UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

MAR 12 1987

TO ALL LICENSEES OF OPERATING REACTORS, APPLICANTS FOR OPERATING LICENSES, AND HOLDERS OF CONSTRUCTION PERMITS FOR BOILING WATER REACTORS (BWRs) WITH MARK I CONTAINMENTS

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION-ASSESSMENT OF LICENSEE MEASURES TO MITIGATE AND/OR IDENTIFY POTENTIAL DEGRADATION OF MARK I DRYWELLS (GENERIC LETTER 87-05)

Gentlemen:

INTRODUCTION

In 1980 at the Oyster Creek Nuclear Generating Station GPU Nuclear Corporation (GPU) observed water coming from the drains that are connected to the sand cushion located between the drywell wall and the surrounding concrete. The licensee continued their investigations to locate and correct the source of leakage during the 1983 refueling outage. In the spring of 1986 during the 1986 refueling outage the licensee again noticed water coming from the drains. At that time they decided to perform ultrasonic thickness measurements of the drywell shell plates adjacent to the sand cushion to determine if corrosion had occurred. On November 20, 1986, the licensee informed the NRC of their initial ultrasonic examination findings. The staff issued Information Notice No. 86-99 on December 8, 1986 providing details on the source of leakage, actions taken by the licensee to eliminate the leakage and preliminary information on the extent of corrosion that had occurred on the drywell shell in the sand cushion location. From the results of further non-destructive examinations of the drywell shell, metallurgical analyses of samples removed from the drywell shell and chemical analyses of the sand and water obtained from the sand cushion region, the wall thinning appears to have resulted from general wastage of the carbon steel plates from corrosion caused by water containing aggressive anions. From the UT results it appears that general wastage of the shell, to a varying extent, has occurred in two localized regions of the drywell shell plates adjacent to the sand cushion. One localized region extends about 35 feet circumferentially, the other region extends about 21 feet circumferentially. The drywell shell in these regions was reduced from a thickness of 1.115 inches to an average of about 0.850 inches with some local spots being reduced to about 0.750 inches. The staff issued a Safety Evaluation on this subject by letter to GPU dated December 29, 1986. The staff, through contacts with the BWR Owner's Group and various licensees has completed a survey to obtain additional information on the sand cushion details, the gap materials and the inspections performed at various facilities. A summary of the results are presented in Table 1.

Purpose

The purpose of this Generic Letter is to obtain information from BWR Owners regarding their intended actions to determine if drywells at their facilities have degraded by the corrosion mechanism described above and if the licensees have current and/or future plans to minimize the potential for this problem at their facility. The information provided will be utilized by the staff to determine, pursuant to 10CFR50.55a(g)(6)(ii), if an augmented inservice inspection program is required for the Mark I drywell shell to assure its continued structural reliability.

Discussion

From the information obtained from the review of the Oyster Creek event, it appears one source of leakage that resulted in wetting the sand cushion was related to the deterioration of a drain line gasket at the drywell to cavity seal (see figure 1). There also is some question as to whether or not the drain line which serves to remove any leakage past the drywell to cavity seal was functioning properly.

Upon reviewing the details of the sand cushion design at the various Mark I facilities, there appears to be a design feature that varies, dependent on the architect-engineer, that may be significant. In some designs, Figure 2, the sand cushion is covered with a galvanized steel plate which is sealed to the drywell shell and the surrounding concrete. Further, drains are provided to remove water which might collect on the plate from above. In other designs, Figure 3, the sand cushion is open to the gap between the drywell shell and the surrounding concrete and the only path for water to drain from the sand cushion is through the small drain lines at the bottom of the sand cushion. It appears from the Oyster Creek experience that, with the high permeability of the sand cushion and the small bottom drains, the likelihood of adequately drying the sand cushion is low if copious amounts of water have entered the sand cushion. The staff has sufficient concern to initiate the collection of information of the licensee's current or proposed action to assure the degradation of the drywell shell plates adjacent to the sand cushion has not occurred and to determine if augmented inspections above and beyond those planned by the licensee's are necessary.

Information Requested

Pursuant to the provisions of 10CFR50.54(f), licensees are requested to provide the following information under oath or affirmation to the Office of Nuclear Reactor Regulation:

All Mark I Owners

1) Provide a discussion of your current program and any future plans for determining if the drain lines that were provided at your facility for removing any leakage that may result from refueling or from spillage of water into the gap between the drywell and the surrounding concrete or from the sand cushion itself are unplugged and functioning as designed.

2) Provide a discussion of preventive maintenance and inspection activities that are currently performed or are planned to minimize the possibility of leakage from the refueling cavity past the various seals and gaskets that might be present.

3) Confirm the information listed in Table 1 is correct with regard to your facility.

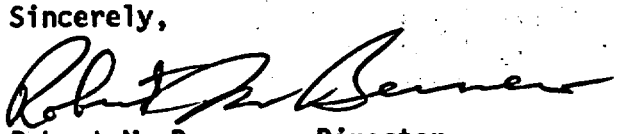
Mark I Owners Whose Designs Are Such That The Sand Cushion Is Open To Gap Between The Drywell Shell And Surrounding Concrete

Provide any plans for performing ultrasonic thickness measurements of the drywell shell plates adjacent to the sand cushion or any other proposed actions to ascertain if plate degradation has occurred. Since the degradation that has occurred at Oyster Creek is localized, sufficient details should be included to show that the sampling basis for ultrasonic thickness measurements is adequate in terms of size and test location.

Licensees and applicants are requested to respond to this generic letter within 60 days of the date of this letter. Our review of your submittal of information is not subject to fees under the provision of 10CFR170.

This request for information was approved by the Office of Management and Budget under clearance number 3150-0011 which expires September 30, 1989 Comments on burden and duplication may be directed to the Office of Management and Budget, Reports Management Room 3208, New Executive Office Building Washington, D.C. 20503.

Sincerely,



Robert M. Bernero, Director
Division of BWR Licensing
Office of Nuclear Reactor Regulation

Enclosure:
As stated
Computer Printout; See Jacket

STATUS 01/06/87

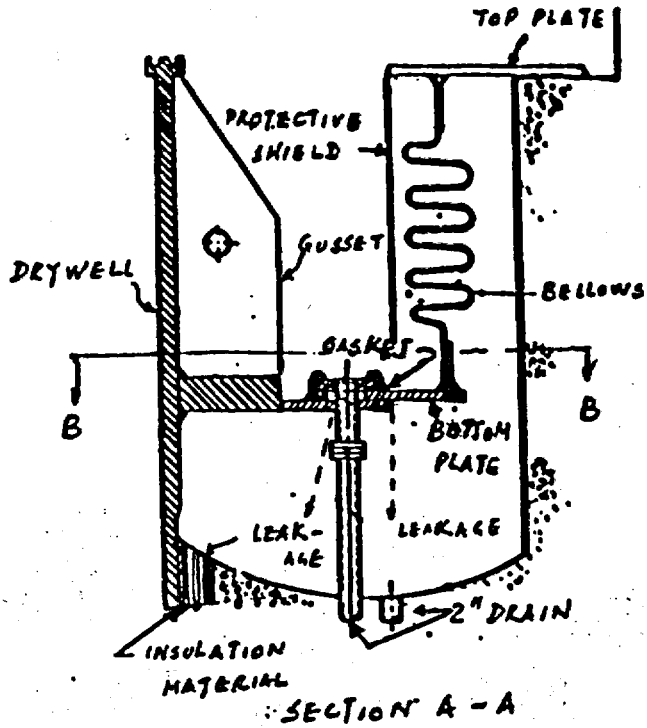
TABLE 1
RESULTS OF
MARK I CONTAINMENT SURVEY

PLANT NAME (A/E)	SAND GAP DETAIL DRW. AVAIL.	WALL THICK UT PER-FORMED	UT METHOD/ RESULTS SENT TO NRC	GAP MATERIAL	WAS THE GAP MATERIAL REMOVED	COMMENTS
Oyster Creek (Burns & Roe)	yes	yes	yes	Firebar D & Fiberglass	no	Gap not sealed
Cooper (Burns & Roe)	yes	yes	yes	Urethane Foam	no	Gap not sealed, UT not meaningful
Duane Arnold (Bechtel)	yes	no	no	Polyurethane Foam	yes	Gap sealed and drains
Hatch 1	yes	no	no	Ethafoam	yes	Gap sealed & drains
Hatch 2 (Bechtel)	yes	no	no	Ethafoam	yes	Gap sealed & drains
Peach Bottom 2 (Bechtel)	no	no	no	Polyethylene Strips	no	Gap sealed & drains
Peach Bottom 3 (Bechtel)	no	no	no	Polyethylene Strips	no	Gap sealed & drains
Pilgrim (Bechtel)	yes	yes	no	Etha Foam	yes	Gap sealed & drains
Browns Ferry 1	yes	no	no	Polyurethane	no	Gap not sealed
Browns Ferry 2	yes	no	no	Polyurethane	no	Gap not sealed
Browns Ferry 3 (TVA)	yes	no	no	Polyurethane	no	Gap not sealed
Hope Creek (Bechtel)	na	no	no	Fiberglass	no	
Millstone 1 (Ebasco)	yes	yes	no	-	yes	No thinning noted Gap not sealed
Monticello (Bechtel)	yes	yes	yes	Polyethylene Strips	yes	Gap sealed & drains
Quad Cities 1	yes	no	no	Polyurethane foam	no	Gap not sealed
Quad Cities 2 (S&L)	yes	yes	yes	Polyurethane foam	no	UT not meaningful Gap not sealed
Dresden 2	yes*	yes	yes	Polyurethane	no	UT not meaningful
Dresden 3 (S&L)	yes*	yes	yes	Foam (burned up)		Gap not sealed
Nine Mile Pt 1 (Utility)	yes	no	no	Fiberglass Form		Gap sealed & drains

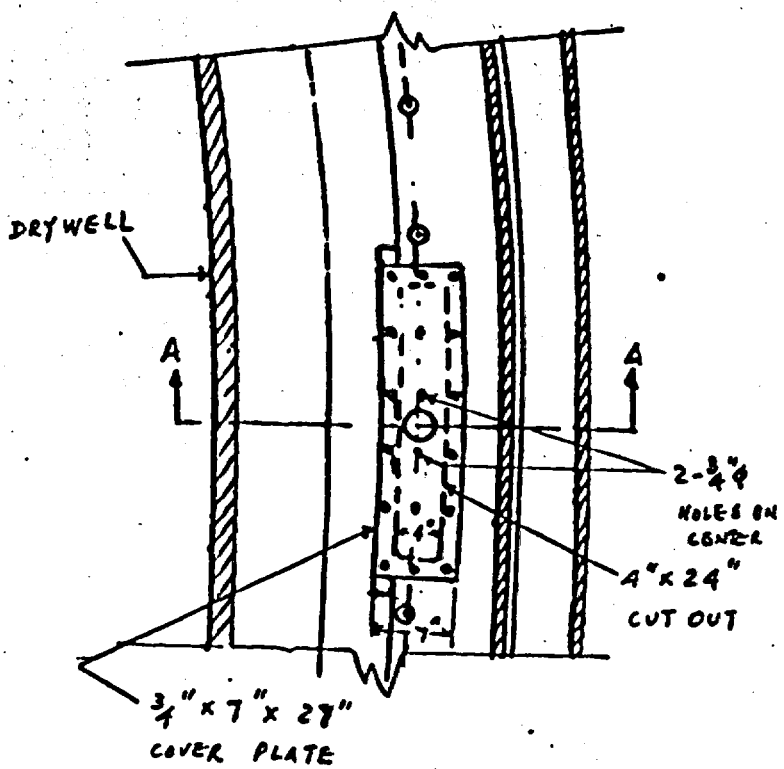
Fitzpatrick (S&W)	yes	no	no	Etha Foam	yes	Gaps sealed, drains n shown
Vermont Yankee (EBasco)	yes*	no	no	Styrofoam	no	Probably not sealed
Brunswick 1 Brunswick 2 (UE&C)	na	na	na	na	na	Concrete reinforced containment
Fermi 2 (S&L)	yes	no	no	Foam	no	Gap not sealed

* Not detailed enough

NA - Not Applicable



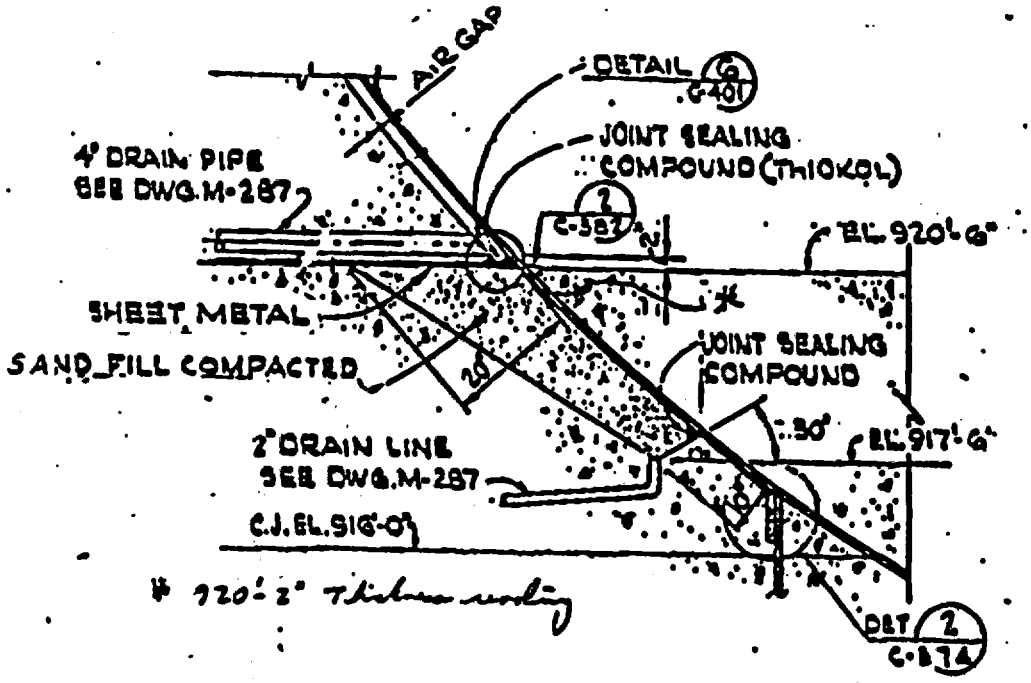
SECTION A - A



SECTION B - B

DRYWELL TO CAVITY SEAL

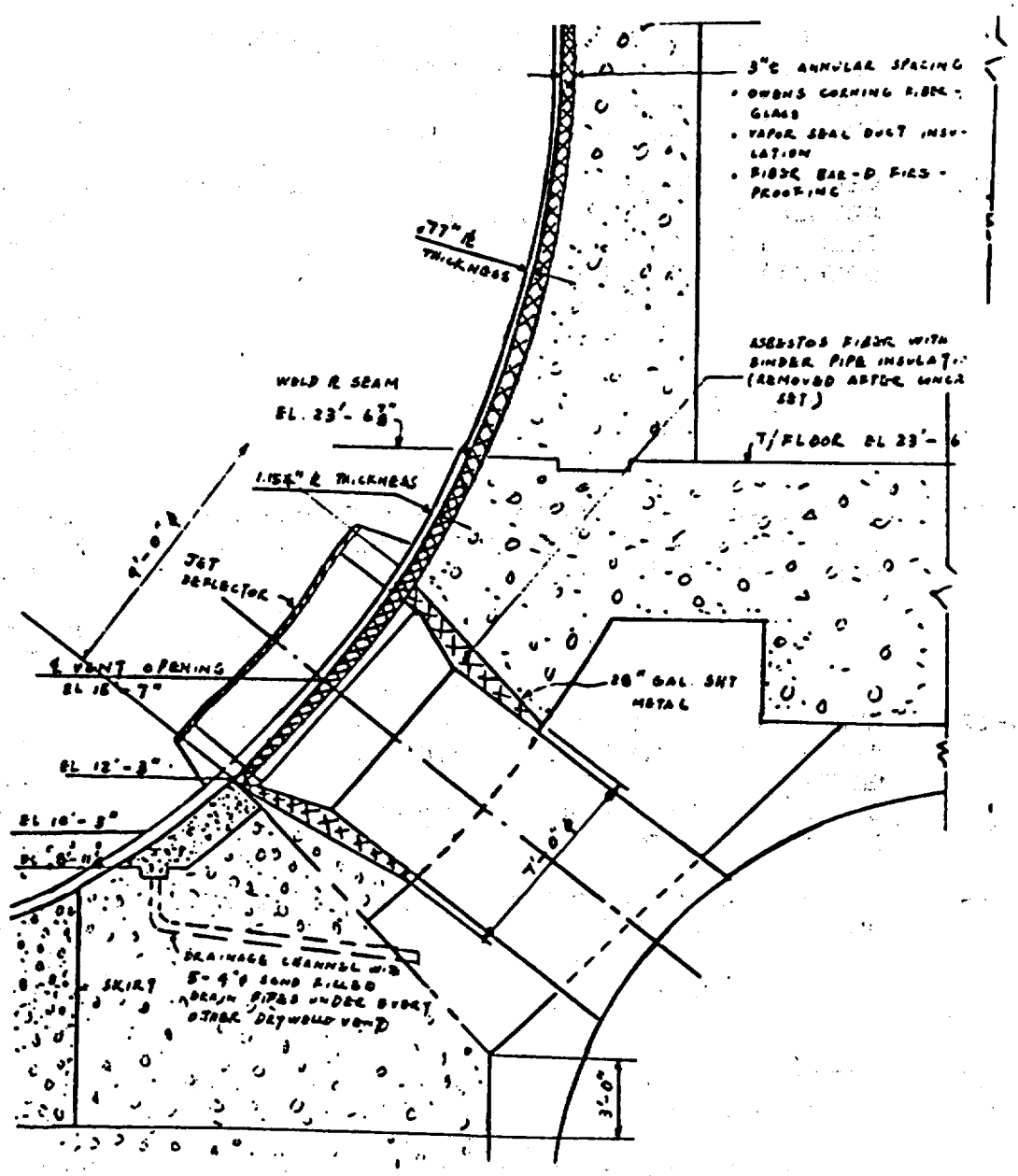
Figure 1



SAND POCKET DETAIL

SEALED

Figure 2



SAND POCKET DETAIL
OPEN

Figure 3

1903#9

LIST OF RECENTLY ISSUED GENERIC LETTERS

Generic Letter No.	Subject	Date of Issuance	Issued To
GL 87-04	TEMPORARY EXEMPTION FROM PROVISIONS OF THE FBI CRIMINAL HISTORY RULE FOR TEMPORARY WORKERS	03/06/87	ALL POWER REACTOR LICENCES
GL 87-03	VERIFICATION OF SEISMIC ADEQUACY OF MECHANICAL AND ELECTRICAL EQUIPTMENT IN OPERATING REACTORS, USI A-46	02/26/87	ALL LICENSEES NOT SUBJECT TO USI A-46 REQUIREMENTS
GL 87-02	VERIFICATION OF SEISMIC ADEQUACY OF MECHANICAL AND ELECTRICAL EQUIPMENT IN OPERATING REACTORS (USI A-46)	02/19/87	ALL HOLDERS OF OPERATING LICENSES NOT REVIEWED TO CURRENT LICENSING CRITERIA ON SEISMIC QUALIFICATION OF EQUIPMENT
GL 87-01	PUBLIC AVAILABILITY OF THE NRC OPERATOR LICENSING EXAMINATION QUESTION BANK	01/08/87	ALL POWER REACTOR LICENSEES AND APPLICANTS FOR AN OPERATING LICENSE
GL 86-17	AVAILABILITY OF NUREG-1169, "TECHNICAL FINDINGS RELATED TO GENERIC ISSUE C-8 BWR MSIC LEAKAGE AND LEAKAGE CONTROL SYSTEM	10/17/86	ALL LICENSEES OF BOILING WATER REACTORS
GL 86-16	WESTINGHOUSE ECCS EVALUATION MODELS	10/22/86	ALL PRESSURIZED WATER REACTOR APPLICANTS AND LICENSEES
GL 86-15	INFORMATION RELATING TO COMPLIANCE WITH 10 CFR 50.49, "EQ OF ELECTRICAL EQUIPMENT IMPORTANT TO SAFETY"	09/22/86	ALL LICENSEES AND HOLDERS OF AN APPLICATION FOR AN OPERATING LICENSE
GL 86-14	OPERATOR LICENSING EXAMINATIONS	08/20/86	ALL POWER REACTOR LICENSEES AND APPLICANTS

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Sincerely,

Robert M. Bernero, Director
Division of BWR Licensing
Office of Nuclear Reactor Regulation

Enclosure:
As stated

DBL:EB	DBL:AD	DBL:DO
R. Hermann	G. Lainas	R. Bernero
3/12/87	3/12/87	3/12/87

3/12/87
GL-LTR-87-0