Duquesne Light

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July 6, 1983

Director of Nuclear Reactor Regulation
United States Nuclear Regulatory Commission
Attn: Mr. Steven A. Varga, Chief
Operating Reactors Branch No. 1
Division of Licensing
Washington, DC 20555

Reference: Beaver Valley Power Station, Unit No. 1
Docket No. 50-334, License No. DPR-66
N-1 Loop Operation

Gentlemen:

With respect to the conference call on June 27, 1983 between K. D. Grada of Duquesne Light Company and R. Barret, R. Goel, and H. Shaw of your staff, the following information was exchanged relative to N-1 loop operation:

Question

1. What is the intention of N-1 loop operation?

Response

The intention of N-1 loop operation is to provide a reduced power method for interim operation during periods where prolonged plant outages may occur due to extended procurement time frames on items such as a Reactor Coolant Pump or Motor. Other cases, such as a defective component (i.e. tube or weld indication) within the loop isolation boundary that would require extensive engineering evaluations or repair would also be potential applications for N-1 operation.

Question

2. What will the status of the isolated loop be; filled or drained? If it is drained, how will water hammer be addressed for a stop valve LOCA?

Response

Due to the potential for water hammer induced failures of the steam generator tubes if a loop stop valve failed in a catastrophic fashion, the isolated loop will be kept full with reactor coolant. A water relief valve with a setting less than 200 psig (if temperature is 70°F) will be installed at the 3/4" high point vent on the RTD Manifold. The set of flow diagrams previously

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forwarded should reflect closing of all vents and drain valves on the isolated loop and opening of all valves on the RTD manifold up to the relief valve. Pressure within the isolated loop is restricted by RCP seal, steam generator tube P limits and brittle fracture considerations. All valves between the relief valve and loop will be administratively locked open and a local pressure gage will be installed to monitor for in-leakage to the system. Total in-leakage (identified) from all coolant boundaries is limited to 10 gpm in accordance with technical specifications. During primary heatup, the effluent from the relief valve will be monitored by trending of the integrated containment sump flow or monitoring the pump out rate to the #1 Primary Drains Tank dependent on which source the relief path is routed to. If either of these sources exceed a pump out rate of 8 gpm during system pressurization due to inleakage to the isolated loop, continuous monitoring of pressure will be maintained to ensure that:

- inleakage remains below 10 gpm
- pressure remains below brittle fracture limits (if 70°F) and within relief valve capacity.
- steam generator tube differential pressure limits are not exceeded.

Question

3. Due to the potential for water hammer, what means will be employed to insure the isolated loop is full?

Response

A visual check on an installed pressure instrument to check that pressure is greater than 15 psig. This will ensure the steam generator tubes are substantially full (see Attachment I)

Question

4. What will the differences be in isolation in various operating modes?

Response

The only difference in isolating the loop for maintenance in the various operating modes is that in Modes 5 and 6, there is no need to maintain the loop filled or have the relief valve installed to facilitate maintenance. The overpressure protection will be installed prior to plant heatup and be capable of relieving a minimum of 15 gpm.

Question

5. All high pressure boundaries do not provide manual isolation valves. Explain.

Response

There is no need to install isolation valves on the 3" Decay Heat Removal lines on the secondary side. Although there is only a single check valve for isolation between the isolated steam generator and the operating units, small amounts of steam inleakage would be vented off the open vent(s) as shown on the previously submitted Figure 21-1. The isolated steam generator would be maintained in a layup condition determined by chemistry, and pressure monitoring would remain available if excessive in-leakage occurred. As stated previously, pressure and temperature of the isolated loop and corresponding steam generator secondary would be maintained within the constraints imposed by brittle fracture considerations, steam generator tube differential pressure limits, and reactor coolant pump seal limitations. Maintenance would not be performed using a check valve as a clearance point at high pressures, thereby eliminating any safety or personnel hazard.

We have forwarded copies to the Project Manager of the existing fill and vent procedures for the reactor coolant system and miscellaneous information related to N-1 loop operation.

Very truly yours,

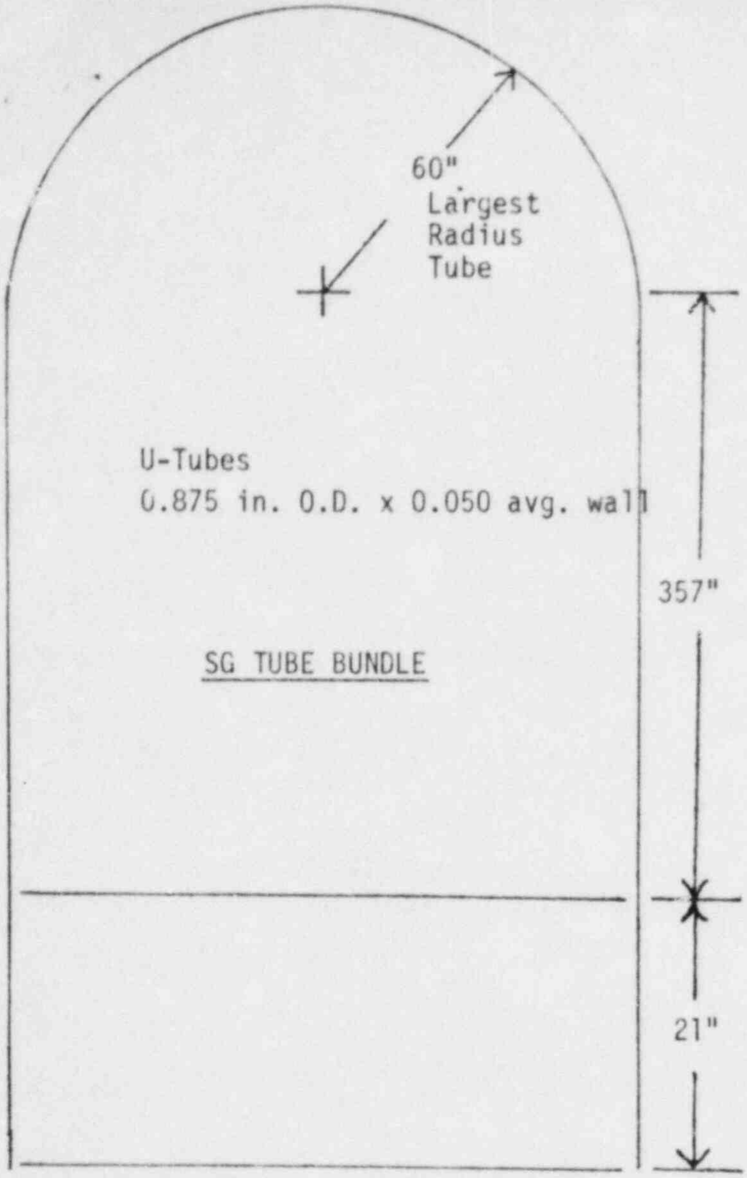
J. J. Carey

J. J. Carey
Vice President, Nuclear

Attachment

cc: Mr. W. M. Troskoski, Resident Inspector
U. S. Nuclear Regulatory Commission
Beaver Valley Power Station
Shippingport, PA 15077

U. S. Nuclear Regulatory Commission
c/o Document Management Branch
Washington, DC 20555



60"	radius of largest tube
357"	length of straight tube
+ 21"	distance to EL 739'3"
36'6"	

1 Elevation at top of tube bundle = 739'3" + 36'6" = 775'9"

2 Elevation of RTD manifold B

= $733'6\frac{15}{16}"$

3 Elevation difference

1 - 2 = 775'9" - 733'7"

= 42'2"

Elevation 739'3"

Pressure of 42'2" water column @ 100°F

$$p = \rho gh$$

$$= 62.0\ \frac{lb_m}{ft^3}\left[\frac{32.2\ ft/sec^2}{32.2\frac{ft\ lb_m}{lb_f\ sec^2}}\right]\ 42.167\ ft\left[\frac{1\ ft^2}{144\ in^2}\right]$$

$$= 18.2\ lb_f/in^2$$

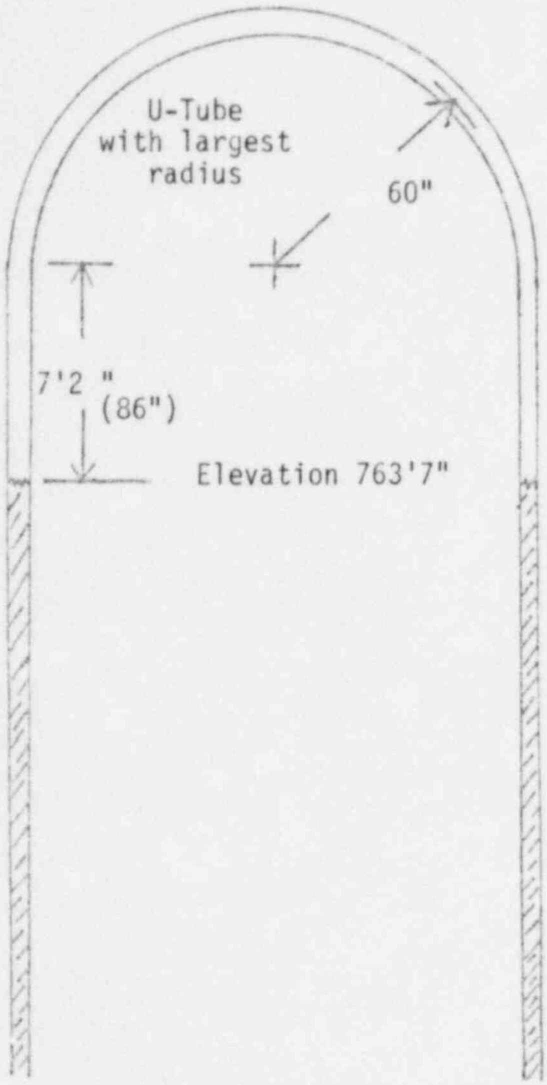
Pressure of 30 ft. water column @ 100°F

$$p = \rho gh$$

$$= (62)(30)\left(\frac{1}{144}\right)$$

$$= 12.9\ lb_f/in^2$$

When tubes are filled to elevation 763'7" (corresponds to 30' water column), the largest radius tube will have an unfilled volume (calculated below).



U-Tube average inside diameter
= 0.825 in.

Crossectional area of U-Tube

$= \pi r^2$

$= \pi (\frac{.825}{2})^2$

$= .535 \text{ in}^2$

Unfilled volume in straight length of U-Tube

$V_1 = 86 \text{ in} \times 2 \times .535\text{in}^2$

$= 92 \text{ in}^3$

Unfilled volume in curved portion of U-Tube

Arc length $s = r\theta$

$= 60"(\pi) = 188.5"$

$V_2 = 188.5\text{in} \times .535\text{in}^2$

$= 101\text{in}^3$

Total unfilled volume in U-Tube $= V_1 + V_2$

$= 193 \text{ in}^3$

<u>References</u>: Steam Generator Technical Manual; Drawings 4.13-8B, 6.13-463A-3, 6.13-464A-2 and 6.13-465A-2