December 8, 1987

Docket No. 50-267

Mr. R. O. Williams, Jr. Vice President, Nuclear Operations Public Service Company of Colorado P. O. Box 840 Denver, Colorado 80201-0840

Dear Mr. Williams:

SUBJECT: FASTNER MATERIAL SELECTION FOR REPAIR OF HELIUM CIRCULATOR C2101 (TAC NO. 65992)

We have held preliminary discussions by telephone with your staff concerning your choice of new bolting materials for helium circulator C2101. These discussions were held by telephone November 18, 1987. One of the key issues was your decision to use A286 specification bolts to fasten the circulatorsteam scroll to the bearing housing.

We have prepared a list of questions related to these issues, which are enclosed. We request you provide a response to these questions within 45 days of the date of this letter.

The information requested in this letter affects fewer than 10 respondents; therefore OMB clearance is not required under P.L. 96-511.

Sincerely,

/s/

Kenneth L. Heitner, Project Manager Project Directorate - IV Division of Reactor Projects - III, IV, V and Special Projects

Enclosure: As stated

cc w/enclosure: See next page

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QUESTIONS RELATED TO THE USE OF A-286 AND

INCONEL X-750 FASTENER MATERIALS IN

FORT ST. VRAIN HELIUM CIRCULATOR REPAIR

- The preload stress applied during assembly is an essential factor in the avoidance of stress corrosion cracking (SCC); also the minimum preload stress should exceed the value where fastener loosening might occur. What are the preload stresses that you intend to use on the A-286 and X-750 materials, compared to the specified yield and ultimate tensile strengths?
- 2. The accuracy of preload stress depends on the tightening method chosen; turn of nut and mechanical torque wrench methods have low accuracies, while the precision torque wrench and stretch measurements have higher accuracies. What method will be used in the repair of C2101 helium circulator?
- 3. What heat-treatments are to be specified for each of the fastener materials; what is the specified hardness after the heat-treatment?
- 4. Manufacturing chemicals used for coolants during cutting operation could either initiate or cause SCC if there is no thermally stable inhibitor or if the coolants do not have compositional limits on sulfur, chlorine, etc. Is this considered to be an issue in the manufacture of the fastener materials for the Fort St. Vrain circulator repair?
- 5. The Mo₂S or Molykote is known as a detrimental bolting lubricant because it may decompose above 100°C and react with water (steam) to form hydrogen sulfide corrodant to cause SCC. What experimental data are available to indicate that silicone-molykote (the lubricant specified for use in the Fort St. Vrain circulator repair) will be stable and compatible with the environment under circulator operation?
- 6. What quality assurance procedures will be used to inspect the fasteners during manufacture in order to ensure a high quality fastener and avoid manufacturino defects?
- 7. The A-286 bolts are projected to have a service life equivalent to the initially installed bolts, which failed by SCC after 60,000 hours circulator operation. In addition, these bolts are to be installed in captive location with respect to the rotating components. Total bolt failure would result only in loss of secondary interspace pressurization. Provide a description of the inservice inspection program and/or procedures to be implemented to assure continuous integrity of the fastener materials.
- Describe the process that will be used during refurbishing the circulators to clean the bolt holes in which the new fasteners will be placed.
- 9. The circulators may be driven by reheat steam, plant condensate water, and/or fire water. Provide the specification that will be implemented for each of the drive materials.