ATTACHMENT 1

TECHNICAL SPECIFICATIONS CHANGES FOR

A 0.95 K-EFFECTIVE AT REFUELING CONDITIONS

SURRY POWER STATION

UNITS NO. 1 AND 2

3.8 CONTAINMENT

Applicability

Applies to the integrity and operating pressure of the reactor containment.

Objective

To define the limiting operating status of the reactor containment for unit operation.

Specification

A. Containment Integrity and Operating Pressure

1. The containment integrity, as defined in TS Section 1.0, shall not be violated unless the reactor is in the cold shutdown condition.

2. The reactor containment shall not be purged whenever the Reactor Coolant System temperature is above 200°F.

3. The inside and outside isolation valves in the steam jet air ejector suction line shall be locked, sealed or otherwise secured closed whenever the Reactor Coolant System temperature is above 200°F.

4. The Reactor Coolant System temperature and pressure must not exceed 350°F and 450 psig, respectively, unless the air partial pressure in the containment is at a value equal to, or below, that specified in TS Figure 3.8-1.

5. The containment integrity shall not be violated when the reactor vessel head is unbolted unless a shutdown margin greater than 5 percent $\Delta k/k$ is maintained.

The shutdown margins are selected based on the type of activities that are being carried out. The 5 percent $\Delta k/k$ shutdown margin during refueling precludes criticality under any circumstances, even though fuel and control rod assemblies are being moved.

The allowable value for the containment air partial pressure is presented in TS Figure 3.8-1 for service water temperatures from 25 to 90°F. The allowable value varies as shown in TS Figure 3.8-1 for a given containment average temperature. The TWST water shall have a maximum temperature of 45°F.

The horizontal limit lines in TS Figure 3.8-1 are based on LOCA peak calculated pressure criteria, and the sloped line is based on LOCA subatmospheric peak pressure criteria.

The curve shall be interpreted as follows:

> The horizontal limit line designates the allowable air partial pressure value for the given average containment temperature. The horizontal limit line applies for service water temperatures from 25°F to the sloped line intersection value (maximum service water temperature).

From TS Figure 3.8-1, if the containment average temperature is 112°F and the service water temperature is less than or equal to 83°F, the allowable air partial pressure value shall be less than or equal to 9.65 psia. If the average containment temperature is 116°F and the service water temperature is less than or equal to 88°F, the allowable air partial pressure value shall be ± 9.35 psia. These horizontal limit lines are a result of the higher allowable initial containment average temperatures and the analysis of the pump suction break.

6. At least one residual heat removal pump and heat exchanger shall be operable to circulate reactor coolant. The residual heat removal loop may be removed from operation for up to 1 hour per 8-hour period during the performance of core alterations or reactor vessel surveillance inspections.

7. Two residual heat removal pumps and heat exchangers shall be operable to circulate reactor coolant when the water level above the top of the reactor pressure vessel flange is less than 23 feet.

8. At least 23 feet of water shall be maintained over the top of the reactor pressure vessel flange during movement of fuel assemblies.

9. With the reactor vessel head unbolted or removed, any filled portions of the Reactor Coolant System and the refueling canal shall be maintained at a boron concentration which is:

   a. Sufficient to maintain K-effective equal to 0.95 or less, and

   b. Greater than or equal to 2000 ppm and shall be checked by sampling at least once every 72 hours.

10. Direct communication between the Main Control Room and the refueling cavity manipulator crane shall be available whenever changes in core geometry are taking place.

11. No movement of irradiated fuel in the reactor core shall be accomplished until the reactor has been subcritical for a period of at least 100 hours.

Basis

Detailed instructions, the above specified precautions and the design of the fuel handling equipment, which incorporates built-in interlocks and safety features, provide assurance that an accident, which would result in a hazard to public health and safety, will not occur during refueling operations. When no change is being made in core geometry, one neutron detector is sufficient to monitor the core and permits maintenance of the out-of-function instrumentation. Continuous monitoring of radiation levels and neutron flux provides immediate indication of an unsafe condition. Containment high radiation levels and high airborne activity levels automatically stop and isolate the Containment Purge System. The fuel building ventilation exhaust is diverted through charcoal filters whenever refueling is in progress. At least one flow path is required for cooling and mixing the coolant contained in the reactor vessel so as to maintain a uniform boron concentration and to remove residual heat.

During refueling, the reactor refueling water cavity is filled with approximately 220,000 gal of water borated to at least 2,000 ppm boron. The boron concentration of this water, established by Specification 3.10.A.9, is sufficient to maintain the reactor subcritical by at least 5% $\Delta k/k$ in the cold shutdown condition with all control rod assemblies inserted. This includes a 1% $\Delta k/k$ and a 50 ppm boron concentration allowance for uncertainty. This concentration is also sufficient to maintain the core subcritical with no control rod assemblies inserted into the reactor. Checks are performed during the reload design and safety analysis process to ensure that K-effective is equal to or less than 0.95 for each core. Periodic checks of refueling water boron concentration assure the proper shutdown margin. Specification 3.10.A.10 allows the Control Room Operator to inform the manipulator operator of any impending unsafe condition detected from the main control board indicators during fuel movement.

ATTACHMENT 2

SAFETY EVALUATION FOR

INCREASING THE K-EFFECTIVE AT REFUELING CONDITIONS

SURRY POWER STATION

UNITS NO. 1 AND 2

ATTACHMENT 2

SAFETY EVALUATION

INCREASING THE K-EFFECTIVE LIMIT AT REFUELING CONDITIONS

Vepco has performed an evaluation of a proposed change to the Surry Technical Specifications governing the boron concentration and K-effective at refueling conditions for Surry Units 1 and 2.

The Surry Technical Specifications currently require a minimum boron concentration of 2,000 ppm and a K-effective less than 0.90 when the reactor vessel head is unbolted. Adherence to this requirement is verified in the Reload Design and Safety Analysis process by a cycle-specific calculation. In recent reload core designs, Vepco has noted that there has been very little margin to this requirement because of increasingly reactive core designs. Vepco therefore proposes an increase in the K-effective limit from 0.90 to the Standard Technical Specifications value of 0.95. This proposed change in K-effective will provide greater flexibility during the reload core design process while maintaining the required safety margin.

Section 3.8.A of the Technical Specifications currently specifies that "The containment integrity shall not be violated when the reactor vessel head is unbolted unless a shutdown margin greater than 10 percent $\Delta k/k$ is maintained".

Section 3.10.A provides limits governing the boron concentration and the K-effective at refueling conditions. These current limits are 1) a minimum boron concentration of 2,000 ppm shall be maintained in any filled portion of the reactor coolant system and 2) the K-effective is less than or equal to 0.90 at refueling conditions. Section 3.10.A also specifies the frequency at which the boron concentration is to be checked.

The basis to the Section 3.10.A also indicates that the core will be subcritical by approximately 1% with no control rod assemblies inserted into the reactor.

The proposed changes to Technical Specifications 3.8.A5 and 3.10.A9 are as follows:

Section 3.8.A5

"The containment integrity shall not be violated when the reactor vessel head is unbolted unless a shutdown margin greater than 5 percent $\Delta k/k$ is maintained."

Section 3.10.A9

"With the reactor vessel head unbolted or removed, any filled portions of the Reactor Coolant System and the refueling canal shall be maintained at a boron concentration which is:

a. Sufficient to maintain K-effective equal to 0.95 or less, and

b. Greater than or equal to 2000 ppm, and shall be checked by sampling at least once every 72 hours."

The basis to the Section 3.10.A9 will also be revised as discussed below.

The proposed Technical Specifications continue to ensure that the reactor remains subcritical during refueling. The current Surry UFSAR accident analyses were reviewed and it has been concluded that only the boron dilution and refueling accidents are potentially impacted by the proposed change to revise K-effective.

Vepco has reviewed the safety analysis of the boron dilution at cold zero power presented in the UFSAR. In the UFSAR analysis, the boron concentration must be reduced from ≥2000 ppm to approximately 1100 ppm before the reactor will become critical. Calculations for recent reloads have shown that the Cold Zero Power, All Rods In (CZP,ARI) critical boron concentration is less than the 1100 ppm assumed in the UFSAR. With the proposed revision to the Technical Specifications, the initial concentration (≥2000 ppm) is still the same as assumed in the UFSAR. Therefore the UFSAR calculated time to criticality remains bounding and the safety margin (i.e., the time provided for corrective action to be initiated) is not reduced. The CZP,ARI critical boron concentration will continue to be checked against the UFSAR assumption for every reload.

Vepco has also reviewed the safety analysis of the fuel handling accident presented in the UFSAR. With the proposed Technical Specifications changes, the refueling boron concentration is still maintained ≥2000 ppm, as discussed above. A K-effective equal to 0.95 will continue to maintain the core subcritical by a sufficient margin to preclude inadvertent criticality during fuel handling and the results in the UFSAR remain bounding.

The basis to Technical Specification 3.10.A9 states that the required refueling boron concentration of 2000 ppm is sufficient to maintain the core subcritical by approximately 1% with no control rod assemblies inserted into the reactor. This statement has been replaced by the more general one that the concentration is sufficient to maintain the core subcritical, with no specific amount of subcriticality margin specified. This is consistent with the wording of General Design Criterion No. 26 (GDC-26), which states that one of two independent reactivity control systems "shall be capable of holding the reactor core subcritical under cold conditions". While the calculations will be performed for every reload core to verify that this condition is met, Cold, All Rods Out is not a credible condition for Surry. When the vessel head is unbolted and removed, administrative controls prohibit the removal of more than one control rod assembly from its fuel assembly at any one time. Therefore, during refueling, fuel assemblies are removed from and inserted into the core with the control rods intact. Additional administrative controls preclude the inadvertent removal of control rods during removal of the core upper internals assembly by requiring independent verification that the control rod assemblies are unlatched from their respective drive shafts. The Surry Updated FSAR Section 9.12.5., REFUELING PROCEDURE, will be updated to ensure that these controls are completely described.

A 1% $\Delta k/k$ uncertainty in K-effective and a 50 ppm uncertainty in boron concentration at refueling conditions are adequately accounted for in Station Operating Procedures for calculating the shutdown margin.

Vepco's review of the Surry UFSAR accident analyses included a determination of the basis for the 8-hour sampling frequency of the boron concentration. The apparent basis, detection of a boron dilution accident, has been discounted. The boron dilution accident analysis calculates the time to criticality to be approximately 57 minutes. This period of time is much less than the 8-hour period presently required by the sampling frequency. Hence, the 8-hour boron concentration sampling frequency requirement has no impact on the boron dilution accident. Other systems operable during refueling conditions were also reviewed for possible interaction with the boron concentration requirement and therein the requirement for the 8-hour sampling frequency. No interactions requiring an 8-hour sampling frequency were identified. The specification is considered to be an administrative control for surveillance to assure that the boron concentration is periodically verified. The NRC considers a sampling frequency of 72 hours to be adequate as evidenced by similar Standardized Technical Specifications. Thus, VEPCO proposes to change the frequency for sampling the boron concentration to 72 hours.

It has been demonstrated that the proposed change in K-effective from 0.90 to 0.95 is acceptable from a safety and licensing standpoint. The proposed change to reduce the boron concentration sampling frequency from 8 hours to 72 hours has also been demonstrated acceptable from a safety and licensing standpoint. The margin of safety as defined in the basis for Technical Specifications is not reduced. Furthermore, the proposed change has been reviewed against the criteria of 10 CFR 50.59 and does not involve an unreviewed safety question. The specific bases for this determination are as follows:

1. The probability of occurrence or the consequences of accidents important to safety and previously evaluated in the Safety Analysis Report is not increased. A review of the accidents which could occur at refueling conditions shows that the UFSAR accident analysis remains bounding.

2. The possibility for an accident or malfunction of a different type than any evaluated previously in the Safety Analysis Report is not created. The change only involves the increase in K-effective at refueling condition and will not involve any new or unique accident precursors.

3. The margin of safety, as defined in the basis for the affected technical specifications, is not changed. Since the analyses remain bounding, there is no reduction in the plant safety margin involved.

The increase in K-effective from 0.90 to 0.95 does not pose a significant hazards consideration as defined in 10CFR50.92. This is based upon example vi of those types of license amendments that are considered unlikely to involve significant hazards considerations. Example vi (48 FR 14870) partially states, " A change which either may result in some increase to the probability or consequences of a previously analyzed accident or may reduce in some way a safety margin, but where the results of the change are clearly within all acceptable criteria with respect to the systems or components specified in the Standard Review Plan". As discussed above, the analysis results show that the proposed amendment would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated; or

2. Create the possibility of a new or different kind of accident from any accident previously evaluated; or

3. Involve a significant reduction in a margin of safety.