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PSEG
Nuclear LLC

10 CFR 50.90

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October 10, 2007

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

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

Subject: Supplement to Response to Request for Additional Information
Request for License Amendment - Extended Power Uprate

References:
1) Letter from George P. Barnes (PSEG Nuclear LLC) to USNRC, September 18, 2006
2) Letter from USNRC to William Levis (PSEG Nuclear LLC), June 7, 2007
3) Letter from George P. Barnes (PSEG Nuclear LLC) to USNRC, August 3, 2007

In Reference 1, PSEG Nuclear LLC (PSEG) requested an amendment to Facility Operating License NPF-57 and the Technical Specifications (TS) for the Hope Creek Generating Station (HCGS) to increase the maximum authorized power level to 3840 megawatts thermal (MWt).

In Reference 2, the NRC requested additional information concerning PSEG's request. PSEG provided the response to the request for additional information in Reference 3. Attachment 1 to this letter provides supplemental information to the PSEG response to NRC request for additional information (RAI) 14.74 in the Reference 3 letter.

PSEG has determined that the information contained in this letter and attachment does not alter the conclusions reached in the 10CFR50.92 no significant hazards analysis previously submitted.

A001
Add: Angela Baxter
E. Rios
Rec'd 2/27/08
Designated Original

NRR

There are no regulatory commitments contained within this letter.

Should you have any questions regarding this submittal, please contact Mr. Paul Duke at 856-339-1466.

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

Executed on October 10, 2007.

Sincerely,

Carl J. Fricker
Vice President - Operations Support

Attachment
1. Supplement to Response to Request for Additional Information

cc: S. Collins, Regional Administrator – NRC Region I
J. Lamb, Project Manager - USNRC
NRC Senior Resident Inspector - Hope Creek
P. Mulligan, Manager IV, NJBNE

ATTACHMENT 1

Hope Creek Generating Station

Facility Operating License No. NPF-57
NRC Docket No. 50-354

Extended Power Uprate

Supplement to Response to Request for Additional Information

In Reference 1, PSEG Nuclear LLC (PSEG) requested an amendment to Facility Operating License NPF-57 and the Technical Specifications (TS) for the Hope Creek Generating Station (HCGS) to increase the maximum authorized power level to 3840 megawatts thermal (MWt). In Reference 2, the NRC requested additional information concerning PSEG's request. PSEG provided the response to the request for additional information (RAI) in Reference 3. This supplement provides additional information in response to RAI 14.74.

14 Mechanical & Civil Engineering Br (EMCB) (additional question)

14.74 In the response to RAI 14.19, PSEG states that during power ascension, it is planned to add accelerometers to four safety relied valves (SRVs) to monitor the vibration levels in comparison to predetermined acceptable limits. PSEG is requested to provide information regarding the acceptable limits for valve vibration, which will be implemented in the Power Ascension Test Plan.

Supplemental Response

HCGS MSL and SRV Background Information

As discussed in section 4.1.1 of Attachment 8 to reference 1, PSEG selected two of the four main steam lines (MSLs) to be monitored for vibration. The selected MSLs were "A" and "B". Figure 1 shows the SRV arrangement on MSL "A" and "B". MSL "D" is a mirror image of "A". MSL "C" is a mirror image of "B" with one exception. MSL "B" line has a fifth standpipe location that is blanked off. The "A," "C" and "D" MSLs do not have a spare location. The spacing of the SRV standpipes between the mirror image MSLs is essentially identical except for minor fabrication differences, which result in a maximum of 0.04-feet (0.5-inch) difference in the spacing, as shown in the table below.

The SRV standpipe and valve, including heights, are identical at all fourteen (14) SRV locations with one exception. Five SRVs are part of the automatic depressurization system (ADS). ADS SRVs "A", "B", "C", "D" and "E" have dual solenoid valves (SOVs). The remaining nine SRVs have a single SOV. It should be noted that except for the difference in the number of SOVs and the SOV manifold, the SRVs are physically identical. The standpipe configuration is a 26-inch to 8-inch sweepolet fitting, an 8-inch

nominal diameter schedule 160 pipe stub, and a flange that bolts up the bottom of the relief valve. The specified heights on all standpipes are the same. Each of the 14 SRVs has a discharge line that is routed below the water level in the torus.

The standpipe for the spare location is identical to the standpipes with SRV, but instead of a valve, it has a blank flange.

"A" and "D" lines Standpipes	Distance From Upstream Elbow (ft) (respectively)	MSL "A" SRV	MSL "D" SRV
1st Standpipe with Target Rock	5.13, 5.09	J	M
2nd Standpipe with Target Rock	8.14, 8.15	R	D (ADS)
3rd Standpipe with Target Rock	11.16, 11.17	A (ADS)	H

"B" and "C" lines Standpipes	Distance From Upstream Elbow (ft) (respectively)	MSL "B" SRV	MSL "C" SRV
1st Standpipe with Target Rock	6.95, 6.95	P	E (ADS)
2nd Standpipe with Target Rock	10.11, 10.07	K	L
3rd Standpipe with Target Rock	17.90, 17.86	B (ADS)	C (ADS)
Spare Standpipe	21.06 (Only in the "B" line)	N/A	-
4th Standpipe with Target Rock	24.21, 24.17	F	G

Monitored SRV Selection Criteria

Figure 1 shows the MSL "A" and "B" SRV locations. The valves are mounted in relatively close proximity on a horizontal MSL run. Thus, the SRV vibration input from MSL vibration is expected to be similar for all SRVs on that MSL. MSL "D" is a mirror image of "A", and MSL "C" is a mirror image of "B". The selection criteria were developed based on the similarity in configuration of the MSLs and SRVs:

- The SRVs being monitored should be on MSLs "A" and "B" to allow correlation of piping vibration to SRV vibration;
- Monitor every other SRV;
- On each monitored MSL, both configurations of SRVs are to be monitored

SRVs "A" and "B" (dual SOV valves) and "P" and "J" (single SOV valves) were selected for monitoring. The unmonitored SRVs on MSL "A" and "B" are at most within three MSL pipe diameters from a monitored SRV. The SRV selection criteria provide assurance that the four selected SRVs are representative of the other ten SRVs.

Location of the Accelerometers on the SRV

Each of the monitored SRVs will be instrumented with three accelerometers. Refer to Figure 2 for the typical arrangement. A mounting block for the accelerometers will be installed on the outside bonnet of the pilot valve housing diametrically opposite the SOV.

Three of the SRVs will have all three accelerometers on the pilot valve mounting block. The fourth SRV, the "A" SRV with dual SOVs, will have the lateral and the axial accelerometers mounted on the pilot assembly. The vertical accelerometer will be mounted on a SOV on the "A" SRV close to the cantilevered end.

SRV Vibration Analysis Methodology

MPR Associates developed a detailed analytical model of the HCGS SRV, which included finite element modeling based on detailed drawings from the valve vendor. The methodology addresses determining the allowable vibration limits on the SRVs to ensure the following:

- The SRV main and pilot seats will not leak (or the valve open),
- The pilot internals will not sustain wear-related damage to the point of inoperability,
- The valve body will not sustain damage due to high cycle fatigue, and
- The pre-loads on bolts attaching the solenoids to the pilot housing will not relax resulting in loss of compressed air.

Detailed analyses were performed to address each potential failure mode. Where applicable, the limiting accelerations were developed as a function of frequency, from 0 to 260 Hz.

The calculated mode shapes and frequencies are sensitive to the modeling approaches, particularly due to the bolted connections in the SRV geometry. Furthermore, details of the in-plant configuration can impact modes and frequencies. To address this uncertainty, MPR will review vibration data collected at CLTP to confirm the acceleration limits or make adjustments to the limits as describe below.

SRV Acceptance Criteria (Following CLTP Data Acquisition)

The MPR analysis indicates that leakage or opening of either the main or pilot seats is not limiting with respect to acceptable acceleration. Likewise, wear on the pilot assembly is not limiting.

Overstressed valve components, especially the SOV bolting, impose the limiting conditions. The limiting accelerations to prevent overstressed conditions in the valve body or SOV attachment are frequency dependent. The most limiting accelerations occur at the calculated natural frequencies of the valve. Although the finite element model used to calculate the frequencies of the SRVs is rigorous, the modes are sensitive to the modeling approaches especially at bolted connections, resulting in some uncertainties in the calculated natural frequencies.

PSEG plans to install SRV accelerometers in the October 2007 outage. After achieving 100% current licensed thermal power (CLTP), PSEG will re-record the MS line (previously obtained in 2005) and take baseline SRV vibration data. The vibration data will be reviewed against the results of the analytical model for the SRV for frequency responses from the valve accelerometers that may allow identifying the natural frequencies of the SRV, the pilot valve, and the solenoid under actual plant conditions. If the measured response level of the natural frequencies of the valve is low, the modal response may not be discernable from the background noise; however, if the response is sufficient to identify the frequencies of the modes, MPR will be able to use it to confirm the modeling or make adjustments to the currently calculated acceleration limits to obtain more accurate acceptance criteria.

After any adjustments based on CLTP data acquisition, calculated limiting accelerations will be applied appropriately at the measured frequencies to generate criteria to ensure that vibration damage will not occur.

Initial Assessment of SRV at EPU

In 2005, PSEG measured the existing vibration levels on the main steam piping at 100% CLTP at normal recirculation pump speed and maximum recirculation pump speed. The values, in units of g-root mean square, are reported in Tables 3 and 4 of Attachment 8 to Reference 1. The only significant vibration spikes seen on the MSL piping are the vane passing frequencies (VPF) from the two recirculation pumps, at approximately 120 to 125 Hz. Since the recirculation system does not require modification to support EPU, no increases are expected on the VPF spikes. The portion due to steam line flow is expected to increase by 32% for a power increase of 15%. The increase is in proportion to the square of (steam line velocity at EPU / steam line velocity at CLTP). However, since the CLTP vibration values are very low, the EPU values are expected to remain low.

The analysis performed by MPR predicts that none of the SRV modes are close to the predicted standpipe acoustic resonance frequency.

Conclusion

Although SRV vibration levels are not anticipated to be limiting for EPU operation, the monitoring during power ascension above CLTP will assure that valve operability is not challenged. In summary, PSEG has obtained a detailed analysis of the SRV which includes consideration of potential failure modes. The criteria will be finalized after four SRVs, representative of the 14 SRVs at HCGS, are instrumented and SRV vibration measurements are acquired at CLTP. The SRVs will be monitored during power ascension above CLTP to verify that no unacceptable vibration is occurring.

License Condition

Based on discussion with the NRC staff, PSEG proposes the following license condition regarding vibration acceptance criteria for the SRVs:

> PSEG Nuclear LLC shall provide the Level 1 main steam safety relief valve vibration acceptance criteria to the NRC by facsimile or electronic transmission to the NRC project manager prior to increasing power above 3339 MWt.

References

1. Letter from George P. Barnes (PSEG Nuclear LLC) to USNRC, September 18, 2006
2. Letter from USNRC to William Levis (PSEG Nuclear LLC), June 7, 2007
3. Letter from George P. Barnes (PSEG Nuclear LLC) to USNRC, August 3, 2007
4. Letter from George P. Barnes (PSEG Nuclear LLC) to USNRC, April 30, 2007

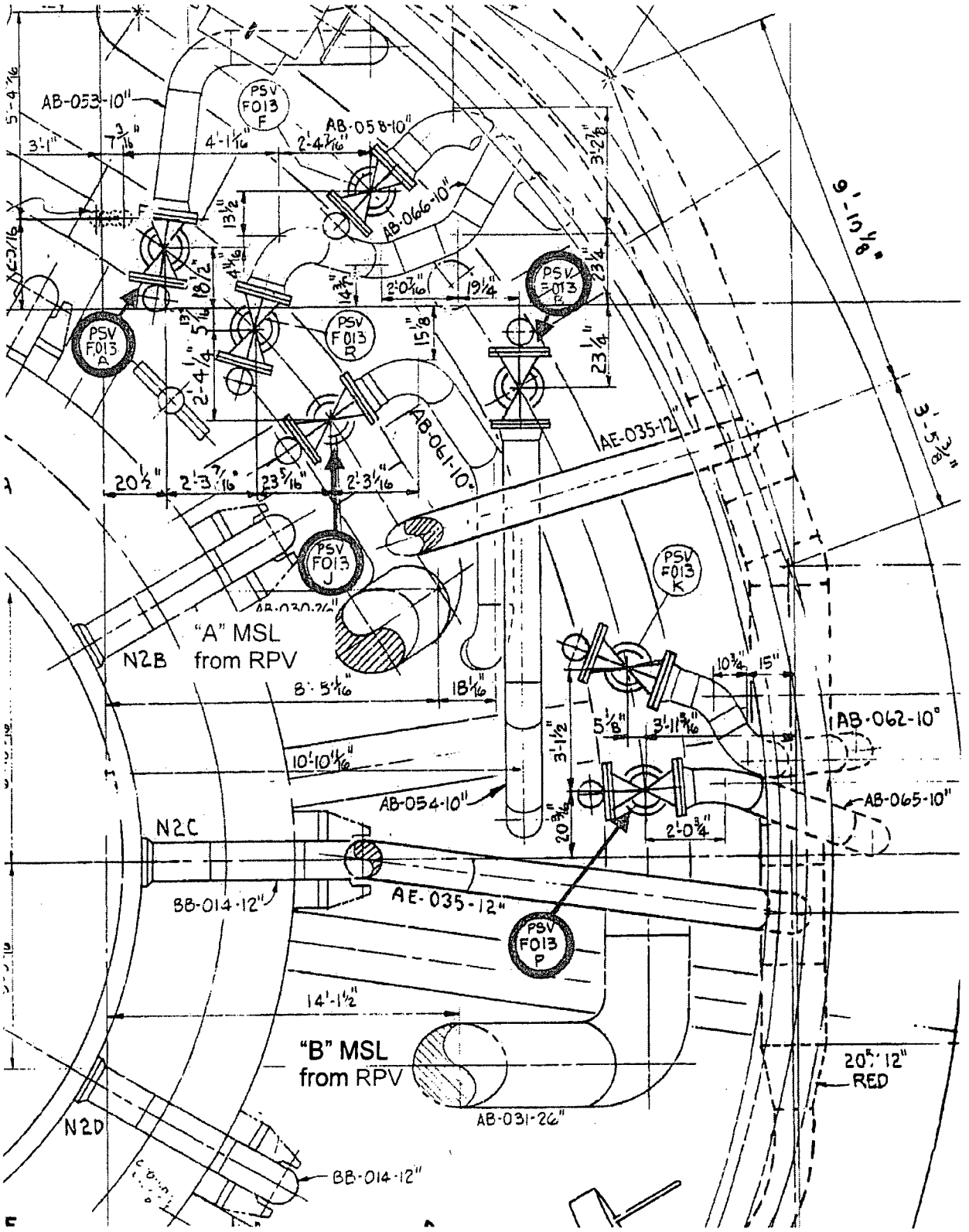

Figure 1 – MSLs "A" and "B" portions showing SRVs

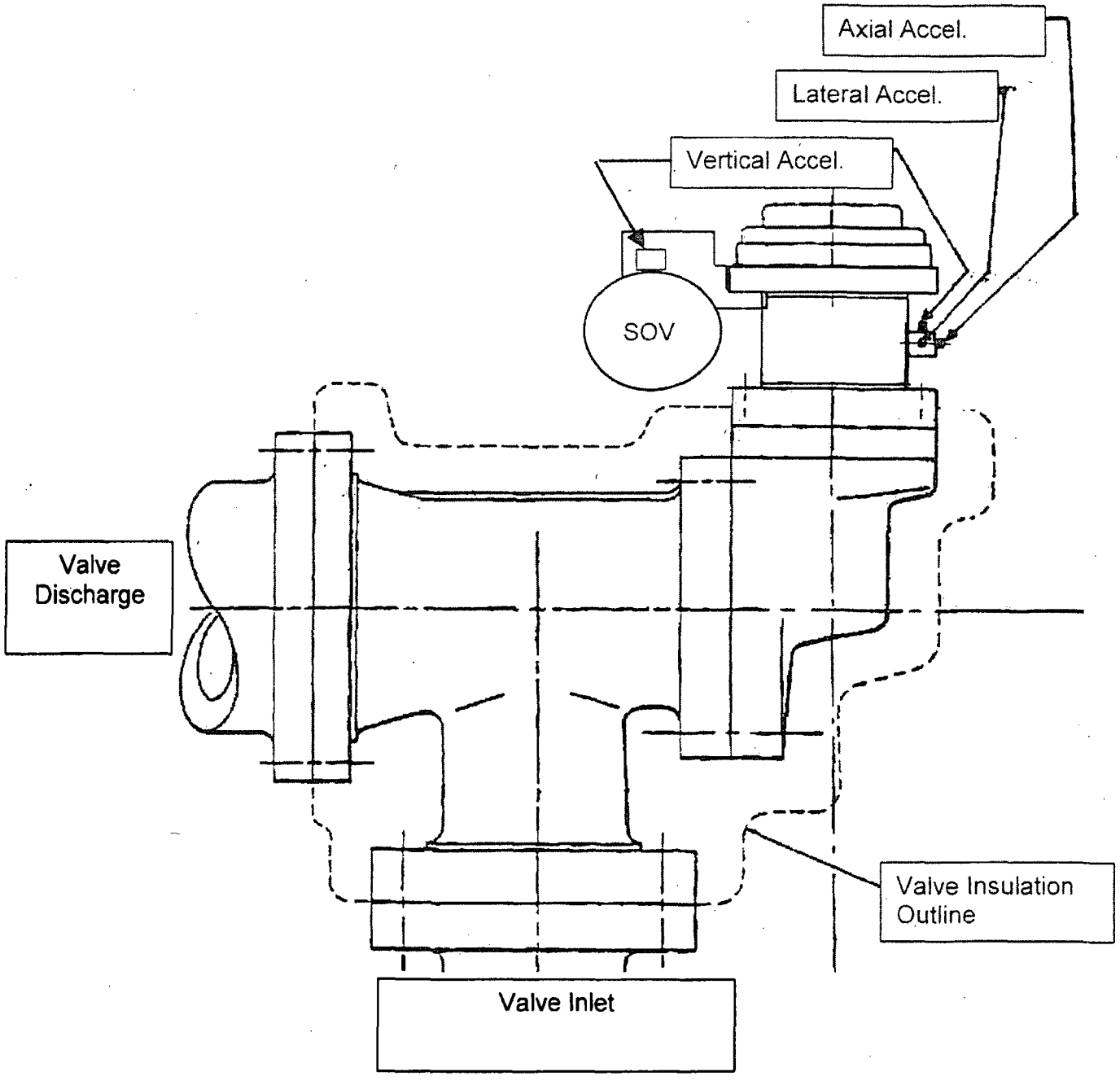

Figure 2 –SRV outline showing accelerometer location. Dual SOV identical except for SOV manifold details.