

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

AA-1

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 AUTH. NAME: CURTIS, N.W. AUTHOR AFFILIATION: Pennsylvania Power & Light Co.
 RECIP. NAME: SCHWENCER, A. RECIPIENT AFFILIATION: Licensing Branch 2

SUBJECT: Forwards revised Section 12.3 of FSAR. Rev will be incorporated in next amendment to FSAR.

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Pennsylvania Power & Light Company

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Norman W. Curtis
Vice President-Engineering & Construction-Nuclear
215/770-7501

DEC 13 1983

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUSQUEHANNA STEAM ELECTRIC STATION
FSAR SECTION 12.3
ER 100508 FILE 841-1
PLA-1869

Docket No. 50-388

Dear Mr. Schwencer:

In order to support obtaining an operating license for Susquehanna SES Unit 2, enclosed is revised Section 12.3 of the Susquehanna SES FSAR. The revisions to this section are as follows:

- 12.3.1.3 - This section has been revised to state that the radiation zoning for Unit 1 is representative of Unit 2.
- 12.3.2.2 - This section has been revised to state that the shielding requirements as shown in the figures are applicable to both units.
- 12.3.4.1.3 - This section has been revised to state that an additional range for the area radiation monitors has been added for Unit 2 in accordance with Regulatory Guide 1.97. This section has also been revised to clarify the location of area radiation monitors in Unit 2. This section has been revised to clarify that the accident range monitors do not have audible alarms.
- 12.3.4.1.4 - This section has been revised to indicate that the accident range radiation monitors do not have audible alarms and the normal range monitors serve as the alarm monitors.
- Table 12.3-7 - This table has been revised to correct typographical errors and to correct the ranges, setpoints and locations for the Unit 2 monitors.

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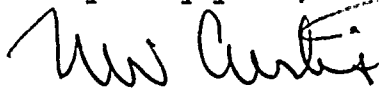
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Page 2

SSES PLA-1869
ER 100508 File 841-1
Mr. A. Schwencer

These revisions will be incorporated in the next amendment to the FSAR.

Very truly yours,



N. W. Curtis
Vice President-Engineering & Construction-Nuclear

Enclosure

cc: R. L. Perch NRC



1951

1952

1953

1954

12.3.1.3. Radiation Zoning and Access Control

Access to areas inside the plant structures and plant yards is regulated and controlled. Each radiation zone defines the radiation level range to which the aggregate of all contributing sources must be attenuated by shielding.

All plant areas are categorized into radiation zones according to expected radiation levels and anticipated personnel occupancy, with consideration given toward maintaining personnel external exposures ALARA and within the standards of 10CFR20. Each room, corridor, and pipeway of every plant building is evaluated for potential radiation sources during normal operation and shutdown; for maintenance occupancy requirements, and for general access requirements to determine appropriate zoning. Radiation zone categories used and their descriptions are given in Table 12.3-1 and the specific zoning for each plant area is shown on Figures 12.3-8 through 12.3-27. Note that the radiation zoning for Unit 1 is not significantly different from those for Unit 2, therefore Figures 12.3-8 through 12.3-27 are also representative of Unit 2. All frequently accessed areas, ie, corridors, are shielded for Zone I and Zone II access.

The control of ingress or egress of plant operating personnel to controlled access areas and procedures employed to ensure that radiation levels and allowable working time are within the limits prescribed by 10CFR20 as described in Section 12.5.

12.3.1.4 Control of Activated Corrosion Products

In order to minimize the radiation exposure associated with the deposition of activated corrosion products in reactor coolant and auxiliary systems, the following steps have been taken:

- (1) The reactor coolant system consists mainly of austenitic stainless steel, carbon steel and low alloy steel components. Nickel content of these materials is low, and it is controlled in accordance with applicable ASME material specifications.

A small amount of nickel base material (Inconel 600) is employed in the reactor vessel internal components. Inconel 600 is required where components are attached to the reactor vessel shell and the coefficient of expansion must match the thermal expansion characteristics of the low alloy vessel steel. Inconel 600 was selected because it provides the proper thermal expansion characteristics, adequate corrosion resistance and can be readily fabricated and welded.

through 12.3-27. Since the layout for Unit 2 is not significantly different from that of Unit 1, the minimum shielding requirements (see Subsection 12.3.2.3) indicated on those drawings are applicable to both Units. General locations of the plant areas and equipment discussed in this subsection are also shown on those drawings.

The material used for most of the plant shielding is ordinary concrete with a minimum bulk density of 145 lb/ft³. Whenever poured-in-place concrete has been replaced by concrete blocks or other material, design ensures protection on an equivalent shielding basis as determined by the characteristics of the concrete block selected. Compliance of concrete radiation shield design with Regulatory Guide 1.69 is discussed in Section 3.13. Water is used as the primary shield material for areas above the spent fuel transfer and storage areas.

Special features employed to maintain radiation exposures ALARA in routinely occupied areas such as valve operating stations and sample stations are described in Subsections 12.3.1.1 and 12.3.1.2.

12.3.2.2.1 Reactor Building Shielding Design

During reactor operation, the steel-lined, reinforced concrete drywell wall and the reactor building walls protect personnel occupying adjacent plant structures and yard areas from radiation originating in the reactor vessel and associated equipment within the reactor building. The reactor vessel shield wall, drywell wall, and various equipment compartment walls together with the reactor building walls minimize the radiation levels outside the reactor building.

Where personnel and equipment hatches or penetrations pass through the drywell wall, additional shielding is designed to attenuate the radiation to below the required level defined by the radiation zone outside the drywell wall during normal operation and shutdown and to acceptable emergency levels as defined by 10CFR50 during design basis accidents.

12.3.2.2.2 Reactor Building Interior Shielding Design

Inside Drywell Structure: Areas within the drywell are designed as Zone V areas and are normally inaccessible during plant operation. The reactor vessel shield provides shielding for access in the drywell during shutdown, and reduces the activation of and radiation damage to drywell equipment and materials.

12.3.4.1.4 Area Radiation Monitoring Instrumentation

Power Sources: The power source for the area radiation monitoring system is the 120 V ac instrument bus and local lighting panels. The area radiation monitor instrumentation is powered by a high and low voltage electrically regulated power supply capable of handling up to 10 channels. The system has no emergency power supply.

Alarm Set Points: Refer to Table 12.3-7.

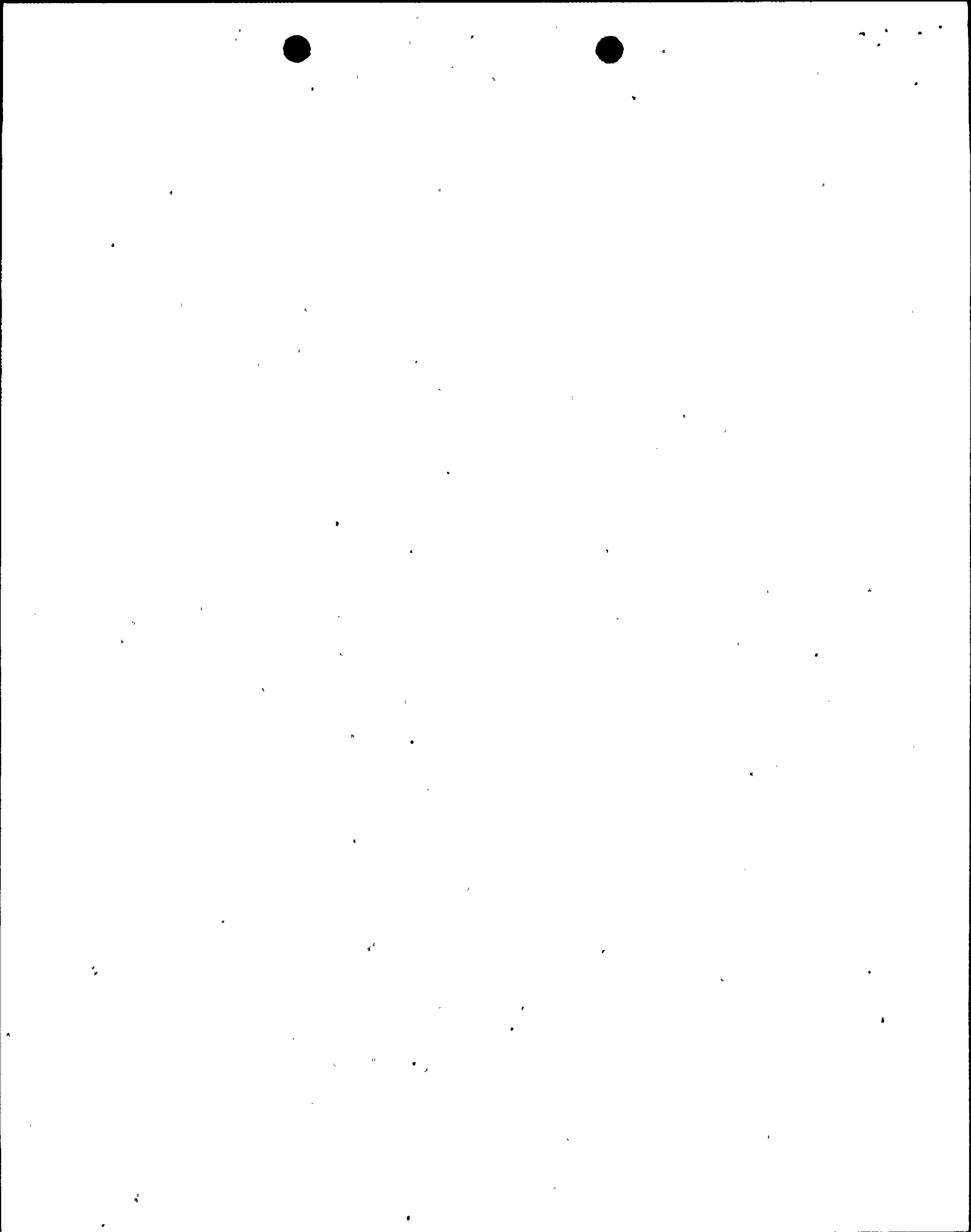
Recording Devices: Two multipoint recorders are located in the control room for recording channels pertaining to Unit 1, Unit 2, and channels which are common to both units. This data is also stored in computer history files and can be retrieved and printed using the PMS Historical Recording service program.

Location of Devices: Refer to details in Table 12.3-7.

Readouts and Alarms: Readouts, visual and audible alarms are provided locally for each monitoring channel. The accident range monitors, channels 48 through 57, serve as indicating channels only and do not have audible alarms. The normal range channels in the same locations serve as the alarm monitors. Readouts and visual alarms are provided by each indicator/trip unit in the Control Structure (Upper Relay Room). Multipoint recorders, visual alarms and PMS displays are provided in the Control Structure (Control Room), with the exception of the three Technical Support Center channels (43, 44, 45).

The following annunciators are located in the main control room to alert the operator:

- a Reactor Building Area High Radiation (Units 1 and 2)
- b Turbine Building Area High Radiation (Units 1 and 2)
- c Radwaste Building Area High Radiation
- d Refueling Floor Area High Radiation (Units 1 and 2)
- e Spent Fuel Pool Area High Radiation (Units 1 and 2)
- f Reactor Building Common Area High Radiation
- g Administration Building Area High Radiation
- h Control Structure Area High Radiation
- i Area Radiation Monitoring Downscale (ganged for all channels)



12.3.4.1.3 System Description (Area Radiation Monitoring)General

The area radiation monitoring system is shown in diagram form in Figure 12.3-29. Each channel consists of a combined sensor/converter unit, a local auxiliary unit (readout with visual and audible alarm), a combined indicator/trip unit, a shared power supply, and a shared multipoint recorder. The exception to this is that the accident range monitors, channels 48 through 57, do not have audible alarms. The location of each area radiation detector is indicated on the shielding and zoning drawings, Figures 12.3-8 through 12.3-27, and is listed in Table 12.3-7. With the exception of channel 12, the detector locations are the same for both Unit 1 and 2. In Unit 1, channel 12 monitors the spent fuel hoistway during transfer operations. This hoistway does not exist in Unit 2.

Circuit Description

Sensor/Converter: Each sensor/converter contains all silicon semiconductors in sealed enclosure with a Cooke-Yarborough courtyard circuit which combines a long integrating time constant at low radiation levels with fast overall response at high radiation levels.

Auxiliary Unit: Each auxiliary unit gives instant local readout at the sensor location with a visual alarm. An audible alarm is connected to the auxiliary unit to alert personnel of excessive area radiation.

Indicator and Trip Unit: The indicator and trip unit provides channel control for the area radiation monitoring system. Its circuitry provides an upscale trip that indicates high radiation and a downscale trip that may indicate instrument trouble or loss of power. The module has an analog readout, a low and high trip indicating light, a trip test device, an alarm reset and an output for a multipoint recorder.

Ranges and Sensitivity: Ranges and sensitivities are selected for each location based on the anticipated radiation level as provided by experimental measurements of levels in similar plants and shielding calculations. Refer to Table 12.3-7 for detail. Additional range ($10^3 - 10^6$ MR) was added for Unit 2 Licensing Commitment for Reg. Guide 1.97.

Accuracy: The overall accuracy is such that the actual reading relative to the true reading is within ± 7.5 percent of equivalent full scale.

TABLE 12.3-7

AREA RADIATION MONITORING SYSTEM UNIT 1 & COMMON

Channel No.	Monitor Description	Bldg.	Approx. Loc.	Elev.	Range (mR/hr)	Set Point (mR/hr)
1	Chan 1 RX Bldg. Residual heat removal area	RB	T/22	645'	0.1-1000	100
2	Chan 2 RX Bldg. RCIC pump turbine room	RB	I/21	645'	0.01-100	2.5
3	Chan 3 RX Bldg. HPCI pump turbine room	RB	S/21	645'	0.01-100	2.5
4	Chan 4 RX Bldg. Radwaste sump area	RB	S/28	645'	0.1-1000	15
5	Chan 5 RX Bldg. Contr. rod drive Hvd. Units north	RB	R/21	719'	0.1-1000	15
6	Chan 6 RX Bldg. Contr. rod drive Hvd. Units south	RB	R/29	719'	0.1-1000	15
7	Chan 7 Off-Gas Bypass Line	TR	G/25	656'	0.1-1000	15
8	Chan 8 RX Bldg.. Cleanup recirc. pump access area	RB	R/21	749'	0.01-100	2.5
9	Chan 9 RX Bldg. CFD Repair Area	RB	T/27	719'	0.1-1000	2.5
10	Chan 10 RX Bldg. Fuel pool pump room	RB	R/27	749'	0.1-1000	2.5
11	Chan 11 RX Bldg. Sample Station (1C210) Room	RB	P/26	779'	0.01-100	15
12	Chan 12 Recirc. fan room-Spent Fuel Cask Hoist Area	RB	U/29	799'	0.01-100	15
13	Chan 13 RX Bldg. New Fuel Area	RB	O/27	799'	0.01-100	5

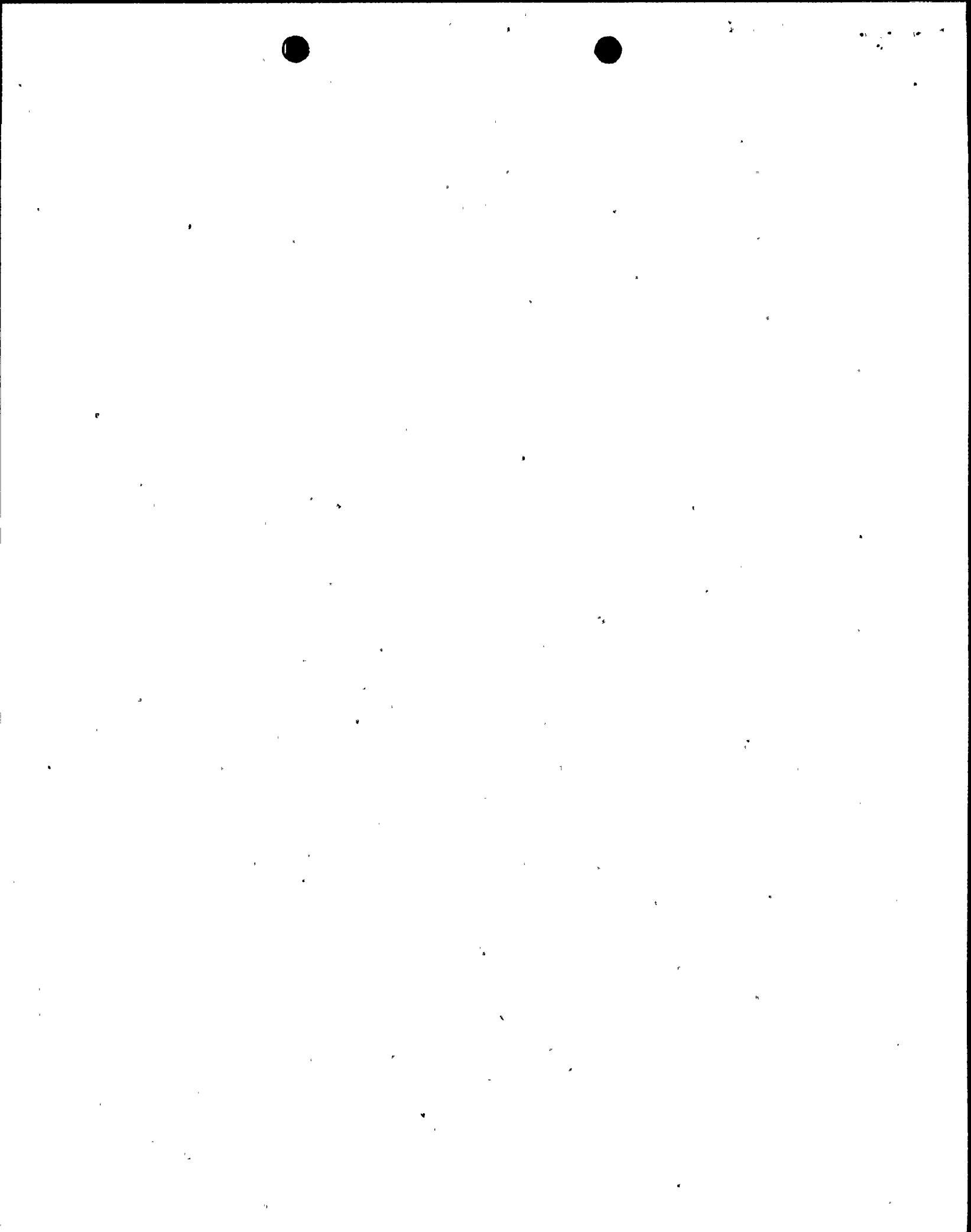


TABLE 12.3-7 (Continued)

APEA RADIATION MONITORING SYSTEM UNIT 1 & COMMON

Channel No.	Monitor Description	Bldg..	Approx. Loc.	Elev.	Range (mR/hr)	Set Point (mR/hr)
14	Chan 14 PX Bldg. Spent fuel pool	RB	S/27	818'	0.1-1000	15
15	Chan 15 PX Bldg. refueling floor area	FB	P/22	818'	0.01-100	2.5
16	Chan 16 PX Bldg. Access to remote shutdown panel	RF	P/21	670'	0.01-100	2.5
17	Chan 17 TB Bldg. Condensate pumps area	TB	J/26	656'	0.01-100	50
18	Chan 18 TB Bldg. RFPT area	TB	L/21	675'	0.01-100	2.5
19	Chan 19 TB Bldg. Air ejector room	TB	Hb/24	682'	0.1-1000	700
20	Chan 20 TB Bldg. Feedwater heater area	TB	H/21	699'	0.1-1000	2.5
21	Chan 21 TB Bldg. Reactor recirc pump M.G. area	TB	H/20	729'	0.01-100	2.5
22	Chan 22 TB Bldg. generator bay area	TB	J/26	729'	0.01-100	2.5
23	Chan 23 TB Bldg. Heat and vent. equipment room	TB	L/23	762'	0.01-100	2.5
24	Chan 24 TB Bldg. Turbine front end	TB	K/15	729'	0.01-100	2.5
25	Chan 25 PX Bldg. Residual heat removal area	RB	T/26	645'	0.1-1000	100
26	Chan 26 PX Bldg. TIP drive area	RB	Q/22	719'	0.1-1000	15

TABLE 12.3-7 (Continued)

AFEA RADIATION MONITORING SYSTEM UNIT 1 & COMMON

Channel No.	Monitor Description	Bldg.	Approx. Loc.	Elev.	Range (mR/hr)	Set Point (mR/hr)
27	Chan 27 Admin. Bldg Access (TP)	TR	N/13	729'	0.01-100	2.5
28	Chan 28 Admin Bldg. Access (FW)	ADM BLDG	N/10	691'	0.01-100	0.5
29	Chan 29 RW Bldg. Corridor pers. access area	RW	K/3	646'	0.1-1000	2.5
30	Chan 30 RW Bldg. Opt. surveillance control area	RW	G/8	646'	0.1-1000	2.5
31	Chan 31 RW Bldg. Corridor to collection tank	RW	J/12	646'	0.1-1000	2.5
32	Chan 32 RW Bldg. Controlled zone shop	RW	K/12	676'	0.1-1000	2.5
33	Chan 33 RW Bldg. RW Control Room	RW	J/9	676'	0.1-1000	2.5
34	Chan 34 RW Bldg. Storage and equipment area	RW	G/6	676'	0.1-1000	2.5
35	Chan 35 FX Bldg. Shipping cask storage area	BB	S/29	918'	0.01-100	15
36	Chan 36 RX Bldg. Railroad access area	BB	U/29	670'	0.01-100	0.5
37	Chan 37 Ctr. Twr. Standby gas treatment room	CTR TWR	K/27	806'	0.01-100	0.5
38	Chan 38 Ctr. Twr. Rad. chem. laboratory	CTR TWR	K/27	676'	0.01-100	0.5

TABLE 12.3-7 (Continued)

AREA RADIATION MONITORING SYSTEM UNIT 1 & COMMON

Channel No.	Monitor Description	Bldg.	Approx. Loc.	Elev.	Range (mR/hr)	Set Point (mR/hr)
39	Chan 39 Ctr. Tvr. Control room	CTR TWP	L/29	725'	0.01-100	0.5
40	Chan 40 Admin Bldg. Access Unit 2 (Railroad Bay)	TB	N/12	676'	0.01-100	2.5
41	Channel 41 Tip Chamber Shield Area	PB	P/22	719'	0.1-1000	200
42	Channel 42 Refueling Floor Area	RB	P/26	818'	0.01-100	5
43	Channel 43 Observation Deck	CTP TWP	L/30	741'	0.01-100	0.5
44	Channel 44 Document Control Area	CTP TWP	N/32	741'	0.01-100	0.5
45	Channel 45 Conference Room	CTR TWP	N/26	741'	0.01-100	0.5

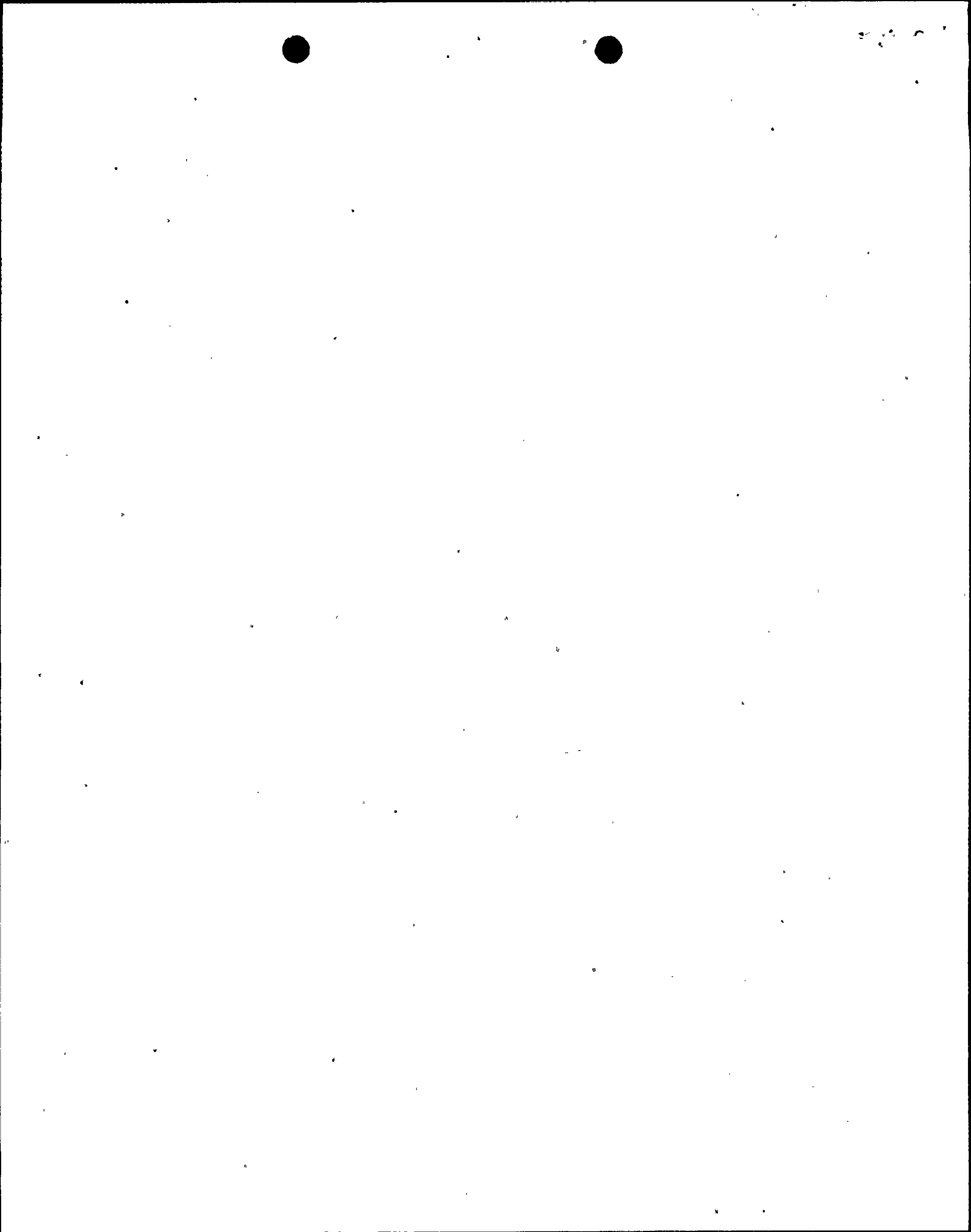


TABLE 12.3-7 (Continued)

AREA RADIATION MONITORING SYSTEM UNIT 2

Channel No.	Monitor Description	Bldg.	Approx. Loc.	Elev.	Range (mR/hr)	Set Point (mR/hr)
1856	Chan 1856 RX Bldg. Residual heat removal area	RB	T/31	645'	(1) 0.1-1000 (56) 10 ³ -10 ⁶	100
2857	Chan 2857 RX Bldg. RCIC pump turbine room	RB	(2) T/29 (57) T/30	645'	(2) 0.1-1000 (57) 10 ³ -10 ⁶	2.5
3848	Chan 3848 RX Bldg. HPCI pump and turbine room	RB	(3) T/30 (48) T/30	645'	(3) 0.1-1000 (48) 10 ³ -10 ⁶	2.5
4	Chan 4 RX Bldg. Radwaste sump area	RB	R/37	645'	0.1-1000	15
5850	Chan 5850 RX Bldg. Contr. rod drive Hyd. Units north	RB	S/29	719'	(5) 0.1-1000 (50) 10 ³ -10 ⁶	15
6851	Chan 6851 RX Bldg. Contr. rod drive south	RB	R/37	719'	(6) 0.1-1000 (51) 10 ³ -10 ⁶	15
7	Chan 7 Off-Gas Bypass Line	TB	G/33	656'	0.1-1000	15
8852	Chan 8852 RX Bldg. Cleanup recirc pump access area	RB	(8) R/37 (52) S/37	749'	(8) 0.01-100 (52) 10 ³ -10 ⁶	2.5
9	Chan 9 RX Bldg. CPD Repair Area	RB	U/35	719'	0.1-1000	2.5
10854	Chan 10854 RX Bldg. Fuel pool pump room	RB	R/30	749'	(10) 0.1-1000 (54) 10 ³ -10 ⁶	200
11	Chan 11 RX Bldg. Sample Station (2C210) Room	RB	P/32	779'	0.01-100	15
12	See Note 2					
13846	Chan 13846 RX Bldg. New Fuel Vault Critical	RB	(13) P/30 (46) P/29	812'	0.1-1000	15

TABLE 12.3-7 (Continued)

AFEA RADIATION MONITORING SYSTEM UNIT 2

Channel No.	Monitor Description	Bldg.	Approx. Loc.	Elev.	Range (mR/hr)	Set Point (mR/hr)
14847	Chan 14847 RX Bldg. Spent fuel pool	RB	(14) S/31 (47) Q/31	818'	0.1-1000	15
15849	Chan 15849 RX Bldg. Refueling floor area	RE	Q/36	818'	(15) 0.01-100 (49) 10 ³ -10 ⁶	2.5
16853	Chan 16853 RX Bldg. Access to remote shutdown panel	RB	(16) P/37 (53) Q/34	670'	(16) 0.01-100 (53) 10 ³ -10 ⁶	2.5
17	Chan 17 TB Bldg. Condensate pumps area	TB	K/33	656'	0.01-100	50
18	Chan 18 TB Bldg. RPPT area	TB	L/37	676'	0.01-100	2.5
19	Chan 19 TB Bldg. Air ejector room	TB	J/33	682'	0.1-1000	700
20	Chan 20 TB Bldg. Feedwater heater area	TB	P/37	699'	0.1-1000	2.5
21	Chan 21 TB Bldg. Reactor recirc. pump M.G. area	TB	M/36	729'	0.01-100	2.5
22	Chan 22 TB Bldg. Generator bay area	TB	K/33	729'	0.01-100	2.5
23	Chan 23 TB Bldg. Heat and vent. equipment room	TB	L/35	762'	0.01-100	2.5
24	Chan 24 TB Bldg. Turbine front end	TB	K/43	729'	0.01-100	2.5
25855	Chan 25855 RX Bldg. Residual heat removal area	RB	T/34	645'	(25) 0.1-1000 (55) 10 ³ -10 ⁶	100
26	Chan 26 Instrument Gas Accumulator Area	PS	Q/30	733'	0.1-1000	15

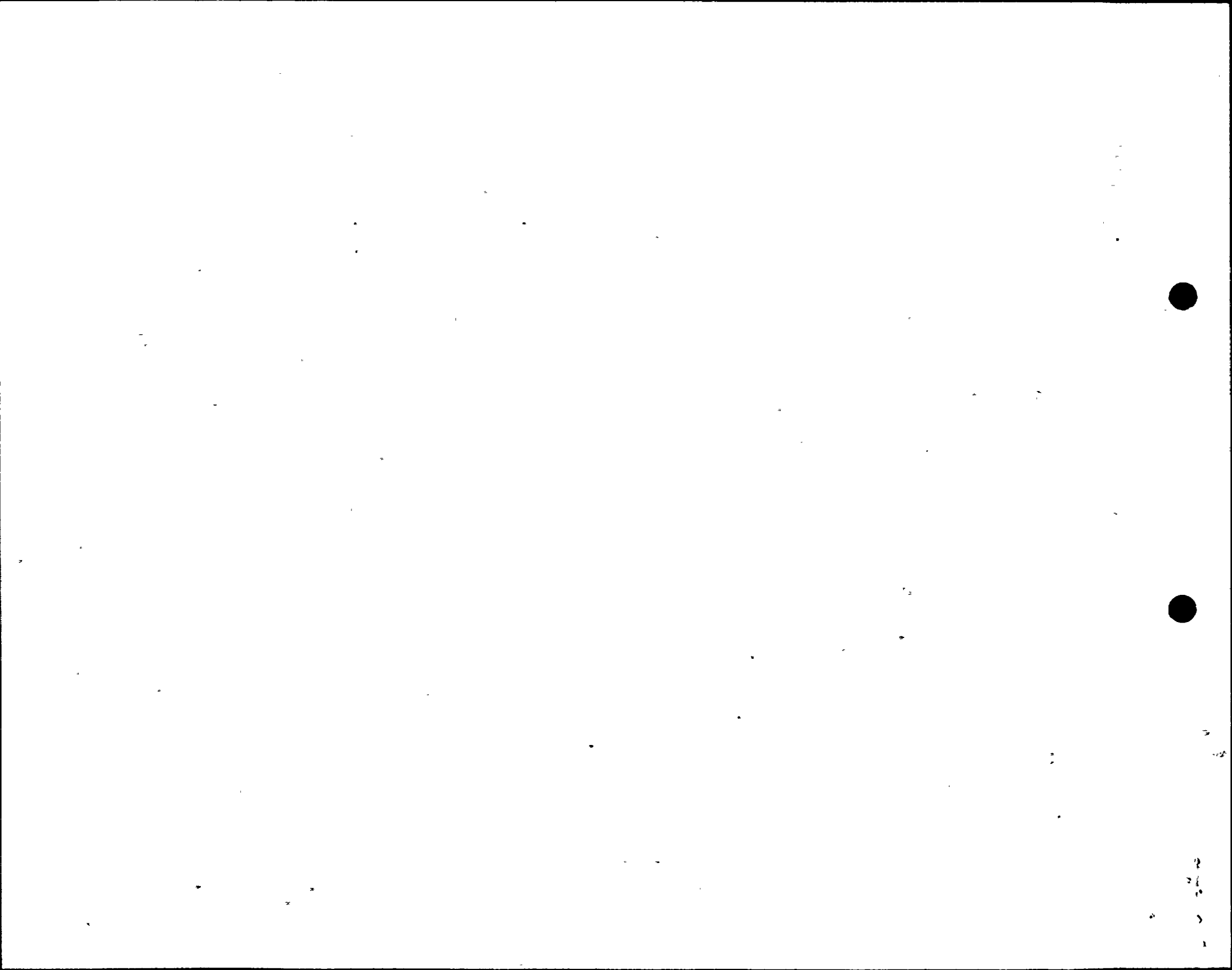


TABLE 12.3-7 (Continued)

AREA RADIATION MONITORING SYSTEM UNIT 2

41	Channel 41 TIP Chamber Shield Area	RB	P/30	719'	.1-100	200
42	Channel 42 Refueling Floor Area	RB	P/31	818'	0.01-100	2.5
46	See Channel 13					
47	See Channel 14					
48	See Channel 3					
49	See Channel 15					
50	See Channel 5					
51	See Channel 6					
52	See Channel 8					
53	See Channel 16					
54	See Channel 10					
55	See Channel 25					
56	See Channel 1					
57	See Channel 2					

- Notes:
1. All set points are estimated values. Actual set points may vary depending on operational considerations and will be determined by measured radiation levels.
 2. Channel 12 is a spare channel number on Unit 2. There are no instruments for this channel and no location for Channel 12.
 3. Unit 1 ARM locations on the radiation and zoning drawings in Figures 12.3-8 through 12.3-27 are representative of the approximate Unit 2 ARM locations. Channels 46 through 57 have not been installed on Unit 1 and therefore do not show on the drawings. These drawings will be updated to show their locations when the Unit 1 channels are installed.



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