ENCLOSURE 3-1

R-81 License - Technical Specifications

PRESENT TECHNICAL SPECIFICATION

Section 3.3.4 - Measuring Channels

The minimum number and type of measuring channels operable and providing information to the control room operator required for reactor operation are give in Table 3.1.

Table 3.1 Minimum number and operating mode of measuring channels

Channel	Minimum No. Operable	Operating Mode Required
Power Level (normal)	2	All
Power Level (intermediate)	1	All
Period Channel	1	All
Count Rate	1*	Startup
Coolant Flow	1	Forced Cooling
Core Delta T	1	Forced Cooling
Rod Position	1/rod	All
Pool Temperature	1	All
Pool Level	1	All

*Operable below 50 W

Basis: The normal power level instruments (level safeties) provide redundant information on reactor power in the range 25% - 150% of the normal operating power level of 5 MW.

The intermediate power instrument (Log N) provides usable reactor power information in the logarithmic range 10^{-4}% to 300% of the normal power of 5MW.

PROPOSED CHANGE

The intermediate power instrument (Log N) provides usable reactor power information with a minimum logarithmic range of 10^{-4}% to 200% of the normal power of 5MW. (1)

MDJ/10E

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Section 5.2.2 Power Level (Intermediate) Channel

PRESENT TECHNICAL SPECIFICATION

For this function, a single channel is provided, covering reliably the range 10^{-3}% to 300% (of 5 MW) with a logarithmic output indication on both a panel meter and a chart recorder. To cover the range under all core conditions, a gamma-compensated boron-ion chamber is used to supply a logarithmic amplifier. The chamber can be changed in position, over a limited range, so as to allow the channel reading to be standardized against reactor thermal power. Rate of change of power information is also derived, in the form of a period, that can produce a fast scram (and backup slow scram) in the same way as in Section 5.2.1. Control and inhibit actions (viz., bypassing of count rate channel functions, bypassing of flow and flapper scrams) are also derived from this channel.

To negate the effect of over compensation in the ion chamber, which can occur under certain conditions, even in an initially under compensated chamber, provision is made to supply an adjustable small current to the channel amplifier (up to 1.5×10^{-10} amps) so as to facilitate startup.

PROPOSED CHANGE

(2)

For this function, a single channel is provided, covering reliably the range 10^{-3}% to 200% (of 5MW) with a logarithmic output indication on both a panel meter and a chart recorder. To cover the range under all core conditions, a gamma-compensated boron-ion chamber is used to supply a logarithmic amplifier. The chamber can be changed in position, over a limited range, so as to allow the channel reading to be standardized against reactor thermal power. Rate of change of power information is also derived, in the form of a period, that can produce a fast scram (and backup slow scram) in the same way as in Section 5.2.1. Control and inhibit actions (viz., bypassing of count rate channel functions, bypassing of flow and flapper scrams) are also derived from this channel.

To negate the effect of over compensation in the ion chamber, which can occur under certain conditions, even in an initially under compensated chamber, provision may be made to supply an adjustable small current to the channel amplifier (up to 1.5×10^{-10} amps) so as to facilitate startup.

(3)

MDJ/10E

Basis: The power level scram provides redundant automatic protective action to prevent exceeding the safety limit on reactor power.

The period scram, assisted by the intermediate level period reverse and rod inhibit, limits the rate of increase in reactor power to values that are controllable without reaching excessive power levels or temperature. These functions are not limiting safety system settings.

The two inhibits on the count rate channel prevent inadvertent criticality during cold startup that could arise from lack of neutron information or from too rapid reactivity insertion by control rods.

The scram pool on level provides an adequate head of water above the core and guards against loss of coolant and loss of building containment.

The coolant flow and flapper valve scrams ensure adequate coolant flow to prevent boiling in the core.

The scrams on bridge lock and guide tubes prevent unplanned reactivity changes that could occur through core and control element movements, respectively.

The keyswitch scram prevents unauthorized operation of the reactor.

Bypass is permitted on those parameters that can be monitored by alternate means if the initiating circuit malfunctions.

3.4 Radiation Monitoring Systems

Applicability: This specification applies to the radiation monitoring systems required for safe operation of the reactor, operating personnel protection, and protection of the public.

Objective: The objective is to ensure that operation of the reactor is within the goal of ALARA and to detect the release of fission products within Union Carbide Subsidiary (UCS) set limits.

Specifications: The specifications for the minimum acceptable monitoring instrumentation required for reactor operation are given in Table 3.3.

Basis: These setpoints produce less personnel exposure than indicated in 10 CFR Part 20, and permit early identification of fuel cladding or process system failure.

3.5 Engineered Safety Features

Applicability: These specifications apply to required equipment for the confinement of activity through controlled release of reactor building air to the atmosphere.

Objective: The objective is to ensure personnel are notified about high radiation incidents and to initiate engineered safeguards systems for safe shutdown of the reactor and mitigation of release of radioactivity to the environment.

Table 3.3 Radiation monitoring systems

Type	No. operable	Max. alarm setpoint	Function
Excursion monitor	1	5 R/hr	Detect high radiation: Alarm and isolate at >5 R/hr
Exhaust duct monitor ("stack monitor")	1	*	Detect particulate, gas, and iodine activities; alarm in control room
Building continuous air monitor (CAM)	1	**	Detect particulate activity in reactor building; alarm in control room
Fixed area monitor	3	50 mr/hr	Detect radiation (γ) in key locations; alarm in control room
Evacuation switch	1	--	Alarm and initiate evacuation sequence (manual)

Note: For maintenance or repair, required radiation monitors (except for excursion monitor) may be replaced by portable or substitute instruments for periods up to 24 hours provided the function will still be accomplished. Interruption for brief periods to permit checking or calibration is permissible.

*The alarm setpoint for the stack gas monitor shall not be set above a value that would result in an exposure greater than 2 mrem per hour assuming a dilution factor of 2000 and the isotope mixture determined by the annual environmental report or most recent analysis. The alarm setpoint for the stack I-131 and stack particulate monitor shall not be set above a value corresponding to that listed in Appendix B, Table II, Column I of 10 CFR Part 20, assuming a dilution factor of 2000 and averaging over one week.

**25% of the maximum permissible concentration at restricted areas according to Appendix B of 10 CFR Part 20.

Specifications: The specifications are as follows:

3.5.1 Excursion Monitor

Specification: See Section ~~3.4~~ 3.4

Basis: This monitor senses excessive radiation at the reactor bridge and automatically initiates the "evacuation sequence," which consists of a distinctive alarm, closure of damper valves in the building ventilation system and hold-up tank vent, and starting of the emergency exhaust fan (see Section 5.5.2).