Attachment 2

Affected Pages

TS 1.1-4
TS 3.8-1
TS 3.8-3
TS 3.8-5
TS 3.6-4

2. Channel Functional Test

A channel functional test consists of injecting a simulated signal into the channel as close to the primary sensor as practicable to verify that it is operable, including alarm and/or trip initiating action.

3. Channel Calibration

Channel calibration consists of the adjustment of channel output such that it responds, with acceptable range and accuracy, to known values of the parameter which the channel monitors. Calibration shall encompass the entire channel, including alarm and/or trip, and shall be deemed to include the channel functional test.

4. Source Check

A Source Check shall be the qualitative assessment of channel response when the channel sensor is exposed to a source of increased radioactivity.

j. Operating Modes

Mode	Reactivity $\Delta k/k$	Coolant Temp T_{avg} °F	Fission Power %
Refueling	$\leq$ -5%	$\leq$140	~ 0
Cold Shutdown	$\leq$ -1%	$\leq$200	~ 0
Intermediate Shutdown	(1)	>200 <540	~ 0
Hot Shutdown	(1)	$\geq$540	~ 0
Hot Standby	<0.25%	~T_{oper}	<2
Operating	<0.25%	~T_{oper}	$\geq$2
Low Power Physics Testing	(To be specified by specific tests)		

(1) Refer to Figure TS 3.10-1

k. Reactor Critical

The reactor is said to be critical when the neutron chain reaction is self-sustaining.

3.8 REFUELING

Applicability

Applies to operating limitations during refueling operations.

Objective

To ensure that no incident occurs during refueling operations that would affect public health and safety.

Specification

a. During refueling operations:

1. The equipment hatch and at least one door in each personnel air lock shall be closed. In addition, each line that penetrates containment and which provides a direct air path from containment atmosphere to the outside atmosphere shall have a closed isolation valve or an operable automatic isolation valve.
2. Radiation levels in fuel handling areas, the containment and the spent fuel storage pool shall be monitored continuously.
3. The reactor will be subcritical for 100 hours prior to movement of its irradiated fuel assemblies. Core subcritical neutron flux shall be continuously monitored by at least TWO neutron monitors, each with continuous visual indication in the control room and ONE with audible indication in the containment whenever core geometry is being changed. When core geometry is not being changed at least ONE neutron flux monitor shall be in service.
4. At least ONE residual heat removal pump shall be operable.
5. When there is fuel in the reactor, a minimum boron concentration of 2100 ppm and a shutdown margin of $\geq$ 5% $\Delta k/k$, shall be maintained in the Reactor Coolant System during reactor vessel head removal or while loading and unloading fuel from the reactor. The required boron concentration shall be verified by chemical analysis daily.

12. A licensed senior reactor operator will be on site and designated in charge of the refueling operation.

b. If any of the specified limiting conditions for refueling are not met, refueling of the reactor shall cease. Work shall be initiated to correct the violated conditions so that the specified limits are met, and no operations which may increase the reactivity of the core shall be performed.

Basis

The equipment and general procedures to be utilized during refueling are discussed in the USAR. Detailed instructions, the above specified precautions, and the design of the fuel handling equipment incorporating built-in interlocks and safety features, provide assurance that no incident occurs during the refueling operations that would result in a hazard to public health and safety.(1) Whenever changes are not being made in core geometry, one flux monitor is sufficient. This permits maintenance of the instrumentation. Continuous monitoring of radiation levels (2 above) and neutron flux provides immediate indication of an unsafe condition. The residual heat removal pump is used to maintain a uniform boron concentration.

A minimum shutdown margin of greater than or equal to 5% Δk/k must be maintained in the core. A boron concentration of 2100 ppm, as required by TS 3.8.a.5, is sufficient to maintain a typical core shutdown by aproximately 10% Δk/k and is specified to ensure an adequate margin of safety. The specification for refueling shutdown margin is based on a dilution during refueling accident (4). With an initial shutdown margin of 5% Δk/k, under the postulated accident conditions, it will take approximately 61 minutes for the reactor to go critical. This is ample time for the operator to recognize the audible high count rate signal, and isolate the reactor makeup water system. Periodic checks of refueling water boron concentration ensure that proper shutdown margin is maintained. Specification 3.8.a.6 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.

Interlocks are utilized during refueling to ensure safe handling. Only one assembly at a time can be handled. The fuel handling hoist is dead weight tested prior to use to assure proper crane operation. It will not be possible to lift or carry heavy objects over the spent fuel pool when fuel is stored

and DOP, respectively. The laboratory carbon sample test results indicate a radioactive methyl iodide removal efficiency under test conditions which are more severe than accident conditions.

Operation of the fans significantly different from the design flow will change the removal efficiency of the HEPA filters and charcoal adsorbers. If the performances are as specified, the calculated doses would be less than the guidelines stated in 10 CFR Part 100 for the accidents analyzed.

The spent fuel pool sweep system will be operated for the first month after reactor is shutdown for refueling during fuel handling and crane operations with loads over the pool. The potential consequences of a postulated fuel handling accident without the system are a very small fraction of the guidelines of 10 CFR Part 100 after one month decay of the spent fuel. Heavy loads greater than one fuel assembly are not allowed over the spent fuel.

In-place testing procedures will be established utilizing applicable sections of ANSI N510 - 1975 standard as a procedural guideline only.

The presence of a licensed senior reactor operator at the site and designated in charge provides qualified supervision of the refueling operation during changes in core geometry. (3)

References

(1) USAR Section 9.5.2
(2) USAR Table 3.2-1
(3) USAR Section 13.2.1
(4) USAR Section 14.1

The cold shutdown condition precludes any energy releases or buildup of containment pressure from flashing of reactor coolant in the event of a system break. The restriction to fuel that has been irradiated during power operation allows initial testing with an open containment when negligible activity exists. The shutdown margin for the cold shutdown condition assures subcriticality with the vessel closed even if the most reactive RCC assembly were inadvertently withdrawn. Therefore, the two parts of Specification 3.6.a allow Containment System integrity to be violated when a fission product inventory is present only under circumstances that preclude both criticality and release of stored energy.

When the reactor vessel head is removed with the Containment System integrity violated, the reactor must not only be in the cold shutdown condition, but also in the refueling shutdown condition. A 5% shutdown margin is specified for refueling conditions to prevent the occurrence of criticality under any circumstances, even when fuel is being moved during refueling operations. The requirement of a 40°F minimum containment ambient temperature is to assure that the minimum containment vessel metal temperature is well above NDTT + 30° criterion for the shell material.

This specification also prevents positive insertion of reactivity whenever Containment System integrity is not maintained if such addition would violate the respective shutdown margins. Effectively, the boron concentration must be maintained at a predicted concentration of 2100 ppm(1) or more if the Containment System is to be disabled with the reactor pressure vessel open.