DEFINITIONS

$\bar{E}$ - Average Disintegration Energy

$\bar{E}$ is the average (weighted in proportion to the concentration of each radionuclide in the reactor coolant at the time of sampling) of the sum of the average beta and gamma energies per disintegration, in MEV, for isotopes, other than iodines, with half lives greater than 15 minutes making up at least 95% of the total non-iodine radioactivity in the coolant.

Offsite Dose Calculation Manual (ODCM)

The document(s) that contain the methodology and parameters used in the calculations of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent radiation monitoring Warn/High (trip) Alarm setpoints, and in the conduct of the Environmental Radiological Monitoring Program. The ODCM shall also contain:

1) The Radiological Effluent Controls and the Radiological Environmental Monitoring Program required by Specification 5.16.

2) Descriptions of the information that should be included in the Annual Radiological Environmental Operating Reports and Annual Radioactive Effluent Release Reports required by Specifications 5.9.4.a and 5.9.4.b.

Unrestricted Area

Any area at or beyond the site boundary access to which is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials.

Core Operating Limits Report (COLR)

The Core Operating Limits Report (COLR) is a Fort Calhoun Station Unit No. 1 specific document that provides core operating limits for the current operating cycle. These cycle-specific core operating limits shall be determined for each reload cycle in accordance with Section 5.9.5. Plant operation within these operating limits is addressed in the individual specifications.

RCS Pressure-Temperature Limits Report (PTLR)

The PTLR is a fluence dependent document that provides Limiting Conditions for Operation (LCO) in the form of pressure-temperature (P-T) limits to ensure prevention of brittle fracture. In addition, this document establishes power operated relief valve setpoints which provide low temperature overpressure protection (LTOP) to assure the P-T limits are not exceeded during the most limiting LTOP event. The P-T limits and LTOP criteria in the PTLR are applicable through the effective full power years (EFPYs) specified in the PTLR. NRC approved methodologies are used as the bases for the information provided in the PTLR.

References

(1) USAR, Section 7.2
(2) USAR, Section 7.3

2.0 LIMITING CONDITIONS FOR OPERATION
2.1 Reactor Coolant System (Continued)
2.1.4 Reactor Coolant System Leakage Limits

Applicability

Applies to the leakage rates of the reactor coolant system whenever the reactor coolant temperature (T_{cold}) is greater than 210 °F.

Objective

To specify limiting conditions of the reactor coolant system leakage rates.

Specifications

To assure safe reactor operation, the following limiting conditions of the reactor coolant system leakage rates must be met:

(1) If the reactor coolant system leakage exceeds 1 gpm and the source of leakage is not identified within 12 hours, the reactor shall be placed in the hot shutdown condition. If the source leakage exceeds 1 gpm and is not identified within 24 hours, the reactor shall be placed in the cold shutdown condition.

(2) If leakage exceeds 10 gpm, the reactor shall be placed in the hot shutdown condition within 12 hours. If the leakage exceeds 10 gpm for 24 hours, the reactor shall be placed in the cold shutdown condition.

(3) Primary-to-secondary leakage through the steam generator tubes shall be limited to 150 gallons per day per steam generator and 300 gallons per day total for both steam generators. When primary-to-secondary leakage has been determined to be in excess of the limit, the leakage rate shall be reduced to within limits in 4 hours or the reactor shall be placed in the cold shutdown condition within the next 36 hours.

(4) To determine leakage to the containment, a containment atmosphere radiation monitor (gaseous or particulate) or dew point instrument, and a containment sump level instrument must be operable.

a. With no containment sump level instrument operable, verify that a containment atmosphere radiation monitor is operable, and restore the containment sump level instrument to operable status within 30 days.

b. With no containment atmosphere radiation monitor and no dewpoint instrument operable, restore either a radiation monitor or dewpoint instrument to operable status within 30 days.

c. With only the dewpoint instrument operable, or with no operable instruments, enter Specification 2.0.1 immediately.

2.0 LIMITING CONDITIONS FOR OPERATION
2.1 Reactor Coolant System (Continued)
2.1.4 Reactor Coolant System Leakage Limits (Continued)

(5) To determine leakage to the secondary system one of the following must be operable:

a. Steam Generator Blow Down Radiation Sample Instrument
b. Condenser Off Gas Radiation Monitor
c. Periodic Secondary Samples Analyzed for Activity

Basis

Leakage directly into the containment indicates the possibility of a breach in the reactor coolant envelope. The limit is held low to minimize the chance of a crack progressing to an unsafe condition without detection and proper evaluation.

When the source of leakage can be identified, the situation shall be evaluated to determine if operation can safely continue. This evaluation will be reviewed by the Plant Review Committee and will be documented in writing and approved by the Plant Manager. Under these conditions, a maximum allowable reactor coolant leakage rate of 10 gpm has been established. This does not include the reactor coolant pump seal leak off that is piped to the volume control tank, which is not considered "leakage" from the reactor coolant system. A reactor coolant leakage to the containment atmosphere greater than 10 gpm would be indicative of seal and packing failures of sufficient magnitude to warrant shutdown for repair.

The maximum reactor coolant leakage rate of 10 gpm is within the 40 gpm capacity of one charging pump which would be available even under a loss-of-off-site power condition. Leakage from the reactor coolant system can be detected by monitoring one or a combination of reactor coolant system inventory, containment building radiation level, condenser offgas, steam generator blowdown water, containment dewpoint, and containment sump level (LT-599 or LT-600).[1,2] The containment atmosphere gaseous and particulate monitors are capable of detecting a one gpm leak from the reactor coolant system to containment within four hours of leak initiation following Regulatory Guide 1.45 criteria. The capability to detect a one gpm RCS leak within 4 hours is required in order to credit leak-before-break methodology. If reactor coolant leakage is to another closed system, it can be detected by the plant radiation monitors or by inventory control.

Placing the reactor in hot shutdown within 12 hours provides adequate time to arrange for an orderly reduction of power on the plant. The hot shutdown condition allows personnel to enter the containment and to inspect the pressure boundary for leaks. The 24 hours allowed prior to going to a cold shutdown condition allows reasonable time to correct small deficiencies. If major repairs are needed, a cold shutdown condition would be in order.

2.0 LIMITING CONDITIONS FOR OPERATION
2.1 Reactor Coolant System (Continued)
2.1.4 Reactor Coolant System Leakage Limits (Continued)

Limiting primary to secondary leakage is important to ensure steam generator tube integrity. The plant is expected to be operated in a manner such that the secondary coolant will be maintained within those chemistry limits found to result in negligible corrosion of the steam generator tubes. If the secondary coolant chemistry is not maintained within these limits, localized corrosion may likely result in stress corrosion cracking. The extent of cracking during plant operation would be limited by the limitation of steam generator tube leakage between the primary coolant system and the secondary coolant system (primary-to-secondary leakage = 150 gallons per day through any one steam generator or 300 gallons per day total). The safety analysis assumes a 1 gpm primary to secondary leak as the initial condition. The Technical Specification requirement to limit primary to secondary leakage through any one steam generator to less than 150 gallons per day is significantly less than the initial condition for the safety analysis. This limit is based on industry operating experience as an indication of one or more propagating tube leak mechanisms. This leakage rate provides reasonable assurance against tube burst at normal and faulted conditions and provides reasonable assurance that flaws will not propagate to burst prior to detection by leakage monitoring and commencement of plant shutdown. Operating plants have demonstrated that primary-to-secondary leakage of 150 gallons per day can readily be detected by radiation monitors. Leakage from any one steam generator in excess of this limit will require plant shutdown and an unscheduled inspection, during which the leaking tubes will be located and plugged or repaired.

References

(1) USAR, Section 11.2.3

(2) USAR, Page G.16-1