ATTACHMENT A

REVISED PAGES FOR THE

SEFOR TECHNICAL SPECIFICATIONS

PROPOSED CHANGE NO. 3

3.3 Reactor Core

Applicability

Applies to reactor core loading configurations.

Objective

To assure that core physics parameters remain within the expected range and that fuel rod cladding integrity is maintained.

Specification

A. The reactor shutdown margin at 350°F shall be equal to or greater than 1$ with one operable reflector segment raised to its most reactive position, and extrapolation of data obtained at or above 350°F shall demonstrate that the reactor would be subcritical at 300°F with one operable reflector segment raised to its most reactive position.

B. The excess reactivity available at rated power (20 MWt) shall be equal to or less than 0.5$ when the core inlet temperature is at 700°F. The core reactivity shall not be increased by adding fuel rods to compensate for an inoperable reflector segment.

C. The reactor power coefficient of reactivity at constant inlet temperature and constant coolant flow rate shall be negative.

D. The isothermal temperature coefficient of reactivity at "zero" power shall be negative.

E. Following initial operations at a power level of 10 MWt, the reactor shall not be operated unless operating data from SEFOR demonstrate that the net non-fuel coefficient is negative and that the Doppler coefficient ($T\frac{dk}{dT}$) is negative with a magnitude equal to or greater than 0.005.

F. The reactor shall have a phase margin of at least 30° at the point where the Nyquist plot crosses the unit circle.

G. The reactor shall have at least 600 fuel rods in the core if the scram trip point is set at a power level greater than 1 MWt.

H. Guinea pig fuel rods of 25.0% plutonium enrichment shall only be located below the six refueling ports. ~~No guinea pig rods shall be located under the three innermost refueling ports during steady state reactor operations above 17.5 MWt.~~

of standard fuel rods at the center of the core during 20 MWt operation. ~~Removal of guinea pig rods from these positions allows operation of the reactor above 17.5 MWt without exceeding this value of the linear power density.~~

Fission chambers (He-3) will be placed in the center channel to provide criticality measurements during initial loading of fuel into the core. After initial core loading, a drywell may be placed in the center channel. Experimental foils or fuel samples will be placed in the center channel (or in a drywell placed in the center channel) for physics experiments[8] at power levels less than 100 KWt during initial reactor operation. The amount of fuel in any sample will be well below 0.5 Kg. The drywell (which does not contain sodium) has limited cooling capacity and for this reason is not suitable for inclusion of fuel during power operations. At 100 KWt, the maximum power generated in 0.5 Kg of fissionable material is less than 300 watts, which can be dissipated to the surrounding structure (which is cooled by sodium flowing in adjacent channels) without a significant temperature rise. Small experimental foils (10 mg or less) may also be placed in the drywell for physics experiments at power levels above 100 KWt.

At 20 MWt, the maximum power generated in 10 mg of fissionable material is only about 1 watt. The reactivity worth of 10 mg of fissionable material in the center of the channel is negligible (about 0.001¢). The inadvertent addition of up to 60¢ in reactivity in the drywell with the reactor just critical and with no reactor scram is similar to the handling accidents discussed in the FDSAR.[9] The maximum fuel temperature for this case would be 1260°F.

Fuel rod defects are defined so as to prevent use of fuel rods which are distorted or which might distort to an extent that adequate cooling of the rod and/or surrounding rods might be compromised.

Pin hole leaks, which may occur in some fuel rods, are excluded from the definition of fuel rod defects.[10]

A rupture of the clad, if localized, might not, of itself, be sufficient to cause significant cooling loss. However, since such behavior is not expected, it would indicate the potential for future more serious damage to the rod, and removal from the core is prudent.

Bases

The reactor power limit will be increased in a step-wise manner with static and oscillator measurements made at the indicated power levels. The results from tests at each power level will be evaluated and compared to predicted results before proceeding to the next higher power level. Results from static and oscillator tests will be analyzed to verify that the minimum conditions for operation specified in Section 3.3.C, D & E are being met.

Reactor stability will be determined by means of conventional oscillator tests at each step in the approach to power. These tests will consist of measuring reactor flux and input reactivity as a function of time while the reactivity is oscillated and coolant flow rate is held constant. Data from these tests will be used to make Nyquist plots for each power level.

Guinea pig fuel rods[1] containing fuel pellets of 25% fissile plutonium will be placed in the core at positions located under through-head refueling ports, and will be removed for examination at scheduled intervals in the test program. Up to three of the guinea pig rods will operate at power densities up to 15% higher than a standard rod nearest the center of the core.

The specified guinea pig rod examinations after operation at power levels of 15 and 17.5 MWt were chosen such that satisfactory operating experience with the guinea pig rods at each of these power levels will provide assurance of satisfactory operation of standard fuel rods at the next higher power level.

~~Guinea pig rods nearest the center of the core will be removed prior to reactor operation above 17.5 MWt, so that no fuel rods will be operated at power densities in excess of that experienced by the hottest standard fuel rod at 20 MWt. (See Specification 3.3.H).~~

The initial calibration of the Wide Range Flux Monitor will be based on physics calculations. This calibration will be verified by experimental data as soon as practicable, and will be checked at the specified steps in the approach to power.

Reactor operating data and experience will be used to establish allowable limits for unexplained changes in reactivity and reactor cover gas activity. These data will be obtained during initial reactor operation up to and including 10 MWt. Observation of unexplained changes beyond these limits will require the actions specified in Section 4.9.

Reference

(1) SEFOR FDSAR, Volume I, Para. 4.2.2.4, p. 4-9.

4.3 Reactor Fuel Rods

Applicability

Applies to fuel rod examination made in the refueling cell.

Objective

To assure maintenance of fuel rod cladding integrity during reactor operation.

Specification

A. Two or more guinea pig fuel rods which have operated at power densities higher than the power density of standard fuel rods nearest the center of the core shall be removed from the reactor after operation at reactor power levels of 15, 17.5, and 20 MWt, and shall be examined in the refueling cell by visual observation, dimensional checks, and gamma scans. After reaching a power level of 15 MWt and before reaching 17.5 MWt, the interval between fuel rod examinations shall not exceed six months.

B. Before the start of the sub-prompt critical excursion tests and before the start of the prompt critical excursion tests, a minimum of one guinea pig fuel rod and one standard fuel rod shall be examined by the methods described in "A" above.

C. After each prompt critical excursion test, at least one guinea pig rod and one standard rod shall be examined by the methods described in "A" above.

D. If the examination of a fuel rod should indicate a defect as described in Section 3.3K, additional fuel rods shall be examined to determine the extent of additional defects if any.

Bases

The bases for fuel rod examinations specified in this section are given in Section 3.10, "Approach to Power", and Section 3.12, "Excursion Tests". The same fuel rod will be chosen for examination following each test, insofar as practicable, to provide comparative data on the effects of each test.