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LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

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INSTRUMENTATION

3/4.3.10 MECHANICAL VACUUM PUMP TRIP INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.10 Two channels of the Main Steam Line Radiation - High, High function for the mechanical vacuum pump trip shall be OPERABLE.

APPLICABILITY: OPERATIONAL CONDITIONS 1 and 2 with mechanical vacuum pump in service and any main steam line not isolated.

ACTION:

- a. With one channel of the Main Steam Line Radiation - High, High function for the mechanical vacuum pump trip inoperable, restore the channel to OPERABLE status within 12 hours. Otherwise, trip the mechanical vacuum pumps, or isolate the main steam lines or be in HOT SHUTDOWN within the next 12 hours.

The provisions of Specification 3.0.4 are not applicable.

- b. With mechanical vacuum pump trip capability not maintained:

1. Trip the mechanical vacuum pumps within 12 hours; or
2. Isolate the main steam lines within 12 hours; or
3. Be in HOT SHUTDOWN within 12 hours.

The provisions of Specification 3.0.4 are not applicable.

- c. When a channel is placed in an inoperable status solely for the performance of required Surveillances, entry into the associated ACTIONS may be delayed for up to 6 hours provided the mechanical vacuum pump trip capability is maintained.

SURVEILLANCE REQUIREMENTS

4.3.10 Each channel of the Main Steam Line Radiation - High, High function for the mechanical vacuum pump trip shall be demonstrated OPERABLE by:

- a. Performance of a CHANNEL CHECK at least once per 12 hours;
- b. Performance of a CHANNEL FUNCTIONAL TEST at least once per 92 days;
- c. Performance of a CHANNEL CALIBRATION at least once per 18 months. The Allowable Value shall be $\leq 3.6 \times$ normal background; and
- d. Performance of a LOGIC SYSTEM FUNCTIONAL TEST, including mechanical vacuum pump trip breaker actuation, at least once per 18 months.

INSTRUMENTATION

BASES

3/4.3.10 MECHANICAL VACUUM PUMP TRIP INSTRUMENTATION

BACKGROUND

The Mechanical Vacuum Pump Trip Instrumentation initiates a trip of the main condenser mechanical vacuum pump breaker following events in which main steam line radiation exceeds predetermined values. Tripping the mechanical vacuum pump limits the offsite and control room doses in the event of a control rod drop accident (CRDA). The trip logic consists of two independent channels of the Main Steam Line Radiation - High, High function. A trip of either channel is sufficient to result in a pump trip signal for both mechanical vacuum pumps.

APPLICABLE SAFETY ANALYSES

The Mechanical Vacuum Pump Trip Instrumentation is assumed in the safety analysis for the CRDA. The Mechanical Vacuum Pump Trip Instrumentation initiates a trip of the mechanical vacuum pump to limit offsite and control room doses resulting from fuel cladding failure in a CRDA (Ref. 1).

The mechanical vacuum pump trip instrumentation satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

LCO

The OPERABILITY of the mechanical vacuum pump trip is dependent on the OPERABILITY of the individual Main Steam Line Radiation - High, High instrumentation channels, which must have their setpoints within the specified Allowable Value of Surveillance Requirement 4.3.10.c. The actual setpoint is calibrated consistent with applicable setpoint methodology assumptions. Channel OPERABILITY also includes the mechanical vacuum pump breakers.

APPLICABILITY

The mechanical vacuum pump trip is required to be OPERABLE in OPERATIONAL CONDITIONS 1 and 2 when any mechanical vacuum pump is in service (i.e., taking a suction on the main condenser) and any main steam line not isolated, to mitigate the consequences of a postulated CRDA. In this condition fission products released during a CRDA could be discharged directly to the environment. Therefore, the mechanical trip is necessary to assure conformance with the radiological evaluation of the CRDA. In OPERATIONAL CONDITION 3, 4 or 5 the consequences of a control rod drop are insignificant, and are not expected to result in any fuel damage or fission product releases. When the mechanical vacuum pump is not in service or the main steam lines are isolated, fission product releases via this pathway would not occur.

INSTRUMENTATION

BASES

3/4.3.10 MECHANICAL VACUUM PUMP TRIP INSTRUMENTATION (continued)

ACTION a.

With one channel inoperable, but with mechanical vacuum pump trip capability maintained (refer to ACTION b Bases), the mechanical vacuum pump trip instrumentation is capable of performing the intended function. However, the reliability and redundancy of the mechanical vacuum pump trip instrumentation is reduced, such that a single failure in the remaining channel could result in the inability of the mechanical vacuum pump trip instrumentation to perform the intended function. Therefore, only a limited time is allowed to restore the inoperable channels to OPERABLE status. Because of the low probability of extensive numbers of inoperabilities affecting multiple channels, and the low probability of an event requiring the initiation of mechanical vacuum pump trip, 12 hours has been shown to be acceptable (Ref. 2) to permit restoration of an inoperable channel to OPERABLE status. If the inoperable channel cannot be restored to OPERABLE status, the plant must be brought to an OPERATIONAL CONDITION or other specified condition in which the LCO does not apply. To achieve this status, the plant must be brought to at least OPERATIONAL CONDITION 3 within 12 hours. Alternately, the associated mechanical vacuum pump(s) may be removed from service since this performs the intended function of the instrumentation. An additional option is provided to isolate the main steam lines which may allow operation to continue. Isolating the main steam lines effectively provides an equivalent level of protection by precluding fission product transport to the condenser.

The allowed completion time of 12 hours is reasonable, based on operating experience, to reach OPERATIONAL CONDITION 3 from full power conditions, or to remove the mechanical vacuum pump(s) from service, or to isolate the main steam lines, in an orderly manner and without challenging plant systems.

ACTION b.

ACTION b. is intended to ensure that appropriate actions are taken if multiple, inoperable, untripped channels result in not maintaining mechanical vacuum pump trip capability. The mechanical vacuum pump trip capability is maintained when one channel is OPERABLE such that the Mechanical Vacuum Pump Trip Instrumentation will generate a trip signal from a valid Main Steam Line Radiation - High, High signal, and the mechanical vacuum pump breakers will open. This would require one channel to be OPERABLE, and the mechanical vacuum pump breakers to be OPERABLE. With mechanical vacuum pump trip capability not maintained, the plant must be brought to an OPERATIONAL CONDITION or other specified condition in which the LCO does not apply. To achieve this status, the plant must be brought to at least OPERATIONAL CONDITION 3 within 12 hours. Alternately, the associated mechanical vacuum pump(s) may be removed from service since this performs the intended function of the instrumentation. An additional option is provided to isolate the main steam lines which may allow operation to continue. Isolating the main steam lines effectively provides an equivalent level of protection by precluding fission product transport to the condenser.

INSTRUMENTATION

BASES

3/4.3.10 MECHANICAL VACUUM PUMP TRIP INSTRUMENTATION (continued)

The allowed completion time of 12 hours is reasonable, based on operating experience, to reach OPERATIONAL CONDITION 3 from full power conditions, or to remove the mechanical vacuum pump(s) from service, or to isolate the main steam lines, in an orderly manner and without challenging plant systems.

ACTION c.

ACTION c. allows that when a channel is placed in an inoperable status solely for performance of required Surveillances, entry into the associated ACTIONS may be delayed for up to 6 hours provided mechanical vacuum pump trip capability is maintained. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the required ACTIONS taken. This allowance is based on the reliability analysis (Ref. 2) assumption of the average time required to perform channel Surveillance. That analysis demonstrated that the 6 hour testing allowance does not significantly reduce the probability that the mechanical vacuum pump will trip when necessary.

Surveillance Requirement 4.3.10.a

Performance of the CHANNEL CHECK once every 12 hours ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel to a similar parameter on other channels. It is based on the assumption that instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between the instrument channels could be an indication of excessive instrument drift in one of the channels or something even more serious. A CHANNEL CHECK will detect gross channel failure; thus, it is key to verifying the instrumentation continues to operate properly between each CHANNEL CALIBRATION.

Agreement criteria are determined by the plant staff based on a combination of the channel instrument uncertainties, including indication and readability. If a channel is outside the criteria, it may be an indication that the instrument has drifted outside its limit.

The frequency is based upon operating experience that demonstrates channel failure is rare. The CHANNEL CHECK supplements less formal, but more frequent, checks of channels during normal operational use of the displays associated with the required channels of this LCO.

Surveillance Requirement 4.3.10.b

A CHANNEL FUNCTIONAL TEST is performed on each required channel to ensure that the channel will perform the intended function. Any setpoint adjustment shall be consistent with the assumptions of the current plant specific setpoint methodology.

INSTRUMENTATION

BASES

3/4.3.10 MECHANICAL VACUUM PUMP TRIP INSTRUMENTATION (continued)

The frequency of 92 days is based on the reliability analysis of Reference 2.

Surveillance Requirement 4.3.10.c

A CHANNEL CALIBRATION is a complete check of the instrument loop and the sensor. This test verifies the channel responds to the measured parameter within the necessary range and accuracy. CHANNEL CALIBRATION leaves the channel adjusted to account for instrument drifts between successive calibrations consistent with the plant specific setpoint methodology. The 18 month frequency is conservative with respect to the assumption of the calibration interval in the determination of the magnitude of instrument drift in the setpoint analysis. For the purpose of this surveillance, normal background is the dose level experienced at 100% rated thermal power with hydrogen water chemistry at the maximum injection rate. The trip setpoint for the Main Steam Line Radiation - High, High trip function and requirements for setpoint adjustment are specified in Technical Specification 3.3.2.

Surveillance Requirement 4.3.10.d

The LOGIC SYSTEM FUNCTIONAL TEST demonstrates the OPERABILITY of the required trip logic for a specific channel. The system functional test of the mechanical vacuum pump breaker is included as part of this Surveillance and overlaps the LOGIC SYSTEM FUNCTIONAL TEST to provide complete testing of the assumed safety function. Therefore, if the breaker is incapable of operating, the associated instrument channel(s) would be inoperable.

The 18 month frequency is based on the need to perform this Surveillance under the conditions that apply during a plant outage and the potential for an unplanned transient if the Surveillance were performed with the reactor at power.

REFERENCES

1. UFSAR, Section 15.4.9.5.1.2
2. NEDC-30851P-A, Supplement 2, "Technical Specification Improvement Analysis for BWR Isolation Instrumentation Common to RPS and ECCS Instrumentation," March 1989