

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401

400 Chestnut Street Tower II

83 NOV 7 A 9:58 November 2, 1983

U.S. Nuclear Regulatory Commission  
Region II  
ATTN: James P. O'Reilly, Regional Administrator  
101 Marietta Street, NW, Suite 2900  
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

OFFICE OF INSPECTION AND ENFORCEMENT BULLETIN 78-14 - DETERIORATION OF BUNA-N COMPONENTS IN ASCO SOLENOIDS - RII:JPO 50-259, -260, -296 - BROWNS FERRY NUCLEAR PLANT

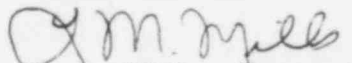
By letter from J. E. Gilleland to you dated February 2, 1979 we submitted our response to the subject bulletin for Browns Ferry. In that letter we described the program for periodic replacement of BUNA-N material in the control rod drive system solenoid valves. Enclosed is a revised program based on updated information from the General Electric Company, Parker Hannifin O-Ring Division recommendations, and operating experience at Browns Ferry. This program takes into consideration not only the periodic replacement of BUNA-N material, but also the periodic replacement of ethylene propylene or any other seal materials.

If you have any questions regarding this matter, please call Jim Domer at FTS 858-2725.

To the best of my knowledge, I declare the statements contained herein are complete and true.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

  
L. M. Mills, Manager  
Nuclear Licensing

Enclosure

cc (Enclosure):

Office of Inspection and Enforcement  
U.S. Nuclear Regulatory Commission  
Division of Reactor Operations Inspection  
Washington, D.C. 20555

Mr. R. J. Clark  
Browns Ferry Project Manager  
U.S. Nuclear Regulatory Commission  
7920 Norfolk Avenue  
Bethesda, Maryland 20814

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ENCLOSURE

SEAL REPLACEMENT PROGRAM FOR SCRAM SOLENOID VALVES  
IE BULLETIN 78-14  
LETTER FROM J. E. GILLELAND TO  
J. P. O'REILLY DATED FEBRUARY 2, 1979  
BROWNS FERRY NUCLEAR PLANT

As stated in the letter dated February 2, 1979, the diaphragms and body gaskets were replaced in all scram pilot valves in the hydraulic control units (HCU's) for the control rod drive system at Browns Ferry Nuclear Plant in January 1976 for unit 1, December 1975 for unit 2, and May 1976 for unit 3. The program for replacing the remaining software parts of the valves every three years was begun in December 1978 for unit 1, May 1979 for unit 2, and September 1979 for unit 3. The diaphragms and their associated body gaskets were to be replaced every six years with an inspection of ten percent of the diaphragms every three years to monitor their condition. However, in December 1978, Browns Ferry plant personnel elected to replace all diaphragms and associated body gaskets after an operating time of only three years, rather than to perform the minimum inspection requirement on ten percent of the valves.

During the performance of the above described scheduled replacement and inspection program, we have not discovered any broken, brittle, or hard Buna-N diaphragms and discs or ethylene propylene body O-rings in the scram pilot valves and have not experienced any valve malfunctions which can be attributed to deterioration of these seals. We have, however, experienced short service life problems with ethylene propylene O-rings in the valve area above the coil housing. This problem has been determined to be associated with the continuous high temperature service to which they are subjected because the valve solenoid coil is normally energized. We have researched this problem and, based on recommendations and approval from our Division of Engineering Design, plan to replace these three ethylene propylene O-rings with ones molded of silicon material. Silicon is a very attractive option since it can withstand temperatures exceeding those generated by the solenoid coil and has a shelf life of up to 20 years. Other O-ring options have been considered should the silicon not provide the desired service characteristics.

GE has provided us with updated recommendations for seal material replacement in Supplement 1 of their Service Information Letter (SIL) 28. This SIL places a service life of approximately seven years on Buna-N seal material. Additional information and data were contained in GE's letter G-ER-9-16 from A. L. Vest to H. J. Green dated January 30, 1979, which gave actual times from shipment of valves to sites until occurrence of first failure of seal material. The first diaphragm failures were recorded at seven years, while the first Buna-N disc failure was not recorded until ten years. It is also important to note that these failures constituted a very small percentage of the total number of valves which were included in the survey.

Our current seal replacement program for the scram pilot valves includes the following:

1. The O-ring seals, diaphragms, and solenoid plunger disc in the scram pilot valves are replaced by every fifth refueling outage so that the operating time does not exceed approximately seven and one-half years for any of these components. The three ethylene propylene O-rings in the heat-affected area above the coil housing are replaced on all valves every refueling outage. As this program is revised to change to silicon (or other appropriate material) in the coil areas, a portion of coil area silicon O-rings will be inspected during each refueling outage until a confidence level is realized which will justify a longer service interval. If no significant problems are discovered with the silicon O-rings during this inspection period, seal replacement will be placed on the approximately seven and one-half year cycle.
2. Shelf life recommendations for the Buna-N, ethylene propylene, silicon, or other materials will be closely observed to provide acceptable service life when the seals are installed.
3. Seal replacement is performed during each refueling outage with a dispersed pattern so that not all of the oldest seals will be in valves that actuate adjacent control rods. This approach to the selection of valves for seal material changeout is an adaptation of the suggestion made by GE in the SIL.
4. The discovery of any broken, brittle, or excessively hard seals will require the inspection of the next newer lot of seals for their possible replacement and a review of the program to confirm that the frequency of seal replacement is sufficient to ensure the reliability of valve operation.

In addition to the scram pilot valves, we plan to incorporate the scram backup valves, scram discharge volume vent and drain pilot valves, and the scram discharge volume vent and drain test valve into this seal replacement program. This will involve a total of seven additional valves per unit. We are including these valves in the CRD seal replacement program even though we have had no problems with them in the past. The seal replacement program for these seven valves will exclude replacement of the coil area O-rings during each refueling outage; however, if future operating experience indicates a problem in this area, the seal replacement program for these valves will be evaluated for the possible need for installation of silicon O-rings in place of the ethylene propylene O-rings.

Since service time for different applications can vary so much, there are no industry specifications for length of time that seal material can be used in a particular application. We believe the seal replacement program as outlined in this letter will provide a satisfactory degree of confidence that valve seal failures will not occur to a degree that would significantly affect the ability to shut down the reactor. Many plants have operated without seal failure for considerably longer periods of time than the time proposed. With proper age control of the seals, there is very low probability of seal failure in the seven and one-half years operating time. In the unlikely event that failures do occur because of aging, the dispersed selection for regular replacement will reduce the probability of adjacent control rods being inoperable at the same time. Replacement of seals in the scram pilot valves can be performed, if required, with the unit in operation. The adequacy of the program is to be reviewed in the event seals are discovered which exhibit unsatisfactory characteristics as the result of aging. All of these features are integral parts of the program and will be implemented by plant mechanical maintenance instructions.