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TABLE 3.2.F SURVEILLANCE INSTRUMENTATION

Minimum No. of Operable Instrument Channels	Instrument	Type Indication and Range	Action***
2	Reactor Water Level (narrow range)	Recorder 0-60" Indicator 0-60"	(1) (2) (3)
2	Reactor Water Level (wide range)	Recorder -165" to +50"	(10) (11)
2	Reactor Water Level (fuel zone)	Recorder -325" to 0"	(10) (11)
2	Reactor Pressure	Recorder 0-1500 psig Indicator 0-1200 psig	(1) (2) (3)
2	Reactor Pressure (SPDS)*	Recorder 0-1500 psig	(12) (13)
2	Drywell Pressure	Recorder 0-70 psig	(1) (2) (3)
2	Drywell Pressure (wide range)	Recorder 0-225 psig	(8) (9)
2	Drywell Pressure (subatmospheric range)	Recorder 5-25 psia	(8) (9)
2	Drywell Temperature	Recorder 0-400 degrees F Indicator 0-400 degrees F	(1) (2) (3)
2	Suppression Chamber Water Temperature*	Recorder 30-230 degrees F Indicator 30-230 degrees F	(1) (2) (3) (9)
2	Suppression Chamber Water Temperature**	Recorder 0-600 degrees F Indicator 0-400 degrees F	(1) (2) (3)
2	Suppression Chamber Water Level (narrow range)	Recorder 0-2 ft. Indicator 0-2 ft.	(1) (2) (3)

TABLE 3.2.F (Cont'd) - SURVEILLANCE INSTRUMENTATION

Minimum No. of Operable Instrument Channels	Instrument	Type Indication and Range	Action
2	Suppression Chamber Water Level (wide range)	Recorder 1-21 ft.	(10) (11)
1	Control Rod Position	28 Volt Indicating Lights	(1) (2) (3) (4)
1	Neutron Monitoring	SRM, IRM, LPRM 0-100%	
1	Safety-Relief Valve Position Indication	Acoustic or Thermocouple	(5)
2	Drywell High Range Radiation Monitors	Recorder 1-1E(+8) R/hr	(7)
1	Main Stack High Range Radiation Monitor	Recorder 1.4E(-2) to 1.4E(+4)uCi/cc	(7)
1	Reactor Building Roof Vent High Range Radiation Monitor	Recorder 1.4E(-2) to 1.4E(+4)uCi/cc	(7)
2	Drywell Hydrogen Concentration Analyzer and Monitor	Analyzer and Recorder 0-20% volumn	(1) (2) (3)

* Effective when modification is complete.
** Delete when modification is complete.
*** Notes for Table 3.2.F appear on pages 78 and 78a.

NOTES FOR TABLE 3.2.F

1) From and after the date that one of these parameters is reduced to one indication, continued operation is permissible during the succeeding thirty days unless such instrumentation is sooner made operable.

2) From and after the date that one of these parameters is not indicated in the control room, continued operation is permissible during the succeeding seven days unless such instrumentation is sooner made operable.

3) If the requirements of notes (1) and (2) cannot be met, an orderly shutdown shall be initiated and the reactor shall be in a cold condition within 24 hours.

4) These surveillance instruments are considered to be redundant to each other.

5) If this parameter is not indicated in the control room, either restore at least one channel to operable status within thirty days or be in at least Hot Shutdown within the next 12 hours.

6) A suppression chamber water temperature instrument channel will be considered operable if there are at least ten (10) resistance temperature detector inputs operable and no two (2) adjacent resistance temperature detector inputs are inoperable.

7) With the number of operable channels less than the minimum number of instrument channels shown in Table 3.2.F, initiate the preplanned alternate method of monitoring the appropriate parameter within 72 hours and:

   a) either restore the inoperable channel(s) to operable status within 7 days of the event, or

   b) prepare and submit a Special Report to the Commission within 10 working days following the event, outlining the action taken, the cause of the inoperability, and the plans and schedule for restoring the system to operable status.

8) With the number of operable channels less than the minimum number of instrumentation channels shown in Table 3.2.F, continued operation is permissible during the succeeding thirty days, provided both Drywell Pressure instruments (0-70 psig) are operable; otherwise, restore the inoperable channel to operable status within 7 days or be in at least Hot Shutdown within the next 12 hours.

NOTES FOR TABLE 3.2.F (Cont'd)

9) If no channels are operable, continued operation is permissible during the succeeding 7 days, provided both Drywell Pressure instruments (0-70 psig) are operable; otherwise, restore the inoperable channel(s) to operable status within 48 hours or be in at least Hot Shutdown within the next 12 hours.

10) With the number of operable channels less than the minimum number of instrumentation channels shown in Table 3.2.F, continued operation is permissible during the succeeding 30 days, provided both narrow range instruments monitoring the same variable are operable; otherwise, restore the inoperable channel to operable status within 7 days or be in at least Hot Shutdown within the next 12 hours.

11) If no channels are operable, continued operation is permissible during the succeeding seven days, provided both narrow range instruments monitoring the same variable are operable; otherwise, restore the inoperable channel(s) to operable status within 48 hours or be in at least Hot Shutdown within the next 12 hours.

12) With the number of operable channels less than the minimum number of instrumentation channels shown in Table 3.2.F, continued operation is permissible during the succeeding 30 days provided both of the other reactor pressure instruments (0-1500 recorder, 0-1200 indicator) are operable; otherwise, restore the inoperable channel to operable status within 7 days or be in at least Hot Shutdown within the next 12 hours.

13) If no channels are operable, continued operation is permissible during the succeeding 7 days, provided both of the reactor pressure instruments (0-1500 recorder, 0-1200 indicator) are operable; otherwise restore the inoperable channel(s) to operable status with 48 hours or be in at least Hot Shutdown within the next 12 hours.

TABLE 4.2.F
MINIMUM TEST AND CALIBRATION FREQUENCY FOR SURVEILLANCE INSTRUMENTATION

	Instrument Channel (thermocouple)	Calibration Frequency	Instrument Check
18)	Drywell High Range Radiation Monitors	Once/operating cycle**	Once/month
19)	Main Stack High Range Radiation Monitor	Once/operating cycle	Once/month
20)	Reactor Bldg. Roof Vent High Range Radiation Monitor	Once/operating cycle	Once/month
21)	Drywell Hydrogen Concentration Analyzer and Monitor	Quarterly***	Once/month

* Perform instrument functional check once per operating cycle.

** Channel calibration shall consist of an electronic calibration of the channel, not including the detector, for range decades above 10R/hr and a one point calibration check of the detector below 10R/hr with an installed or portable gamma source.

*** At least a two-point calibration using sample gas.

3.2 BASES (Cont'd)

trip and the other a downscale trip. There is a fifteen minute delay before the air ejector off-gas isolation valve is closed. This delay is accounted for by the 30-minute holdup time of the off-gas before it is released to the stack during reactor power operation when the recombiner system is not operating.

Both instruments are required for trip but the instruments are so designed that any instrument failure gives a downscale trip. The trip settings of the instruments are set so that the instantaneous stack release rate limit given in Sepcification 3.8 is not exceeded.

Four sets of two radiation monitors are provided which initiate the Reactor Building Isolation function and operation of the standby gas treatment system. Four instrument channels monitor the radiation from the refueling area ventilation exhaust ducts and four instrument channels monitor the building ventilation below the refueling floor. Each set of instrument channels is arranged in a 1 out of 2 twice trip logic.

Trip settings of less than 16 mr/hr for the monitors in the refueling area ventilation exhaust ducts are based upon initiating normal ventilation isolation and standby gas treatment system operation so that none of the activity released during the refueling accident leaves the Reactor Building via the normal ventilation path but rather all the activity is processed by the standby gas treatment system.

Flow integrators are used to record the integrated flow of liquid from the drywell sumps. The alarm unit in each integrator is set to annuciate before the values specified in Specification 3.6.c are exceeded. An air sampling system is also provided to detect leakage inside the primary containment.

Some of the surveillance instrumentation listed in Table 3.2.F are required to meet the accident monitoring requirements of NUREG-0737, Clarification of TMI Action Plan Requirements. The instrumentation and the applicable NUREG-0737 requirements are:

1. Wide range drywell pressure (II.F.1.4)
2. Subatmospheric drywell pressure (II.F.1.4)
3. Wide range suppression chamber water level (II.F.1.5)
4. Main stack high range radiation monitor (II.F.1.1)
5. Reactor building roof vent high range radiation monitor (II.F.1.1)
6. Drywell hydrogen concentration analyzer and monitor (II.F.1.6)

3.2 BASES (Cont'd.)

7. Drywell high range radiation monitors (II.F.1.3)
8. Reactor Water Level - wide and fuel range (II.F.2)
9. Reactor pressure (I.D.2)
10. Safety-Relief Valve position indication (II.D.3)

The recirculation pump trip has been added at the suggestion of ACRS as a means of limiting the consequences of the unlikely occurrence of a failure to scram during an anticipated transient. The response of the plant to this postulated event fall within the envelope of study events given in General Electric Company Topical Report, NEDO-10349, dated March, 1971.

In the event of a loss of the reactor building ventilation system, radiant heating in the vicinity of the main steam lines raises the ambient temperature above 200 degrees F. Restoration of the main steam line tunnel ventilation flow momentarily exposes the temperature sensors to high gas temperatures. The momentary temperature increase can cause an unnecessary main steam line isolation and reactor scram. Permission is provided to increase the temperature trip setpoint to 250 degrees F for 30 minutes during restoration of ventilation system to avoid an unnecessary plant transient.

The Emergency Aux. Power Source Degraded Voltage trip function prevents damage to safety-related equipment in the event of a sustained period of low voltage. The voltage supply to each of the 4kV buses will be monitored by undervoltage relaying. With a degraded voltage condition on the off-site source, the undervoltage sensing relays operate to initiate a timing sequence.

The timing sequence provides constant and inverse time voltage characteristics. Degraded voltage protection includes: (1) An instantaneous relay (ITE) initiated at 90% voltage which initiates a 60-second time delay relay and a 6 second time delay relay. The 6-second time delay relay requires the presence of a safety injection signal to initiate transfer; (2) An inverse time voltage relay (CV-6) initiated at 87% voltage with a maximum 60 second delay and operates at 70% voltage in 30 seconds; and (3) An inverse time voltage relay (IAV) initiated at approximately 60% voltage and operates at 1.8 seconds at zero volts.

When the timing sequence is completed, the corresponding 4kV emergency circuit breakers are tripped and the emergency buses are transferred to the alternate source. The 60-second timing sequences were selected to prevent unnecessary transfers during motor starts and to allow the automatic tapchanger on the startup transformer to respond to the voltage condition. The 6-second timing sequence is necessary to prevent separation of the emergency buses from the off-site source during motor starting transients, yet still be contained within the time envelope in FSAR Table 8.5.1.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS

3.5.D Reactor Core Isolation Cooling (RCIC Sub-System)

1. The RCIC Sub-System shall be operable whenever there is irradiated fuel in the reactor vessel, the reactor pressure is greater than 105 psig, and prior to reactor startup from a Cold Condition, except as specified in 3.5.D.2 below.

2. From and after the date that the RCICS is made or found to be inoperable for any reason, continued reactor power operation is permissible only during the succeeding seven days provided that during such seven days the HPCIS is operable.

3. If the requirements of 3.5.D cannot be met, an orderly shutdown shall be initiated and the reactor pressure shall be reduced to 105 psig within 24 hours.

4.5.D Reactor Core Isolation Cooling (RCIC Sub-System)

1. RCIC Sub-System testing shall be performed as follows:

Item	Frequency
(a) Simulated Automatic Actuation Test*	Once/Operating Cycle
(b) Pump Operability	Once/Month
(c) Motor Operated Valve Operability	Once/Month
(d) Flow Rate at approximately 1000 psig Steam Pressure**	Once/3 Months
(e) Flow Rate at approximately 150 psig Steam Pressure**	Once/Operating Cycle
(f) Verify automatic transfer from CST to suppression pool on low CST water level	Once/Operating Cycle

2. When it is determined that the RCIC sub-system is inoperable, the HPCIS shall be demonstrated to be operable immediately and weekly thereafter.

*Shall include automatic restart on low water level signal.

**The RCIC pump shall deliver at least 600 gpm for a system head corresponding to a reactor pressure of 1000 to 150 psig.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.7.A Primary Containment	4.7.A Primary Containment
6. Containment Atmosphere Dilution	6. Containment Atmosphere Dilution
a. Whenever either reactor is in power operation, the Post-LOCA Containment Atmosphere Dilution System must be operable and capable of supplying nitorgen to either Unit 2 or Unit 3 containment for atmosphere dilution if required by post-LOCA conditions. If this specification cannot be met, the system must be restored to an operable condition within 30 days or both reactors must be taken out of power operation.	a. The post-LOCA containment atmosphere dilution system shall be functionally tested once per operating cycle.
b. Whenever either reactor is in power operation, the post-LOCA Containment Atmosphere Dilution System shall contain a minimum of 2000 gallons of liquid nitrogen. If this specification cannot be met, the minimum volume will be restored within 30 days or both reactors must be taken out of power operation.	b. The level in the liquid nitrogen storage tank shall be recorded weekly.
c. Whenever either of the reactors is in power operation, there shall be at least one CAD system oxygen analyzer serving the drywell and one CAD system oxygen analyzer serving the suppression chamber on that reactor. If this specification cannot be met,	

LIMITING CONDITIONS FOR OPERATION | SURVEILLANCE REQUIREMENTS

3.7.A.6.c (Cont'd)

the unit shall be in Hot Shutdown within 12 hours.

d. A 30 psig limit is the maximum containment repressurization allowable using the CAD system. Venting via the SBGT system to this stack must be initiated at 30 psig following the initial peak pressure at 49.1 psig.

4.7.A.6 (Cont'd)

c. The CAD system oxygen analyzers shall be tested for operability using standard bottled oxygen once per month and shall be calibrated once per 6 months. The atmospheric analyzing system shall be functionally tested once per oprating cycle in conjunction with the specification 4.7.A.6.a. Should one of the two oxygen analyzers serving the drywell or suppression pool be found inoperable, the remaining analyzer serving the same compartment shall be tested for operability once per week until the defective analyzer is made operable.

3.7.A & 4.7.A BASES (Cont'd)

periodic testing of the system is required. Twice weekly operation of the containment oxygen analyzer that is associated with the containment inerting makeup system is sufficient to insure its readiness. Reliance on that oxygen analyzer for this purpose of post-LOCA oxygen measurement will terminate when the CAD system is operable.

The Post-LOCA Containment Atmosphere Dilution system design basis and description are presented in Question 14.6 of the FSAR. In summary, the limiting criteria, based on the assumptions of Safety Guide 7, are:

1. Maintain oxygen concentration in the containment during post-LOCA conditions to less than 5 % Volume.

2. Limit the buildup in the containment pressure due to nitrogen addition to less than 30 psig.

3. To limit the offsite dose due to containment venting (for pressure control) to less than 30 Rem to the thyroid.

By maintaining at least a 7-day supply of nitrogen on site, there will be sufficient time after the occurrence of a LOCA for obtaining additional nitrogen supply from local commercial sources which have been discussed in Question 14.6 of the FSAR. The system design contains sufficient redundancy to ensure its reliability. Thus, it is sufficient to test the operability of the whole system once per operating cycle. Redundant oxygen analyzers are provided for both the drywell and suppression chamber, i.e., there are four oxygen analyzers on each Unit. By permitting continued reactor operation at rated power with two of the four analyzers inoperable, redundancy of analyzing capability will be maintained while not imposing an unnecessary interruption in plant operation. If one of the two analyzers serving one of the compartments of the containment (drywell or suppression chamber) fails, the frequency of testing of the other analyzer of the same type serving the same compartment will be increased from monthly to weekly to assure its continued availability. Monthly testing of the analyzers using bottled oxygen will ensure the system's readiness because of the multiplicity of design. Since the analyzers are normally not in operation, there will be little deterioration due to use.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
3.11 Additional Safety Related Plant Capabilities	4.11 Additional Safety Related Plant Capabilities
A. Main Control Room Emergency Ventilation System	A. Main Control Room Emergency Ventilation System
1. Both control room emergency ventilation systems shall be operable at all times when secondary containment integrity is required except that one system may be out-of-service for 7 days.	1. At least once per operating cycle, the pressure drop across the combined HEPA filters and charcoal adsorber banks shall be demonstrated to be less than 8 inches of water at system design flow rate.
2. If Specification 3.11.A.1 cannot be met, be in hot shutdown within 12 hours and cold shutdown within the following 24 hours.	2. a. The tests and sample analysis of Specification 3.11.A.4 shall be performed initially and at least once per year for standby service; or after every 720 hours of system operation; or following significant painting, fire or chemical release in any ventilation zone communicating with the system while it is in operation.
3. With both control room emergency ventilation systems inoperable, suspend core alternations, handling of irradiated fuel in the secondary containment, and operations with a potential for draining the reactor vessel.	
4. a. The results of the inplace cold DOP and halogenated hydrocarbon refrigerant tests at approximately 3,000 CFM on HEPA filters and charcoal adsorber filter trains shall show >99% DOP removal and >99% halogenated hydrocarbon removal or that filter train shall not be considered operable.	b. Cold DOP testing shall be performed after each complete or partial replacement of the HEPA filter train or after any structural maintenance on the system housing.
	c. Halogenated hydrocarbon refrigerant testing shall be performed after each complete or partial replacement of the charcoal adsorber filters or after any structural maintenance on the system housing.

LIMITING CONDITIONS FOR OPERATION	SURVEILLANCE REQUIREMENTS
b. The results of laboratory carbon sample analysis shall show 90% radioactive methyl iodide removal at a velocity within 20% of system design, 0.05 to 0.15 mg/m3 inlet methyl iodide concentration, >95% relative humidity and >125 degrees F, or that filter train shall not be considered operable.	d. A dry gas purge shall be provided to the filters to insure that the relative humidity in the filter systems does not exceed 70% during idle periods.
c. Fans shall be shown to operate at approximately 3,000 CFM +/- 300 CFM (design flow for the filter train).	3. At least once per operating cycle automatic initiation of the control room air treatment system shall be demonstrated.
	4. Operability of the main control room air intake radiation monitor shall be tested every 3 months.
5. At least 1 of the 2 main control room intake air radiation monitors shall be operable with the inoperable channel failed safe whenever the control room emergency ventilation air supply fans and filter trains are required to be operable by 3.11.A.1 or filtration of the control room ventilation intake air must be initiated.	

6.19 Postaccident Sampling

Administrative controls shall be implemented to ensure the capability to obtain and analyze: (1) reactor coolant and containment atmosphere samples under accident conditions, and (2) radioactive iodines and particulates in plant gaseous effluents under accident conditions. The administrative controls shall include the following:

1. Training of personnel,
2. Procedures for sampling and analysis,
3. Provisions for maintenance of sampling and analytical equipment.

6.19 BASES

These administrative controls apply to the systems installed to ensure the capabilities required by NUREG-0737, Item II.B.3 (Post-Accident Sampling Capability) and Item II.F.1.2 (Iodine and Particulate Sampling).

The first capability is accomplished through the use of the Post-Accident Sampling System (PASS) located in the M-G set rooms and by the equipment available to handle, transport and analyze the samples. Analytical capability is provided at both the Unit 1 laboratory and an off-site laboratory, provided by contractual arrangements, for selected analyses. The off-site laboratory is relied upon to perform the chloride analysis required by NUREG-0737, Item II.B.3. The data obtained from the post-accident sampling system would be utilized to calculate the extent of fuel damage during accident conditons.

The second capability (II.F.1.2) is accomplished by the use of shielded sample collection devices, special handling tools, a shielded transport container, and high radiation measuring techniques. The collection devices (particulate filters and iodine cartridges) are located on the main stack and reactor building vent sampling systems.