

5E.4 VERTICAL TENDON PRESTRESS LOSSES DUE TO FUTURE WIRE BREAKAGE

In accordance with American Concrete Institute Code 318-63, the prestress system has been designed for prestress losses from the following effects:

- a. Seating of anchorage;
- b. Elastic shortening of concrete;
- c. Creep of concrete;
- d. Shrinkage of concrete;
- e. Relaxation of prestressing steel stress; and
- f. Frictional loss due to intended or unintended curvature in the tendons

Due to the discovery of corrosion at the top end of vertical tendons on both Units, the prestress system has also been designed for possible vertical tendon individual wire breaks. It is anticipated that over the remaining operating life of both Units, wire breakage will occur in the remaining original vertical tendon population. Unit 1 will meet its design basis with up to 1,195 additional broken vertical tendon wires, and Unit 2 will meet its design basis with up to 1,228 additional broken vertical tendon wires.

The tendon force versus time curves discussed in Section 5E.3 for the three vertical sub-populations, hoop population, and dome population on each Unit are based on 90-1/4" diameter wire tendons. Should individual wire breakage be discovered in tendons during future inspections, the tendon force versus time curves will be proportioned-down by the ratio of unbroken wires to 90. The difference between the proportioned down tendon force versus time curve, and the 90-wire tendon curve, will represent the prestress loss due to wire breakage at that period of tendon life.

The prestress losses caused by the effects listed in a through f, above, occur for the most part uniformly throughout the Containment Structures. The distribution of possible future vertical tendon wire breakage is predicted to be skewed heavily toward the more severely corroded remaining vertical tendons. This was a critical factor in the evaluation to support 1,195 (Unit 1) and 1,228 (Unit 2) wire breaks.

Therefore, in addition to monitoring the loss of prestress due to the gross number of future wire breaks, the localized area effects of prestress losses will also be monitored as part of the enhanced inspections described in Section 5E.2.5.