Tennessee Valley Authority, Post Office Box 2000, Spring City, Tennessee 37381

JUL 1 8 1995

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

In the Matter of the Application of	)	Docket Nos. 50-390
Tennessee Valley Authority	)	50-391

WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - FINAL SAFETY ANALYSIS REPORT (FSAR) CHAPTER 12 AMENDMENT 89 REVIEW (TAC NO. M91523)

This letter provides draft FSAR pages as discussed in the teleconference on June 8, 1995, with NRC's F. Hebdon, R. Pedersen, B. Marcus, J. Mims and N. Merriweather.

Enclosure 1 provides the draft Chapter 12 FSAR pages. In addition, the corresponding section in the Chapter 11 discussion of calibration and maintenance is being clarified. The FSAR will be amended by Amendment 90 to include these draft FSAR pages.

Enclosure 2 list the commitment tracked by this letter. If you have any questions concerning this matter, please telephone John Vorees at (615) 365-8819.

Sincerely,

Paul Baron

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Enclosures
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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
CHAPTER 11 and 12
DRAFT FSAR REVISIONS

the pump discharge and produce audible and visible alarms locally and in the main control room. The radiation dose rate levels are indicated locally and indicated and recorded in the Main Control Room.

11.4.2.2.9 Reactor Building Floor and Equipment Drain Sump Monitors

These monitors, which use Geiger-Mueller tube detectors continuously monitor the dose rate in the Reactor Building floor and equipment drain sump pump discharge. Upon detection of high radiation, the monitors initiate a signal to isolate the pump discharge and produce audible and visible alarms locally and in the main control room. The radiation dose rate levels are indicated locally and indicated and recorded in the Main Control Room.

11.4.2.2.10 RHR Post Accident Monitors

These monitors, which use low range Geiger-Mueller tubes and high range ion chambers continuously monitor the RHR lines. Upon detection of high radiation, the monitors produce audible and visible alarms locally and in the main control room. The radiation levels are indicated locally and indicated and recorded in the Main Control Room.

11.4.3 SAMPLING

The points subject to periodic sampling are all liquid and gaseous effluent releases which could exceed 10 CFR 50 Appendix I and 10 CFR 20 limits. Radioanalytical sampling instrumentation, sampling frequencies procedures, and lower limits of detection ensure the Offsite Dose Calculation Manual (ODCM) limits are met. Sampling tables in the ODCM list the operation characteristics (sampling procedure, frequency, type of analysis, etc.) and the effects on plant operation of each gaseous and liquid sample. The plant discharge meets the ODCM, 10 CFR 50 Appendix I, and 40 CFR 190 limits.

11.4.4 CALIBRATION AND MAINTENANCE

The calibration and maintence procedures for the process monitors are described below. ~~Each monitor is checked regularly with an operational test for functional performance, and a complete calibration and performance check is performed periodically on each monitor.~~

Each detector and/or its associated electronics has a built in mechanism for checking operability. Built-in check sources can be remotely actuated from its ratemeter mounted either locally or in the MCR. The radioactive check source materials for the normal range gaseous and liquid monitors are listed in Table 11.4-5.

Response checks, calibration checks, and electronic calibration are performed periodically per the ODCM, Technical Specifications, or maintenance instructions as appropriate. The maximum interval for a complete calibration and performance check for any monitor is 22.5 months (18 months plus 25%). Maintenance is performed, as necessary, if abnormalities are detected during any of the above checks. Unscheduled maintenance is performed, as required.

TABLE 11.4-1

PROCESS AND EFFLUENT RADIATION MONITORS - LIQUID MEDIA

Monitor	TVA Instrument No.	Seis. Clas	Location Fl.Elev	Location Bldg.	Amb. Background* mR/hr	Detector Type	Nuclide	Range Min.Det[1] Conc. µCi/cc	Range Max.Det[1] Conc. µCi/cc	Range Scale cpm
Waste Disposal System Liquid Effluent Monitor	0-RE-90-122	I(L)	692.0	Aux.	1.0	Gamma Scint.	Co-60 Cs-137 I-131	9.6(-7) 1.8(-6) 1.5(-6)	1.6(-2) 2.8(-2) 2.4(-2)	$10-10^7$
Essential Raw [3] Cooling Water Effluent Monitor	0-RE-90-133 0-RE-90-134 0-RE-90-140 0-RE-90-141	I	692.0	Aux.	1.0	Gamma Scint.	Co-60 Cs-137 I-131	9.6(-7) 1.8(-6) 1.5(-6)	1.6(-2) 2.8(-2) 2.4(-2)	$10-10^7$
Component Cooling [3] System Liquid Effluent Monitor	0-RE-90-123 1-RE-90-123 2-RE-90-123	I(L)	737.0	Aux.	1.0	Gamma Scint.	Co-60 Cs-137 I-131	9.6(-7) 1.8(-6) 1.5(-6)	1.6(-2) 2.8(-2) 2.4(-2)	$10-10^7$
Steam Generator Blowdown Liquid Sample Monitor	2-RE-90-124[2]	I(L)	713.0	Aux.	5.0	Gamma Scint.	Co-60 Cs-137 Ba-133	6.1(-8) 1.2(-7) 1.2(-7)	1.5(-2) 2.9(-2) 2.8(-2)	$10-10^7$
Boric Acid Evaporator Condensate Monitor	1-RE-90-170[2] 2-RE-90-170[2]	I(L)	713.0	Aux.	10.0	Gamma Scint.	Co-60 Cs-137 I-131	1.7(-7) 3.2(-7) 2.6(-7)	1.6(-2) 2.8(-2) 2.4(-2)	$10-10^7$
Condensate Demineralizer Regenerant Effluent Monitor	0-RE-90-225	None	708.0	Turbine Bldg.	5.0	Gamma Scint.	Co-60 Cs-137 Ba-133	6.1(-8) 1.2(-7) 1.2(-7)	1.5(-2) 2.9(-2) 2.8(-2)	$10-10^7$
Steam Generator Blowdown Effluent Monitor	1-RE-90-120 2-RE-90-120[2] 1-RE-90-121 2-RE-90-121[2]	None	708.0	~~Aux.~~ Turbine Bldg.	1.0	Gamma Scint.	Co-60 Cs-137 I-131	9.6(-7) 1.8(-6) 1.5(-6)	1.6(-2) 2.8(-2) 2.4(-2)	$10-10^7$
Turbine Building Sump Effluent Monitor	0-RE-90-212	None	685.0	Turbine Bldg.	5.0	Gamma Scint.	Co-60 Cs-137 Ba-133	6.8(-8) 1.2(-7) 1.2(-7)	1.5(-2) 2.9(-2) 2.8(-2)	$10-10^7$

*External Background at which the tabulated minimum detectable concentrations were determined.

(1) MDC values are based on manufacturer's sensitivity and readout scale under laboratory conditions at the ambient background specified. Refer to Watts Bar specific calculations for actual demonstrated range. [9.6(-7) is read 9.6×10^{-7}]
(2) Not required for Unit 1 operation.
(3) These monitors perform process monitoring for detection of inleakage.

TABLE 11.4-2

(Sheet 2 of 2)

PROCESS AND EFFLUENT RADIATION MONITORS
AREA TYPE

Monitor	TVA Instrument No.	Seis. Class	Location Fl. Elev.	Bldg.	Max Amb. Background* mR/hr	Detector Type	Nuclide	Range: Min. Det.[5]	Range: Max. Measurable[5]	Range: Scale cpm
Main Steamline Radiation Monitors	1-RE-90-421 1-RE-90-422 1-RE-90-423 1-RE-90-424 2-RE-90-421[6] 2-RE-90-422[6] 2-RE-90-423[6] 2-RE-90-424[6]	I(L)	729.0	Aux.	-	Ion Chamber ~~(High Range)~~	Total gas	7.3(-2)[4,8] µCi/cc	1.35(4)[4,9] µCi/cc	Digital
Fuel Pool Radiation Monitor	0-RE-90-102 0-RE-90-103	I	757.0	Aux.	10.0	Geiger-Mueller Tube	-	10^{-1} mR/hr	10^{4} mR/hr	1.0(-1)-1.0(4) mR/hr
Reactor Coolant Drain Tank	1-RE-90-275 2-RE-90-275[6] 1-RE-90-276 2-RE-90-276[6]	I	713.0	Aux.	-	Geiger-Mueller Tube	-	10^{0} mR/hr	10^{5} mR/hr	10^{0}-10^{5} mR/hr
Reactor Bldg. Floor and Equipment Drain	1-RE-90-277 2-RE-90-277[6] 1-RE-90-278 2-RE-90-278[6]	I	713.0	Aux.	-	Geiger-Mueller Tube	-	10^{0} mR/hr	10^{5} mR/hr	10^{0}-10^{5} mR/hr
RHR Post Accident Monitors	1-RE-90-290 2-RE-90-290[6] 1-RE-90-291 2-RE-90-291[6] 1-RE-90-292 2-RE-90-292[6] 1-RE-90-293 2-RE-90-293[6]	I	676.0	Aux.	-	Geiger-Mueller Tube (Low range), Ion Chamber (High range)	-	10^{-1} mR/hr 10^{3} mR/hr 10^{-1} mR/hr 10^{3} mR/hr	10^{4} mR/hr 10^{11} mR/hr 10^{4} mR/hr 10^{11} mR/hr	10^{-1}-10^{4} mR/hr 10^{3}-10^{11} mR/hr 10^{-1}-10^{4} mR/hr 10^{3}-10^{11} mR/hr

(1) Deleted
(2) Deleted
(3) Deleted
(4) WBN-APS3-048
(5) With the exception of monitors RE-90-421 through -424, Sens. and MDC values are based on manufacturer's sensitivity and readout scale under laboratory conditions at the ambient background specified. Refer to Watts Bar specific calculations for actual demonstrated range. [1.3(-10) is read 1.3 x 10^{-10}]. Units are µCi/cc except where specifically indicated as mR/Hr.
(6) Not required for Unit 1 operation
(7) 1,2-RE-90-400 use a beta scintillation and CdTe (Ci) detectors. 1,2-RE-90-402 are samplers and require no detectors.
(8) Pre-shutdown normal
(9) Post accident
(10) Detector types, nuclides, and ranges are for gas detectors unless noted otherwise.

* External background at which the tabulated minimum detectable concentrations were determined.

12.3.4.1.2.2 Main Control Room Ratemeter (0-M-12, 1-,2-M-30)

Ratemeters are of solid-state construction containing a solid-state, high-voltage power supply. Alarms are provided on the ratemeter chassis for high radiation and instrument malfunction. Visual and audible alarms are provided for high radiation and instrument malfunction in the main control room.

12.3.4.1.2.3 Local Indicator-Alarm Panel

With the exception of the main control room and Reactor Building upper and lower compartment post accident monitors, each monitor has a locally mounted panel which contains an indicator, a visual and audible high radiation alarm, and a power-on light.

12.3.4.1.2.4 Multipoint Recorders (Main Control Room 0-M-12, 1-,2-M-31)

The area monitors are recorded on multipoint recorders on panels 0-M-12, or 1-,2-M-31 in the MCR.

12.3.4.1.2.5 Monitor Sensitivity and Range

The ranges of the instrumentation provided are given in Table 12.3-4. The area monitors set points, adjustable over the entire range, are determined by the radiation control group based on operating background levels. The setpoints for the containment high range monitors are determined by engineering analysis.

Insert A

12.3.4.1.3 Calibration and Maintenance

~~Each monitor is checked regularly with an operational test for functional performance, and a complete calibration and performance check is performed periodically on each monitor.~~

~~Each channel is provided with a means by which an operational channel check can be rapidly performed. This is performed by operation of a check source which may be radioactive, or by check of the electronics in the case of the ion chamber.~~

~~Response checks, calibration checks, and electronic calibration are performed per appropriate plant procedures (e.g. technical specifications or maintenance instructions).~~

Maintenance is performed, as necessary, if abnormalities are detected during any of the above checks. Unscheduled maintenance will be performed as required.

INSERT A

12.3.4.1.3 Area Monitor Calibration and Maintenance

With the exception of the Reactor Building, upper and lower compartment post accident monitors, periodic testing of each area monitor includes a channel calibration performed at least once per fuel cycle, and a channel operational test that is performed at least once per quarter. Testing of the Reactor Building upper and lower compartment post accident monitors is described by plant Technical Specifications.

The channel calibration is the adjustment, as necessary, of the channel so that it responds within the required range and accuracy to known input from a radioactive calibration source. The channel calibration encompasses the entire channel, including the required sensor, alarm, interlock, display and trip functions. The channel calibration may be performed by means of any series of sequential, overlapping calibrations or total channel steps so that the entire channel is calibrated.

The channel operational test (COT) is the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify the operability of required alarm, interlock, display, and trip functions. The COT includes adjustments, as necessary, of the required alarm, interlock, and trip setpoints so that the setpoints are within the required range and accuracy.

The built in check source function exposes the channel detector to a radioactive source for all channels except those employing an ion chamber detector. The check source function simulates a detector signal at the channel electronics in channels employing an ion chamber detector. The built in check source feature is used to verify functional response of the detector and/or electronics during the performance of the channel operational test. This function is also used by operations personnel at other times, such as after maintenance, to rapidly determine channel operability.

~~Calibration together with analog channel operational tests verify that instrument malfunction is alarmed on loss of input and that an alarm on reaching the monitor setpoint is annunciated.~~

12.3.4.2 Airborne Particulate Radioactivity Monitoring

12.3.4.2.1 Design Basis

The airborne radioactivity monitoring systems are one of the plant features provided to comply with 10 CFR 50, Appendix A, General Design Criteria 19, 63, and 64, and with paragraph 20.1501(a) of 10 CFR 20. Adequate systems are provided to comply with 10 CFR 20 paragraph 20.1201, 20.1204, and 20.1502. Each of the systems monitor an air space to which one or more of the following descriptions are applicable.

1. Spaces in which there is, during normal operation, a potential for airborne concentrations at DAC levels which, when integrated over a normal 40 hr/wk and 50 wk/yr, would exceed the ALI of any isotope or mixture of isotopes and for which there are requirements for either (a) frequent (i.e., once per shift) visits, each of which is for a duration of at least several minutes, or (b) infrequent but routine visits of at least an hour's duration and for which monitoring systems can be practicably supplied in lieu of provision for safely taking and analyzing grab samples for airborne activity prior to personnel entry.

2. General spaces (e.g., spaces outside shielded equipment rooms) of buildings that contain equipment which bears, in process fluids, potentially significant radioactivity. (Although the plant ventilation systems normally supply clean air upstream of the spaces containing potential leakage points, monitoring is provided to detect airborne activity in the event of malfunction of the ventilation systems).

3. Spaces which have requirements for routine occupancy into which significant airborne activity may be introduced directly (e.g., physical barriers to its introduction do not exist). If an existing physical barrier consists of a ventilation system, consideration is given to the magnitudes of possible airborne concentrations should the ventilation system malfunction.

4. Spaces in which habitable conditions must be guaranteed at all times, even during accident conditions.

12.3.4.2.2 Airborne Monitoring Channels

Process and effluent radiation monitoring systems provide useful information about the airborne activity within the plant buildings. These systems, described in Section 11.4, are the following:

1. Containment Building lower and upper compartment air monitors.

2. Auxiliary Building ventilation monitor.

In addition to these process and effluent monitors, there are 11 channels for monitoring airborne particulate activity. These channels are listed in Table 12.3-5.

Monitoring of the Auxiliary Building airborne activity during normal conditions is accomplished with the eight airborne monitoring systems that monitor the spent fuel pool area, the two sample rooms, the holdup valve gallery general area, the decontamination area, the safety injection pump general area and the two waste packaging areas.

The Auxiliary Building ventilation monitor real time particulate and iodine channels are used to supplement auxiliary building monitors listed in Table 12.3-5. These channels ~~should~~ detect airborne radioactivity from particulates and iodines in excess of 10 DAC-Hr from any area in the Auxiliary Building which may be normally occupied, taking into account dilution in the ventilation system.

The lower compartment Unit 1 instrument room monitor provides monitoring of airborne activity in the Reactor Building instrument room during normal operation. ~~conditions.~~ The containment upper and lower compartment monitors (described in Section 11.4) can also be used to monitor for airborne activity in the Reactor Building under normal and accident conditions provided containment isolation has not occurred, or conditions allow the lines to be reopened.

The locations of the eleven ~~assigned~~ airborne monitors that are in the Auxiliary, Reactor and Control Buildings can be determined by their respective coordinates from Table 12.3-5 applied to Figures 12.3-4, 12.3-8, 12.3-10, 12.3-12, and 12.3-15.

12.3.4.2.3 Operational Characteristics

Paragraphs 12.3.4.2.3 through 12.3.4.2.6 discuss the eleven airborne monitors. For operational characteristics of the containment lower and upper compartment air monitors and the Auxiliary Building ventilation monitors, refer to Section 11.4.

Each particulate channel has a detector assembly containing a moving tape filter through which a continuous air sample is drawn. Particulate radioactivity collected on the moving tape filter is detected by a beta scintillation detector. Local indication, recording, alarms, and pump and flow controls are provided.

12.3.4.2.4 Component Descriptions

Detectors

The particulate detector units employ beta scintillation detectors and built-in preamplifiers. The detectors are able to detect beta radiation of an energy level of 0.2 MeV and above.

Filter Transport System

The particulate filter transport mechanism is operated in the continuous advance mode. A local visual filter tape tear alarm is provided. A filter tape tear alarm also initiates an instrument malfunction alarm in the main control room.

Local Ratemeter

The log ratemeter is a solid-state device with a range of 10^1 to 10^7 cpm. It is equipped with a solid-state power supply with adjustable high voltage.

Local alarms are provided on the ratemeter chassis for high radiation and instrument malfunction. Visual and audible alarms are provided in the main control room on detection of a high radiation or instrument malfunction condition.

Multipoint Recorder (0-M-12)

With exception of 0-RE-90-105, the air particulate monitor activity signals are recorded on a common multipoint recorder located on panel 0-M-12 in the main control room.

Local Recorders

A single pin local recorder is provided at each airborne monitor unit. Each recorder has direct-reading indicating scales calibrated from 10^1 to 10^7 cpm.

Pumping System

The pumping system has automatic flow regulation with manual override. A flow indicator is also provided. Visual alarms for loss of flow are provided at the enclosure. An instrument malfunction alarm is provided in the main control room on loss of flow.

12.3.4.2.5 Sensitivity, Range and Set Point

The particulate monitors located in the Auxiliary Building and Control Building have a required range of 1.99E-8 to 7.96E-6 μCi/cc. For the Reactor Building instrument room particulate monitor, the required range is 1.08E-8 to 4.32E-6 μCi/cc. This required range is sufficient to detect 10 DAC hours of airborne radionuclides expected in the area (i.e., Co-60, Cs-137, etc.).

Insert B

12.3.4.2.6 Calibration and Maintenance

~~Each monitor is checked regularly with an operational test for functional performance, and calibration is preformed periodically on each monitor.~~

~~Each detector has a built-in check source to verify operability which is operated locally from a control on the unit chassis.~~

~~Response checks, calibration checks, and electronic calibration are performed per appropriate plant procedures (e.g. Tech Specs or maintenance instructions).~~

~~Maintenance is performed, as necessary, if abnormalities are detected during any of the above checks. Unscheduled maintenance is performed as required.~~

INSERT B

12.3.4.2.6 Calibration and Maintenance

Periodic testing of each air particulate monitor includes a channel calibration performed at least once per fuel cycle, and a channel operational test that is performed at least once per quarter. Periodic maintenance is performed to replace filters, and ensure proper sampler operation. Testing of the Containment Building lower and upper compartment air monitors is described in FSAR Chapter 11 and the Technical Specifications. Testing of the Auxiliary Building vent monitor is described in FSAR Chapter 11 and the Offsite Dose Calculation Manual.

The channel calibration is the adjustment, as necessary, of the channel so that it responds within the required range and accuracy to known input from a radioactive calibration source. The channel calibration encompasses the entire channel, including the required sensor, alarm, interlock, display and trip functions. The channel calibration may be performed by means of any series of sequential, overlapping calibrations or total channel steps so that the entire channel is calibrated.

The channel operational test (COT) is the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify the operability of required alarm, interlock, display, and trip functions. The COT includes adjustments, as necessary, of the required alarm, interlock, and trip setpoints so that the setpoints are within the required range and accuracy.

The built in check source function exposes the channel detector to a radioactive source. The built in check source feature is used to verify functional response of the detector and/or electronics during the performance of the channel operational test. This function is also used by operations personnel at other times, such as after maintenance, to rapidly determine channel operability.

Periodic maintenance to change filters and to ensure proper sampler operation is performed at a frequency based upon length of service time for filters and sample equipment as determined by operational experience and trending.

Maintenance is performed, as necessary, if abnormalities are defected during any of the above checks. Unscheduled maintenance is performed as required.

12.3.4.3 Deleted by Amendment 84.

12.3.4.4 Special Radiation Monitors

The types of special radiation monitors are described in the following sections.

12.3.4.4.1 Portal Monitors

The portal monitor is a radiation monitoring device for providing a visual and aural warning when the radiation contamination of an individual exceeds a preset level, especially on the heels and soles of the shoes and a general overall body scan. The portal monitors are located at the gatehouse.

12.3.4.4.2 Personnel Contamination Monitors

The personnel contamination monitor is a radiation monitoring device designed to detect the presence and general location of beta-gamma contamination on the hands, shoes, and clothing of personnel. The instrument is designed to allow an individual to monitor himself.

~~12.3.4.4.3 Deleted by Amendment 84.~~

REFERENCES:

1. SDC, A Shielding - Design Calculation Code for Fuel- Handling Facilities (RSIC Code Package CCC-60).

2. Reactor Shielding Design Manual, Theodore Rockwell III, D. Van Nostrund Company, Incorporated, New York, N. Y., 1956.

3. ANSI N13.10-1974, Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents.

4. WBNTSR-077 "Radiation Zones"

5. 10 CFR 20 ~~May 1991~~ JANUARY, 1994

6. QAD-P5Z, "Source Shield Detector Problems", ID No. 262361.

ENCLOSURE 2

WATTS BAR NUCLEAR PLANT UNITS 1 AND 2
CHAPTER 11 AND 12
COMMITMENT LIST

The FSAR will be amended by Amendment 90 to include the draft FSAR pages in Chapter 11 and 12.