INSTRUMENTATION

3/4.3.3 MONITORING INSTRUMENTATION

RADIATION MONITORING INSTRUMENTATION

LIMITING CONDITION FOR OPERATION

3.3.3.1 The radiation monitoring instrumentation channels shown in Table 3.3-6 shall be OPERABLE with their alarm/trip setpoints within the specified limits.

APPLICABILITY: As shown in Table 3.3-6.

ACTION:

a. With a radiation monitoring channel alarm/trip setpoint exceeding the value shown in Table 3.3-6, adjust the setpoint to within the limit within 4 hours or declare the channel inoperable.

b. With one or more radiation monitoring channels inoperable, take the ACTION shown in Table 3.3-6.

c. The provisions of Specifications 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.3.3.1 Each radiation monitoring instrumentation channel shall be demonstrated OPERABLE by the performance of the CHANNEL CHECK, CHANNEL CALIBRATION and CHANNEL FUNCTIONAL TEST operations for the MODES and at the frequencies shown in Table 4.3-3.

TABLE 3.3-6

RADIATION MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ALARM/TRIP SETPOINT	MEASUREMENT RANGE	ACTION
1. AREA MONITORS					
a. Fuel Storage Pool Area					
i. Criticality Monitor	(1)	*	$\leq$ 15 mR/hr	$(10^{-1} - 10^{4})$ mR/hr	25
ii. Ventilation System Isolation	(1)	**	($\leq$ 2 x background)	$(1 - 10^{5})$ cpm	27
b. Containment - Purge & Exhaust Isolation	(1)	6	($\leq$ 2 x background)	$(1 - 10^{5})$ cpm	28
c. Control Room Isolation	(1)	All MODES	($\leq$ 2 x background)	$(10^{-1} - 10^{4})$mR/hr	29
d. Containment Area	2	1, 2, 3 & 4	( ) rad/hr	$1-10^{8}$ rad/hr	30
2. PROCESS MONITORS					
a. Fuel Storage Pool Area - Ventilation System Isolation					
i. Gaseous Activity	(1)	**	($\leq$ 2 x background)	$(1 - 10^{5})$ cpm	27
ii. Particulate Activity	(1)	**	($\leq$ 2 x background)	$(1 - 10^{5})$ cpm	27
b. Containment					
i. Gaseous Activity					
a) Purge & Exhaust Isolation	(1)	6	($\leq$ 2 x background)	$(1 - 10^{5})$ cpm	28
b) RCS Leakage Detection	(1)	1, 2, 3 & 4	N/A	$(1 - 10^{5})$ cpm	26
ii. Particulate Activity					
a) Purge & Exhaust Isolation	(1)	6	($\leq$ 2 x background)	$(1 - 10^{5})$ cpm	28
b) RCS Leakage Detection	(1)	1, 2, 3 & 4	N/A	$(1 - 10^{5})$ cpm	26

* With fuel in the storage pool or building

** With irradiated fuel in the storage pool

TABLE 3.3-6 (Continued)

RADIATION MONITORING INSTRUMENTATION

INSTRUMENT	MINIMUM CHANNELS OPERABLE	APPLICABLE MODES	ALARM/TRIP SETPOINT	MEASUREMENT RANGE	ACTION
PROCESS MONITORS (Continued)					
c. Noble Gas Effluent Monitors					
i. Radwaste Building Exhaust System	1	1, 2, 3 & 4	( ) rad/hr	$1\text{-}10^2$ uCi/cc	30
ii. Auxiliary Building Exhaust System	1	1, 2, 3 & 4	( ) rad/hr	$1\text{-}10^3$ uCi/cc	30
iii. Steam Safety Valve Discharge	1/valve	1, 2, 3 & 4	( ) rad/hr	$1\text{-}10^3$ uCi/cc	30
iv. Atmospheric Steam Dump Valve Discharge	1/valve	1, 2, 3 & 4	( ) rad/hr	$1\text{-}10^3$ uCi/cc	30
v. Shield Building Exhaust System	1	1, 2, 3 & 4	( ) rad/hr	$1\text{-}10^4$ uCi/cc	30
vi. Containment Purge & Exhaust System	1	1, 2, 3 & 4	( ) rad/hr	$1\text{-}10^5$ uCi/cc	30
vii. Condenser Exhaust System	1	1, 2, 3 & 4	( ) rad/hr	$1\text{-}10^5$ uCi/cc	30

TABLE 3.3-6 (Continued)

ACTION STATEMENTS

ACTION 25 - With the number of OPERABLE channels less than required by the Minimum Channels OPERABLE requirement, perform area surveys of the monitored area with portable monitoring instrumentation at least once per 24 hours.

ACTION 26 - With the number of OPERABLE channels less than required by the Minimum Channels OPERABLE requirement, comply with the ACTION requirements of Specification (3.4.6.1).

ACTION 27 - With the number of OPERABLE channels less than required by the Minimum Channels OPERABLE requirement, comply with the ACTION requirements of Specification (3.9.12).

ACTION 28 - With the number of OPERABLE channels less than required by the Minimum Channels OPERABLE requirement, comply with the ACTION requirements of Specification (3.9.9).

ACTION 29 - With the number of OPERABLE channels less than required by the Minimum Channels OPERABLE requirement, within 1 hour initiate and maintain operation of the control room emergency ventilation system in the recirculation mode of operation.

ACTION 30 - With the number of OPERABLE Channels less than required by the Minimum Channels OPERABLE requirement, restore the inoperable Channel(s) to OPERABLE status within 7 days, or be in at least HOT STANDBY within the next 6 hours, in at least HOT SHUTDOWN within the following 6 hours and in COLD SHUTDOWN within the subsequent 24 hours.

TABLE 4.3-3

RADIATION MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
1. AREA MONITORS				
a. Fuel Storage Pool Area				
i. Criticality Monitor	S	R	M	*
ii. Ventilation System Isolation	S	R	M	**
b. Containment - Purge & Exhaust Isolation	S	R	M	6
c. Control Room Isolation	S	R	M	All MODES
d. Containment Area	S	R	M	1, 2, 3 & 4
2. PROCESS MONITORS				
a. Fuel Storage Pool Area - Ventilation System Isolation				
i. Gaseous Activity	S	R	M	**
ii. Particulate Activity	S	R	M	**
b. Containment				
i. Gaseous Activity				
a) Purge & Exhaust Isolation	S	R	M	6
b) RCS Leakage Detection	S	R	M	1, 2, 3, & 4
ii. Particulate Activity				
a) Purge & Exhaust Isolation	S	R	M	6
b) RCS Leakage Detection	S	R	M	1, 2, 3, & 4

*With fuel in the storage pool or building.
**With irradiated fuel in the storage pool.

TABLE 4.3-3 (Continued)

RADIATION MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

INSTRUMENT	CHANNEL CHECK	CHANNEL CALIBRATION	CHANNEL FUNCTIONAL TEST	MODES FOR WHICH SURVEILLANCE IS REQUIRED
PROCESS MONITORS (Continued)				
c. Noble Gas Effluent Monitors				
i. Radwaste Building Exhaust System	S	R	M	1, 2, 3 & 4
ii. Auxiliary Building Exhaust System	S	R	M	1, 2, 3 & 4
iii. Steam Safety Valve Discharge	S	R	M	1, 2, 3 & 4
iv. Atmospheric Steam Dump Valve Discharge	S	R	M	1, 2, 3 & 4
v. Shield Building Exhaust System	S	R	M	1, 2, 3 & 4
vi. Containment Purge & Exhaust System	S	R	M	1, 2, 3 & 4
vii. Condenser Exhaust System	S	R	M	1, 2, 3 & 4

3/4.3 3.3 SEISMIC INSTRUMENTATION

The OPERABILITY of the seismic instrumentation ensures that sufficient capability is available to promptly determine the magnitude of a seismic event and evaluate the response of those features important to safety. This capability is required to permit comparison of the measured response to that used in the design basis for the facility to determine if plant shutdown is required pursuant to Appendix "A" of 10 CFR Part 100. The instrumentation is consistent with the recommendations of Regulatory Guide 1.12, "Instrumentation for Earthquakes," April 1974.

3/4.3.3.4 METEOROLOGICAL INSTRUMENTATION

The OPERABILITY of the meteorological instrumentation ensures that sufficient meteorological data is available for estimating potential radiation doses to the public as a result of routine or accidental release of radioactive materials to the atmosphere. This capability is required to evaluate the need for initiating protective measures to protect the health and safety of the public and is consistent with the recommendations of Regulatory Guide 1.23, "Onsite Meteorological Programs," February 1972.

3/4.3.3.5 REMOTE SHUTDOWN INSTRUMENTATION

The OPERABILITY of the remote shutdown instrumentation ensures that sufficient capability is available to permit shutdown and maintenance of HOT STANDBY of the facility from locations outside of the control room. This capability is required in the event control room habitability is lost and is consistent with General Design Criteria 19 of 10 CFR 50.

3/4.3.3.6 ACCIDENT MONITORING INSTRUMENTATION

The OPERABILITY of the accident monitoring instrumentation ensures that sufficient information is available on selected plant parameters to monitor and assess these variables following an accident. This capability is consistent with the recommendations of Regulatory Guide 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," December 1980 and NUREG-0737, "Clarification of TMI Action Plan Requirements," November, 1980.

NUREG-0737 ITEMS II.F.1.1 AND II.F.1.2

GENERAL INFORMATION AND COMMENTS

II.F.1.1 NOBLE GAS EFFLUENT MONI)RS

Some licensees have questioned the value of 10^5 uCi/cc as the upper limit of monitoring for noble gas effluents from containment and from the PWR air ejector. They claim we are too conservative in assuming a 100% release of gas to containment and that a direct path is presumed to be open. The noble gas release into containment at TMI was on the order of 60 to 70% of the total core inventory. While the containment purge path was not open, if it had been open, it would not have been completely closed automatically until almost four hours into the accident. Licensees say that containment purges would be isolated on a high radiation signal; this is usually not technically correct in that the typical arrangement is to close a damper by radiation signal; however, the purge system "isolation" valves, which are the only valves in the system that are designed and qualified for minimum or "zero" leakage, don't close automatically until the reactor protection system causes total plant isolation. There is a significant difference, since dampers may leak (and even a leak of short duration must be monitored -- and be on-scale).

The value of 10^5 uCi/cc for PWR air ejector effluent is based on a TID-14844 release into the primary coolant, an assumed Technical Specification limit on primary to secondary leak of 1 gpm through the steam generators and continued use of the main condenser as the principal means of cooling the reactor. At TMI-2, the condenser air ejector exhaust was discharged into the auxiliary building vent and was heavily diluted. However, at TMI-1 and at many other PWRs, the air ejector has its own small vent stack and has a potential for a release concentration of around 10^5 uCi/cc at a low flow of about 30 scfm. In most plants, this could be vented through a main plant vent or stack and monitored with other stack contributors and the requirement for monitoring at 10^5 uCi/cc would be eliminated. Our position on these monitors is that we never want to have a condition where the monitors are off-scale.

An argument presented in some early submittals was that no such equipment was commercially available. At least three vendors (Eberline, General Atomic, Victoreen) are supplying such monitors and several others have plans to do so (Nuclear Measurements Corp., Kaman Sciences, Radeco).

II.F.1.2 PARTICULATE AND IODINE SAMPLING

A number of licensees have stated that the required sampling capability of 10^2 uCi/cc for particulates and iodines is much too high. The usual arguments are that there is no way their plant could emit that much activity and that EPRI has submitted documentation supporting or recommending adoption of lower levels for postulated accident releases. They also say that the 10^2 figure is based on an assumed TID release which is overly conservative in view of past experience.

A calculation of potential release concentrations involving containment (PWR) or drywell (BWR) purging and based on a TID-14844 iodine release of 25% of the core radioiodine in a containment volume of 10^6 ft^3 indicated a potential release concentration of 10^4 uCi/cc. ANSI N320-1979 recommends particulate and iodine effluent monitoring at 10^4 uCi/cc. BNWL-1635 recommends 10^3 uCi/cc for iodines. The 10^2 value is a compromise between the ultra-conservative approach, which would require a value of 10^4 uCi/cc, and the less conservative approach, which holds that iodine releases historically -- with the single exception of the Windscale accident -- have been only a very small fraction of the predicted TID release. We consider that the 10^2 uCi/cc value represents an upper limit of the total or integrated concentration of activity which, if accumulated on a sampling device or media, could be safely handled by trained personnel utilizing all practicable safety techniques, including use of shielded sample collection devices, remote handling tools or equipment, shielded transport containers, and special high-level measurements or analytical facilities. The frequent claims that such samples could not be safely handled may be predicated on someone picking up and transporting samples literally bare-handed -- this was never the intent.

The design-basis shielding envelope specified in NUREG-0737 calls for 10^2 uCi/cc of activity (either iodine or particulates) to be deposited on sampling media for 30 minutes, and an average gamma energy of 0.5 MeV per disintegration. For a 2 cfm sampler, this would result in an integrated sample activity of approximately 170 Ci. Two inches of lead shielding, assuming point source geometry, and narrow beam attenuation, would reduce the radiation level by a factor of almost 4,000. 170 Ci of 0.5 MeV material would produce a gamma radiation field of about 50 R/hr at 1 Meter; two inches of lead shielding would reduce this to about 13 mR/hr at 1 Meter. Using long-handled tools, such a sample could be handled in air without shielding for the short periods of time required to transfer a sample from its collection shield to a shielded transfer cask.

While the validity of the EPRI argument is acknowledged for many accident scenarios, the staff and ACRS position at this time is that not enough information is currently available to completely discount TID-1484 assumptions for all accident scenarios.