

TABLE 11.4-1  
UNIT 1 PROCESS RADIATION MONITORING SYSTEM

<u>Channel No.</u>	<u>Type of Detector</u>	<u>Channel Description</u>	<u>Minimum Detectable Level</u>	<u>Control Function/Interlocks</u>
1-R1B(1)	Beta Scintillation	Control Room Intake Duct	$10^{-6} \mu\text{Ci/cc } ^{133}\text{Xe}$	Isolates the Control Room Envelope from outside air and places the ventilation system in accident pressurized mode
1-R11A(1)	Scintillation	Containment or Vent Air	$10^{-9} \mu\text{Ci/cc } ^{137}\text{Cs}$ Particulate (moving filter)	Containment Ventilation Isolation (Mode 6)
1-R12A(1)	GM Tube	Containment or Vent Gas	$10^{-6} \mu\text{Ci/cc } ^{133}\text{Xe}$ Effluent	Containment Ventilation Isolation
1-R12B(1)	Scintillation	Containment or Vent Iodine	$10^{-11} \mu\text{Ci/cc } ^{131}\text{I}$ Effluent (fixed filter)	Containment Ventilation Isolation
1R13A	Scintillation	Nos. 11, 12, & 13 Cont Fan Coil Unit Cooling Water	$10^{-7} \mu\text{Ci/cc } ^{137}\text{Cs}$	—
1R13B	Scintillation	Nos. 13, 14 & 15 Cont Fan Coil Unit Cooling Water	$10^{-7} \mu\text{Ci/cc } ^{137}\text{Cs}$	—
1-R15	Scintillation (In-Line)	Condenser Air Ejector	$10^{-6} \mu\text{Ci/cc } ^{133}\text{Xe}$	—
1-R17A	Scintillation	Component Cooling-Liquid	$10^{-5} \mu\text{Ci/cc } ^{137}\text{Cs}$	Surge Tank Vent Valve Closure

TABLE 11.4-1 (Cont.)

<u>Channel No.</u>	<u>Type of Detector</u>	<u>Channel Description</u>	<u>Minimum Detectable Level</u>	<u>Control Function/Interlocks</u>
1-R17B	Scintillation	Component Cooling-Liquid	$10^{-5} \mu\text{Ci/cc } ^{137}\text{Cs}$	Surge Tank Vent Valve Closure
1-R18(1)	Scintillation	Liquid Waste Disposal Closure	$10^{-5} \mu\text{Ci/cc } ^{137}\text{Cs}$	Liquid Waste Discharge Valve
1-R19A	Scintillation	No. 11 Steam Generator Blowdown	$10^{-5} \mu\text{Ci/cc } ^{137}\text{Cs}$	High No.12 Blowdown Tank Inlet Valves High: SG Blowdown Isolation Valves
1-R19B	Scintillation	No. 12 Steam Generator Blowdown	$10^{-5} \mu\text{Ci/cc } ^{137}\text{Cs}$	High No.12 Blowdown Tank Inlet Valves High: SG Blowdown Isolation Valves
1-R19C	Scintillation	No. 13 Steam Generator Blowdown	$10^{-5} \mu\text{Ci/cc } ^{137}\text{Cs}$	High No.12 Blowdown Tank Inlet Valves High: SG Blowdown Isolation Valves
-R19D	Scintillation	No. 14 Steam Generator Blowdown	$10^{-5} \mu\text{Ci/cc } ^{137}\text{Cs}$	High No.12 Blowdown Tank Inlet Valves High: SG Blowdown Isolation Valves
1-R31A	Scintillation	Letdown Line (Cross)	$10^{-4} \mu\text{Ci/cc } ^{60}\text{Co}$	—

TABLE 11.4-1 (Cont.)

<u>Channel No.</u>	<u>Type of Detector</u>	<u>Channel Description</u>	<u>Minimum Detectable Level</u>	<u>Control Function/Interlocks</u>
1-R36	Gamma Scintillator	Evaporator and Feed Heater Condensate	$10^{-5} \mu\text{Ci/cc } ^{137}\text{Cs}$	Condensate Line Valve
1-R41A	Beta Scintillator	Plant Vent Noble Gas (Low)	$3 \times 10^{-7} \mu\text{Ci/cc } ^{133}\text{Xe} *$	
1-R41B	Beta-Gamma Scintillator	Plant Vent Noble Gas (Inter.)	$7 \times 10^{-4} \mu\text{Ci/cc } ^{133}\text{Xe}$	
1-R41C	Beta-Gamma Scintillator	Plant Vent Noble Gas (High)	$10^{-1} \mu\text{Ci/cc } ^{133}\text{Xe}$	
1-R41D	N/A	Plant Vent Noble Gas (composite)	N/A	Containment Ventilation Isolation Closes Waste Gas Discharge Valve

\* This MDL reflects the design range of the detector. The actual detection level may be higher than the MDL due to the masking effect of background radiation at the installed location.

TABLE 11.4-1 (Cont.)

<u>Channel No.</u>	<u>Type of Detector</u>	<u>Channel Description</u>	<u>Minimum Detectable Level</u>	<u>Control Function/Interlocks</u>
1-R46A	Ion Chamber	Main Steam Line No. 11	0.1 mr/hr to 10,000 mr/hr(4)	---
1-R46B	Ion Chamber	Main Steam Line No. 12	0.1 mr/hr to 10,000 mr/hr(4)	---
1-R46C	Ion Chamber	Main Steam Line No. 14	0.1 mr/hr to 10,000 mr/hr(4)	---
1-R46D	Ion Chamber	Main Steam Line No. 13	0.1 mr/hr to 10,000 mr/hr(4)	---
1-R53A	Nal(T1) Gamma Scint.	Main Steam Line No. 11	10 cpm (nominal) (5)	---
1-R53B	Nal(T1) Gamma Scint.	Main Steam Line No. 12	10 cpm (nominal) (5)	---
1-R53C	Nal(T1) Gamma Scint.	Main Steam Line No. 14	10 cpm (nominal) (5)	---
1-R53D	Nal(T1) Gamma Scint.	Main Steam Line No. 13	10 cpm (nominal) (5)	---

NOTES:

- (1) Also performs a safety function
- (2) Assumes 1-week collection time
- (3) The upper range corresponds to at least  $10^5$   $\mu\text{Ci/cc}$  (Xe-133)
- (4) The upper range corresponds to at least  $10^3$   $\mu\text{Ci/cc}$  (Xe-133)
- (5) > Background (electrical noise)

TABLE 11.4-2  
UNIT 2 PROCESS RADIATION MONITORING SYSTEM

<u>Channel No.</u>	<u>Type of Detector</u>	<u>Channel Description</u>	<u>Minimum Detectable Level</u>	<u>Control Function/Interlocks</u>
2-R1B	Beta Scintillator (2 channels)	Control Room Vent Intake Duct	$10^{-6}$ $\mu\text{Ci/cc}$ $^{133}\text{Xe}$	Isolates the Control Room Envelope from outside air and places the ventilation system in accident pressurized mode
2-R11A	Beta Scintillator	Containment Particulate	$10^{-11}$ $\mu\text{Ci/cc}$ $^{137}\text{Cs}$	Containment Ventilation Isolation (Mode 6)
2-R12A	Beta Scintillator	Containment Noble Gas	$10^{-6}$ $\mu\text{Ci/cc}$ $^{133}\text{Xe}$	Containment Ventilation Isolation
2-R12B	Gamma Scintillator	Containment Iodine	$10^{-11}$ $\mu\text{Ci/cc}$ $^{131}\text{I}^{(2)}$	Containment Ventilation Isolation
2-R13A	Gamma Scintillator	21,22,23 Fan Cooler Service Water Discharge	$10^{-7}$ $\mu\text{Ci/cc}$ $^{137}\text{Cs}$	—
2-R13B	Gamma Scintillator	23,24,25 Fan Cooler Service Water Discharge	$10^{-7}$ $\mu\text{Ci/cc}$ $^{137}\text{Cs}$	—
2-R15	Gamma Scintillator	Condenser Air Ejector	$10^{-6}$ $\mu\text{Ci/cc}$ $^{133}\text{Xe}$	—
2-R17A	Gamma Scintillator	21 Component Cooling Loop	$10^{-7}$ $\mu\text{Ci/cc}$ $^{137}\text{Cs}$	Closes Surge Tank Vent Valve
2-R17B	Gamma Scintillator	22 Component Cooling Loop	$10^{-7}$ $\mu\text{Ci/cc}$ $^{137}\text{Cs}$	Closes Surge Tank Vent Valve
2-R18(1)	Gamma Scintillator	Liquid Waste Discharge	$10^{-7}$ $\mu\text{Ci/cc}$ $^{137}\text{Cs}$	Closes Liquid Waste Discharge Valve

TABLE 11.4-2 (Cont.)  
UNIT 2 PROCESS RADIATION MONITORING SYSTEM

<u>Channel No.</u>	<u>Type of Detector</u>	<u>Channel Description</u>	<u>Minimum Detectable Level</u>	<u>Control Function/Interlocks</u>
2-R19A	Gamma Scintillator	21 Steam Generator Blowdown	$3 \times 10^{-8} \mu\text{Ci/cc } ^{137}\text{Cs}$	Warn: Closed Blowdown Tank Inlet Valves High: Isolate 21 Steam Generator Blowdown
2-R19B	Gamma Scintillator	22 Steam Generator Blowdown	$3 \times 10^{-8} \mu\text{Ci/cc } ^{137}\text{Cs}$	Warn: Closed Blowdown Tank Inlet Valves High: Isolate 22 Steam Generator Blowdown
2-R19C	Gamma Scintillator	23 Steam Generator Blowdown	$3 \times 10^{-8} \mu\text{Ci/cc } ^{137}\text{Cs}$	Warn: Closed Blowdown Tank Inlet Valves High: Isolate 23 Steam Generator Blowdown
2-R19D	Gamma Scintillator	24 Steam Generator Blowdown	$3 \times 10^{-8} \mu\text{Ci/cc } ^{137}\text{Cs}$	Warn: Closed Blowdown Tank Inlet Valves High: Isolate 24 Steam Generator Blowdown
2-R31(1)	Gamma Scintillator	Letdown Line	$10^{-6} \mu\text{Ci/cc } ^{137}\text{Cs}$	—
2-R37	Gamma Scintillator	Non Radwaste Basin	$10^{-8} \mu\text{Ci/cc } ^{137}\text{Cs}$	None
2-R41A	Beta Scintillator	Plant Vent Noble Gas (low)	$3 \times 10^{-7} \mu\text{Ci/cc } ^{133}\text{Xe}(2) *$	None
2-R41B	Beta-Gamma Scintillator	Plant Vent Noble Gas (inter.)	$7 \times 10^{-4} \mu\text{Ci/cc } ^{133}\text{Xe}(2)$	None
2-R41C	Beta-Gamma Scintillator	Plant Vent Noble Gas (high)	$10^{-1} \mu\text{Ci/cc } ^{133}\text{Xe}$	None
2-R41D	N/A	Plant Vent Noble Gas (composite)	N/A	Containment Ventilation Isolation; Closes Waste Gas Discharge Valve

\* This MDL reflects the design range of the detector. The actual detection level may be higher than the MDL due to the masking effect of background radiation at the installed location.

TABLE 11.4-2 (Cont.)

## UNIT 2 PROCESS RADIATION MONITORING SYSTEM

<u>Channel No.</u>	<u>Type of Detector</u>	<u>Channel Description</u>	<u>Minimum Detectable Level</u>	<u>Control Function/Interlocks</u>
2-R46A	Ion Chamber	Main Steam Line No. 21	0.1 mr/hr to 10,000 mr/hr(4)	---
2-R46B	Ion Chamber	Main Steam Line No. 22	0.1 mr/hr to 10,000 mr/hr(4)	---
2-R46C	Ion Chamber	Main Steam Line No. 24	0.1 mr/hr to 10,000 mr/hr(4)	---
2-R46D	Ion Chamber	Main Steam Line No. 23	0.1 mr/hr to 10,000 mr/hr(4)	---

TABLE 11.4-2 (Cont.)

UNIT 2 PROCESS RADIATION MONITORING SYSTEM

<u>Channel No.</u>	<u>Type of Detector</u>	<u>Channel Description</u>	<u>Minimum Detectable Level</u>	<u>Control Function/Interlocks</u>
2-R53A	Nal(T1) Gamma Scint.	Main Steam Line 21	10 cpm (nominal) (5)	—
2-R53B	Nal(T1) Gamma Scint.	Main Steam Line 22	10 cpm (nominal) (5)	—
2-R53C	Nal(T1) Gamma Scint.	Main Steam Line 23	10 cpm (nominal) (5)	—
2-R53D	Nal(T1) Gamma Scint.	Main Steam Line 24	10 cpm (nominal) (5)	—

NOTES:

- (1) Also performs a safety function
- (2) Assumes 1 week collection time
- (3) The upper range corresponds to  $10^5 \mu\text{Ci/cc}$  (Xe-133)
- (4) The upper range corresponds to at least  $10^3 \mu\text{Ci/cc}$  (Xe-133)
- (5) > Background (electrical noise)



TABLE 11.4-3

## UNIT 1 AREA RADIATION MONITORING SYSTEM

<u>Channel No.</u>	<u>Channel Description</u>	<u>Type of Detector</u>	<u>Range</u>	<u>Control Function/Interlocks</u>
1-R1A	Control Room	GM Tube	10 <sup>-1</sup> -10 <sup>4</sup> mR/hr	---
1-R2	Containment	GM Tube	10 <sup>-1</sup> -10 <sup>4</sup> mR/hr	---
R3	Radio-Chem Laboratory	GM Tube	10 <sup>-1</sup> -10 <sup>4</sup> mR/hr	---
1-R4	Charging Pump Room	GM Tube	10 <sup>-1</sup> -10 <sup>4</sup> mR/hr	---
1-R5(1)	Fuel Handling	GM Tube	10 <sup>-1</sup> -10 <sup>4</sup> mR/hr	1) Fuel Handling Area Hi-Rad Evacuation Alarm 2) Fuel Handling Area Ventilation Exhaust Filter Units
R6A	Sampling Room	GM Tube	10 <sup>-1</sup> -10 <sup>4</sup> mR/hr	---
1-R7	In-core Seal Table	GM Tube	10 <sup>-1</sup> -10 <sup>4</sup> mR/hr	---
1-R9(1)	Fuel Storage Area	GM Tube	10 <sup>-1</sup> -10 <sup>4</sup> mR/hr	1) Fuel Handling Area Hi-Rad Evacuation Alarm 2) Fuel Handling Area Ventilation Exhaust Filter Units
1-R10A	Personnel Hatch to Containment (el 100 ft)	GM Tube	10 <sup>-1</sup> -10 <sup>4</sup> mR/hr	Containment Area High Radiation Alarm
1-R10B	Personnel Hatch to Containment (el 100 ft)	GM Tube	10 <sup>-1</sup> -10 <sup>4</sup> mR/hr	Containment Area High Radiation Alarm Actuates High Radiation Signal at Hatch
R20B	Counting Room	GM Tube	10 <sup>-1</sup> -10 <sup>4</sup> mR/hr	---

TABLE 11.4-3 (Cont.)

<u>Channel No.</u>	<u>Channel Description</u>	<u>Type of Detector</u>	<u>Range</u>	<u>Control Function/Interlocks</u>
R23	Monitoring Room	GM Tube	$10^{-1}$ - $10^4$ mR/hr	---
1-R32A (2)	Fuel Handling Crane Monitor	GM Tube	$10^{-1}$ - $10^4$ mR/hr	---
1-R34	Mechanical Penetration Area	GM Tube	$10^{-1}$ - $10^4$ mR/hr	---
1-R44A	Containment (High Range)		$10^0$ - $10^7$ R/hr	---
1-R44B	Containment (High Range)		$10^0$ - $10^7$ R/hr	---
1-R47	Electrical Penetration Area	Ion Chamber	$10^{-1}$ - $10^4$ R/hr	---
R51	Technical Support Center	GM Tube	$10^{-1}$ - $10^4$ mR/hr	---

NOTES:

(1) Also performs a safety function

(2) Local monitor only. Not indicated, recorded, or alarmed in the control room.

TABLE 11.4-4

## UNIT 2 AREA RADIATION MONITORING SYSTEM

<u>Channel No.</u>	<u>Channel Description</u>	<u>Type of Detector</u>	<u>Range</u>	<u>Control Functions/Interlocks</u>
2-R1A	Control Room	GM Tube	$10^{-1} - 10^4$ mR/hr	
2-R2	Containment	GM Tube	$10^{-1} - 10^4$ mR/hr	Actuates High Radiation Sign at Hatches
2-R4	Charging Pump Room	GM Tube	$10^{-1} - 10^4$ mR/hr	(el 100 ft and el 130 ft)
2-R5(1)	Fuel Handling Building	GM Tube	$10^{-1} - 10^4$ mR/hr	Initiates Charcoal Filtration and Evacuation Horns in Fuel Handling Building and automatically starts exhaust fans.
2-R7	Incore Seal Table	GM Tube	$10^{-1} - 10^4$ mR/hr	---
2-R9(1)	Fuel Handling Building	GM Tube	$10^{-1} - 10^4$ mR/hr	Initiates Charcoal Filtration and Evacuation Horns in Fuel Handling Building and automatically starts exhaust fans.
2-R10A	Containment Personnel Hatch (el 100 ft)	GM Tube	$10^{-1} - 10^4$ mR/hr	Actuates High Radiation Sign at Hatch
2-R10B	Containment Personnel Hatch (el 130 ft)	GM Tube	$10^{-1} - 10^4$ mR/hr	Actuates High Radiation Sign at Hatch
2-R32A(2)	Fuel Handling Crane	GM Tube	$10^{-1} - 10^4$ mR/hr	---

TABLE 11.4-4 (Cont.)

<u>Channel No.</u>	<u>Channel Description</u>	<u>Type of Detector</u>	<u>Range</u>	<u>Control Functions/Interlocks</u>
2-R34	Mechanical Penetration Area	GM Tube	$10^{-1}$ - $10^6$ mR/hr	---
2-R44A	Containment (High Range)	Ion Chamber	$10^0$ - $10^7$ R/hr	---
2-R44B	Containment (High Range)	Ion Chamber	$10^0$ - $10^7$ R/hr	---
2-R47	Electrical Penetration	GM Tube	$10^{-1}$ - $10^4$ R/hr	---

NOTES:

- (1) Also performs a safety function.
- (2) Local only - Not connected to RMS monitor in the Control Equipment Room.