

#### 4.4.2 Structural Integrity

##### Applicability

Applies to the structural integrity of the reactor building.

##### Objective

To define the structural integrity of the reactor building.

##### Specification

#### 4.4.2.1 Tendon Surveillance

For the tendon surveillance program, to be conducted over the life of the unit, twenty-one tendons shall be selected on a random but representative basis each surveillance for inspection for symptoms of material deterioration or force reduction. The surveillance tendons shall consist of ten hoop tendons, at least three in each of the three 240° sectors of the reactor building; five vertical tendons located at approximately equally spaced intervals; and six dome tendons, two in each of the three groups of dome tendons.

If the results of the tendon surveillances conducted at the 1, 3 and 5 year intervals are acceptable, then nine (9) surveillance tendons shall be selected on a random but representative basis. The nine surveillance tendons shall consist of three hoop tendons, at least one in each of the three 240° angular sectors of the reactor building; three vertical tendons located at approximately equally spaced intervals; and three dome tendons, one in each of the three groups of dome tendons.

##### 4.4.2.1.1 Lift-Off

Lift-off readings shall be taken for all surveillance tendons. (See Applicable Acceptance Criteria in Section 4.4.2.1.3)

##### 4.4.2.1.2 Wire Inspection and Testing

A minimum of three surveillance tendons, one from each of the hoop, vertical and dome families, shall be relaxed and one wire from each relaxed tendon shall be removed as a sample and visually inspected for corrosion or pitting. In addition, the applicable anchor assemblies shall be inspected for deleterious conditions, such as corrosion, cracks, missing wires and off size button heads. Tensile and elongation tests shall also be performed on a minimum of three specimens taken from the ends and middle of each of the wires. The specimens shall be the maximum length acceptable for the test apparatus to be used and shall include areas representative of significant corrosion or pitting.

After the wire removal, the tendons shall be retensioned to the stress level measured at the lift-off reading (and changes in shim thicknesses shall be recorded) and then checked by a final lift-off reading. The tendon elongation during retensioning shall be measured.

Should the inspection of one of the wires reveal any significant physical change (pitting or loss of area), additional wires shall be removed from the applicable surveillance tendons and inspected to determine the extent and cause change. The sheathing filler will be sampled and inspected for changes in physical appearance. (See Applicable Acceptance Criteria in Section 4.4.2.1.3)

#### 4.4.2.1.3 Acceptance Criteria

The Reactor Building Post Tensioning System shall be considered acceptable if the following acceptance criteria are met.

1. Each surveillance tendon has a normalized lift-off force equaling or exceeding its expected prestress force for the time of the test. See Figures 4.4.2-1, -2, and -3. If the normalized lift-off force of any one tendon in a group lies between the expected prestress force and the lower bound prestress force, an adjacent tendon on each side shall be checked for lift-off force. If both of these tendons are found acceptable, the surveillance program may proceed considering the single deficiency as unique and acceptable. If either of the adjacent tendons is found unacceptable, it shall be considered evidence of possible abnormal degradation of the containment structure. (See TS 6.12.4)

If the normalized lift-off force of any single tendon lies below the lower bound prestress force, the occurrence should be considered evidence of possible abnormal degradation of the containment structure. (See TS 6.12.4)

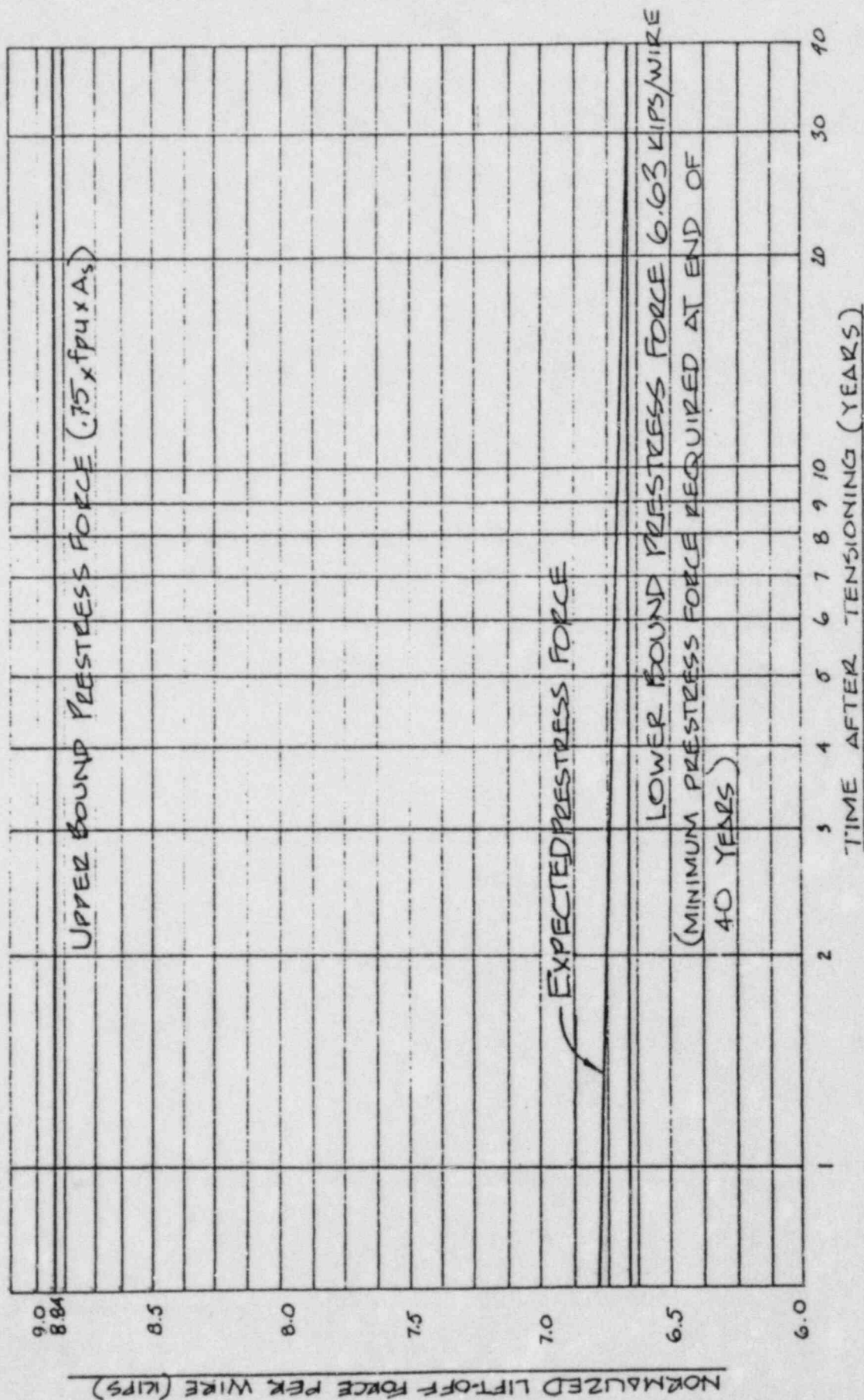
2. The wires removed from three detensioned surveillance tendons (one dome, one vertical and one hoop) shall be inspected for corrosion, cracks, or other damage over the entire length of the wire. The presence of abnormal corrosion, cracks, or other damage shall be considered evidence of possible abnormal degradation of the containment structure. (See TS 6.12.4)

A minimum of three (3) wire samples cut from each removed wire (one from each end and one at mid length) shall be subjected to a tensile test. Failure of any one of these wire samples to meet a minimum ultimate tensile strength of 240 ksi shall be considered evidence of possible abnormal degradation of the containment structure. (See TS 6.12.4)

3. Sheathing Filler material samples from each surveillance shall be considered acceptable provided the results of the tests performed on the samples fall within the following limits.

1.	Water Soluble Chlorides	less than	10 ppm
2.	Water Soluble Nitrates	less than	10 ppm
3.	Water Soluble Sulfides	less than	10 ppm
4.	Water Content	less than	10% Dry Weight

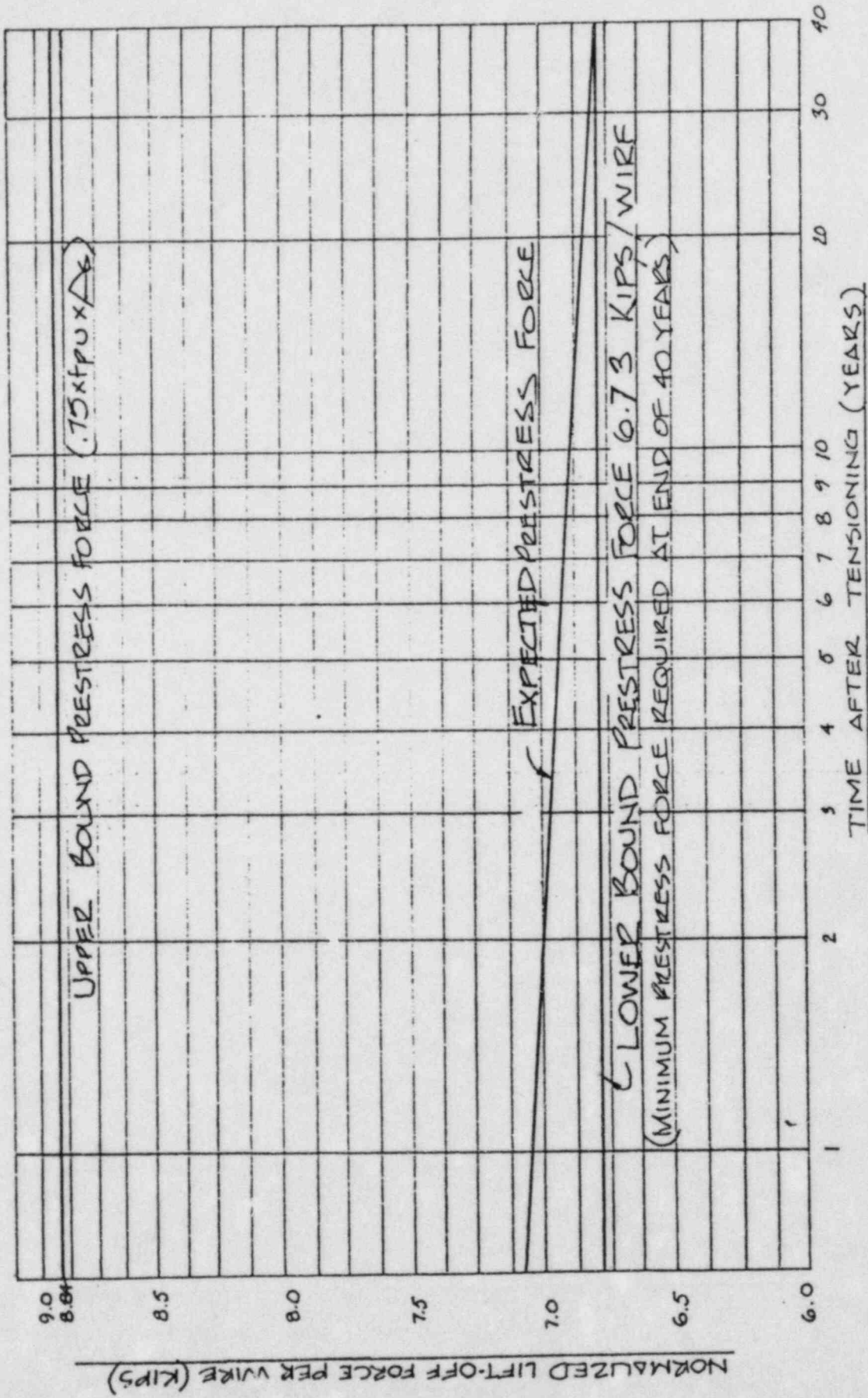
Figure 4.4.2-1



NORMALIZED LIFTOFF FORCE - HOOP TENDONS

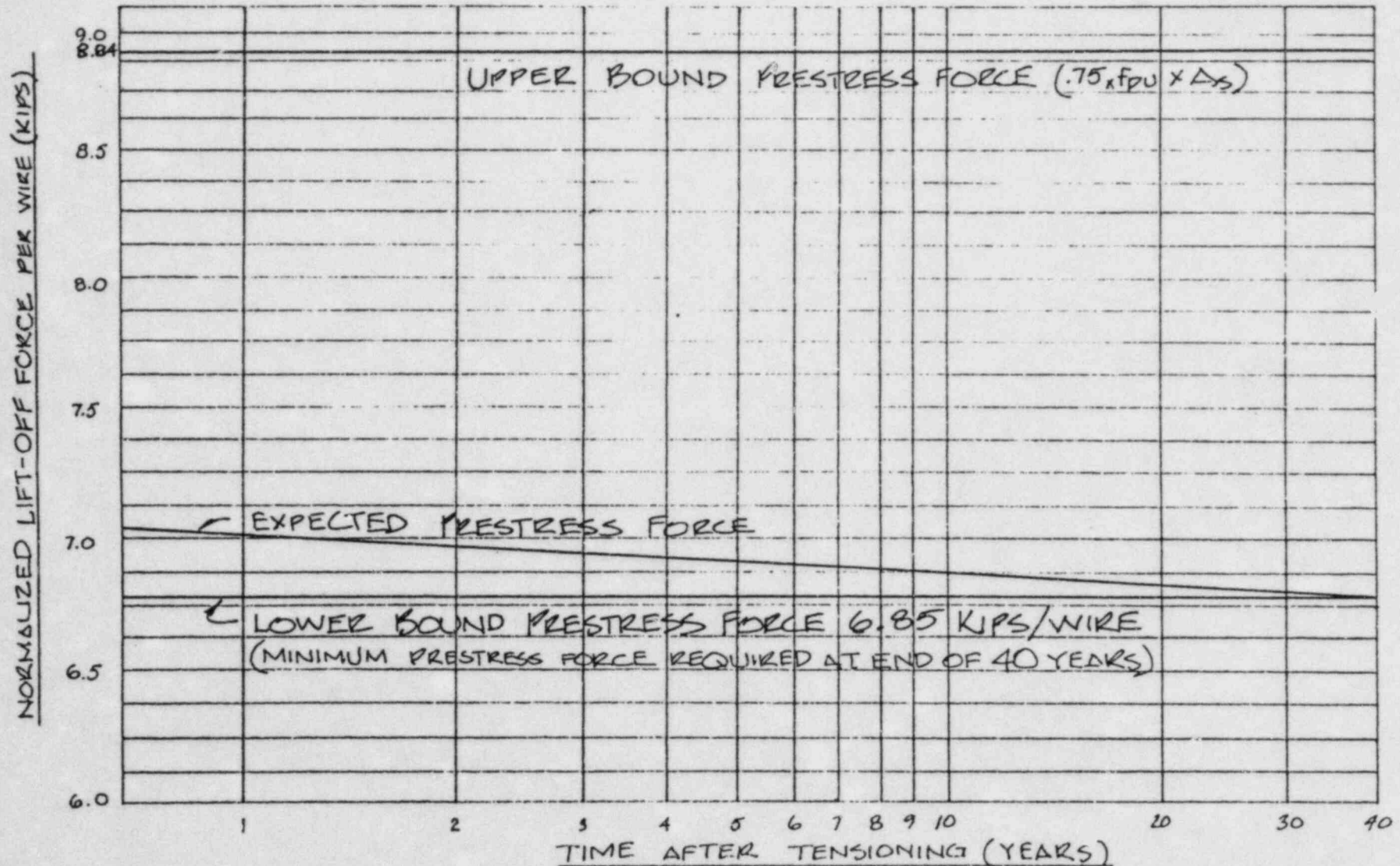


Figure 4.4.2-2



NORMALIZED LIFTOFF FORCE - DOME TENDONS

Figure 4.4.2-3



NORMALIZED LIFTOFF FORCE - VERTICAL TENDONS

#### 4.4.2.2 Inspection Intervals and Reports

The inspection intervals, measured from the date of the initial structural test, shall be one year, three years, five years, and every five years thereafter. Tendon surveillance may be conducted during reactor operation provided design conditions regarding loss of adjacent tendons are satisfied at all times.

A quantitative analytical report covering results of each inspection shall be submitted (required by Technical Specification 6.12.4) and shall especially address the following conditions, should they develop:

- (1) Broken wires.
- (2) The force-time trend line for any tendon, when extrapolated, that extends beyond either the upper or lower bounds of the predicted design band.
- (3) Unexpected changes in tendon conditions or sheathing filler properties.

#### 4.4.2.3 End Anchorage Concrete Surveillance

- A. The end anchorages of the surveillance tendons and adjacent concrete surface will be inspected.
- B. The inspection interval will be one-half year and one year after the structural integrity test.
- C. The selected inspection location shall include:
  - (1) Four (4) locations on one buttress (hoop tendon anchorage).
  - (2) Two (2) locations on the top of the ring girder (vertical tendon anchorage).
  - (3) One (1) location on the ring girder (dome tendon anchorage).