Washington Public Power Supply System
Box 1223 Elma, Washington 98541 (206) 482-4428

Docket No. 50-508

September 8, 1983
G03-83-720

Director of Nuclear Reactor Regulation
ATTN: Mr. G. W. Knighton, Chief
Licensing Branch No. 3
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: NUCLEAR PROJECT 3
RESPONSES TO NRC SAFETY EVALUATION QUESTIONS

Reference: a) Letter #G03-83-711, G. C. Sorensen to G. W. Knighton dated September 2, 1983

Via the referenced letter the Supply System transmitted for NRC Review our responses to 127 questions generated as a part of the Safety Evaluation of the WNP-3 Operating Licensee Application.

Due to an error in our document reproduction facilities while generating the requisite number of copies for the above submittal, portions of those responses were inadvertently not included. Attached please find the information required to bring the included listing of questions up to date. In all cases, where some information may have been missing from the earlier submittal, the entire question response is repeated herein.

B001
/1

If you require additional information or clarification, the Supply System point of contact for this matter is Mr. D. W. Coleman, Licensing Project Manager (206/482-4428 ex. 5436).

Sincerely,

KW Cook for

G. C. Sorensen, Manager
Nuclear Safety and Regulatory Programs

AJM/sa

Attachments:

cc: D. J. Chin - Ebasco NYO
N. S. Reynolds - D & L
J. A. Adams - NESCO
D. Smithpeter - BPA
A. Vietti - RNC
A. A. Tuzes - CE
Ebasco - Elma
WNP-3 Files - Richland

STRUCTURAL ENGINEERING BRANCH

220.10 - Complete *
220.11 - Complete *
220.12 - Complete *
220.13 - Not Scheduled
220.14 - Complete *
220.15 - Not Scheduled
220.16 - Not Scheduled
220.17 - Complete *
220.18 - Not Scheduled
220.19 - Complete *
220.20 - Complete *
220.21 - Complete *
220.22 - Not Scheduled
220.23 - Complete *
220.24 - Complete *
220.25 - Not Scheduled
220.26 - Not Scheduled
220.27 - Complete *
220.28 - Complete *
220.29 - Complete *
220.30 - Not Scheduled
220.31 - Complete *
220.32 - Compelte *
220.33 - Complete
220.34 - Complete *
220.35 - Complete *
220.36 - Complete *
220.37 - Not Scheduled
220.38 - Complete *

GEOSCIENCES BRANCH

230.1 - Not Scheduled
230.2 - Not Scheduled
230.3 - Not Scheduled
230.4 - Not Scheduled
230.5 - Not Scheduled
230.6 - Not Scheduled

GEOSCIENCES BRANCH

231.1 - Not Scheduled
231.2 - Not Scheduled
231.3 - Not Scheduled
231.4 - Not Scheduled
231.5 - Not Scheduled
231.6 - Not Scheduled
231.7 - Not Scheduled

* - indicates September submittal

HYDROLOGIC AND GEOTECHNICAL ENGINEERING BRANCH

241.12 - Complete
241.13 - Complete
241.14 - Complete
241.15 - Complete
241.16 - Complete
241.17 - Complete
241.18 - Complete *
241.19 - Complete *
241.20 - Not Scheduled
241.21 - Complete *
241.22 - Complete *
241.23 - Complete
241.24 - Complete *
241.25 - Complete *

QUALITY ASSURANCE BRANCH

260.0 - Not Scheduled

CHEMICAL ENGINEERING BRANCH

281.5 - Complete
281.6 - Not Scheduled
281.7 - Complete *
281.8 - Complete
281.9 - Complete
281.10 - Complete
281.11 - Complete
281.12 - Complete
281.13 - Complete *
281.14 - Complete *
281.15 - Complete
281.16 - Complete *
281.17 - Complete *

EFFLUENT TREATMENT SYSTEMS BRANCH

321.1 - Complete *
321.2 - Complete *
321.3 - Complete *
321.4 - Complete *
321.5 - Complete
321.6 - Complete *

AUXILIARY SYSTEMS BRANCH

410.15 - Complete
410.16 - Complete *
410.17 - Complete *
410.18 - Complete *
410.19 - Complete *
410.20 - Not Scheduled
410.21 - Not Scheduled
410.22 - Not Scheduled
410.23 - Complete
410.24 - Complete *
410.25 - Complete *
410.26 - Not Scheduled
410.27 - Complete
410.28 - Complete
410.29 - Complete *
410.30 - Complete *
410.31 - Complete
410.32 - Complete *
410.33 - Complete
410.34 - Not Scheduled
410.35 - Complete *
410.36 - Complete *
410.37 - Complete
410.38 - Complete *
410.39 - Not Scheduled
410.40 - Not Scheduled
410.41 - Complete
410.42 - Not Scheduled
410.43 - Not Scheduled
410.44 - Complete

AUXILIARY SYSTEMS BRANCH CONT.

410.45 - Complete *
410.46 - Complete
410.47 - Complete *
410.48 - Complete
410.49 - Complete
410.50 - Complete *
410.51 - Complete
410.52 - Complete *
410.53 - Not Scheduled

POWER SYSTEMS BRANCH

430.3 - Complete*
430.4 - Complete*
430.5 - Complete*
430.6 - Complete*
430.7 - Complete*
430.8 - Complete*
430.9 - Complete*
430.10 -Complete*
430.11 - Not Scheduled
430.12 - Complete*
430.13 - Complete*
430.14 - Not Scheduled
430.15 - Complete*
430.16 - Complete*
430.17 - Complete
430.18 - Complete*
430.19 - Complete*
430.20 - Complete*
430.21 - Not Scheduled
430.22 - Complete*
430.23 - Not Scheduled
430.24 - Complete*
439.25 - Complete*
430.26 - Not Scheduled
430.27 - Not Scheduled
430.28 - Not Scheduled
430.29 - Not Scheduled
430.30 - Not Scheduled
430.31 - Not Scheduled
430.32 - Complete*
430.33 - Not Scheduled
430.34 - Complete*
430.35 - Complete*
430.36 - Not Scheduled
430.37 - Not Scheduled
430.38 - Complete*
430.39 - Not Scheduled
430.40 - Complete*
430.41 - Complete*
430.42 - Not Scheduled
430.43 - Not Scheduled
430.44 - Not Scheduled
430.45 - Not Scheduled
430.46 - Not Scheduled
430.47 - Not Scheduled
430.48 - Not Scheduled
430.49 - Complete*
430.50 - Not Scheduled
430.51 - Complete*
430.52 - Not Scheduled
430.53 - Not Scheduled
430.54 - Complete*
430.55 - Complete*

POWER SYSTEMS BRANCH CONT.

430.56 - Complete*
430.57 - Complete*
430.58 - Not Scheduled
430.59 - Not Scheduled
430.60 - Complete*
430.61 - Not Scheduled
430.62 - Complete*
430.63 - Complete*
430.64 - Not Scheduled
430.65 - Complete*
430.66 - Complete*
430.67 - Complete*
430.68 - Complete*

ACCIDENT EVALUATION BRANCH

450.1 - Not Scheduled
450.2 - Complete
450.3 - Complete
450.4 - Complete*
450.5 - Complete*
450.6 - Not Scheduled
450.7 - Complete*
450.8 - Not Scheduled
450.9 - Complete*
450.10 - Complete*
450.11 - Complete*
450.12 - Not Scheduled

ACCIDENT EVALUATION BRANCH

451.3 - Complete
451.4 - Complete*
451.5 - Complete
451.6 - Not Scheduled
451.7 - Complete

RADIOLOGICAL ASSESSMENT BRANCH

471.10 - Complete
471.11 - Complete*
471.12 - Not Scheduled
471.13 - Complete
471.14 - Not Scheduled
471.15 - Complete*
471.16 - Complete*
471.17 - Complete
471.18 - Complete
471.19 - Complete*
471.20 - Complete*
471.21 - Not Scheduled
471.22 - Complete*
471.23 - Not Scheduled
471.24 - Complete
471.25 - Not Scheduled

CONTAINMENT SYSTEMS BRANCH

480.7 - Complete*
480.8 - Complete*
480.9 - Not Scheduled
480.10 - Complete*
480.11 - Complete*
480.12 - Not Scheduled
480.13 - Not Scheduled
480.14 - Complete*
480.15 - Complete*
480.16 - Complete*
480.17 - Not Scheduled
480.18 - Not Scheduled
480.19 - Not Scheduled
480.20 - Not Scheduled
480.21 - Not Scheduled
480.22 - Complete*
480.23 - Complete*
480.24 - Not Scheduled
480.25 - Complete*
480.26 - Not Scheduled

CORE PERFORMANCE BRANCH

490.2 - Not Scheduled

CORE PERFORMANCE BRANCH

492.1 - Complete*
492.2 - Not Scheduled
492.3 - Not Scheduled

LICENSEE QUALIFICATION BRANCH

630.3 - Complete
630.4 - Complete*
630.5 - Complete*
630.6 - Complete*
630.7 - Complete
630.8 - Complete
630.9 - Complete*
630.10 - Complete*
630.11 - Complete*
630.12 - Complete

PROCEDURES AND TEST REVIEW BRANCH

640.1 - Complete*
640.2 - Complete*
640.3 - Complete*
640.4 - Complete*
640.5 - Complete*
640.6 - Complete*
640.7 - Complete*
640.8 - Complete*
640.9 - Complete*
640.10 - Complete*
640.11 - Complete*
640.12 - Complete*
640.13 - Complete*
640.14 - Complete*
640.15 - Complete*

Question No.

220.14 (SRP 3.8.1, II, 4, e (for reference) FSAR 3.7.1, 3.7.2, 3.7.3, 3.8.3, 3.8.4, 3.8.5)	Provide a tabulation of all computer programs used in these sections. Include descriptions and validation information. The staff position is described in NUREG-0800 (SRP) Section 3.8.1, II, 4, e.

Response

NUREG-0800 (SRP) Subsection 3.8.1, II 4, e states that computer program used for design and analysis should be described and validated by any of the following procedures or criteria:

(i) The computer program is a recognized program in the public domain and has had sufficient history of use to justify its applicability and validity without further demonstration.

(ii) The computer program solution to a series of test problems has been demonstrated to be substantially identical to those obtained by a similar and independently written and recognized program in the public domain. The test problems should be demonstrated to be similar to or within the range of applicability of the problems analyzed by the public domain computer program.

(iii) The computer program solution to a series of test problems has been demonstrated to be substantially identical to those obtained from classical solutions or from accepted experimental tests, or to analytical results published in technical literature. The test problems should be demonstrated to be similar to or within the range of applicability of the classical problems analyzed to justify acceptance of the program.

The computer programs used in the subject FSAR Subsections (3.7.1, 3.7.2, 3.7.3, 3.8.3, 3.8.4 and 3.8.5), along with their method of validation, are as follows:

Response (Cont'd)

220.14

PROGRAM	DESCRIPTION	METHOD OF VALIDATION
NASTRAN	(1) Seismic dynamic analysis (2) Static analysis	Criterion (i)
DYNAMIC 2037 (Also called FIXMAT 2037	Seismic dynamic analysis	Previously validated on the Waterford-3 FSAR (Docket No. 50-382) using Criterion (ii). See attached pages.
STARDYNE	(1) Seismic dynamic analysis (torsional) (2) Static analysis	Criterion (i)
ANSYS	Static analysic (non-linear)	Criterion (i)
SHAKE	See ref: Schnabel, P B, Lysmer, J and Seed, H B, "SHAKE: A Computer Program for Earthquake Response Analysis of Horizontally Layered Sites." Report No. EERC, 72-12 Earthquake Engineering Research Center, University of California, Berkeley, California - December 1972	Criterion (i)

Comparison of DYNAMIC 2037 and STARDYNE

DYNAMIC 2037 is an EBASCO in-house computer program which operates on BURROUGHS-7700 and solves seismic dynamic problems by time history modal-response method. Since this program is not a recognized program in public domain, a comparison of it with STARDYNE (version 4/1/72) is made here to demonstrate its validity and applicability.

A typical reactor building is used in this comparison and the dynamic structural model of this building is shown in Fig. 1. The seismic time history used is Elcentro NS 1940 normalize to 0.18g.

Natural frequencies for first ten modes, maximum displacements, forces, shears and moments at selected mass points or numbers output from both DYNAMIC 2037 and STARDYNE are tabulated in TABLE I, II, III, IV and V respectively. These almost identical results validate DYNAMIC 2037 for type of problem stated here.

Q 220.14

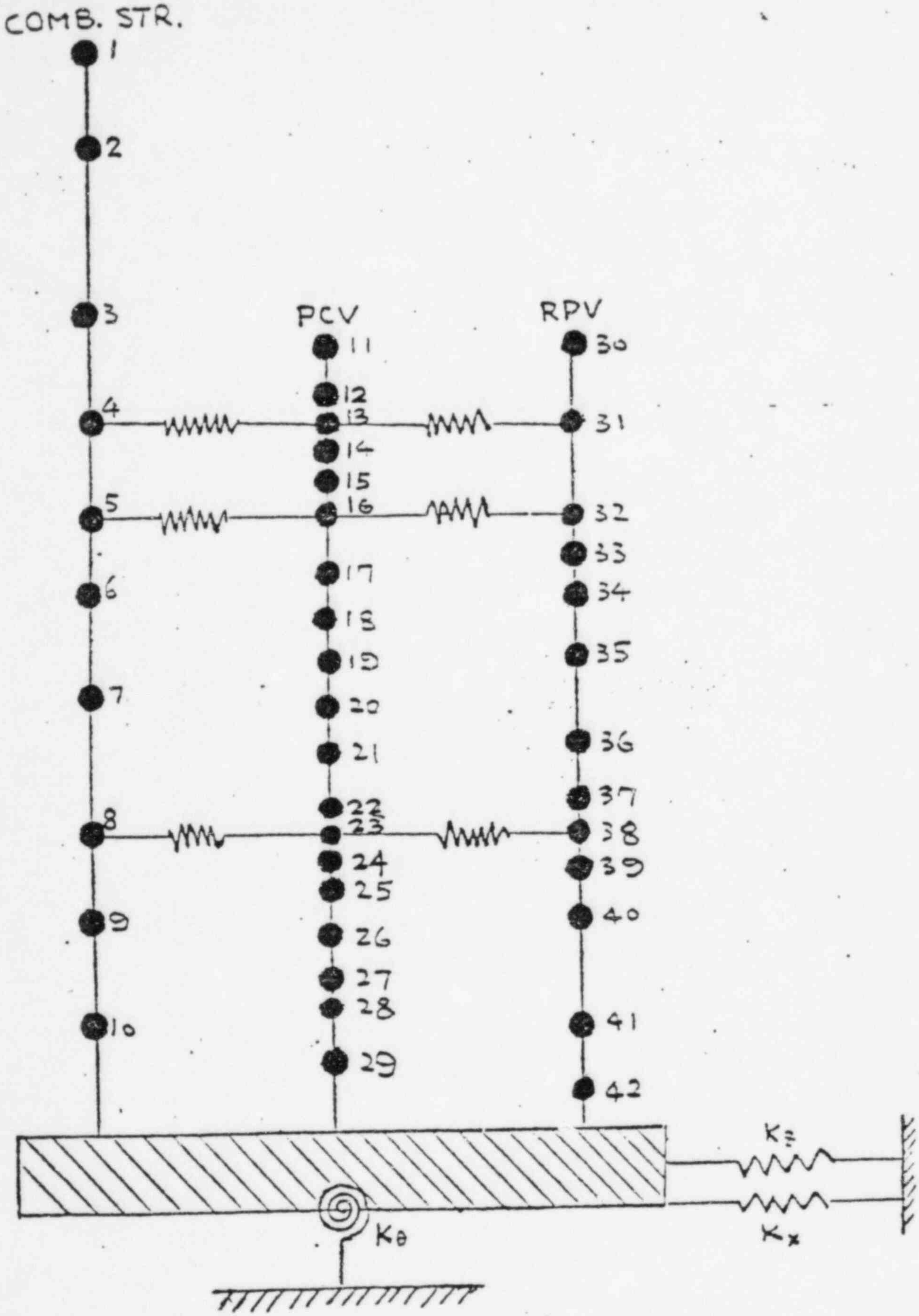

FIG. 1 STRUCTURAL MODEL

Q 220.14

MODE NUMBER	NATURAL FREQUENCY	
	DYNAMIC 2037 cps	STARDYNE (version 4/1/72) cps
1	2.44	2.43
2	5.02	5.01
3	8.39	8.36
4	8.91	8.91
5	11.3	11.2
6	13.1	13.1
7	15.5	15.4
8	17.8	17.7
9	18.4	18.3
10	22.1	22.0

TABLE I

COMPARISON OF NATURAL FREQUENCY

Q220.14

MASS POINT	DYNAMIC 2037		STARDYNE (Version 4/1/72)	
	TIME secs	MAX. DISP. meters	TIME secs	MAX. DISP. meters
1	2.48	0.0565	2.48	0.0567
10	2.69	0.0179	2.69	0.0179
11	2.48	0.0419	2.48	0.0420
29	2.69	0.0172	2.69	0.0172
30	2.48	0.0436	2.48	0.0437
42	2.69	0.0156	2.69	0.0155

TABLE II

COMPARISON OF MAX. DISPLACEMENT

Q220.14

MASS POINT	DYNAMIC 2037		STARDYNE (Version 4/1/72)	
	TIME secs	MAX.FORCE tons	TIME secs	MAX. FORCE tons
1	2.48	3,180	2.48	3,150
10	2.68	14,200	2.69	14,100
11	2.48	20	2.48	20
29	2.68	2,050	2.69	2,040
30	2.49	124	2.49	123
42	2.68	332	2.69	329

TABLE III

COMPARISON OF MAXIMUM FORCE

Q220.14

MEMBER NUMBER	DYNAMIC 2037		STARDYNE (Version 4/1/72)	
	TIME secs	MAX. SHEAR tons	TIME secs	MAX. SHEAR tons
1	2.48	3,170	2.48	3,150
10	2.68	85,600	2.69	85,600
11	2.48	20	2.48	20
29	2.68	3,670	2.69	3,690
30	2.49	124	2.48	123
42	2.66	2,840	2.69	2,810

TABLE IV

COMPARISON OF MAX. SHEAR

Q220.14

MEMBER NUMBER	DYNAMIC 2037		STARDYNE (Version 4/1/72)	
	TIME secs	MAX. MOMENT ton-meters	TIME secs	MAX. MOMENT ton-meters
1	2.48	30,315	2.48	29,900
10	2.48	2,890,000	2.48	2,890,000
11	2.48	54	2.48	54
29	2.48	62,000	2.48	62,300
30	2.49	525	2.48	520
42	2.67	39,600	2.69	38,600

TABLE V

COMPARISON OF MAX. MOMENT

Q220.14

Question No.

321.4 Your description of the Gas Analyzer Package, beginning on page 11.3-2 (Amendment 2, 12/82) does not meet the acceptance criteria of SRP 11.3. For systems which are not designed to withstand a hydrogen explosion, Section II.8.5 of SRP 11.3 states "...(gaseous waste management systems) should be provided with dual gas analyzers with automatic control functions to preclude the formation of buildup of explosive mixtures...with dual being defined as two independent gas analyzers continuously operating and providing two independent measurements verifying that hydrogen and/or oxygen are not present in potentially dangerous concentrations...control features to reduce potential for explosion should be automatically initiated...The automatic control features should be as follows...for systems designed to preclude explosions by maintaining either hydrogen or oxygen below 4%, the source of hydrogen or oxygen...should be automatically isolated from the system...(or) injection of diluents to reduce concentrations below the limits specified...If gas analyzers are to be used to sequentially measure several points in a system not designed to withstand a hydrogen explosion, at least one gas analyzer which is continuously on-stream is required...(and) should be at a point common to streams monitored sequentially..."

Your design provisions for one sequential hydrogen analyzer and one sequential oxygen analyzer, with no provisions for automatic control features, do not comply with the minimum acceptance criteria of SRP 11.3. You should provide an additional continuously-operating gas analyzer serving one fixed point, preferably between the waste gas compressor and the on-line gas decay tank. You should additionally provide for one of the automatic control features described in SRP 11.3.

Response: The gas analyzer package is provided to monitor hydrogen and oxygen concentrations in various plant components where potentially explosive mixtures could develop. The gas analyzer operates continuously by monitoring through a programmed sequence of sample sources. The gas analyzer is also capable of monitoring a single sample source for as long as desired by manually overriding the sequence selector. Each sample source is purged - analyzed and recorded. Continuous recording of sample concentrations allows for the detection and observation of trends which may be developing. When the analysis indicates that the hydrogen or oxygen concentration of a sample exceeds a predetermined setpoint an alarm is annunciated.

Question No. 321.4

Response (Cont'd)

If automatic analyzer operation is interrupted, samples can be obtained from the grab sample port on the analyzer and from local sample ports at selected locations in the Gaseous Waste Management System (GWMS). The sample port on the analyzer will allow manual sample collection of a tank which has sufficient pressure to drive the gas to the analyzer, if the analyzer pump is inoperable. Local sample lines are also located on headers where samples can be taken manually. Samples taken can then be analyzed by a portable analyzer or taken to the radio chemistry lab. This will allow GWMS operation to continue until the analyzer is back in automatic operation.

The presence of oxygen in the GWMS would result from air infiltration into component gas spaces or air desorption into component gas spaces from water. Since the gas stripper, volume control tank and gas decay tanks operate under pressure air infiltration is not probable. Although air may be present in the gas stripper and volume control tank after maintenance it would not normally be vented to the gas decay tanks. Trace amounts of air may be present in the gases vented from the gas stripper and volume control tank due to desorption of air from reactor coolant in these components. However, since the reactor coolant system oxygen (air) concentration is maintained less than .1 ppm by the addition of hydrazine and by feed and bleed operations with desarated makeup it is not likely that more than trace amounts of oxygen would be desorbed.

Under the worst conditions of compressing air (i.e., no H_2 or excess N_2 dilution) into a gas decay tank it would take 3 to 16 hours to reach a detonatable mixture, depending on the hydrogen dilution volume in the tank. Under the more probable and realistic circumstances of trace oxygen, the time to reach a detonatable mixture would be substantially greater.

In view of the low probability of significant oxygen being present in the GWMS and the substantial time periods required for explosive mixture buildup, manual sampling with portable or laboratory analysis provide adequate backup for the automatic gas analyzer.

Question No.

321.6 (11.5) Provide information to show conformance with Items II.F.1, Attachments 1 and 2, NUREG-0737.

Response In conformance with NUREG-0737 Item II.F.1. Attachments 2 and 1, Plant Vent Radiation Monitors (extended range) and High Range Main Steam Line Monitors respectively, are provided for WNP-3.

The Plant Vent Radiation Monitors are described in Subsection 11.5.2.4.2(a) and supplemented by the following:
The extended range effluent monitor is a noble gas monitor that detects and measures the gross beta/gamma activity level of isotopes present in gaseous form in the effluent release vents. Designed to satisfy current regulatory requirements, this monitor uses three detectors to cover the gaseous activity range from 10^{-7} μCi/cc to 10^{5} μCi/cc. Also included is a collection system for both particulates and halogens to allow collection at levels at or below 10^{2} μCi/cc.

The extended range Plant Vent Radiation Monitor is actually two monitors; a normal range monitor and a high range monitor. Each of these two monitors is mounted on a separate skid. Each of the skids has it's own microprocessor and the two are interconnected to provide appropriate "handover" signals to each other as the radiation rate increases in an accident condition. The high range monitor is activated by a "handover" signal from the normal range monitor when the activity increases above a pre-set level. For additional reliability, the high range monitor will automatically turn on if power is lost at the normal range monitor, or if the instrument cables are severed.

In order to maintain a reasonable time to events occurring in the stream being sampled, a flow rate of several SCFM must be maintained through the monitor. Trying to collect particulates and iodines at such a flow rate during accident conditions is not practical, however. To overcome this problem and yet provide a reasonable response time, the following scheme is employed. An isokinetic tap is provided on the low range unit. The pumping system on th low range unit operates continuously at a high flow rate to minimize the response time. The pumping system on the high range unit draws a sample from the tap at a much lower flow rate in order to make collection feasible. Tubing length between the two skids is limited in order to minimize transit delays and plateout.

(i) Normal Range Monitor (KSC Model KMG-HRN).

The normal range monitor is designed to monitor effluents during normal operation of the plant.

Response

Q321.6 (Cont'd)

(i) Normal Range Monitor (KSC Model KMG-HRN) (Cont'd)

The noble gas sampler assembly consists of a gas sample changer and a lead shield. The changer is cylindrical in shape and has a volume of 2.2 liters. The lead shield is configured in 4 π geometry affording 4 inches of shielding thickness around the chamber. A beta scintillation detector is mounted inside the sample chamber. The detector is suitable for use down to a low energy level of 80 KeV and covers the range from 1×10^{-7} μCi/cc to 3×10^{-1} μCi/cc for Xe-133.

Two particulate and iodine collectors are mounted in parallel in the sample input line upstream of the gas sampler. The particulate collector is a paper filter disk with a collection efficiency of 99% for 0.3 micron particles. The iodine collector is a charcoal cartridge with a collection efficiency (for methyl iodides) of not less than 95% at a flow rate of 4 SCFM. These collectors are used only during the normal monitor operation and are isolated and bypassed during accident monitoring. Both collectors can be removed for laboratory analysis.

(ii) High Range Monitor (KSC Model KMG-HRH)

The accident range monitor consists of three particulate and iodine lead shielded collectors and the mid and high range gas sampler assembly.

The noble gas sampler assembly (Model KMG-HR) consists of a sample changer, an attenuator-collimator and a lead shield.

The sample changer is constructed of type 300 stainless steel with all wetted surfaces passivated and polished. The chamber is cylindrical in shape and has a volume of 0.8 liters. One end of the cylinder is held in place by a snap-ring enabling quick disassembly for decontamination and cleaning.

A 6 inch 4 π lead shield surrounds the sample chamber. The mid range GM detector is located within the sample chamber and is inside of a stainless steel protective well. This detector covers the following range:

5×10^{-2} μCi/cc to 1×10^{2} μCi/cc for Xe-133

Response

Q321.6 (Cont'd)

(ii) High Range Monitor (KSC Model KMG-HRH) (Cont'd)

The high range GM detector is mounted to monitor the inlet/outlet tubing of the sample chamber with the necessary attenuation and collimation to cover the following range:

1×10^1 uCi/cc to 1×10^5 uCi/cc for Xe-133

Each of the two GM detector assemblies (Model KDGM) consists of a Geiger-Mueller tube and associated preamplifier assembly. The Geiger-Mueller tube is Argon-Halogen quench filled. The preamplifier includes a foldover protection circuit to maintain full scale readings when radiation levels exceed the detector range.

A check/source assembly containing a 0.05 uCi Cl-36 source is located next to the GM tube in each detector assembly.

Particulate and Iodine Assemblies: Three P & I collecting assemblies are supplied with the High Range Monitor. Each assembly is identical to that described for the Normal Range Monitor with the following additions:

Each collector assembly is located within a shielded sampler to protect personnel from high radiation levels during operation. This sampler consists of a drawer to house the collector assembly and a lead shield.

The shield is a 3 inch 4 π lead design with all wetted surfaces constructed from type 300 stainless steel. The drawer assembly is attached and sealed to the shield so that the particulate filter and iodine cartridge are held in a horizontal position. The sample air flows downward through the shield and into this collecting assembly.

Mounted directly above each collector assembly is a GM detector which measures the radiation build-up level of the collectors. The primary function of this detector is personnel protection. The alarm of this detector is set at the maximum level acceptable for the personnel who will remove the collector assembly for lab analysis. When the detector sensing circuit reaches this high alarm set point, the associated microcomputer transfers the flow to the next particulate and iodine assembly, isolates the alarmed assembly and indicates to the operator the need to replace the collector assembly. If all collector assemblies have alarmed collection continues on the last filter sequenced.

Response

Q321.6 (Cont'd)

The door of the collector assembly is attached to the lead shield by use of a quick release hand operated latch. Once the door has been opened, the collector assembly can be unclamped and removed immediately and placed into the supplied portable three inch lead shield for transporting the collectors to the laboratory for analysis.

The High Range Main Steam Line Monitor description is as follows:

These monitors provide plant operations personnel with a measurement and record of the radioactivity released because of the actuation of the steam generator safety relief valve or the atmospheric steam dump valves during certain phases of plant operations. As designed these monitors conform with the requirements of NUREG-0737 (II.F.1, Att. 1) and RG 1.97 Rev 2 (type E Variables) for monitoring airborne radioactive material released from the plant.

There are four High Range Main Steam Line Monitors, one for each main steam line. Each monitor consists of an ion chamber detector, a microcomputer and associated indication units in the non-seismic portion of the Main Control Room Monitoring System. A 5.5 inch lead shield is provided for reducing the effect of background radiation on the detector. The detector will be mounted in th center of the shield and a slot in the lead shield will allow an unattenuated view of the steam line of the detector. The configuration is such that the detector will be able to detect activity concentration in the main steam through the pipe wall in the range of 10^{-1} μCi/cc to 10^{3} μCi/cc. The ion chamber detector assembly contains an internal 0.1 uCi Am-241 "keep-alive" source providing a constant upscale reading to insure detector operation.

Each detector will be viewing a segment of the main steam line upstream of the safety relief valves and the atmospheric steam dump valves. The detector, lead shield and support structure are seismically qualified.

The FSAR will be amended to reflect the response to this question.

TABLE 1.8-2 (Cont'd)

NUREG- 0737 FSAR Item No.	Related NUREG Item No.	Location	Requirements	Remarks
II.E.4.1*	NUREG-0578 2.1.5.a 2.1.5.c NUREG-0694 II.E.4.1	6.2.4	Dedicated Hydrogen Penetrations	H_2 recombiners are located inside the Reactor Building.
II.E.4.2*	NUREG-0578 2.1.4	(6.2.4)	Containment Isolation Dependability	Note 4, see CESSAR-F Appendix B
II.F.1*	NUREG-0578 2.1.8.b, 2.1.9 (ACRS) NUREG-0694 II.F.1	11.5 for attach 1 & 2 ~~(11.5)~~ (7.A) 6.2.5 12.3.4 for attach 3	Accident Monitoring Instrumentation a) Containment Pressure b) Containment Water Level c) Containment Hydrogen Concentration d) Containment Radiation Intensity e) High Range Noble Gas Effluents from PWR Steam Safety and Atmospheric Dump Valves	Note 4, procedures developed prior to fuel load
II.F.2	NUREG-0578 2.1.3.b NUREG-0694 II.F.2	(6.5) (7.A)	Instrumentation for Detection of Inadequate Core Cooling	Note 2 See Item II.F.1 See CESSAR-F Appendix B
II.G.1*	NUREG-0578 2.1.1 NUREG-0694 Part 1	(5.4.7) (7.6)	Emergency Power for Pressurizer Equipment	Note 1 See II.E.3.1
II.K.1		1.8	IE Bulletins	See Table 1.8-3. See CESSAR-F Appendix B
II.K.2.2*			Control of Auxiliary Feedwater Independent of the Integrated Control System	Not Applicable
II.K.2.8*			Auxiliary Feedwater System Upgrading	Not Applicable
II.K.2.9*	NUREG-0645 2.4.6 NUREG-0694 Part 2		Failure Mode Effects Analysis on the Integrated Control System	Not Applicable
II.K.2.10	NUREG-0645 2.4.6 NUREG-0694 II.K.I		Safety Grade Anticipatory Reactor Trip	Not Applicable
II.K.2.13	NUREG-0645 2.4.5	In Review	Thermal Mechanical Report Effect of High Pressure Injection on Vessel Integrity for Small-Break LOCA with no Auxiliary Feedwater	Note 1 (6 months prior). See CESSAR-F Appendix B
II.K.2.14			Lift Frequency of PORVs and Safety Valves	Not Applicable
II.K.2.15	NUREG-0565 2.6.2.1 NUREG-0645 2.4.6 NUREG-0694 Part 2		Effects of Slug Flow on Steam Generator Tubes	Not Applicable

Q 321.6 SCN 514

11.5.2.4.2 Effluent Radiation Monitors

a) Plant Vent Radiation Monitors (Extended Range)

extended range

The plant vent radiation monitors provide plant operations personnel with a measurement and a record of the airborne activity released through the plant vents for both normal operation and post-accident conditions. These monitors sample and monitor radioactive particulates, sample halogens (iodine) and monitor radioactive gases which are in the effluent air. The samples are available for later laboratory analysis. Thus, these monitors are seismically qualified and satisfy the requirements of NUREG-0737 (II.F.1.(1)&(2), and of Reg. Guide 1.97 (Type E) for monitoring of airborne radioactive material released from the plant.

Insert A

extended range

There are four plant vent radiation monitors, one for each plant vent. These airborne monitors are located on the 417.5 ft. level of the Reactor Auxiliary Building near the vertical riser which contributes to each plant vent. The sample for each monitor is taken from the plant vent stack downstream of the point at which the last tributary joins it. At the sampling point the air first flows through an air straightener to remove vorticity from the airflow and then a multipoint isokinetic sample (per ANSI 13.1) is taken and a multipoint flow measurement is made. The flow measurement is used both for controlling the isokinetic sampling and for integrating the release of radioactive material. The sample line is heat traced and routed with a minimum number of bends and horizontal runs to preserve the quality of the sample. After the sample passes through the monitor it is returned to the plant vent. ~~Physically each of these monitors is a two-stage airborne monitor as described in Subsection 11.5.2.3.3.2, which uses a fixed particulate filter, two parallel redundant air pumps and has a temperature control system to prevent condensation within the monitor and its sample lines. The monitors are seismic, Class IE qualified devices.~~ 2

INSERT B →

The measured activity levels for both the particulate and gas channels are transmitted to the Main Control Room. ~~where they are displayed on modules and recorded by strip chart recorders mounted in the seismic Class IE panels~~. The information is transmitted ~~through appropriate buffering~~ to the Radiation Monitoring System computer for incorporation into displays, records, and the system's database. If the activity exceeds pre-established setpoints an annunciation is made ~~on the main control panel and~~ through the Radiation Monitoring System CRTs and event typer.

The receipt of these alarms will alert the operator to the presence of unusual levels of contamination so that additional surveys, sampling and equipment isolation can be effected in order to locate and eliminate the source of the contamination. The records of the total quantity of radioactive material released is used in writing the reports required by Regulatory Guide 1.21. The alarm setpoints are selected to prevent activity concentrations at the plant boundary or beyond from exceeding 10CFR20 limits and to support the limits set in the plant technical specification. The setpoints may be adjusted continuously over the entire range of the monitor. The system will continue to operate following postulated accidents and will be utilized to provide the operator with information regarding radioactive releases during the post-accident period.

Q321.6
SCN 514

Q321.6

INSERT A

... in conformance with Item II.F.1, Attachments 1 and 2 of NUREG-0737. As designed by Kaman Sciences Corporation (KSC)...

Q321.6

INSERT B

The extended range effluent monitor is a noble gas monitor that detects and measures the gross beta/gamma activity level °F isotopes present in gaseous form in the effluent release vents. Designed to satisfy current regulatory requirements, this monitor uses three detectors to cover the gaseous activity range from 10^{-7} µCi/cc to 10^{5} µCi/cc. Also included is a collection system for both particulates and halogens to allow collection at levels at or below 10^{2} µCi/cc.

The extended range Plant Vent Radiation Monitor is actually two monitors; a normal range monitor and a high range monitor. Each of these two monitors is mounted on a separate skid. Each of the skids has it's own microprocessor and the two are interconnected to provide appropriate "handover" signals to each other as the radiation rate increases in an accident condition. The high range monitor is activated by a "handover" signal from the normal range monitor when the activity increases above a pre-set level. For additional reliability, the high range monitor will automatically turn on if power is lost at the normal range monitor, or if the instrument cables are severed.

In order to maintain a reasonable time to events occurring in the steam being sampled, a flow rate of several SCFM must be maintained through the monitor. Trying to collect particulates not practical, however. To overcome this problem and yet provide a reasonable response time, the following scheme is employed. An isokinetic tap is provided on the low range unit. The pumping system on th low range unit operates continuously at a high flow rate to minimize the response time. The pumping system on the high range unit draws a sample from the tap at a much lower flow rate in order to make collection feasible. Tubing length between the two skids is limited in order to minimize transit delays and plateout.

(i) <u>Normal Range Monitor</u> (KSC Model [illegible] RN).

The normal range monitor is designed to monitor effluents during normal operation of the plant.

INSERT B (CONT'D)

(i) Normal Range Monitor (KSC Model KMG-HRN) (Cont'd)

The noble gas sampler assembly consists of a gas sample chamber and a lead shield. The chamger is cylindrical in shape and has a volume of 2.2 liters. The lead shield is configured in 4 π geometry affording 4 inches of shielding thickness around the chamber. A beta scintillation detector is mounted inside the sample chamber. The detector is suitable for use down to a low energy level of 80 KeV and covers the range from $1x10^{-7}$ μCi/cc to $3x10^{-1}$ μCi/cc for Xe-133.

Two particulate and iodine collectors are mounted in parallel in the sample input line upstream of the gas sampler. The particulate collector is a paper filter disk with a collection efficiency of 99% for 0.3 micron particles. The iodine collector is a charcoal cartridge with a collection efficiency (for methyl iodides) of not less than 95% at a flow rate of 4 SCFM. These collectors are used only during the normal monitor operation and are isolated and bypassed during accident monitoring. Both collectors can be removed for laboratory analysis.

(ii) High Range Monitor (KSC Model KMG-HRH)

The accident range monitor consists of three particulate and iodine lead shielded collectors and the mid and high range gas sampler assembly.

The noble gas sampler assembly (Model KMG-HR) consists of a sample chamber, an attenuator-collimator and a lead shield.

The sample chamber is constructed of type 300 stainless steel with all wetted surfaces passivated and polished. The chamber is cylindrical in shape and has a volume of 0.8 liters. One end of the cylinder is held in place by a snap-ring enabling quick disassembly for decontamination and cleaning.

A 6 inch 4 π lead shield surrounds the sample chamber. The mid range GM detector is located within the sample chamber and is inside of a stainless steel protective well. This detector covers the following range:

$$5 \times 10^{-2} \text{ μCi/cc to } 1 \times 10^{2} \text{ μCi/cc for Xe-133}$$

INSERT B (CONT'D)

(ii) High Range Monitor (KSC Model KMG-HRH) (Cont'd)

The high range GM detector is mounted to monitor the inlet/outlet tubing of the sample chamber with the necessary attenuation and collimation to cover the following range:

1×10^{1} μCi/cc to 1×10^{5} μCi/cc for Xe-133

Each of the two GM detector assemblies (Model KDGM) consists of a Geiger-Mueller tube and associated preamplifier assembly. The Geiger-Mueller tube is Argon-Halogen quench filled. The preamplifier includes a foldover protection circuit to maintain full scale readings when radiation levels exceed the detector range.

A check/source assembly containing a 0.05 uCi Cl-36 source is located next to the GM tube in each detector assembly.

Particulate and Iodine Assemblies: Three P & I collecting assemblies are supplied with the High Range Monitor. Each assembly is identical to that described for the Normal Range Monitor with the following additions:

Each collector assembly is located within a shielded sampler to protect personnel from high radiation levels during operation. This sampler consists of a drawer to house the collector assembly and a lead shield.

The shield is a 3 inch 4π lead design with all wetted surfaces constructed from type 300 stainless steel. The drawer assembly is attached and sealed to the shield so that the particulate filter and iodine cartridge are held in a horizontal position. The sample air flows downward through the shield and into this collecting assembly.

Mounted directly above each collector assembly is a GM detector which measures the radiation build-up level of the collectors. The primary functon of this detector is personnel protection. The alarm of this detector is set at the maximum level acceptable for the personnel who will remove the collector assembly for lab analysis. When the detector sensing circuit reaches this high alarm set point, the associated microcomputer transfers the flow to the next particulate and iodine assembly, isolates the alarmed assembly and indicates to the operator the need to replace the collector assembly. If all collector assemblies have alarmed collection continues on the last filter sequenced.

INSERT B (CONT'D)

The door of the collector assembly is attached to the lead shield by use of a quick release hand operated latch. Once the door has been opened, the collector assembly can be unclamped and removed immediately and placed into the supplied portable three inch lead shield for transporting the collectors to the laboratory for analysis.

1633W-9

The receipt of an alarm will alert operators to analyze additional water and other samples to determine the reason for the alarm. The groundwater is not expected to contain any radioactive contamination therefore setpoints for this radiation monitor are placed just above and as statistically close as practicable to the measured natural background level. The setpoints maybe adjusted over the entire five decade range of this monitor. The design of this monitor was selected to give a very high level of sensitivity.

Insert C →

11.5.2.5 Noncontinuous Sampling for Radioactivity

To augment the information provided by the continuous process and effluent monitors, samples are taken at specified intervals at selected locations in the process and effluent streams.

The samples are then taken to the radiochemistry laboratory for analysis. Although a number of the analyses are for other than radioactivity content, each sample can be analyzed for its isotope content or gross activity by use of instrumentation available in the counting room. This instrumentation consists of proportional counters, liquid scintillation detectors and Ge(Li) semiconductor detector and associated data analysis computer.

The sensitivity of the liquid scintillation spectrometer and Ge(Li) semiconductor-detector spectrometer are sufficient to enable detection of the isotopes in the samples within the limits specified by Regulatory Guide 1.21.

There are three kinds of samples taken at the plant: samples from the Process Sample System (Subsection 9.3.2), local liquid grab samples, and gas analyzer grab samples. In addition grab samples taken directly from all process and effluent radiation monitors and the particulate and iodine filters in the gaseous monitors may be removed for laboratory analysis. The location and other data for the specific sampling points are listed in Table 9.3.2-1 for primary samples, and secondary samples, and Tables 11.5-2 and 11.5-3 for local and gas analyzer samples respectively.

Sample point locations are based on one or more of the following requirements:

a) to check the performance of process equipment,

b) to alert the operator to any abnormal condition such as leakage, and/or

c) to insure effluent releases are below applicable limits.

Q321.6
SCN514

Q321.6

INSERT C

The High Range Main Steam Line Monitor description is as follows:

These monitors provide plant operations personnel with a measurement and record of the radioactivity released because of the actuation of the steam generator safety relief valve or the atmospheric steam dump valves during certain phases of plant operations. As designed these monitors conform with the requirements of NUREG-0737 (II.F.1, Att. 1) and RG 1.97 Rev 2 (type E Variables) for monitoring airborne radioactive material released from the plant.

There are four High Range Main Steam Line Monitors, one for each main steam line. Each monitor consists of an ion chamber detector, a microcomputer and associated indication units in the non-seismic portion of the Main Control Room Monitoring System. A 5.5 inch lead shield is provided for reducing the effect of background radiation on the detector. The detector will be mounted in the center of the shield and a slot in the lead shield will allow an unattenuated view of the steam line of the detector. The configuration is such that the detector will be able to detect activity concentration in the main steam through the pipe wall in the range of 10^{-1} μCi/cc to 10^{3} μCi/cc. The ion chamber detector assembly contains an internal 0.1 μCi Am-241 "keep-alive" source providing a constant upscale reading to insure detector operation.

Each detector will be viewing a segment of the main steam line upstream of the safety relief valves and the atmospheric steam dump valves. The detector, lead shield and support structure are seismically qualified.

TABLE 11.5-1 (Cont'd)

Name (Instrument Tag Number)	Q'ty	Design Background (mR/hr Co-60)	Sampler Type	Activity Measured	Sensitivity @ Background	Range µCi/cc	Typical Alarm Set-points µCi/cc	Automatic Actions Initiated	Location	Duty
Steam Generator Blow-down Line Radiation Monitor (RE-BD-0125A; RE-BD-0125B)	2	2.5	Ambient	Gross γ	N.A.	1×10^{-1} to 1×10^{4}	5 10	Alarm Only	Lines 2BD4-113SN 2BD4-112SN	Continuous
Refueling Pool Ambient Radiation Monitor (RE-HV-6701-AS; RE-HV-6702-AS) (RE-HV-6701-BS; RE-HV-6702-BS)*	4	2.5	Ambient	Gross γ	N.A.	1×10^{-1} to 1×10^{4}	5 10	Containment Purge & Selected Penetration Isolation	Walls of Refueling Pool	Continuous
Spent Fuel Pool Ambient Radiation Monitor (RE-HV-5071-AS; RE-HV-5072-AS) (RE-HV-5071-BS; RE-HV-5072-BS)	4	2.5	Ambient	Gross γ	N.A.	1×10^{-1} to 1×10^{4}	5 10	FHB HVAC System Isolation	Walls of Fuel Handling Building	Continuous
Effluent Radiation Monitors										
Plant Vent Radiation Monitors - Extended Range										
~~(RE-HV-4913A & RE-HV-4914A) (RE-HV-4913B & RE-HV-4914B) (RE-HV-5043A & RE-HV-5044A) (RE-HV-5043B & RE-HV-5044B)*~~ REPLACE WITH: (RE-HV-4913B1/B2 & RE-HV-4914B1/B2) (RE-HV-4913A1/A2 & RE-HV-4914A1/A2) (RE-HV-5043A1/A2 & RE-HV-5044A1/A2) (RE-HV-5043B1/B2 & RE-HV 5044B1/B2)	4	2.5	Two Stage Airborne	Gross β Particulate & Gas	1×10^{-9} µCi/cc Sr-90 @ 1 mR/hr Co-60(2) 1×10^{-6} µCi/cc Kr-85 @ 1 mR/hr Co-60(3)	1×10^{-10} to 1×10^{-5} ~~1×10^{-7} to 1×10^{-2}~~ Normal Range: 1×10^{-7} to 1×10^{-1} Accident Range: 1×10^{-2} to 1×10^{5}	3×10^{-10} 3×10^{-9} ~~5×10^{-7} 5×10^{-6}~~ Normal Range: 1×10^{-2} to 1×10^{-1} Accident Range: 1×10^{1} to 1×10^{5}	Alarm Only	HVAC Vent Stacks No. 3 No. 2 No. 4 No. 1	Continuous

| 2

Q321.6

TABLE 11.5-1 (Cont'd)

Name (Instrument Tag Number)	Q'ty	Design Background (mR/hr Co-60)	Sampler Type	Activity Measured	Sensitivity @ Background	Range µCi/cc	Typical Alarm Set-points µCi/cc	Automatic Actions Initiated	Location	Duty
Sump and Secondary High Purity Discharge Radiation Monitor (RE-SD-0001)	1	2.5	Liquid	Gross γ	$1x10^{-6}$ µCi/cc Cs-137 @ 1 mR/hr Co-60(1)	$5x10^{-7}$ to $5x10^{-2}$	$5x10^{-6}$ $5x10^{-5}$	Alarm & Termination of Discharge	Line 6SD3-098	Batch
Discharge to Neutralization Pond Radiation Monitor (RE-WM-6106)	1	2.5	Liquid	Gross γ	$1x10^{-6}$ µCi/cc Cs-137 @ 1 mR/hr Co-60(1)	$5x10^{-7}$ to $5x10^{-2}$	$5x10^{-5}$ $5x10^{-4}$	Alarm & Termination of Discharge	Line 6LS 1 1/2-433R	Batch
Groundwater Drain Radiation Monitor (RE-RM-0007)	1	0.01	Ambient	Gross γ	Approximately 10^{-5} µCi/cc Cs-137 @ ambient background(1), (4)	$5x10^{-7}$ to $5x10^{-2}$	Above Ambient Background	Alarm Only	Sump in Groundwater Tunnel	Continuous
High Range Main Steam Line Monitors (RE-MS-1000A&B) (RE-MS-10001A&1B)	4	5.0	Ambient	Gross γ	Note 5	$1x10^{-1}$ to $1x10^{3}$	$1x10^{1}$ to $1x10^{2}$	Alarm Only	MS line upstream of steam relief & atmo. dump valves in main steam tunnel	continuous

(1) Sensitivity is defined as the ability to detect the stated concentration of radioactive material, in µCi/cc as an increase in the counting rate equal to two standard deviations of the counting rate of the monitor, when it has the specified dose rate of gamma radiation from the specified isotope incident on the outside of its shielding during an integrated counting period of one minute.

(2) Sensitivity is defined as the ability to detect the stated concentration of radioactive material in µCi/cc contained in air which is passing through a filter at two scfm for a period of 10 minutes as an increase in the counting rate equal to two standard deviations of the counting rate, of the monitor, when it has the specified dose rate of gamma radiation from the specified isotope incident on the outside of its shielding during an integrated counting period of one half minute.

(3) Sensitivity is defined as the ability to detect the stated concentration of radioactive material, in µCi/cc as an increase in the counting rate equal to two standard deviations of the counting rate, of the monitor, when it has the specified dose rate of gamma radiation from the specified isotope incident on the outside of its shielding during an integrated counting period of one half minute.

(4) Vendor sensitivity data is not available at this time.

(5) Efficiency : 6.6×10^{-9} A/R/hr

*Class IE

Q321.6

Question No.

430.68 (SRP 10.4.1) If the systems that can be used for mitigation of the accident are not available or decision is made to use other means to shut down the reactor, describe how these systems are secured to assure positive steam shutoff. Describe what operator actions (if any) are required.

If any of the requested information is presently included in the FSAR text, provide only the reference where the information may be found.

Response

For a discussion of the systems used to mitigate the degraded condition of the main condenser and a discussion of how these systems are secured to assure positive steam shutoff, refer to CESSAR-F Subsection 15.2.3 "Loss of Condenser Vacuum."

Question No.

471.11 NUREG-0800, Standard Review Plan, lists several Regulatory Guides and NUREGS as programs acceptable to meet the Regulations. Several of these Regulatory Guides and NUREGs have been referenced in your FSAR as having been "used as guidance" or as "the technical basis." You should indicate if the guidance in the Regulatory Guides and NUREGs listed below were fully implemented. If not, the particular guidance not followed should be specified and an alternative control described.

1. Regulatory Guide 1.8 as it applies to personnel qualifications in Section 12.1.2.

2. Regulatory Guide 1.140 as it applies to ventilation design features in Section 12.3.3.3.

3. Regulatory Guide 8.2 as it applies to instrumentation in Section 12.3.4.

4. Regulatory Guide 8.8 as referenced in Section 12.4.1.1.

5. Regulatory Guide 8.8 and Regulatory Guide 1.97 where they apply to Health Physics instrumentation selection in Section 12.5.2.2.

6. Regulatory Guide 8.4, Regulatory Guide 8.8 and Regulatory Guide 8.14 as they apply to selection of personnel monitoring instruments in Section 12.5.2.4.

7. NUREG-0041 as it applies to respiratory protection devices in Section 12.5.2.4.

8. Regulatory Guide 8.9, Regulatory Guide 8.20 and Regulatory Guide 8.26 as they apply to your bioassey program in Section 12.5.3.4.2.

Response

1) Reg. Guide 1.8 - FSAR Table 1.8-1 under Reg. Guide 1.8 has a note that refers to Section 17.2 of the FSAR. Section 17.2 refers to the Supply System Operational Quality Assurance Program Description.

2) Table 1.8-1 amended April 1983 shown in compliance with Regulatory Guide 1.140 Rev. 1, 10/79 which has been used as guidance for design of the non-ESF air cleaning systems. The ANSI standards ANSI N509-1976 and ANSI N510-1975 frequently mentioned in the regulatory guide are the technical basis that was fully implemented.

FSAR Subsection 12.3.3.3 will be revised to reflect the extent of compliance and the correct revision of R.G. 1.140.

Question No.

471.11

3) Regulatory Guide 8.2 as it applies to Section 12.3.4. We have committed to Regulatory Guide 8.2 with no exceptions in Table 1.8-1.

4) Regulatory Guide 8.8 as referenced in Section 12.4.1.1.

Table 1.8-3, Section 12.3-12.4, page 1.8-445 hase committed WNP-3 to Regulatory Guide 8.8 with no exceptions.

5) Regulatory Guide 8.8 and Regulatory Guide 1.97 where they apply to Health Physics instrumentation selection in Section 12.5.2.2.

Table 1.8-3, Section 12.5, page 1.8-456 has committed WNP-3 to Rebulatory Guide 8.8 with no exceptions.

Table 1.8-3, Section 12.5, page 1.8-456 contains a commitment to Regulatory Guide 1.97 with one exception. The exception is in respect to high range portable beta dose rate instruments. FSAR Section 12.5.2.2 on page 12.5-6 notes that portable high range beta dose rate instruments are not commercially available but such instruments will be evaluated against Regulating Guide 1.97 when available.

6) Regulatory Guide 8.4, Regulatory Guide 8.8 and Regulatory Guide 8.14 as they apply to selection of personnel monitoring instruments in Section 12.5.2.4.

It is assumed that the reviewer is refering to Section 12.5.2.2.4 as there is no 12.5.2.4 and the title matches his question.

Table 1.8-3, Section 12.5, page 1.8-456 commits WNP-3 to Regulatory Guide 8.4 with one exception that exception is explained in the response to question 471.17.

Table 1.8-3, Section 12.5, page 1.8-456 commits WNP-3 to Regulatory Guide 8.8 with no exceptions.

Table 1.8-3, Section 12.5, page 1.8-457 states that the Supply System is still evaluating this criterion and a compliance statement will be provided by October, 1983. However, this question has been answered inthe WNP-2 FSAR and this response is provided as a response to question 471.23.

Question No.

471.11

7) NUREG-0041 as it applies to respiratory protection devices in Section 12.5.2.4.

   It is assumed that the reviewer is refering to Section 12.5.2.3.

   Table 1.8-3, Section 12.5, page 1.8-458 commits WNP-3 to NUREG-0041 with no exceptions.

8) Regulatory Guide 8.9, Regulatory 8.20 and Regulatory Guide 8.26 as they apply to your bioassey program in Section 12.5.3.4.2.

   Table 1.8-3, Section 12.5, pages 1.8-456 and 1.8-457 commits WNP-3 to Regulatory Guides 8.9, 8.20 and 8.26 with no exceptions.

Question No.

480.23 (6.2.5) Provide a qualitative discussion of the effectiveness of convective mixing and/or spray system operation to mix combustible gases that may be generated within the containment. In so doing, describe the design features of containment internal structures which promote the free circulation of the atmosphere. Identify the interior compartments when it may be difficult to achieve good mixing of combustible gases. Provide elevation drawings of the containment showing expected circulation patterns caused by sprays or thermal convection.

Response

At WNP-3, a well mixed atmosphere in the containment is assured by the operation of the Containment Spray System (CSS) augmented by natural convection. The CSS consists of two redundant and independent trains, each capable of providing 100 percent of the required heat removal capability. Trains A and B provide a spray coverage of 87.27 percent and 91.6 percent respectively, of the containment free volume. This is due to the different physical arrangement of the spray headers. The unsprayed volumes are expected to be at a higher temperature than the surrounding space covered by the sprays. As a result, a natural convection would take place which would tend to move the air from the unsprayed volumes toward the surrounding volumes covered by the sprays. The possibility for pocketing of hydrogen in the containment following a hypothetical LOCA has been evaluated, and the results of the evaluation show that pockets of hydrogen concentrations reaching flammable limits would not be produced unless the bulk concentration within the containment is also above the lower flammability limit. Since the bulk concentration is controlled, the lower flammability limit is not approached and mixing of the air is such that pockets of flammable hydrogen-air-steam mixtures cannot be formed. The recombiners have been located in the containment in positions where uniform mixing of the containment atmosphere occurs by natural circulation when either hydrogen recombiner is in operation.

The operating floor and intermediate platforms are constructed on structural steel framing with grating, checker plate or concrete slab depending on the requirements of the supported equipment to facilitate, as much as practicable, the free circulation of air within the containment.

The containment free volume is made up of two defined regions, one above the operating floor - EL. 425 ft. - and one below. The portions of sprayed and unsprayed volumes of these two regions are tabulated in Table 6.5.2-4 for both Trains A and B. The unsprayed volume above the operating

Response

480.23 (Cont'd)

floor is the free space above the spray headers and the containment vessel dome, and the space below the spray nozzles before the sprays are fully developed and overlapped.

The unsprayed volume below the operating floor is basically the space which is not covered by the sprays due to the obstruction of the steel grating and operating floor and lower elevations. It is conservatively assumed that the steel grating creates a 30 percent obstruction to the free volume below EL. 425 ft. Generally, the region below EL. 425 ft. is fully covered by the sprays with the exception of the pressurizer cubical, the reactor vessel cavity and isolated pockets of space created by the obstruction of equipment located at EL. 425 ft. and lower.

A discussion of the containment volume covered by the sprays as well as the overlap of the sprays is presented in Subsection 6.5.2. Figures 6.5-3 and 6.5-4 show plan and elevations of the expected spray patterns.

Question No.

Question No.

630.9 Provide the length of the course in weeks for each of the following courses: (SRP References 13.2.1, and II.B.1).

(a) NSSS Lecture Series

(b) Balance of Plant Systems

(c) Senior Operators and Shift Managers

Response

(a) and (b) The system letures (NSSS Lecture Series and Balance of Plant Systems) will take nine (9) weeks.

(c) Training programs for Senior Operators and Shift Manager consist of the following:

	Weeks Cold	Weeks Hot
Academic Fundamentals	20	19
Plant Systems	9	9
Observation	4	
Simulator	10	5
Onsite Experience	26	
Control Room Experience		12
SO/SM Duties	1	1
Review	4	
	74	46

The FSAR will be updated to reflect the response to this question.

f) Command responsibility and limits

g) Administrative requirements for the particular SRO position.

License Review Training (4 weeks)

A comprehensive examination is given to the license candidates to determine their knowledge of the plant (written examination) and ability to safely operate (simulator examination). Based on the results of the examination, review training and/or individual tutoring may be provided. Instruction on plant design and operating problems at similar plants will be provided.

Training Program Evaluation

The performance of employees participating in the Cold License Training Program are monitored and evaluated throughout the program. Frequent examinations are given to license candidates in order to determine the effectiveness of the training and the knowledge of the trainees. Records will be maintained on an individual basis. In the event the scheduled fuel loading date is substantially delayed, the cold license candidates will continue to maintain proficiency through participation in training similar in scope to the retraining program described in (Section 13.2.3.1).

Training Schedule

The training schedule for license operator candidates is based upon three training groups. The three groups include initial license candidates and replacements. The schedule for the three groups is shown on Figure 13.2-2. 2

At the time of FSAR submittal the first group was in training and had completed the following courses:

COURSE	APPROXIMATE CONTACT HOURS
Pre-Calculus Math (Math 103, 105)	90
Trigonometry	25
Chemistry	45
Calculus I, II, III	135
General Physics I, II, III	135
Fluid Mechanics	45
Material Science	45

insert 1 →

Q630.9

2543W-5

Question No.

Q630.9

Insert 1

Training programs for Senior Operators and Shift Manager consist of t[illegible] following:

	Weeks Cold	Hot
Academic Fundamentals	20	19
Plant Systems	9	9
Observation	4	
Simulator	10	5
Onsite Experience	26	
Control Room Experience		12
SO/SM Duties	1	1
Review	4	
	74	46