

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

500C Chestnut Street Tower II

DEC 28 1978

Director of Nuclear Reactor Regulation  
Attention: Mr. S. A. Varga, Chief  
Light Water Reactors Branch No. 4  
Division of Project Management  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

Dear Mr. Varga:

In the Matter of the Application of ) Docket Nos. 50-390  
Tennessee Valley Authority ) 50-391  
50-438  
50-439

The following information is submitted for your review in support of a request for the use of Tefzel 200 as an approved mechanical snubber seal material.

Typically, technical specifications and surveillance instructions permit a snubber inspection interval varying inversely with the number of snubbers found inoperable during the previous inspection if the snubbers are equipped with seals " . . . fabricated from ethylene propylene or other materials demonstrated compatible with the operating environment and approved as such by the NRC." That interval may be as great as 18 months. Otherwise, all hydraulic snubbers with nonapproved seal materials are required to be inspected at a minimum of 31-day intervals.

Paul-Munroe Hydraulics, Inc., has furnished, for certain applications at Watts Bar and Bellefonte Nuclear Plants, snubbers which have some seals manufactured from a fluoropolymer, Dupont's Tefzel 200. The Paul-Munroe snubber design includes the latest development in sealing material and concept specifically designed for long life. The seal material is a fluoropolymer with radiation resistant characteristics which eliminate the need to replace these seals over the life of the unit.

I. Description of Seal Material - Life-of-Plant Thermoplastic Seals.

- A. The material is a Dupont Fluoropolymer. The trade name is Tefzel 200.
- B. Generally, the material is a tough, medium stiffness, ductile material that has excellent flex life, impact, and abrasion resistance and excellent resistance to high-energy radiation.

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Mr. S. A. Varga

DEC 26 1978

- C. The Tefzel seals are not an elastomer.
  - 1. An elastomer is generally a soft rubber or synthetic with a consistency approximately like the rubber hoses in an automobile. Tefzel is (1) injection molded into "tubes," (2) machined into rings, (3) machined to allow a stainless steel expander ring, and (4) assembled with the expander ring.
- D. Tefzel exhibits an indefinite shelf-life characteristic.
- E. The continuous temperature rating of the material is 300<sup>o</sup>F.
- F. The material is chemically inert.
- G. The material exhibits excellent physical properties at  $5 \times 10^7$  rads exposure.

## II. Performance Advantages

- A. The bleed rate past dynamic seals is accurately predictable and zero leakage can be achieved. Thus, piston bleed can be accurately set with a control valve orifice.
- B. The static seals flex to insure 100 percent seal at all loading conditions.
- C. The loads induced due to seal friction are lower than with metallic piston rings.
- D. The seal configuration is internally loaded with a spiral wound stainless steel spring to compensate for long term compression set.
- E. The new design reduces possibility of schedule delay inherent with metallic piston rings due to the normal re honing required.

## III. Development Testing of Plastic Seals

- A. Three alternate plastic seal materials have been tested to date. The materials are (1) Tefzel 200 (Fluoropolymer), (2) Astrel 360 (Polyarsulfone), and (3) PPS (Poly Phenylene Sulfide).
- B. Each of the plastics has been successfully tested in full-size hydraulic snubbers.

DEC 22 1978

Mr. S. A. Varga

- C. All of these materials exhibit excellent retention of physical characteristics in a radiation environment at high temperatures and have excellent shelf-aging characteristics.
  - D. Development testing for snubber application consists of static and dynamic tests to insure the following:
    - 1. Seal material may be assembled.
    - 2. Seal material withstands operations static pressures.
    - 3. Seal material withstands operational pressures at piston velocities to 10 in/min.
    - 4. Seal material can withstand repeated application of operational pressures.
  - E. Tefzel was selected based on slightly greater conformability due to its lower hardness.
  - F. The properties of Tefzel under various environmental conditions are available in the "Dupont Tefzel Fluoropolymer Design Handbook," E 04607-1973.
- IV. Tefzel is being used by the following NSSS suppliers and utilities:
- A. Duke Power Company
  - B. Westinghouse Nuclear Energy Systems
  - C. Tennessee Valley Authority
  - D. Central Nuclear de Almaraz
  - E. Jersey Central Power & Light
  - F. Framatome.

We therefore request approval of Dupont's Tefzel 200 for use in hydraulic snubbers.

Very truly yours,



J. E. Gilleland  
Assistant Manager of Power