NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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March 31, 1988

Docket No. 50-245
B12803
Re: Generic Letter 87-05

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

Gentlemen:

Millstone Nuclear Power Station, Unit No. 1
Additional Information Concerning Generic Letter 87-05

Generic Letter 87-05[1] requested information from BWR owners regarding their intended actions to determine if drywells at their facilities have degraded by a corrosion mechanism similar to that which occurred at the Oyster Creek Nuclear Generating Station from 1980 to 1986. Northeast Nuclear Energy Company (NNECO) provided the requested information concerning Millstone Unit No. 1 on May 12, 1987.[2] In this letter, NNECO committed to perform visual inspections of the eight 1-inch drain lines and ultrasonic thickness measurements of drywell shell plates. The purpose of this letter is to provide further information subsequent to the completion of inspections performed during the 1987 refueling outage.

During the 1987 refueling outage the following actions were taken concerning the drywell and the drywell shell:

- o A detailed visual inspection on the eight 1-inch drain lines.
- o Ultrasonic thickness measurements on the drywell shell plates adjacent to the sand cushion.

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(1) R. M. Bernero letter to All Licensees of Operating Reactors, Applicants for Operating Licenses, and Holders of Construction Permits for Boiling Water Reactors (BWRs) with Mark I Drywells (Generic Letter 87-05), dated March 12, 1987.

(2) E. J. Mroczka letter to U.S. Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 1, Response to Request for Additional Information Concerning Assessment of Licensee Measures to Mitigate and/or Identify Potential Degradation of Mark I Drywells (Generic Letter 87-05)," dated May 12, 1987.

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The results of the inspections show that the sand pocket drain lines are functioning properly as originally designed. The ultrasonic thickness measurements performed confirm that the shell liner thickness is within ASTM thickness tolerance criteria and the shell liner shows no signs of plate degradation. Attachments 1 and 2 present detailed engineering evaluations of the inspection results for the sand pocket drain lines and the drywell liner, respectively.

Should you have any questions concerning this matter, please contact us.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

E. J. Mroczka
Senior Vice President

cc: W. T. Russell, Region I Administrator
M. L. Boyle, NRC Project Manager, Millstone Unit No. 1
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2 and 3

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Attachment 1

Millstone Nuclear Power Station, Unit No. 1

Results of Sand Pocket Drain Line Inspection

March 1988

ENGINEERING SUMMARY
SAND POCKET DRAIN LINE

INTRODUCTION

In accordance with NNECO's response to NRC Generic Letter 87-05 titled "Request for Additional Information--Assessment of Licensee Measures to Mitigate and/or Identify potential Degradation of Mark I Drywells," the drain lines that are connected to the sand cushion located between the drywell wall and the surrounding concrete were inspected. The Millstone Unit No. 1 sand cushion design is open to the gap between the drywell shell and surrounding concrete. The only path for the water to drain from the sand cushion is through the 1-inch plastic drain lines located at the bottom of the sand cushion. In order to properly inspect the sand cushion drain lines, a visual inspection of each line was performed, as well as a closed circuit television (CCTV) camera inspection during the past 1987 Millstone Unit No. 1 Refueling Outage.

SAND CUSHION DRAIN LINE DESIGN DETAIL

The sand cushion drain line detail is shown in Figure 1. The detail presented shows a pre-formed metal trough 6 inches wide by 3 inches deep. A 1-inch diameter drain line is connected to the bottom of the metal trough. The drain line extends vertically downward, turns 90^{0} to a horizontal position, and then slopes downward and extends through the concrete wall. This design permits any water to exit the drain line and into the torus room.

SAND POCKET DRAIN LINE EXAMINATION RESULTS

The following is a chronological list of events which were performed to inspect the sand pocket drain lines.

a. Pre-Outage Inspection

NNECO performed a visual inspection on the eight drain lines to determine drain line pipe material and inspect for evidence of drain line water leakage. The inspection was performed from the floor of the torus room at elevation -22'. The drain line pipe was determined to be black flexible polyethylene pipe which extended out from the concrete wall approximately 2 to 3 feet. No visible water or water stains from where water had exited the drain lines were visible for all eight drain lines inspected.

b. Outage Inspections

1. Fiberscopic inspections were performed on 5A, 5C, 5E, and 5G drain lines. These drain line locations are shown in Figure 1. Inspection results are as follows:

   - o Water pockets were present in all four drain lines.
   - o Drain lines in the concrete wall were not continuously sloped lines as shown in Figure 2. The lines appeared to be wavy throughout the thickness of the wall.
   - o Sand from the sand cushion was present in each of the drain lines.
   - o Water stains and sand were visible on the torus structure at the 11 o'clock position.

   The fiberscopic inspection did not reveal the clarity inside the pipe as was originally intended. In order to achieve better inspection results, a CCTV inspection service was obtained.

2. Drain Line Water Removal

   Water was removed from inside each of the drain lines by the use of a Randolph pump, and Tygon tubing was placed in the drain line from the concrete wall to the sand cushion. Water was collected from each drain line into a sample canister and subsequently chemically analyzed. In order to facilitate future, visual inspections from the floor of the torus room, the drain lines were cut back from the 2 to 3 foot extended length to approximately 2 inches from the wall. This activity permits the water to exit the drain pipe and fall directly onto the torus room floor rather than fall on the torus shell structure.

3. Chemical Water Analysis

   Water samples were taken from each drain line and were chemically analyzed to determine its radioactivity levels and the extent of contamination. The water samples indicate that the water was not reactor cavity water. The existence of the water in the drain lines may have been caused from condensation on the drywell shell over a period of time.

4. CCTV Inspection

   A CCTV inspection was performed on the eight 1-inch diameter drain lines. The inspection of each drain line was recorded on a VCR

tape and is available for viewing as a permanent record. The results of the inspection are as follows:

- Drain lines in the concrete wall are not continuously sloped lines as shown in Figure 1 but have various peaks and valleys. It appears that the lines were not supported during the concrete pour of the wall and that they moved when the concrete was placed.

- Minor amounts of sand from the sand cushion were present in the lower half of the drain line which indicates sand has passed from the cushion into the line.

- Minor amounts of water were visible in some of the drain line pockets which indicates that water is filtering through the sand cushion. (Lines were previously pumped out.)

- There is a wire cloth screen at the base of the metal trough which was not shown in Figure 1. The screen appears to be passing minor amounts of sand from the sand cushion. (See Table 1 for details of each screen.)

- The sand which is in the drain lines from the sand cushion resembles a very fine beach sand. The sand is much finer than the mesh on the wire cloth screens, which is why it is passing into the drain line.

CONCLUSION

The sand pocket drain lines are functioning properly as intended, although the present as-built condition differs from the stated design details. This statement is based on the following engineering facts:

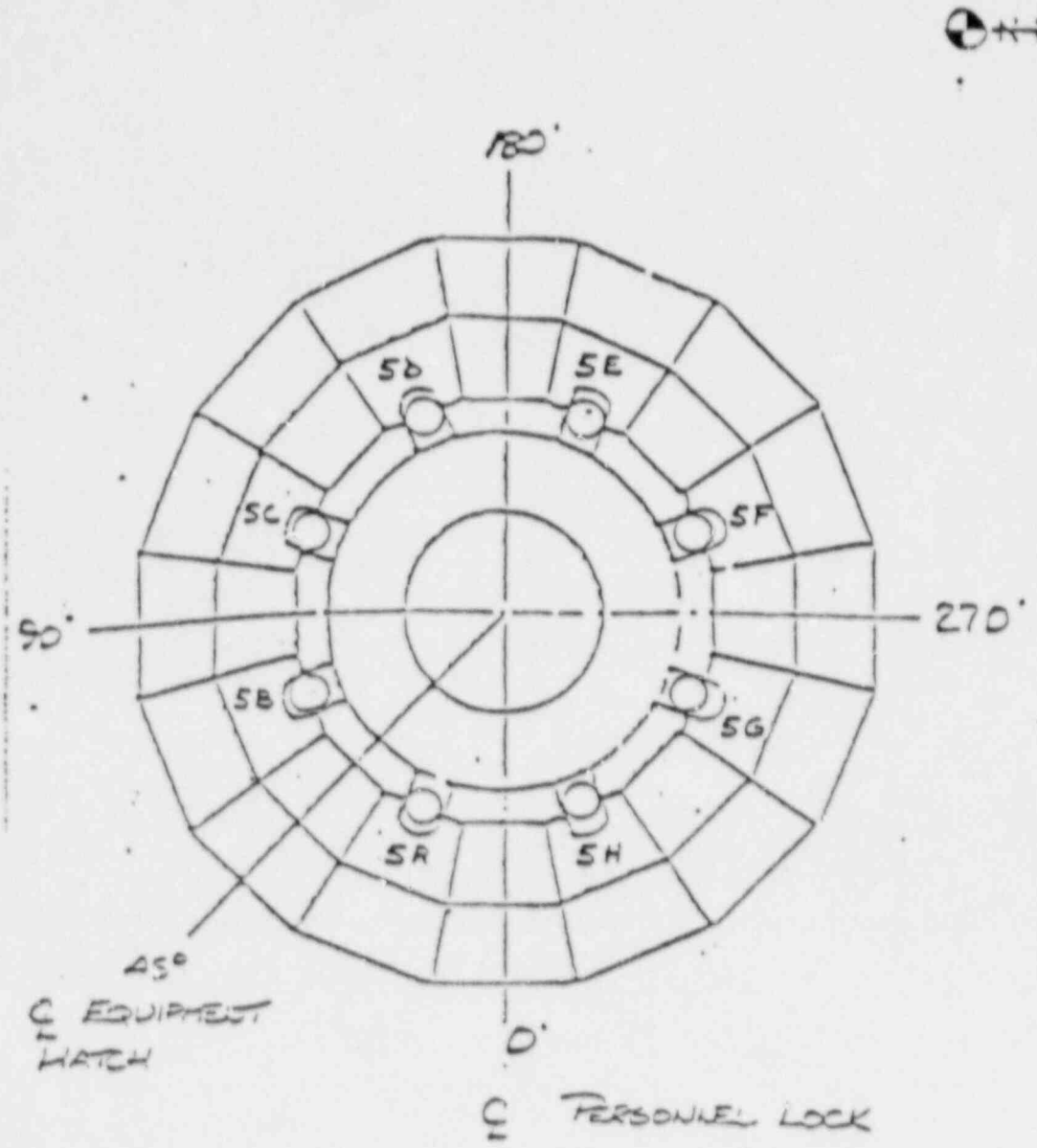
- Water is able to filter through the sand cushion, wire cloth screen, and 1-inch drain lines as indicated by water stains on the torus shell. After each drain line has been pumped dry, minor amounts of water accumulated in some of the drain line pockets.

- Although the drain line is not a continuous slope line, the difference in elevation between the lower elevation of the sand cushion and the drain line exit elevation dictates water will always drain.

- Although minor amounts of sand are present in the drain line, no major loss of sand from the sand cushion is evident. Sand is present in the drain line due to its fineness as opposed to other materials caught by the wire cloth screen.

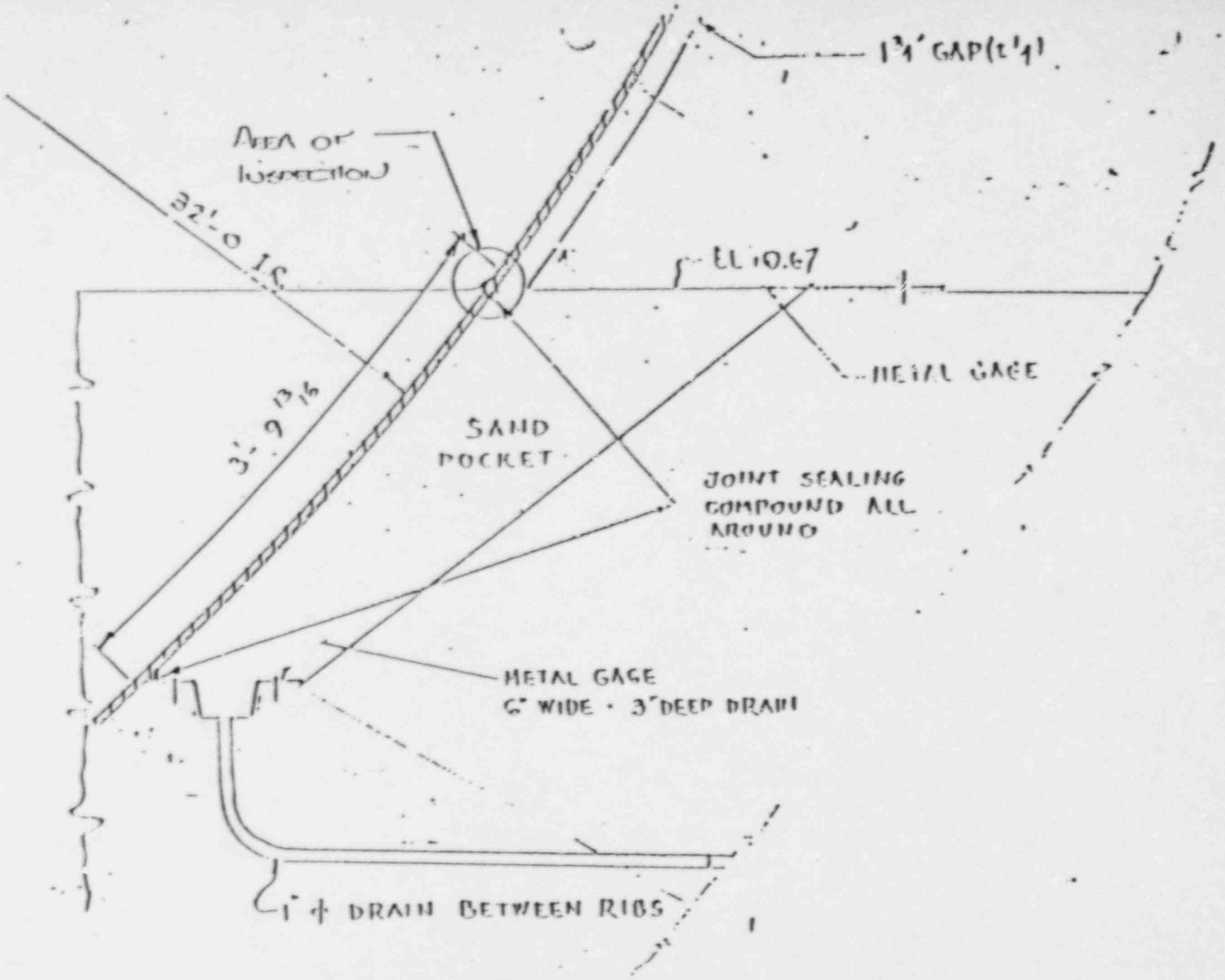
- Water samples taken from drain line indicate the water is not reactor cavity water.

DRYWELL LINER INSPECTION
VENT LINE NUMBERING SYSTEM



○ 1° VENT LINE NUMBER

PLAN VIEW DRYWELL
N.T.S.
FIGURE 1



SAND POCKET DETAIL

FIGURE 2

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Attachment 2

Millstone Nuclear Power Station, Unit No. 1

Results of Drywell Inspection

March 1988

ENGINEERING SUMMARY
DRYWELL LINER INSPECTION
ULTRASONIC LINER THICKNESS MEASUREMENTS

INTRODUCTION

In accordance with NNECO's response to NRC Generic Letter 87-05 titled "Request for Additional Information--Assessment of Licensee Measures to mitigate and/or Identify Potential Degradation of Mark I Drywells," the drywell shell plates adjacent to the sand cushion were inspected. Ultrasonic thickness measurements were taken in 16 inspection pockets along the shell circumference on the 0'-8" level of the Millstone Unit No. 1 drywell interior.

DRYWELL LINER DESIGN DETAILS

The drywell liner shell thickness in the area of the sand cushion at elevation 0'-8" is 0.875 inches thick as shown on the original Chicago Bridge and Iron drawings. The shell is composed of many plate section welded together to form a spherical shell. See Figure 1 attached.

ULTRASONIC THICKNESS MEASUREMENTS

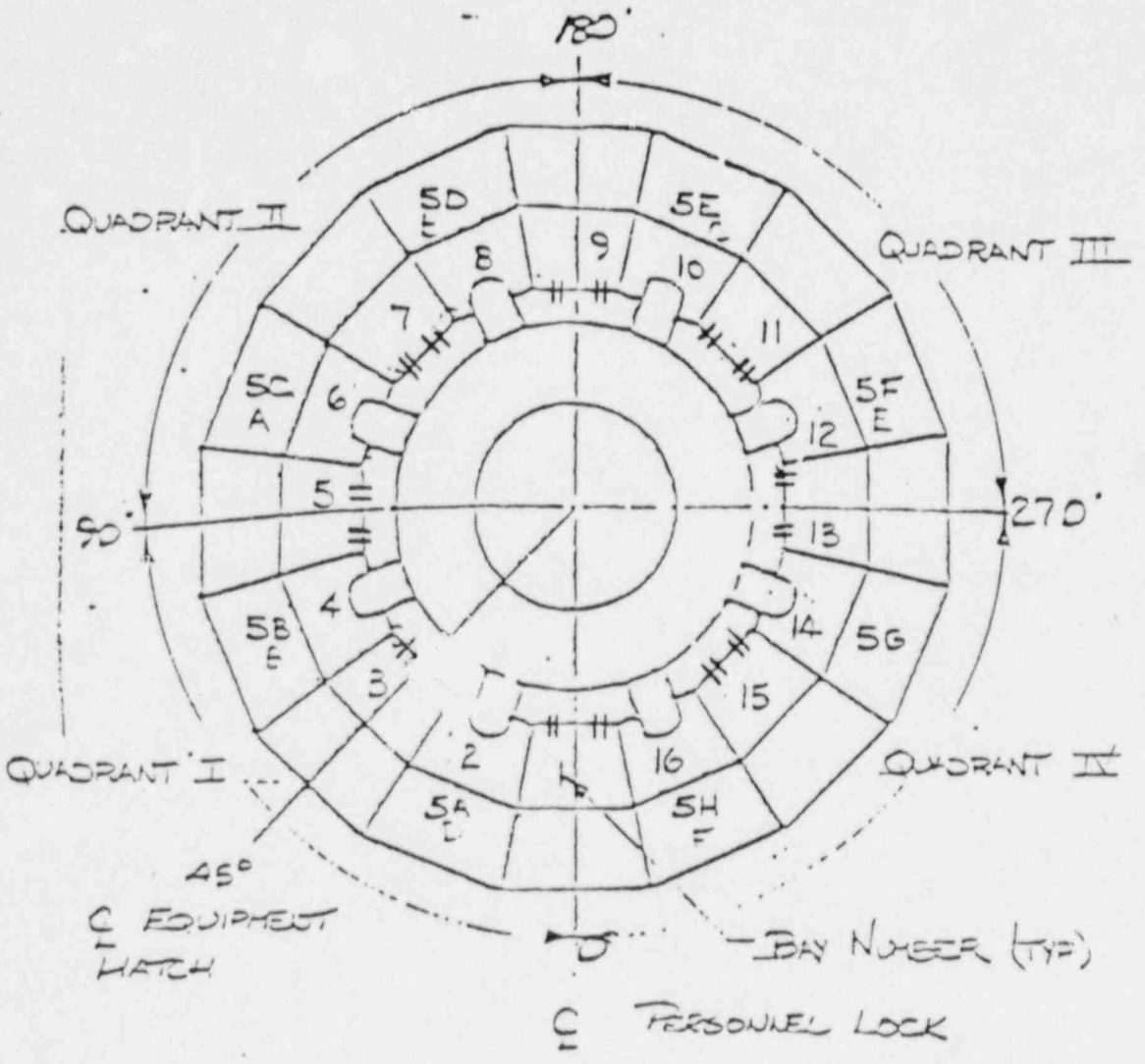
In order to perform the required ultrasonic thickness measurements, sixteen 4" x 4" x 4" inspection pockets of concrete on the 0'-8" level were removed by hand chipping. Preformed sheet metal forms were fabricated to be placed in each of the inspection pockets and were grouted in place. A 4" x 4" grid located within the concrete pocket on the drywell liner shell was established and marked for the current and any future inspections. Ultrasonic thickness measurements were taken in each of the 16 inspection pockets using the 4" x 4" measurement grid. Prefabricated sheet metal plugs were then placed in the inspection pocket and caulked. The use of prefabricated plugs in each inspection pocket, as well as the marking of the 4" x 4" grid, allows for future inspection utilizing the same inspection points and allows for direct correlation of results.

The drywell liner inspection ultrasonic thickness measurements are presented in Table 1. As can be seen from the table, 16 points were taken in each pocket. From these readings, the high and low readings were recorded and averaged to obtain the average shell thickness in the area of the concrete pocket. This average thickness is then compared to the center thickness of the 4" x 4" pocket and finally to the actual design plate thickness. The average plate thickness for all inspection pockets is 0.865 inches as compared to 0.875 inch design plate thickness.

CONCLUSIONS

Based on the recorded ultrasonic thickness measurements performed in the 16 inspection pockets, the measured shell liner thickness is within ASTM thickness tolerances and the shell liner shows no signs of plate degradation.

DRYWELL LINER INSPECTION
SHELL THICKNESS MEASUREMENT
REFERENCE SYSTEM



PLAN VIEW DRYWELL
N.T.S.
FIGURE 1

TABLE 1
DRYWELL LINER INSPECTION
TABULATION OF UT LINER MEASUREMENTS

Location	High Readings		Low Readings					
	No. Points	THK (Inches)	No. Points	THK (Inches)	No. Points	Avg. THK (Inches)	Center THK (Inches)	Design Plate THK (Inches)
5AL	16	0.86	9	0.84	7	0.851	0.84	0.875
5AR	16	0.88	4	0.86	12	0.865	0.86	0.875
5BL	16	0.88	16	-	-	0.88	0.88	0.875
5BR	16	0.88	16	-	-	0.88	0.88	0.875
5CL	16	0.88	12	0.86	4	0.875	0.88	0.875
5CR	16	0.86	4	0.84	12	0.845	0.84	0.875
5DL	16	0.86	14	0.84	2	0.858	0.86	0.875
				0.86	9			
5DR	15	0.88	2	0.84	4	0.857	0.86	0.875
5EL	16	0.86	12	0.84	4	0.855	0.84	0.875
5ER	16	0.88	16	-	-	0.88	0.88	0.875
5FL	16	0.88	16	-	-	0.88	0.88	0.875
5GR	16	0.86	6	0.84	10	0.848	0.86	0.875
				0.86	7			
5HL	16	0.88	1	0.84	8	0.851	0.84	0.875
5HR	16	0.86	6	0.84	10	0.848	0.84	0.875

Notes: 4" x 4" grid used for UT inspection in 4" x 4" liner pocket.