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Vogtle Project

May 6, 1985

Director of Nuclear Reactor Regulation
Attention: Ms. Elinor G. Adensam, Chief
Licensing Branch #4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

File: X7BC35
Log: GN-598

NRC DOCKET NUMBERS 50-424 AND 50-425
CONSTRUCTION PERMIT NUMBERS CPPR-108 AND CPPR-109
VOGTLE ELECTRIC GENERATING PLANT - UNITS 1 AND 2
REQUESTS FOR ADDITIONAL INFORMATION: DSER OPEN ITEMS

Dear Mr. Denton:

Your staff has requested additional information as part of the VEGP review process. Attached is a listing of the DSER open items, the enclosures where they are addressed and the source of the request.

If your staff requires any additional information, please do not hesitate to contact me.

Sincerely,

J. A. Bailey

J. A. Bailey
Project Licensing Manager

JAB/sm
Enclosure
xc: D. O. Foster
R. A. Thomas
J. E. Joiner, Esquire
B. W. Churchill, Esquire
M. A. Miller
B. Jones, Esquire (w/o enclosure)
L. T. Gucwa
G. Bockhold, Jr.
T. Johnson (w/o enclosure)
D. C. Teper (w/o enclosure)
L. Fowler
Vogtle Project File

B001 1/1

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ATTACHMENT

OPEN ITEMS INDEX

Open Item	Enclosure	Remarks
36	A	This enclosure contains: 1) draft copy of the ultrasonic cast stainless steel examination procedure which was successfully demonstrated to the NRC Region II in Atlanta on 5/1/85, 2) Combustion Engineering, GPC subcontractor, implementation procedure for R.G. 1.50, and 3) commitment to perform a minimum of 8% ESF PSI weld inspections. This commitment will appear in Amendment 17.
57	B	Revisions to Q 420.29, Q 420.30, and 420.41 committing to GPC's new design for override of isolation signals. These revisions will appear in Amendment 17.
85	C	Commitment to install smoke detectors in the main control board. This commitment will appear in Amendment 17.
Q430.5	D	Commitment to install seismically qualified distribution panel boards. This revision will appear in Amendment 17.
Q430.72	E	Results of CCP analysis. This revision will appear in Amendment 17.

Open Item	Enclosure	Remarks
Q430.74	F	Commitment to readjust or replace the magnetic circuit breakers. This revision will appear in Amendment 17.
C39	G	Revision to Q 480.33 on type C testing of penetrations. This revision will appear in Amendment 17.

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FOR INFORMATION ONLY **Enclosure A**

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1.0 PURPOSE

This procedure provides the requirements for manual ultrasonic examination of cast stainless steel full penetration butt welds, branch connection welds, and the adjacent base material in accordance with the applicable American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Codes.

2.0 SCOPE

This procedure is applicable for cast stainless steel piping whose nominal thickness is greater than 0.2 inches and up to 6 inches. Examinations may be performed outside these ranges provided nondestructive examination (NDE) Level III concurrence is obtained. Other examinations may be performed using portions of this procedure upon NDE Level III concurrence.

3.0 APPLICABLE DOCUMENTS

This procedure is written in compliance with the following documents:

1. ASME Boiler and Pressure Vessel Code, Section XI, 1980 Edition with Addenda through Winter 1980, "Rules for Inservice Inspection of Nuclear Power Plant Components."

2. ASME Boiler and Pressure Vessel Code, Section V, 1980 Edition with Addenda through Winter 1980, "Nondestructive Examination."

In addition, this procedure is written in compliance with earlier editions of the ASME Boiler and Pressure Vessel Code and may be used as necessary when deemed acceptable by NDE Level III examiner.

4.0 RESPONSIBILITIES

4.1 The manager-inspection, testing, and engineering shall be responsible for the approval and control of this procedure.

4.2 An NDE Level III certified in ultrasonic examination is responsible for having ultrasonic examination procedures and techniques developed and approved, and for assuring that this procedure, when correctly followed, will detect discontinuities which do not meet the applicable acceptance standards.

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5.0 QUALIFICATION OF ULTRASONIC EXAMINATION PERSONNEL

5.1 All NDE personnel performing ultrasonic examinations in accordance with this procedure shall be qualified and certified to the requirements of a procedure (written practice) written and approved in accordance with the American Society of Nondestructive Testing (ASNT) SNT-TC-1A.

5.1 The ultrasonic examination may be performed by a Level I examiner under the direct supervision of a certified Level II or Level III in ultrasonic examination; however, all interpretation of the results of the examinations shall be performed by a Level II or Level III examiner certified in ultrasonic examination. In addition, a trainee may assist in the performance of the ultrasonic examination provided the trainee is directly supervised by a Level II or Level III examiner.

6.0 ULTRASONIC EQUIPMENT

6.1 The Ultrasonic Instrument

6.1.1 A pulse-echo type ultrasonic instrument with an A-Scan presentation and operating frequencies of 1 to 10 MHz shall be used to perform examinations in accordance with this procedure. Screen height linearity, horizontal linearity, and amplitude control linearity (dB) shall be verified in accordance with Procedure UT-V-455.

6.1.2 The following ultrasonic instruments shall be used in accordance with this procedure.

- KrautKramer Branson USL-38.
- Nortec 131.
- Sonic Mark I.
- KrautKramer USK-7.

Other instruments may be used provided Level III concurrence is obtained.

6.2 The Ultrasonic Search Unit (Transducer)

6.2.1 Search units having a nominal frequency of 1.0 MHz shall be used for examination in accordance with this procedure.

6.2.2 Other frequencies may be used upon Level III concurrence when variables such as production material grain structure require their use to ensure adequate penetration or resolution.

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6.2.3 For straight beam examinations, the nominal search unit size shall be 1/2, 3/4, or 1 inch diameter; however, other sizes may be used upon Level III concurrence.

6.2.4 For angle beam examination the nominal search unit size shall be 1.0 inch. Special pitch-catch transducer assemblies may be used. The beam angle shall be 45° (nominal) refracted longitudinal wave; however, other sizes or angles may be used upon Level III concurrence.

6.2.5 For dual elements search units, the dimension applies to one of the two elements.

6.3 Couplant

6.3.1 USP-grade glycerine or deionized water shall be used when performing calibrations and examinations in accordance with this procedure.

6.3.2 Other compounds may be used upon the concurrence of an NDE Level III.

6.3.3 Couplants other than deionized water shall be certified for total sulfur and halogen content in accordance with American Society for Testing and Materials (ASTM) D-129-64 and D-808-63. The total residual amount of sulfur and halogen shall not exceed 1 percent by weight.

6.4 Reference Blocks

Reference blocks (e.g., IIW Block, Rompas), if used, should be of the same material (e.g., carbon steel, stainless steel) as the component to be examined.

6.5 Basic Calibration Blocks

6.5.1 The basic calibration block shall be manufactured in accordance with Section V, Article 5 of the ASME Boiler and Pressure Vessel Code.

6.5.2 Where different thicknesses are involved in examination, the calibration block thickness is determined from the average thickness of the weld or component to be examined.

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7.0 SEARCH UNIT (TRANSDUCER) VERIFICATION

7.1 Prior to calibration of the ultrasonic system, the search unit beam exit point and nominal angle of refraction shall be verified using an appropriate reference block.

7.2 Angle beam search units used during ultrasonic calibration and examination shall comply with the following:

7.2.1 Angle beam search units shall produce a sound beam within ±3° of the nominal angle.

7.2.2 Each search unit wedge shall be marked to clearly indicate the nominal angle of refraction and the beam exit point.

8.0 EQUIPMENT CALIBRATION

8.1 Prior to the beginning of each day of examination, the complete ultrasonic examination system shall be calibrated on the basic calibration block for the particular examination to be performed. The examination system includes the ultrasonic instrument (and battery pack, if applicable), search unit, coaxial cable, couplant and any other apparatus, instrument, or circuit used.

8.2 A change to any part of the system will require recalibration or at least a check of the calibration (section 8.7).

8.3 The reject control shall be placed and remain in the "O" (off or minimum position during calibration and examination).

8.4 The temperature of the calibration block shall be within 25°F (14°C) of the component to be examined.

8.5 The equipment calibrations shall be performed in accordance with the following and the results documented on Ultrasonic Instrument Calibration Record, UT-H/F/V-Form 400D (Figure 406-1).

8.6 Angle Beam Calibration

8.6.1 Reflections from the machined notch(es) and side drilled holes in the appropriate basic calibration block shall be used for angle beam calibration.

8.6.2 For examination of circumferential welds, responses from the side drilled holes (SDH) oriented perpendicular to the axis of the basic calibration block shall be used to construct a distance amplitude correction (DAC) curve.

8.6.3 For the examination of longitudinal welds, and branch connection welds, a DAC curve shall be constructed by utilizing the responses from the side drilled holes oriented axially with the basic calibration block.

8.6.4 A DAC curve shall be constructed by utilizing responses from reflections as stated in 8.6.2 and 8.6.3. The DAC curve shall be accomplished from the following:

8.6.5 Half-node Calibration

1. Obtain reflections from the 1/4t, 1/2t and/or 3/4t (SDH) in order to set up the sweep line at convenient locations; (e.g., 2, 4, 6, 8 or 1.5, 3.0, 4.5, 6.0.)

2. Position the search unit for maximum response from the hole which gives the highest amplitude. Adjust the instrument controls to set the signal peak at 80 percent full screen height (FSH). Mark the peak on the cathode ray tube (CRT).

3. Check the vertical linearity of the test system by reducing the gain control setting by 6 dB. The resulting signal amplitude should be reduced to 40 percent of FSH, ±5 percent. If the signal falls either above or below this range and if adjustment of the instrument controls fails to provide a satisfactory check, the search unit and/or the search unit cable shall be changed and the calibration repeated.

4. Reestablish the maximum response to 80 percent of FSH by adding back the 6dB gain. Without further changing the instrument controls, obtain reflections from the remaining SDH reflectors in order to cover the full examination thickness. Mark the maximum peaks of each on the Cathode Ray Tube (CRT).

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5. Connect the marks and extrapolate to cover the full examination thickness in order to establish the DAC curve. Record the amplitudes and sweep readings of each reflector on the Ultrasonic Instrument Calibration Record, Form 400D (Figure 406-1).

6. Obtain a signal from the ID notch and maximize the signal. Adjust the instrument gain control to set the notch amplitude to the level of the DAC curve. This is the Primary Reference Response. Record the amplitude and sweep reading of the notch on the Ultrasonic Instrument Calibration Record, Form 400D (Figure 406-1).

8.6.6 Full-node Calibration

1. Obtain reflections from the calibration notches, at least 2t, or 1 vee path, in order to set up the sweep range at convenient locations; e.g., 3 and 6.

2. Obtain a reflection from the first ID notch and maximize this signal.

3. Adjust the instrument controls in order to set this signal peak at 80 percent FSH.

4. Check the vertical linearity of the test system by reducing the gain control setting by 6 dB. The resulting signal amplitude should be reduced to 40 percent of FSH, ±5 percent. If the signal falls either above or below this range and if adjustment of the instrument controls fails to provide a satisfactory check, the search unit and/or the search unit cable shall be changed and the calibration repeated.

5. Reestablish the maximum response to 80 percent of FSH by adding back the 6dB gain. Without further changing the instrument controls, obtain and maximize the reflections from subsequent OD notch. Mark each signal peak on the CRT.

6. Connect the marks to establish the DAC curve and record the amplitude and sweep readings of each calibration notch on CRT

and the Ultrasonic Instrument Calibration Record, Form 400D (Figure 406-1). This is the primary reference response.

8.6.7 A calibration reference response shall be established using an appropriate reference standard (e.g., Rompas, IIW Block). This reference response shall include both sweep and amplitude calibration points and shall be recorded on the CRT and Figure 406-1. This response may be used for calibration checks (section 8.7) when the basic calibration block is not available; however, final calibration ("cal out") shall be performed on the basic calibration block.

8.7 Calibration Check

8.7.1 A calibration check on at least one of the basic reflectors in the basic calibration block or a check using a simulator or reference block (e.g., Rompas or DSC block) shall be made at the finish of each examination or every 12 hours of examination, and when examination personnel are changed. If a simulator or reference block is used, it shall be identified on the applicable calibration sheet (Figure 406-1).

8.7.2 If, in the opinion of the examiner, there is doubt as to the validity of the calibration, a calibration check shall be performed.

8.7.3 If any point of the calibration check has moved on the sweep line by more than 10 percent of the sweep division reading, correct the sweep range calibration and note the correction on the applicable calibration sheet. If recordable indications are noted, the examination is voided, and a new calibration (section 8.0) shall be recorded and the voided examination shall be reexamined.

8.7.4 If any point of the calibration check has decreased more than 20 percent or 2 dB of its amplitude, all data and/or calibration sheets since the last calibration or calibration check shall be voided. A new calibration (section 8.6) shall be recorded and the voided examinations shall be reexamined.

8.7.5 If any point of the calibration check was increased more than 20 percent or 2 dB of its amplitude, all recorded indications since the

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last valid calibration or calibration check may be reexamined with the corrected calibration and their value shall be recorded on the applicable calibration and data sheet.

9.0 EXAMINATION AREAS

9.1 Unless otherwise specified (e.g., program, plan, etc.) the examination volume shall be the inner inside diameter 1/3t (where t is the nominal wall thickness) and 1/4-inch base material from the toe of the weld, e.g., see Figure 406-2.

9.2 When conditions limit the area of examination, the limitations shall be recorded and an approximate percentage value assigned governing the area examined.

10.0 SURFACE PREPARATION

The finished contact surface shall be free from weld spatter and any roughness that would interfere with free movement of the search unit or impair the transmission of ultrasonic vibrations.

11.0 EXAMINATION PROCEDURE

11.1 When all required search unit verifications and equipment calibrations have been completed, the following procedure shall be used to perform the ultrasonic examination and the data recorded on Ultrasonic Weld Examination Record, UT-H/F/V-Form 400E (Figure 406-3).

11.1.1 The required volume of weld and base material shall be examined by the angle beam method from two sides of the weld, where practical.

11.1.2 To assure complete coverage of the examination area, each pass of the search unit shall overlap a minimum of 10 percent of the search unit's width.

11.1.3 While scanning the search unit shall be oscillated approximately 20° left and 20° right and progressively indexed along the weld such that the entire scan follows a zig-zag pattern. If the oscillation is not possible, the search unit shall be overlapped at least 50 percent.

11.1.4 Scanning speed shall not exceed 6 inches per second.

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11.1.5 When practical, scanning shall be performed at a minimum of 2 times (6 dB) the primary reference level sensitivity. Scanning at lower levels may be performed upon Level III concurrence when noise levels are excessive.

11.1.6 Straight Beam Examination of the Base Material

When required (e.g., preservice examination) the volume of base material through which the sound beam will travel in angle beam examination shall be examined by a straight beam transducer in accordance with the following:

1. The straight beam transducer shall be coupled to the production material at a location free of indications. The sensitivity of the instrument shall be adjusted as required to maintain the first back reflection at an amplitude of 50 to 80 percent.

2. Indications other than noise that have an amplitude equal to or greater than 50 percent of the initial back reflection and accompanied by a 50 percent loss of back reflection shall be recorded. If total loss of back reflection occurs, even if unaccompanied by an intermediate echo, the total area of back reflection loss shall be recorded.

11.1.7 Angle Beam Examination: Reflectors Parallel to the Weld

11.1.7.1 When practical, welds shall be examined (45° nominal) from both sides so that at least 1/2 vee-path passes through the weld, the heat-affected zone, and the required volume of the base material on each side of the weld.

11.1.7.2 Scanning shall be accomplished by placing the search unit on the contact surface with the beam aimed perpendicular to the weld and by manipulating the search unit laterally and longitudinally so that the ultransonic beam passes through the required volume of weld and base material.

11.1.8 Angle Beam Examination: Reflectors Transverse to the Weld

The angle beam examination (45° nominal only) shall be conducted by coupling the applicable search unit to the weld with the sound beam directed into and parallel with the weld and the required amount of base material. The entire length of the weld shall be scanned in this manner. The search unit shall then be rotated 180° and the scan completed in this direction.

11.1.9 Post-Examination Cleaning

Upon completion of the ultrasonic examination, the couplant should be removed from the area of examination to the extent practical.

12.0 INVESTIGATION OF INDICATIONS

All indications shall be investigated to the extent the examiner can determine the shape, identity, and location of all such indications.

13.0 RECORDING OF INDICATIONS

13.1 Indications (e.g., flaw, geometry) shall be recorded as follows:

Indication Amplitude	Indication Evaluation	Abbreviation
0-percent	Disregard	NI
1- to 49-percent DAC	Geometry disregard	NRI
50-percent DAC or greater	All indications including geometry	RI
Any Amplitude	Flaw	RI

14.0 EVALUATION AND DISPOSITION OF INDICATIONS

14.1 It shall be the responsibility of a Level II or Level III certified in ultrasonic examination to review, evaluate, and disposition all recordable indications to determine their reportability requirements.

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14.2 Reportable indications or other indications determined to be significant by the Level II or Level III shall be reported to the operating company in accordance with Procedure ADM-H/F/V-205.

Ultrasonic Instrument Calibration Record UT H/F/V Form 400D

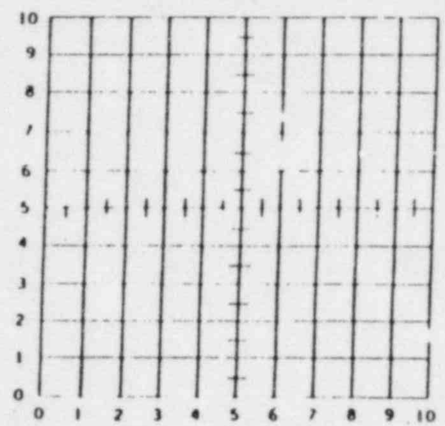
Plant/Unit	Weld No	Isometric Drawing Number	Sheet Number

Procedure No ______
Revision No ______
Deviation No ______

Instrument/Model	Serial Number	Examiner	SNT Level	Date (Month Day Year)
Couplant/Batch Number		Examiner	SNT Level	Vertical Linearity Check Accept ☐

Basic Calibration Block Number	Cal Block Temp.	Thermometer Mfg/S N	Reference Block S/N	Calibration Time

Search Units	Axial	Circ.
Manufacturer	Serial Number	
Size		
Frequency (MHz)		
Nominal Angle		
Measured Angle		
Instrument Settings	N-Axial Scan-H	N-Circ. Scan-H
Uncalibrated dB		
dB		
Reject		
Frequency		
Mode		
Damping		
Cable Type		
Cable Length		



10 Screen Divisions ______ inches

Axial Scan		
Node	Screen Div.	% FSH
4/8		
8/8		
12/8		
S.D.H.		

Circ. Scan		
Node	Screen Div.	% FSH
4/8		
8/8		
12/8		
S.D.H.		

Remarks:

NDE Level II/III Review	Date	Technical Review	Date	SCS Review	Date

Form No. 9-1902

Figure 406-1 Ultrasonic Instrument Calibration Record

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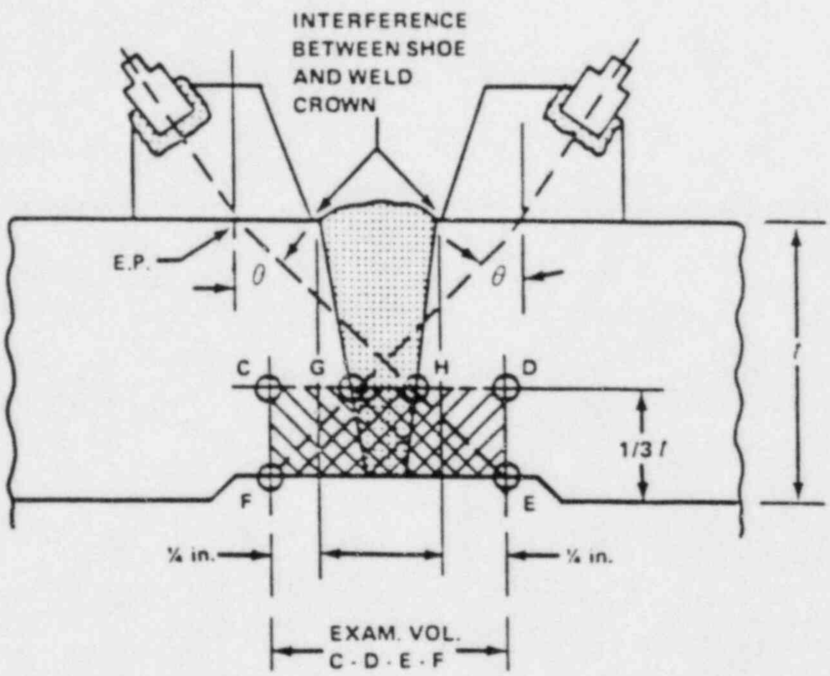

Figure 406-2

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Ultrasonic Weld Examination Record

UT-H/F/V-Form 400E

Plant/Unit	Weld No.	Isometric Drawing Number	Date	Sheet No.

Procedure No. ______ Revision No. ______ Deviation No. ______	Examiner	SNT Level	L_o Location	Examination Time		Calibration Sheet
				Started		
	Examiner	SNT Level	W_o Location	Ended		Component Temp °F

Scan	Components (Flow ⟶)	S.U. Angle	dB		Ind. No.	% DAC	Length (L)			Exit Pt. (W)			Sound (S) Path			Comments, Limitations, etc	% Area Examined	Results		
			Ref.	Scan			L_1	L_{Max}	L_2	W_1	W_{Max}	W_2	S_1	S_{Max}	S_2			NI	NRI	RI

Remarks

NDE Level II/III Review	Date	Technical Review	Date	SCS Review	Date

Form No. 9-1454D

Figure 406-3 Ultrasonic Weld Examination Record

III) Compliance with Regulatory Guide 1.150

The program for Vogtle Unit 1 will be conducted in accordance with the ASME Code Section XI 1980 Edition through the Winter 1981 Addenda augmented by the NRC Regulatory Guide 1.150 Rev. 1 dated February 1, 1983. Procedural and technique compliance with each of the regulatory positions will be discussed here. For consistency, the paragraph designations of the original document will be used for reference throughout. Likewise, the 1980 ASME Code Section XI references will be used.

1.0 Instrument Performance Checks

The ultrasonic system along with associated recording devices were described in detail in the preceeding sections. Each combination of transducer, cable, and ultrasonic instrument channel used for the examination are subject to the instrument performance checks.

1.1 Frequency of Checks

The instrument performance checks are performed on site prior to the start and after completion of the examinations. Prior to shipment of the equipment, the instrument checks are performed in the laboratory.

1.2 & 1.3 Screen Height Linearity and Amplitude Control Linearity

On site, prior to the examinations, the screen height linearity and amplitude control linearity are performed by procedural requirement for each examination calibration to be used. These checks are done in accordance with Section XI of the ASME Code. The calibration settings are used for each check.

1.4 & 1.5 Frequency Amplitude Curve and Pulse Shape

The manufacturers spectrum analysis for each transducer is supplied as part of the transducer certification. In addition, the RF waveform from the maximum response from a reference reflector in the

appropriate calibration block is photographed. The CRT display on the ultrasonic instrument is used to display the RF pulse and consequently no signal gating is used. Calibration of the CRT time base is part of the periodic instrument calibration requirements.

2.0 Calibration

System calibration to establish the distance-amplitude curve (DAC) and sweep range is done in accordance with ASME Code Section XI guidelines. There are two calibrations that are done with variations to the normal technique: the near surface and inner radius exams.

Both these exams are simple point calibrations based on 2% notch reflectors for sensitivity setting and metal path time base calibrations are used. No time corrected gain is used for these exams since in each case only one inch of material is being examined.

2.1 Calibration for Manual Scanning

For manual scanning examinations, the DAC is established dynamically using the calibration blocks. A scanning sensitivity of + 6dB is applied after the DAC reference is established. For sizing, the indication is maximized statically and compared to the DAC reference level.

2.2 Calibration for Mechanized Scanning

After the DAC reference level has been established manually and statically using the calibration block, a correction factor is applied to the sensitivity setting based on a comparison of static and dynamic

flaw response. The correction factor is determined at C-E's in-house NDE Development Laboratory using a full scale mockup of a shell course section that is scanned at inspection speed with the mechanical system used for the reactor vessel examination. The mockup is a nozzle dropout with reference side drilled hole reflectors at every inch of depth through the material. A set of holes were drilled in each direction, one parallel in the cladding direction and one perpendicular. The hole response is used to determine the dynamic/static correction factor and the effect of the relative orientation of the beam to the cladding direction.

2.3 Calibration Checks

After system calibration onsite prior to the start of examinations using the calibration blocks, the DAC curve is stored in the electronic block simulator (PSG-16). The simulator has been extensively checked for drift to demonstrate that no change of signal exceeding plus or minus 2dB response occurs during the examination period. The solid state memory has a battery backup power supply so that inadvertent power interruptions do not cause a loss of memory. The PSG-16 is used to check the electronics package on a twelve hour basis for stability of amplitude and time base calibration for each active channel. To check the entire connected system including the transducer, cable and remote pulse (if applicable) a series of target reflectors are inserted in the reactor vessel and their responses are noted and checked on a twelve hour period for each active channel. A single target

is used as a reflector for each channel and the plus or minus 2dB variation specified in the ASME Code is the allowable response tolerance for calibration checks. (Note that the two target recommendations of the Ad Hoc Committee doe snot apply here because the block calibration is done on site. This provides equivalent assurance that the system is operating within tolerances.)

The system of using the PSG-16 and target reflectors allows for storage of calibrations for inactive channels for later callup to the system. For ALARA considerations (i.e. during subsequent ISI examinations) transducers for up to fourteen channels can be inserted in the vessel at one time although only eight are active at any one time. With the digital controls on the ultrasonic instrument, calibration settings can be stored and called in and out of active use as necessary. By using the PSG-16 targets, calibrations can be changed and checked without lifting the inspection tool off the vessel and checking on the calibration block. The initial and final system calibrations are always done on the actual calibration blocks for each channel but the interim checks, including reinitializing an inactive channel, do not require use of the calibration block.

3.0 Near Surface Examination and Surface Resolution

A special near surface examination system has been developed to detect planar flaws just below the clad surface. This technique has been demonstrated in a blind

test to be able to detect and size planar flaws with a through wall dimension of 1/4 inch and greater under an as-finished clad surface.

The demonstration flaws included electric discharge machine notches and fatigue cracks oriented both parallel and perpendicular to the clad direction.

For the other category welds, the 45 degrees and 60 degrees exams are gated as close as possible to the near surface without causing almost continuous spurious signals in the gate. The actual gate start position for these examinations are reported on the calibration data sheets. Typically, the missed depth for these examinations is approximately .36" for the 45 degrees exam and .27" for the 60 degrees exam.

The outer surface region is included in the gated portion of the signals for the 45 degrees and 60 degrees examinations. Signals at the outer surface will be compared to notch responses at the appropriate depths based on calibration block responses. The gated region for the 0 degrees exam is set as close as practical to the back reflection without causing continuous triggering of the gate. In actual examinations of other reactor vessels, these exams have been demonstrated to be able to detect flaws smaller than the 2% notch reflector.

4.0 Beam Profile

Prior to the examination, the beam profiles are measured and documented for all examinations to determine the planar dimension of a flaw. The beam profiles are done at both

20% and 50% DAC using the appropriate calibration blocks. Although the ASME Code technique covers only angle beams specifically, the same technique is used for nominal straight flaws, e.g., the nozzle bore and flange mating surface examinations. The near surface and inner radius examinations are profiled by sizing the appropriate notch reflectors used for calibration.

5.0 Scanning Weld Metal Interface

When feasible, the weld-metal interface is examined with beam angles perpendicular (plus or minus 15 degrees) to the interface. Specifically, the nozzle to shell weld from the bore and the flange weld from the mating surface are examined with perpendicular beams. The nozzle to shell weld is examined from the bore with two different inspection beam angles. One angle is a correction for the nozzle taper so that the sound beam is perpendicular to the weld interface. The other angle is used to compensate for the vessel curvature to allow for beam coverage at the inner portion of the weld. Similarly, the flange weld is examined from above with several different angle beams. Each of these examination angles covers a different segment of the weld thickness.

For other welds in the reactor vessel, the fusion line is nearly normal to the surface precluding the use of a perpendicular beam. The conventional 45 degree and 60 degree in two directions perpendicular to the weld will be used providing four examinations of the interface. The recent report (ND-R-801(r), Watkins et al) on the UKEA defect detection trials on plates with embedded flaws indicates that the ASME Code techniques using a 20% DAC

reporting threshold are capable of detecting unfavorably oriented flaws. Additionally, the beltline region welds will be examined by the near surface inspection technique specifically for planar oriented flaws. Consequently, no alternate examination techniques are anticipated.

6.0 Sizing

Sizing of indications will be done in a variety of ways depending on the specific examination in use. For the beltline region, the volume will be segmented into three zones with separate reporting and sizing criteria, as shown in Figure 4.

The near surface (first inch) will have a report threshold of 20% of the 2% notch response and a sizing technique employing the 6dB drop method. In qualification tests on notches and fatigue cracks, this method had an average error of +0.042 inch with a range from -0.1 to +0.2 inch.

For the inner quarter of the plate thickness, a 20% DAC report threshold will be used. Sizing will be done two ways using 20% DAC minus the beam spread and 50% DAC. The larger of the two sizes will be reported. For the outer three quarters of the plate thickness, a 50% DAC reporting threshold and sizing technique will be used.

In all cases, the examination is done in two steps. First, a detection mode is done to determine what reportable indication exists. (This exam is done with a 25% transducer overlap, 50% where near surface is used.) The second step is done for sizing and the indication is rescanned to find the maximum response. The sizing is then

done with a 1/4 inch scan increment and quasistatic scanning to determine the applicable end points. (20% and/or 50% DAC) for the planar dimension. The length dimension is determined by the 50% DAC (50% amplitude for near surface) points. (Note that the 20% DAC technique is not applicable since no lateral beam spread measurements are available.)

All indications are treated initially as if they are traveling indications until additional evaluation can determine the nature of the indication. In particular, indications observed when the scanning direction is perpendicular to the beam direction are treated as potentially traveling indications.

7.0 Reporting of Results

Complete documentation of all reportable indications is made available to the utility at the time of the examination. Evaluation sheets are completed for all indications in accordance with the acceptance limits established in the ASME Code Section XI, IWB-3500.

The flaw sizing error band for the 45 degrees and 60 degrees exams are based on profile measurements which are also included as part of the final report. If required to further evaluate an indication, focused transducers may be used to provide improved resolution by minimizing the beam spread. The sizing accuracy for the near surface exam was previously described.

All inaccessible areas caused by obstructions or part geometry are document as part of the examination data package. The start and stop points of the electronic gating are also documented.

6.6 INSERVICE INSPECTION OF CLASS 2 AND 3 COMPONENTS

6.6.1 COMPONENTS SUBJECT TO EXAMINATION

Inservice inspection and testing of Class 2 and 3
pressure-retaining components such as vessels, piping, pumps,
valves, bolting, and supports shall be performed in accordance
with Section XI of the American Society of Mechanical Engineers
(ASME) Code including subsections IWC and IWD and applicable
addenda of the code in accordance with 10 CFR 50.55a(g)
(specific edition and addenda of the code will be delineated in 1
each program). The testing of pumps and valves is in accordance
with the requirements of subsections IWP and IWV of ASME Code
Section XI as discussed in subsection 3.9.6. Class 1 component 1
examinations are addressed in subsection 5.2.4. Certain
exceptions to the above requirements may be taken whenever
specific written relief is granted by the Nuclear Regulatory
Commission (NRC) in accordance with 10 CFR 50.55a(g)(6)(i). A
preservice inspection program (nondestructive examination) and a
preservice test program (pumps and valves) for each unit will be
submitted to the NRC by May 1984. The inservice inspection
program and inservice test program will be submitted to the NRC
within 6 months of the anticipated date for commercial
operation. These programs will comply with applicable inservice
inspection provisions of 10 CFR 50.55a(g) and the NRC guidelines
attached as an appendix to section 121.0 of review questions 1
entitled, "Guidance for Preparing Preservice and Inservice
Inspection Programs and Relief Requests Pursuant to
10 CFR 50.55a(g)." The preservice programs will provide details
of areas subject to examination, as well as the method and
extent of preservice examinations. Inservice programs will
detail the areas subject to examination and method, extent, and
frequency of examinations. Additionally, component supports and
snubber testing requirements are included in the inspection 1
programs.

The preservice inspection will include a minimum of eight (8) percent of the Class 2 piping welds in the Engineered Safety Systems.

Enclosure B

Question 420.29

Using detailed plant design drawings, discuss the control room essential heating, ventilation, and air conditioning (HVAC) system.

Response

This question was discussed with the NRC at the ICSB meeting August 27-30, 1984.

The control room isolation safety actuation signal is derived from three variables: safety injection, high radiation signal from outside air intake, and toxic gas from outside air intake. ~~The balance of plant engineered safety features actuation system is designed such that when one of the combined variables is overridden the other variables are blocked. If a false signal generates control room isolation, overriding the signals would not affect the safety of the plant, because the control room heating, ventilation, and air conditioning system may be operated in the emergency mode until the false signal is removed. The radiation monitors and chlorine detectors are accessible to allow maintenance during normal power operation.~~

Insert to 420.29

Figure 7.2.1-1, sheet 8, has been revised to include chlo .ne detection for toxic gas isolation.

Smoke detector (1-ASH-12166) provides an alarm in the control room to alert the operator to manually actuate the smoke removal mode. Figure 7.3.6-1, sheet 13 has been revised to reflect the deletion of the automatic function of the smoke detector.

Figure 7.3.6-1, sheet 1 shows the logic for the signals, including safety injection, SI-A, and that input to generate a control room isolation signal, CRI-A. Note 1 on this figure indicates that CRI-B is similar as tabulated on drawing AX5ON020-6 (i.e., figure 7.3.6-1, sheet 3). Figure 7.3.6-1, sheet 3 is a tabulation of equipment actuated by CRI and the input signals which initiate the CRI signal. As shown in figure 7.3.6-1, sheet 3 and 15, the CRI signal actuates valve A-HY-12162A. Figure 7.3.6-1, sheet 1 has been revised to provide the appropriate references between these drawings. 13

The hydrogen sulfide detection signal input has been deleted as an input to the toxic gas logic as shown in figure 7.3.6-1, sheet 4. Figure 7.3.6-1, sheet 7 has been revised to delete the hydrogen sulfide input signal.

Insert to 420.29

The reset/override design of the radiation monitors and toxic gas detectors input to the ~~fuel~~ control room ~~handling building~~ isolation will be revised to allow an individual ~~monitor~~ channel to be reset/overriden by the operator. The final design will be such that overriding a supurious channel, will not affect the other radiation monitor channel~~s.~~ or toxic gas channel. The FSAR will be revised to reflect these changes when the design has been completed.

Question 420.30

Using detailed plant design drawings, discuss the containment automatic isolation system.

Response

This question was discussed with the NRC at the ICSB meeting August 27-30, 1984.

The containment automatic isolation system is described in detail in subsection 6.2.4. (The logics and elementary drawings for several containment isolation valves were reviewed by ICSB.)

As requested, the following describes the reset/override of the radiation detector input to containment isolation logic. 15

The safety-related containment low range area monitors (one out of two channels) and nonsafety-related containment purge radiation monitors (particulate, gas, and iodine) automatically input to the containment ventilation isolation signal. The reset/override design of the radiation monitor input to containment ventilation isolation is being revised to allow an individual monitor channel to be reset/overriden by the operator. 15 By overriding the spurious channel, the other radiation monitor channels would not be blocked as well. The safety injection signal is not blocked by this action.

The design of the safety-related containment high range area radiation monitors (out of the two channels) is being revised to ~~provide a high alarm signal in the control room without initiating containment isolation Phase A. Therefore reset/override is not applicable.~~ 15 allow an individual monitor channel to be reset/overriden by the operator. Overriding the spurious channel will not affect the other channel. The safety injection signal is not blocked by this action.

The FSAR will be revised to reflect these changes.

Question 420.41

Using detailed drawings, describe the ventilation system used to support engineered safety features areas, including areas containing systems required for safe shutdown. Discuss the design bases for these systems including redundancy, testability, etc.

Response

This question was discussed with the NRC at the ICSB meeting August 27-30, 1984.

The list of ventilation systems used to support engineered safety features was presented. The control room heating, ventilation, and air conditioning (HVAC) and fuel handling building HVAC were reviewed in detail using the logics, piping and instrumentation diagrams, and elementary diagrams. The electrical tunnel ventilation system was reviewed briefly.

See Insert to 420.41

The fuel handling building isolation is derived from high radiation signal from inside the normal HVAC system ducting and differential pressure signal between outside pressure and the inside pressure of the fuel handling building. ~~The fuel handling building isolation reset/override design is similar to the control room isolation as discussed in response to question 420.29. If a false signal generates fuel handling building isolation, overriding the signals would not affect the safety of the plant or cause unacceptable radiological releases, because the HVAC may be operated in the emergency mode until the false signal is removed.~~

The tunnel system fan initiation will be reviewed as part of the Regulatory Guide 1.151 evaluation (question 420.11).

Figure 9.4.9-3 shows the following instrumentation for monitoring the safety-related electrical tunnels:

- local temperature indication
- high temperature alarms in the control room 13
- fan status indication in the control room

Figure 420.41-1 shows the logic diagram for a safety-related electrical tunnel ventilation system. Paragraph 9.4.9.2.5 has been revised to clarify which instrumentation is provided in the control room.

Insert to 420.41

The reset/override design of the radiation monitor input to the fuel handling building isolation will be revised to allow an individual monitor channel to be reset/overriden by the operator. The final design will be such that overriding a supurious channel, will not affect the other radiation monitor channels. The FSAR will be revised to reflect these changes when the design has been completed.

Enclosure C

Consequently, the addition of smoke dampers would not increase plant safety.

B. Appendix 9B (C.7.b) ~~states~~ will be revised to indicate that smoke detectors are provided for the control room ~~but not for the cabinets and consoles.~~ and will be installed in the main control board. Remote shutdown panels, located outside of the main control room fire area, provide alternate shutdown capability in the event of a control room fire. Consequently, the addition of smoke detectors to the control room cabinets and consoles provides no additional safety margin. Additionally, because the control room cabinets are designed to provide separation for train-oriented functions, a small fire in a single cabinet is not likely to disable both trains.

C. A limited amount of carpeting is provided in the control room as indicated in appendix 9B (C.7.6). The flame spread, smoke contribution, and fuel contribution is 25 percent or less. Additionally, the plant can be brought to safe shutdown after a control room fire by using a remote shutdown panel; the elimination of the control room carpeting would not increase plant safety.

D. See item A above.

E. As stated in appendix 9B, other than cables for lighting of the control room, cables are not located in the concealed floor and ceiling spaces. Cables which enter the control room terminate in the control room. No cabling is routed through the control room from one area to another.

Enclosure D

Question 430.5

Expand paragraph 9.5.3.2.3 to provide the following additional information regarding emergency lighting for the main control board and remote shutdown panels. Your discussion should also include access routes to the control room.

A. List the illumination levels provided by each of the emergency lighting systems, and demonstrate that these illumination levels conform to the minimum recommendations of NUREG-0700. In your discussion of illumination levels, consider a single active failure of an emergency diesel generator.

B. Consider the design basis seismic event coincident with the loss of all nonseismic equipment, components, and systems (including offsite power). Show that adequate illumination will be provided in the control room to effect safe, cold shutdown of the reactor and to maintain cold shutdown for an extended period of time, or provide justification for not requiring control room lighting under these conditions.

Response

The VEGP project has adequate lighting available to achieve safe shutdown. (See table 430.5-1.) In the event of loss of any ac powered emergency lighting system in the main control room, the remote shutdown panel rooms, the diesel generator panel rooms, the auxiliary feedwater pumphouse panel rooms, and the access routes between these rooms, adequate lighting with minimum illumination level of 10 ft-candles on the main control board, the remote shutdown panels, diesel generator panels and auxiliary feedwater pumphouse panels and 2 ft-candles on the access routes, will be provided by the sealed beam lighting fixtures. Power to the sealed beam lighting fixtures will be 15
from its self-contained batter and charger unit (power pack unit) and is rated for 8-h minimum operation. The power pack unit is identical to the unit which was seismically tested by the supplier, and is, therefore, equivalent to Seismic Category I.

The emergency lighting system components including raceways, ~~panelboards~~, and lighting fixtures, have been mounted to Seismic Category I requirements. The distribution panelboards will be seismically qualified. A sample of the emergency lighting system conduit/cable assembly (ALS), and its mounting details on the request of the NRC, were submitted to the NRC. (See figure 430.5-1.)

Should repairs be necessary to bring any emergency lighting system back into service, i.e., a fixture or circuit breaker problem develops, the repair could be performed within the 8-h period (the time during which the sealed beam fixtures are providing the minimum illumination in the area). See table Q430.5-1. 15

TABLE 430.5-1 (SHEET 2 OF 2)

e. The emergency lighting power distribution system is Class 1E from the 4.16-kV to the 480-V level. Fully qualified Class 1E isolation transformers reduce the voltage to the 120-V level. Beyond the isolation transformers the system is non-Class 1E. ~~All components including raceways, panelboards, and lighting fixtures have been mounted to Seismic Category 1 requirements. Due to the simple design of panels and fixtures, it is felt that should a fixture or breaker problem develop as a result of a design basis earthquake (DBE), repair could be performed (if required) within the same time frame as relamping could be accomplished.~~

It should be noted that in areas where emergency lighting is provided, fixtures are powered from alternate distribution systems; i.e., diversity in distribution is provided.

f. The main control room luminous ceiling is designed and qualified to Seismic Category 1 requirements. Lamps within the fixtures are not guaranteed to function during or following a DBE. Test results have shown that lamps remain functional, however. Should all lamps (including 8-h modular sealed beam units) fail during a DBE, the illumination levels can be restored by replacing the lamps, and/or portable dc units can be used until lighting is restored.

g. The lighting fixtures are not seismically qualified to function during or after a DBE. However, the fixtures are mounted in accordance with Seismic Category 1 requirements. Failed lamps within the fixtures (if any) can be replaced and/or portable dc units can be used until lighting is restored.

Within the non-class 1E portion of the Emergency Lighting System, the distribution panel boards will be seismically qualified. All other components including raceways and lighting fixtures, while not Seismic Category, have been mounted in accordance with Seismic Category 1 requirements.

Enclosure E

Question 430.72

For the centrifugal charging pumps you state that the pump brake horsepower exceeds the nameplate rating of the motor (670 hp and 600 hp, respectively) but is within the capability of the motors which have a service factor of 1.15. The service factor applied to a motor allows it to deliver greater than rated horsepower without damaging its insulation system when operating at its nameplate voltage. It is not, however, capable of delivering this same horsepower at reduced voltages. Therefore, justify operation of this motor at reduced voltages down to the settings of the degraded voltage relays.

Response

In accordance with NEMA MG-1, the motors of the centrifugal charging pumps will function continuously at 90 percent voltage (degraded voltage relay setting).

Westinghouse is performing an analysis to determine the specific pump characteristics after operating at a degraded voltage. Results of the analyses will be reported in June 1985. 14

Analyses have demonstrated that running the charging pumps at reduced voltage corresponding to the degraded voltage settings for long periods of time will cause the motors to heat up. This heatup is well within the limits specified in NEMA standards. The system effects of a lower pump speed have also been evaluated and the limited flow degradation has been demonstrated to be well above the flows assumed in the accident analyses.

Enclosure F

penetration, since the penetration thermal capability curve is always to the right of the fuse curves. For example, the 400-A fuse would clear a 1000 A fault current within 100 s; however, the 500 MCM penetration conductor can handle 1000 A for 1 week.

These penetrations are protected by a motor feeder breaker and a fuse. If one fails to operate, the other will always protect the penetration from damaging fault currents.

F. See item B above. A No. 2/0 AWG penetration conductor is the correct size.

G. See item B above.

H. ~~The minimum postulated fault for this circuit is 306 amps. This value exceeds the area where the overlap exists (less than 190) as shown in figure 8.3.1-7, sheet 2; therefore, no correction is warranted~~. The maximum fault currents have been provided.

See insert to Q430.74

The minimum postulated fault currents were calculated based on the source impedance, the breaker impedance plus tolerance, and the largest cable impedance from the longest cable run from source to load inside containment. ~~In the areas below these minimum fault currents where the largest magnetic-only circuit breaker trip setting overlaps the penetration thermal capability curve, higher impedance faults or locked rotor motor conditions would not exist long enough to damage the penetration before degrading into faults that would be cleared by the magnetic-only circuit breakers. Therefore, the minimum fault currents shown on the figures represent the lowest credible faults which could be maintained for any significant period of time~~.

The inverter shown on sheet 11 of FSAR figure 8.3.1-7 has an output rating of 480 V-ac (3 phase) and 30 A. The maximum fault current was calculated based solely on the current limiting circuitry of this inverter. If this feature is lost, the penetration will always be protected from damaging fault currents by the output 15 A breaker and the internal inverter fuses, whose curves are both to the left of the penetration thermal capability curve. Although these fuses are on the dc side of the inverter, the fault energy would have to pass through them before conversion to ac inside the inverter.

Insert to Q430.74

The magnetic only circuit breakers will either be readjusted or be replaced with thermal magnetic circuit breakers on those penetration circuits where the penetration thermal capability (I^2t) curve currently overlaps the tripping characteristic curve of the magnetic only circuit breaker. The readjusted magnetic only circuit breaker or the replacement thermal magnetic circuit breaker tripping characteristic curve will be chosen so that it is to the left of and does not overlap the penetration I^2t curve. A revised version of figure 8.3.1-7 will be submitted to indicate this change in a later amendment.

Enclosure G

Question 480.33

FSAR paragraph 6.2.6.3 states that type C testing of the safety injection lines, containment spray lines, and long term recirculation lines will not be done on the basis that these lines are water sealed. Additional justification is needed for the elimination of type C tests (note that table 6.2.4-1 indicates type C testing for the spray lines):

A. For each line, discuss and justify that a sufficient water inventory will be available for at least 30 days following a loss-of-coolant accident (LOCA).

B. For each line, discuss your plans for hydrostatically testing the valves to show that water leakage from the isolation valves is compatible with the 30-day inventory requirement. The leakage limits for these valves should be included in the plant Technical Specifications.

C. FSAR paragraph 6.2.6.3 states that the isolation valves in the charging line of the chemical and volume control system are type C tested using water. Type C testing using water as the test fluid is permissible only if it can be shown that parts A and B above are satisfied.

Response

The lines penetrating the containment which ~~penetrate containment and~~ are required to perform a safeguard function following an accident and are part of a closed system outside containment are not Type C tested. Each of these lines is equipped with isolation valves that can be actuated by the operator from the control room.

Lines which fall into this category are:

A. Safety injection pump discharge lines (penetrations 30, 31, and 33). 9

B. Residual heat removal pump discharge lines (penetrations 56, 57, and 58).

C. Centrifugal charging pump cold leg injection path (penetration 32).

~~D. Containment spray pump discharge lines (penetrations 34 and 35).~~

D ~~E~~. Containment emergency sump lines to the residual heat removal and containment spray pumps suction (penetrations 36 through 39).

E ~~F~~. Residual heat removal pump hot leg suction lines (penetrations 59 and 60).

Because the Safety injection, residual heat removal, long term sump recirculation ~~containment spray~~, and high head safety injection portions of the chemical and volume control system are closed systems outside the containment, designed and constructed to ASME III, Class 2, and Seismic Category 1 requirements, they do not constitute a potential containment atmosphere leak path during or following an accident with a single active failure of a system component. The above systems are operated and inspected during normal plant operation to ensure that the integrity is maintained. ~~A simple active failure can be accommodated.~~

The reactor coolant pump seal water injection lines (penetrations 51 through 54) are not required to perform a safety function during an accident. However, due to the sensitive nature of the seals, it is highly desirable to provide seal flow at all times. The charging pumps are used for high head safety injection, and flow will be provided by these pumps through the seal injection lines following an accident. In addition, the system is designed, constructed, and maintained to qualify as a closed system outside the containment. Each line is equipped with a remote manual containment isolation valve which the operator can close if required. 9

The isolation valves in the above lines are either normally open at the time of an accident or are opened at some time after the accident to effect immediate and long term core cooling. (Insert to Q480.33) ~~Therefore, these lines are continuously water filled during emergency core cooling system operation, either from the refueling water storage tank or from the containment emergency sumps and as such do not provide a credible path for leakage of the containment atmosphere.~~

Table 6.2.4-1 and subsection 6.2.6 has been ~~will be~~ revised ~~in Amendment 10~~ to reflect the above discussion and to indicate that the containment spray discharge line valves (penetrations 34 and 35) are type C tested.

INSERT TO 480.33

Valves which are closed initially or closed at some time following a loss-of-coolant accident are positioned to effect proper system operation and not to effect a barrier against release of containment atmosphere. Should the valves leak slightly when closed, the fluid seal within the pipe or the closed piping system outside the containment would preclude release of containment atmosphere to the environs as discussed further below for each penetration.

- Valve HV-8835 (Penetration 30) is a power lookout open valve and remains open during all modes of emergency core cooling operation. However, if the valve were to be closed at any time during the 30 day period following a LOCA, either one of the safety injection pumps will maintain an inward action head of water on the valve. The source of water is the refueling water storage tank (RWST) during the injection mode and from the containment emergency sumps during the recirculation mode (see Figure 6.3.2-1, sheet 3).

- Valves HV-8802 A and B (Penetrations 31 and 33) are normally closed valves and are opened during the long term hot leg recirculation mode. When the valves are closed either one of the safety injection pumps will maintain an inward acting head of water on the valves (see Figure 6.3.2-1, sheet 3).

- Valves HV-8801 A and B (Penetration 32) are normally closed valves that are automatically open on receipt of a safety injection signal and remain open during all modes of emergency core cooling. If one of the valves fails to open, either one of the centrifugal charging pumps will maintain an inward acting head of water on the valve. The source of water is from the RWST during the injection mode and from the containment emergency sumps during the recirculation mode (see Figure 6.3.2-1 sheet 1).

- Valves HV-8811 A and B and HV-9002 A and B (Penetrations 36 through 39) are normally closed valves and are opened during the recirculation mode. When the valves are closed a water seal is provided by water from the RWST (outside containment during the injection mode and from the emergency sumps (inside containment) during the recirculation mode. These valves are enclosed in encapsulation vessels which are an extension of the containment boundary. The encapsulation vessels are Type B tested as discussed in paragraph 6.2.6.2 (see Figures 5.4.7-1 and 6.2.2-3).

- Valve HV-8840 (Penetration 56) is a normally closed valve and is opened during hot leg recirculation mode. When the valve is closed either one of the residual heat removal (RHR) pumps will maintain an inward acting head of water on the valve except when valve HV-5716 A (train A) and/or valve HV-8716 B (train B) are closed and the opposite train RHR pump is not running. The source of water is from the RWST during the injection mode and from the containment emergency sumps during the recirculation mode. Even if the valve was to leak slightly when closed and valve HV-8716 A and/or valve HV-8716 B are closed and the opposite train RHR pump is not running, the closed RHR system outside containment would preclude release of containment atmosphere to the environs (see Figures 6.3.2-1, sheet 3 and 5.4.7-1).

- Valves HV-8809 A and B (Penetrations 57 and 58) are normally opened valves and are closed during hot leg recirculation mode. When the valves are closed either one of the RHR pumps will maintain an inward acting head of water on the valves except when valve HV-8716 A and/or valve HV-8716 B are closed and the same train RHR pump as the closed valve HV-8809 A or B is not running. As discussed above, the closed RHR system outside containment would preclude the release of containment atmosphere to the environs (see Figures 6.3.2-1, sheet 3 and 5.4.7-1).

- Valves HV-8701 A and HV-8702 A (Penetrations 59 and 60) are normally closed and remain closed during the injection and recirculation modes. If these valves were to leak slightly, the RHR pumps would pump the leakage back into the containments and the closed RHR system would preclude any release to the environs (see Figure 5.4.7-1).

The valve stems are not a potential containment atmosphere leak path when the valves are closed for one of the following reasons:

- the valve stem leak-off connection is capped.

- the valve is enclosed in an encapsulation vessel.

- the valve stem leakage is routed to the recycle holdup tank which has a diaphragm. The space above the diaphragm is part of the negative pressure boundary and is continuously ventilated with the safety related piping penetration exhaust system (see Figure 9.3.4.2 and paragraph 9.4.3.2).