DCG.

OPERATING EXPERIENCE INFORMATION REVIEW

DATE: 10/16/91

TO : CAPPUCCIO
FROM : BUTEAU
SUBJECT: CATEGORY A COMMITMENT REVIEW

Attached is a copy of commitment: CAR91063

This document is being assigned to you for assessment of its importance to safe plant operation and for specific action as indicated in the Additional Instructions below.

Please review the commitment, carry out additional instructions, and complete the lower portion of this form.

Additional Instructions: Type B Commitment

DEVELOP CORRECTIVE ACTION REPORT TO ADDRESS MS-77 PACKING LEAK RESULTING IN WATER CONTAINING I131 & I133 ON REACTOR BUILDING FLOOR. SEE PRO91-069.

SUBMIT THIS COMPLETED FORM AND OTHER RESULTS OF YOUR REVIEW TO THE OPERATING EXPERIENCE COORDINATOR (OEC) BY 11/30/91

Additional Corrective Action Process per VY Corrective Action Guideline

Sig. CAR [__] Routine CAR [✓] NCR [__] None [__]

To be completed by Reviewer:

A completed CAR 91-063 is attached.

__ A copy of this complete document should be forwarded to training.

Department Supervisor Approval: DCDiMare for GC / 11/26/91 Date

---

Manager/Superintendent or Director Disposition: [signature] / 12-2-91 Date

✓ Item is complete, well documented; no further tracking required.

__ Additional commitment tracking; required; initiate the following commitment(s) and due date(s).

Additional tracking being provided via PFI916502

__ Item needs add'l closeout; DH to present to N/A for final closeout.

(DH) Enter date presented: N/A

(OEC) Final closeout received: N/A

① Video tapes ?
② CR's for inductions in drums ?

OPERATING EXPERIENCE INFORMATION REVIEW

DATE: 11/13/91

FILE W
CAR 91063

TO : CAPPUCCIO
FROM : BUTEAU
SUBJECT: CATEGORY A COMMITMENT REVIEW

Attached is a copy of commitment: PFI916502

This document is being assigned to you for assessment of its importance to safe plant operation and for specific action as indicated in the Additional Instructions below.

Please review the commitment, carry out additional instructions, and complete the lower portion of this form.

Additional Instructions: Type B Commitment

INVESTIGATE CAUSE OF WATER POOL NEAR PRIMARY CONTAINMENT WALL. PROVIDE CORRECTIVE ACTIONS. THIS ITEM TRACKS CAR91063.

SUBMIT THIS COMPLETED FORM AND OTHER RESULTS OF YOUR REVIEW TO THE OPERATING EXPERIENCE COORDINATOR (OEC) BY 11/30/91

Additional Corrective Action Process per VY Corrective Action Guideline

Sig. CAR [__] Routine CAR [✓] NCR [__] None [__]

To be completed by Reviewer:
A completed CAR 91063 is attached.

___ A copy of this complete document should be forwarded to training.

Department Supervisor Approval: DeDivior for GC / 11/26/91 Date

---

Manager/Superintendent or Director Disposition: [signature] / 12-2-91 Date

___ Item is complete, well documented; no further tracking required.

✓ Additional commitment tracking; required; initiate the following commitment(s) and due date(s).
See Recommendations in CAR.
BRANCH Commitments: CAR91063 MEC1, MEC2, MEC3, MT1.

✓ Item needs add'l closeout; DH to present to PORC for final closeout.

(DH) Enter date presented: 12/4/91

(OEC) Final closeout received: 12/4/91 PORC 91-79

RJ 12/4/91

2

RCM

POTENTIAL REPORTABLE OCCURENCE PRO 91-69

Description of Event / Condition / Pertinant Information : (Include cause if know and corrective actions taken)

Water, containing I^{131} & I^{133} was discovered on the floor of the Rx Bldg at elev. 215 in bay #12. The source of the water was identified as a packing leak from MS-77. The leakage was diverted and an assessment of the consequences was completed. (See attached)

Originator: Dennis C Davis 9/30/91

Plant Conditions Effecting Event:

Notifications / Reviews: (Check all blocks that apply)

NRC	AP 3125	State	Other
[ ] 1 Hour [ ] 4 Hour [ ] Other	[ ] NRC _____	[ ] Notification Made [ ] Corp. Responsibility	[ ] DCO Notified [ ] Resident Insp Notified [X] Log Entry Made [ ] Other

Comments:

Shift Supervisor: [signature] 9-30-91

[X] Not Reportable	[ ] 20.405 (a)(1)(i)	[ ] 50.36 (c)(2)	[ ] 50.73 (a)(2)(iv)	[ ] 50.73 (a)(2)(viii)(B)
[ ] RPORS	[ ] 20.405 (a)(1)(ii)	[ ] 50.73 (a)(2)(i)	[ ] 50.73 (a)(2)(v/vi)	[ ] 50.73 (a)(2)(x)
[ ] Fire Report	[ ] 20.405 (a)(1)(iii)	[ ] 50.73 (a)(2)(ii)	[ ] 50.73 (a)(2)(vii)	[ ] 73.71 (b)
[ ] 50.9	[ ] 20.405 (a)(1)(iv)	[ ] 50.73 (a)(2)(iii)	[ ] 50.73 (a)(2)(viii)(A)	[ ] 73.71 (c)
[ ] Part 21	[ ] 20.405 (a)(1)(v)			
[ ] 20.402 (b)	[ ] 20.405 (c)			
[ ] 40.302	[ ] 50.36 (c)(1)			
[ ] Other _____				

Comments / Evaluation : A CAR HAS BEEN INITIATED FOR THIS EVENT. THIS IS BEING TRACKED BY A "DOTS". W
Cat A to MR&C Due 11/30/91
CAR 91-063

MRC Rep: [signature], 10/1/91

Agree / Disagree with ESS Evaluation

Comments:

TSS: RD Pagodin, 10/7/91

Additional Corrective Action Process Required:

Sig. CAR [ ] Routine CAR [ ] NCR [ ] None [X] (CAR. Cat A in Initial)

Due Date _____

Agree / Disagree with TSS Recommendation

Comments / Other Actions Desired :

PM : [signature], 10/7/91

If event is reportable, submit copy of PRO to Sr. V.P., Ops.

ESRC [signature], 10/8/91

91-01

3

VYAPP 6810.01
AP 0810 Rev.22 , Page 1 of 1 , DI #91-01

RESIDUAL EFFECT OF THE LEAK ON THE CONTAINMENT

There is no concern for the water or moisture that may reside between the concrete containment base and the drywell.

It is identified that the leak was very small as identified by the maximum leakage rate identified to be approximately 260 ml/hr. When the leak was isolated a two fold response was observed following an appropriate lag time. The reduction in leakage flow was also paralleled by an expected decrease in Isotope concentration. This two fold reduction demonstrated that a reservoir was not established somewhere in the "circuit" and the flow path was free flowing. If a reservoir was established a steady state flow would be expected to be maintained for some period of time.

Since a reservoir was not established it can reasonably be assumed that the short term leak would readily drain at least to the same release location. Additionally, the total residence time is short for any corrosion mechanism to initiate.

The sand cushion environment does encourage drying. The reactor vessel and the torus area is relatively warm. The inspections recently completed did not identify any other source of moisture which would maintain or elevate humidity. Ventilation throughout the areas of concern is appreciable.

Operator rounds identified this leak and prompted corrective action. If this amount of leakage had occurred previously before it is expected that such a leak would also have been identified by plant personnel.

The RCAC penetration is also the only penetration which is pitched down to the containment. A like potential with other penetrations does not exist.

In addition, the sand drains were inspected in June of 1987 and identified not to be plugged. No draining from these lines has ever been observed. No leakage was observed in this area up to April, 1991. During the recent 9/28/91 inspections, an inspector was able to "grab" a sand sample from the cushion and determine that this sample was dry.

The latest inspections performed on 9/29/31 by borescope identify that the sand cushion is apparently compacted and a gap of approx. 3/4' exists between the cushion and the drywell. In addition, during the inspection the sand was further observed to be extremely dry as evidenced by "plumes of dust" generated by the inspection equipment.

Since the leak was evaluated to be relatively short in duration no immediate corrosion potential or concern is identified. It is therefore concluded that the small leakage that existed did not adversely affect the containment structural integrity.

RCO 9/30/91

DCS

VERMONT YANKEE NUCLEAR POWER CORPORATION

CORRECTIVE ACTION GUIDELINE

May 1991
Revision 0

D.A. Reid, Plant Manager

5

DEFINITIONS

A. Problems discovered through the corrective action process need to be evaluated as routine or significant. A significant item requires corrective action to preclude recurrence. The following are the definitions of routine and significant.

Significant

A condition adverse to quality which could or has affected plant safety or reliability or is a condition which constitutes a breakdown in the Quality Assurance Program. Violation of Technical Specifications, regulations, or applicable standards constitutes a significant item.

The following events and symptoms must be reviewed with the above definition to determine if a significant CAR is warranted:

Events:
Potentially Reportable Occurrences (PRO's)
QA Audit Deficiencies, Level 1
QA Surveillance Deficiencies
Fire/NPDES Violations
NRC Violations

Symptoms:

- Any departure from the conditions of the operating license or permits required to support plant operation
- Any unplanned engineered safety feature actuation including reactor protection system actuations
- Any event or plant condition which requires notification to the NRC Operations Center
- Repetitive failures which have significant operational impact
- Failures of safety related components that may have generic implications

Review of the above information may conclude that the matter is more appropriately handled as a routine item and assigned as such.

A significant item requires all nine elements of the corrective action process be completed in addressing the identified issue. All nine elements are addressed by preparing an LER, NCR or significant CAR.

Routine

An adverse condition which appears to be an isolated event and not symptomatic of other conditions and therefore lead to a significant item. These items typically do not pose any immediate concern to safety or reliability.

The following types of items must be reviewed against the above definition to determine if a routine CAR is appropriate:

- QA Audit Deficiencies, Level 2
- QA Audit Observations, Level 1
- NRC Unresolved Items

ROUTINE CORRECTIVE ACTION REPORT (Sample)

SECTION 1 - CAR PREPARATION

Originating Department MEFC CAR Number 91-63

Description of Problem:

The packing on MS-77 leaked, resulting in water on the torus floor. The source of water was not readily apparent until after a task force effort identified that it was from MS-77. The water contained I-131 and I-133 and appeared to be reactor coolant and possibly from the primary containment. See the attached task force report.

Corrective Actions:

Immediate and Short Term Corrective Actions:

1) A task force was convened and the source of the leak identified
2) The leak was diverted away from the containment and controlled and collected until repairs were effected

See the attached task force report.

Apparent Cause Determination:

The apparent cause of this event was the leaking MS-77 valve packing. The root cause (attached) is the design of the PCRC contractor beneath the MS-77 valve and/or the location (and design review) above the pipe of the valve.

Additional Corrective Action Recommendations:

1) The consequences of the leak were determined following extensive visual inspections of the containment wall.
2) Surveillance of the Torus ID is increased in frequency.

See the attached task force report for other CA's.

Originator DCDinoir 11/26/91

SECTION 2 - REVIEW/APPROVAL

Department Supervisor Review/Approval DCDinoir for GC / 11/26/91

Superintendent/Manager/Director Review/Approval [signature] / 12-2-91

Comments:

① Recommendation #1 should be considered addressed upon verification by RED that an NB is outstanding to ensure repair.
② Recom #2 is completed.

RED - see Van for #

HOW?

VYAPF 0007.02 (Sample)
AP 0007 Rev. 1
Page 1 of 1

7

- TASK TEAM FINAL REPORT -

CONTAINMENT PEDESTAL LEAK

Released/Approved for
the Task Team by:

Dennis Lavoie 10/8/91
Date

Task Team Members:

- Dennis Girrior, Senior Mechanical Engineer; Team Leader
- Tim Drouin, Mechanical Engineer
- Van Bowman, Operations Planning Coordinator
- Rich Booth, Mechanical Engineer, Maintenance
- Jim Fitzpatrick, Senior Engineer, Yankee Nuclear Services Division
- Frank Helin, Project Engineer, Corporate Engineering Support Department
- Steve Skibniowsky, Chemistry Supervisor (part-time)

Conclusion:

It is concluded that the source of the water leaking out of the concrete pedestal under the drywell is outside containment and **the integrity of the containment is intact.** The source of the water leaking out the concrete pedestal under the drywell is condensed steam from the packing leak on main steam line drain valve MS-77. This conclusion is based on the reduction in flowrate and I-133 concentration which has occurred during the time since the leakage of MS-77 was directed away from the containment shell.

The path this leakage was taking is suspected to have bypassed the transition sand volume. It is postulated that due to the very low volume flow rate, water would cling to the surface of the containment or concrete and pass through the sand transition area thereby never reaching the sand drain lines. A sketch of the sand/containment interface (Attachment 1) shows a gap of approximately 3/4" between the sand and containment, which would allow water to flow, clinging to the steel containment, to bypass the sand. After bypassing the transition sand the flow path through the concrete pedestal is indeterminate. The most probable path is that the water reached a small crack or a cold joint existing between concrete pours and followed these cold joints through the concrete pedestal until it flowed out of the surface cracks in bays 2 and 12.

Residual Effect on the Containment:

For this leak there is no concern regarding the moisture between the concrete containment base and the steel containment. The basis for this determinatiion is a follows:

1) Only a very small amount of leakage was identified, the maximum leakage rate was identified to be approximately 260 ml/hr. An operator on routine rounds identified this leak and promptly initiated further investigation. It is believed that this leak did not exist for a long period of time prior to discovery.

2) Following redirection of leakage from MS-77, the reduction in leakage flow was paralleled by an expected decrease in iodine concentration. Reductions in both flow and iodine concentration demonstrate that the flow path was free flowing. If a reservoir existed somewhere in the path it is expected that flow of water would continue at a near constant rate. A reduction in iodine

concentration, from decay, would still be seen following isolation of the leak source. Without a reservoir as a source of water a short term leak would continue to drain to the same location and the rate of flow would decrease over time.

3) The sand cushion environment and the relative warm temperatures of the reactor vessel, containment and the torus area encourages drying. The recently completed boroscopic inspections did not identify any other source of moisture which would maintain or elevate humidity. An appreciable amount of ventilation exists throughout the area.

4) The sand drains were inspected in June of 1987 and identified to be clear and functional. No water has ever been observed draining from these lines. These lines did not have significant levels of contamination. Additional boroscopic inspections performed on 9/30/91 confirm that the drains are functional.

5) Inspections performed on 9/29/31 by borescope show the sand cushion to be compacted and a 3/4" gap exists between the sand ring and the containment. In addition, during the inspection the sand was further observed to extremely dry.

In conclusion, the leak was relatively short in duration and adequate drainage and drying exist. The total exposure time for any corrosion mechanism to act is very short. Therefore, no detrimental containment corrosion concern is expected. It is therefore concluded that the small leakage that existed did not affect the containment structural integrity.

Chronology:

Sunday
9/22/91

* Water was discovered by an Auxiliary Operator on routine (once per 8 hours) rounds. Water on the floor was traced back and determined to be seeping from a surface crack in the concrete supporting pedestal under the drywell, at bay 12 internal to the ring of the torus. No contamination was identified at that time. See Attachment 2 for details of the crack.

Monday
9/23/91

* The discovery of this water was identified to the Operations Planning Coordinator on Monday morning. The Operations Planning Coordinator began to investigate the problem as soon as he was made aware of the issue.

* A sample of the water that had made its way to the floor was taken. This sample was found to be contaminated. Floor contamination levels were 30,000 counts per minute above background.

Tuesday
9/24/91

* Mechanical Engineering was contacted for assistance to review the construction drawings in the area of the leak. Following the drawing review the Operations Planning Coordinator performed a visual examination of the transition sand drain lines and did not see evidence of any leakage.

* Inconclusive Chemistry sample results were presented and discussed at the morning OPS Planning meeting. The OPS Supt. and NRC Resident were in attendance.

* A second sample was taken, this time from the water on the wall. The results of this sample were also suspect due to surface contamination of the wall. The sample results were inconclusive, regarding the source of the water.

* The Operations Supervisor was briefed by the OPS Planning Coordinator. It was recommended that a more accurate sample be taken.

Wednesday
9/25/91

• The Operations Planning Coordinator reviewed Generic Letter 87-05 and related documentation including the VY closeout. The closeout of the GL package indicated that the sand drains at VY were clear and functional. The Operations Planning Coordinator requested an uncontaminated sample with some conclusive results be taken to provide additional information regarding the source of the leakage.

• The leak from the pedestal was sampled at approximately 1330 and I-131 and I-133 were measured, conclusively.

Thursday
9/26/91

* The pedestal wall in this area was decontaminated and another sample was taken. The results of this sample indicated some isotopes found in reactor coolant water. The concentrations of iodine in the sample indicated that the water was 80 hours older than Rx Coolant based on the ratio of I-131 and the decay of I-133 ,however, the lack of other nuclides normally present in the reactor coolant still made the conclusions unclear.

* Additional seepage of water was discovered in Bay 2 of this area by RP during surveys of the area. The flow rate of this crack was less than the flow rate at Bay 12. See Attachment 3 for locations of Bays 2, 12 and MS-77.

• Once these results were reported, the Operations Planning Coordinator contacted John Herron, Operations Supervisor and the issue was raised at the afternoon PORC meeting. At 1630 following the PORC meeting the Operations Supervisor informed Bob Wanczyk, Operations Superintendent of the problem and he contacted Bernie Buteau, Engineering Director for assistance.

* Su[Bbsequent to the request for assistance the Engineering Director met with the ME&C Supervisor and decided to form a multi-disciplined task team to address the problem.

* In addition, A.D. Himle of General Electric was contacted and he in turn contacted the GE lead systems engineer for containments and a search for similar problems was put out on GE's world wide computer bulletin board.

Friday
9/27/91

* The Task Team was formed in the morning, an initial meeting was held at 1330. The immediate task of the team was to determine the state of containment integrity.

* Since the source of the water was unknown the team was directed to attempt to quantify the leak assuming the worse case, that leakage was through the containment, in terms of the Technical Specification limits. A calculation was performed by the Mechanical Engineering Group to convert a water leak at 2 psi in the containment to an air leak at 44 psi. The results of this calculation were independently verified by YNSD and concluded that the containment still met the Technical Specification requirements for integrated leakage. [See Attachment 4]

* At 1400, the NRC Senior Resident Inspector was formally notified of the problem.

* At 1600, a telecon was held with NRC Region I management, to discuss the problem and present the results of the calculation. During the telecon the NRC expressed concern over the leakage and the possibility that reactor coolant could be making its way out of containment. The NRC urged an active effort to identify the source of the leakage. The NRC was assured that the task team was scheduled to work over the weekend to investigate the problem. It was agreed that a telecon be held Monday morning to discuss the weekends findings.

* The task team was scheduled to be in Saturday morning to continue the search for the leak. The effort to get the boroscopic examination team on-site at the earliest possible time was expedited.

* CTS was contacted by the Task Team to supply VY with a Boroscope Inspection crew. The crew was originally scheduled to arrive Monday morning. This was expedited to Saturday evening.

* The Shift Supervisor was fully briefed on the situation.

Saturday
9/28/91

* The team met at 0730. The first task of the team was to walk down and visually inspect all accessible containment penetrations, beginning with the torus penetrations. The scope of the inspection effort was to visually inspect each penetration for signs of moisture leakage at that penetration as well as examining the containment wall for signs of leakage down the containment wall from a penetration above the one being examined. This gave maximum inspection coverage to the containment wall.

* A sample of the leakage in Bay 2 was taken at 0800. The result of this sample showed I-133 concentration to be slightly greater than the concentration in the Bay 12 sample. This indicates that the travel time to this leak is shorter than the travel time to the Bay 12 leak, Bay 2 is closer to the MS-77 valve so this is consistent with the teams finding.

* At 1010, during the visual examination of the torus penetrations a packing leak was discovered on valve MS-77 (Main Steam Line Drain Line) valve. A portion of the condensation from this packing leak was dripping on the drywell ventilation supply line and was running down the line to Penetration X-26. This line has a downward slope of 15 degrees toward the containment. This penetration is also the only penetration which is pitched down to the containment. A like potential with other penetrations is significantly less. Water running down this pipe was reaching the drywell and running down the exterior of the steel containment. This penetration is located above bay 3. See penetration detail on Attachment 5.

NOTE: The packing leak on MS-77 was initially reported on 6/4/91, and MR 91-1367 was written. However the packing leak stopped shortly thereafter and the MR was left open to repack the valve at a later date. Shortly following the reactor startup on 6/16/91 the packing leak was again reported to the Operations Planning Coordinator. This leak was also expected to stop shortly after startup.

* A sample of the MS-77 leakage was taken at 1022. S. Skibiniowsky, Chemistry Supervisor, compared results of this sample to the results of the sample of pedestal leakage. This comparison revealed that the source of the leakage could be this packing leak. It was further determined by this comparison that if this were the source of the leakage it was taking about 20 hours for this water to migrate to the bay 12 pedestal area. [Attachment 6]

* At 1100, the leakage from the MS-77 valve was redirected by Maintenance Department personnel, in an attempt to stop the leakage from running down the drywell ventilation supply pipe and reaching the containment wall.

• Following the redirection of this leakage the team recommended a sampling program to measure both leakage rate and iodine concentration levels be instituted.

• The visual examinations on the remainder of the containment penetrations, with the exception of the following unaccessible areas; Steam Tunnel, and Cleanup Phase Separator Room, continued in the afternoon. These inspections were completed at 1530 and failed to reveal any evidence of moisture leakage on any other containment penetrations or other areas of the containment wall.

* The boroscope examination vendor (CTS) arrived on site at 1900 and began preparations for conducting boroscope inspections of the containment walls and the transition sand drain lines.

Sunday
9/29/91

• The results of the sampling program show the leakage and the concentration of I-133 (half-life of 20.8 hours) began dropping soon (within 4 hours) after the flow from MS-77 was directed away from containment. I-131 is a longer lived (half-life of 8.04 days) isotope and would therefore not show the same change in concentrations as I-133. These results are consistent with what one would expect if the source of the leak had been cut off. The activity levels drop along the decay curve showing that the source of water for the leakage no longer exists. [See Attachment 7]

Monday
9/30/91

* The results of the sampling program show the leakage rate to continue to be decreasing.

• Boroscope inspections of the area between the sand ring and the drywell reveal no residual moisture. The sand does not contact the steel shell and is dry.

• Boroscopic inspection of all 8 sand drains show no indication of new or recent leakage. The conditions of these lines are verified as being unchanged from the inspections performed in 1987.

• The leak stops at 1800 hrs.

* A review of the video tapes by the team leader and YNSD confirm that the drywell shell is not suffering corrosion due to this or other leakage. There is no visual indication of excessive scale or pitting.

Tuesday
10/1/91

• The [Btask force met with plant management (RJW,BRB,GC) and informed them all inspection activities are complete. Outstanding items were discussed and a critique of the task force performance was provided.

Recommendations:

1) Repair the MS-77 packing leak at the first opportunity.

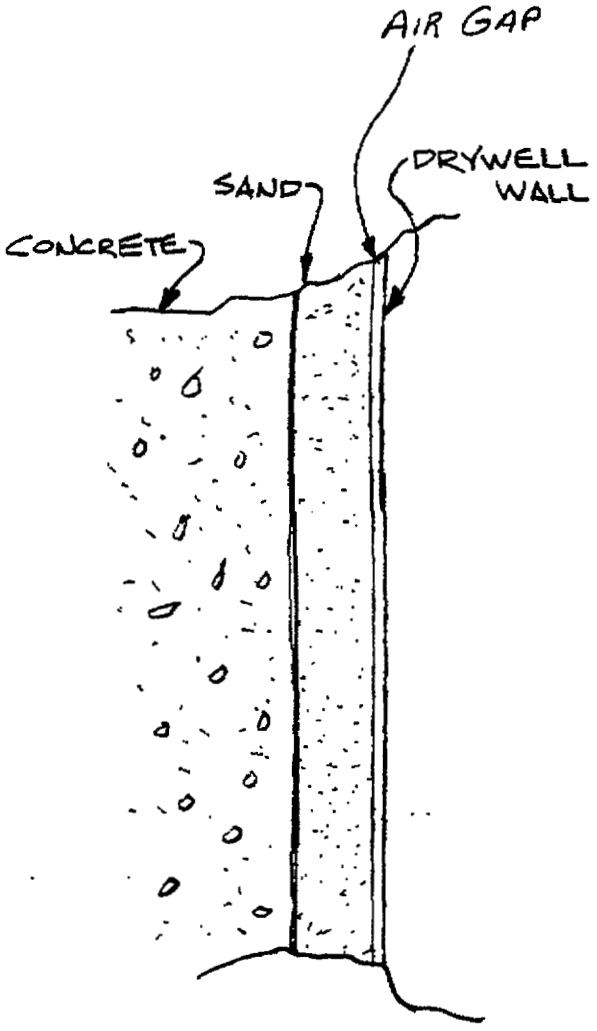
2) Operations Dept. should perform weekly surveillance on the torus inner diameter. Implemented

3) Although we determined the problem to be external to the containment a requirement to visually inspect the area at the intersection between the containment wall and the concrete floor inside the drywell should be added to a drywell inspection procedure. MEC1 MEC

4) The plant should consider installing a "cone" type barrier on the penetration that slopes toward the containment to prevent any future water leakage from reaching the wall of the containment. MT1 MAINT

5) Review Vermont Yankee response to Generic Letter 87-05 and determine if a revision is necessary. MEC2 MEC

6) Review the BWR Owners' Group letter to NRC of 12/22/89 and determine if any further actions are appropriate. MEC3 MEC



ATTACHMENT #1

ATTACHMENT 2

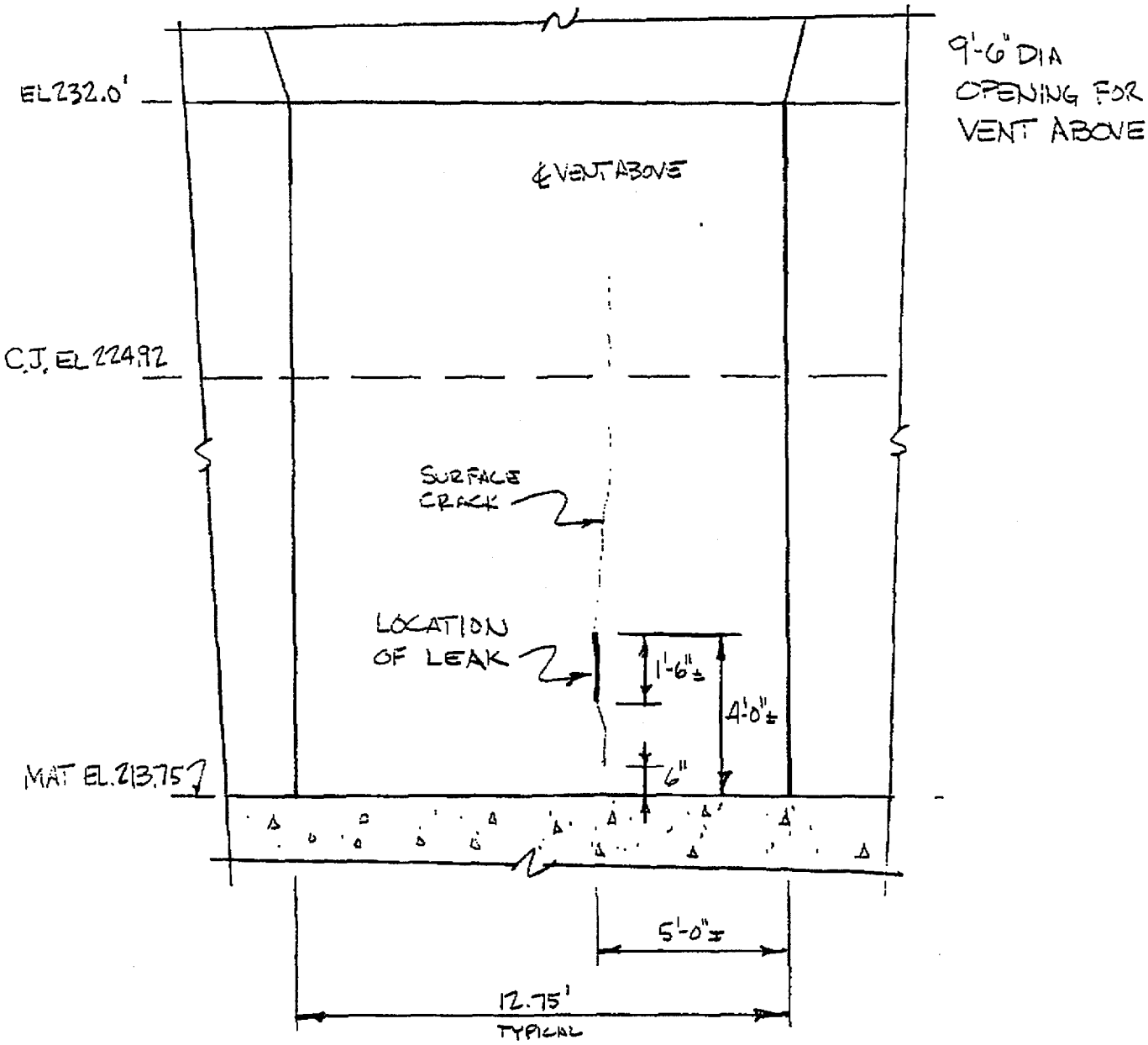
VERMONT YANKEE NUCLEAR POWER CORPORATION
P.O.BOX 157
VERNON, VERMONT 05354

REPORT _____ DATE _____

PAGE NO. _____

SUBJECT _____

PREPARED BY _____ CHECKED BY _____ REVIEWED _____



ELEVATION: DRYWELL PEDISTAL
@ BAY 12

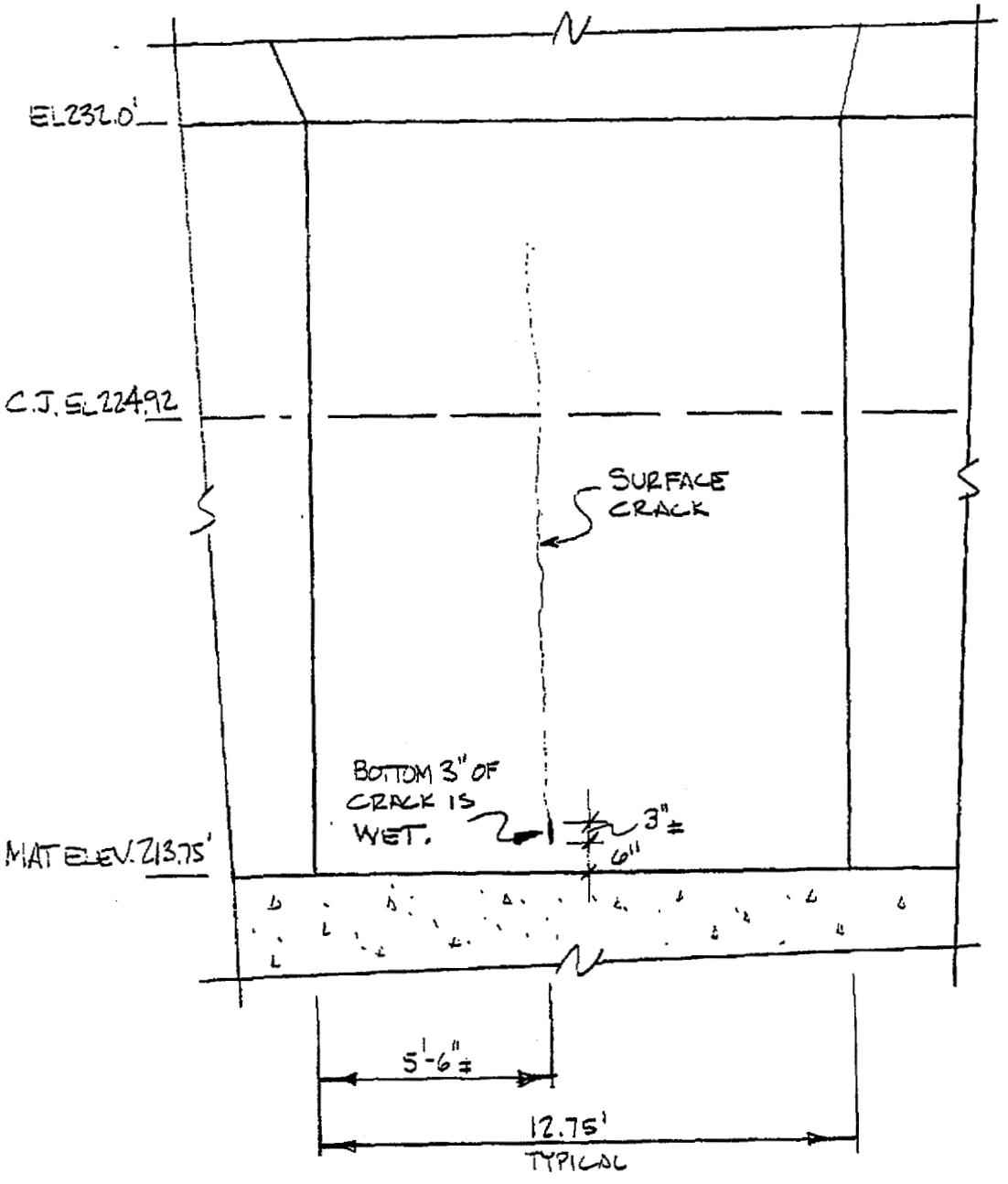
VERMONT YANKEE NUCLEAR POWER CORPORATION
P.O.BOX 157
VERNON, VERMONT 05354

REPORT _____ DATE _____

PAGE NO. _____

SUBJECT _____

PREPARED BY _____ CHECKED BY _____ REVIEWED _____



ELEVATION: DRYWELL PEDISTAL
@ BAY 2

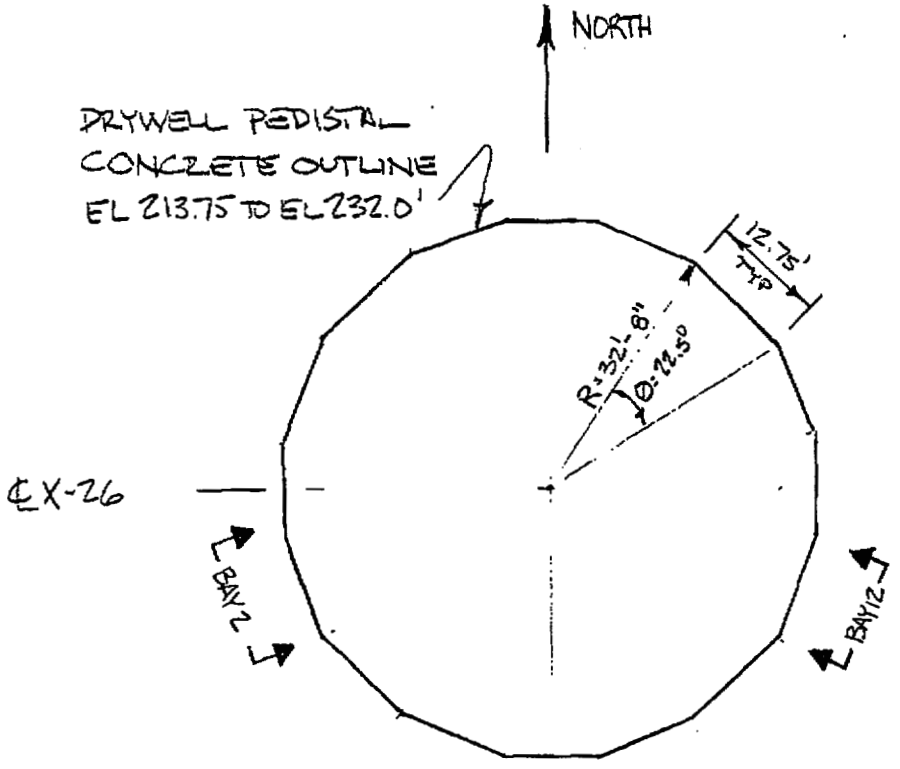
VERMONT YANKEE NUCLEAR POWER CORPORATION
P.O.BOX 157
VERNON, VERMONT 05354

REPORT DATE

PAGE NO.

SUBJECT

PREPARED BY CHECKED BY REVIEWED



LOCATION PLAN

ATTACHMENT 3

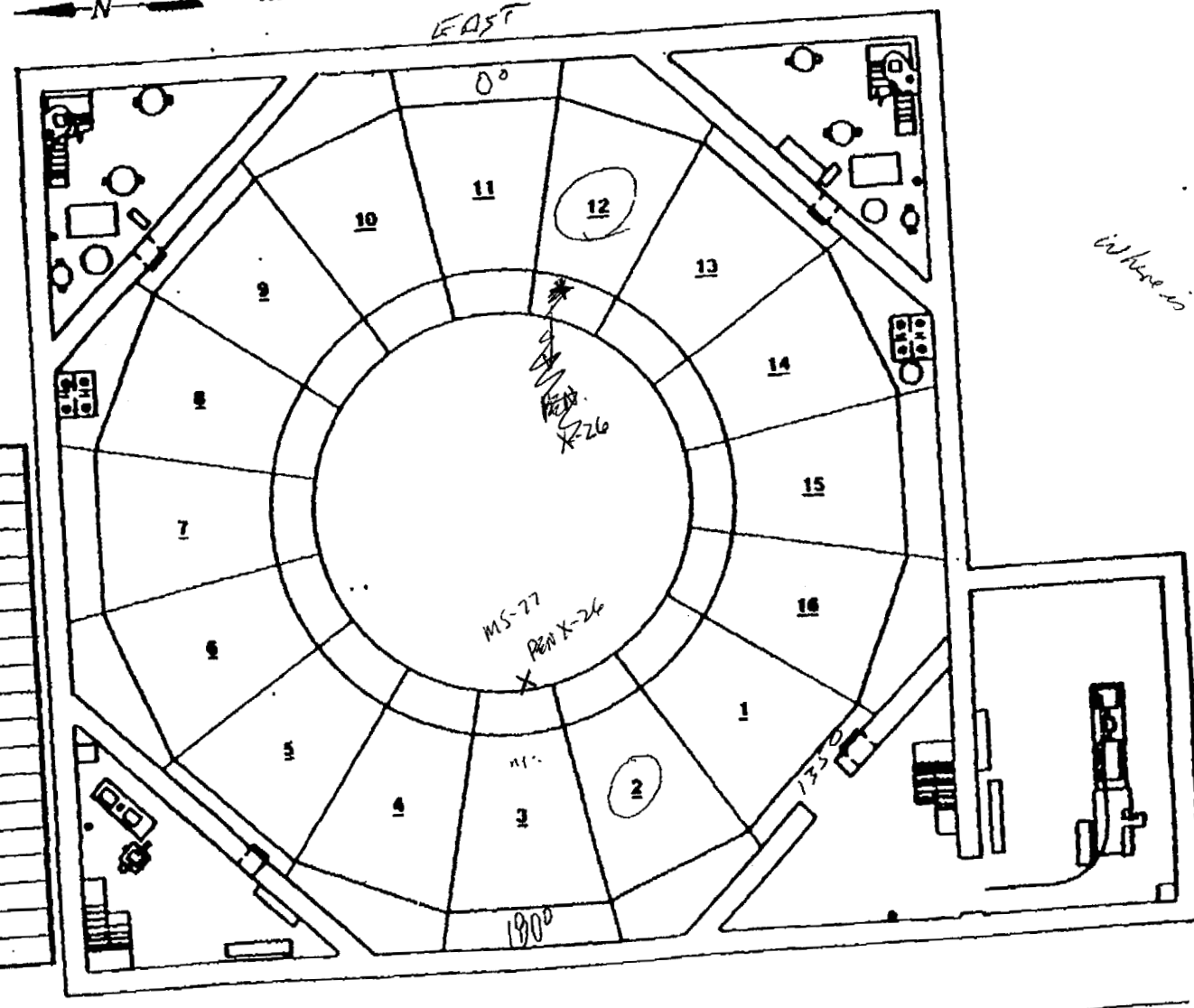
Date_____
Time_____
Power Level_____%
Instrument_____
Serial Number_____
Air Sample_____µC/cc
Surveyor_____
Dose this survey_____mrem
RWP Number_____

Unless otherwise noted...
▭ = Dose rate in mr/hr
○ = Smear locations
____ = CPM w/RM-14

Contamination data in dpm/100 cm²

1.	20.	39.
2.	21.	40.
3.	22.	41.
4.	23.	42.
5.	24.	43.
6.	25.	44.
7.	26.	45.
8.	27.	46.
9.	28.	47.
10.	29.	48.
11.	30.	49.
12.	31.	50.
13.	32.	51.
14.	33.	52.
15.	34.	53.
16.	35.	54.
17.	36.	55.
18.	37.	56.
19.	38.	57.

REACTOR BUILDING ELEVATION 213'



Reviewed by _____

VYOPF 4530.03
OP 4530 Rev. 18, RT No. 10.511.150

20

ATTACHMENT 4

MEMORANDUM

To: TASK GROUP V.Y. Vernon Date 9/29/91
From: G. CAPPUCCIO V.Y. Vernon File: 3.1
Subject: LEAK CALCULATION

PURPOSE

THE PURPOSE OF THIS MEMORANDUM IS TO PROVIDE THE BASIS FOR THE CALCULATION PROVIDED TO TASK GROUP.

INTRODUCTION

ON 9/27/91 A CONCERN WAS RAISED AS TO THE STATE OF CONTAINMENT ON THE WALL MOISTURE/LEAK DISCOVERED IN THE TORUS AREA. SINCE THE SOURCE OF THE LEAKAGE WAS UNKNOWN, THE WORST CASE SCENARIO WAS ASSUMED WHICH WAS THE LEAKAGE WAS COMING FROM THE PRIMARY CONTAINMENT. TO ASSESS THE STATE OF CONTAINMENT, A CALCULATION WAS PERFORMED TO FIND AN EQUIVALENT HOLE AND THEN RECALCULATE THE LEAKAGE AT ACCIDENT CONDITIONS.

CALCULATION

FROM THE AMOUNT OF MEASURED WATER COMING FROM THE HOLE, A ORIFICE WAS CALCULATED USING A COMPUTER PROGRAM. THE CONDITIONS ENTERED WERE AS FOLLOWS:

1) THE LEAKAGE WAS MEASURED AT 220mL/HR. FOR THE CALCULATION THE RATE WAS DOUBLED, (440mL/HR).

2) A PRESSURE OF 2PSI WAS USED AS THE dp. THIS WAS CONSIDERED CONSERVATIVE CONSIDERING THAT IF THE LEAK WAS COMING FROM THE DRYWELL, THERE WAS A MINIMUM OF 12 FEET OF STANDING HEAD IN ADDITION TO THE DRYWELL PRESSURE.

AFTER THE ORIFICE WAS SIZED FOR LIQUID, A CALCULATION WAS PERFORMED TO DETERMINE THE AMOUNT OF AIR WHICH COULD BE PASSED THROUGH THIS HOLE AT ACCIDENT CONDITIONS.

UPON FINDING THIS QUANTITY, THE LEAKAGE WAS SUPERIMPOSED ON THE PRESENT/LAST APPENDIX J TYPE A TEST. THE RESULTS OF THE CALCULATION SHOWED THAT THE CONTAINMENT STILL MET THE TECHNICAL SPECIFICATION REQUIREMENTS FOR INTEGRATED LEAKAGE.

ORIFICE SIZING SUMMARY

FLOWRATE, LBS/HR	.2313702
FLOWRATE, ACFM	1.289689E-02
FLUID STATE	GAS
ORIFICE DIAMETER, INCHES	.009
PIPELINE DIAMETER, INCHES	.622
ORIFICE/PIPE DIA RATIO	1.446945E-02
ORIFICE TAPS	FLANGE
INTERNAL AREA, SQ.IN.	6.361739E-05
DENSITY, LBS/CUBIC FT.	.299
VISCOSITY, CENTIPOISE	.018
TEMPERATURE, DEG.F.	70
UPSTREAM PRESSURE, PSIG	44
FLOW COEFFICIENT	.5890159
ORIFICE COEFFICIENT	.5890159
EXPANSION COEFFICIENT	.7076517
SPECIFIC HEAT RATIO	1.4
ORIFICE REYNOLDS NO.	9012.013
PRESSURE DROP, INCHES H20	1218
PRESSURE DROP, PSI	43.92355
PERMANENT PSI LOSS	43.91435

Front B & C MAX 5.352 lbm/hr + .231 < 18
MIN 1.412 lbm/hr

ORIFICE SIZING SUMMARY

WATER LEAKAGE THRU 1/2	
FLOWRATE, GAL/MIN	.002
FLOWRATE, LBS/HR	.986128
FLUID STATE	LIQUID
ORIFICE DIAMETER, INCHES	9.093419E-03
PIPELINE DIAMETER, INCHES	.5
ORIFICE/PIPE DIA RATIO	1.818684E-02
ORIFICE TAPS	FLANGE
INTERNAL AREA, SQ.IN.	6.494493E-05
DENSITY, LBS/CUBIC FT.	61.633
VISCOSITY, CENTIPOISE	.511
TEMPERATURE, DEG.F.	125
UPSTREAM PRESSURE, PSIG	2
FLOW COEFFICIENT	.5875482
ORIFICE COEFFICIENT	.5875482
ORIFICE REYNOLDS NO.	1339.105
PRESSURE DROP, INCHES H20	52
PRESSURE DROP, PSI	1.875225
PERMANENT PSI DROP	1.874605

2 psig [illegible] ultra [illegible] orifice

F1 FILE F2 OPTIONS F3 UNKNOWN F4 TAPS F5 SP HT RATIO F6 SIZE F7 TYPE

ORIFICE SIZING

PRESSURE DROP. IN.H2O	1218.000
ORIFICE DIAMETER. IN.	.009
DENSITY. LBS/CU.FT.	.299
VISCOSITY, CENTIPOISE	.018
TEMPERATURE. DEG.F.	70.0
INLET PRESSSURE, PSIG	44.00
PIPE INTERNAL DIA.,IN.	.622
FLOWRATE. LBS/HR	0.231
PRESSURE DROP. PSI	43.924
FLOW COEFFICIENT	0.589
ORIFICE COEFFICIENT	0.589

SYSTEM DESCRIPTION:

F10 CALCULATE

VERMONT YANKEE NUCLEAR POWER CORPORATION
P.O.BOX 157
VERNON, VERMONT 05354

REPORT DATE

PAGE NO.

SUBJECT

PREPARED BY CHECKED BY REVIEWED

~ 74000 lbm – CONTAINMENT AT 44 psig.

.3 w% DAY = .003 $\left(\frac{74000}{24}\right)$ = 24.6 lbm

.75 = .6 w%/DAY = 18.5 lbm

LAST 1 MST = .537 w%/DAY = 16.5 lbm/HR.

.29 lbm/HR / 24 HR/DAY) / 100 (wt / 74201 lbm) =

.00937 w%/DAY

.537
.00937

.54637 w%/DAY

Above assumes .29

VY = .23
NSD = .11

$\frac{(.23)(24)}{74201}$ = .0074 w%/DAY

$\frac{(.11)(24)}{742.01}$ = .0035 w%/DAY

MEMORANDUM

To: B.R.BUTEAU V.Y. Vernon Date 9/27/91
From: G. CAPPUCCIO V.Y. Vernon File: 3.1
Subject: TASK FORCE

PURPOSE

THE PURPOSE OF THIS MEMO IS TO PROVIDE THE GUIDANCE IN RESOLVING THE CURRENT ISSUE OF MOISTURE ON THE CONTAINMENT SUPPORTING BASE.

INTRODUCTION

RECENTLY, THE OPERATIONS DEPARTMENT IDENTIFIED MOISTURE WHICH WAS WEEPING OUT OF THE CONCRETE WALL LOCATED APPROXIMATELY 4 FEET ABOVE THE TORUS LEVEL, SOUTH EAST DIRECTION. SINCE THE LEAK IS VERY SMALL, THE SOURCE HAS NOT BEEN IDENTIFIED. TO RECTIFY THIS PROBLEM, A TASK GROUP WILL BE FORMED TO INVESTIGATE THE ISSUE AND PROVIDE FINDING AND RECOMMENDATIONS BY 10/4/91.

TASK EXPECTATIONS
THE TASK GROUP IS EXPECTED TO PERFORM THE FOLLOWING TASKS.

1) IDENTIFY MEANS OF DETERMING THE SOURCE OF THE LEAKAGE BY FRIDAY OCT. 4TH.
2) WRITE A BMO AND PRESENT TO PORC SEPTEMBER 30.
3) DEVELOP A CORRECTIVE ACTION PLAN AND USE 0007 AS A STARTING POINT AND FINALIZE BY OCTOBER 15TH.
4) ENSURE THAT ALL EQUIPMENT AND SOFTWARE IS AVAILABLE TO PERFORM A TYPE A TEST. IDENTIFY ANY PURCHASES.
5) THE GROUP MUST PERFORM A THOROUGH INSPECTION OF THE WALL. THIS INCLUDES (BUT IS NOT LIMITED TO), THE CONSTRUCTION DRAINS, SAND RING DRAINS, POUR LINES ETC. ADDITIONALLY, THE GROUP SHALL USE ORIGINAL CONSTRUCTION PICTURES, CB&I DRAWINGS, M&K DRAWINGS, ETC.
6) THE GROUP MUST CONTACT RP FOR RWPs AND TOUCH BASE WITH ANY OTHER SUPPORTING DEPARTMENT FOR SERVICE. IF A DEPARTMENT CANNOT SUPPORT YOUR REQUESTS, I MUST BE CONTACTED IMMEDIATELY.
7) THE GROUP MUST CONTACT OTHER SIMILAR BWRs TO SEE IF THIS PROBLEM HAS OCCURRED ELSEWHERE.
8) THE GROUP SHALL CONSULT INDUSTRY INFORMATIONAL SOURCES SUCH AS NPRDS, INPO, EPRI, SEARCH, ETC. ON THE ISSUE.
9) THE GROUP SHALL PROPOSE ANY TEMPORARY OR PERMANENT FIXES.
10) THE GROUP SHALL MEASURE THE AMOUNT OF LEAKAGE AND FORMULATE THE EQUIVALENT ORIFICE SIZE.
11) REVIEW THE RECENT VCR TAPE OF THE LOWER LEVEL OF CONTAINMENT FOR CLUES.
12) COMPARE ACTIVITY OF FLUID WITH OTHER SAMPLES WHICH CHEMISTRY TAKES TO DETERMINE IF THE SOURCE OF WATER CAN BE ISOLATED.

IMMEDIATE TASK

BEFORE 1800 9/27/91 IDENTIFY WHETHER PRIMARY CONTAINMENT IS IN QUESTION.

MEMORANDUM

THE TASK GROUP

THE GROUP LEADER IS EXPECTED TO IDENTIFY INDIVIDUAL RESPONSIBILITIES AND IDENTIFY DUE DATES FOR EACH ASSIGNMENT
THE TASK GROUP WILL BE COMPRISED OF
*DENNIS GIRROIR-GROUP LEADER
*TIM DROUIN
*E.VAN BOWMEN
*FRANK HELIN
*YNSD REP.
*MAINTENANCE REP.
*CHEMISTRY (AS REQRIRED).

REPORT

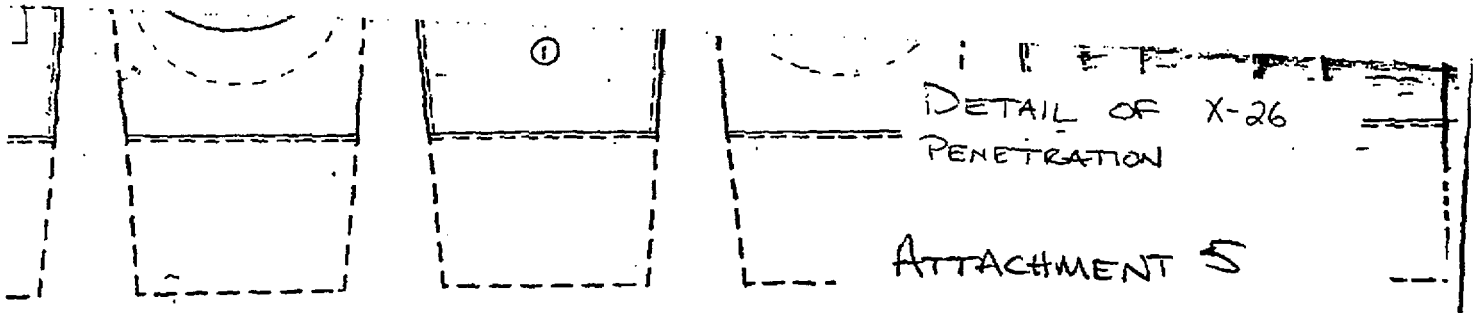
THE GROUP LEADER WILL PROVIDE PROGRESS REPORTS AT 9AM AND AT 3PM DAILY TO GC. THESE REPORTS SHALL STATE THE PROGRESS OF THE ABOVE ITEMS AS LISTED.

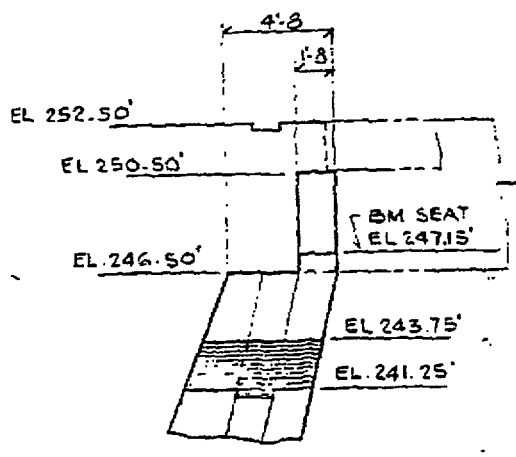
SCHEDULE

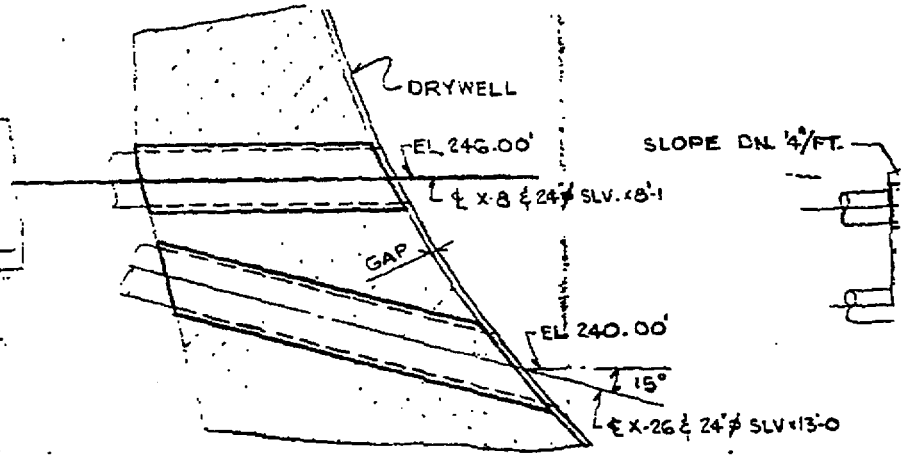
THE TASK GROUP WILL WORK THIS WEEKEND SEPTEMBER 28 & 29, AND REQUIRED OVERTIME TO SUPPORT THE PROPOSED SCHEDULE FOR COMPLETION. THE MANAGEMENT HAS RECOGNIZED OVERTIME FOR THIS PROJECT. THE GROUP WILL ULTIMATELY REPORT TO ME.

APPROVED_____
ENGINEERING DIRECTOR

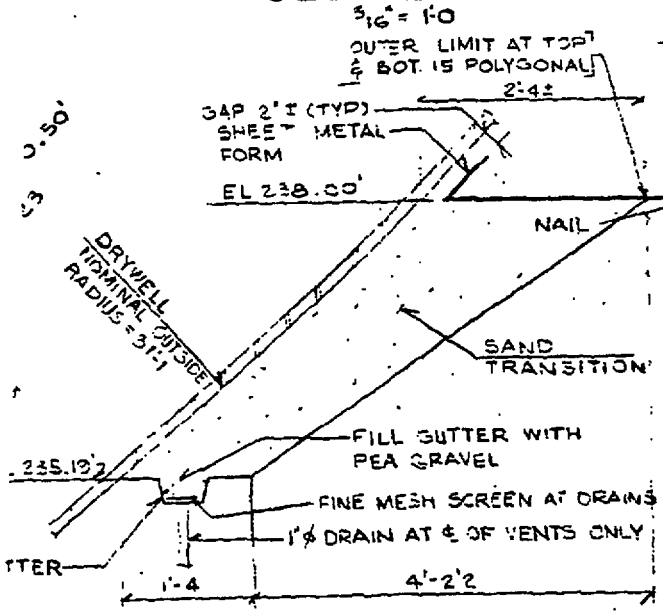
CC
DAR
RJW
RDP
DEPT. HEADS
TASK GROUP



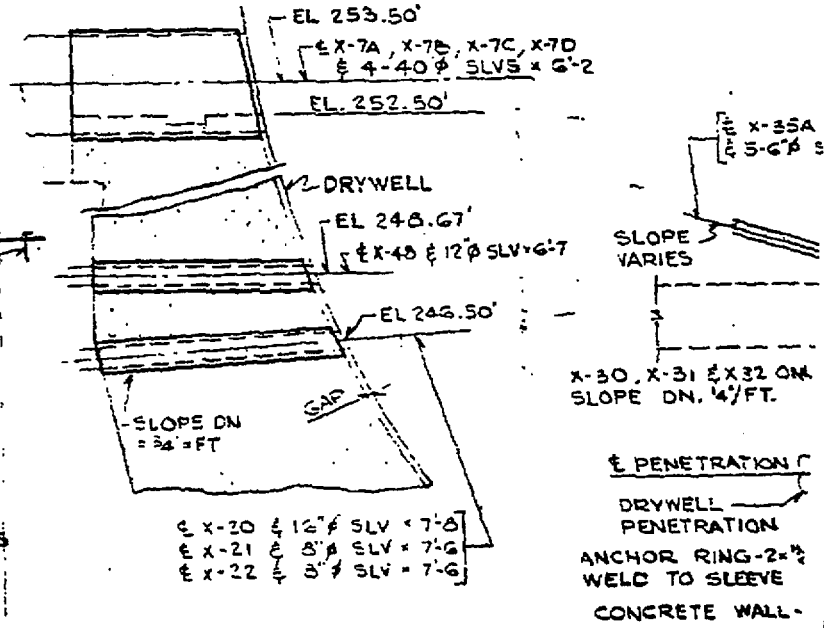




SECT E-E (F24)
3/16" = 1'-0

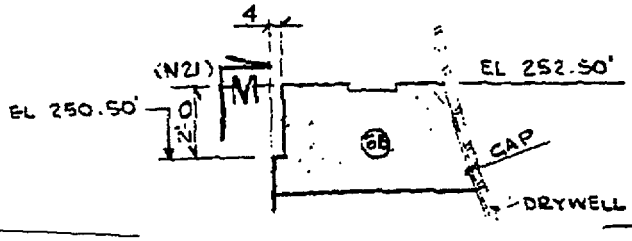


DETAIL OF SAND TRANSITION AT ℄ OF SEGMENT
3/4 = 1'-0

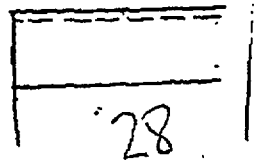


NOTES: ALL SLEEVES TO BE OF LIGHT WALL THICKNESS
LENGTHS ARE APPROX. OVERALL LGTHS
SLEEVES TO BE CUT TO SUIT BY FIELD

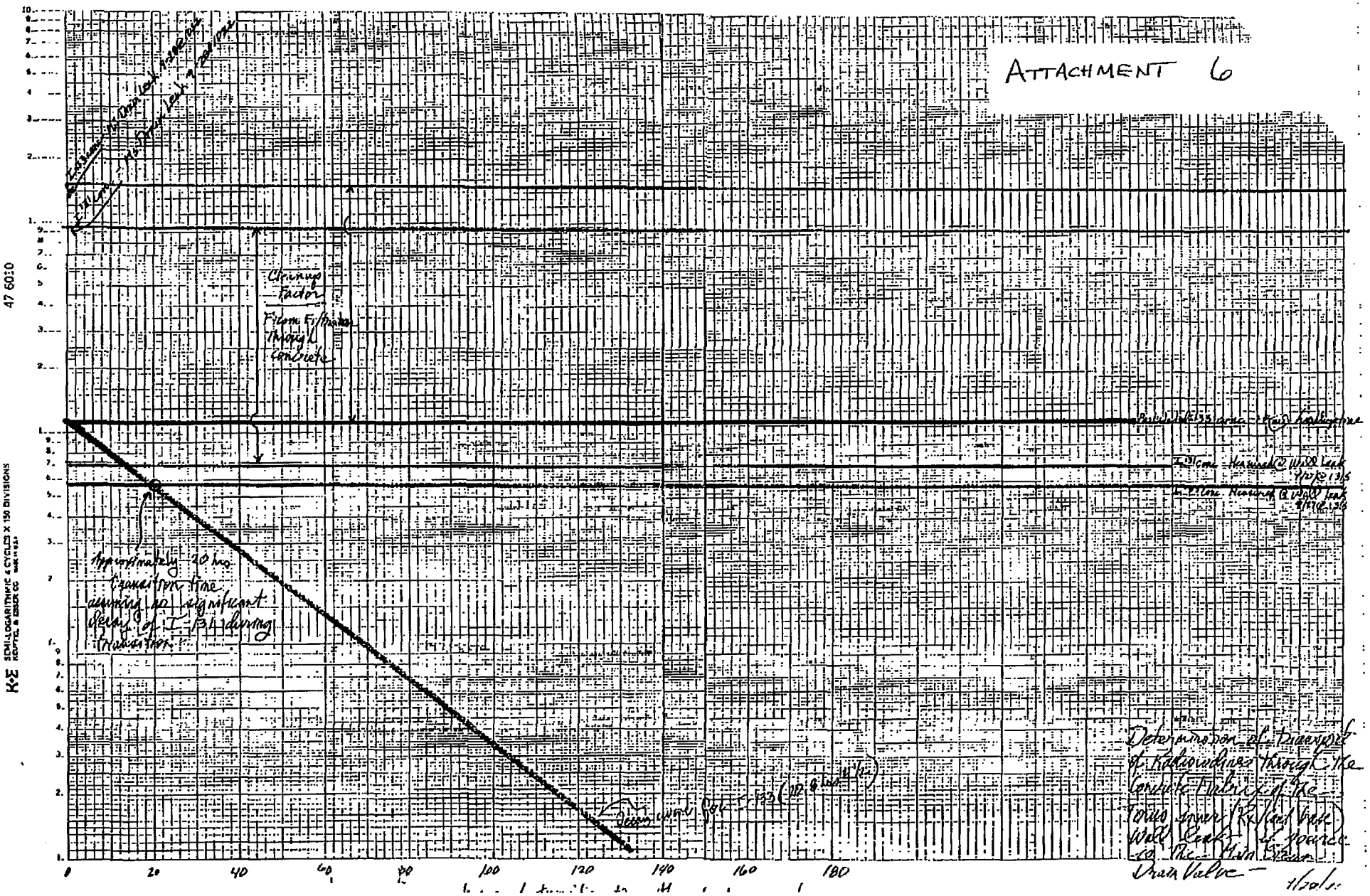
SECTS SHOWING DETS OF SLEEV
NOT TO SCALE



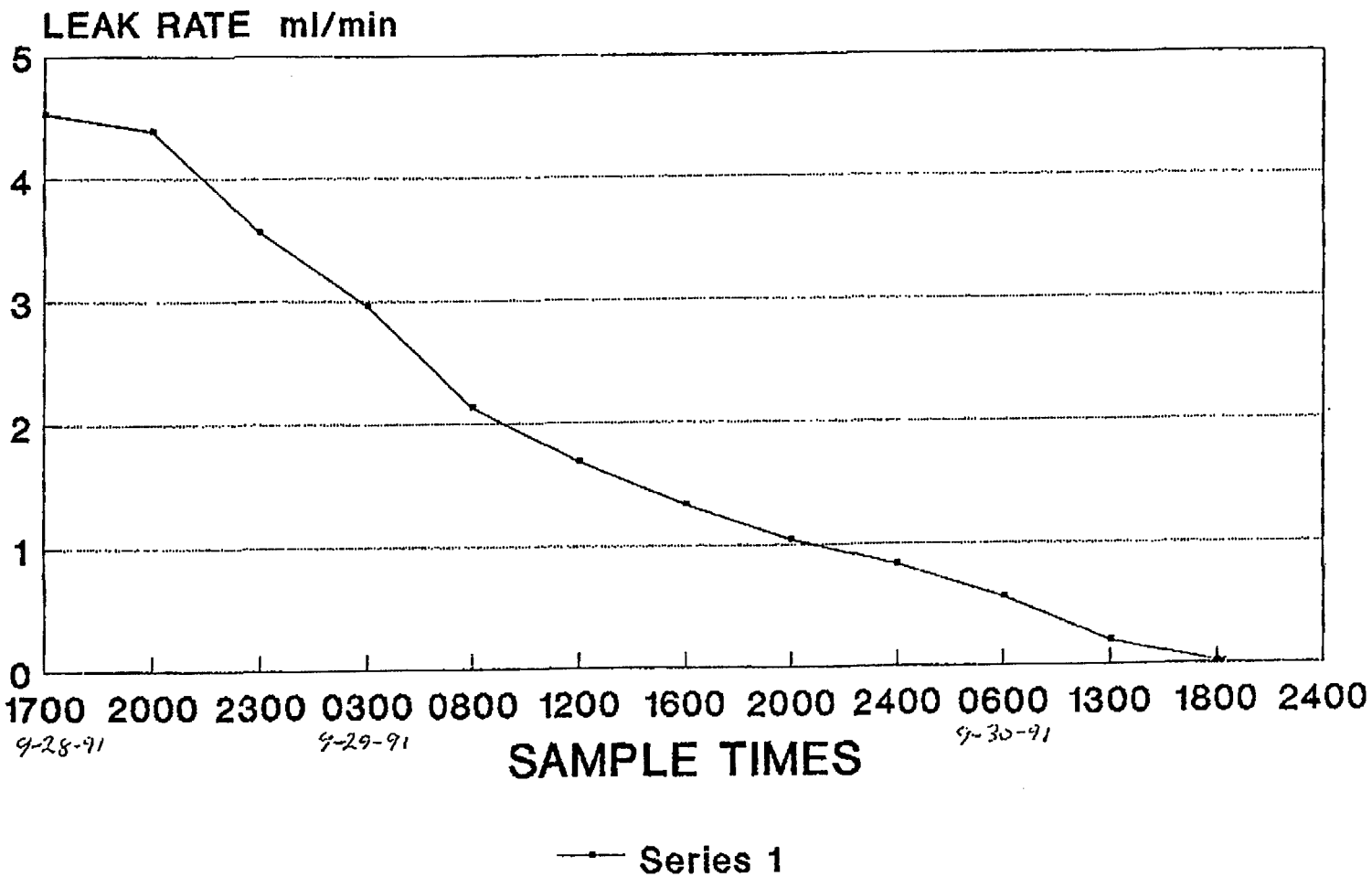
9'-6 I.D. SPLIT SLEEVE x 1/4 THK. x 11'-1
APPROX. OVER ALL LGTH, CUT TO SUIT
BY FIELD (8 REQD) TO BE ASSEMBLED
TESTED



ATTACHMENT 6



TORUS WALL LEAK

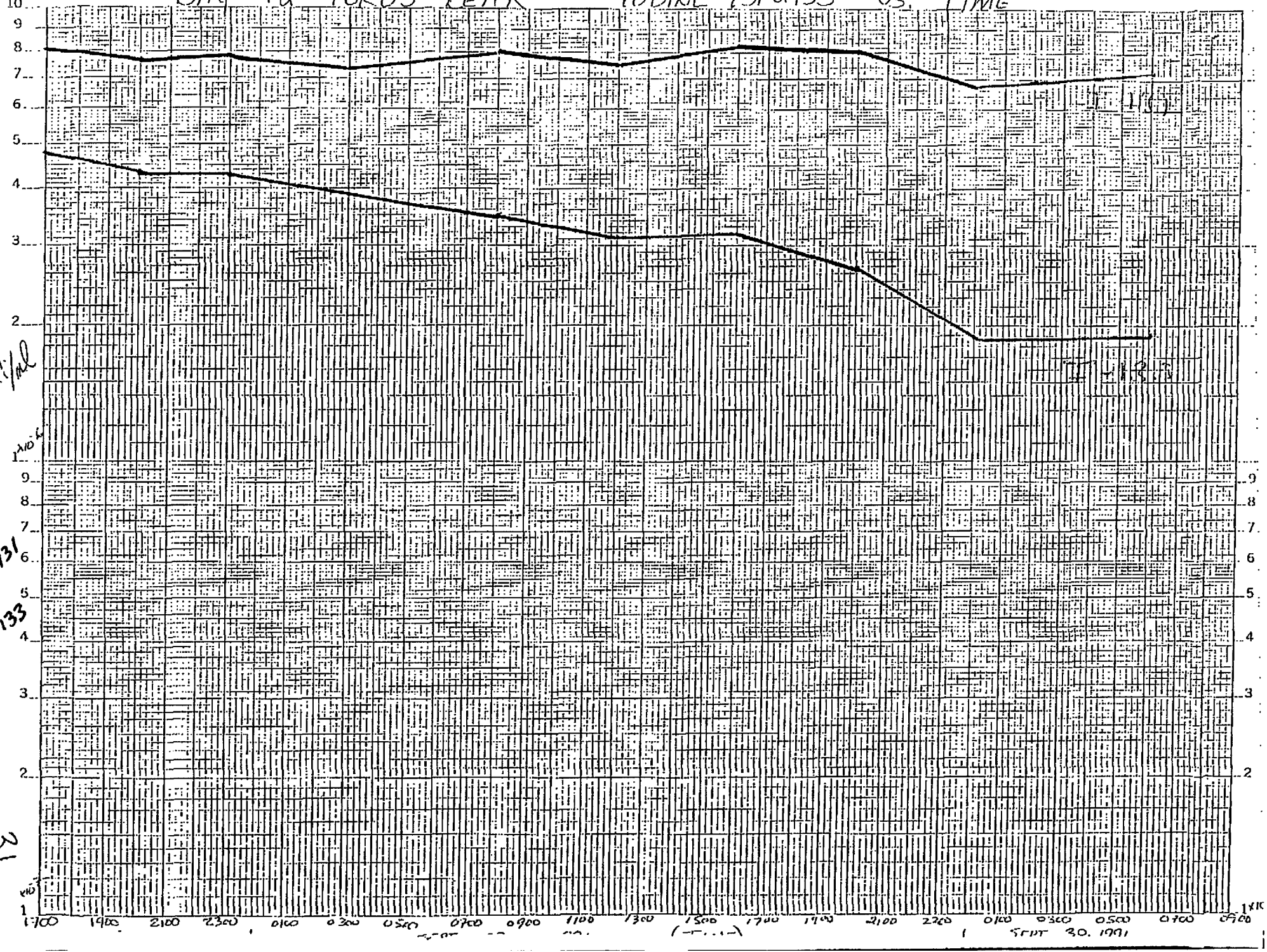


ATTACHMENT 7

SEMI-LOGARITHMIC 3 CYCLES X 200 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.

46 5250

BAY 12 TORUS LEAK IODINE 131 or 133 VS. TIME



A Root Cause Analysis of this event was performed. It was determined that the root cause of the event was a deficient design and design review performed during original construction.

The subject PCAC penetration is the only containment penetration with a downward slope to the containment. The placement of MS-77 directly over this pipe allowed leakage from the valve packing to travel down this pipe and contact the drywell shell.

It is not unexpected that valve packings will leak, especially in high pressure - high temperature service. The location of MS-77 directly over the negative sloping PCAC pipe is identified as a poor original plant design and design review. Root Cause Analysis Items D12 and E31 are identifed as the root cause(s) for this event.

A "checked-off" Appendix C to AP 0007 and RCA Flow Chart is attached.

Dennis Guisot 11/26/91

ATTACHMENT 3

EXPLANATION OF THE DECISION TREE AND ITS USES

This charting method is used for logically displaying the failure and illustrating its causes. Charting also helps identify where corrective actions are needed.

The decision tree has various levels of detail from the top of the tree (least detail) to the bottom of the tree (most detail). The decision tree is labeled with alpha-numeric codes which correspond to each category of the decision tree. Recommended questions for each category can be found in this guideline.

The investigator will decide if a category is:

ADEQUATE,

INADEQUATE,

NOT APPLICABLE,

NEEDS MORE INFORMATION (prior to coding as ADEQUATE, INADEQUATE, or NOT APPLICABLE)

Once the question is answered and the block is coded, move to the next block down the tree. The root cause(s) and/or contributing cause(s) are the block(s) coded as INADEQUATE. The process is complete when the whole tree is coded. Return to the User's Guide to test and code the causes, see Steps 4, 5 and 7.

A1. NATURAL PHENOMENON/SABOTAGE

Was a tornado, hurricane, earthquake, lightning, flood, or other natural phenomenon the cause of the failure? Were deliberate intentions or subversions responsible for the failure?

A2. SOFTWARE DIFFICULTY (PROCEDURES, COMMUNICATIONS, HUMAN FACTORS, TRAINING, MANAGEMENT SYSTEMS, IMMEDIATE SUPERVISION, QUALITY CONTROL, PERSONNEL ERROR)

Refer to Section D1 through D8 for further development under SOFTWARE DIFFICULTY.

NOTE

At this point in the decision tree, there is a skip from level A to level D because there are no level B or C categories under Section A2, SOFTWARE DIFFICULTY.

D1. PROCEDURES

Was a procedure related difficulty (procedure not used, procedure followed incorrectly, or procedure wrong or incomplete) involved? Refer to Sections E1, E2, and E3 for further development under PROCEDURES.

E1. PROCEDURE NOT USED

Was a procedure used to do the job? Was the procedure not available or inconvenient for use? Was the procedure difficult to use?

NOTE

If a procedure was available but not used, the event should also be dual coded under Section E14, PROCEDURES, POLICIES, or ADMINISTRATIVE CONTROLS NOT USED, because the procedure or policy to use procedures to perform all work was not used.

E2. PROCEDURE FOLLOWED INCORRECTLY

Was a failure caused by making an error while following or trying to follow a procedure? Was the procedure format confusing or different from the standard format? Was there more than one action per procedure step? Was the checklist misused? Were data computations in the procedure wrong or incomplete? Were the graphics used in the procedure inadequate? Was equipment identification inadequate? Were the procedure steps ambiguous?

NOTE

Some errors in following procedures should also be dual coded under Section E14, STANDARDS, POLICIES, OR ADMINISTRATIVE CONTROLS NOT USED.

Also, some causes may be dual coded under Section D4, TRAINING, if additional training was needed to successfully complete the procedure.

E3. PROCEDURE WRONG/INCOMPLETE

Was a procedure incomplete or wrong or did it fail to address a situation which could occur? Was a typographical error in the procedure responsible for the failure? Was there an incorrect sequence of steps in the procedure, even though the correct information was present? Was the wrong revision of a procedure being used?

D2. COMMUNICATIONS

Was an error caused by misunderstood verbal communication or lack of communication? Refer to Sections E4, E5 and E6 for further development under COMMUNICATIONS.

E4. MISUNDERSTOOD VERBAL COMMUNICATION

Was a failure caused by misunderstood verbal or oral communications between personnel? Was a communication error caused by failure to repeat back a message to verify the message was heard and understood correctly? Was a message or instruction misunderstood because it was too long and should have been written instead of oral?

E5. NO COMMUNICATION OR NOT TIMELY

Was a failure caused by failure to communicate or by communicating too late? Was no communication ever made because no method or system existed for communication? Were communications provided too late because events happened too fast to allow time for communications?

E6. SHIFT TURNOVER INADEQUATE

Did incorrect, incomplete, or otherwise inadequate shift turnover occur?

D3. HUMAN FACTORS

Was an error made because of poor or undesirable human factors engineering?

Refer to Sections E7, E8, E9, and E10 for further development under HUMAN FACTORS.

E7. MAN-MACHINE INTERFACE

Was a failure caused by poor coordination or interaction of personnel with the equipment, systems, facilities, or instrumentation with which they work? Did labeling fail to clearly identify or did labeling incorrectly identify equipment? Did poor arrangement of equipment contribute to causing the failure?

Did differences in equipment or equipment controls between the plant and simulator Control Rooms contribute to the failure? Did inadequate or unclear instrument gages, displays, or equipment controls contribute to causing the failure?

E8. *WORK ENVIRONMENT*

Was the work environment not conducive to good human performance (such as poor housekeeping, inadequate lighting, or excessive noise)? Did high radiation contribute to the failure by causing personnel to hurry work to reduce exposure or by requiring protective clothing that diminished performance?

E9. COMPLEX SYSTEMS

Was a failure caused by the system or equipment controls being complex or complicated?

E10. NON-FAULT TOLERANCE SYSTEM

Were errors undetectable before a failure or event occurred? Were errors not recoverable if discovered before a failure occurred?

~~D4~~. TRAINING

Was a failure caused by lack of, incomplete, or otherwise inadequate training?

Refer to Sections E11 and E12 for further development under TRAINING.

~~E11~~. NO TRAINING

Was there a lack of training to personnel on a particular system or subject? Was no training offered because a task was performed so infrequently (or not expected at all) that training was decided to be unnecessary?

~~E12~~. TRAINING METHODS INADEQUATE

Were training methods such as testing, repeat training, facilities used, and thoroughness of training inadequate?

NOTE

The **MANAGEMENT SYSTEM** category refers to problems in the administrative controls, the organization, or the system by which work is controlled and accomplished. This category represents problems which upper level management has control over and responsibility to correct and is not intended to reflect errors committed by management but rather weakness in the work control system. Management errors will be treated the same as worker errors.

D5. MANAGEMENT SYSTEM

Did an error result because of inadequate standards, policy, directives, organizational ineffectiveness, or administrative control deficiencies or failure to use existing policy? Was implementation of policy or directives inadequate? Was an event caused by failure to adequately correct or to implement corrective actions of known malfunctions or deficiencies? Refer to Sections E13, E14, E15, and E16 for further development under MANAGEMENT SYSTEM.

E13. STANDARDS, POLICIES, OR ADMINISTRATIVE CONTROLS (SPAC) INADEQUATE

Was a failure caused by inadequate standards, policy or administrative controls including drawings or prints? Were the SPAC confusing, incomplete/outdated, unclear, ambiguous or not strict enough. Were drawings or prints incorrect or not updated, or did they not reflect "as built" conditions?

E14. SPAC NOT USED

Were SPAC or directives not used, adhered to or followed? Were standards, directives, or policy not communicated from management down through the organization? Has enforcement of the SPAC in the past been lax? Was an SPAC not followed because a method of implementation was not provided for the SPAC.

E15. AUDITS/EVALUATIONS

Was a failure caused by, or can it be attributed to, inadequate audit or evaluation programs or failure to provide independent audits or evaluations?

E16. CORRECTIVE ACTION

Were recommended corrective actions for known deficiencies not implemented or installed (due to delays in funding, project design, corrective action implementation cycle, etc.) before recurrence of the deficiency?

D6. IMMEDIATE SUPERVISION

Was a failure caused by inadequate or lack of immediate (first line) supervision during job preparation or during performance of the job? Refer to Section E17 and E18 for further development under IMMEDIATE SUPERVISION.

E17. PREPARATION

Was a failure caused by failure of immediate supervision to provide adequate preparation (including capable workers), job plans, or walk through for a job? Was a failure the result of an incorrect switching and tagging order or a failure to switch and tag all necessary equipment before doing a job? Was scheduling of periodic tests, surveillances or Maintenance Requests inadequate?

E18. SUPERVISION DURING WORK

Did immediate supervision fail to provide adequate support, coverage, oversight or supervision during job performance?

D7. QUALITY CONTROL (QC)

Were equipment malfunctions or maintenance difficulties not discovered because of a failure to perform or adequately perform QC, functional tests, post maintenance tests, or quality verification checks during or after completion of work? Refer to Sections E19 and E20 for further development under QC.

E19. NO QC

Were QC checks, functional tests, or quality verification checks during or after completion of work not required or not performed?

E20. QC INADEQUATE

Was an equipment malfunction or difficulty caused by specifying QC, quality verification, or functional testing that was not adequate or comprehensive enough to detect possible errors?

D8. PERSONNEL ERROR

Caution should be used when selecting this category. There is a potential to mask other root causes under SOFTWARE DIFFICULTY and EQUIPMENT DIFFICULTY. This would result in inappropriate corrective actions and inaccurate failure trending.

E21. LACK OF MENTAL ATTENTION

Was an error caused by preoccupation, illness, excessive overtime, horseplay or distractions?

E22. MISINTERPRETATION OF INFORMATION

Was an error caused by a lack of information, wrong information or improper communication of information?

E23. PROCEDURE NOT FOLLOWED

Was an error caused by a worker electing not to use a procedure?

E24. INEXPERIENCE/INDECISION

Was an error made due to a lack of experience or improper decision making?

A3. EQUIPMENT MALFUNCTION/DIFFICULTY

Did an equipment malfunction or equipment difficulty initiate the failure?

Refer to Sections B1, EQUIPMENT MAINTENANCE (INSTALLATION, CORRECTIVE, PREDICTIVE AND PREVENTIVE, B2, EQUIPMENT RELIABILITY/DESIGN, and B3, CONSTRUCTION/FABRICATION, for further development under EQUIPMENT MALFUNCTION/DIFFICULTY.

B1. EQUIPMENT MAINTENANCE

Was the failure initiated or a result of equipment maintenance activities? Refer to C1 and C2.

C1. INSTALLATION/CORRECTIVE/PREVENTIVE/PREDICTIVE MAINTENANCE DIFFICULTY

Did a failure occur during or after installation of project work or equipment modification? Was there a corrective maintenance error during or after repairing or correcting an equipment malfunction? Was an error committed during or after performing scheduled preventive or predictive maintenance on equipment?

Refer to Sections D1 through D8 for further development under INSTALLATION/CORRECTIVE/PREVENTIVE/PREDICTIVE/MAINTENANCE DIFFICULTY, then return to C2.

C2. PREDICTIVE/PREVENTIVE MAINTENANCE (PM) PROGRAM

Should a reasonable PM program have prevented the equipment malfunction or equipment difficulty? Was the PM inadequate? Refer to Section D9, PM NOT ADEQUATE, for further development under PM program.

NOTE

This category should only be used if sound PM is not being performed, or is inadequate, for a piece of equipment.

D9. PM INADEQUATE

Was an equipment malfunction caused by inadequate or lack of PM?

E25. NO PM FOR EQUIPMENT

Was an equipment malfunction caused by not having PM scheduled for equipment? Should there have been PM on the equipment that failed?

E26. PM FOR EQUIPMENT INADEQUATE

Was PM scheduled too infrequently, considering the vendor recommendation, maintenance history, and industry experience for that piece of equipment?

B2. EQUIPMENT RELIABILITY/DESIGN

Was the equipment difficulty or malfunction a repeat or unexpected failure (reliability problem) or caused by a design error?

Refer to Sections C3, C4, and C5 for further development under EQUIPMENT RELIABILITY/DESIGN.

C3. REPEAT FAILURE

Was the equipment malfunction a repeat failure, known to have occurred in the past?

Refer to Section D10 for further development under REPEAT FAILURE.

D10. MANAGEMENT SYSTEM

Did a known equipment reliability problem exist for the equipment that failed such that management assignment of resources should have been reasonably expected to prevent recurrence?

E27. CORRECTIVE ACTION

Should adequate and timely corrective action been taken based on previously known equipment malfunctions or reliability problems?

C4. UNEXPECTED FAILURE

Was the failure unpredictable, unforeseen, or unexpected for the piece of equipment?

C5. DESIGN

Did the error or difficulty occur during the design or design review process?

Refer to Sections D11 and D12 for further development under DESIGN.

NOTE

Code all human factor design problems under Section D3, HUMAN FACTORS.

D11. DESIGN SPECIFICATIONS

Was an equipment malfunction caused by inadequate design specifications, not building equipment to design specifications, or not anticipating operational problems during design?

E28. SPECIFICATIONS INADEQUATE

Was an equipment malfunction caused by incorrect or inadequate design specifications or basic data? Were design standards or standards used for design, such as vendor or GE standards incorrect?

E29. DESIGN NOT TO SPECIFICATIONS

Were the specifications for the design correct but the design did not meet the specifications?

NOTE

Also consider dual coding under Section D12, DESIGN REVIEW, because the design review process can and should, in many cases, detect designs that do not meet specifications.

E30. PROBLEM NOT ANTICIPATED

Did the designer not anticipate and design equipment to withstand or adjust to potential problems that might occur during equipment service lifetime?

NOTE

Also consider dual coding under Section D12, DESIGN REVIEW, because the design review process can and should, in many cases, detect designs that do not anticipate potential problem areas.

D12. DESIGN REVIEW

Did the design review process fail to detect design errors?

NOTE

The cause of an equipment malfunction should only be coded as a design review error if the reviewer could have been reasonably expected to detect the error, realizing that the reviewer is usually not as familiar with a design as the designer.

E31. INDEPENDENT REVIEW INADEQUATE

Was a design review error caused by failure to have adequate independent review by someone other than the designer?

B3. CONSTRUCTION/FABRICATION

Was the cause related to construction, fabrication, or vendor activities?

Refer to Sections C6, C7, and C8 for further development under CONSTRUCTION/FABRICATION.

C6. INSTALLATION/MAINTENANCE DIFFICULTY

Did the difficulty or error occur during installation of project work or equipment modifications or during maintenance on existing systems?

Refer to Sections D1 through D8 for further development under INSTALLATION/MAINTENANCE DIFFICULTY. Return to C7.

C7. FABRICATION DIFFICULTY AT VY SITE

Was an error made during fabrication at the VY site?

C8. FABRICATION DIFFICULTY - AT VENDOR SITE

Was an error made during fabrication at the vendor site?

OPERATING EXPERIENCE INFORMATION REVIEW

INDEX NUMBER: CAR91063_01

RESPONSIBLE DEPARTMENT: PERFORMANCE ENGINEERING

DUE DATE: 12/31/99 ( ) ( ) ( ) ( )

DATE INITIATED: 09/19/96

Additional Instructions: Type B Commitment

RE: LEAK IN CONCRETE REACTOR PEDESTAL (MS-77).
CONTINUE TO INSPECT SAND DRAINS EVERY TEN YEARS.
(NEXT SCHEDULED SURVEILLANCE DUE 9-1-2001.)
SEE REC. 1.

To be completed by Reviewer:

See attached memo from S.A. Vekasy to R.L. Rusin dated 9/28/99
plus form 4000.01

9/28/99

___ A copy of this complete document needs to be forwarded to Training.
___ A copy of this complete document needs to be forwarded to YNSD Vendor Performance Review Group.
___ A copy of this complete document needs to be forwarded to the Maintenance Rule Coordinator.
___ Attached memorandum requires distribution.
___ Item is complete, well documented; no further tracking required.
___ Additional commitment tracking; required; initiate the following AP 0028 commitment(s)/due date(s).
✓ Additional actions tracked by a process other than AP 0028 e.g., MPAC, Design Change List, AP 0037 change forms.
(AP 4000)

Department Head Approval (Type A and B):

Tom R. Rusin / 9/28/99
Date

(Type A Only)

Manager/Superintendent or Director Disposition:

N/A / N/A
Date

___ Item needs add'l closeout; DH to present to N/A for final closeout.

(DH) Enter date presented: N/A

(OEC) Final closeout received: N/A RECEIVED SEP 28 1999

VYAPF 0028.01
AP 0028 Rev. 16

MEMORANDUM
SYSTEM ENGINEERING

To: R.L. Rusin Date: September 28, 1999

From: S.A. Vekasy SAV

Subject: Commitment Item CAR91063_01 DW Support Sand Drain Inspection

The subject ER was written to require continuing inspection of the drywell support sand cushion and the sand drains on a ten year interval. An initial baseline inspection was performed during 9/91. The next inspection is not scheduled until 9/1/01. Due to the nature of the commitment tracking system, this inspection shows up on the current commitment item list, even though there is no intention to perform this inspection until 9/1/01.

To ensure that this inspection continues to be properly tracked for completion on the correct due date, a new surveillance has been established in accordance with AP 4000 (see attached VYAPF 4000.01). Since the surveillance system will generate notification of the test before its due date, this commitment item may be closed. Tracking of the planned surveillance through AP 4000 provides adequate assurance that this surveillance test will be done on schedule.

SURVEILLANCE TESTING PROGRAM CHANGE FORM

Initiating Department System Engineering Date 9/23/99

Test Owner Department System Engineering

Type of change: New Test ☒ Deletion ☐ Change ☐

Complete all information as applicable:

1. Test Number: _____ (blank if new)
2. Title: Inspect Reactor Pedestal Sand Drains
3. Schedule Interval: Every 10 years
4. Base Date: 9/1/01
5. Last Done Date: 9/91
6. Expiration Date: N/A
7. Procedure(s): None
8. Cold Shutdown Test: Yes ☐ No ☒
9. Operations Release Required: Yes ☐ No ☒
10. Technical Specification(s): None
    Technical Requirements Manual: None
11. Notes: See Corrective Action Report CAR91063 for documentation of original inspection, inspection objectives and ~~results~~ initial inspection acceptance criteria of A SAW
12. Effective date for change: 9/23/99
13. For each change, describe the reason for the change: New surveillance required to ensure no standing water lies against lower drywell shell, resulting in corrosion of the drywell exterior
14. Plant Programs affected by this change: None
    (eg: ISI, IST, Maint Rule, PM, Check Valve, and Relief Valve Programs, etc)

    14a. Plant Program Owner Approval: N/A Date: _____

15. Initiating Department Head Approval: GWW 9/27/99 RUR Date: 9/28/99
16. Test Owner Department Head Approval: GWW 9/27/99 RUR Date: 9/28/99
17. Change Received: Date: _____ By: _____ STC
18. Master Test List Signature on Original. _____ By: _____ STC
19. Independent Veri _____ :e: _____ By: _____

VYAPF 4000.01 (Sample)
AP 4000 Rev. 20
Page 1 of 1
RT No. 09.S01.152

To: TCT

OPERATING EXPERIENCE INFORMATION REVIEW

DATE: 12/12/91

TO : CAPPUCCIO
FROM : BUTEAU
SUBJECT: CATEGORY A COMMITMENT REVIEW

Attached is a copy of commitment: CAR91063MEC1

This document is being assigned to you for assessment of its importance to safe plant operation and for specific action as indicated in the Additional Instructions below.

Please review the commitment, carry out additional instructions, and complete the lower portion of this form.

Additional Instructions: Type B Commitment

RE: LEAK IN CONCRETE REACTOR PEDESTAL (MS-77).
PER REC.3, REVISE DRYWELL INSPECTION PROCEDURE TO REQUIRE INSPECTIONS OF THE CONCRETE FLOOR INSIDE THE DRYWELL/CONTAINMENT WALL INTERSECTION.

SUBMIT THIS COMPLETED FORM AND OTHER RESULTS OF YOUR REVIEW TO THE OPERATING EXPERIENCE COORDINATOR (OEC) BY 03/01/92

Additional Corrective Action Process per VY Corrective Action Guideline

Sig. CAR [__] Routine CAR [__] NCR [__] None [✓]

To be completed by Reviewer:
See Attached Memo with recommended actions for this outage and future.
TCT

___ A copy of this complete document should be forwarded to training.

Department Supervisor Approval: _____ / 2/28/92
Date

To BRB IF You accept this Recommendation Please sign & E-MAIL Message and I will ensure inspection is done.

Manager/Superintendent or Director Disposition: _____ / 3-2-92
Date

___ Item is complete, well documented; no further tracking required.

✓ Additional commitment tracking; required; initiate the following commitment(s) and due date(s).

Complete recommendation 1 by 3/15/92 BRANCH Commitment: CAR91063MEC4
Complete " " 2 by 6/1/92

___ Item needs add'l closeout; DH to present to N/A for final closeout.

(DH) Enter date presented: N/A

(OEC) Final closeout received: N/A

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MECHANICAL ENGINEERING AND CONSTRUCTION DEPARTMENT MEMORANDUM

TO: B. R. Buteau **DATE:** February 28, 1992

FROM: T.C. Trask TCT

SUBJECT: Response To Category A Commitment Review CAR91063MEC1

References:

1) Category A Commitment Review CAR91063MEC1, dated December 12, 1991.

2) Drawing 5920-233, Revision 0, "Lower Drywell Concrete Pours - Primary Containment".

3) Category A Commitment Review SURV9011902CM1, dated December 7, 1990.

4) OP 4115, Revision 27, "Primary Containment Surveillance".

Background:

Category A Commitment Review CAR91063MEC1 requests the Mechanical Engineering & Construction Department to revise the drywell inspection procedure to require inspections of the concrete floor inside the Drywell / Containment wall intersection.

This request stems from Recommendation No. 3 of the Containment Pedestal Leak Task Team Final Report, dated October 8, 1991. In summary, on September 24, 1991, a leak was noted from the concrete pedestal under the drywell. After a series of investigations, the Task Team concluded that the leak was caused by a packing leak on valve MS-77. The condensed steam from the leak had travelled a path between the steel containment shell and the concrete containment and sand cushion to eventually leak from existing cracks or cold joints in the pedestal. The Task Team also concluded that primary containment integrity was maintained throughout the event.

Although the source of the leak was identified to be external to the primary containment, the Task Team recommended that a visual inspection of the area at the intersection between the containment wall and the concrete floor inside the drywell be

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added to a drywell inspection procedure. A leak through this intersection and the steel containment could result in an external leak similar to the one noted and be difficult to rapidly discover and identify.

Discussion:

A review of plant drawings indicates that drawing 5920-233 provides the only available details of the subject intersection. 5920-233 indicates that the interface between the inside of the steel containment and the concrete floor is pressure grouted and filled with a joint sealing compound at the edges. However, the exact surface condition of the compound, including paint coatings and cleanliness, and the ability to access the areas near the compound for visual inspections are both unknown at this time. Such determinations are not possible until the upcoming refueling outage.

At present, two (2) procedures exist for inspections of the interior surfaces of the primary containment, OP 4115 and OP 5250. OP 4115, Section D and VYOPF 4115.04 require that the painted interior surfaces of the drywell be inspected for chips, abrasions, scale, blisters, and rust spots. Inspections of the total interior surfaces are also performed for cracked welds, loose anchor points, or structural deformation. It should be noted that the inspections under OP 4115 are performed at the end of the refueling outage and serve as final confirmation of containment cleanliness and integrity prior to close out and plant startup. Until this time, these inspections have not shown the need for inspections ~~are~~ the start or early stages of the refueling outage. AT/bc

OP 5250, "Maintenance/Inspection of Primary Containment Interior Surfaces," was originally prepared in response to Category A Commitment Review SURV9011902CM1 and is presently undergoing final preparation by the Maintenance Department. This procedure provides for inspections of the painted surfaces within the drywell and torus and includes detailed instructions for surface preparation and painting. The inspections under this procedure are performed at the early stages of the refueling outage. However, unlike OP 4115, they are specific to painted surfaces.

Conclusions:

At present, two concerns exist which preclude the addition of inspections of the joint sealing compound to a procedure. First, the exact condition of and access to the compound make the preparation of detailed inspections instruction difficult.

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To DCG (Rem)

OPERATING EXPERIENCE INFORMATION REVIEW

DATE: 12/12/91

TO : CAPPUCCIO
FROM : BUTEAU
SUBJECT: CATEGORY A COMMITMENT REVIEW

Attached is a copy of commitment: CAR91063MEC2

This document is being assigned to you for assessment of its importance to safe plant operation and for specific action as indicated in the Additional Instructions below.

Please review the commitment, carry out additional instructions, and complete the lower portion of this form.

Additional Instructions: Type B Commitment

RE: LEAK IN CONCRETE REACTOR PEDESTAL (MS-77). PER REC.5, REVIEW VY RESPONSE TO GENERIC LETTER 87-05 AND DETERMINE IF REVISION IS NECESSARY.

SUBMIT THIS COMPLETED FORM AND OTHER RESULTS OF YOUR REVIEW TO THE OPERATING EXPERIENCE COORDINATOR (OEC) BY 02/12/92

Additional Corrective Action Process per VY Corrective Action Guideline

Sig. CAR [__] Routine CAR [__] NCR [__] None [X]

To be completed by Reviewer:

See attached response. Memo DCG to GC dated 2/7/92. RCS 2/7

___ A copy of this complete document should be forwarded to training.

Department Supervisor Approval: [signature] / 2/7/92 Date

Manager/Superintendent or Director Disposition: R Wanczyk for BRB 2/10/92 Date

✓ Item is complete, well documented; no further tracking required.
MEEC to Discuss conclusion with Sr. Resident Inspector. *

___ Additional commitment tracking; required; initiate the following commitment(s) and due date(s).

provided to Paul Harris 9/1/93 RCS

___ Item needs add'l closeout; DH to present to N/A for final closeout.

(DH) Enter date presented: N/A

(OEC) Final closeout received: N/A

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Second, neither of the existing inspection procedures provides an optimal location for these inspection instructions. Ideally, the inspections would be performed in the early stages of the outage to allow for sufficient time to effect repairs should they be required.

Recommendations:

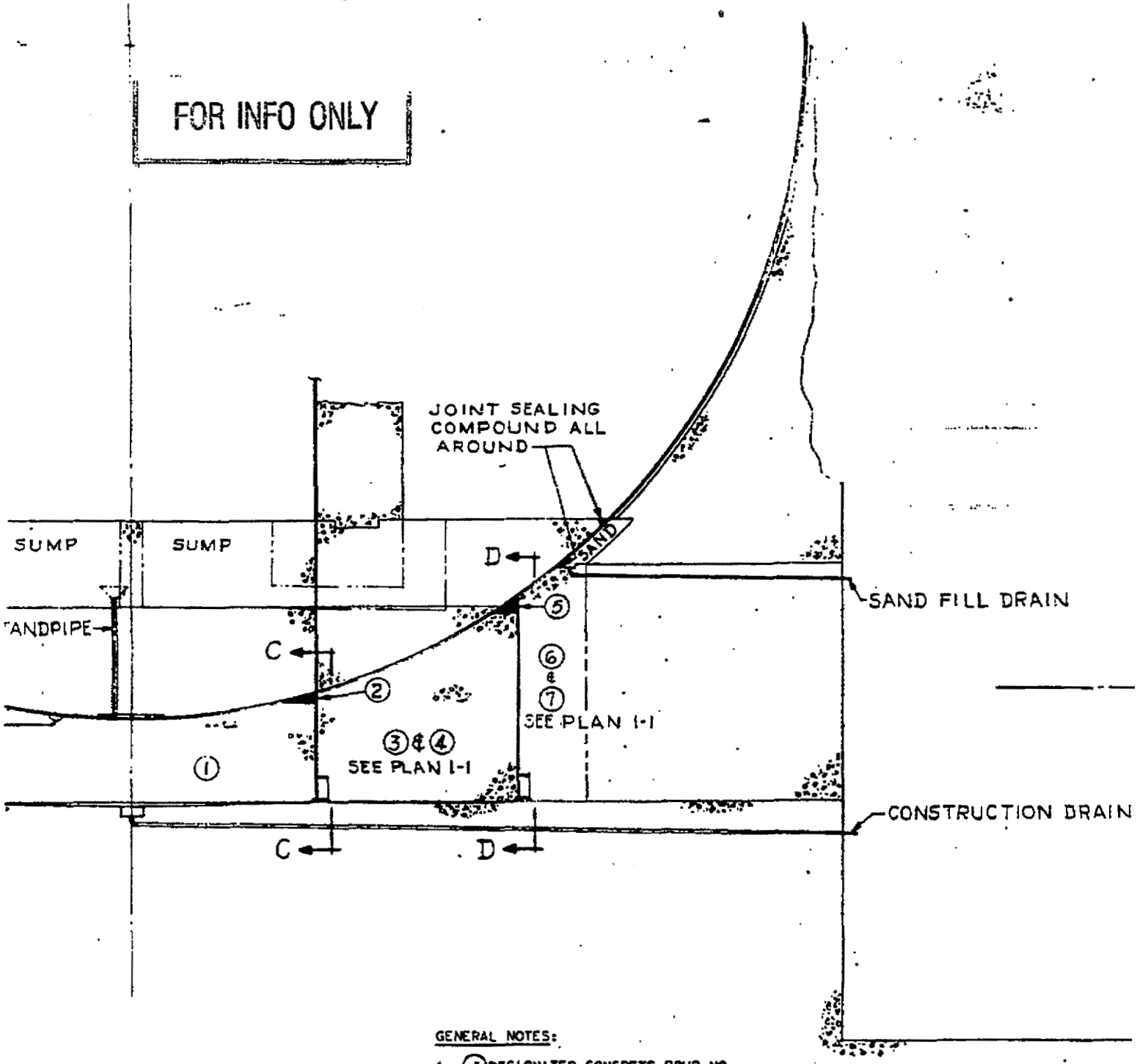
1 Based on the above conclusions, a two step resolution is recommended. First, inspections of the joint sealing compound this refueling outage will be performed by ME&C personnel under a Work Order. Upon acceptance of this recommendation, a Work Order Request will be initiated for this task. If any surface preparation or repairs are required, these tasks would also be controlled via Work Orders.

CAR 91036 MEC2

2 Subsequent to the refueling outage, detailed inspection instructions will be prepared and included in an appropriate procedure. This would be either a new section of OP 4115 to be performed at the start of the refueling outage, a new section of OP 5250 for items other than painted surfaces, or a new inspection procedure. This decision will be based both on the content of the inspection instructions and discussions with Operations and Maintenance personnel.

TUBE GROUTING METHOD

FOR INFO ONLY



ELEVATION

GENERAL NOTES:

1. (#) DESIGNATES CONCRETE POUR NO.
2. CONCRETE SHALL BE THOROUGHLY VIBRATED TO INSURE COMPLETE CONTACT WITH DRYWELL.
3. GROUTING AND CONCRETE PRESSURE AGAINST THE OUTSIDE OF DRYWELL TO BE DETERMINED BY A.E.
4. A MIN. 6 - 8 HOURS SHOULD BE MAINTAINED BETWEEN SUCCESSIVE CONCRETE POURS.
5. CONCRETE MAY BE PLACED INSIDE THE DRYWELL AFTER POUR ②. HEIGHT OF CONCRETE ABOVE POUR ② SHALL BE LIMITED TO 2' - 0" EFFECTIVE DEPTH AGAINST THE DRYWELL SHELL.
6. TYPE II CEMENT SHALL BE USED FOR THE CONCRETE WITH PLASTIMENT COLMA-DUR BY SIKA CHEMICAL CORPORATION OR APPROVED EQUAL TO INDUCE A UNIFORM VOID BY SUBSIDENCE.
7. CONCRETE STRENGTH SHALL BE F_C = 3000 PSI.
8. EACH POUR SHALL BE CONTINUOUS. EXCESS MATERIAL SHALL NOT BE USED FOR SUCCEEDING POUR.
9. DRYWELL MANHOLE TO BE SEAL WELDED AFTER PRESSURE GROUTING POUR ① AREA.

MEMORANDUM

TO: G. CAPPUCCIO	VERNON	DATE: 2/7/92
FROM: D.C. GIRROIR	VERNON	FILE: 3.1

SUBJECT: CAT A #CAR91063ME2, Review letter FVY 87-52

This commitment item required a review of the VY letter response to NRC Generic Letter 87-05, FVY 87-52 dated 5/8/87.

This letter was reviewed and determined that no revision is necessary as a result of the "pedestal leak" event.

Items 1) through 3) are unaffected by this event. The last item (page 3, "Response" needed to be considered. It states:

"Therefore, Vermont Yankee ... will conclude that no water has leaked into the sand gap area and if any water had it would have exited by way of the eight drain lines provided."

Later the paragraph further states:

"However, if our investigations indicate the drain lines were not operating properly or undetected water has penetrated the gap area, Vermont Yankee will submit a revised response for your review."

The original concern is that water (from the refuel cavity) has the potential to leak to this lower elevation, undetected, such that the sand cushion would become wet, be in contact with the drywell shell, and promote unacceptable corrosion.

The following is offered to address our letter statements and the original concern of NRC (and the BWR's Owners Group position):

1) The event condition was such that VY had leakage that WAS detected.
2) The sand cushion was not wetted. Visual inspection verified it to be dry.
3) There is an existing gap between the drywell shell and the sand cushion as verified by inspection.
4) The drain lines were once again verified to be open and operable.
5) The drywell shell was visually inspected and verified to be dry and evaluated to have no corrosion concern.

It is concluded that:

1) No water has leaked in the sand cushion area.
2) If water had leaked into this area it would have exited via the drain lines.
3) Undetected water also did not enter into the gap area between the

drywell and the sand cushion.

Based upon the above conclusions, the Vermont Yankee FVY 87-52 letter remains accurate and no revision is necessary.

In addition, the corrective actions taken are measures over and above our stated commitment. Most notable is the increased frequency of inspection of the sand drain lines and the torus floor areas.

Additional Note:

Our original response did state/imply that we would revise our response (for their review) if water penetrated the gap area. Our close communications on this issue with the NRC fulfills our basic commitment, to inform. Additionally, the finalized CAR was given to the NRC.

JL 2/7/92

Outgoing NRC Correspondence

VERMONT YANKEE LICENSING CORRESPONDENCE/COMMITMENT CONTROL SHEET

CATEGORY: LAI STATUS: OPEN WORK ORDER: 1-P

DOCUMENT NUMBER(S): LAI 717 FVY 87-52 DOCUMENT DATE: 5 /8 /87

RESPONSIBILITY: PLANT , , JPP

FINAL DUE: / / DRAFT DUE: / / LAST UPDATE: / /

DESCRIPTION: TRANSMITTAL OF VY RESPONSE TO NRC GENERIC LETTER 87-05 REQUEST FOR ADDITIONAL INFORMATION - MARK I DRYWELL DEGRADATION.

REMARKS: LAIs 717 A, B AND C ASSIGNED - SEE ATTACHED.

CLOSE OUT: LAI 710 CLOSED

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NUS Corporation

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VERMONT YANKEE LICENSING CORRESPONDENCE/COMMITMENT CONTROL SHEET

CATEGORY: LAI STATUS: OPEN WORK ORDER: 1-P

DOCUMENT NUMBER(S): LAI 717A FVY 87-52 DOCUMENT DATE: 5 /8 /87

RESPONSIBILITY: PLANT , , JPP

FINAL DUE: 8/ 7 /87 DRAFT DUE: / / LAST UPDATE: / /

DESCRIPTION: COMPLETE INTERNAL (BORESCOPE) INSPECTION OF SAND REGION DRAINLINES PER GENERIC LETTER 87-05 RESPONSE COMMITMENT.

REMARKS: TO BE COMPLETED PRIOR TO 1987 REFUEL OUTAGE. COMMITMENT MADE UNDER 50.54 f.

CLOSE OUT:

VERMONT YANKEE LICENSING CORRESPONDENCE/COMMITMENT CONTROL SHEET

CATEGORY: LAI STATUS: OPEN WORK ORDER: 1-P

DOCUMENT NUMBER(S): LAI 717B FVY 87-52 DOCUMENT DATE: 5 / 8 / 87

RESPONSIBILITY: PLANT , , JPP

FINAL DUE: / / DRAFT DUE: / / LAST UPDATE: / /

DESCRIPTION: VERIFY OPERABILITY OF BELLOWS/DRAIN LINE LEAK DETECTION INSTRUMENTATION PER GENERIC LETTER 87-05 RESPONSE COMMITMENT.

REMARKS: TO BE COMPLETED DURING 1987 REFUEL OUTAGE. COMMITMENT MADE UNDER 50.54 f.

CLOSE OUT:

VERMONT YANKEE LICENSING CORRESPONDENCE/COMMITMENT CONTROL SHEET

CATEGORY: LAI STATUS: OPEN WORK ORDER: 1-P

DOCUMENT NUMBER(S): LAI 717C FVY 87-52 DOCUMENT DATE: 5 / 8 / 87

RESPONSIBILITY: PLANT, _____, JPP

FINAL DUE: 10 / 8 / 87 DRAFT DUE: / / LAST UPDATE: / /

DESCRIPTION: SUBMIT REVISED RESPONSE TO GENERIC LETTER 87-05 IF LAI 717 A AND B INVESTIGATIONS INDICATE DRAIN LINE INOPERABILITY OR UNDETECTED WATER PENETRATED THE GAP AREA.

REMARKS:

COMMITMENT MADE PER 50.54 f.

CLOSE OUT:

VERMONT YANKEE LICENSING CORRESPONDENCE/COMMITMENT CONTROL SHEET

CATEGORY: LAI STATUS: _____ WORK ORDER: _____

DOCUMENT NUMBER(S): _____ _____ DOCUMENT DATE: / /

RESPONSIBILITY: _____, _____, _____

FINAL DUE: / / DRAFT DUE: / / LAST UPDATE: / /

DESCRIPTION:

REMARKS:

CLOSE OUT:

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VERMONT YANKEE
NUCLEAR POWER CORPORATION

RD 5, Box 169, Ferry Road. Brattleboro, VT 05301

Warren P Murphy

Vice President and
Manager of Operations

(802) 257-5271

May 8, 1987

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Office of Nuclear Reactor Regulation
Mr. Thomas E. Murley

References:
a) License No. DPR-28 (Docket No. 50-271)
b) Letter, USNRC to All Licensees of Operating Reactor (BWR's) with Mark I Drywells (Generic Letter 87-05), dated 3/12/87
c) IE Information Notice 86-99: Degradation of Steel Containments, dated 12/8/86

Dear Sir:

Subject: Response to Generic Letter 87-05 - Request for Additional Information - Assessment of Licensee Measures to Mitigate and/or Identify Potential Degradation of Mark I Drywells

By Generic Letter 87-05 [Reference b)] and pursuant to 10CFR50.54(f), you requested that each licensee of an operating reactor with Mark I drywell submit a formal response of its review. This letter provides Vermont Yankee Nuclear Power Corporation's response to that request.

Specifically, you requested, under oath or affirmation, responses to the following:

Item 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.

Response

Information Notice 86-99 [Reference c)] identified a potential problem with drywell corrosion at Oyster Creek. Vermont Yankee began an immediate review of the conditions and their applicabilty to Vermont Yankee's containment. A walk-down was performed by the Operations Department which verified the installation

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of the drain lines (a total of eight 1" PVC drain lines) which lead from the sand region between the drywell shell and the concrete. A visual inspection was also performed which indicated no leakage from any of the eight drain lines.

Vermont Yankee will complete an internal inspection of the drain lines by using a borescope and verify that the drains are not plugged and will perform their intended function. This inspection will be accomplished prior to our 1987 refuel outage, which is scheduled to begin August 8, 1987. This verification of properly installed drain lines, combined with no other evidence of a fuel pool leak, will provide Vermont Yankee adequate assurance that any potential water leakage into the sand region would not go undetected. ESD

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

Response

The existing refueling cavity design at Vermont Yankee includes fully welded stainless steel/carbon steel construction with a backup barrier channel and seal rupture drain. In addition, an alarm system is provided to detect any bellows or drain line leakage.

Figure 1 Section A-A of the Oyster Creek drywell to cavity seal (of Generic Letter 87-05) indicates that the source of leaking was a gasket at the cavity drain. The 42' diameter drywell to reactor bellows at Vermont Yankee is sealed with a penetration weld not a gasket. In addition, as a backup in the event of leakage in the bellows or drain piping, an additional stainless steel water barrier is included as part of the concrete liner to catch any water. A 3" diameter bellows rupture drain welded to the water barrier provides a flow path for any leakage to the equipment drain with an alarm system to notify operators in the event of bellows leakage.

Vermont Yankee will verify that the leak detection instrumentation is operable during the next refuel outage. IC

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

Response

The information that was originally provided in Table I was preliminary information only. A more detailed review has been completed with the following results.

Sand Gap Details Drawing Available	-	Yes G191481, Rev. 2
Wall Thickness UT Performed	-	No
UT Method/Results Sent to NRC	-	No
Gap Material	-	Ethafoam
Was Gap Material Removed	-	Yes - See Note 1

NOTE 1: In order to create the 2" gap, a layer of Ethafoam material was attached to the steel prior to the concrete pour. To form this 2" gap at Vermont Yankee, 2" thick sheets of Ethafoam were placed between the steel liner and a .040 sheet of Noblock plastic sheeting which kept the concrete from adhering to the Ethafoam. Concrete was then poured against this in 3' lifts and allowed to set. The Ethafoam sheets were then removed creating the 2" gap. Upon removal of the Ethafoam, 2" thick by 6" wide strips of polyurethane were placed circumferentially in the top of the opening to prevent objects from entering the gap. This process was repeated for the several concrete lifts necessary to form the shield wall.

Item 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.

Response

As identified in Reference b), Oyster Creek identified localized degradation as a result of some water leakage into the sand region surrounding the containment shell. This leakage was attributed to the deterioration of a drain line gasket at the drywell to cavity bellows. Further, due to Vermont Yankee's design for the refuel bellows, we do not believe any water has or will leak into the 2" gap area undetected. Therefore, Vermont Yankee, assuming satisfactory results of its visual inspection of the drain lines, will conclude that no water has leaked into the sand gap area and if any water had it would have exited by way of the eight drain lines provided. Based on the above discussion, combined with potentially significant ALARA concerns, Vermont Yankee feels ultrasonic testing of the drywell shell is not warranted. However, if our investigations indicate the drain lines were not operating properly or undetected water has penetrated the gap area, Vermont Yankee will submit a revised response for your review.

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We trust that the above information adequately addresses your request; however, should you have questions or desire additional information, please do not hesitate to contact us.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Warren P. Murphy
Vice President and
Manager of Operations

/dm

STATE OF VERMONT)
)ss
WINDHAM COUNTY)

Then personally appeared before me, Warren P. Murphy, who, being duly sworn, did state that he is Vice President and Manager of Operations of Vermont Yankee Nuclear Power Corporation, that he is duly authorized to execute and file the foregoing document in the name and on the behalf of Vermont Yankee Nuclear Power Corporation and that the statements therein are true to the best of his knowledge and belief.

Diane M. McCue Notary Public
My Commission Expires February 10, 1991

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To DCG

OPERATING EXPERIENCE INFORMATION REVIEW

DATE: 12/12/91

TO : CAPPUCCIO
FROM : BUTEAU
SUBJECT: CATEGORY A COMMITMENT REVIEW

Attached is a copy of commitment: CAR91063MEC3

This document is being assigned to you for assessment of its importance to safe plant operation and for specific action as indicated in the Additional Instructions below.

Please review the commitment, carry out additional instructions, and complete the lower portion of this form.

Additional Instructions: Type B Commitment

RE: LEAK IN CONCRETE REACTOR PEDESTAL (MS-77). PER REC.6, REVIEW BWROG LETTER TO NRC DATED 12-22-89 AND DETERMINE IF FURTHER ACTIONS ARE APPROPRIATE.

SUBMIT THIS COMPLETED FORM AND OTHER RESULTS OF YOUR REVIEW TO THE OPERATING EXPERIENCE COORDINATOR (OEC) BY 02/12/92

Additional Corrective Action Process per VY Corrective Action Guideline

Sig. CAR [__] Routine CAR [__] NCR [__] None [X]

To be completed by Reviewer:

See attached DCG to GC memo, dated 2/7/92. → See CAR91063MEC2
RDB. 2/7

___ A copy of this complete document should be forwarded to training.

Department Supervisor Approval: _____ / 2/7/92 Date

Manager/Superintendent or Director Disposition: _____ / 2/19/92 Date

___ Item is complete, well documented; no further tracking required.

✓ Additional commitment tracking; required; initiate the following commitment(s) and due date(s).

" MEIC to Evaluate BWROG Letter 8997 Recommendations and make recommendation " Due 9/1/92

___ Item needs add'l closeout; DH to present to N/A for final closeout.

Branch Commitment : CAR 91063 MT4

(DH) Enter date presented: N/A

(OEC) Final closeout received: N/A

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BWR OWNERS' GROUP

Stephen D. Floyd, Chairman
(919) 546-6901

c/o Carolina Power & Light Company • 411 Fayetteville Street • Raleigh, NC 27602

HMM DCP

I preserve this record. No UY action

Rich Ragodin

for your info

BWROG-8997

December 22, 1989

RECEIVED
JAN 4 1990
OPS. SUPPORT

TRACKED AS UND 9002

Mr. G. Bagchi, Chief
Structural and Geosciences Branch
Division of Engineering Technology
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: BWROG RECOMMENDATIONS ON DRYWELL INSPECTIONS

Reference: James E. Richardson (NRC) to Don Grace (BWROG), "Inservice Inspection of Mark I Drywell Steel Shells," June 23, 1989

Dear Mr. Bagchi:

In response to the reference letter, Attachment 1 provides BWR Owners' Group (BWROG) recommendations regarding inspection of the drywell sand cushion region. These recommendations apply only to the plants at issue; that is, certain Mark I and Mark II plants but not Mark III plants. The BWROG believes that the program described in the attachment will assure that the BWR facilities at issue will continue to operate in a safe manner without undue risk to public health and safety, by the prevention and/or rapid detection of drywell shell corrosion.

The approach recommended by the BWROG is to determine first whether a potential corrosion concern exists. This aim is accomplished by assuring that the drain system dedicated to the drywell/bioshield gap is functioning so that any leakage into the gap is not only quickly eliminated but also readily detected. When warranted, thickness measurements are taken to determine the extent of any corrosion if it exists.

Attachment 2 provides recommendations on a process and schedule for determining inspection requirements for the wetwell and the remainder of the drywell.

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The comments/positions provided in this letter have been endorsed by a substantial number of the members of the BWROG; however, it should not be interpreted as a commitment of any individual member to a specific course of action. Each member must formally endorse the BWROG position in order for that position to become that member's position.

Sincerely yours,

Stephen D. Floyd

Stephen D. Floyd, Chairman
BWR Owners' Group

cc: F. J. Miraglia, NRC
G. J. Beck, BWROG Vice Chairman
D. N. Grace, RRG Chairman
BWROG Primary Representatives
BWROG Executive Oversight Committee
BWROG Drywell Inspection Committee
W. A. Zarbis, GE

ATTACHMENT I

BWROG Recommendations for Inspections
of Drywell Sand Cushion Region

1. INTRODUCTION

In November 1986, thinning of the drywell wall was observed at a BWR/2 with a Mark I containment. The thinning is attributed to corrosion induced by the presence of moisture in the sand cushion. The source of the moisture was leakage from the refueling pool through fatigue cracks in the cavity seal and possibly the bellows at the drywell-to-cavity seal.

At all Mark I plants except Brunswick Units 1 and 2 and at a single Mark II plant (WNP-2), a gap exists between the steel drywell and the surrounding concrete bioshield structure. All of these plants except Hope Creek are equipped with a sand cushion at the bottom of the drywell/bioshield cavity. To prevent collection of water in this region, it is equipped with drain lines that typically open onto the torus room floor. In some plants, the sand cushion is sealed from the cavity by a steel plate; in these plants the sand cushion may not have drain lines. However, the region above the steel plate is equipped with drain lines.

By letter dated June 23, 1989, the NRC proposed recommendations regarding inspection of the drywell shell for those plants with a drywell/bioshield gap. Representatives of the BWR Owners' Group (BWROG) met with the NRC on October 4, 1989, to discuss these proposed inspections. As a result of that meeting, the BWROG agreed to investigate the measures needed to preclude or detect potential corrosion of the drywell at or around the sand cushion region.

Provided below are the BWROG recommendations and supporting discussion.

2. BWROG RECOMMENDATIONS

In general, the BWROG approach emphasizes first, measures to be taken to detect and mitigate potential leakage, and second, additional inspections to minimize the potential for leakage into the gap region. The advantage of this approach is that utilities can readily determine whether conditions necessary for corrosion are present, prior to undertaking costly and difficult actions such as ultrasonic testing (UT) required to detect corrosion.

A. Verify the functionality of drain lines in and above the sand cushion.

The primary means of detecting leakage is to monitor the drain lines in or above the sand cushion. The drain system is designed to collect and remove moisture from the sand cushion or, for those plants with a sealed sand cushion, from the air gap above the sand cushion. If the drain lines are functional, any leakage into the drywell/bioshield gap can be readily observed at the drain line outlet.

At the beginning of its next refueling outage, each plant should verify functionality of the drain system via an initial inspection using a boroscope, compressed air, smoke kits, or other appropriate means. If this initial inspection indicates that the drain lines are functional, then additional inspections of the drains should be conducted at a frequency deemed appropriate by the individual utility, but at least once every ten years. The ten-year inspection frequency is justified because there is no likely mechanism which would cause the drains to become nonfunctional, especially those in the sand cushion, where the sand acts as a filter to prevent matter from reaching and thus plugging the drains. In addition, there are a number of drain lines, providing sufficient redundancy to ensure the drain system will function.

If the drain lines are nonfunctional, then corrective action should be taken. The lines should then be inspected again at the beginning of the next refueling outage, and if they remain functional, subsequent inspections should be conducted as discussed above.

B. Look for signs of leakage.

Upon confirmation that a free flow path exists between any potential leakage sources and the drain system, plants should conduct inspections to look for signs of leakage. These inspections should be conducted early during each refueling outage, after the refueling pool has been filled, and repeated at the end of the refueling outage. Plants should also look for signs of leakage from previous outages, such as stains near the outlets of the drain system.

It is also suggested that plants without a sealed sand cushion insert into the sand cushion through the drain lines an instrument suitable for indicating the presence of moisture in the sand cushion, such as those commercially available for measuring moisture in soil. An alternative would be to insert a carbon-steel specimen into the sand cushion and periodically withdraw it to look for signs of corrosion.

C. Perform thickness measurements if there is evidence of leakage.

Thickness measurements of the drywell are costly and difficult, particularly measurements of the region adjacent to the sand cushion since this area is surrounded by concrete. In the sand cushion region, concrete would have to be chipped or drilled to permit the measurements. The difficulty of this task would also limit the amount of surface area measured to a small percentage of the total surface area. Since any corrosion would likely be randomly located, the probability of detecting it would consequently be low. Because of the difficulty of performing them, and because of their questionable worth, thickness measurements should be performed only if corrosion is suspected, based on the presence of water as discussed in the preceding paragraphs.

Plants were typically built with margin to the drywell shell thickness required by industry standards. Recent measurements at a BWR/3 as part of the Plant Life Extension Program demonstrated shell

thicknesses in excess of design requirements. In a briefing of the Commission on October 25, 1989, T. E. Murley (Director, NRR) stated that corrosion of containments has affected only the margin above code limits on thickness, and that as long as the containment meets the code, there is still two to three times as much thickness as needed. If corrosion is not suspected, more than adequate wall thickness remains to ensure containment integrity.

If evidence of prolonged leakage exists, then thickness measurements should be made at the next outage of opportunity after the evidence is observed. If the leakage is observed to have come from the sand cushion region, the measurements should be made at that elevation. For plants with a sealed sand cushion, if leakage is observed from the region above the sand cushion, thickness measurements should be made at that elevation; however, measurements need not be made at the sand cushion unless leakage is also observed at that location.

Thickness measurements should be repeated at the same locations two refueling outages or approximately three years after the first ones are made. From these two sets of measurements the corrosion rate can be established. The frequency of subsequent measurements should then be based on the corrosion rate and may be less frequent then every three years.

It may be justifiable to not perform thickness measurements if the leakage was a one-time occurrence or of a small amount (for guidance, an amount comparable to the volume of the drain line would be considered a small amount), and the source of the leakage was detected early or has been eliminated. A small amount of leakage would not induce a significant amount of corrosion. Measurement of the moisture content of the sand cushion and the relative humidity of the air in the drywell/bioshield gap would indicate whether conditions are present to cause extensive corrosion and thus whether thickness measurements are required.

D. <u>At each plant's option, inspect the refueling cavity for potential leaks.</u>

As discussed above, the primary means of detecting leakage is by monitoring the drain lines in and above the sand cushion. However, it is advisable although not necessary to minimize the potential for leakage into the drywell/bioshield gap by inspecting for leaks in the refueling cavity. Each plant should determine the necessity for and the degree of inspections of the refueling cavity or other sources of potential leakage into the drywell gap.

There are numerous joints and seals associated with the refueling cavity. Only those joints and seals which would allow water into the drywell/bioshield gap if they leaked may need to be inspected. Also, only those joints that rely on sealing compounds or gaskets may need periodic inspection. Seal welded joints and the drywell bellows should be good for the life of the plant. In addition, the drywell bellows is protected by a large guard plate that is not easily

removed; removal of this plate would increase outage time and personnel radiation exposure.

It is suggested that plants perform an initial inspection of only the joints and seals potentially susceptible to leakage, and repeat the inspection at an appropriate interval but a least once every ten years.

3. EXCEPTIONS

Individual plants may justifiably take exception to some or all of the inspections discussed above, depending on whether they had previously performed an inspection in response to Generic Letter 87-05. In addition, plants may take credit for mitigating design features or analyses such as those listed below to reduce or eliminate some inspections:

a) Exterior surface of the drywell coated with a superior grade of corrosion resistant primer; or

b) Thickness of drywell wall increased by design to specifically allow for corrosion; or

c) Lack of a sand cushion; or

d) Demonstration by analysis that the corrosion rate will not affect the life of the drywell.

ATTACHMENT 2

BWROG Recommendations for Inspections of Drywell and Wetwell

Attachment 1 provides BWROG recommendations regarding inspections of the sand cushion region of the drywell. As a result of the October 4, 1989, meeting with the NRC, the BWROG also agreed to recommend an approach for determining inspection requirements for the wetwell and the remainder of the drywell.

The ASME Boiler and Pressure Code, Section XI, Division 1, Subsection IWE, "Requirements for Class MC and Metallic Liners of Class CC Components of Light-Water Cooled Power Plants", provides guidance for conducting inspections of BWR containments. This document is a living document that can be revised as needed to address new inspection requirements that may arise. In fact, Subsection IWE is currently being amended to require examination of areas likely to experience accelerated aging and degradation. Other substantial revisions are also underway, including one to require ultrasonic thickness measurements of areas of potential containment degradation.

The BWROG proposes to follow the work of the ASME as they revise and finalize Subsection IWE, and will make recommendations as needed regarding drywell and wetwell inspections. Since the NRC is also involved with the development of Subsection IWE, the ASME process provides a common forum for arriving at a mutually acceptable inspection program.

The BWROG committee charged with resolving this issue will meet early in 1990 to develop a recommended long term course of action for consideration by the BWROG.

OPERATING EXPERIENCE INFORMATION REVIEW

DATE: 03/03/92

TO : CAPPUCCIO
FROM : BUTEAU
SUBJECT: CATEGORY A COMMITMENT REVIEW

Attached is a copy of commitment: CAR91063MEC4

This document is being assigned to you for assessment of its importance to safe plant operation and for specific action as indicated in the Additional Instructions below.

Please review the commitment, carry out additional instructions, and complete the lower portion of this form.

Additional Instructions: Type B Commitment

RE: LEAK IN CONCRETE REACTOR PEDESTAL (MS-77). PER REC.1 OF 2-28-92 TCT TO BRB MEMO, COMPLETE INSPECTIONS OF JOINT SEALING COMPOUND. INITIATE WORK ORDERS AS NEEDED.

SUBMIT THIS COMPLETED FORM AND OTHER RESULTS OF YOUR REVIEW TO THE OPERATING EXPERIENCE COORDINATOR (OEC) BY 03/15/92

Additional Corrective Action Process per VY Corrective Action Guideline

Sig. CAR [__] Routine CAR [__] NCR [__] None [X]

To be completed by Reviewer:

See Attached memo, TCT to BRB, dated 3-15-92.

___ A copy of this complete document should be forwarded to training.

Department Supervisor Approval: _____ / 3-15-92 Date

Manager/Superintendent or Director Disposition: _____ / 3-20-92 Date

___ Item is complete, well documented; no further tracking required.

✓ Additional commitment tracking; required; initiate the following commitment(s) and due date(s).

New commitment due 12/1/92 to address recommendations in TCT's memo of 3/15/92 Branch Commitment: CAR91063MEC5"

___ Item needs add'l closeout; DH to present to N/A for final closeout.

(DH) Enter date presented: N/A

(OEC) Final closeout received: N/A

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MECHANICAL ENGINEERING AND CONSTRUCTION DEPARTMENT
MEMORANDUM

TO: B.R. Buteau **DATE:** March 15, 1992

FROM: T.C. Trask TCT

SUBJECT: Supplemental Response To Category A Commitment Review CAR91063MEC1

References:

1) Memo, TC Trask to BR Buteau, "Response to Category A Commitment Review CAR91063MEC1," dated February 28, 1992.

2) Drawing 5920-233, Revision 0, "Lower Drywell Concrete Pours - Primary Containment".

3) Memo, TC Trask to BR Buteau, "Response to Category A Commitment Review SURV9011902CM1," dated January 2, 1992.

Background:

Category A Commitment Review CAR91063MEC1 requested the Mechanical Engineering & Construction Department to revise the drywell inspection procedure to require inspections of the intersection of the concrete floor and the inside Drywell wall.

This request stemmed from Recommendation No. 3 of the Containment Pedestal Leak Task Team Final Report, dated October 8, 1991. The Task Team recommended that a visual inspection of the area at the intersection between the containment wall and the concrete floor inside the drywell be added to a drywell inspection procedure. A leak through this intersection and the steel containment could result in an external leak similar to the one noted in September, 1991 and be difficult to rapidly discover and identify.

Reference 1) recommended a two step resolution, with the first step being inspections of the wall/floor intersection this refueling outage by ME&C personnel. This recommendation was the result of unknowns regarding the exact surface condition of the intersection, including paint coatings and cleanliness, and the ability to access the areas near the intersection for visual inspections.

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This memorandum provides the results of the inspection performed by Mark Stello and myself on this date. Conclusions and Recommendations resulting from this inspection are also included.

Discussion:

The results of the inspection performed are as follows:

1) The area of the intersection was easily accessed for the entire circumference of the drywell. Representative areas were video taped for later reference.

2) Contrary to Drawing 5920-233, no joint sealing compound was identified at the intersection. Drawing 5920-233 indicates that a joint sealing compound was to be applied at the intersection.

3) The actual configuration found was a 45 degree bevel at the concrete edge, approximately 1 inch in both depth and width. A sketch is attached as Figure 1.

4) The bevel was filled with dirt and some standing water. The dirt was easily cleared away to allow inspection of the sides and bottom of the bevel.

5) The bottom of the bevel was viewed to be tight against the drywell liner. This would support the Drawing 5920-233 statement that the interface between the inside of the steel containment and the concrete floor was pressure grouted.

6) No evidence of corrosion of the steel drywell liner was noted. Areas where the paint was no longer intact were noted, but the primer coat was still intact.

Conclusions:

It is engineering judgement that the existing bevel may have been considered too small for proper installation and retention of the joint sealing compound.

While the existing bevel configuration is not optimal, as it provides a location for the accumulation of standing water and dirt falling down the drywell wall, it is not considered an immediate concern and there is adequate assurance that primary containment integrity will be maintained for the following operating cycle. This conclusion is based on the following:

1) Required Leakage Path:

As discussed in Reference 1) and the Containment Pedestal Leak Task Team Final Report, leakage must occur through both the intersection and the steel containment liner.

2) Physical Condition of the Existing Bevel:

As noted in observation #5, the concrete appears to be tight against the steel liner.

3) Physical Condition of the Steel Containment Liner:

a) As noted in observation #6, no corrosion of the interior of the steel containment liner was observed.

b) As also noted in observation #6, the primer coat was observed to be intact. Reference 3) notes that the existing primer in both the Drywell and the Torus is well cured and exhibits excellent adhesion and durability. The primer provides adequate protection for the primary containment interior surfaces, and no re-application of topcoat is required.

c) As also discussed in the Containment Pedestal Leak Task Team Final Report, no evidence of leakage through the steel containment liner has been observed. Samples of the sand fill under the liner were dry.

4) Performance of the Type A ILRT:

Performance of the Type A ILRT verifies that the total primary containment leakage rate at 44 psig is less than 75% of the maximum leakage rate assumed to occur following a design basis accident. Should leakage occur through both the intersection and the steel containment liner, such leakage would be seen during the ILRT and analyzed accordingly.

5) Inerted Primary Containment Atmosphere:

Should corrosion be present at this time, further acceleration of the corrosion is not considered probable because the primary containment is inerted during power operation.

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Recommendations:

Based on the above conclusions, it is recommended that no further actions be taken during the present refueling outage.

During the next operating cycle, it is recommended that:

1) An investigation be performed to determine if the present generation of joint compounds or sealants can be properly installed in the existing bevel with adequate assurance that failure will not result.

2) Irrespective of the results of Recommendation #1, plans should be made to clean, prepare and paint both the bevel and the surrounding area during the next refueling outage.

3) Following the completion of Recommendations #1 and #2, detailed inspection instructions be prepared and included in an appropriate procedure. This would be either a new section of OP 4115 to be performed at the start of the refueling outage, a new section of OP 5250 for items other than painted surfaces, or a new inspection procedure. This decision will be based both on the content of the inspection instructions and discussions with Operations and Maintenance personnel.

Approved: [signature] * 3/15/92
ME&C Supervisor / Date

* ALTHOUGH THIS MEMO RECOGNIZES THE CONDITION OF THE STEEL/CONCRETE INTERFACE AS ACCEPTABLE AND CAN BE REPAIR NEXT OUTAGE, I WOULD REVIEW THE POSIBILITY OF REPAIR THIS OUTAGE IF TIME/RESOURCES PERMIT.
[signature]

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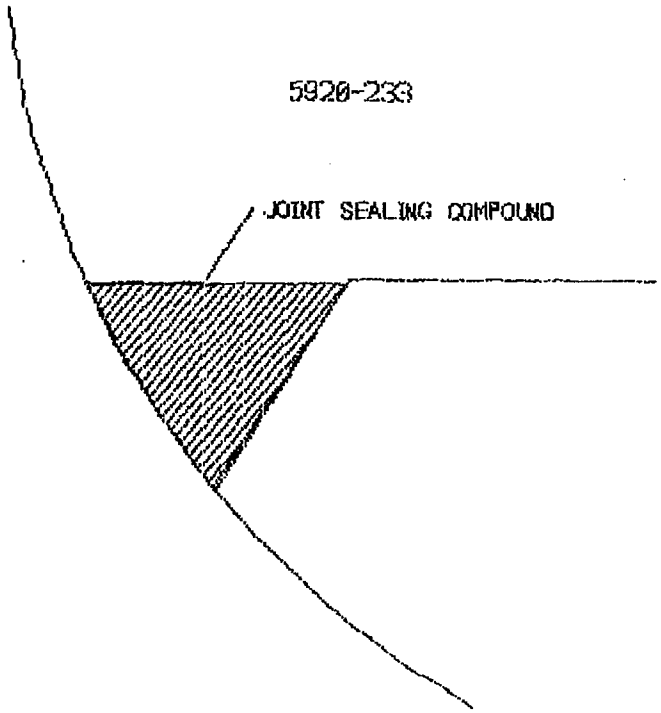

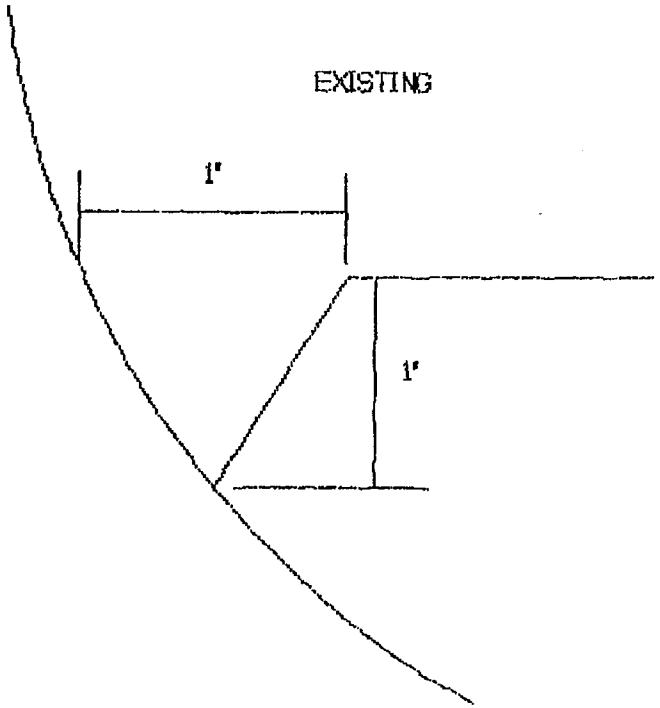

FIGURE 1 - CAT A CAR91063MEC1

DRYWELL FLOOR TO WALL INTERSECTION

(To: TCS)

OPERATING EXPERIENCE INFORMATION REVIEW

DATE: 04/04/92

TO : CAPPUCCIO
FROM : BUTEAU
SUBJECT: CATEGORY A COMMITMENT REVIEW

Attached is a copy of commitment: CAR91063MEC5

This document is being assigned to you for assessment of its importance to safe plant operation and for specific action as indicated in the Additional Instructions below.

Please review the commitment, carry out additional instructions, and complete the lower portion of this form.

Additional Instructions: Type B Commitment

RE: LEAK IN CONCRETE REACTOR PEDESTAL (MS-77). ADDRESS RECOMMENDATIONS IN RESPONSE TO "CAR91063MT4." RESPOND TO REC.1-3 RE: JOINT COMPOUNDS, PREPARATIONS, INSPECTIONS.

SUBMIT THIS COMPLETED FORM AND OTHER RESULTS OF YOUR REVIEW TO THE OPERATING EXPERIENCE COORDINATOR (OEC) BY 12/01/92

Additional Corrective Action Process per VY Corrective Action Guideline

Sig. CAR [__] Routine CAR [__] NCR [__] None [✓]

To be completed by Reviewer:

See Attached Memo.
JCT 1-25-93

___ A copy of this complete document should be forwarded to training.

Department Supervisor Approval: _____ / 1/26/93
Date

Manager/Superintendent or Director Disposition: _____ / 2-9-93
Date

___ Item is complete, well documented; no further tracking required.

✓ Additional commitment tracking; required; initiate the following commitment(s) and due date(s).
Please forward procedure mark-ups to Maintenance and Incorporate.

Branch Commitment: CAR91063MT2

___ Item needs add'l closeout; DH to present to N/A for final closeout.

(DH) Enter date presented: N/A

(OEC) Final closeout received: N/A

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MECHANICAL ENGINEERING AND CONSTRUCTION DEPARTMENT
MEMORANDUM

TO: B.R. Buteau **DATE:** January 25, 1993

FROM: T.C. Trask TCT

SUBJECT: Response To Category A Commitment Review CAR91063MEC5

References:

1) Memo, TC Trask to BR Buteau, "Supplemental Response to Category A Commitment Review CAR91063MEC1", dated March 15, 1992.

2) Memo, TC Trask to BR Buteau, "Response to Category A Commitment Review CAR91063MEC1", dated February 28, 1992.

3) Drawing 5920-233, Revision 0, "Lower Drywell Concrete Pours - Primary Containment".

4) Memo, TC Trask to BR Buteau, "Response to Category A Commitment Review SURV9011902CM1", dated January 2, 1992.

5) OP 5250, Revision 0, "Maintenance / Inspection of Primary Containment Interior Surfaces".

6) Federal Register Notice 57FR54860, "Proposed Generic Letter on Augmented Inservice Inspection Requirements for Mark I and Mark II Steel Containments, Refueling Cavities and Associated Drainage Systems", dated November 20, 1992.

Background:

Category A Commitment Review CAR91063MEC5 requested the Mechanical Engineering & Construction Department to respond to recommendations 1 through 3 in Reference 1), regarding the use of joint compounds and painting and inspection of the intersection of the concrete floor and the inside Drywell wall.

The recommendations stemmed from inspections made by ME&C personnel during the 1992 Refueling Outage. Those inspections noted that no joint sealing compound was present at the intersection, contrary to Drawing 5920-233, See Rep No 1.

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The inspections, in turn, stemmed from the ME&C review of Category A Commitment Review CAR91063MEC1 and Recommendation No. 3 of the Containment Pedestal Leak Task Team Final Report, dated October 8, 1991. The Task Team recommended that a visual inspection of the area at the intersection between the containment wall and the concrete floor inside the drywell be added to a drywell inspection procedure. A leak through this intersection and the steel containment could result in an external leak similar to the one noted in September, 1991 and be difficult to rapidly discover and identify.

This memorandum provides responses to the recommendations, based on studies performed during 1992.

Discussion:

Recommendation 1:

An investigation be performed to determine if the present generation of joint compounds or sealants can be properly installed in the existing bevel with adequate assurance that failure will not result.

Response:

Discussions with representatives from Dow Corning and 3M have indicated that joint compounds are not presently available that provide adequate assurance that failure would not result over the remaining life of the plant. This decision is based on three points:

a) The existing configuration found at the concrete edge, i.e., a 45 degree bevel approximately 1 inch in both depth and width, will not allow for the joint compound to be locked in place,

b) The differential thermal expansion between the steel drywell and the concrete floor would result in expansion and contraction of the compound, increasing the likelihood of failure, and

c) The present generation of joint compounds has not been qualified to remain intact and functional in post-LOCA radiation, humidity, and temperature conditions.

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Recommendation 2:

Irrespective of the results of Recommendation #1, plans should be made to clean, prepare and paint both the bevel and the surrounding area during the next refueling outage.

Response:

During the 1993 Vermont Yankee budget preparation process, the responsibility and budget for performance of the primary containment coating inspection and maintenance was transferred from the Maintenance Department to ME&C. A review of the present budget and workscope indicates that sufficient funds exist to clean, prepare and paint both the bevel and the surrounding area during the 1993 Refueling Outage, in addition to the normally expected workscope.

Recommendation 3:

Following the completion of Recommendations #1 and #2, detailed inspection instructions be prepared and included in an appropriate procedure. This would be either a new section of OP 4115 to be performed at the start of the refueling outage, a new section of OP 5250 for items other than painted surfaces, or a new inspection procedure. This decision will be based both on the content of the inspection instructions and discussions with Operations and Maintenance personnel.

Response:

Based on the response to Recommendation #2, i.e., both the bevel and the surrounding area be painted, the appropriate location for inspection and maintenance of the area is OP 5250. A marked up copy of the applicable pages of OP 5250 is attached to this memorandum.

Conclusions:

It is concluded that both the bevel and the surrounding area be painted during the 1993 Refueling Outage and then inspected and maintained in accordance with OP 5250.

While the existing bevel configuration is not optimal, as it provides a location for the accumulation of standing water and dirt falling down the drywell wall, the conclusions provided in Reference 1) are still considered valid and there is adequate assurance that primary containment integrity will be maintained.

It should also be noted that this issue may be revisited based on the studies required to answer the Generic Letter proposed in Reference 6), a copy of which is attached.

Approved: _____ 1/26/93.
ME&O Supervisor Date

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Endowment for the Arts, Washington, DC 20506, or call (202) 682-5439.

Dated: November 16, 1992

Yvonne M. Sabine,

Director, Panel Operations, National Endowment for the Arts.

[FR Doc. 92-28212 Filed 11-19-92; 8:45 am]

BILLING CODE 7537-01-M

NUCLEAR REGULATORY COMMISSION

Proposed Generic Communication

AGENCY: United States Nuclear Regulatory Commission.

ACTION: Notice of opportunity for public comment.

SUMMARY: The Nuclear Regulatory Commission (NRC) is proposing to issue a Generic Letter. A generic letter is an NRC document that: (1) Transmits information to and requests that analyses or descriptions of proposed corrective actions or both be submitted by the addressees regarding matters of safety, safeguards, or environmental significance; (2) informs addressees of changes in NRC policy and requirements approved by the Committee to Review Generic Requirements (CRGR), the issuance of a topical report evaluation or a NUREG type document of interest to them, or changes in NRC administrative procedures; or (3) requests the addressees to submit revised technical specifications or other technical or administrative information which does not involve any physical changes to the facility, but which NRC needs to properly perform its function.

The draft generic letter recommends actions to be taken by operating plants with Mark I and Mark II steel containments to implement certain inservice inspection procedures that would prevent inadvertent loss of containment integrity and maintain continued conformity with their licensing bases.

The NRC is seeking comment from interested parties regarding both the technical and regulatory aspects of the proposed generic letter presented under the Supplementary Information heading. The NRC will consider comments received from interested parties in the final evaluation of the proposed generic letter. Should this generic letter be issued by the NRC, it will become available for public inspection in the Public Document Rooms.

DATES: Comment period expires December 21, 1992. Comments submitted after this date will be considered if it is practical to do so, but assurance of consideration cannot be given except for comments received on or before this date.

ADDRESSES: Submit written comments to Chief, Rules and Directives Review Branch, U.S. Nuclear Regulatory Commission, Washington, DC 20555. Written comments may also be delivered to room P-223, Phillips Building, 7920 Norfolk Avenue, Bethesda, Maryland, from 7:30 am to 4:15 pm, Federal workdays. Copies of written comments received may be examined at the NRC Public Document Room, 2120 L Street, NW. (Lower Level), Washington, DC.

FOR FURTHER INFORMATION CONTACT: Ronald Eaton, (301) 504-3041.

SUPPLEMENTARY INFORMATION: The proposed generic letter text is given below:

AUGMENTED INSERVICE INSPECTION REQUIREMENTS FOR MARK I AND MARK II STEEL CONTAINMENTS, REFUELING CAVITIES,[1] AND ASSOCIATED DRAINAGE SYSTEMS

Purpose

The staff of the U.S. Nuclear Regulatory Commission (NRC) is issuing this generic letter to request that licensees of operating plants with Mark I and Mark II steel containments adopt certain inservice inspection procedures that would prevent inadvertent loss of containment integrity and maintain continued conformity with their licensing bases.

The staff, with industry assistance, has devised an inspection program which should produce the necessary information. This inspection program consists of the inservice inspection (ISI) of all Mark I and Mark II steel containments, refueling cavities, pools, and associated drainage systems. Each licensee should indicate whether it will adopt the staff's inspection program or an alternate equally effective inspection program. Each licensee should inform the staff in detail regarding the inspection program that it will adopt as part of the plant's inservice inspection program to address the corrosion considerations discussed in this letter. If a licensee adopts an alternate inspection program, which it asserts is equally effective but which deviates from the staff's recommended program, the licensee should identify all deviations and provide the bases for such deviations so that the staff can make a determination of the equal effectiveness of the alternate inspection program.

[1] Includes the refueling cavity as well as the adjacent equipment pool and the spent fuel pool.

Background

Corrosion was first discovered in the sand cushion region on the outside face of the steel drywell of the Mark I containment of the Oyster Creek Generating Station, and later on the outside face of the upper regions of the drywell. The Mark II steel containment has a different physical arrangement but with construction details which could lead to corrosion as in the Mark I drywell. Corrosion and coating degradation have been discovered on the inside face of Mark I suppression pool tori and may occur on the inside face of the suppression pool portion of the Mark II containment. Because of these discoveries, the inservice inspections recommended for Mark I drywell and torus also apply to Mark II containment.

Drywell

On March 12, 1987, after completing its review and evaluation of the licensee's detailed investigation of the steel drywell shell corrosion event at the Oyster Creek Nuclear Power Plant, the NRC staff issued Generic Letter (GL) 87-05 to all licensees of operating reactors with Mark I containments. In the generic letter, the NRC requested licensees to provide information on the following items:

(1) Drainage of the sand cushion.

(2) Preventive maintenance and inspection activities to minimize any possible leakage from the refueling pool.

(3) Plans for ultrasonic thickness measurements for those drywell shells with open sand cushions.

(4) Confirmation of information as listed in Table 1 of GL 87-05.

Having performed its review and evaluated the response provided by the licensee, the NRC staff concluded that the extensive corrosion at Oyster Creek may have been caused by the water leaking through the flexible seal in the refueling pool, and that similar containment degradation may exist at other plants.

Torus (Suppression Pool)

On October 14, 1988, the NRC staff issued Information Notice 88-82, "Torus Shells with Degraded Coatings in BWR Containments," alerting licensees of BWR plants to the discovery of corrosion of the torus at Nine Mile Point 1 and of degraded coatings of the tori of some BWR plants in Region I. The torus at Nine Mile Point 1 was designed and constructed without a coating. Corrosion of the torus shell and degradation of the torus coating that could lead to corrosion of the shell base metal may jeopardize the integrity of the torus

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suppression pool, which is critical to the BWR containment as a whole. The suppression pool boundary in the Mark II containment may also become corroded.

Discussion

Drywell

The information collected about the drywell shell corrosion at Oyster Creek indicates that the corrosion resulted from water that had leaked into the sand cushion from the refueling pool. However, the design of the refueling pool and the provision of various drain lines should prevent the water from entering the sand cushion if the seal and the drainage system have been properly constructed and frequently inspected and maintained. Consequently, the NRC issue GL 87-05 to all licensees with Mark I or Mark II steel containments.

While reviewing the licensees' responses, the NRC staff has made the following observations:

(1) Functionality Check of the Drains

Because most of the drains from the sand cushion are filled with sand and fitted with traps or screens at the ends, it is difficult to determine whether or not such drains are functional. As a result, some of the licensees have visually inspected the drain ends, while others have not performed any inspection. Water that is observed coming from these drains can provide an indication that the drains are unplugged. At one plant, the source of the leakage was from the refueling cavity. Although small amounts of moisture were present at three other plants, no indications of corrosion products or contamination were observed. This led the staff to conclude that the moisture resulted from condensation rather than from leakage. However, when no water is coming from the drains, visual inspections will not indicate whether the drains are plugged or whether the sand cushion does not contain water or moisture.

(2) Leaktightness of the Refueling Cavity and Other Pools Above the Reactor

With the exception of the licensee for Oyster Creek, all licensees indicated that the connections in the reactor cavity seal drain are welded, and no nonmetallic gaskets are used. Therefore, the reactor head cavity seal should not leak. Any leakage will be directed to a drain that is equipped with leak-detection instrumentation and an alarm system to notify the operator about the leak. Licensees are allowed to set these leak-detection devices to sense different rates of leakage. For instance, in one plant the flow indication switch is set to trip the alarm at 5 gallons per minute (gpm), in another plant the switch trips at 0.1 gpm, in a third plant the switch trips at 10 gpm, and in other responses, licensees did not mention settings. However, if the leakage is continuous during refueling, even at a level below the lowest possible setting, the potential for moisture in the sand cushion to cause corrosion still exists.

Besides finding the leakage through the connections in the reactor cavity seal drains, the GPU Nuclear Corporation, the licensee of Oyster Creek, has further found that the stainless steel liners in the refueling cavity and the equipment pool developed cracks along the perimeters of the liner plates where they were welded to embedded channels.

To ensure that no leakage occurs when the reactor cavity and the equipment pool are flooded, liner cracks are sealed with adhesive stainless steel tape and a strippable coating is applied on the liner before the flooding and is removed after this water is drained. It appears such a procedure has been effective in stopping the leakage.

(3) Ultrasonic Thickness Measurements of the Drywell Shell

In most plants, the thickness of the steel drywell shell in the area of concern cannot be measured by ultrasonic testing (UT) devices because it is sandwiched between the concrete floor on the inside and the sand cushion on the outside (see enclosed figure). In some plants, licensees conducted UT measurements from inside the drywell for areas immediately above the sand cushion and did not find either general or local corrosion. In addition to occurring in the sand cushion area, moisture may also accumulate at locations where the gap-forming material has not been removed (for example, between the drywell and the shield building). The licensees should identify such areas. Even though GL 87-05 proposed that licensees need to perform UT thickness measurements of only those drywells with open sand cushions, drywells with closed sand cushions should be remotely examined with a visual device to ensure that the cover plate sealing joint is not degraded. If the sealing joint shows evidence of degradation, water leaking through the cover plate sealing joint into the sand cushion could cause corrosion of the drywell.

BILLING CODE 7590-01-M

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Dept. Supv.		Proc. No.	OP 5250
PORC 92-17		Rev. No.	Original
QSS		Issue Date	03/15/92
Plant Mgr.		Review Date	03/15/94
Sr. VP, Ops.			

MAINTENANCE / INSPECTION OF PRIMARY CONTAINMENT INTERIOR SURFACES

1.0 PURPOSE

1.1 To provide information and instructions necessary for the Maintenance Department personnel to perform inspections and maintenance on primary containment interior surfaces.

1.2 Performance of Section 6.1 of this procedure implements Technical Specification 4.7.A.1.

2.0 DISCUSSION

2.1 Protective coatings have been applied to the interior surfaces of both the drywell and torus both to inhibit corrosion and to aid in decontamination. The protective coating originally consisted of an epoxy topcoat applied over an inorganic zinc primer.

2.2 Inspections performed during previous refueling and maintenance outages have observed peeling of the epoxy topcoat. However, the existing primer in both the Drywell and the Torus is well cured and exhibits excellent adhesion and durability. The primer provides adequate protection for the primary containment interior surfaces, and no re-application of topcoat is required.

2.3 The protective coatings applied to the interior surfaces of both the drywell and torus are defined as Class 1 Service Level in accordance with ANSI N101.4-1972. Class 1 Service Level applies to those systems and components of nuclear facilities which are essential (1) to prevent postulated accidents which could affect the public health and safety or (2) to mitigate the consequences of these accidents.

2.4 QC shall be applied to this procedure as necessary to ensure job quality. In addition, pretesting of the paint application personnel may be specified.

2.5 ATTACHMENTS

2.5.1	VYOPF 5250.01	Drywell Inspection Record
2.5.2	VYOPF 5250.02	Torus Inspection Record
2.5.3	VYOPF 5250.03	Protective Coating Application Record

UNCONTROLLED COPY
FOR INFORMATION ONLY

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3.0 REFERENCES

3.1 Technical Specifications

3.1.1 Technical Specifications Section 4.7.A.1

3.2 Administrative Limits

3.2.1 AP 0125, Plant Equipment Control

3.3 Other

3.3.1	ANSI N45.2.6 - 1978 Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants
3.3.2	ANSI N5.12 - 1974 Protective Coatings (Paints) for the Nuclear Industry
3.3.3	ANSI N101.2 - 1972 Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities
3.3.4	ANSI N101.4 - 1972 Quality Assurance for Protective Coatings Applied to Nuclear Facilities
3.3.5	Steel Structures Painting Council, Steel Structures Painting Manual, Volumes 1 and 2, Third Edition, June 1983
3.3.6	ASTM D 4228-83 Standard Practice for Qualification of Journeyman Painters for Application of Coatings to Steel Surfaces of Safety-Related Areas in Nuclear Facilities
3.3.7	YOQAP-1A Operational Quality Assurance Manual
3.3.8	AP 0019, Control of Temporary Materials
3.3.9	AP 0021, Work Orders
3.3.10	AP 0042, Plant Fire Protection
3.3.11	AP 0502, Radiation Work Permits
3.3.12	AP 0510, Working in Confined Spaces
3.3.13	AP 0512, Work in Hot Environments
3.3.14	AP 0536, ALARA Implementation for Design Changes and Work Analysis
3.3.15	AP 0620, Chemical Material Use in Radiation Control Areas
3.3.16	AP 6024, Plant Housekeeping
3.3.17	AP 6025, Quality Control/Independent Inspection
3.3.18	Vermont Yankee Safety Manual
3.3.19	Memo, T.C. Trask to B.R. Buteau, "Response to Category A Commitment Review SURV9011902CM1," dated December 31, 1991
3.3.20	Mark I Torus Shell and Vent System Thickness Requirements Vermont Yankee Nuclear Station, Teledyne Engineering Services Technical Report No. TR-7426, December 1990
3.3.21	Memo, T.C. Trask to B.R. Buteau, "Response to Category A Commitment Review CAR91063MEL5", dated January 25, 1993.

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NOTES (Cont.)

2. Insulation need not be removed to perform the inspection.

6.1.1 Perform visual inspections of the following drywell surfaces:

6.1.1.1 Interior of Drywell Liner

6.1.1.2 Exterior of Sacrificial Shield Wall

6.1.1.3 Drywell Penetrations

6.1.1.4 Personnel, Equipment and CRD Equipment Hatches

6.1.1.5 Sacrificial Shield Wall Lateral Supports

6.1.1.6 Safety Related Structural Steel

6.1.1.7 Intersection of Concrete Floor and Drywell Wall (CAR9103MEC5) Performed By_____/_____

6.1.2 Document the following on VYOPF 5250.01:

6.1.2.1 Areas of peeling, loose or bubbling paint or primer greater than 9 sq. in (3" x 3").

6.1.2.2 Areas of bare base material.

6.1.2.3 Areas of corrosion which exceed SSPC-Vis 2, Rust Grade 6.

Performed By_____/_____
Verified By_____/_____

6.1.3 Map those areas identified in Step 6.1.2 and located below elevation 278' on VYOPF 5250.01.

6.1.4 Perform visual inspections of the following torus surfaces:

6.1.4.1 Interior of Torus Shell including areas approximately 1 foot below the water line

6.1.4.2 Interior of Drywell to Torus Vent Pipes

6.1.4.3 Interior of Ring Header and Downcomers located above the water line

OPERATING EXPERIENCE INFORMATION REVIEW

DATE: 12/12/91

TO : LOPRIORE
FROM : WANCZYK
SUBJECT: CATEGORY A COMMITMENT REVIEW

Attached is a copy of commitment: CAR91063MT1

This document is being assigned to you for assessment of its importance to safe plant operation and for specific action as indicated in the Additional Instructions below.

Please review the commitment, carry out additional instructions, and complete the lower portion of this form.

Additional Instructions: Type B Commitment

RE: LEAK IN CONCRETE REACTOR PEDESTAL. (MS-77)
PER REC.4, CONSIDER INSTALLING A CONE TYPE BARRIER ON THE PENETRATION THAT SLOPES TOWARD CONTAINMENT WALL TO PREVENT FUTURE LEAKS.

SUBMIT THIS COMPLETED FORM AND OTHER RESULTS OF YOUR REVIEW TO THE OPERATING EXPERIENCE COORDINATOR (OEC) BY ~~03/01/92~~ ~~5/15/92~~ ~~7/1/92~~ ~~8/1~~ 9/15/92 RW

Additional Corrective Action Process per VY Corrective Action Guideline

Sig. CAR [__] Routine CAR [__] NCR [__] None [✓]

To be completed by Reviewer: Place this design change on the Major Project Work List for an engineering design. MEC Supervisor considers this work a design change to be placed on the with list for prioritization. Maint will install when the design is completed. Dec 5/13/92

___ A copy of this complete document should be forwarded to training.

Department Supervisor Approval: [signature] RW / 10/1/92 5/13/92 Date

WO 6646 has been prepared in MPAR and is scheduled for 9/21-22/92

WO 6646 was closed by Maint. on or before 10/1/92 (work complete)

Manager/Superintendent or Director Disposition: [signature] / 10/5/92 Date

✓ Item is complete, well documented; no further tracking required.

___ Additional commitment tracking; required; initiate the following commitment(s) and due date(s).

___ Item needs add'l closeout; DH to present to N/A for final closeout.

(DH) Enter date presented: N/A

(OEC) Final closeout received: N/A

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CAR91063MT1

MEMORANDUM

To: Dennis Girroir	VY - Vernon	**Date:** Oct. 1, 1992
From: Clifford Greeno CEG	VY - Vernon	**File:**
Subject: DRIP SHIELD FOR MS-77 STEAM DRAIN LINE.		

DISCUSSION:

This memo. is being sent to inform you that the drip shield for MS-77 steam drain line was installed per W.O. #92-6646.

A memo. from B. A. Trugeon to you, dated 6/17/92, listed two options to choose from. A modified version of option # 2 was chosen for installation (see attached photo's for details).

RECOMMENDATION:

Based on the installation of the drip shield, as stated above, it is recommended that commitment item # CAR91063MT1 be closed out.

CC:
RJW
BRB
RPL
GC
SWP

REM. For commitment file. RJW

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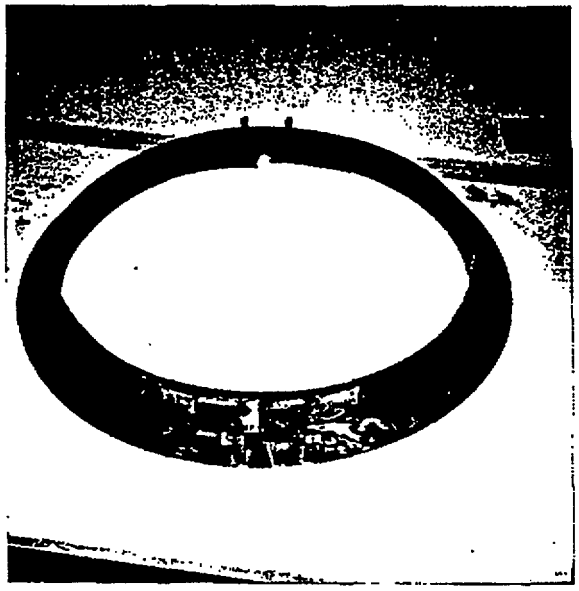
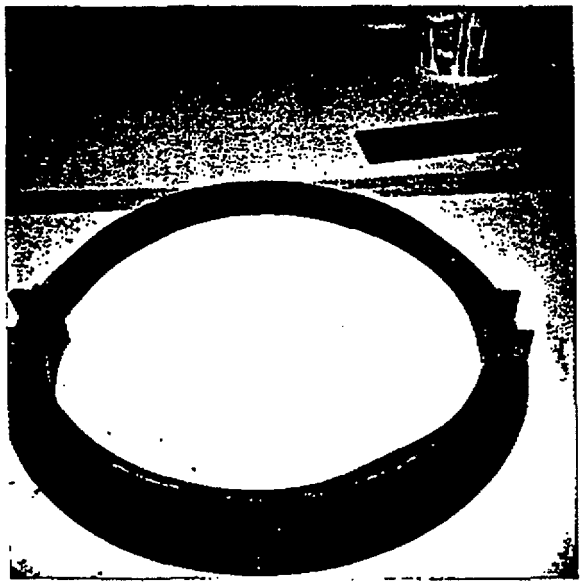


RTV WAS ALSO USED TO SEAL THE GASKET TO THE PIPE TO ENSURE NO LEAKAGE.



Date 7/15/92

FROM THE DESK OF:

DENNIS J. LEGERE

TO: Steve

Dennis Girroir delivered these two design options on the containment penetration drip shield. One is a sheetmetal fabrication ≈$2K, the other is a clamped on flange for ≈$50. I'd suggest the simpler option. If you agree let Dennis know and have Chris order whatever quantity and size we need. Dennis will take care of the one for one & seismic.

7/21

Cliff,

Would you coordinate fabrication/installation of this sheild. I agree with Dennis - the ½ flange, from McMaster Carr seems the best way to go. I've added this to the engineering assignments work list - due 12/31/92

Thanks

Steve

GC Bob wants a pictoral design not a D.C. 5/14

GC *

VERMONT YANKEE NUCLEAR POWER STATION

MEMORANDUM

TO: B.R. Buteau

DATE: 1/27/92

FROM: R.J. Wanczyk

FILE: 2.1

SUBJECT: Design of Drip Shield

Please provide the Maintenance Department with a design of a drip shield for the MS-77 steam drain line. As noted in ME&C's informal comments, it appears that a seismic calculation , Work Order, drawing changes will be required.

Maintenance presently has a commitment for this item due, 5/15/92. To meet that commitment, and get the shield installed during the outage, it will be necessary to receive the information from Engineering by 2/21/92. If that date is not reasonable, please contact me.

cc: RPL

GC —

Please address. Determine if date is reasonable. Coop project?

1/29

addition weight of shield needs to be lwd to YAEC for incorporation into Kbasco Calc #513

Ref dwg G-191175 sh 1 of 2
G-191221 & 222

in accordance w/ VY project procedure #26

RCA 7/10/92

Req # 6572 for FLANGE

wp. Req. 5228

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MEMORANDUM

To: D.C. Girroir **Date:** 6/17/92

From: B.A. Turgeon

Subject: Penetration X-26 Barrier

Following are two options for a barrier on the penetration that slopes down toward containment (Penetration X-26). The basis for this design is recommendation #4 of the Containment Pedestal Leak Task Team Final Report. This report recommends that a "cone" type barrier be installed on this line to prevent any future leakage from reaching the wall of containment.

OPTION #1

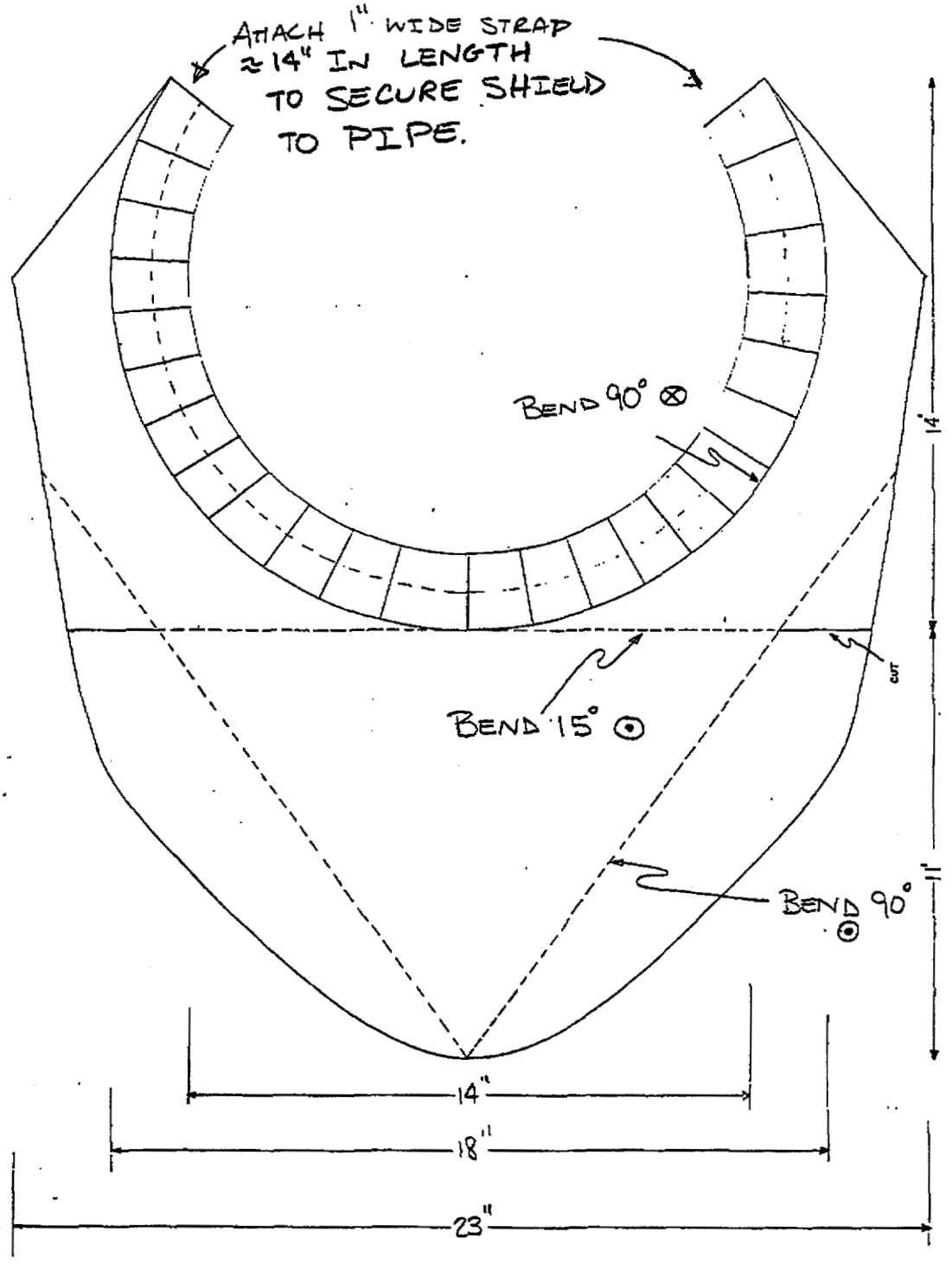
- Fabricate shield as illustrated in the attached drawing. This is to be made of lightweight sheet metal or aluminum.
    - Attach (weld,rivet) straps to the shield. These straps should be made of sheet metal or aluminum, approximately 1" wide and at least 14" in length. Each free end should be bent at a right angle and drilled to accomodate a nut and bolt to secure this sheild to the pipe.

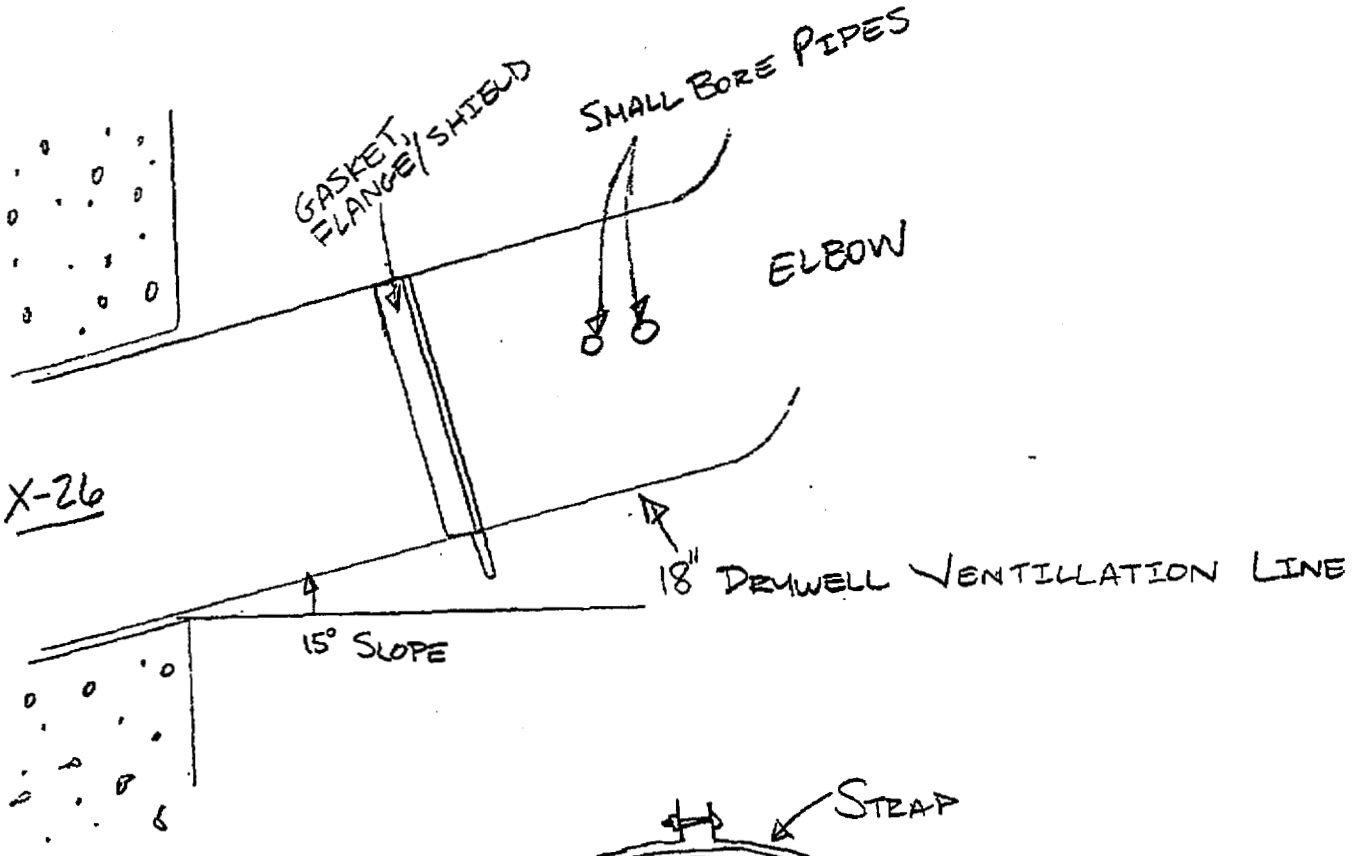
        Note: This pipe is 18" O.D., circumference of 56.55"

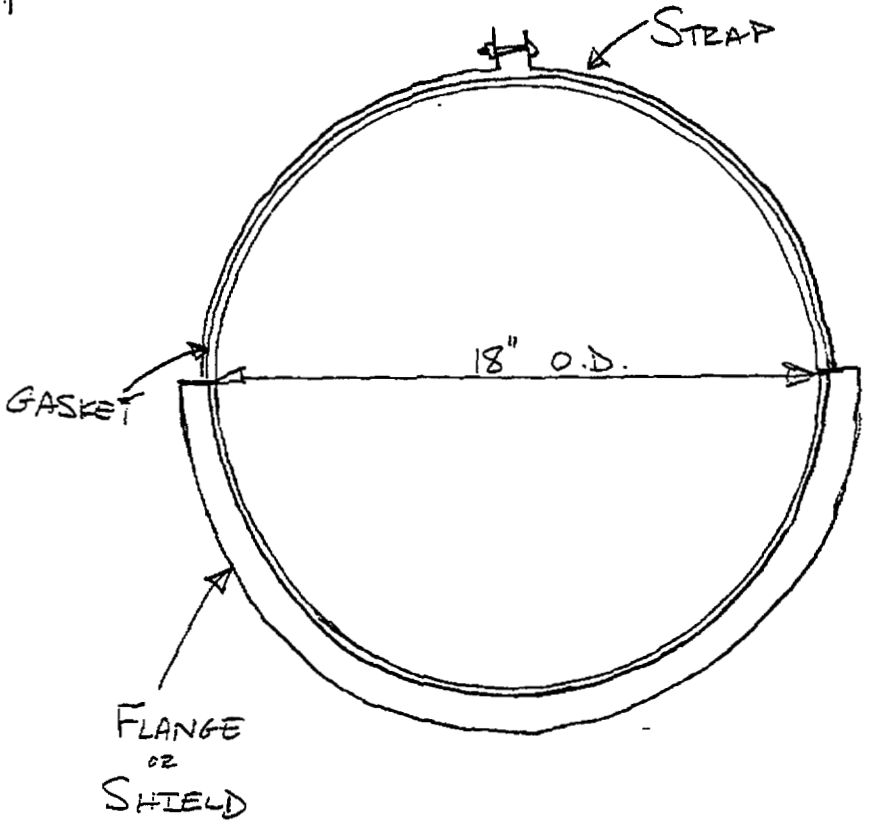
    - Make a 2" wide 3/16" thick rubber gasket. This should be 56 1/2" in length.
- Install shield with rubber gasket on pipe as shown in the attached sketch.
- A preliminary estimate from Mercury is $280 (8 hrs. for a journeyman) plus materials to fabricate this shield (this does not include installation or gasket).

OPTION #2

- Purchase steel angle flange.
    - 18 1/4" I.D. McMaster-Carr #1764K64 (Pg. 80 of Catalog 94)
    - Cut flange in half.
    - Attach (weld,rivet) straps to flange. These straps should be approximately 1" wide and at least 18" in length. Each free end should be bent at a right angle and drilled to accomodate a nut and bolt to secure this flange to the pipe.
    - Make a 2" wide 1/4" thick rubber gasket. This should be 56 1/2" in length.
- See attached sketch for diagram.
- The price for this flange from McMaster-Carr is $20 (Does not include additional alterations or gasket).


ATTACH 1" WIDE STRAP
≈14" IN LENGTH
TO SECURE SHIELD
TO PIPE.
BEND 90° ⊗
BEND 15° ⊙
BEND 90° ⊙
CUT
14"
11"
14"
18"
23"


SMALL BORE PIPES
GASKET, FLANGE/SHIELD
ELBOW
X-26
18" DRYWELL VENTILLATION LINE
15° SLOPE


STRAP
18" O.D.
GASKET
FLANGE
OR
SHIELD

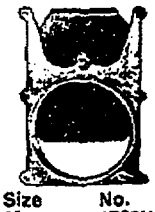
Ball Joints

For use where an easy moving, lightweight connection is required. All units are zinc plated after spinning.

Used for ventilation applications and air transmission and fume collection in manufacturing processes. Available in 3" through 14" diameters.

Size	No.	NET EACH	Size	No.	NET EACH
3"	1790K21	$43.33	8"	1790K26	$87.24
4"	1790K22	45.56	9"	1790K27	116.33
5"	1790K23	50.54	10"	1790K28	116.33
6"	1790K24	62.22	12"	1790K29	124.49
7"	1790K25	72.78	14"	1790K31	264.80

Full Blast Gates



Control volume and shut off flow of air or exhaust gases. Increase suction efficiency on all flow pipes.

Save energy and reduce heating costs. Cast aluminum construction.

Install with circular collar on inside of the pipe.

Size	No.	NET EACH	Size	No.	NET EACH
3"	1788K11	$11.73	9"	1788K17	$52.06
4"	1788K12	12.89	10"	1788K18	84.00
5"	1788K13	17.24	12"	1788K19	95.70
6"	1788K14	19.13	14"	1788K25 ◆	146.30
7"	1788K15	26.09	16"	1788K27 ◆	200.00
8"	1788K16	35.65	18"	1788K29 ◆	251.57

● Fabricated steel.

Galvanized Pipe Reducers and Increasers

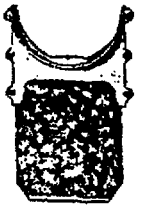
Reducers and increasers are used when adapting to two pipes of different radiuses.

Reducers have the crimped connection at the smaller radius, and increasers are crimped at the larger radius.

Both reducers and increasers are made from 28 gauge galvanized steel.

REDUCERS Size	No.	NET EACH	INCREASERS Size	No.	NET EACH
7" to 6"	2013K21	$7.39	6" to 7"	2013K41	$7.39
8" to 6"	2013K22	9.13	6" to 8"	2013K42	9.13
9" to 6"	2013K23	10.54	6" to 9"	2013K43	10.54
10" to 6"	2013K24	14.02	6" to 10"	2013K44	14.02
12" to 6"	2013K25	17.57	6" to 12"	2013K45	17.57
8" to 7"	2013K26	9.13	7" to 8"	2013K46	9.13
9" to 7"	2013K27	10.54	7" to 9"	2013K47	10.54
10" to 7"	2013K28	14.02	7" to 10"	2013K48	14.02
12" to 7"	2013K29	17.57	7" to 12"	2013K49	17.57
9" to 8"	2013K31	10.54	8" to 9"	2013K51	10.54
10" to 8"	2013K32	14.02	8" to 10"	2013K52	14.02
12" to 8"	2013K33	17.57	8" to 12"	2013K53	17.57
10" to 9"	2013K34	14.02	9" to 10"	2013K54	14.02
12" to 9"	2013K35	17.57	9" to 12"	2013K55	17.57
12" to 10"	2013K36	17.57	10" to 12"	2013K56	17.57

Half Blast Gates



Install in suction and blow pipe lines. Fit ovewr outside of pipe. Will cut part of system in or out. Cast aluminum frame, steel slide.

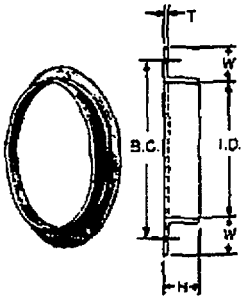
Size	No.	NET EACH
3"	1789K1	$13.16
4"	1789K2	15.38
5"	1789K3	15.82
6"	1789K4	19.79
7"	1789K5	21.67
8"	1789K6	24.49

Square to Round Duct Adapters

Used to access round duct to the main square duct. Adapters are constructed of 30 gauge galvanized steel. Will work on galvanized steel and flexible air handling ducts. Available in take-off, male collar, and female collar styles.

Description	Size	No.	NET EACH
Take-Off	6" to 7"	2015K44	$5.70
Female Collar	6"	2015K45	2.21
Male Collar	6"	2015K46	2.21

Lightweight Steel Angle Flanges



Strong, accurately made flanges. Sizes: 3 1/16" to 5 1/16" ID flanges are pressed steel. The remaining flanges are rolled structural angle iron. Larger angles, channels, bar, and shapes in steel, stainless steel, aluminum, and other materials rolled to specifications, and special punching are available. **Specify 1764K999. Prices on request.**

Punched flanges have bolt holes. Bolts are not included. **CODE: ID** = inside diameter. **H** = height. **W** = width from ID of flange to OD of flange. **T** = thickness of flange. **BC** = bolt circle.

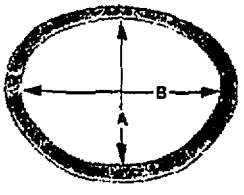
Size, Inches ID	H	W	T	BC	Hole Size, In.	No. Holes	PLAIN No.	NET EACH	PUNCHED No.	NET EACH
3 1/16	1	1	#10	4 5/16	9/32	6	1764K81	$5.32	1764K41	$5.98
4 1/16	1	1	#10	5 1/4	9/32	6	1764K82	5.65	1764K42	6.47
5 1/16	1	1	#10	6 5/16	9/32	6	1764K83	6.18	1764K43	7.03
6 1/8	1 1/4	1 1/4	1/8	7 1/2	11/32	6	1764K51	6.93	1764K11	7.60
7 1/8	1 1/4	1 1/4	1/8	8 1/2	11/32	6	1764K52	7.53	1764K12	7.95
8 1/8	1 1/4	1 1/4	1/8	9 1/2	11/32	8	1764K53	6.13	1764K13	6.55
9 1/8	1 1/4	1 1/4	1/8	10 1/2	11/32	8	1764K54	6.98	1764K14	7.45
10 3/16	1 1/4	1 1/4	1/8	11 9/16	11/32	8	1764K55	7.53	1764K15	7.95
11 3/16	1 1/4	1 1/4	1/8	12 9/16	11/32	8	1764K56	8.80	1764K16	9.43
12 3/16	1 1/2	1 1/2	3/16	13 13/16	13/32	12	1764K57	13.30	1764K17	14.24
13 3/16	1 1/2	1 1/2	3/16	14 13/16	13/32	12	1764K58	13.88	1764K18	14.99
14 3/16	1 1/2	1 1/2	3/16	15 13/16	13/32	12	1764K59	14.84	1764K19	16.00
15 3/16	1 1/2	1 1/2	3/16	16 13/16	13/32	16	1764K61	16.13	1764K21	17.26
16 1/4	1 3/4	1 3/4	3/16	18 1/8	13/32	16	1764K62	16.79	1764K22	18.19
18 1/4	1 3/4	1 3/4	3/16	20 1/8	13/32	16	1764K64	18.86	1764K24	20.43
20 1/4	1 3/4	1 3/4	3/16	22 1/8	13/32	20	1764K66	21.43	1764K26	22.93
22 1/4	1 3/4	1 3/4	3/16	24 1/8	9/16	20	1764K68	22.73	1764K28	24.31
24 1/4	1 3/4	1 3/4	3/16	26 1/8	9/16	20	1764K71	23.78	1764K31	25.45
26 1/4	2	2	3/16	28 1/2	9/16	24	1764K73	28.88	1764K33	30.90
28 1/4	2	2	3/16	30 1/2	9/16	24	1764K75	31.88	1764K35	34.12
30 1/4	2	2	3/16	32 1/2	9/16	28	1764K76	32.68	1764K36	34.95

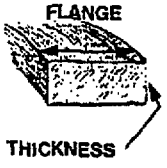
High Temperature Boiler Gaskets

Constructed of wire woven fiberglass, these high temperature gaskets are well suited to boiler, handhole, and manhole covers as well as tank heads and other applications. Gaskets are rated to 379°F and 180 pounds per square inch. Gaskets are specially treated to stay flat and remain soft and pliable.

How to order standard sizes: Determine flange width and thickness needed. Specify Dimension A and Dimension B as shown on diagram. Standard size range is shown in table below.

Custom sizes and shapes are available for all flanges and thicknesses. **Specify 1899K999 or 1881K999. Prices on request.**





Description	Standard Size Range Dimension A Min.	Dimension A Max.	Dimension B Min.	Dimension B Max.	No.	NET EACH
HANDHOLE GASKETS						
1/2" Flange—3/16" Thick	2"	4"	3 1/2"	5"	1899K312	$1.49
5/8" Flange—1/4" Thick	2"	4"	4"	5"	1899K513	2.14
3/4" Flange—1/4" Thick	2 1/2"	6"	4"	8"	1899K714	2.85
MANHOLE GASKETS						
3/4" Flange—1/4" Thick	9"	12"	12"	17"	1881K211	$6.15
1" Flange—1/4" Thick	10"	12"	14"	16"	1881K413	7.77
1 1/4" Flange—1/4" Thick	10"	12"	14"	16"	1881K514	9.87

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OPERATING EXPERIENCE INFORMATION REVIEW

DATE: 02/10/93

TO : LOPRIORE
FROM : ~~WANCZYK~~
SUBJECT: CATEGORY A COMMITMENT REVIEW

Attached is a copy of commitment: CAR91063MT2

This document is being assigned to you for assessment of its importance to safe plant operation and for specific action as indicated in the Additional Instructions below.

Please review the commitment, carry out additional instructions, and complete the lower portion of this form.

Additional Instructions: Type B Commitment

RE: LEAK IN CONCRETE REACTOR PEDESTAL (MS-77).
REVISE OP5250 TO INCLUDE MEC MARKUP'S AS DETAILED
IN CAR91063MEC5. (BEVEL, PAINT, INSPECTION)

SUBMIT THIS COMPLETED FORM AND OTHER RESULTS OF YOUR REVIEW TO THE OPERATING EXPERIENCE COORDINATOR (OEC) BY ~~07/30/93~~ 3/30/94

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Additional Corrective Action Process per VY Corrective Action Guideline

Sig. CAR [__] Routine CAR [__] NCR [__] None [✓]

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To be completed by Reviewer: The attached pages were inserted in the Procedure Change Tickler File for inclusion in OP5250 during the next scheduled change (March 1994) Procedure Change Completed 4/15/94 (See attached pages of Rev. 1)

___ A copy of this complete document should be forwarded to training.

Department Supervisor Approval: [signature] / 4/18/94 Date

==========

Manager/Superintendent or Director Disposition: [signature] / 4/19/94 Date

✓ Item is complete, well documented; no further tracking required.

___ Additional commitment tracking; required; initiate the following commitment(s) and due date(s).

___ Item needs add'l closeout; DH to present to NA for final closeout. See CAR 91063MEC5

(DH) Enter date presented: NA

(OEC) Final closeout received: NA

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3.2 Administrative Limits

3.2.1 AP 0125, Plant Equipment Control

FOR INFO ONLY

3.3 Other

3.3.1 ANSI N45.2.6 - 1978 Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants

3.3.2 ANSI N5.12 - 1974 Protective Coatings (Paints) for the Nuclear Industry

3.3.3 ANSI N101.2 - 1972 Protective Coatings (Paints) for Light Water Nuclear Reactor Containment Facilities

3.3.4 ANSI N101.4 - 1972 Quality Assurance for Protective Coatings Applied to Nuclear Facilities

3.3.5 Steel Structures Painting Council, Steel Structures Painting Manual, Volumes 1 and 2, Third Edition, June 1983

3.3.6 ASTM D 4228-83 Standard Practice for Qualification of Journeyman Painters for Application of Coatings to Steel Surfaces of Safety-Related Areas in Nuclear Facilities

3.3.7 YOQAP-1A Operational Quality Assurance Manual

3.3.8 AP 0019, Control of Temporary and/or Portable Materials

3.3.9 AP 0021, Work Orders

3.3.10 AP 0042, Plant Fire Protection

3.3.11 AP 0502, Radiation Work Permits

3.3.12 AP 0510, Working in Confined Spaces

3.3.13 AP 0512, Work in Hot Environments

3.3.14 AP 0536, ALARA Implementation for Design Changes and Work Analysis

3.3.15 AP 0620, Chemical Material Use

3.3.16 AP 6024, Plant Housekeeping

3.3.17 AP 6025, Quality Control/Independent Inspection

3.3.18 Vermont Yankee Safety Manual

3.3.19 Memo, T.C. Trask to B.R. Buteau, "Response to Category A Commitment Review SURV9011902CM1," dated December 31, 1991

3.3.20 Mark I Torus Shell and Vent System Thickness Requirements Vermont Yankee Nuclear Station, Teledyne Engineering Services Technical Report No. TR-7426, December 1990

3.3.21 Memo, T.C. Trask to B.R. Buteau, "Response to Category A Commitment Review CAR91063MEC5" dated January 25, 1993

4.0 PRECAUTIONS

4.1 Ensure the requirements of AP 0510 and AP 0512 have been addressed by Chemistry and Radiation Protection, to avoid entry into an unacceptable working environment.

4.2 Solvent based primers and paints give off flammable vapors when curing. Measures shall be taken to ensure that such vapors do not buildup causing an unsafe situation to develop.

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FOR INFO ONLY

6.1.1.6 Safety Related Structural Steel

6.1.1.7 Intersection of Drywell Concrete Floor and Drywell Wall (Ref. Dwg. #5920-0233)(CAR91063MEC5)

Performed By_____/_____

6.1.2 Document the following on VYOPF 5250.01:

6.1.2.1 Areas of peeling, loose or bubbling paint or primer greater than 9 sq. in (3" x 3").

6.1.2.2 Areas of bare base material.

6.1.2.3 Areas of corrosion which exceed SSPC-Vis 2, Rust Grade 6.

6.1.2.4 Areas of accumulated standing water and dirt at the intersection of the Drywell floor and Drywell wall. (Ref. Dwg. 5920-0233)(CAR91063MEC5)

Performed By_____/_____
Verified By_____/_____

6.1.3 Map those areas identified in Step 6.1.2 and located below elevation 278' on VYOPF 5250.01.

6.1.4 Perform visual inspections of the following torus surfaces:

6.1.4.1 Interior of Torus Shell including areas approximately 1 foot below the water line

6.1.4.2 Interior of Drywell to Torus Vent Pipes

6.1.4.3 Interior of Ring Header and Downcomers located above the water line

6.1.4.4 Exterior of Ring Header and Downcomers located inside the torus

6.1.4.5 Torus Penetrations

6.1.4.6 Safety Related Structural Steel

Performed By_____/_____

6.1.5 Document the following on VYOPF 5250.02:

6.1.5.1 Areas of peeling, loose or bubbling paint greater than 9 sq. in (3" x 3").

6.1.5.2 Areas of bare base metal.

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To DCG.

OPERATING EXPERIENCE INFORMATION REVIEW

DATE: 02/20/92

TO : CAPPUCCIO
FROM : BUTEAU
SUBJECT: CATEGORY A COMMITMENT REVIEW

Attached is a copy of commitment: CAR91063MT4

This document is being assigned to you for assessment of its importance to safe plant operation and for specific action as indicated in the Additional Instructions below.

Please review the commitment, carry out additional instructions, and complete the lower portion of this form.

Additional Instructions: Type B Commitment

RE: LEAK IN CONCRETE REACTOR PEDESTAL (MS-77).
PER MEC RESPONSE TO REC.6, EVALUATE BWROG LETTER 8997 AND MAKE RECOMMENDATIONS AS NECESSARY.
(CAVITY JOINTS/SEALS & SAND DRAIN LINES)

SUBMIT THIS COMPLETED FORM AND OTHER RESULTS OF YOUR REVIEW TO THE OPERATING EXPERIENCE COORDINATOR (OEC) BY 09/01/92

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Additional Corrective Action Process per VY Corrective Action Guideline

Sig. CAR [__] Routine CAR [__] NCR [__] None [X]

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To be completed by Reviewer:
See attached DCG to GC memo dated 4/29/92.
DCG 4/29/92

___ A copy of this complete document should be forwarded to training.

Department Supervisor Approval: _____ / 4/29/92 Date

==========

Manager/Superintendent or Director Disposition: _____ / 5-2-92 Date

___ Item is complete, well documented; no further tracking required.

✓ Additional commitment tracking; required; initiate the following commitment(s) and due date(s).

SEE Comments/Recommendations in attached DCG memo.

Branch: CAR91063-01

___ Item needs add'l closeout; DH to present to NA for final closeout.

(DH) Enter date presented: NA

(OEC) Final closeout received: NA

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MEMORANDUM

TO: G. CAPPUCCIO	VERNON	DATE: 4/29/92
FROM: D.C. GIRROIR	VERNON	FILE: 3.1

SUBJECT: CAT A RESPONSE re: #CAR91063MT4, Cavity Joints & Seals

The subject CAT A assignment required that BWROG Letter 8997 be evaluated and that recommendations be made as necessary. In response to the assignment the following is offered.

The refueling cavity design at Vermont Yankee includes fully welded stainless steel/carbon construction with a backup channel and seal rupture drain. An alarm system is provided to detect any bellows or drain line leakage.

The 42' diameter drywell to reactor bellows is sealed with a penetration weld and not a gasket. (Oyster Creek experienced leakage with their gasket design.) As a backup in the event of leakage in the bellows or drain piping, an additional stainless steel water barrier is included as part of the concrete liner to catch any water. A 3" diameter bellows rupture drain is welded to the water barrier and provides a flow path for any leakage to the equipment drain with an alarm to notify operators in the event of bellows leakage.

The BWROG letter identified that the concern is with "those joints that rely on sealing compounds or gaskets" and that the "seal welded joints and the drywell bellows should be good for the life of the plant.

It is determined that no additional inspections of the welded reactor to refueling cavity bellows is warranted. Additional inspection of the drywell to torus bellows is also not warranted since adequate surveillance of these components are provided during the Appendix J tests.

Based upon a detailed review of the subject BWROG letter, previously performed engineering reviews and experiences (see CAR 91-63), Vermont Yankee's physical configuration and the existing detection system for leakage, THE FOLLOWING IS RECOMMENDED.

1) ME & C should continue to inspect the sand drains approximately every ten years, verifying that they are open and functional. This inspection was last performed 9/91 and should be rescheduled for 9/01.

2001

CAR91063-01

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2) Operations should continue the weekly surveillance/walkdown of the inner diameter of the torus at elevation 213' and a check for leakage of the sand drain lines. These inspection would quickly identify any leakage of water which would find its way to the containment.

Approved: _____ 4/20/92
ME & C Supervisor

Approved: _____ 5-29-92
Engineering Director

NOTE TO BRB: PLEASE INITIATE A BRANCH COMMITMENT FOR T.P. TO INCLUDE THIS INSPECTION IN THE MASTER SURVEILLANCE PROGRAM. SINCE THIS IS NOT A PART OF ANY PROGRAM, THIS COMMITMENT ITEM NUMBER MUST BE INCLUDED IN THE REFERENCE SECTION OF THE MATRIX DUE TO ITS LONG SPAN OF TIME BETWEEN INSPECTIONS.

AC.

Item Search Results

Index Num	Due Date		Title	Dept.	Status	State	Initiate
CAR-91063_00	11/30/1991	B	CAR91063	ENGINEERING-OBSOLE	Closed	Close Out	10/16/1991
CAR-91063_01	09/01/2001	B	CAR91063_01	SYSTEM ENGINEERING	Closed	Close Out	09/19/1990
CAR-91063MEC1_00	03/01/1992	B	CAR91063MEC1	ENGINEERING-OBSOLE	Closed	Close Out	12/12/1991
CAR-91063MEC2_00	02/12/1992	B	CAR91063MEC2	ENGINEERING-OBSOLE	Closed	Close Out	12/12/1991
CAR-91063MEC3_00	02/12/1992	B	CAR91063MEC3	ENGINEERING-OBSOLE	Closed	Close Out	12/12/1991
CAR-91063MEC4_00	03/15/1992	B	CAR91063MEC4	ENGINEERING-OBSOLE	Closed	Close Out	03/03/1992
CAR-91063MEC5_00	12/01/1992	B	CAR91063MEC5	ENGINEERING-OBSOLE	Closed	Close Out	04/04/1992
CAR-91063MT1_00	09/15/1992	B	CAR91063MT1	MECHANICAL MAINTEN	Closed	Close Out	12/12/1991
CAR-91063MT2_00	03/30/1994	B	CAR91063MT2	MECHANICAL MAINTEN	Closed	Close Out	02/10/1993
CAR-91063MT4_00	09/01/1992	B	CAR91063MT4	ENGINEERING-OBSOLE	Closed	Close Out	02/20/1992

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