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October 22, 1985
ST-HL-AE-1461
File No.: G9.17

Mr. George W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, DC 20555

South Texas Project
Units 1 and 2
Docket Nos. STN 50-498, STN 50-499
Responses to DSER/FSAR Items Concerning the
Radiation Monitoring System (Chapter 11)

Dear Mr. Knighton:

The attachments enclosed provide STP's response to Draft Safety Evaluation Report (DSER) or Final Safety Analysis Report (FSAR) items.

The item numbers listed below correspond to those assigned on STP's internal list of items for completion which includes open and confirmatory DSER items, STP FSAR open items and open NRC questions. This list was given to your Mr. N. Prasad Kadambi on October 8, 1985 by our Mr. M. E. Powell.

The attachments include mark-ups of FSAR pages which will be incorporated in a future FSAR amendment unless otherwise noted below.

The items which are attached to this letter are:

Attachment	Item No.*	Subject
1	F 11.5-21	Radiation Monitoring

B001
1/1

* Legend
D - DSER Open Item
F - FSAR Open Item
C - DSER Confirmatory Item
Q - FSAR Question Response Item

L1/DSER/aak

If you should have any questions concerning this matter, please contact Mr. Powell at (713) 993-1328.

Very truly yours,

M. R. Wisenburg
Manager, Nuclear Licensing

MEP/vmq

Attachments: See above

L1/DSER/aak

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Revised 9/25/85

L1/DSER/aak

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c. CR/EAB ventilation actuation

d. Containment high range area monitors (discussed in Section 12.3.4)

14. Monitors and their detectors are designed to function at the maximum temperature and pressure normally expected to occur at the sampling point. Where required, sampling conditioning equipment is provided.

15. RMS equipment is designed and located so that radiation effects to electrical insulation and other materials will not affect the equipment usefulness over the life of the plant.

16. All microprocessors are located in areas where the background radiation is 2.5 mR/hr. or less

17. The RMS is designed so it can be checked on a daily basis, tested periodically, and recalibrated during refueling shutdowns, or as system operation requires.

18. Radiation monitors are designed for stand alone operation. In the event of a communication link failure, the monitor continues to function and store data. No failure in one monitor will cause a loss of operating function of more than that one monitor. 44

19. Detectors are designed to minimize crud buildup. Purge or flush capabilities are provided where required and sample chambers are removable for decontamination. Flowrates for liquid monitors are selected to minimize particulate settlement.

20. Post-accident monitoring detectors meet the shielding requirements of RG 1.97 and NUREG-0737. 46

21. Radiation monitors which perform an automatic isolation function are designed and qualified to the same criteria consistent with those of the actuated system.

11.5.2 System Description

11.5.2.1 General Description. The RMS is comprised of the following:

1. The area radiation monitors, which continually monitor radiation fields in various representative regions within the plant. These monitors are described in Section 12.3.4. 44

2. The process and effluent radiation monitors, which provide a means for assessing radioactivity levels in plant process and effluent streams, and control plant and effluent streams including the handling and processing of radioactive waste.

3. Airborne monitors, which continually monitor airborne radioactivity in selected ventilation streams in the plant to assist in determining habitability. Functional requirements for these monitors are discussed in Section 12.3.4.

Two independently adjustable radiation setpoints are provided, alert and high. The alert activates an alarm, while the high actuates an alarm and also initiates control action where appropriate. The alert setpoint may be set as close to the background as feasible to provide early warning without generating statistically nonsignificant alarms. The setpoints are listed in Table 11.5-1.

11.5.2.1.4 Annunciators and Alarms: Radiation monitors alarm at the RMS operator consoles in the control room and health physics office. The individual detector microprocessor initiates alarm messages when setpoints are exceeded. Monitor failure or malfunctions also initiate alarm messages.

Each new alarm condition is logged at a console printer for a permanent record.

11.5.2.1.5 Maintenance and Calibration: The channel detector and electronics are serviced and maintained in accordance with manufacturers' recommendations to insure reliable operations. Such maintenance includes component cleaning, replacement or adjustment required after performing a test or calibration check. If any work is performed which could affect the calibration, a recalibration is performed upon completion of the work.

The initial calibration of each complete monitoring system is performed by the manufacturer at the factory. Primary calibration is performed in accordance with ANSI N13.10. Each process monitor is tested with calibration sources traceable to the National Bureau of Standards (NBS) in a 1.0 mr/hr, Co-60 gamma field. The lowest activity level produces a counting rate in the lowest monitor decade above background, the highest activity level produces a counting rate in the uppermost decade of response, and the medium activity level produces approximately the average of the lowest and highest activities. After installation, the equipment is rechecked and the response compared to portable calibration sources. Calibration of samples is performed based on a known correlation between the detector responses and a secondary standard. The source-detector geometry during primary calibration is identical to the sample-dectector geometry in actual use. Portable field calibration sources are supplied for each type of detector. These are in addition to the monitor's built-in CR-activated check source or current. The calibration source radionuclides, which are traceable to the NBS, have a repeatability of $\pm$ 5 percent and a half-life of greater than 10 years, except for Ba-133, which has a half-life of 7.2 years and is used in iodine monitors due to gamma energy considerations. 44

Each monitor has a solenoid-operated check source or current to check detector response. For gamma detectors a Cs-137 source is used and for beta detectors a Cl-36 source is used. Each detector is checked periodically using its built-in check source or current.

A channel calibration is performed on each monitor at least every 18 months during plant operation or during the refueling outage. If the detector is not readily accessible then calibration is performed using the secondary radionuclide standard Which is periodically confirmed USING CALIBRATION SOURCES TRACEABLE TO NBS STANDARDS. A calibration can also be performed by using liquid or gaseous radionuclide standards Traceable to NBS. ~~or by analyzing particulate, iodine, or gaseous grab samples with laboratory instruments.~~

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microprocessor has a data base which includes calibration count rate, conversion factors, high alarm limit, alert alarm limit, check-source count rate, and, where monitored, flow rate. Processed data are averaged and stored in memory for historical trends. The historical file of detector data consists of 24 10-min averages, 24 1-hr averages, and 28 1-day averages. Locally stored data is battery-backed to preclude loss of data in the event of a loss of power.

Depending upon the application, each microprocessor receives input from up to four detectors. Liquid and noble gas monitors have one detector, while the airborne monitors have up to three detectors each (particulate, iodine, noble gas). The main steamline and steam generator blowdown (SGBD) monitors have two detector channels each. Up to four detectors are handled by one area microprocessor.

only and function independently of any other computer systems.

11.5.2.2.3 Operator Consoles: The operator consoles are dedicated to radiation monitoring duties ~~and function independently of the plant computer.~~

delete.

The consoles each have a color CRT display, a keyboard, and a printer. The consoles give operators consolidated and fully processed information on the RMS throughout the plant. The basic displays on the CRT console are the status grid displays, wherein each monitor is represented by a colored rectangle with six superimposed characters. The characters identify the monitor, and the background color indicates monitor status.

All displayed data and plots on the CRT displays are updated at regular intervals or after an alarm message is received from that monitor. 44

All displayed data and plots on the CRT displays are updated at regular intervals or after an alarm message is received from that monitor.

DELETE

11.5.2.2.4 Dose Assessment and Report Generation Computer (RM-21A): The RM-21A computer system performs the following:

1. Collects radioactivity level information from effluent radiation monitors throughout the plant.

2. Collects and displays meteorological data from the meteorological towers.

3. Calculates meteorological dispersion factors and generates reports for compliance with RG 1.23.

4. Generates radioactive effluent reports for compliance with RG 1.21.

5. Calculates offsite dose consequences from normal plant operation releases.

6. Calculates offsite dose consequences from accident conditions in accordance with NUREG-0654.

The RM-21A system interfac~~ing~~es ~~is~~ are shown on Figure 11.5-1. X

Laboratory isotopic data needed for RG 1.21 reports can be entered manually at the CRT keyboard or communicated from the counting room multichannel analyzer.

11.5.2.2.5 Remote Control Unit and Special Considerations for Class 1E Monitors: Each Class 1E radiation monitor includes an environmentally and seismically qualified RCU mounted in the RMS control room cabinet.

The microprocessor-based RCU provides control and indication of the Class 1E radiation monitor, independent of the RMS computer system. The RM-11 computer system can, through communication isolation devices, display on the operator console CRT the data and alarm status of the Class 1E radiation monitors. However, only the RCU provides remote control of the monitor functions (check source actuation, purge initiation etc.) and loading or changing of the monitor's data base.

11.5.2.3 Airborne Radioactivity Monitoring System. Fixed monitors are provided for continuous detection and measurement of airborne radioactivity for ventilation systems and for plant gaseous effluents. The design parameters for these monitors are summarized in Table 11.5-1. Design requirements for building ventilation monitors are given in Section 12.3.4. The following criteria for air sampling are met:

1. Detectors are located as close to sampler intakes as feasible.

2. Design of sample nozzles and lines is based on applicable sections of ANSI N13.1-1969 to ensure representative sampling and minimum settling and plateout losses of particulates during transport to the detector.

11.5.2.3.1 Sampling Devices: For each off-line monitor, a sample is drawn through a sample line and passed through a filter to collect particulates. The filters used to collect particulates have a collection efficiency of at least 99 percent for 0.3 micron particules. The airstream then passes through a charcoal cartridge to collect iodine. The charcoal cartridges used to collect iodine have been shown to have a minimum efficiency of 95 percent for elemental and organic iodine. These filters and cartridges are replaced at ~~weekly~~ PERIODIC intervals, and removed filters and cartridges are counted, and analyzed if necessary in the The counting room for particulate and iodine activity. 44

The air stream is then routed by a pump to a shielded, internally polished, stainless steel chamber where the sampled air is monitored for radioactive noble gases by a beta scintillation detector. The air is finally returned to the system for which it was extracted.

Each sample pump is capable of drawing an appropriate air sample through the monitor. Each monitor has a low sample flow alarm.

The location of sample probes and off-line monitors has been chosen to minimize sample plateout. Unavoidable bends are made with radii not less than five times the tubing diameter. Stainless steel lines and appropriate sampling valves are used.

Sample conditioning skids, provided as part of the unit vent and condenser vacuum pump monitors, provide sampling capability of plant effluents in compliance with NUREG-0737, Item II.F.1.

11.5.2.3.2 Reactor Containment Building Atmosphere Monitor: This monitor is provided to monitor Containment air for particulate, iodine and noble

as needed and consistent with the sampling intervals provided in the Technical Specifications.

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The monitor inlet and outlet lines have compression fittings. The sample piping has isolation valves so that the monitor skid can be isolated and the sample chamber dissembled for decontamination.

11.5.2.4.2 Detector Unit: Each detector is a NaI(Tl) gamma-sensitive scintillation detector. The detectors are designed to remain fully operational over a wide range of temperatures. If they are exposed to high radiation transients exceeding the channel range, the channel maintains its operation and returns to normal functioning when the transients have subsided. Since gamma detectors are used, comparison of monitor readout with the results of grab samples is possible. The grab samples are counted in the plant multichannel gamma pulse height spectrometer to check for proper monitor operation. Solenoid-operated check sources are provided to check detector response.

11.5.2.4.3 Steam Generator Blowdown (SGBD) Liquid Monitor: The SGBD liquid monitor samples the liquid from either the SGBD flash tank or demineralizer. The sample is continuously monitored by a shielded gamma-sensitive detector. ~~High radioactivity indicates a primary-to-secondary system leak and provides backup information to that of the condenser vacuum pump monitor.~~
DETECTION OF HIGH RADIATION BY THIS MONITOR ALERTS THE OPERATOR TO THE POSSIBILITY OF PRIMARY-TO-SECONDARY LEAKAGE.
In the event of activity above the high alarm setpoint or monitor failure, the monitor initiates the automatic closure of FV-5019, the SGBD discharge to neutralization basin isolation valve.

11.5.2.4.4 Liquid Waste Processing System (LWPS) Monitors: LWPS monitor #1 detects activity present in the liquid waste effluent being discharged from the waste monitor tanks in the LWPS. The monitor is located upstream of the LWPS diversion valve, FV-4077. Upon initiation of a high radiation or monitor failure alarm, the monitor causes the valve to automatically divert the effluent back to the waste monitor tanks.

Prior to discharge, the liquid in the monitor tank to be released is sampled and analyzed in the laboratory for radioactivity. Based upon this analysis, a discharge permit is issued specifying the release rate and the dilution rate. The release rate and dilution rate are used to determine the alarm setpoints for the monitor.

LWPS monitor #2 detects activity present in the liquid waste effluent being discharged to the waste monitoring tanks outside the Mechanical Auxiliary Building.

11.5.2.4.5 Component Cooling Water Monitor: This monitor samples the discharge of the CCW pumps. The monitor can sample from any of the three CCW pumps in the system, as selected by the operator.

The sample is drawn from the CCW pump discharge line downstream of the CCW heat exchanger, monitored, and then returned to the CCW surge tank.

11.5.2.4.6 Boron Recycle System Monitor: This monitor is located in the BRS evaporator condensate line downstream of the recycle evaporator condensate filter.

Upon initiation of a high radiation or monitor failure alarm, the monitor initiates changeover of the BRS diversion valve, RCV-4202, causing the BRS

The monitors provide a dose rate range equivalent to 10^{-1} to 10^{3} μCi/cc Xe-133. Based on core inventory, the ratio of Xe-133 to other nuclides in the fuel can be determined. In order to obtain the above concentrations of Xe-133 in the main steam line, a large primary-to-secondary leak must be present coincident with a large amount of fuel failure. The presence of Xe-133 indicates other radioactive isotopes are present.

Using the relative ratios of isotopes present in the main steam line, a computer model for determination of dose rates from these isotopes, ~~and~~ detector response curves, the dose rate equivalent to main steam line concentration is obtained. The quantity of radioactive effluents released is obtained by multiplying the Xe-133 equivalent main steam line concentrations by the isotope ratio times the steam release rate.

~~The computer model considers~~ and the thickness of the main steam line, ~~as well as~~ and the geometry of the main steam line relative to the detector.

These detectors are safety-related Class 1E and meet the requirements of RG 1.97 and NUREG-0737.

11.5.2.5.4 Steam Generator Blowdown Monitors: These monitors are identical to the main steam line monitors and are adjacent to the SGBD lines in the Isolation Valve Cubicle (IVC).

The monitors are used as an aid in determining the source of SGBD radioactivity due to SG tube rupture or leakage.

These detectors are safety-related Class 1E and meet the requirements of RG 44
1.97.

11.5.2.6 Safety Evaluation. Samples for radiation monitors are not removed from the RCB for monitoring, except for the RCB atmosphere monitor, which is shown on Figure 9.4.5-1. In the unlikely event of an accident, the lines providing the sample to the monitor and returning the sample to the RCB would be automatically isolated by the valves inside and outside the RCB. As discussed in Section 6.2.4 and shown on Figure 6.2.4-1 Sheet 93, the inside and outside valves receive power from separate Class 1E power sources and close upon receipt of a Containment ventilation isolation signal.

The monitors of the RMS which are safety-related in function are seismic Category I supported and Class 1E qualified and powered, and are the following:

1. RCB Purge Isolation Monitors
2. CR/EAB ventilation monitors
3. SFP exhaust monitors
4. RCB high range area monitors
5. Main steamline monitors
6. SGBD monitors

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9.3.4.2.5.5 Radiation -

Radiation Level of Recycle Evaporator Condensate

Instrumentation is provided to give an indication in the main control room of the radiation level in the recycle evaporator condensate. Upon a high-level signal, this system causes a three-way valve to divert flow back to the recycle evaporator feed demineralizers. This instrumentation also has a high-radiation level alarm on both the BRS panel and on the main control board.

9.3.5 Standby Liquid Control System

This does not apply to STP.

9.3.6 Failed Fuel Detection

~~A liquid detector channel monitor is provided as part of the Radiation Monitoring System (RMS) for gross failed fuel detection. The monitor obtains a continuous sample from the CVCS downstream of the letdown HX.~~ 40

~~The monitor is composed of a sample canister designed for easy removal and at least a 3 in. 4-Pi lead shield. The detector used is a gamma scintillation type with a NaI crystal in the cross counting mode, which outputs data to a locally mounted microprocessor for alarm checking and display. The monitor is provided with a sample flow switch to alarm flow stoppage. The monitor has the same local and remote alarm, indication and recording capabilities as discussed for the process and effluent radiation monitors in Section 11.5.~~

~~The alarm is set to indicate an increase over normal activity. When an alarm occurs a sample will be taken for laboratory analysis. The failed fuel monitor is nonsafety-related.~~ 40

See Section 11.5.2.4.8 for a description of the failed fuel monitor.

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TABLE 11.5-1

PROCESS AND EFFLUENT RADIATION MONITORING SYSTEM

Monitor	Service	Sample Location	Detector Number	Detector Type	Analysis Performed	Range (µCi/cc)	MDC (1) (µCi/cc)	Controlling Isotope(8)	Alert Alarm (µCi/cc)	High Alarm (µCi/cc)	Control Function
RT-8011	Reactor Containment Building Atmosphere	Containment Atmosphere	RE-8011A Particulate (P)	(2)	Gross Beta	~~(8)~~ 8.6(-12) to 1.4(-5) 9.3(-11) to 7.0(-5)	8.6(-12) * 9.3(-11)	Cs-137 Rb-88	5.0 (-8)	1.0 (-7)	Sends Signal to SSPS for Containment Ventilation Isolation (Section 9.4.5)
			RE-8011B Iodine (1) R	(3)	Gross Gamma	~~(9)~~ 4.4(-11) to 1.2(-5)	*4.4(-11)	I-131	9.0 (-8)	9.0 (-7)	
			RE-8011C Noble Gas (NG)	(2)	Gross Beta	~~(10)~~ 2.1(-7) to 2.8(-1)	*2.1(-7)	Kr-85	~~1.0 (-6)~~ 3.3(-6)	~~4.0 (-6)~~ 6.6(-6)	
RT-8010A	Unit Vent Particulate and Iodine	Unit Vent Stack, MAB Roof	RE-8010A (P)	(2)	Gross Beta	~~(8)~~ 8.6(-12) to 1.4(-5)	*8.6(-12)	Cs-137	5. (-8)	1.0 (-7)	NONE
			RE-8010B (I)	(3)	Gross Gamma	~~(9)~~ 4.4(-11) to 1.2(-5)	*4.4(-10)	I-131	~~1.0~~ 5.0 (-7)	~~4.0~~ 9.0 (-7)	
RT-8010B	Unit Vent Wide Range Gas	Unit Vent Stack, MAB Roof	RE-8010C (NG) Low Range	(2)	Gross Beta 6.5(-8) to 2.3(-1)	~~1.4x10^-7 to 1.4x10^-1~~	~~[illegible]~~ 6.5(-8)	Xe-133 ~~Kr-85~~	3.9(-7)*	7.8(-7)*	NONE
			RE-8010D (NG) Mid-Range	(5)	3.8(-5) to 7.1(2)	~~6.6x10^-4 to 6.6x10^2~~	*3.8(-5)	Xe-133 ~~Kr-85~~	N/A	N/A	
			RE-8010E (NG) High Range	(5)	1.0(-2) to 2.6(5)	~~1.7x10^-1 to 1.7x10^5~~	1.0(-2)	Xe-133 ~~Kr-85~~	N/A	N/A	
RT-8033	Control Room/ Electrical Auxiliary Building (EAB) Air Intake	EAB Intake Air	RE-8033 (NG)	(2)	Gross Beta	~~(11)~~ ~~5.3(-8) to 1.4(-4)~~ 3.2(-7) to 2.3(-1)	3.2(-7) ~~5.3(-8)~~	Xe-133 ~~Kr-85~~	7.5 (-4)	1.5 (-3)	Initiates Control Room/EAB Emergency Ventilation (Section 9.4.1)
RT-8034	Control Room/ Electrical Auxiliary Building (EAB) Air Intake	EAB Intake Air	RE-8034 (NG)	(2)	Gross Beta	~~(11)~~ ~~5.3(-8) to 1.4(-4)~~ 3.2(-7) to 2.3(-1)	3.2(-7) ~~5.3(-8)~~	Xe-133 ~~Kr-85~~	7.5 (-4)	1.5 (-3)	Initiates Control Room/EAB Emergency Ventilation (Section 9.4.1)
RT-8027	Condenser Vacuum Pump (CVP)	CVP Exhaust Pipe, TCB	RE-8027A (NG) Low Range	(2)	Gross Beta 6.0(-8) to 2.3(-1)	~~1.4x10^-7 to 1.4x10^-1~~	*6.0(-8)	Xe-133 ~~Kr-85~~	1.0(-5)*	1.0(-4)*	NONE
			RE-8027B (NG) Mid-Range	(5)	3.0(-5) to 7.1(2)	~~6.6x10^-4 to 6.6x10^2~~	*3.0(-5)	Xe-133 ~~Kr-85~~	N/A	N/A	
			RE-8027C (NG) High Range	(5)	9.3(-3) to 2.5(5)	~~1.7x10^-1 to 1.7x10^5~~	*9.3(-3)	Xe-133 ~~Kr-85~~	N/A	N/A	

* Later
See notes at end of table

TABLE 11.5-1 (Continued)

PROCESS AND EFFLUENT RADIATION MONITORING SYSTEM

Monitor	Service	Sample Location	Detector Number	Detector Type	Analysis Performed	Range (μCi/cc)	MDC (1) (μCi/cc)	Controlling Isotope(8)	Alert Alarm (μCi/cc)	High Alarm (μCi/cc)	Control Function
RT-8035	Spent Fuel Pool Exhaust	Fuel Handling Building Ventilation Exhaust	RE-8035 (NG)	(2)	Gross Beta	~~(11)~~ 2.3 1.4(-7) to ~~[illegible]~~(-1)	1.4 (-7)	Xe-133 ~~Kr-85~~	4.0(-2)	8.1(-2)	Initiates Fuel Handing Building Exhaust Filtration (Section 9.4.2)
RT-8036	Spent Fuel Pool Exhaust	Fuel Handling Building Ventilation Exhaust	RE-8036 (NG)	(2)	Gross Beta	~~(11)~~ 2.3 1.4(-7) to ~~[illegible]~~(-1)	1.4 (-7)	Xe-133 ~~Kr-85~~	4.0 (-2)	8.1 (-2)	Initiates Fuel Handling Building Exhaust Filtration (Section 9.4.2)
RT-8012	Reactor Containment Building (RCB) Purge Isolation	RCB Normal Purge System Exhaust	RE-8012 (NG)	(2)	Gross Beta	~~(11)~~ 2.3 1.9(-7) to ~~[illegible]~~(-1)	1.9(-7) ~~5.3 (-8)~~	Xe-133 ~~Kr-85~~	7.5 (-3)	7.5 (-2)	Sends Signal to SSPS for Containment Ventilation Isolation (Section 9.4.5)
RT-8013	RCB Purge Isolation	RCB Normal Purge System Exhaust	RE-8013 (NG)	(2)	Gross Beta	~~(11)~~ 2.3 1.9(-7) to ~~[illegible]~~(-1)	1.9(-7) ~~5.3 (-8)~~	Xe-133 ~~Kr-85~~	7.5 (-3)	7.5 (-2)	Sends Signals to SSPS for Containment Ventilation Isolation (Section 9.4.5)
RT-8043	Steam Generator Blowdown (SGBD) Liquid	SGBD Flash Tank Outlet Demineralizer Outlet	RE-8043 Liquid (L)	(4)	Gross Gamma	~~(11)~~ 3.9(-8) to 7.8(-2)	3.9 ~~7.9~~ (-8)	Cs-137	3.0(-6)	1.0(-5)	Closes SGBD Discharge to Neutralization Basin Isolation Valve, FV-5019
RT-8038	Liquid Waste Processing System (LWPS)	Upstream of LWPS Diversion Valve FV-4077	RE-8038 (L)	(4)	Gross Gamma	~~(11)~~ 7.9(-8) to 7.8(-2)	7.9 (-8)	Cs-137	4.2(-6)	8.4(-6)	Positions Diversion Valve FV-4077 to Divert Effluent Back to Waste Monitor Tanks (Section 11.2)
RT-8045	Liquid Waste Processing System (LWPS)	Upstream of LWPS Diversion Valve FV-5050	RE-8045 (L)	(4)	Gross Gamma	~~(11)~~ 7.9(-8) to 7.8(-2)	7.9 (-8)	Cs-137	2.4(-5)	4.8(-5)	NONE

* Later
See notes at end of table

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TABLE 11.5-1 (Continued)

PROCESS AND EFFLUENT RADIATION MONITORING SYSTEM

Monitor	Service	Sample Location	Detector Number	Detector Type	Analysis Performed	Range (μCi/cc)	MDC (1) (μCi/cc)	Controlling Isotope (8)	Alert Alarm (μCi/cc)	High Alarm (μCi/cc)	Control Function
RT-8040	Component Cooling Water (CCW)	Discharge of CCW Pumps	RE-8040 (L)	(4)	Gross Gamma	~~(11)~~ 7.9(-8) to 7.8(-2)	7.9 (-8)	Cs-137	3.0(-6) ~~*~~	1.0(-5) ~~*~~	NONE
RT-8037	Boron Recycle System (BRS)	BRS Evaporator Condensate Line	RE-8037 (L)	(4)	Gross Gamma	~~(11)~~ 7.9(-8) to 7.8(-2)	7.9 (-8)	Cs-137	2.0(-6) ~~*~~	5.0(-6) ~~*~~	Positions Diversion Valve RCV-4202 to Divert Fluid Back to BRS Evaporator Feed Demineralizers (Section 9.3.4.2)
RT-8041	Turbine Generator Building Drain	Discharge Sump Pumps Sump No. 1	RE-8041 (L)	(4)	Gross Gamma	~~(11)~~ 3.9(-8) to 7.8(-2)	3.9 (-8)	Cs-137	3.0(-6) ~~*~~	3.0(-5) ~~*~~	Stops TBG Sump No. 1 Sump Pump (Section 9.3.3)
RT-8039	Failed Fuel	Chemical and Volume Control System Letdown Line	RE-8039 (L)	(4)	Gross Gamma	~~(11)~~ 7.9(-8) to 7.8(-2)	7.9 (-8)	Cs-137	2.2(-2) ~~*~~	4.5(-2) ~~*~~	NONE
RT-8042	Condensate Polishing System (CPS)	Discharge of CPS to Neutralization Basin	RE-8042 (L)	(4)	Gross Gamma	~~(11)~~ 3.9(-8) to 7.8(-2)	3.9 ~~3.0~~ (-8)	Cs-137	2.0(-7) ~~*~~	4.0(-7) ~~*~~	Closes FV-5804, CPS Discharge to Neutralization Basin Valve (Section 10.4.6)
RT-8031	Gaseous Waste Processing System (GWPS) Inlet	Adjacent to Inlet Line to GWPS	RE-8031 Adjacent-to-line (ATL)	(3)	Gross Gamma	~~*~~ 1.8(-4) to 1.8(2)	1.8(-4) ~~5.0 (-7)~~	Xe-133 ~~Kr-85~~	1.0 (0) mR/hr (11)	2.5 (0) mR/hr (11)	NONE
RT-8032	Gaseous Waste Processing System (GWPS) Discharge	Adjacent to Discharge Line, Upstream of GWPS Discharge Valve	RE-8032 (ATL)	(3)	Gross Gamma	~~*~~ 1.4(-3) to 1.4(3)	1.4(-3) ~~5.0 (-7)~~	Kr-85	0.5 ~~[illegible]~~ (0) mR/hr (10)	1.0(0) ~~[illegible]~~ mR/hr (10)	Closes FV-4671, GWPS Discharge Valve (Section 11.3)

* Later
See notes at end of table

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TABLE 11.5-1 (Continued)

PROCESS AND EFFLUENT RADIATION MONITORING SYSTEM

Monitor	Service	Sample Location	Detector Number	Detector Type	Analysis Performed	Range (µCi/cc)	MDC (1) (µCi/cc)	Controlling Isotope(8)	Alert Alarm (µCi/cc)	High Alarm (µCi/cc)	Control Function
RT-8046	Main Steam Line 'A'	IVC, Adjacent to Main Steam Line	RE-8046A (ATL) RE-8046B (ATL)	(6) (7)	Gross Gamma	~~(12)~~ ~~(13)~~ 4.2(-3) to 8.9(3)	4.2(-3)	Xe-133	1.0(-1) mR/hr (9)	1.0(0) mR/hr (9)	NONE
RT-8047	Main Steam Line 'B'	IVC, Adjacent to Main Steam Line	RE-8047A (ATL) RE-8047B (ATL)	(6) (7)	Gross Gamma	~~(12)~~ ~~(13)~~ 4.2(-3) to 8.9(3)	4.2(-3)	Xe-133	1.0(-1) mR/hr (9)	1.0(0) mR/hr (9)	NONE
RT-8048	Main Steam Line 'C'	IVC, Adjacent to Main Steam Line	RE-8048A (ATL) RE-8048B (ATL)	(6) (7)	Gross Gamma	~~(12)~~ ~~(13)~~ 4.2(-3) to 8.9(3)	4.2(-3)	Xe-133	1.0(-1) mR/hr (9)	1.0(0) mR/hr (9)	NONE
RT-8049	Main Steam Line 'D'	IVC, Adjacent to Main Steam Line	RE-8049A (ATL) RE-8049B (ATL)	(6) (7)	Gross Gamma	~~(12)~~ ~~(13)~~ 4.2(-3) to 8.9(3)	4.2(-3)	Xe-133	1.0(-1) mR/hr (9)	1.0(0) mR/hr (9)	NONE
RT-8022	SGBD Steam Generator 'A'	IVC, Adjacent to SGBD Line	RE-8022A (ATL) RE-8022B (ATL)	(6) (7)	Gross Gamma	~~(12)~~ * ~~(13)~~	*	* ~~Xe-133~~	1.0(0) ~~5.0~~ mR/hr	2.0(0) ~~10.0~~ mR/hr	NONE
RT-8023	SGBD Steam Generator 'B'	IVC, Adjacent to SGBD Line	RE-8023A (ATL) RE-8023B (ATL)	(6) (7)	Gross Gamma	~~(12)~~ * ~~(13)~~	*	* ~~Xe-133~~	1.0(0) ~~1.0~~ mR/hr	2.0(0) mR/hr	NONE
RT-8024	SGBD Steam Generator 'C'	IVC, Adjacent to SGBD Line	RE-8024A (ATL) RE-8024B (ATL)	(6) (7)	Gross Gamma	~~(12)~~ * ~~(13)~~	*	* ~~Xe-133~~	1.0(0) mR/hr	2.0(0) mR/hr	NONE
RT-8025	SGBD Steam Generator 'D'	IVC, Adjacent to SGBD Line	RE-8025A (ATL) RE-8025B (ATL)	(6) (7)	Gross Gamma	~~(12)~~ * ~~(13)~~	*	* ~~Xe-133~~	1.0(0) mR/hr	2.0(0) mR/hr	NONE

Notes:

1. Minimum Detectable Concentration
2. Beta Scintillation Detector
3. Gamma Scintillation Detector
4. NaI(TL) Gamma Scintillatin Detector
5. CdTe, Chlorine-doped, Solid State Sensor
6. GM Tube
7. Ion ~~Chamber~~
~~8. 3.3 x 10^{-11} to 3.3 x 10^{-6} Ci/cc~~
~~9. 7.7 x 10^{-12} to 3.8 x 10^{-6} Ci/cc~~
8. Used to determine MDC
9. Conversion Factor 9.3 mR/hr = 1.0 µCi/cc of Xe-133
10. Conversion Factor 4(-3) mR/hr = 1.0 µCi/cc of Kr-85
11. Conversion Factor 1.7 mR/hr = 1.0 µCi/cc of Xe-133
~~10. 2.8 x 10^{-7} to 2.8 x 10^{-1} Ci/cc~~
~~11. 1 x 10^{-5} to 1 x 10^{-1} Ci/cc~~
~~12. 10^{-1} to 10^{4} mR/hr~~
~~13. 10^{2} to 10^{7} mR/hr~~

* Later

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