OYSTER CREEK NUCLEAR GENERATING STATION
TECHNICAL SPECIFICATION CHANGE REQUEST NO. 218
PROPOSED CHANGES TO SECTIONS 3.1 AND 4.1

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PDR ADOCK 05000219
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3.1 PROTECTIVE INSTRUMENTATION

Applicability: Applies to the operating status of plant instrumentation which performs a protective function.

Objective: To assure the OPERABILITY of protective instrumentation.

Specifications: A. The following operating requirements for plant protective instrumentation are given in Table 3.1.1:

1. The reactor mode in which a specified function must be OPERABLE including allowable bypass conditions.

2. The minimum number of OPERABLE instrument channels per OPERABLE trip system.

3. The trip settings which initiate automatic protective action.

4. The action required when the limiting conditions for operation are not satisfied.

B. 1. Failure of four chambers assigned to any one APRM shall make the APRM inoperable.

2. Failure of two chambers from one radial core location in any one APRM shall make that APRM inoperable.

C. 1. Any two (2) LPRM assemblies which are input to the APRM system and are separated in distance by less than three (3) times the control rod pitch may not contain a combination of more than three (3) inoperable detectors (i.e., APRM channel failed or bypassed, or LPRM detectors failed or bypassed) out of the four (4) detectors located in either the A and B, or the C and D levels.

2. A Travelling In-Core Probe (TIP) chamber may be used as an APRM input to meet the criteria of 3.1.B and 3.1.C.1, provided the TIP is positioned in close proximity to one of the failed LPRM's. If the criteria of 3.1.B.2 or 3.1.C.1 cannot be met, POWER OPERATION may continue at up to rated power level provided a control rod withdrawal block is OPERATING or at power levels less than 61% of rated power until the TIP can be connected, positioned and satisfactorily tested, as long as Specification 3.1.B.1 and Table 3.1.1 are satisfied.

Bases: The plant protection system automatically initiates protective functions to prevent exceeding established limits. In addition, other protective instrumentation is provided to initiate action which mitigates the consequences of accidents or terminates operator control. This specification provides the limiting conditions for operation necessary to preserve the effectiveness of these instrument systems.

Table 3.1.1 defines, for each function, the minimum number of OPERABLE instrument channels for an OPERABLE trip system for the various functions specified. There are usually two trip systems required or available for each function. The specified limiting conditions for operation apply for the indicated modes of operation. When the specified limiting condition cannot be met, the specified Actions Required shall be undertaken promptly to modify plant operation to the condition indicated in a normal manner. Conditions under which the specified plant instrumentation may be out-of-service are also defined in Table 3.1.1.

Except as noted in Table 3.1.1 an inoperable trip system will be placed in the tripped condition. A tripped trip system is considered OPERATING since by virtue of being tripped it is performing its required function. All sensors in the untripped trip system must be OPERABLE, except as follows:

1. The high temperature sensor system in the main steam line tunnel has eight sensors in each protection logic channel. This multiplicity of sensors serving a duplicate function permits this system to operate for twenty month nominal intervals without calibration. Thus, if one of the temperature sensors causes a trip in one of the two trip systems, there are several cross checks that would verify if this were a real one. If not, this sensor could be removed for service. However, a minimum of two of eight are required to be OPERABLE and only one of the two is required to accomplish a trip in a single trip system.

2. One APRM of the four in each trip system may be bypassed without tripping the trip system if core protection is maintained. Core protection is maintained by the remaining three APRM's in each trip system as discussed in Section 7.5.1.8.7 of the Updated FSAR.

3. One IRM channel in each of the two trip systems may be bypassed without compromising the effectiveness of the system. There are few possible sources of rapid reactivity input to the system in the low power low flow condition. Effects of increasing pressure at zero or low void content are minor, cold water from sources available during startup is not much colder than that already in the system, temperature coefficients are small, and control rod patterns are constrained to be uniform by operating procedures backed up by the rod worth minimizer. Worth of individual rods is very low in a uniform rod pattern. Thus, of all possible sources of reactivity input, uniform control rod withdrawal is the most probable cause of significant power rise. Because the flux distribution associated with uniform rod withdrawals does not involve high local peaks, and because several rods must be moved to change power by a significant percentage of rated, the rate of power rise is very slow. Generally the heat flux is in near equilibrium with the fission rate. In an assumed uniform rod withdrawal approach to the scram level, the rate of power rise is no more than five percent of rated per minute, and three OPERABLE IRM instruments in each trip system would be more than adequate to assure a scram before the power could exceed the safety limit. In many cases, if properly located, a single OPERABLE IRM channel in each trip system would suffice.

4. When required for surveillance testing, a channel is made inoperable. In order to be able to test its trip function to the final actuating device of its trip system, the trip system cannot already be tripped by some other means such as a mode switch, interlock, or manual trip. Therefore, there will be times during the test that the channel is inoperable but not tripped. For a two channel trip system, this means that full reliance is being placed on the channel that is not being tested. A channel may be placed in an inoperable status for up to 6 hours for required surveillance without placing the trip system in the tripped condition provided at least one OPERABLE channel in the same trip system is monitoring that parameter.

5. Allowed outage times (AOT) to permit restoration of inoperable instrumentation to OPERABLE status are provided in Table 3.1.1. AOTs vary depending on type of function and the number of inoperable channels per function. If an inoperable channel cannot be restored to OPERABLE status within the AOT, the channel or the associated trip system must be placed in the tripped condition. Placing the inoperable channel in trip (or the associated trip system in trip) conservatively compensates for the inoperability and allows operation to continue. Alternatively, if it is not desired to place the channel (or trip system) in trip (e.g., as in the case where placing the inoperable channel in trip would result in a full scram) the Action Required must be taken.

AOTs discussed in 4 (6 hours for surveillance) and 5 (repair AOTs in Table 3.1.1, Notes nn, oo and pp) above have been determined in accordance with References 1 through 6 except for instrumentation in Table 3.1.1, Sections M and N. Note kk has been provided to specify a 2 hour surveillance AOT for those instruments.

Bypasses of inputs to a trip system other than the IRM and APRM bypasses are provided for meeting operational requirements listed in the notes in Table 3.1.1. Note 'a' allows the "high water level in scram discharge volume" scram trip to be bypassed in the refuel mode. In order to reset the safety system after a scram condition, it is necessary to drain the scram discharge volume to clear this scram input condition. (This condition usually follows any scram, no matter what the initial cause might have been.) In order to do this, this particular scram function can be bypassed only in the refuel position. Since all of the control rods are completely inserted following a scram, it is permissible to bypass this condition because a control rod block prevents withdrawal as long as the switch is in the bypass condition for this function.

The manual scram associated with moving the mode switch to shutdown is used merely to provide a mechanism whereby the reactor protection system scram logic channels and the reactor manual control system can be energized. The ability to reset a scram twenty (20) seconds after going into the SHUTDOWN MODE provides the beneficial function of relieving scram pressure from the control rod drives which will increase their expected lifetime.

To permit plant operation to generate adequate steam and pressure to establish turbine seals and condenser vacuum at relatively low reactor power, the main condenser vacuum trip is bypassed until 600 psig. This bypass also applies to the main steam isolation valves for the same reason.

The action required when the minimum instrument logic conditions are not met is chosen so as to bring plant operation promptly to such a condition that the particular protection instrument is not required; or the plant is placed in the protection or safe condition that the instrument initiates. This is accomplished in a normal manner without subjecting the plant to abnormal operations conditions. The action and out-of-service requirements apply to all instrumentation within a particular function, e.g., if the requirements on any one of the ten scram functions cannot be met then control rods shall be inserted.

The trip level settings not specified in Specification 2.3 have been included in this specification. The bases for these settings are discussed below.

The high drywell pressure trip setting is ≤ 3.5 psig. This trip will scram the reactor, initiate core spray, initiate primary containment isolation, initiate automatic depressurization in conjunction with low-low-low-reactor water level, initiate the standby gas treatment system and isolate the reactor building. The scram function shuts the core down during the loss-of-coolant accidents. A steam leak of about 15 gpm and a liquid leak of about 35 gpm from the primary system will cause drywell pressure to reach the scram point; and, therefore, the scram provides protection for breaks greater than the above.

High drywell pressure provides a second means of initiating the core spray to mitigate the consequences of loss-of-coolant accident. Its trip setting of ≤3.5 psig initiates the core spray in time to provide adequate core cooling. The break size coverage of high drywell pressure was discussed above. Low-low water level and high drywell pressure in addition to initiating core spray also causes isolation valve closure. These settings are adequate to cause isolation to minimize the offsite dose within required limits.

It is permissible to make the drywell pressure instrument channels inoperable during performance of the integrated primary containment leakage rate test provided the reactor is in the COLD SHUTDOWN condition. The reason for this is that the Engineered Safety Features, which are effective in case of a LOCA under these conditions, will still be effective because they will be activated (when the Engineered Safety Features system is required as identified in the technical specification of the system) by low-low reactor water level.*

The scram discharge volume has two separate instrument volumes utilized to detect water accumulation. The high water level is based on the design that the water in the SDIV's, as detected by either set of level instruments, shall not be allowed to exceed 29.0 gallons; thereby, permitting 137 control rods to scram. To provide further margin, an accumulation of not more than 14.0 gallons of water, as detected by either instrument volume, will result in a rod block and an alarm. The accumulation of not more than 7.0 gallons of water, as detected in either instrument volume will result in an alarm.

Detailed analyses of transients have shown that sufficient protection is provided by other scrams below 45% power to permit bypassing of the turbine trip and generator load rejection scrams. However, for operational convenience, 40% of rated power has been chosen as the setpoint below which these trips are bypassed. This setpoint is coincident with bypass valve capacity.

A low condenser vacuum scram trip of 20 inches Hg has been provided to protect the main condenser in the event that vacuum is lost. A loss of condenser vacuum would cause the turbine stop valves to close, resulting in a turbine trip transient.

The low condenser vacuum trip provides a reliable backup to the turbine trip. Thus, if there is a failure of the turbine trip on low vacuum, the reactor would automatically scram at 20 inches Hg. The condenser is capable of receiving bypass steam until 7 inches Hg vacuum thereby mitigating the transient and providing a margin.

Main steamline high radiation is an indication of excessive fuel failure. Scram and reactor isolation are initiated when high activity is detected in the main steam lines. These actions prevent further release of fission products to the environment. This is accomplished by setting the trip at 10 times normal rated power background. Although these actions are initiated at this level, at lower activities the monitoring system also provides for continuous monitoring of radioactivity in the primary steam lines as discussed in Section VII-6 of the FDSAR. Such capability provides the operator with a prompt indication of any release of fission products from the fuel to the reactor coolant above normal rated power background. The gross failure of any single fuel rod could release a sufficient amount of activity to approximately double the background activity at normal rated power. This would be indicative of the onset of fuel failures and would alert the operator to the need for appropriate action, as defined by Section 6 of these specifications.

The settings to isolate the isolation condenser in the event of a break in the steam or condensate lines are based on the predicted maximum flows that these systems would experience during operation, thus permitting operation while affording protection in the event of a break. The settings correspond to a flow rate of less than three times the normal flow rate of $3.2X10^5$ lb/hr. Upon initiation of the alternate shutdown panel, this function is bypassed to prevent spurious isolation due to fire induced circuit faults.

The setting of ten times the stack release limit for isolation of the air-ejector offgas line is to permit the operator to perform normal, immediate remedial action if the stack limit is exceeded. The time necessary for this action would be extremely short when considering the annual averaging which is allowed under 10 CFR 20.106, and, therefore, would produce insignificant effects on doses to the public.

Four radiation monitors are provided which initiate isolation of the reactor building and operation of the standby gas treatment system. Two monitors are located in the ventilation ducts, one is located in the area of the refueling pool and one is located in the reactor vessel head storage area. The trip logic is basically a 1 out of 4 system. Any upscale trip will cause the desired action. Trip settings of 17 mr/hr in the duct and 100 mr/hr on the refueling floor are based upon initiating standby gas treatment system so as not to exceed allowed dose rates of 10 CFR 20 at the nearest site boundary.

The SRM upscale of 5×10^5 CPS initiates a rod block so that the chamber can be relocated to a lower flux area to maintain SRM capability as power is increased to the IRM range. Full scale reading is 1×10^6 CPS. This rod block is bypassed in IRM Ranges 8 and higher since a level of 5×10^5 CPS is reached and the SRM chamber is at its fully withdrawn position.

The SRM downscale rod block of 100 CPS prevents the instrument chamber from being withdrawn too far from the core during the period that it is required to monitor the neutron flux. This downscale rod block is also bypassed in IRM Ranges 8 and higher. It is not required at this power level since good indication exists in the Intermediate Range and the SRM will be reading approximately 5×10^5 CPS when using IRM Ranges 8 and higher.

The IRM downscale rod block in conjunction with the chamber full-in position and range switch setting, provides a rod block to assure that the IRM is in its most sensitive condition before startup. If the two latter conditions are satisfied, control rod withdrawal may commence even if the IRM is not reading at least 5%. However, after a substantial neutron flux is obtained, the rod block setting prevents the chamber from being withdrawn to an insensitive area of the core.

The APRM downscale setting of $\geq$ 2/150 full scale is provided in the RUN MODE to prevent control rod withdrawal without adequate neutron monitoring.

High flow in the main steamline is set at 120% of rated flow. At this setting the isolation valves close and in the event of a steam line break limit the loss of inventory so that fuel clad perforation does not occur. The 120% flow would correspond to the thermal power so this would either indicate a line break or too high a power.

Temperature sensors are provided in the steam line tunnel to provide for closure of the main steamline isolation valves should a break or leak occur in this area of the plant. The trip is set at 50°F above ambient temperature at rated power. This setting will cause isolation to occur for main steamline breaks which result in a flow of a few pounds per minute or greater. Isolation occurs soon enough to meet the criterion of no clad perforation.

The low-low-low water level trip point is set at 4'8" above the top of the active fuel and will prevent spurious operation of the automatic relief system. The trip point established will initiate the automatic depressurization system in time to provide adequate core cooling.

Specification 3.1.B.1 defines the minimum number of APRM channel inputs required to permit accurate average core power monitoring. Specifications 3.1.B.2 and 3.1.C.1 further define the distribution of the OPERABLE chambers to provide monitoring of local power changes that might be caused by a single rod withdrawal. Any nearby, OPERABLE LPRM chamber can provide the required input for average core monitoring. A Travelling Incore Probe or Probes can be used temporarily to provide APRM input(s) until LPRM replacement is possible. Since APRM rod block protection is not required below 61% of rated power, as discussed in Section 2.3, Limiting Safety System Settings, operation may continue below 61% as long as Specification 3.1.B.1 and the requirements of Table 3.1.1 are met. In order to maintain reliability of core monitoring in that quadrant where an APRM is inoperable, it is permitted to remove the OPERABLE APRM from service for calibration and/or test provided that the same core protection is maintained by alternate means.

In the rare event that Travelling In-core Probes (TIPs) are used to meet the requirements 3.1.B or 3.1.C, the licensee may perform an analysis of substitute LPRM inputs to the APRM system using spare (non-APRM input) LPRM detectors and change the APRM system as permitted by 10 CFR 50.59.

Under assumed loss-of-coolant accident conditions and certain loss of offsite power conditions with no assumed loss-of-coolant accident, it is inadvisable to allow the simultaneous starting of emergency core cooling and heavy load auxiliary systems in order to minimize the voltage drop across the emergency buses and to protect against a potential diesel generator overload. The diesel generator load sequence time delay relays provide this protective function and are set accordingly. The repetitive accuracy rating of the timer mechanism as well as parametric analyses to evaluate the maximum acceptable tolerances for the diesel loading sequence timers were considered in the establishment of the appropriate load sequencing.

Manual actuation can be accomplished by the operator and is considered appropriate only when the automatic load sequencing has been completed. This will prevent simultaneous starting of heavy load auxiliary systems and protect against the potential for diesel generator overload.

Also, the Reactor Building Closed Cooling Water and Service Water pump circuit breakers will trip whenever a loss-of-coolant accident condition exists. This is justified by Amendment 42 of the Licensing Application which determined that these pumps were not required during this accident condition.

The drywell high radiation setpoint will ensure a timely closure of the large vent and purge isolation valves to prevent releases from exceeding ten percent of the dose guideline values allowed by 10 CFR 100. The containment vent and purge isolation function is provided in response to NUREG 0737 Item II E.4.2.7.

<u>References</u>:

(1) NEDC-30851P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System."

(2) NEDC-30936P-A, "BWR Owners' Group Technical Specification Improvement Methodology (With Demonstration for BWR ECCS Actuation Instrumentation)," Parts 1 and 2.

(3) NEDC-30851P-A, Supplement 1, "Technical Specification Improvement Analysis for BWR Control Rod Block Instrumentation."

(4) NEDC-30851P-A, Supplement 2, "Technical Specification Improvement Analysis for BWR Isolation Instrumentation Common to RPS and ECCS Instrumentation."

(5) NEDC-31677P-A, "Technical Specification Improvement Analysis for BWR Isolation Actuation Instrumentation."

(6) GENE-770-06-1-A, "Bases for Changes to Surveillance Test Intervals and Allowed Out-of-Service Times for Selected Instrumentation Technical Specifications."

TABLE 3.1.1 PROTECTIVE INSTRUMENTATION REQUIREMENTS

Function	Trip Setting	Reactor Modes in which Function Must Be OPERABLE: Shutdown	Refuel	Startup	Run	Min. No. of OPERABLE or OPERATING [tripped] Trip Systems	Min. No. of Instrument Channels Per OPERABLE Trip System	Action Required*
A. Scram								
1. Manual Scram		X	X	X	X	2	1	Insert control rods
2. High Reactor Pressure	**		X(s)	X(ll)	X	2	2(nn)	
3. High Drywell Pressure	≤ 3.5 psig		X(u)	X(u)	X	2	2(nn)	
4. Low Reactor Water Level	**		X	X	X	2	2(nn)	
5. a. High Water Level in Scram Discharge Volume North Side	≤ 29 gal.		X(a)	X(z)	X(z)	2	2(nn)	
b. High Water Level in Scram Discharge Volume South Side	≤ 29 gal.		X(a)	X(z)	X(z)	2	2(nn)	
6. Low Condenser Vacuum	≥ 20 in. hg.			X(b)	X	1	3(mm)(nn)	
7. High Radiation in Main Steam-line Tunnel	≤ 10 x normal background		X(s)	X	X	2	2(nn)	
8. Average Power Range Monitor (APRM)	**		X(c,s)	X(c)	X(c)	2	3(nn)	
9. Intermediate Range Monitor (IRM)	**		X(d)	X(d)		2	3(nn)	
10. Main Steamline Isolation Valve Closure	**		X(b,s)	X(b)	X	2	4(nn)	
11. Turbine Trip Scram	**				X(j)	2	4(nn)	
12. Generator Load Rejection Scram	**				X(j)	2	2(nn)	

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B. Reactor Isolation								Close main steam isolation valves and close isolation condenser vent valves, or PLACE IN COLD SHUT-DOWN CONDIT")N
1. Low-Low Reactor Water Level	**	X	X	X	X	2	2(oo)	
2. High Flow in Main Steam-line A	≤120% rated	X(s)	X(s)	X	X	2	2(oo)	
3. High Flow in Main Steam-line B	≤120% rated	X(s)	X(s)	X	X	2	2(oo)	
4. High Temp-erature in Main Steam-line Tunnel	≤Ambient at Power + 50°F	X(s)	X(s)	X	X	2	[illegible]o)	
5. Low Pressure in Main Steam-line	**			X(cc)	X	2	2(oo)	
6. High Radia-tion in Main Steamline Tunnel	≤10X Normal Background	X(s)	X(s)	X	X	2	2(oo)	
C. Isolation Condenser Initiation								
1. High Reactor Pressure	**	X(s)	X(s)	X(ll)	X	2	2(pp)	PLACE IN COLD SHUT-DOWN CONDITION
2. Low-Low Reactor Water Level	≥7'2" above TOP OF ACTIVE FUEL	X(s)	X(s)	X	X	2	2(pp)	

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D. Core Spray								Consider the respective core spray loop inoperable, and comply with Spec. 3.4
1. Low-Low Reactor Water Level	**	X(t)	X(t)	X(t)	X	2	2(pp)	
2. High Drywell Pressure	≤ 3.5 psig	X(t)	X(t)	X(t)	X	2(k)	2(k)(pp)	
3. Low Reactor Pressure (valve permissive)	≥ 285 psig	X(t)	X(t)	X(t)	X	2	2(pp)	
E. Containment Spray								
Comply with Technical Specification 3.4								
F. Primary Containment Isolation								Isolate containment or PLACE IN COLD SHUT-DOWN CONDITION
1. High Drywell Pressure	≤ 3.5 psig	X(u)	X(u)	X(u)	X	2(k)	2(k)(oo)	
2. Low-Low Reactor Water Level	≥ 7'2" above TOP OF ACTIVE FUEL	X(u)	X(u)	X(u)	X	2	2(oo)	
G. Automatic Depressurization								
1. High Drywell Pressure	< 3.5 psig	X(v)	X(v)	X(v)	X	2(k)	2(k)(pp)	See note h
2. Low-Low-Low Reactor Water Level	≥ 4'8" above TOP OF ACTIVE FUEL	X(v)	X(v)	X(v)	X	2	2(pp)	See note h
3. AC Voltage	NA			X(v)	X	2	2(pp)	Prevent auto depressurization on loss of AC power. See note i

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H. Isolation Condenser Isolation (See Note hh)								Isolate affected Isolation Condenser, comply with Spec. 3.8 See note dd
1. High Flow Steam Line	≤ 20 psig P	X(s)	X(s)	X	X	2	2(oo)	
2. High Flow Condensate Line	≤ 27" P H_2O	X(s)	X(s)	X	X	2	2(oo)	
I. Offgas System Isolation								
1. High Radiation In Offgas Line (e)	≤ 2.1/Ē Ci/sec	X(s)	X(s)	X	X	1(ii)	2(ii)	See Note jj
J. Reactor Building Isolation and Standby Gas Treatment System Initiation								Isolate Reactor Building and Initiate Standby Gas Treatment System or Manual Surveillance for not more than 24 hours (total for all instruments under J) in any 30-day period
1. High Radiation Reactor Building Operating Floor	≤ 100 Mr/Hr	X(w)	X(w)	X	X	1	1	
2. Reactor Building Ventilation Exhaust	≤ 17 Mr/Hr	X(w)	X(w)	X	X	1	1	
3. High Drywell Pressure	≤ 3.5 psig	X(u)	X(u)	X	X	1(k)	2(k)	
4. Low-Low Reactor Water Level	≥ 7'2" above TOP OF ACTIVE FUEL	X	X	X	X	1	2	

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K. Rod Block								No control rod withdrawals permitted
1. SRM Upscale	$\leq 5x10^5$ cps		X	X(l)		1	2	
2. SRM Downscale	$\geq$100cps(f)		X	X(l)		1	2	
3. IRM Downscale	$\geq$5/125 fullscale (g)		X	X		2	3	
4. APRM Upscale	**		X(s)	X	X	2	3(e)	
5. APRM Downscale	$\geq$2/150 fullscale				X	2	3(e)	
6. IRM Upscale	$\leq$108/125 fullscale		X	X		2	3	
7. a) water level high scram discharge volume North	$\leq$14 gallons		X(z)	X(z)	X(z)	1	1 per instrument volume	
b) water level high scram discharge volume South	$\leq$ 14 gallons		X(z)	X(z)	X(z)	1	1 per instrument volume	

Function	Trip Setting	Reactor Modes in which Function Must Be OPERABLE	Min. No. of OPERABLE or OPERATING [tripped] Trip Systems	Min. No. of Instrument Channels Per OPERABLE Trip System	Action Required*
L. Condenser Vacuum Pump Isolation					
1. High Radiation in Main Steam-line Tunnel	$\leq$ 10 x Normal Background	During Startup and Run when vacuum pump is OPERATING	2	2(oo)	Insert Control Rods

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M. Diesel Generator Load Sequence Timers	Time delay after energizaion of relay							
1. CRD pump	60 sec ± 15%	X	X	X	X	2(m)	1(n)(kk)	Consider the pump inoperable and comply with Spec. 3.4.D (see Note q)
2. Service Water Pump (aa)	120 sec. ± 15% (SK1A) 10 sec. ± 15% (SK2A) (SK7A) (SK8A)	X	X	X	X	2(o)	2(p)(kk)	Consider the pump inoperable and comply within 7 days (See Note q)
3. Reactor Building Closed Cooling Water Pump (bb)	166 Sec. ± 15%	X	X	X	X	2(m)	1(n)(kk)	Consider the pump inoperable and comply within 7 days (See Note q)
N. Loss of Power								
a. 4.16KV Emergency Bus Undervoltage (Loss of Voltage)	**	X(ff)	X(ff)	X(ff)	X(ff)	2	1(kk)	
b. 4.16 KV Emergency Bus Undervoltage (Degraded Voltage)	**	X(ff)	X(ff)	X(ff)	X(ff)	2	3(kk)	See note ee

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O. Containment Vent and Purge Isolation								
1. Drywell High Radiation	≤74.6 R/hr	X(u)	X(u)	X(u)	X	1	1	Isolate vent and purge pathways or PLACE IN COLD SHUTDOWN CONDITION

TABLE 3.1.1 (CONT'D)

* Action required when minimum conditions for operation are not satisfied. Also permissible to trip inoperable trip system. A channel may be placed in an inoperable status for up to six hours for required surveillance without placing the trip system in the tripped condition provided at least one OPERABLE instrument channel in the same trip system is monitoring that parameter.

** See Specification 2.3 for Limiting Safety System Settings.

Notes:

a. Permissible to bypass, with control rod block, for reactor protection system reset in REFUEL MODE.
b. Permissible to bypass below 800 psia in REFUEL and STARTUP MODES.
c. One (1) APRM in each OPERABLE trip system may be bypassed or inoperable provided the requirements of Specification 3.1.C and 3.10.C are satisfied. Two APRM's in the same quadrant shall not be concurrently bypassed except as noted below or permitted by note.

   Any one APRM may be removed from service for up to six hours for test or calibration without inserting trips in its trip system only if the remaining OPERABLE APRM's meet the requirements of Specification 3.1.B.1 and no control rods are moved outward during the calibration or test. During this short period, the requirements of Specifications 3.1.B.2, 3.1.C and 3.10.C need not be met.
d. The IRMs shall be inserted and OPERABLE until the APRMs are OPERABLE and reading at least 2/150 full scale.
e. Offgas system isolation trip set at $\leq 2.1/\bar{E}$ Ci/sec where $\bar{E}$ = average gamma energy from noble gas in offgas after holdup line (Mev). Air ejector isolation valve closure time delay shall not exceed 15 minutes.
f. Unless SRM chambers are fully inserted.
g. Not applicable when IRM on lowest range.
h. One instrument channel in each trip system may be inoperable provided the circuit which it operates in the trip system is placed in a simulated tripped condition. If repairs cannot be completed within 72 hours the reactor shall be PLACED IN THE COLD SHUTDOWN CONDITION. If more than one instrument channel in any trip system becomes inoperable, the reactor shall be PLACED IN THE COLD SHUTDOWN CONDITION. Relief valve controllers shall not be bypassed for more than 3 hours (total time for all controllers) in any 30-day period and only one relief valve controller may be bypassed at a time.
i. The interlock is not required during the start-up test program and demonstration of plant electrical output but shall be provided following these actions.
j. Not required below 40% of turbine rated steam flow.

k. All four (4) drywell pressure instrument channels may be made inoperable during the integrated primary containment leakage rate test (See Specification 4.5), provided that the plant is in the COLD SHUTDOWN condition and that no work is performed on the reactor or its connected systems which could result in lowering the reactor water level to less than 4'8" above the TOP OF THE ACTIVE FUEL.

l. Bypass in IRM Ranges 8,9, and 10.

m. There is one time delay relay associated with each of two pumps.

n. One time delay rely per pump must be OPERABLE.

o. There are two time delay relays associated with each of two pumps. One timer per pump is for sequence starting (SK1A, SK2A) and one timer per pump is for tripping the pump circuit breaker (SK7A, SK8A).

p. Two time delay relays per pump must be OPERABLE.

q. Manual initiation of affected component can be accomplished after the automatic load sequencing is completed.

r. Time delay starts after closing of containment spray pump circuit breaker.

s. These functions not required to be OPERABLE with the reactor temperature less than 212°F and the vessel head removed or vented or during REACTOR VESSEL PRESSURE TESTING.

t. These functions may be inoperable or bypassed when corresponding portions in the same core spray system logic train are inoperable per Specification 3.4.A.

u. These functions not required to be OPERABLE when PRIMARY CONTAINMENT INTEGRITY is not required to be maintained.

v. These functions not required to be OPERABLE when the ADS is not required to be OPERABLE.

w. These functions must be OPERABLE only when irradiated fuel is in the fuel pool or reactor vessel and SECONDARY CONTAINMENT INTEGRITY is required per Specification 3.5.B.

y. Deleted

z. The bypass function to permit scram reset in the SHUTDOWN or REFUEL MODE with control rod block must be OPERABLE in this mode.

aa. Pump circuit breakers will be tripped in 10 seconds ± 15% during a LOCA by relays SK7A and SK8A.

bb. Pump circuit breakers will trip instantaneously during a LOCA.

cc. Only applicable during STARTUP MODE while OPERATING in IRM range 10.

dd. If an isolation condenser inlet (steam side) isolation valve becomes or is made inoperable in the open position during the RUN MODE comply with Specification 3.8.E. If an AC motor-operated outlet (condensate return) isolation valve becomes or is made inoperable in the open position during the RUN MODE comply with Specification 3.8.F.

ee. With the number of OPERABLE channels one less than the Min. No. of OPERABLE Instrument Channels per OPERABLE Trip System, operation may proceed until performance of the next required Channel Functional Test provided the inoperable channel is placed in the tripped condition within 1 hour.

ff. This function is not required to be OPERABLE when the associated safety bus is not required to be energized or fully OPERABLE as per applicable sections of these Technical Specifications.

gg. Deleted

hh. The high flow trip function for "B" Isolation Condenser is bypassed upon initiation of the alternate shutdown panel. This prevents a spurious trip of the Isolation Condenser in the event of fire induced circuit damage.

ii. Instrument shall be OPERABLE during main condenser air ejector operation except that a channel may be taken out-of-service for the purpose of a check, calibration, test, or maintenance without declaring it inoperable.

jj. With no channel OPERABLE, main condenser offgas may be released to the environment for as long as 72 hours provided the stack radioactive noble gas monitor is OPERABLE. Otherwise, be in at least SHUTDOWN CONDITION within 24 hours.

kk. One channel may be placed in an inoperable status for up to two hours for required surveillance without placing the trip system in the tripped condition.

ll. This function not required to be OPERABLE with the reactor vessel head removed or unbolted.

mm. "Instrument Channel" in this case refers to the bellows which sense vacuum in each of the three condensers (A, B, and C), and "Trip System" refers to vacuum trip systems 1 and 2.

nn. With one required channel inoperable in one Trip System, within 12 hours, restore the inoperable channel or place the inoperable channel and/or that Trip System in the tripped▲ condition.

With two or more required channels inoperable:

1. Within one hour, verify sufficient channels remain OPERABLE or tripped▲ to maintain trip capability, and
2. Within 6 hours, place the inoperable channel(s) in one Trip System and/or that Trip System▲▲ in the tripped condition▲, and
3. Within 12 hours, restore the inoperable channels in the other Trip System to an OPERABLE status or tripped▲.

Otherwise, take the Action Required.

▲ An inoperable channel or Trip System need not be placed in the tripped condition where this would cause the Trip Function to occur. In these cases, if the inoperable channel is not restored to OPERABLE status within the required time, the Action Required shall be taken.

▲▲ This action applies to that Trip System with the most inoperable channels; if both Trip Systems have the same number of inoperable channels, the action can be applied to either Trip System.

TABLE 3.1.1 (CONT'D)

oo. With one required channel inoperable in one Trip System, either

1. Place the inoperable channel in the tripped condition within

   a. 12 hours for parameters common to Scram Instrumentation, and
   b. 24 hours for parameters not common to Scram Instrumentation.

   or

2. Take the Action Required.

With one required channel inoperable in both Trip Systems,

1. Place the inoperable channel in one Trip System in the tripped condition within one hour, and

2. a. Place the inoperable channel in the remaining Trip System in the tripped condition within

      (1) 12 hours for parameters common to Scram Instrumentation, and
      (2) 24 hours for parameters not common to Scram Instrumentation.

   or

   b. Take the Action Required.

pp. With one or more required channels inoperable per Trip System:

1. For one channel inoperable, within 24 hours place the inoperable channel in the tripped condition or take the Action Required.

2. With more than one channel inoperable, take the Action Required.

SECTION 4

SURVEILLANCE REQUIREMENTS

4.1 PROTECTIVE INSTRUMENTATION

Applicability: Applies to the surveillance of the instrumentation that performs a safety function.

Objective: To specify the minimum frequency and type of surveillance to be applied to the safety instrumentation.

Specification: Instrumentation shall be checked, tested, and calibrated as indicated in Tables 4.1.1 and 4.1.2 using the definitions given in Section 1.

Basis: Surveillance intervals are based on reliability analyses and have been determined in accordance with General Electric Licensing Topical Reports given in References 1 through 5.

The functions listed in Table 4.1.1 logically divide into three groups:

a. On-off sensors that provide a scram function or some other equally important function.

b. Analog devices coupled with a bi-stable trip that provides a scram function or some other vitally important function.

c. Devices which only serve a useful function during some restricted mode of operation, such as startup or shutdown, or for which the only practical test is one that can be performed only at shutdown.

Group (b) devices utilize an analog sensor followed by an amplifier and bi-stable trip circuit. The sensor and amplifier are active components and a failure would generally result in an upscale signal, a downscale signal, or no signal. These conditions are alarmed so a failure would not go undetected. The bi-stable portion does need to be tested in order to prove that it will assume its tripped state when required.

Group (c) devices are active only during a given portion of the operational cycle. For example, the IRM is inactive during full-power operation and active during startup. Thus, the only test that is significant is the one performed just prior to shutdown and startup. The condenser Low Vacuum trip can only be tested during shutdown, and although it is connected into the reactor protection system, it is not required to protect the reactor. Testing at each REFUELING OUTAGE is adequate. The switches for the high temperature main steamline tunnel are not accessible during normal operation because of their location above the main steam lines. Therefore, after initial calibration and in-place OPERABILITY checks, they will not be tested between refueling shutdowns. Considering the physical arrangement of the piping which would allow a steam leak at any of the four sensing locations to affect the other locations, it is considered that the function is not jeopardized by limiting calibration and testing to refueling outages.

The logic of the instrument safety systems in Table 4.1.1 is such that testing the instrument channels also trips the trip system, verifying that it is OPERABLE. However, certain systems require coincident instrument channel trips to completely test their trip systems. Therefore, Table 4.1.2 specifies the minimum trip system test frequency for these tripped systems. This assures that all trip systems for protective instrumentation are adequately tested, from sensors through the trip system.

IRM calibration is to be performed during reactor startup. The calibration of the IRMs during startup will be significant since the IRMs will be relied on for neutron monitoring and reactor protection up to 38.4% of rated power during a reactor startup.

General Electric Licensing Topical Report NEDC-30851P-A (Reference 1), Section 5.7 indicates that the major contributor to reactor protection system unavailability is common cause failure of the automatic scram contactors. Analysis showed a weekly test interval to be optimum for scram contactors. The test of the automatic scram contactors can be performed as part of the Channel Calibration or Test of Scram Functions or by use of the subchannel test switches.

References: (1) NEDC-30851P-A, "Technical Specification Improvement Analyses for BWR Reactor Protection System."

(2) NEDC-30936P-A, "BWR Owners' Group Technical Specification Improvement Methodology (With Demonstration for BWR ECCS Actuation Instrumentation)," Parts 1 and 2.

(3) NEDC-30851P-A, Supplement 1, "Technical Specification Improvement Analysis for BWR Control Rod Block Instrumentation."

(4) NEDC-30851P-A, Supplement 2, "Technical Specification Improvement Analysis for BWR Isolation Instrumentation Common to RPS and ECCS Instrumentation."

(5) NEDC-31677P-A, "Technical Specification Improvement Analysis for BWR Isolation Actuation Instrumentation."

TABLE 4.1.1

MINIMUM CHECK, CALIBRATION AND TEST FREQUENCY FOR PROTECTIVE INSTRUMENTATION

Instrument Channel	Check	Calibrate	Test	Remarks (Applies to Test and Calibration)
1. High Reactor Pressure	1/d	Note 3	1/3 mo	
2. High Drywell Pressure (Scram)	N/A	1/3 mo	1/3 mo	By application of test pressure
3. Low Reactor Water Level	1/d	Note 3	1/3 mo	
4. Low-Low Water Level	1/d	Note 3	1/3 mo	
5. High Water Level in Scram Discharge Volume				
a. Digital	N/A	1/3 mo	1/3 mo	By varying level in sensor columns
b. Analog	N/A	Note 3	1/3 mo	
6. Low-Low-Low Water Level	N/A	1/3 mo	1/3 mo	By application of test pressure
7. High Flow in Main Steamline	1/d	1/3 mo	1/3 mo	By application of test pressure
8. Low Pressure in Main Steamline	N/A	1/3 mo	1/3 mo	By application of test pressure
9. High Drywell Pressure (Core Cooling)	1/d	1/3 mo	1/3 mo	By application of test pressure
10. Main Steam Isolation Valve (Scram)	N/A	N/A	1/3 mo	By exercising valve
11. APRM Level	N/A	1/3d	N/A	Output adjustment using operational type heat balance during POWER OPERATION
APRM Scram Trips	Note 2	1/3 mo	1/3 mo	Using built-in calibration equipment during POWER OPERATION
12. APRM Rod Blocks	Note 2	1/3 mo	1/3 mo	Upscale and downscale

TABLE 4.1.1 (cont'd)

Instrument Channel	Check	Calibrate	Test	Remarks (Applies to Test and Calibration)
13. a. High Radiation in Main Steamline	1/s	1/3 mo	1/3 mo	Using built-in calibration equipment during POWER OPERATION
b. Sensors for 13(a)	N/A	Each refueling outage	N/A	Using external radiation source
14. High Radiation in Reactor Building				
Operating Floor	1/s	1/3 mo	1/3 mo	Using gamma source for
Ventilation Exhaust	1/s	1/3 mo	1/3 mo	calibration
15. High Radiation on Air Ejector Off-Gas		1/3 mo	1/3 mo	Using built-in calibration equipment
	1/s			Channel Check
	1/mo			Source check
		1/24 mo		Calibration according to established station calibration procedures
			1/24 mo	Note a
16. IRM Level	N/A	Each startup	N/A	
IRM Scram	*	*	*	Using built-in calibration equipment
17. IRM Blocks	N/A	Prior to startup and shutdown	Prior to startup and shutdown	Upscale and downscale
18. Condenser Low Vacuum	N/A	1/20 mo	1/20 mo	
19. Manual Scram Buttons	N/A	N/A	1/3 mo	
20. High Temperature Main Steamline Tunnel	N/A	1/20 mo	Each refueling outage	Using heat source box

TABLE 4.1.1 (cont'd)

Instrument Channel	Check	Calibrate	Test	Remarks (Applies to Test and Calibration)
21. SRM	*	*	*	Using built-in calibration equipment
22. Isolation Condenser High Flow ΔP (Steam and Water)	N/A	1/3 mo	1/3 mo	By application of test pressure
23. Turbine Trip Scram	N/A	N/A	1/3 mo	
24. Generator Load Rejection Scram	N/A	1/3 mo	1/3 mo	
25. Recirculation Loop Flow	N/A	1/20 mo	N/A	By application of test pressure
26. Low Reactor Pressure Core Spray Valve Permissive	N/A	1/3 mo	1/3 mo	By application of test pressure
27. Scram Discharge Volume (Rod Block)				
a) Water level high	N/A	Each refueling outage	1/3 mo	Calibrate by varying level in sensor column
b) Scram Trip bypass	N/A	N/A	Each refueling outage	
28. Loss of Power				
a) 4.16 KV Emergency Bus Undervoltage (Loss of voltage)	1/d	1/24 mo	1/mo	
b) 4.16 KV Emergency Bus Undervoltage (Degraded Voltage)	1/d	1/24 mo	1/mo	

TABLE 4.1.1 (cont'd)

Instrument Channel	Check	Calibrate	Test	Remarks (Applies to Test and Calibration)
29. Drywell High Radiation	N/A	Each refueling outage	Each refueling outage	
30. Automatic Scram Contactors	N/A	N/A	1/wk	Note 1

* Calibrate prior to startup and normal shutdown and thereafter check 1/s and test 1/wk until no longer required.

Legend: N/A = Not Applicable; 1/s = Once per shift; 1/d = Once per day; 1/3d = Once per 3 days; 1/wk = Once per week; 1/mo = Once per month; 1/3 mo = Once every 3 months; 1/20 mo = Once every 20 months; 1/24 mo = Once every 24 months

NOTE 1: Each automatic scram contactor is required to be tested at least once per week. When not tested by other means, the weekly test can be performed by using the subchannel test switches.

NOTE 2: At least daily during reactor POWER OPERATION, the reactor neutron flux peaking factor shall be estimated and flow-referenced APRM scram and rod block settings shall be adjusted, if necessary, as specified in Section 2.3 Specifications A.1 and A.2.

NOTE 3: Calibrate electronic bistable trips by injection of an external test current once per 3 months. Calibrate transmitters by application of test pressure once per 12 months.

The following notes are only for Item 15 of Table 4.1.1:

A channel may be taken out of service for the purpose of a check, calibration, test or maintenance without declaring the channel to be inoperable.

a. The Channel Test shall also demonstrate that control room alarm annunciation occurs if any of the following conditions exists:

1) Instrument indicates measured levels above the alarm setpoint.
2) Instrument indicates a downscale failure.
3) Instrument controls not set in operate mode.
4) Instrument electrical power loss.

TABLE 4.1.2

MINIMUM TEST FREQUENCIES FOR TRIP SYSTEMS

Trip System	Minimum Test Frequency
1) Dual Channel (Scram)	Same as for respective instrumentation in Table 4.1.1
2) Rod Block	Same as for respective instrumentation in Table 4.1.1
3) DELETED	DELETED
4) Automatic Depressurization each trip system, one at a time	Each refueling outage
5) MSIV Closure, each closure logic circuit independently (1 valve at a time)	Each refueling outage
6) Core Spray, each trip system, one at a time	1/3 mo and each refueling outage
7) Primary Containment Isolation, each closure circuit independently (1 valve at a time)	Each refueling outage
8) Refueling Interlocks	Prior to each refueling operation
9) Isolation Condenser Actuation and Isolation, each trip circuit independently (1 valve at a time)	Each refueling outage
10) Reactor Building Isolation and SGTS Initiation	Same as for respective instrumentation in Table 4.1.1
11) Condenser Vacuum Pump Isolation	Prior to each startup
12) Air Ejector Offgas Line Isolation	Each refueling outage
13) Containment Vent and Purge Isolation	1/20 mo

FIGURE 4.1.1

DELETED