

### 3.0 LIMITING CONDITIONS FOR OPERATION (Continued)

#### 3.7 Radiation Monitoring Systems and Effluents

##### 3.7.1 Applicability

These specifications apply to the radiation monitoring systems and to the limits on effluent releases.

##### 3.7.2 Objective

To specify the minimum number of acceptable components or the lowest acceptable level of performance for the radiation monitoring systems and the limits for release of effluents.

##### 3.7.3 Specifications

The reactor shall not be made critical unless the following conditions exist:

- A. The radiation monitoring channels and components shall be operable in accordance with Table 3-3, including the minimum number of channels or components, and their setpoints.
- B. The cumulative energy production of the reactor shall not exceed 4760 kilowatt-hours in any twelve-month interval nor exceed 100 kilowatt-hours in any 7-day interval to limit the generation and release of argon-41.
- C. If evidence exists that the limit in 3.3.3 G will be exceeded, the reactor shall be shut down and the leakage source found and eliminated; however, the reactor may be operated intermittently to assist in determining the source of leakage.

##### 3.7.4 Bases

Specification A provides assurance that the required radiation monitors are operable.

- The air-particulate monitor is placed in service and operated continuously whenever designated experiments are being performed, viz., those which could produce airborne radioactivity. The alarm setpoint is influenced by the normal background reading while the reactor operates at the required power level and is based on the same reasoning as given for the deionizer monitor setpoint.
- (Paragraph deleted.)

- The radiation area monitors are placed on the walls adjacent to the fuel storage pit. (Sentence deleted.) The south and west units initiate an evacuation alarm at or above (phrase deleted) the radiation-evacuation setpoint of 5 mR/h. The 5 mR/h limit is based on the minimum value permitted for monitoring SNM in storage and applies when the area is unattended (phrase deleted).
- The doorway radiation monitor serves as a frisker to detect abnormal levels of radiation when a person passes the detector. The increasing aural signal alerts the reactor operator and the affected individual that further assessment must be initiated.
- The radiation film badge (or its equivalent) provides radiation dose information at the perimeter wall of the reactor room and serves as a control for the film badges used by personnel in the restricted area.

Specification B provides a conservative limit on the generation and release of argon-41 and is based on measurements at this facility (SAR: 4.5.4). Argon-41 is the only significant radioactive effluent produced during normal operation of the reactor, and the limits provided meet the requirements of paragraphs 20.103 and 20.106 of 10 CFR Part 20. The first part of specification B is based on the assumption that the reactor operates continuously at 10 kW for 476 hours and that the dilution from diffusion of the air in the enclosure is only 10; for these conditions, the argon-41 concentration averaged over one year is about 50% of the value listed for unrestricted areas in Table II, Appendix B of 10 CFR Part 20. The second part of specification B uses the assumption that the reactor operates continuously at 10 kW for 10 hours for one 40-hour week; these conditions yield an average concentration in the enclosure of 50% of the value listed for the restricted areas in Table I, Appendix B of 10 CFR Part 20.

Specification C allows a search for the leaking fuel assembly to be conducted by using the reactor to the extent needed to detect the source of fission products.

Table 3-3. Required Radiation Monitoring Channels or Components.

Channel	Setpoint	Min. Operable	Function
Air-Particulate unit (a)	As required	1	Alarm
------(Table Entry Deleted)-----			
Area units	5 mR/h	2	Alarm
Doorway monitor	--	1	Warn of abnormal radiation level.
Environmental film	--	1	Integrated dose in restricted area.

(a) This unit is activated whenever designated experiments are being performed.

Technical Specification (Old)  
Section 3.7  
Amendment # 12

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##### 3.7.1 Applicability

These specifications apply to the radiation monitoring systems and to the limits on effluent releases.

##### 3.7.2 Objective

To specify the minimum number of acceptable components or the lowest acceptable level of performance for the radiation monitoring systems and the limits for release of effluents.

##### 3.7.3 Specifications

The reactor shall not be made critical unless the following conditions exist:

- A. The radiation monitoring channels and components shall be operable in accordance with Table 3-3, including the minimum number of channels or components, and their setpoints.
- B. The cumulative energy production of the reactor shall not exceed 4760 kilowatt-hours in any twelve-month interval nor exceed 100 kilowatt-hours in any 7-day interval to limit the generation and release of argon-41.
- C. If evidence exists that the limit in 3.3.3 G will be exceeded, the reactor shall be shut down and the leakage source found and eliminated; however, the reactor may be operated intermittently to assist in determining the source of leakage.

##### 3.7.4 Bases

Specification A provides assurance that the required radiation monitors are operable.

- The air-particulate monitor is placed in service and operated continuously whenever designated experiments are being performed, viz., those which could produce airborne radioactivity. The alarm setpoint is influenced by the normal background reading while the reactor operates at the required power level and is based on the same reasoning as given for the deionizer monitor setpoint.
- The radiation detector located near the deionizer initiates an alarm when the exposure rate exceeds five times the nominal value observed during normal full power operation. The trip value is sufficient for significant radiation events, yet not too sensitive to produce frequent false alarms. (See also 3.3.3. F.) This monitor would be the first to sense a release of fission products into the coolant.

- The radiation area monitors are placed around the perimeter of the reactor room. All four units are able to initiate an alarm signal at or above 5 mR/h whenever the reactor console is energized. The south and west units initiate an evacuation alarm at or above 50 mR/h when the reactor is in operation; when the console is not energized, the radiation-evacuation setpoint is 5 mR/h. The 5 mR/h limit is based on the minimum value permitted for monitoring SNM in storage and applies when the area is unattended, while the 50 mR/h limit is based on the radiation level associated with the emergency action level associated with the alert classification.
- The doorway radiation monitor serves as a frisker to detect abnormal levels of radiation when a person passes the detector. The increasing aural signal alerts the reactor operator and the affected individual that further assessment must be initiated.
- The radiation film badge (or its equivalent) provides radiation dose information at the perimeter wall of the reactor room and serves as a control for the film badges used by personnel in the restricted area.

Specification B provides a conservative limit on the generation and release of argon-41 and is based on measurements at this facility (SAR: 4.5.4). Argon-41 is the only significant radioactive effluent produced during normal operation of the reactor, and the limits provided meet the requirements of paragraphs 20.103 and 20.106 of 10 CFR Part 20. The first part of specification B is based on the assumption that the reactor operates continuously at 10 kW for 476 hours and that the dilution from diffusion of the air in the enclosure is only 10; for these conditions, the argon-41 concentration averaged over one year is about 50% of the value listed for unrestricted areas in Table II, Appendix B of 10 CFR Part 20. The second part of specification B uses the assumption that the reactor operates continuously at 10 kW for 10 hours for one 40-hour week; these conditions yield an average concentration in the enclosure of 50% of the value listed for the restricted areas in Table I, Appendix B of 10 CFR Part 20.

Specification C allows a search for the leaking fuel assembly to be conducted by using the reactor to the extent needed to detect the source of fission products.

Table 3-3. Required Radiation Monitoring Channels or Components.

Channel	Setpoint	Min. Operable	Function
Air-Particulate unit (a)	As required	1	Alarm
Deionizer unit (b)	As required to Satisfy 3.3.3 F	1	Alarm
Area units (c) (d)	5 (50) mR/h	4	Alarm
Doorway monitor	--	1	Warn of abnormal radiation level.
Environmental film	--	1	Integrated dose in restricted area.

- (a) This unit is activated whenever designated experiments are being performed.
- (b) This unit serves as the fission product monitor specified in 3.3.3 F.
- (c) When either the north or east area monitoring units are inoperable, portable instruments may be substituted for periods up to 48 hours.
- (d) The normal setpoint is shown. The parenthetical value is the maximum setpoint to be used depending on local conditions. Use of higher than normal setpoints requires approval of the Reactor Manager. The south and west units monitor the fuel storage area and are reset to the normal value after shutdown.