421-3	---	0.13	52.0 [5]	0.0981	12.8	45.3	YES
Lower-Int. Shell #2	22-2	C2929-1	---	0.13	83.9	0.0981	12.8	73.2	NO
Lower-Int. Shell #2	22-3	C2433-2	---	0.10	48.1 [5]	0.0981	11.0	42.8	YES
Weld #1	---	629616	L320A27AG	0.04	114.0	0.0815	10.5	102.0	NO
Weld #2	---	624263	E204A27A	0.06	73.0 [5]	0.0815	11.2	64.8	NO
Weld #3	---	09M057	C109A27A	0.03	44.0 [5]	0.0815	10.5	39.4	YES
Weld #4	---	659N315	F414B27AF	0.04	137.0	0.0815	10.5	122.6	NO
Weld #5	---	411L3071	L311A27AF	0.03	125.0	0.0815	10.5	111.9	NO
Weld #6	---	494K2351	L307A27AD	0.04	192.0	0.0815	10.5	171.8	NO
Weld #7	---	401S0371	B504B27AE	0.03	125.0	0.0815	10.5	111.9	NO
Weld #8	---	402K9171	K315A27AE	0.03	134.0	0.0815	10.5	119.9	NO
Weld #9	---	402C4371	C115A27A	0.02	92.0 [5]	0.0815	10.5	82.3	NO
Weld #10	---	412P3611	J417B27AF	0.03	140.0	0.0815	10.5	125.3	NO

Notes:
1. Unirradiated C_vUSE values are obtained from Table 7-5 of GE Report GE-NE-523-107-0893 Rev. 1 except for Welds, #5 and #7, where the surveillance results from Table 5-5 of GE-NE-523-107-0893 Rev. 1 are used.
2. The fluence values are obtained from RAMA Code fluence RPV ID wall data, which includes EPU and is adjusted to ¼ t using Reg. Guide 1.99.
3. C_vUSE at ¼ t computed as (Unirr. C_vUSE)(100 - % Drop in C_vUSE).
4. If C_vUSE < 50 ft-lbs, then "YES", and assessment for this material in accordance with BWRVIP-74-A will be performed.
5. Value is based in 10° or40°F data, since the initial USE value is not available.

Table 6: SSES-2 Equivalent Margins Assessment for Plate C2421-3 for 54 EFPY

BWR/3-6 PLATE
(SSES-2 PLATE No. C2421-3)

Surveillance Plate USE:

%Cu =	0.12	
Capsule Fluence =	0.13×10^{18} n/cm^2	
Measure % Decrease =	-4 (increase)	(Charpy Curves)
RG1.99 Predicted % Decrease =	8	(RG1.99, Figure 2)

(Refer to pp.33 and 39 of GE-NE-523-107-0893 Rev. 1 for the above values)

Lower Beltline Plate USE:

%Cu =	0.13	*See Table 5*
54 EFPY Peak ID Fluence =	1.42×10^{18} n/cm^2	*RAMA CODE Fluence Evaluation*
54 EFPY 1/4t Fluence =	0.981×10^{18} n/cm^2	*See Table 5*
RG1.99 Predicted % Decrease =	12.8	
Adjusted % Decrease =	N/A	(RG1.99, Position 2.2)

12.8% ≤ 23.5% so vessel plates are bounded by equivalent margin analysis.

Table 7: SSES-2 Equivalent Margins Assessment for Plate C2433-2 for 54 EFPY

BWR/3-6 PLATE
(SSES-2 PLATE No. C2433-2)

Surveillance Plate USE:

%Cu =	0.12	
Capsule Fluence =	0.13×10^{18} n/cm^2	
Measure % Decrease =	-4 (increase)	(Charpy Curves)
RG1.99 Predicted % Decrease =	8	(RG1.99, Figure 2)

(Refer to pp. 33 and 39 of GE-NE-523-107-0893 Rev. 1 for the above values)

Lower Beltline Plate USE:

%Cu =	0.10	*See Table 5*
54 EFPY Peak ID Fluence =	1.42×10^{18} n/cm^2	*RAMA CODE Fluence Evaluation*
54 EFPY 1/4t Fluence =	0.981×10^{18} n/cm^2	*See Table 5*
RG1.99 Predicted % Decrease =	11.0	
Adjusted % Decrease =	N/A	(RG1.99, Position 2.2)

11.0% ≤ 23.5% so vessel plates are bounded by equivalent margin analysis.

Table 8: SSES-2 Equivalent Margins Assessment for Weld 09M057 for 54 EFPY

BWR/2-6 WELD
(SSES-2 Weld No. 09M057)

Surveillance Weld USE:

%Cu =	0.02	
Capsule Fluence =	0.13×10^{18} n/cm^2	
Measure % Decrease =	4	(Charpy Curves)
RG1.99 Predicted % Decrease =	5 to 6	(RG1.99, Figure 2)

(Refer to pp. 33 and 39 GE-NE-523-107-0893 Rev. 1 for the above values)

Weld #3 USE:

%Cu =	0.03	*See Table 5*
54 EFPY Peak ID Fluence =	1.18×10^{18} n/cm^2	*RAMA CODE Fluence Evaluation*
54 EFPY 1/4t Fluence =	0.815×10^{18} n/cm^2	*See Table 5*
RG1.99 Predicted % Decrease =	10.5	
Adjusted % Decrease =	N/A	(RG1.99, Position 2.2)

10.5% ≤ 39% so vessel plates are bounded by equivalent margin analysis.