

2.4.22 Radiation Monitoring System

1.0 Description

The radiation monitoring system provides surveillance of ionizing radiation comprising all provisions dealing with the occurrence of ionizing radiation within the plant and measures related to the health control of personnel who could be exposed to radiation.

The radiation monitoring system provides the following safety-related function:

- Provides surveillance of ionizing radiation and provides a signal that initiates Reactor Building air filtration isolation.

The radiation monitoring system provides the following non-safety-related function:

- Provides signals for the display of non-safety related radiological conditions.

2.0 Arrangement

2.1 The location of the radiation monitoring system equipment is as listed in Table 2.4.22-1—Radiation Monitoring System Equipment Mechanical Design.

3.0 Mechanical Design Features

3.1 Equipment identified as Seismic Category I in Table 2.4.22-1 can withstand seismic design basis loads without loss of safety function.

4.0 Displays and Controls

4.1 Each monitor listed in Table 2.4.22-1 initiates a MCR alarm when radiation level exceeds a preset limit.

4.2 Each channel for monitors listed in Table 2.4.22-1 provides an indication of radiation level.

5.0 Electrical Power Design Features

5.1 The components identified as Class 1E in Table 2.4.22-2 are powered from the Class 1E division as listed in Table 2.4.22-2 in a normal or alternate feed condition.

6.0 Environmental Qualifications

6.1 Electrical drivers for the equipment listed in Table 2.4.22-2 for harsh environment can perform the safety function in Table 2.4.22-1 following exposure to the design basis environments for the time required.

7.0 Equipment and System Performance

7.1 Containment High Range Dose Rate Monitors listed in Table 2.4.22-1 initiate Reactor Building air filtration isolation upon receipt of high radioactivity levels.

8.0

Inspections, Tests, Analyses, and Acceptance Criteria

Table 2.4.22-3 lists the radiation monitoring system ITAAC.

**Table 2.4.22-1—Radiation Monitoring System Equipment
Mechanical Design**

| Equipment Description | Equipment Tag Number ⁽¹⁾ | Equipment Location | Function | Seismic Category |
|--|--|---------------------------|--|-------------------------|
| Containment High Range Dose Rate Monitor | JYK15CR101 | Reactor Building | Monitor Post Accident Radioactivity Levels | I |
| Containment High Range Dose Rate Monitor | JYK15CR102 | Reactor Building | Monitor Post Accident Radioactivity Levels | I |
| Containment High Range Dose Rate Monitor | JYK15CR103 | Reactor Building | Monitor Post Accident Radioactivity Levels | I |
| Containment High Range Dose Rate Monitor | JYK28CR101 | Reactor Building | Monitor Post Accident Radioactivity Levels | I |

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

Table 2.4.22-2—Radiation Monitoring System Equipment I&C and Electrical Design

| Equipment Description | Equipment Tag Number ⁽¹⁾ | Equipment Location | IEEE Class 1E Source ⁽²⁾ | EQ – Harsh Env. | MCR/RSS Displays |
|--|--|---------------------------|--|------------------------|-------------------------------------|
| Containment High Range Dose Rate Monitor | JYK15CR101 | Reactor Building | 1 ^N 2 ^A | Yes | Radiation Alarm/ Radiation Alarm |
| Containment High Range Dose Rate Monitor | JYK15CR102 | Reactor Building | 2 ^N 1 ^A | Yes | Radiation Alarm/ Radiation Alarm |
| Containment High Range Dose Rate Monitor | JYK15CR103 | Reactor Building | 3 ^N 4 ^A | Yes | Radiation Alarm/ Radiation Alarm |
| Containment High Range Dose Rate Monitor | JYK28CR101 | Reactor Building | 4 ^N 3 ^A | Yes | Radiation Alarm/ Radiation Alarm |

- 1) Equipment tag numbers are provided for information only and are not part of the certified design.
- 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 2.4.22-3—Radiation Monitoring System ITAAC
(2 Sheets)**

| Commitment Wording | | Inspections, Tests, Analyses | Acceptance Criteria |
|---------------------------|--|---|---|
| 2.1 | The location of the radiation monitoring system equipment is as listed in Table 2.4.22-1. | An inspection will be performed of the location of the equipment listed in Table 2.4.22-1. | The equipment listed in Table 2.4.22-1 is located as listed in Table 2.4.22-1. |
| 3.1 | Equipment identified as Seismic Category I in Table 2.4.22-1 can withstand seismic design basis loads without loss of safety function. | <p>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 2.4.22-1 using analytical assumptions, or under conditions, which bound the Seismic Category I design requirements.</p> <p>b. Inspections will be performed of the as-installed Seismic Category I equipment listed in Table 2.4.22-1 to verify that the equipment including anchorage is installed as specified on the construction drawings.</p> | <p>a. Tests/analysis reports exist and conclude that the equipment listed as Seismic Category I in Table 2.4.22-1 can withstand seismic design basis loads without loss of safety function.</p> <p>b. Inspection reports exist and conclude that the as-installed Seismic Category I equipment listed in Table 2.4.22-1 including anchorage is installed as specified on the construction drawings.</p> |
| 4.1 | Each monitor listed in Table 2.4.22-1 initiates a MCR alarm when radiation level exceeds a preset limit. | A test will be performed to verify that the MCR alarm is initiated when radiation level exceeds a preset limit. | The monitors listed in Table 2.4.22-1 initiate MCR alarm when a radiation level exceeds a preset limit. |
| 4.2 | Each channel for monitors listed in Table 2.4.22-1 provides an indication of radiation level. | A test will be performed to verify that each channel responds to radiation. | The monitors listed in Table 2.4.22-1 indicate radiation levels for each channel. |

**Table 2.4.22-3—Radiation Monitoring System ITAAC
(2 Sheets)**

| Commitment Wording | | Inspections, Tests, Analyses | Acceptance Criteria |
|--------------------|--|---|--|
| 5.1 | The components identified as Class 1E in Table 2.4.22-2 are powered from the Class 1E division as listed in Table 2.4.22-2 in a normal or alternate feed condition. | <ul style="list-style-type: none"> a. Testing will be performed for components identified as Class 1E in Table 2.4.22-2 by providing a test signal in each normally aligned division. b. Testing will be performed for components identified as Class 1E in Table 2.4.22-2 by providing a test signal in each division with the alternate feed aligned to the divisional pair. | <ul style="list-style-type: none"> a. The test signal provided in the normally aligned division is present at the respective Class 1E components identified in Table 2.4.22-2. b. The test signal provided in each division with the alternate feed aligned to the divisional pair is present at the respective Class 1E components identified in Table 2.4.22-2. |
| 6.1 | Electrical drivers for equipment listed in Table 2.4.22-2 for harsh environment can perform the safety function in Table 2.4.22-1 following exposure to the design basis environments for the time required. | <ul style="list-style-type: none"> a. Type tests, tests, analyses or a combination of tests and analyses will be performed to demonstrate the ability of the equipment listed for harsh environment in Table 2.4.22-2 to perform the function listed in Table 2.4.22-1 for the environmental conditions that could occur before and during a design basis accident. b. For equipment listed for harsh environment in Table 2.4.22-2, an inspection will be performed of the as-installed Class 1E equipment and the associated wiring, cables and terminations. | <ul style="list-style-type: none"> a. The Class 1E equipment listed for harsh environment in Table 2.4.22-2 can perform the function listed in Table 2.4.22-1 before and during design basis accidents for the time required to perform the listed function. b. Inspection concludes that the as-installed Class 1E equipment and associated wiring, cables, and terminations as listed in Table 2.4.22-2 for harsh environment conform with the design. |
| 7.1 | Containment High Range Dose Rate Monitors listed in Table 2.4.22-1 initiates Reactor Building air filtration isolation upon receipt of high radioactivity levels. | A test will be performed to verify that the Reactor Building air filtration is isolated upon radiation levels exceeding a preset limit. | Containment High Range Dose Rate Monitors listed in Table 2.4.22-1 initiate Reactor Building air filtration isolation when radiation level exceeds a preset limit. |