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6/30/2010

3.3 Instrumentation

3.3.4 TRM Post-Accident Monitoring Instrumentation

TRO 3.3.4 The TRM post-accident monitoring instrumentation channels shown in Table 3.3.4-1 shall be OPERABLE.

APPLICABILITY: According to Table 3.3.4-1

ACTIONS

----------NOTES----------

1. Separate condition entry is allowed for each Function.
2. The provisions of TRO 3.0.6 are not applicable.

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more required channel inoperable.	A.1 Enter the Condition referenced in Table 3.3.4-1 for the channel.	Immediately
B. As required by Required Action A.1 and referenced in Table 3.3.4-1.	B.1 Initiate the preplanned alternate method of monitoring the appropriate parameter(s). AND B.2 Restore the required channel to OPERABLE status.	72 hours 7 days
C. As required by Required Action A.1 and referenced in Table 3.3.4-1	C.1 Restore the required channel(s) to OPERABLE status.	30 days
D. As required by Required Action A.1 and referenced in Table 3.3.4-1	D.1 Verify a minimum 14 of the associated acoustic monitor channels and 5 of the ADS SRV acoustic monitor channels are operable.	Immediately AND Once per 24 hours thereafter

ACTIONS (continued)

CONDITION	REQUIRED ACTION	COMPLETION TIME
	OR	
	D.2 Verify SRV tailpipe temperature indication and alarm are available for the tailpipe associated with the inoperable acoustic monitor.	Immediately AND Once per 24 hours thereafter
	OR	
	D.3 Verify that the following alternate monitoring methods in TS Table 3.3.3.1-1 are OPERABLE: • Function 1 • Function 2 • Function 3 • Function 10	Immediately AND Once per 24 hours thereafter
	AND	
	D.4 Restore the required channel(s) to OPERABLE status.	30 days OR At next outage with containment entry, not to exceed the next refueling outage for in-accessible containment components.

TECHNICAL REQUIREMENT SURVEILLANCE

---------- NOTES ----------

1. Refer to Table 3.3.4-1 to determine which TRSs apply for each Post Accident Monitoring Function.

2. When a channel is placed in an inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided an alternate means of monitoring the parameter or an associated function is available.

SURVEILLANCE		FREQUENCY
TRS 3.3.4.1	Perform CHANNEL CHECK	31 days
TRS 3.3.4.2	Perform CHANNEL FUNCTIONAL TEST	92 days
TRS 3.3.4.3	Perform a CHANNEL CALIBRATION. The Trip Setpoint shall be less than or equal to 0.25 of the full open noise level.	24 months
TRS 3.3.4.4	Perform CHANNEL CALIBRATION	24 months
TRS 3.3.4.5	Perform CHANNEL CALIBRATION of the Primary Containment H_2 and O_2 Analyzers.	92 days

TABLE 3.3.4-1
TRM POST-ACCIDENT MONITORING INSTRUMENTATION

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	REQUIRED SURVEILLANCE
1. Suppression Chamber Air Temperature	1,2	2	C	TRS 3.3.4.1 TRS 3.3.4.4
2. Main Steam Safety/Relief Valve Position Indicator (Acoustic Monitor)	1,2	1/valve	D	TRS 3.3.4.1 TRS 3.3.4.2 TRS 3.3.4.3
3. Reactor Building Vent Noble Gas Monitor				
a. Mid Range[(b)]	1,2, (a)	1	B	TRS 3.3.4.1 TRS 3.3.4.4
b. High Range[(b)]	1,2, (a)	1	B	TRS 3.3.4.1 TRS 3.3.4.4
4. Standby Gas Treatment System Vent Noble Gas Monitor				
a. Mid Range[(b)]	1,2, (a)	2	B (Both Ch. Inop) C (One Ch. Inop)	TRS 3.3.4.1 TRS 3.3.4.4
b. High Range[(b)]	1,2, (a)	2	B (Both Ch. Inop) C (One Ch. Inop)	TRS 3.3.4.1 TRS 3.3.4.4
5. Turbine Building Vent Noble Gas Monitor				
a. Mid Range[(b)]	1,2	2	B (Both Ch. Inop) C (One Ch. Inop)	TRS 3.3.4.1 TRS 3.3.4.4
b. High Range[(b)]	1,2	2	B (Both Ch. Inop) C (One Ch. Inop)	TRS 3.3.4.1 TRS 3.3.4.4

(continued)

TABLE 3.3.4-1 (continued)
TRM POST-ACCIDENT MONITORING INSTRUMENTATION

FUNCTION	APPLICABLE MODES OR OTHER SPECIFIED CONDITIONS	REQUIRED CHANNELS	CONDITIONS REFERENCED FROM REQUIRED ACTION A.1	REQUIRED SURVEILLANCE
6. Standby Gas Treatment System Post Accident Vent Stack Sampling System (PAVSSS)				
a. Effluent System flow rate monitor[b]	1,2, (a)	1	C	TRS 3.3.4.1 TRS 3.3.4.4
b. Sampler flow rate monitor[b]	1,2, (a)	1	C	TRS 3.3.4.1 TRS 3.3.4.4
7. Turbine Building Post Accident Vent Stack Sampling System (PAVSSS)				
a. Effluent System flow rate monitor[b]	1,2	1	C	TRS 3.3.4.1 TRS 3.3.4.4
b. Sampler flow rate monitor[b]	1,2	1	C	TRS 3.3.4.1 TRS 3.3.4.4
8. Containment H_2 and O_2 Analyzer[b]	1,2	2	C	TRS 3.3.4.1 TRS 3.3.4.5

(a) When moving irradiated fuel in the secondary containment.
(b) The provisions of TRO 3.0.4 are not applicable.

B 3.3.4 TRM Post Accident Monitoring (PAM) Instrumentation

BASES

TRO

The primary purpose of the TRM PAM instrumentation is to display plant variables that provide information required by the control room operators during accident situations. The OPERABILITY of the TRM PAM instrumentation ensures that the identified information is available on selected plant parameters to monitor and assess important variables following an accident. This capability is consistent with the recommendations of Regulatory Guide 1.97 Revision 2, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant Conditions During and following an Accident," NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations" and NEDO-33160-A Revision 1, "Regulatory Relaxation For The Post Accident SRV Position Indication System" (Reference 6). It should be noted that the Technical Specifications LCO 3.3.3.1 contains all Category 1, non-type A instruments and Regulatory Guide 1.97 Type A instrument (References 1 and 2). This TRO requires instruments outside of these criteria.

Table 3.3.4-1 identifies the following required Functions. Suppression Chamber Air Temperature provides a post accident indication of problems with the primary containment pressure suppression system. The Suppression Chamber Air Temperature loops are comprised of the following instruments for the purpose of this TRM. The recorders are the primary method of indication used by the operator during an accident; therefore, the PAM specification deals specifically with this portion of the instrument.

LOOP A	LOOP B
• TE-15703	• TE-15725
• TT-15703	• TT-15725
• TR-15795A	• TR-15795B

Main Steam Safety/Relief Valve Position Indicators (Acoustic Monitors) provide indication when the valves are functioning. Alternate methods for monitoring SRV position include SRV Tailpipe Temperature and the following Functions from Technical Specification Table 3.3.3.1-1:

Suppression Chamber Water Level (Function 3)

Suppression Chamber Water Temperature (Function 10)

Reactor Vessel Water Level (Function 2)

Reactor Steam Dome Pressure (Function 1)

(continued)

B 3.3.4 TRM Post Accident Monitoring (PAM) Instrumentation

BASES

TRO (continued)

The required channels for REACTOR BUILDING VENT Noble Gas Monitor, Standby Gas Treatment System Vent Noble Gas Monitor, and Turbine Building Vent Noble Gas Monitor provide information regarding the release of radioactive materials to allow for early indication of the need to initiate action necessary to protect the public and for an estimate of the magnitude of any impending threat. For the Noble Gas Monitors the only required channels are the mid range and high range. For the Standby Gas Treatment System Vent Noble Gas Monitor and the Turbine Building Vent Noble Gas Monitor, the "2" required channels for each Function consist of: the one channel of System Particulate, Iodine, and Noble Gas (SPING), which includes a Mid-Range monitor and a High-Range monitor; and the one channel of the Post Accident Vent Stack Sampling System (PAVSSS), which includes a Mid-Range monitor and a High-Range monitor.

The drywell and suppression chamber hydrogen and oxygen concentrations gas analyzers monitor hydrogen and oxygen concentration to detect combustible gas levels in primary containment. The analyzers are capable of determining hydrogen concentration in the range of 0 to 30% by volume and oxygen concentration in the range of 0 to 10% by volume, and each provide control room indication and output to a control room recorder. Each gas analyzer must be capable of sampling either the drywell or the suppression chamber. The recorders are the primary method of indication available for use by the operator during an accident, therefore the PAM Specification deals specifically with this portion of the instrument channel. The gas analyzer piping is provided with heat tracing to reduce the buildup of condensation in the system. H_2O_2 Analyzers can be considered OPERABLE for accident monitoring for up to 100 days with their heat tracing INOPERABLE.

Functions 6 and 7 describe the requirements for determining PAVSSS effluent flow via sample flow instrumentation. For all the PAVSSS Channels, (Functions 4, 5, 6 and 7) the channels may be considered OPERABLE if they are ready for service even though sample flow is not established and Control Terminal monitoring is not initiated.

ACTIONS

The Actions are defined to ensure proper corrective measures are taken in response to the inoperable components.

(continued)

B 3.3.4 TRM Post Accident Monitoring (PAM) Instrumentation

BASES

ACTIONS (continued)

Action D requirements were determined by balancing the safety significance of the system with the impact of the actions on the operating unit. The loss of the acoustic monitors is not safety significant providing the diverse and redundant alternate methods of determining SRV position are available. System components in the control room are restorable within 30 days without unit operation impact. Components located in containment require a unit shutdown to gain access to individual components. The system channels shall be restored to operable condition at earliest opportunity.

Noble gas monitoring may be interrupted for up to 30 minutes to perform particulate filter/iodine cartridge changeout required by TRM Table 3.11.2-1 without entering the TRO ACTIONS.

Components of alternate SRV position systems may be taken inoperable for routine surveillances and periodic maintenance providing the appropriate LCO requirements are met during this action statement. Tailpipe temperature is the direct process monitoring, alternate method and is not covered by Technical Specification LCO's as are the other alternative methods.

TRS

The Technical Requirement Surveillances (TRS) are modified by two Notes.

Note 1 states that the TRSs for each Post Accident Monitoring instrumentation Function are located in the SR column of Table 3.3.4-1.

Note 2 modifies the Surveillances to indicate that when a channel is placed in a inoperable status solely for performance of required Surveillances, entry into associated Conditions and Required Actions may be delayed for up to 6 hours provided an alternate means of monitoring the parameter or associated Function are available. Upon completion of the Surveillance, or expiration of the 6 hour allowance, the channel must be returned to OPERABLE status or the applicable Condition entered and Required Actions taken.

(continued)

B 3.3.4 TRM Post Accident Monitoring (PAM) Instrumentation

BASES

TRS (continued) The alternate means of monitoring the parameter or the associated function are:

Parameter	Alternate Means/Associated Function
Suppression Chamber Air Temperature	One channel of Suppression Chamber Air Temperature
Main Steam Safety/Relief Valve Position Indicator	Suppression Pool level Suppression Pool Temperature RPV level RPV pressure SRV Tailpipe Temperature
Reactor Building Vent Noble Gas Monitor	Standby Gas Treatment System Post Accident Vent Stack Sampling System (PAVSSS)
Standby Gas Treatment System Vent Noble Gas Monitor	Standby Gas Treatment System Post Accident Vent Stack Sampling System (PAVSSS)
Turbine Building Vent Noble Gas Monitor	Turbine Building Accident Vent Stack Sampling System (PAVSSS)
Standby Gas Treatment System Post Accident Vent Stack Sampling System (PAVSSS)	Reactor Building Vent Noble Gas Monitor
Standby Gas Treatment System Post Accident Vent Stack Sampling System (PAVSSS)	Standby Gas Treatment System Vent Noble Gas Monitor
Turbine Building Accident Vent Stack Sampling System (PAVSSS)	Turbine Building Vent Noble Gas Monitor
Containment H_2 and O_2 Analyzer	One channel of Containment H_2 and O_2

The TRSs are defined to be performed at the specified Frequency to ensure that the TRM PAM Function is maintained OPERABLE.

TRS 3.3.4.1

Performance of the CHANNEL CHECK once every 31 days ensures that a gross failure of instrumentation has not occurred. A CHANNEL CHECK is normally a comparison of the parameter indicated on one channel against a similar parameter on other channels. It is based on the assumption that

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B 3.3.4 TRM Post Accident Monitoring (PAM) Instrumentation

BASES

TRS

TRS 3.3.4.1 (continued)

instrument channels monitoring the same parameter should read approximately the same value. Significant deviations between 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, which are determined by the plant staff based on an investigation of a combination of the channel instrument uncertainties, may be used to support this parameter comparison and include indication and readability. If a channel is outside the criteria, it may be an indication that the instrument has drifted outside its limit and does not necessarily indicate the channel is inoperable.

REFERENCES

1. Regulatory Guide 1.97 Revision 2, "Instrumentation for Light Water Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident."

2. NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations."

3. Technical Specification Amendment No. 100 to License No. NPF-22 for failed Unit 2 "S" acoustic monitor.

4. Technical Specification Amendment No. 169 to License No. NPF-14 for failed Unit 1 "S" acoustic monitor.

5. Proposed amendment No. 183 to License No. NPF-22 failed Unit 2 "J" acoustic monitor.

6. NEDO-33160-A, Revision 1, "Regulatory Relaxation For The Post Accident SRV Position Indication System," dated October 2006.

7. NRC letter, "Final Safety Evaluation For Boiling Water Reactor Owners' Group (BWROG) Topical Report (TR) NEDO-33160, Regulatory Relaxation For The Post Accident SRV [Safety Relief Valve] Position Indication System (TAC No. MC5446)," dated September 26, 2006.

B 3.11.4.1 Monitoring Program

BASES

TRO

The radiological environmental monitoring program required by this Requirement provides representative measurements of radiation and of radioactive materials in those environmental exposure pathways and for those radionuclides that lead to the highest potential radiation exposures of MEMBERS OF THE PUBLIC resulting from the station operation. This monitoring program thereby supplements the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and modeling of the environmental exposure pathways. Changes to the radiological environmental monitoring program specified in Table 3.11.4.1-1 may be made based on expected SSES operation and the results of radiological environmental monitoring during SSES operation.

The required detection capabilities for environmental sample analyses are tabulated in terms of the lower limits of detection (LLDs). The LLDs required by Table 3.11.4.1-3 are considered optimum for routine environmental measurements in industrial laboratories. It should be recognized that the LLD is defined as an *a priori* (before the fact) limit representing the capability of a measurement system and not as an *a posteriori* (after the fact) limit for a particular measurement.

Detailed discussion of the LLD, and other detection limits, can be found in HASL Procedures Manual, HASL-300 (revised annually); Currie, L. A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry" Anal. Chem. 40, 586-93 (1968); and Hartwell, J. K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975). (Reference 1)

This section of the TRM is also part of the ODCM (Reference 2).

ACTIONS

The Actions are defined to ensure proper corrective measures are taken when requirements are not met. Once a Condition Report is generated (per the applicable Action), the TRO may be exited because at that time, the Condition that caused the TRO is no longer out of compliance with the program.

(continued)

B 3.11.4.1 Monitoring Program

BASES

ACTIONS (continued)

Per Action A.1, the Annual Radiological Environmental Operating Report shall provide a description of the reasons for not conducting the program as required and the plans for preventing a recurrence.

The Special Report submitted per Action B.1 shall identify the cause(s) for exceeding the limit(s) and define the corrective actions to be taken to reduce radioactive effluents so that the potential annual dose to a MEMBER OF THE PUBLIC is less than the calendar year limits of Requirements 3.11.1.2, 3.11.2.2 and 3.11.2.3.

Include revised figure(s) and table for the ODCM reflecting the new locations for obtaining samples per Action F.1 in the next Radioactive Effluent Release Report.

TRS

The TRSs are defined to be performed at the specified frequency to ensure that the requirements are implemented. Monitoring samples collected per TRS 3.11.4.1.1 shall be from the specific locations given in the table and figure in the ODCM. (Reference 2)

The TRSs are modified by a Note to take exception to TRS 3.0.3.

Table 3.11.4.1-1

Sample Locations Specific parameters of distance and direction sector from the centerline of one reactor, and additional description where pertinent, shall be provided for each and every sample location in this Table and in a table and figure(s) in the ODCM. Refer to NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," October 1978, and to Radiological Assessment Branch Technical Position, Revision 1, November 1979. (Reference 3) Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment and other legitimate reasons. If specimens are unobtainable due to sampling equipment malfunction, every effort shall be made to complete corrective action prior to the end of the next sampling

(continued)

B 3.11.4.1 Monitoring Program

BASES

TRS (continued)

period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report. It is recognized that, at times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time.

In these instances suitable alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made within 30 days in the radiological environmental monitoring program. Identify the cause of the unavailability of samples for that pathway and identify the new location(s) for obtaining replacement samples in the next Radioactive Effluent Release Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).

Direct Radiation One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purposes of this table, a thermoluminescent dosimeter (TLD) is considered to be one phosphor; two or more phosphors in a packet are considered as two or more dosimeters. Film badges shall not be used as dosimeters for measuring direct radiation.

Radioiodine and Particulates - Sampling and Collection Frequency
The charcoal cartridges used in the airborne radioiodine sampling conducted as part of the radiological environmental monitoring program are designed and tested by the manufacturer to assure a high efficiency in the capture of radioiodine. Certificates from the manufacturer of the cartridges are provided with each batch of cartridges certifying the percent retention of the radiodine for stated air flows.

Radioiodine and Particulates - Particulate Sample; Waterborne - Surface, Ground, Sediment; Food Products Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.

Waterborne - Surface The "upstream sample" shall be taken at a distance beyond significant influence of the discharge. The "downstream" sample shall be taken within the discharge line or just downstream of the discharge line near the mixing zone.

(continued)

B 3.11.4.1 Monitoring Program

BASES

TRS (continued)

Waterborne - Drinking - Sampling and Collection Frequency A composite sample is one in which the quantity (aliquot) of liquid sampled is proportional to the quantity of flowing liquid and in which the method of sampling employed results in a specimen that is representative of the liquid flow. In this program composite samples shall be collected at time intervals that are very short (e.g., hourly) relative to the compositing period (e.g., monthly) in order to assure obtaining a representative sample.

Waterborne - Ground - Samples and Sample Locations Groundwater samples shall be taken when this source is tapped for drinking or irrigation purposes in areas where the hydraulic gradient or recharge properties are suitable for contamination.

Drinking Water - I-131 Analyses Calculation of the dose projected from I-131 in drinking water to determine if I-131 analyses of the water are required shall be performed for the maximum organ and age group using the methodology and parameters of the ODCM.

Food Products - Sampling and Collection Frequency If harvest occurs more than once a year, sampling shall be performed during each discrete harvest. If harvest occurs continuously, sampling shall be monthly. Attention shall be paid to including samples of tuborous and root food products.

Table 3.11.4.1-3

This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable at 95% confidence level together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating report.

Required detection capabilities for thermoluminescent dosimeters used for environmental measurements are given in Regulatory Guide 4.13. (Reference 4)

(continued)

B 3.11.4.1 Monitoring Program

BASES

TRS (continued)

The LLD is defined, for purpose of these Requirements, as the smallest concentration of radioactive material in a sample that will yield a net count (above system background) that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66 s_b}{E \bullet V \bullet 2.22 \bullet Y \bullet \exp(-\lambda \Delta t)}$$

Where:

LLD is the *a priori* lower limit of detection as defined above (as picrocuries per unit mass or volume),

s_b is the standard deviation of the background counting rate or of the countingrate of a blank sample as appropriate (as counts per minute),

E is the counting efficiency, as counts per disintegration,

V is the sample size, in units of mass or volume,

2.22 is the number of disintegrations per minute per picrocurie,

Y is the fractional radiochemical yield, when applicable,

λ is the radioactive decay constant for the particular radionuclide, and

Δt for environmental samples is the elapsed time between sample collection (or end of the sample collection period) and time of counting.

Typical values of E, V, Y, and Δt should be used in the calculation.

(continued)

B 3.11.4.1 Monitoring Program

BASES

TRS (continued)

It should be recognized that the LLD is defined as *a priori* (before the fact) limit representing the capability of a measurement system and not as an *a posteriori* (after the fact) limit for a particular measurement. Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidably small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDS unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report.

REFERENCES

1. HASL Procedures Manual, HASL-300 (revised annually); Curie, L.A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry" Anal. Chem. 40, 586-93 (1968); and Hartwell, J. K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975) Offsite Dose Calculation Manual

2. Technical Specification 5.5.1 - Offsite Dose Calculation Manual

3. NUREG-0133, "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants," October 1978, and to Radiological Assessment Branch Technical Position, Revision 1, November 1979

4. Regulatory Guide 4.13

5. NUREG-1302, Offsite Dose Calculation Manual Guidance: "Standard Radiological Effluent Controls for Boiling Water Reactors," April 1991