

## DEFENSE NUCLEAR FACILITIES SAFETY BOARD

October 24, 1997

**MEMORANDUM FOR:** G. W. Cunningham, Technical Director  
**FROM:** J. Kent Fortenberry / Joe Sanders  
**SUBJECT:** SRS Report for Week Ending October 24, 1997

Outside expert Ralph West was onsite this week following the FB-Line 95-2 Integrated Safety Management System Review (Phase II). Also, Asa Hadjian, Chuck Keilers, and outside experts Bill Hall, Paul Rizzo, and John Stevenson were onsite reviewing SRS ground motion as well as design criteria and functional classification for the Actinide Packaging and Storage Facility (APSF).

**Overpressure protection for High Level Waste Transfer Lines** - Several applications of variable frequency drive (VFD) controlled transfer pumps require protection to prevent overpressurizing high level waste transfer lines. The lowest pressure rating for a transfer line is 150 psig. Transfer pumps can develop 150 psig when operated deadheaded at about 2000 rpm (assumes a maximum sludge density). However, the VFD's are capable of much higher operating speeds (theoretical speeds greater than 10,000 rpm). Although each VFD is equipped with a programmable setpoint that limits the maximum frequency, the potential to overpressurize a transfer line has resulted in the recent addition of independent frequency sensors to limit maximum pump speed. Two separate sensors (on separate phases) monitor the current frequency and provide independent trips (one unit trips the 480V supply breaker while the other actuates the VFD emergency stop circuit). These sensors and their surveillance requirements will be included in the new Technical Safety Requirements (TSRs) for the Tank Farms. This is an example of a new control being formalized by the new Tank Farm TSRs.

**Highly-Enriched Uranium (HEU) Blend-down for Commercial Reactor Fuel** - As discussed in the recent SRS Board visit, SRS will have 9 MT of HEU solution after processing the Mk-16 & 22 spent fuel. SRS has an additional 12.3 MT HEU as unirradiated fuel stored at K-Reactor. Also, ORNL has about 10 MT HEU metal and 3 MT of HEU U-Al alloy. Altogether, this represents about 34.5 MT of material with an average U-235 enrichment of 60% and an average U-236 enrichment of 25%. TVA estimates this material would provide about 12 reactor reloads (over 1000 PWR fuel assemblies) with an equivalent U-235 enrichment of about 4.0% (4.6% U-235 with 1.6% U-236 is equivalent to about 4.0% U-235 without U-236).

Four lead assemblies are to be fabricated for use in TVA's Sequoyah Unit 2 by spring 1999. As planned, Nuclear Fuel Supply (NFS) at Erwin, TN will dissolve about 120 to 230kg HEU scrap, purify the resulting uranyl nitrate, convert to a UO<sub>2</sub> powder, and blend to low-enriched uranium (LEU) using natural uranium blendstock. The LEU powder will be sent overseas for fabrication into fuel rods. Even after purification, the recycled uranium is expected to significantly exceed the applicable ASTM specification for certain contaminants. One example is a high phosphorous content from tributyl phosphate that could cause pellet cracking during sintering. DOE is developing a special specification for this material.