ENERGY NORTHWEST

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

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397
RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION RELATED TO LICENSE AMENDMENT REQUEST FOR CONDENSATE STORAGE TANK TECHNICAL SPECIFICATIONS**

References: 1) Letter dated May 2, 2008, CF Lyon (NRC) to JV Parrish (Energy Northwest), "Columbia Generating Station – Request for Additional Information Related to License Amendment Request Associated with Condensate Storage Tank Level (TAC No. MD6176)"

2) Letter dated August 8, 2007, SK Gambhir (Energy Northwest) to NRC, "License Amendment Request to Technical Specifications Associated With Condensate Storage Tank Level"

Dear Sir or Madam:

Transmitted herewith in the attachment is Energy Northwest's response to the subject request for additional information (Reference 1) regarding the license amendment request (Reference 2) to revise Columbia Generating Station Technical Specifications associated with Condensate Storage Tank level.

There are no new commitments being made. If you have any questions, please contact MC Humphreys, Licensing Supervisor at (509) 377-4025.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the date of this letter.

Respectfully,

SK Gambhir
Vice President, Technical Services

Attachments

cc: EE Collins, Jr. – NRC RIV
CF Lyon – NRC NRR
NRC Senior Resident Inspector/988C
RN Sherman – BPA/1399
WA Horin – Winston & Strawn

A001
NRR

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

Item 1

The application dated August 8, 2007, states "...The level switches are not connected directly to the CSTs but rather on a standpipe located downstream on the suction line in the reactor building..." Please provide a drawing or sketch showing/illustrating the arrangement of the switches and standpipe.

Response

See Attachment 2 for a simplified sketch.

Item 2

The application dated August 8, 2007, states "...Thus, they are influenced by such factors as differential head between the tank and the standpipe (due primarily to flow losses), reactor building temperature, and reactor building pressure. Previously the calculation did not address the head loss that occurs in the switches when the HPCS pump is drawing water from the CST..." Please provide either:

a. A copy of the calculation that determined the new levels for the sensors, or

b. A description/summary of the calculation describing the methodology, assumptions and significant parameters (e.g., pressures, temperatures, etc.). The description should be sufficient to support simplified confirmatory calculations by the staff.

Response

The following is a summary from the calculation describing the methodology, assumptions and significant parameters:

Description

The Condensate Storage Tanks (CSTs) are located outside the reactor building, subject to atmospheric pressure and temperature. The level switches, RCIC-LS-15A/B and HPCS-LS-1A/B are located on a standpipe inside the reactor building since the CSTs are not safety related.

Parameters

- Top of suction pipe inside the CST is 446.302 feet elevation.
- Centerline of suction pipe is elevation 445.33 feet.
- Suction pipe diameter is 24 inches with 0.375" wall thickness.

- Each 5.69 feet of water in a CST contains 67,500 gallons.
- HPCS-LS-1A/B and RCIC-LS-15A/B are located on the standpipe in the Reactor Building, nominal elevation 448.25 feet. (Nominal Set point 448.25 feet, highest possible activation 448.38', reference Energy Northwest calculation E/I-02-91-1011)
- The CST sees outside, ambient pressure.
- The standpipe temperature was assumed to be between 40 and 150^{O}F.
- The CST temperature was assumed to be between 40 and 150^{O}F.
- GE Process Diagram 02E22-04,7,1 gives a HPCS flow of 6856 gpm (bounding flow for purposes of this calculation).
- Pipe resistance value (K) between the CST and the Standpipe is 348.386f, where f is the pipe friction factor for 24" pipe.

Assumptions

- The standpipe water in the reactor building sees a different ambient pressure than the water in the CST as the RB is kept at a negative pressure relative to its environment. Appendix D to E/I-02-91-1011 conservatively calculates this differential pressure to be -3.5 inches water gauge relative to the outside environment taking into account instrument uncertainties. Thus, zero elevation at the CST is equivalent to a max of 3.5 inches at the standpipe.

- Ambient pressure difference may be less than 3.5 inches. However, this effect has been compensated for by the addition of 0.6ft (2 tanks) and 0.9ft (1 tank). After switch activation, additional water is available (up to ~1.8 inches depending on flow rate) since it takes time for the suction valve switchover to take place. This additional water volume is ignored for added conservatism.

- The standpipe water could be at a different temperature than the water in the CST, therefore it is assumed that the worst combinations of CST and Standpipe water temperatures are present (150^{O}F at both tank and switch).

- Although flow rate from each CST will be half of the total flow when two CST tanks are available, the analysis will assume all flow is from one CST tank, maximizing vortex height.

- Friction factor is 120% of Crane "Flow of Fluids" friction factor.
- Level switches activate at the highest possible point (when determining required level to ensure 135,000 gallons).

Method for ensuring 135,000 gallons available

- To ensure that 135,000 gallons will be used prior to switchover to the suppression pool, the highest possible activation elevation must be obtained from the instrument uncertainty analysis. This elevation is a combination of instrument setpoint, tolerances and instrument uncertainty. This highest possible activation point, per E/I-02-91-1011, is 448.38 feet.

- Flow losses are calculated as follows:

  Flow losses (ft) = $KV^2/2g$
  K = pipe resistance
  V = velocity
  g = gravity

- Using the conservatively higher value of 448.42 feet, the required elevation of water in both tanks is determined as such:

  - The required water elevation is the highest possible switch activation level (448.42 feet), plus

  - Flow losses (2.40 ft) between the CST and the standpipe in the reactor building (assume high flow rate and hot water when converting to feet of water column to maximize required elevation), minus

  - 3.5 in (0.29 ft) ambient pressure difference between reactor building and CST, plus

  - 0.6 feet (for conservatism) and 5.69 ft for two tank elevation, or

  - 0.9 feet (for conservatism) and 2(5.69 ft) for one tank elevation.

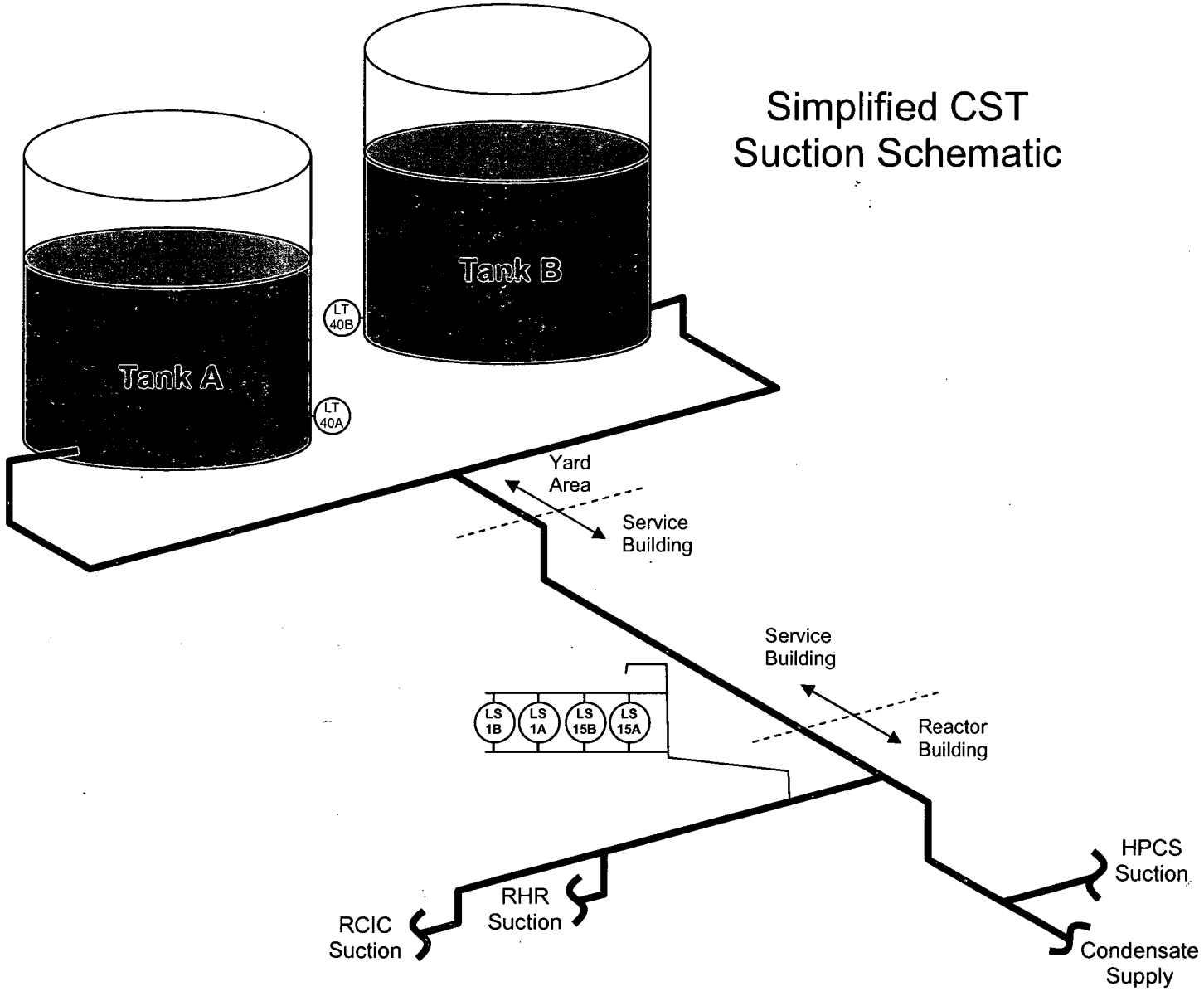
  Required Level $_{(2\ tanks)}$ = 448.42 ft + 2.40 ft – 0.29 ft + 0.6 ft + 5.69 ft = 456.8 ft

  Required Level $_{(1\ tank)}$ = 448.42 ft +2.40 ft – 0.29 ft + 0.9 ft + 11.38 ft = 462.8 ft

- The instruments used by operators for verifying minimum Technical Specification (TS) CST level (COND-LI-40A & 40B) receive level from transmitters actually located on the side of the tanks (COND-LT-40A & 40B) which have a zero indication equal to 446.5 ft. Therefore, the minimum TS Level as observed on COND-LI 40 A & B would be as follows:

  2 Tanks = 456.8 ft – 446.5 ft + 0.2 ft (rounded up for readability) = **10.5 ft**

  1 Tank = 462.8 ft – 446.5 ft + 0.2 ft (rounded up for readability) = **16.5 ft**


Simplified CST
Suction Schematic
Tank A
Tank B
LT 40A
LT 40B
Yard Area
Service Building
Service Building
Reactor Building
LS 1B
LS 1A
LS 15B
LS 15A
HPCS Suction
RHR Suction
RCIC Suction
Condensate Supply