2.4.19 Incore Instrumentation System

1.0 Description

The incore instrumentation system (ICIS) provides information about the conditions inside the reactor core.

The ICIS has the following safety related functions:

- Provides self powered neutron detector (SPND) output signals to signal conditioning and distribution system (SCDS).
- Provides a measurement of core outlet temperatures.

2.0 Arrangement

2.1 The ICIS equipment is located as listed in Table 2.4.19-1—Incore Instrumentation System Equipment.

3.0 Mechanical Design Features

3.1 Equipment identified as Seismic Category I in Table 2.4.19-1 can withstand seismic design basis loads without loss of safety function.

4.0 I&C Design Features, Displays and Controls

4.1 The ICIS equipment classified as Class 1E in Table 2.4.19-1 can perform its safety function when subjected to electromagnetic interference (EMI), radio-frequency interference (RFI), electrostatic discharges (ESD), and power surges.

4.2 The ICIS provides output signals listed in Table 2.4.19-2.

5.0 Environmental Qualifications

5.1 Components listed as Class 1E in Table 2.4.19-1 that are designated as harsh environment, will perform their function in the environments that exist during and following design basis events.

6.0 System Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.19-3 lists the ICIS ITAAC.

Table 2.4.19-1—Incore Instrumentation Equipment
(4 Sheets)

Description	Tag Number (1)	Location	Seismic Class	IEEE Class 1E	Harsh Environment
SPND Division 1	30JKS41CX811 30JKS41CX812 30JKS41CX813 30JKS41CX814 30JKS41CX815 30JKS41CX816 30JKS16CX811 30JKS16CX812 30JKS16CX813 30JKS16CX814 30JKS16CX815 30JKS16CX816 30JKS21CX811 30JKS21CX812 30JKS21CX813 30JKS21CX814 30JKS21CX815 30JKS21CX816	Reactor Building	I	Yes	Yes
SPND Division 2	30JKS11CX821 30JKS11CX822 30JKS11CX823 30JKS11CX824 30JKS11CX825 30JKS11CX826 30JKS13CX821 30JKS13CX822 30JKS13CX823 30JKS13CX824 30JKS13CX825 30JKS13CX826 30JKS15CX821 30JKS15CX822 30JKS15CX823 30JKS15CX824 30JKS15CX825 30JKS15CX826	Reactor Building	I	Yes	Yes

Table 2.4.19-1—Incore Instrumentation Equipment
(4 Sheets)

Description	Tag Number (1)	Location	Seismic Class	IEEE Class 1E	Harsh Environment
SPND Division 3	30JKS42CX831 30JKS42CX832 30JKS42CX833 30JKS42CX834 30JKS42CX835 30JKS42CX836 30JKS31CX831 30JKS31CX832 30JKS31CX833 30JKS31CX834 30JKS31CX835 30JKS31CX836 30JKS22CX831 30JKS22CX832 30JKS22CX833 30JKS22CX834 30JKS22CX835 30JKS22CX836	Reactor Building	I	Yes	Yes
SPND Division 4	30JKS14CX841 30JKS14CX842 30JKS14CX843 30JKS14CX844 30JKS14CX845 30JKS14CX846 30JKS32CX841 30JKS32CX842 30JKS32CX843 30JKS32CX844 30JKS32CX845 30JKS32CX846 30JKS12CX841 30JKS12CX842 30JKS12CX843 30JKS12CX844 30JKS12CX845 30JKS12CX846	Reactor Building	I	Yes	Yes

Table 2.4.19-1—Incore Instrumentation Equipment
(4 Sheets)

Description	Tag Number (1)	Location	Seismic Class	IEEE Class 1E	Harsh Environment
Core Outlet Thermocouples (NR) Division 1	30JKS16CT812 30JKS21CT812 30JKS41CT812 30JKS16CT813 30JKS21CT813 30JKS41CT813	Reactor Building	I	Yes	Yes
Core Outlet Thermocouples (NR) Division 2	30JKS11CT822 30JKS13CT822 30JKS15CT822 30JKS11CT823 30JKS13CT823 30JKS15CT823	Reactor Building	I	Yes	Yes
Core Outlet Thermocouples (NR) Division 3	30JKS22CT832 30JKS31CT832 30JKS42CT832 30JKS22CT833 30JKS31CT833 30JKS42CT833	Reactor Building	I	Yes	Yes
Core Outlet Thermocouples (NR) Division 4	30JKS12CT842 30JKS14CT842 30JKS32CT842 30JKS12CT843 30JKS14CT843 30JKS32CT843	Reactor Building	I	Yes	Yes
Core Outlet Thermocouples (WR) Division 1	30JKS16CT811 30JKS21CT811 30JKS41CT811	Reactor Building	I	Yes	Yes
Core Outlet Thermocouples (WR) Division 2	30JKS11CT821 30JKS13CT821 30JKS15CT821	Reactor Building	I	Yes	Yes
Core Outlet Thermocouples (WR) Division 3	30JKS22CT831 30JKS31CT831 30JKS42CT831	Reactor Building	I	Yes	Yes

Table 2.4.19-1—Incore Instrumentation Equipment
(4 Sheets)

Description	Tag Number (1)	Location	Seismic Class	IEEE Class 1E	Harsh Environment
Core Outlet Thermocouples (WR) Division 4	30JKS12CT841 30JKS14CT841 30JKS32CT841	Reactor Building	I	Yes	Yes
Incore Instrumentation Cabinets – Division 1	30CLE12GH001 30CLE15GH	Safeguard Building 1	I	1^N 2^A	No
Incore Instrumentation Cabinets – Division 2	30CLF12GH002 30CLF15GH	Safeguard Building 2	I	2^N 1^A	No
Incore Instrumentation Cabinets – Division 3	30CLG12GH003 30CLG15GH	Safeguard Building 3	I	3^N 4^A	No
Incore Instrumentation Cabinets – Division 4	30CLH12GH004 30CLH15GH	Safeguard Building 4	I	4^N 3^A	No

1) Equipment tag numbers are provided for information and are not part of the design certification.

2) ^{N} denotes the division the component is normally powered from. ^{A} denotes the division the component is powered from when alternate feed is implemented.

Table 2.4.19-2—Incore Instrumentation System Output Signals

Item #	Output Signal	Recipient	# Divisions
1	Neutron Flux Measurements	SCDS	4

Table 2.4.19-3—Incore Instrumentation System ITAAC
(2 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
2.1	The ICIS equipment is located as listed in Table 2.4.19-1.	Inspections will be performed of the location of the ICIS equipment.	The equipment listed in Table 2.4.19-1 is located as listed in Table 2.4.19-1.
3.1	Equipment identified as Seismic Category I in Table 2.4.19-1 can withstand seismic design basis loads without loss of safety function.	a. Type tests, analyses or a combination of type tests and analyses will be performed on the equipment listed as Seismic Category I in Table 2.4.19-1 using analytical assumptions, or under conditions, which bound the Seismic Category I design requirements. b. Inspections will be performed of the Seismic Category I equipment listed in Table 2.4.19-1 to verify that the equipment including anchorage is installed as specified on the construction drawings.	a. Tests/analysis reports exist and conclude that the equipment listed as Seismic Category I in Table 2.4.19-1 can withstand seismic design basis loads without loss of safety function. b. Inspection reports exist and conclude that the Seismic Category I equipment listed in Table 2.4.19-1 including anchorage is installed as specified on the construction drawings.
4.1	The ICIS equipment classified as Class 1E in Table 2.4.19-1 can perform its safety function when subjected to EMI, RFI, ESD, and power surges.	Type tests, tests, analyses or a combination of these will be performed for the Class 1E equipment listed in Table 2.4.19-1.	A report exists and concludes that the equipment listed as Class 1E in Table 2.4.19-1 can perform its safety function when subjected to EMI, RFI, ESD, and power surges.
4.2	The ICIS provides output signals listed in Table 2.4.19-2.	Tests will be performed to verify the existence of output signals.	The ICIS provides output signals to the recipients listed in Table 2.4.19-2.

Table 2.4.19-3—Incore Instrumentation System ITAAC
(2 Sheets)

Commitment Wording		Inspections, Tests, Analyses	Acceptance Criteria
5.1	Components listed as Class 1E in Table 2.4.19-1 that are designated as harsh environment, will perform their function in the environments that exist during and following design basis events.	a. Type tests or type tests and analysis will be performed to demonstrate the ability of the components listed as Class 1E in Table 2.4.19-1 to perform their function for the environmental conditions that could occur during and following design basis events.	a. Environmental Qualification Data Packages (EQDP) exist and conclude that the components listed as Class 1E in Table 2.4.19-1 can perform their function during and following design basis events including the time required to perform the listed function.
		b. Components listed as Class 1E in Table 2.4.19-1 will be inspected to verify installation in accordance with the construction drawings including the associated wiring, cables and terminations. Deviations to the construction drawings will be reconciled to the EQDP.	b. Inspection reports exists and conclude that the components listed as Class 1E in Table 2.4.19-1 has been installed per the construction drawings and any deviations have been reconciled to the EQDP.

Next File