CONDITION REPORT

CR Number 01-2862

TITLE: POTENTIAL ADVERSE TREND IN UNIDENTIFIED RCS LEAKAGE

ORIGINATION

DISCOVERY DATE	TIME	EVENT DATE	TIME	SYSTEM / ASSET#
10/25/2001	1700	10/22/01	2100	064-02 N/A

EQUIPMENT DESCRIPTION Reactor Coolant System

DESCRIPTION OF CONDITION and PROBABLE CAUSE (if known) Summarize any attachments. Identify what, when, where, why, how.

Calculated unidentified leakage for the reactor coolant system has indicated an increasing trend following the scheduled downpower.

SUPV COMMENTS / IMMEDIATE ACTIONS TAKEN (Discuss CORRECTIVE ACTIONS completed, basis for closure.)

A multidiscipline team has been assembled to validate available indications and establish actions to identfiy potential contributors.

QUALITY ORGANIZATION USE ONLY	IDENTIFIED BY (Check one)		ATTACHMENTS
Quality Org. Initiated ☐ Yes	☑ Individual/Work Group	☐ Self-Revealed	☐ Yes ☑ No
Quality Org. Follow-up ☐ Yes ☐ No	☐ Supervision/Management	☐ Internal Oversight ☐ External Oversight	

ORIGINATOR	ORGANIZATION	DATE	SUPERVISOR	DATE	PHONE EXT.
MCCLOSKEY, P	CHEM	10/25/2001	MCCLOSKEY, P	10/25/2001	7148

PLANT OPERATIONS

SRO REVIEW	EQUIPMENT OPERABLE	EVALUATION REQUIRED	IMMEDIATE INVESTIGATION REQUIRED	ORGANIZATION NOTIFIED	MODE CHANGE RESTRAINT
☑ Yes ☐ No	☑ Yes ☐ No ☐ N/A	☐ Yes ☑ No	☐ Yes ☑ No	N/A	☐ Yes ☑ No

MODE	ASSOCIATED TECH SPEC NUMBER(S)	ASSOCIATED LCO ACTION STATEMENT(S)
N/A	N/A	#1 N/A
		#2
		#3

DECLARED INOPERABLE (Date / Time)	REPORTABLE?		APPLICABLE UNIT(S)
N/A	☐ Yes ☑ No ☐ Eval Required	One Hour N/A Four Hour N/A Other N/A	☑ U1 ☐ U2 ☐ Both

COMMENTS

No further actions taken at this time other than described above.

Current Mode - Unit 1	Power Level - Unit 1	Current Mode - Unit 2	Power Level - Unit 2
1	100	N/A	N/A

SRO - UNIT 1	SRO - UNIT 2	DATE
Horvath, E	Wise, S	10/25/2001

CRPA / SUPV / MRB

CATEGORY / EVAL	ASSIGNED ORGANIZATION	DUE DATE
CB	CHEM	12/9/2001

TREND CODES

Process / Activity / Cause Code(s)			Comp Type / ID (If Cause T or W)		Resp Org
A	0200	U			NONE

REGULATORY

REPORTABLE? ☐ Yes ☑ No ☐ LER No. _____

REPORTABILITY REVIEWER Bless, A

DATE 10/29/01

INVESTIGATION OPTIONS

☐ Generic Implications ☐ Part 21 ☐ Maint.Rule ☑ OE Evaluation

CLOSED BY | **DATE**

CAUSE ANALYSIS

NOP-LP-2001-03

CR Number
01-2862

Category / Eval Code: CB

Condition Description and Cause Basis:

Hardware / Degraded Condition Resolution Required? ☐ Yes ☑ No

If Yes, select one
☐ Repair ☐ Scrap
☐ Rework ☐ Use-As-Is

Condition Report CR 2001-2862
Increasing Trend in Reactor Coolant System Unidentified Leakage

PROBLEM STATEMENT

Following the Station downpower of October 20, 2001, an adverse trend in the calculated reactor coolant system (RCS) unidentified leakage (UID) was observed. The UID prior to the downpower was stable at or about 0.15 gpm. Following the power maneuvering, the leakage climbed to 0.28 gpm, further increasing to approximately 0.35 gpm on October 24, where it stabilized.

Condition Report 2001-3025 was written to document a step-change in the unidentified leak rate, which occurred on or about November 10. This condition report was closed to CR 2001-02862.

TEAM
A multidisciplinary team was assembled to gather and assess data on a continuing basis to develop actions to attempt to identify the source of the leakage. The team also monitored changes in plant conditions and equipment responses to establish potential contributing factors. Actions were assigned and statused. Results were assessed and compared to expected responses. "Next Step" actions were then developed. Recommendations were also made by the team to Plant Operations in an attempt to achieve or duplicate specified plant responses.

Members of this team are listed below:

Andrew Siemaszko (Plant Engineering)
Jim Marley (Plant Engineering)
Alex Garza (Radiation Protection)
Daniel Emery (Operations)
Todd Pluene (Chemistry)
Rich Edwards (Chemistry)
P. J. McCloskey (Chemistry)

Supporting Members:
Tony Stallard
Craig Hengge
Robert Lakis
Larry Bonker
John Cunnings

DATA ANALYSIS

Fact List

Date, , Description

10/15, UID RCS leakage at 0.15 gpm

10/20, Plant downpower conducted to address an issue with stator cooling water and perform leak

investigation and plugging in the condenser

10/22, UID at 0.280 gpm

10/23, UID at 0.301 gpm

10/24, Containment temperature experiences a 4 degree F rise – recent restoration of Station heating influences building temperature surrounding containment

10/24, Effect of any increased airborne boron from leakage not evident on CACs

10/24, Plant RCS inventories are not stable as a result of water additions in response to downpower – accurate UID is difficult to establish

10/24, Letdown rate was increased to 68 gpm from 43 gpm in response to increased RCS iodine concentrations

10/24, In-leakage to containment normal sump trending upwards > 10/16 - ~0.50 gpm, 10/24 - ~0.60 gpm

10/25, UID at 0.358 gpm

10/25 , Reactor Coolant Leak Management, DB-OP-01200; Attachment 6 provides guidance for determining action level – based upon delta from 0.28 gpm to 0.358 gpm in two days, rate of increase if continued would result in achieving Technical Specification limit in ~17 days (Action Level 3)

10/25, CTMT sump collection at 0.70 gpm

10/25, Daily auxiliary building tank inventories (RCDT, MWDT, CWRTs) not effective means of monitoring given large volumes of tanks – very small rate of change

10/25, Grab air samples throughout the auxiliary building provide no indication of significant change in noble gas or iodine

10/25 , Auxiliary building walkdowns indicate boron accumulation of Make-Up (MU) filter 1-2, and MU 160 – neither reflect active leakage

10/25, Plugs are pulled on seal injection filter bunkers – no leaks observed or noble gas or iodine detected

10/25 , Results of containment gas sample isotopic analysis reveals an estimated 0.22 gpm increase in CTMT RCS leakage from the previous sample – Although reflecting a good correlation, this method requires additional validation

10/25, Interviews conducted with personnel entering CTMT on 10/20 – Nothing obvious or abnormal was noted

10/25, Action level for UID as described in the maintenance rule is identified at 0.75 gpm

10/26, UID at 0.359 gpm

10/27, UID at 0.337 gpm

10/28, UID at 0.353 gpm

10/29, UID at 0.349 gpm

10/29, CTMT sump sampling for lithium/born/conductivity/and pH – results show very little lithium > method inconclusive

10/29, Follow-up survey performed in the auxiliary building – no Iodine detected, small amount of Xenon

10/29 , Results of continued tank monitoring (CWRT/RCDT/MWDT) not indicative of intersystem leakage

10/30, UID at 0.350 gpm/ CTMT sump at 0.77 gpm

10/30, RE 5052 (Containment Purge) pulling on the auxiliary building shows increasing iodine trend

10/30, Trend for noble gas on RE 4597AA/BA (CTMT atmosphere) does not indicate a significant increase in airborne contamination as a result of containment leakage.

10/31, UID at 0.335 gpm/ CTMT sump at 0.66 gpm

11/01, Unexpected amounts of water are hampering maintenance on MU 160

11/06, UID at 0.15 gpm/ CTMT sump at 0.55 gpm – no change in plant operation to correlate with UID recovery

11/06, Results of auxiliary building inspections/surveys/monitoring continue to indicate no contribution to UID

11/07, Review of Davis-Besse previous operating cycles reveals similar UID reached in cycle 7, 8 and 12

11/07, UID team postulates possible contribution from APSRs (Group 8 – DD10) - recommends to Operations to consider use of acid to achieve planned downpower on November 17

11/07, Work on MU 160 hampered by difficulty in providing system isolation

11/08, UID at 0.18 gpm/ CTMT sump at 0.52 gpm

11/08, RE 5052 is found in alarm on filter

11/10, Moderator temperature coefficient testing is conducted – power maneuver/ significant water additions made to RCS

11/12, UID at 0.370 (fluctuating due to water add)

11/12, Plant maneuvering for moderator coefficient testing did not reveal a continuing issue with DD10 (APSR) - UID team withdraws request to perform downpower using only acid

11/12, Pressurizer spray was initiated during power maneuvering for moderator temperature coefficient testing – possible correlation for this equipment remains

11/13, UID stable at 0.35 gpm

11/13, Results of using tritium concentration in CTMT sump sample reflects 0.326 gpm RCS to sump- despite strong correlation, method requires further validation

11/13, Result of Operations validation of RCS UID leak rate methodology for September/October 2001 shows good correlation – method appears valid

11/15, UID at 0.333 gpm

11/17, Plant downpower to 55% to support leak detection and plugging in the condenser

11/17, APSRs were moved in association with downpower – No initiation of pressurizer spray valves

11/21 , UID decreases to 0.12 gpm (unstable following downpower)

11/22, UID at 0.13 gpm/ CTMT sump at 0.50 – apparent return to conditions prior to downpower of October 20

11/24, UID at 0.15

12/03, UID at 0.169 gpm

12/04, UID at 0.175 gpm

12/05, UID at 0.209 gpm

12/06, UID at 0.185 gpm

DISCUSSION

The Davis-Besse plant has experienced fluctuations in unidentified reactor coolant system leakage (UID) in Cycles 7, 8 and 12. Values for the leakage exceeded 0.3 gpm on several occasions each of these cycles, reaching as high as 0.5 gpm during cycles 7 and 8, and 0.4 gpm in cycle 12. Normal operating unidentified leakage appears to begin each cycle at or just below 0.1 gpm, and escalate to a cycle average of between 0.15 and 0.18 gpm. Other B&W facilities have similar trends, with normal operating leakage at between 0.10 and 0.15 gpm. The Oconee plant has shown improved performed in this area, achieving UID at 0.05 gpm for sustained periods.

The UID evaluation team established the following goals to be achieved during the evaluation:

1) Determine that the change in calculated leak rate was valid, and not being influenced by the data collection or calculation method.
2) Establish whether the leak origin was in Containment or from systems in the Auxiliary Building. It was recognized that the leakage could be a combination of contributors in both locations.
3) Determine if the leak rate represented an historical precedent for the Unit by reviewing past operating cycle performance
4) Establish a perspective by reviewing current and historical performance of other facilities
5) Determine if current leak detection practices were effective through comparison with industry standards
6) Develop a plan for and conduct a containment entry to identify any obvious and/or significant contributors to the calculated leakage
7) Develop and propose a "going-forward" plan based upon the results of previous actions and investigations

Leak Rate Validation

Validation of the leak rate calculation was performed by the Operations organization by reviewing data from a stable operating period; mid-September through mid-October 2001. The validation identified a solid correlation between calculations and the various input parameters. No calculation errors were identified which would contribute to the significant change in leak rate that was being observed.

Leak Origin Investigation

An aggressive inspection and monitoring program was established. Areas in the auxiliary building were inspected for signs of active leakage, while grab air samples were collected for iodine and noble gas. Plugs were removed from filter bunkers and infrequently visited rooms were entered. Results indicated that conditions in the auxiliary building were not contributing to the unidentified RCS leakage.

The inventories of various tanks in the auxiliary building (CWRT, RCDT, MWDT) were monitored and trended for possible intersystem leakage. Due to the large volumes of the tanks, the anticipated rate of change from in-leakage would be slow. No unaccounted for tank inventory changes were identified as a result of this investigation.

Maintenance work on the make-up system, specifically MU 160, was monitored by the Team due to reports of difficulties in isolating the valve and water intrusion hampering the work. Although system leak-by was confirmed, the amount of leakage was deemed inadequate to be a significant contributor to the UID issue.

A number of sample valves on Chemistry and Operations systems were identified, which if open, could be provided a pathway out of the RCS. These valves were validated as being in their appropriate configuration and no leakage was observed.

As a result of this effort, the Team concluded that potential sources in the auxiliary building were not contributors, and efforts were focused on the Containment building.

Cycle History and Unidentified Leak Rate Cycle

As discussed, unidentified leakage has reached the observed levels in previous Davis-Besse operating cycles. In all instances, the increases have stabilized and ultimately returned to a value more reflective of the cycle norm.

Leak Rates and Other Facilities

Likewise mentioned previously, the other B&W facilities have experienced increased unidentified RCS leakage. Values for most remained within the 0.20 to 0.25 gpm range. None reported periods of normal operation consistently above the 0.30 gpm level. An operating value of between 0.10 and 0.15 is common.

Leak Detection Practices

Existing methodologies for RCS leak detection involve the identification and inspection of associated plant systems and components which have by virtue of recent maintenance or modification a potential for leakage, or have shown historical propensity for leakage due to design. The Team developed a list of "targets" for inspection if accessible, or monitoring by means of evaluating data on temperature and pressure, or component manipulation.

The "target" list included but was not limited to:

Seal Injection Bunkers
M/U Pump Room Components
Letdown Cooler Area
PORV Room Valves (RC2. RC 262, PORV)
Pressurizer Relief Valves
Pressurizer Rupture Discs
Incore Tank
Steam Generators (as accessible on top and bottom of "D" rings)
CRD Flanges; specifically DD10 (APSR)

A leak detection plan was also obtained from Salem-Hope Creek and reviewed for structure and content. The guidance detailed an approach very much like that taken historically at Davis-Besse, and being implemented by the Team. It was recognized, however, that DB does not currently have written guidance on the leak detection process, which could be of great value to future efforts.

It is important to note that current methods at Davis-Besse – Containment Entries at power, Mode 3 walkdowns at full temperature and pressure, etc, have not resulted in identifying the source of UID in containment. It is apparent that more innovative and aggressive methods are warranted.

Containment Entry

A plan for a containment entry was developed by the Team, to be conducted in association with the scheduled condenser tube leak downpower of November 17. The plan involved two (2) teams. The first would inspect the PORV valve room and the 653 elevation of both "D" rings. The team would not enter the PORV room; if additional inspection was required, a third team would be briefed and dispatched. The second team would proceed down to the 565 elevation to inspect the base of both steam generators and other components visible through openings in the "D" rings. This team was also tasked with viewing the Letdown cooler area, incore tank, and the containment air coolers.

The results of the containment entry identified no visible signs of active leakage in any of the target areas; no accumulation of boric acid was observed in the PORV room, nothing of note was observed above the pressurizer. Additionally, nothing was noted in the incore tank, pressurizer sample valves, core flood tank area, the openings at the bottom of the "D" rings, the letdown cooler area, or on the CACs. Leakage was identified on DH 22 (packing leak) and on MU 264 (packing leak), but neither was significant.

Dose for the entry was projected at between 250 and 300 mRem, dependent upon whether inspection would be augmented following the initial entry. Actual dose was recorded at 118 mRem.

Conclusions

As a result of the efforts by the UID team, no credible source of increased unidentified reactor coolant system leakage could be determined.

It was concluded that contributions from systems and components in the auxiliary building were not significant, if contributing at all. Intersystem leakage, as identified though monitoring of tank inventories, did not reflect the response anticipated for a leak of this magnitude.

The leakage was found to be not unlike previous Davis-Besse operating cycles. The cyclic oscillation of UID is not abnormal, although it is yet unpredictable. As it is quite similar to past patterns, which through extensive inspection and walkdowns during previous outage entry and restoration have shown no safety

significance, the current UID pattern should it remain stable, does not appear to have an impact on continued plant operation.

"Going-Forward" Plan

Although no conclusive determination as to the source of the leakage was made, the Team recommends that actions continue to monitor the condition and leak detection methods be enhanced to support success in finding leaks of this magnitude. Below is a summary of the plan:

1. Continue to monitor daily RCS Leakage calculation for trends

2. Continue to monitor pertinent tank inventories for trends

3. Continue periodic sampling and analysis of the containment sump for tritium comparison against calculated leakage

4. Institute new unidentified leakage calculation software to enhance the accuracy of the calculation

5. Continue to monitor DAS system data for results of RE 4597AA/BA; Containment atmosphere, noble gas and iodine trends

6. Develop 13RFO enhanced inspection plan

7. Develop RCS leak identification guideline

8. Monitor changes in PORV block valve (RC13A/B)

9. Recommend manipulation of pressurizer spray valve to induce effect on unidentified leakage trend

10. Monitor effect of planned Tave reduction on unidentified leakage trend

11. Perform thermographic analysis of internals of MU 11

CAUSE DETERMINATION

Based upon the investigation of increased calculated reactor coolant system leakage, the cause for the condition is found to be indeterminate (UNKNOWN). The methodology used for this determination was a Change Analysis using data from the recent series of downpowers, power maneuvering for turbine valve testing, and operational changes used to facilitate the recent moderator temperature coefficient testing. Interviews with personnel involved with previous investigations were conducted, and the assessment of previous recommended actions was performed. As detailed in the report, efforts to classify, quantify and locate the source of the leakage have proven inconclusive.

The results of the effort have, with a high level of confidence, eliminated point sources in the auxiliary building as significant contributors. Monitoring has substantiated an apparent relationship between the containment normal sump collection rate and the unidentified RCS rate of leakage, placing the source for the leak variation within the confines of the containment building. Chemistry analysis of the containment sump for tritium concentrations have validated that postulated RCS leakage to the sump correlates well with the recorded increase in sump in-leakage. However, this method is unproven and requires additional

validation.

Results of the containment entry of November 17 revealed no visible indications of significant leakage for the identified targets. These targets were selected based upon past efforts and recommendations of the Team resulting from the data from the recent downpowers.
The Team has postulated that the source of the leakage could be associated with the following:

1. Operation of the pressurizer valves: These valves were utilized during the power maneuvering operation after which the unidentified RCS leakage increased. The instance, during which they were not used, no fluctuation in the leak rate was observed.
2. Leakage could be occurring at one or more of the control rod drive motor (CRDM) flanges. This has been a historic location, however, experience has shown that leakage at these locations are not evidenced by contributions in containment sump in-leakage. Likewise, should leakage be occurring at the CRD nozzle penetrations, results of recent inspections at other facilities have shown these leaks not to be reflected in the RCS unidentified leakage calculation.
3. Leakage could be occurring in previously uninspected locations in containment, i.e. behind sections of insulation, which are not routinely removed or have not been removed at all during previous refueling outages. As mentioned previous, more aggressive inspection methods would require commitment to additional outage duration, resources, and dose.

RECOMMENDED ACTIONS

The following actions in addition to those currently under implementation have been recommended by the Team as being required to fortify and sustain the leak identification initiative:

1. Develop a leak identification guideline to provide direction for inspection and documentation of activities of future efforts.
Assigned to: A. Siemaszko (Plant Engineering)
Due Date: June 31, 2002

2. Develop a Containment Inspection Plan for 13RFO
Assigned to: A. Siemaszko (Plant Engineering)
Due Date: January 31, 2002

3. Monitor potential effect of planned Tave reduction on unidentified leakage
Assigned to: A. Siemaszko (Plant Engineering)
Due Date: January 15, 2002

4. Institute new unidentified leakage software to improve calculation accuracy
Assigned to: A. Siemaszko (Plant Engineering)
Due Date: April 30, 2002

ATTACHMENTS

I. Unidentified Leakage Trend through December 6, 2002

II. Containment Sump Leakage through December 6, 2002

III. Containment Entry Plan for November 17, 2002

CAUSE ANALYSIS

NOP-LP-2001-03

CR Number
01-2862

Process Code	Trend Codes						
A				(If cause is T or W) Component Code			
Activity Code		**Cause Code**		Type	ID#	**Resp Org**	
0200	**Primary**	U	Unknown			NONE	None
	Secondary						
	Tertiary						

Completed By: MCCLOSKEY, P

Date: 12/9/2001

CORRECTIVE ACTION

NOP-LP-2001-05

CR Number: 01-2862

ORIGINATOR

CR Category:	Action Type:	Schedule Type:	CA Number:
CB	(K) OTHER	(A) Normal Work Management	1

Corrective Action Type:	Cause Code:	Resp Org:
(OT) Other	(NA) Not Applicable	CHEM

Description:

Determine if an OE evaluation is required via NG-NA-00305. If you have questions, please contact John Johnson at 8345.

Completed By:	Organization:	Date:	Phone:	Attachments:
NOWICKI, K	RA	10/31/2001	8590	☐ Yes ☑ No

ACCEPT

If a Refueling Outage is required, Enter the Refueling Outage number:	Other Tracking #	Corrective Action Due Date:
☐ 1R ☐ 2R N/A	N/A	12/31/2001

Approval: (Enter Name and Sign)	Section:	Date:
MCCLOSKEY, P	CHEM	12/9/2001

QUALITY

Quality Organization Approval:	Date:

IMPLEMENTING ORG

Response:

The investigation of the increase in calculated unidentified reactor coolant system leakage, which occurred following the October 20 downpower, did not result in a conclusive cause. Efforts to identify contributors by means of monitoring plant operations, tank inventories, auxiliary building conditions, radiation elements, and containment sump volume and activity, failed to establish a determinate cause. A walkdown of containment "targets" during the November 17 downpower also failed to reveal a solid contributor.

Based upon this investigation, it is not recommended that an Operating Experience be developed. Monitoring efforts continue, which will be complemented by a more aggressive leak inspection plan during 13RFO. An operating experience may very well result from efforts during 13RFO.

Corrective Action Implementation Date: 12/28/2001

☑ **Signature indicates Corrective Action complete:**
Completed By: MCCLOSKEY, P **Date:** 12/28/2001

☑ **Signature indicates verification for SCAQ CRs:**
Implementing Organization Supervisor: **Date:**

☑ **Enter Name and Sign:**
Implementing Organization Approval: MCCLOSKEY, P **Date:** 12/28/2001

QUALITY VERIFIER

Comments:

Approval: **Date:**

CORRECTIVE ACTION

NOP-LP-2001-05

CR Number: 01-2862

ORIGINATOR

CR Category:	Action Type:	Schedule Type:	CA Number:
CB	(J) ROLL-OVER	(A) Normal Work Management	2

Corrective Action Type:	Cause Code:	Resp Org:
(OT) Other	(NA) Not Applicable	CHEM

Description:

Ensure CR 01-3025 is addressed in this response based on it being rolled into this CR.

Completed By:	Organization:	Date:	Phone:	Attachments:
NOWICKI, K	RA	11/12/2001	8590	☐ Yes ☑ No

ACCEPT

If a Refueling Outage is required, Enter the Refueling Outage number:	Other Tracking #	Corrective Action Due Date:
☐ 1R ☐ 2R N/A	N/A	12/9/2001

Approval: (Enter Name and Sign)	Section:	Date:
MCCLOSKEY, P	CHEM	12/9/2001

QUALITY

Quality Organization Approval:	Date:

IMPLEMENTING ORG

Response:

Condition Report CR 2001-3025 was identified in the PROBLEM STATEMENT for CR 2001-2862 as being addressed by this Basic Cause evaluation.

Corrective Action Implementation Date: 12/7/2001

☑ Signature indicates Corrective Action complete:
Completed By: MCCLOSKEY, P **Date:** 12/9/2001

☑ Signature indicates verification for SCAQ CRs:
Implementing Organization Supervisor: **Date:**

☑ Enter Name and Sign:
Implementing Organization Approval: MCCLOSKEY, P **Date:** 12/9/2001

QUALITY VERIFIER

Comments:

Approval: **Date:**

CORRECTIVE ACTION

NOP-LP-2001-05

CR Number: 01-2862

ORIGINATOR

CR Category:	Action Type:	Schedule Type:	CA Number:
CB	(P) PROCEDURE / INSTRUCTION	(A) Normal Work Management	3

Corrective Action Type:	Cause Code:	Resp Org:
(EA) Enhancement Action	(U) Unknown	PE

Description:

Develop a leak identification Guideline to provide direction for inspection and documentation of activities for future efforts.

Completed By:	Organization:	Date:	Phone:	Attachments:
MCCLOSKEY, P	CHEM	12/9/2001	7148	☐ Yes ☑ No

ACCEPT

If a Refueling Outage is required, Enter the Refueling Outage number:	Other Tracking #	Corrective Action Due Date:
☐ 1R ☐ 2R N/A	N/A	6/30/2002

Approval: (Enter Name and Sign)	Section:	Date:
CUNNINGS, J	PE	12/9/2001

QUALITY

Quality Organization Approval:	Date:

IMPLEMENTING ORG

Response:

Corrective Action Implementation Date: _____

☐ Signature indicates Corrective Action complete:
Completed By: Date:

☐ Signature indicates verification for SCAQ CRs:
Implementing Organization Supervisor: Date:

☐ Enter Name and Sign:
Implementing Organization Approval: Date:

QUALITY VERIFIER

Comments:

Approval: **Date:**

CORRECTIVE ACTION

NOP-LP-2001-05

CR Number: 01-2862

ORIGINATOR

CR Category:	Action Type:	Schedule Type:	CA Number:
CB	(I) EXAMINATION / INSPECTION	(A) Normal Work Management	4

Corrective Action Type:	Cause Code:	Resp Org:
(EA) Enhancement Action	(U) Unknown	PE

Description:

Develop a Containment Inspection Plan for 13RFO

Completed By:	Organization:	Date:	Phone:	Attachments:
MCCLOSKEY, P	CHEM	12/9/2001	7148	☐ Yes ☑ No

ACCEPT

If a Refueling Outage is required, Enter the Refueling Outage number:	Other Tracking #	Corrective Action Due Date:
☐ 1R ☐ 2R N/A	N/A	1/31/2002

Approval: (Enter Name and Sign)	Section:	Date:
CUNNINGS, J	PE	12/9/2001

QUALITY

Quality Organization Approval:	Date:

IMPLEMENTING ORG

Response:

Response to CR 2001-2862 Follow-up Action 4

DISCUSSION.
Four independent actions/programs are in place to identify RCS leaking components. The actions/programs are:
1. Mode 3 walkdown.
2. Mode 5 RCS SYME walkdowns.
3. Boric Acid Corrosion Control walkdowns.
4. ASME VT-2 examination.

Mode 3 walkdown.
The goal of the action/program is to perform Containment walkdown to identify any RCS and other source leaks with the plant at Mode 3. Typically three teams of two inspectors will perform walkdown of the specific areas in the Containment Building. Teams will inspect both D-rings as well as the areas outside D-rings. Special care will be taken to examine RC13A, and B including the thermocouple condition. Infrared gun/contact pyrometer will be used to identify surface temperatures of piping. This data will be compared to the Plant Computer trends to validate instrument accuracy. In addition teams will inspect all visible flanges including Continuous Vent Header flange. Each team will consist of SYME engineer and a support person. The support person may represent other organizations and will be named prior to 13 RFO.

Mode 5 RCS walkdowns.
Actions that will be performed during 13RFO at Mode 5 include:
Video inspection of Reactor Head above and below the insulation.
Repair of all identified leaking CRDM flanges.
Video inspection of all CRDM tubes for leakage.

CORRECTIVE ACTION

NOP-LP-2001-05

CR Number: 01-2862

Inspection of Continuous Vent Line flanges and top of Service Structure.
Examination of Reactor Head Closure bolt/nut area for boric acid leakage.
Inspection of RC 46 to verify valve position and the condition of the packing.
Video taping of as found condition of the floor under the Reactor Vessel.
Video taping of as left (after the 13RFO outage completion) condition of the floor under the Reactor Vessel.
Removal of insulation and inspection of all RCS hot and cold legs thermocouples.
Inspection of the Reactor Vessel inner and outer gaskets and grooves.
Removal of insulation from one RC Pump to examine studs for leakage.
Examination of 3 remaining RCPs with use of the boroscope.
Detailed inspection of the letdown cooler room.
Inspection of flanges of Continuous Vent Header.
Inspection of the service structure and all CRDM vent valves.

Boric Acid Corrosion Control walkdowns.
This inspection takes place during Mode 5. The duration of the inspection is approximately 60 hours. The inspection is performed in accordance with NG-NE-0324 (Boric Acid Corrosion Control) guidance. The goal for this walkdown is to inspect all RCS valves and eliminate any RCS leakage through the valve to the Containment atmosphere.

ASME VT-2 examination.
This inspection takes place during Mode 3 at the end of the refueling outage. The inspection is performed in accordance with DB-PF-03010 (RCS Leakage Test).

FOLLOW-UP ACTIONS
None

Corrective Action Implementation Date: 1/23/2002

Signature indicates Corrective Action complete:
Completed By: SIEMASZKO, A **Date:** 1/22/2002

Signature indicates verification for SCAQ CRs:
Implementing Organization Supervisor: **Date:**

Enter Name and Sign:
Implementing Organization Approval: CUNNINGS, J **Date:** 1/24/2002

QUALITY VERIFIER

Comments:

Approval: **Date:**

CORRECTIVE ACTION

NOP-LP-2001-05

CR Number: 01-2862

ORIGINATOR

CR Category:	Action Type:	Schedule Type:	CA Number:
CB	(B) REVIEW	(A) Normal Work Management	5

Corrective Action Type:	Cause Code:	Resp Org:
(OT) Other	(U) Unknown	PE

Description:

Monitor the effect of the planned Tave reduction on unidentified leakage

Completed By:	Organization:	Date:	Phone:	Attachments:
MCCLOSKEY, P	CHEM	12/9/2001	7148	☐ Yes ☑ No

ACCEPT

If a Refueling Outage is required, Enter the Refueling Outage number:	Other Tracking #	Corrective Action Due Date:
☐ 1R ☐ 2R N/A	N/A	1/15/2002

Approval: (Enter Name and Sign)	Section:	Date:
CUNNINGS, J	PE	12/9/2001

QUALITY

Quality Organization Approval:	Date:

IMPLEMENTING ORG

Response:

Response to CR 2001-2862 Follow-up Action 5

PROBLEM STATEMENT:
This condition report was written to document the increase in unidentified leakage for the Reactor Coolant System (RCS) following the scheduled downpower performed between 11/17/01 and 11/19/01.
Follow-up Action 5 was issued to monitor the effect of the planned Tave reduction on unidentified leakage.

REMEDIAL ACTIONS.
During November and December of 2001, special team was investigating the source of increased RCS unidentified leakage. Members of the team represented Chemistry, Operations, Health Physics, and Plant Engineering. As part of the investigation a power entry was conducted to view letdown cooler room as well as majority of accessible in Mode 1 areas in the Containment. The team was unable to locate the source of leakage. Actions will be taken during 13RFO to locate and eliminate the source of the RCS leakage. There are already actions in place to conduct Mode 3 walkdown and to investigate the inaccessible in Mode 1 areas.

APPARENT CAUSE.
Based on the evaluation performed by the team, there are no specific areas which could be identified as a source of increased RCS unidentified leakage. Therefore the apparent cause is listed as Not a Deficiency.

DISCUSSION.
As part of the Davis-Besse response to NRC Information Bulletin 2001-01, T-average was decreased by 7 deg.F This was performed on 12/16/01 and accomplished by reducing the temperature of the "hot leg" in the Reactor Coolant System from 605 to 598 deg.F.

CORRECTIVE ACTION

CR Number: 01-2862

NOP-LP-2001-05

System Engineer reviewed all RCS key indicators and parameters. The reduction of T average has no effect on the RCS system and its components. The unidentified RCS leakage remains unchanged and is approximately at 0.18 GPM.

CORRECTIVE ACTIONS.
No remedial actions are required.

Corrective Action Implementation Date: 1/14/2002

Signature indicates Corrective Action complete:
Completed By: SIEMASZKO, A **Date:** 1/14/2002

Signature indicates verification for SCAQ CRs:
Implementing Organization Supervisor: **Date:**

Enter Name and Sign:
Implementing Organization Approval: CUNNINGS, J **Date:** 1/15/2002

QUALITY VERIFIER

Comments:

Approval: **Date:**

CORRECTIVE ACTION

NOP-LP-2001-05

CR Number: 01-2862

ORIGINATOR

CR Category:	Action Type:	Schedule Type:	CA Number:
CB	(C) CALCULATION	(A) Normal Work Management	6

Corrective Action Type:	Cause Code:	Resp Org:
(EA) Enhancement Action	(U) Unknown	PE

Description:
Institutre new unidentified leakge software to improve the calculation accuracy

Completed By:	Organization:	Date:	Phone:	Attachments:
MCCLOSKEY, P	CHEM	12/9/2001	7148	☐ Yes ☑ No

ACCEPT

If a Refueling Outage is required, Enter the Refueling Outage number:	Other Tracking #	Corrective Action Due Date:
☐ 1R ☐ 2R N/A	N/A	4/30/2002

Approval: (Enter Name and Sign)	Section:	Date:
CUNNINGS, J	PE	12/9/2001

QUALITY

Quality Organization Approval:	Date:

IMPLEMENTING ORG

Response:

Corrective Action Implementation Date: _____

☐ Signature indicates Corrective Action complete:
Completed By: Date:

☐ Signature indicates verification for SCAQ CRs:
Implementing Organization Supervisor: Date:

☐ Enter Name and Sign:
Implementing Organization Approval: Date:

QUALITY VERIFIER

Comments:

Approval: **Date:**

GENERIC IMPLICATIONS

NOP-LP-2001-02

CR Number

01-2862

Past occurrences of the issue at the site.

Document Number:	Description:	Previous Response:
See Report	See Report	See Report

☑ continued on attached

Past occurrences of the issue in the industry.

Document Number:	Description:	Previous Response:
See Report	See Report	See Report

☑ continued on attached

Experience Review Questions:

1. **Do past occurrences of similar conditions (as identified above) indicate a generic or broader scope issue?**

   Past occureences of undesired increases in unidentifed reactor coolant system leakage have been documented. Efforts to quantify, and/or identify the source of the leakage, as diccussed in the report, have had limited success.

   The consequences of the condition remaining unresolved have proven to lack significance. Inpections following operating cycles with such leakage have not revealed any failure of components which would affect the safe operation of the Plant. As these effort have not identified a clear contributor to the leakge, no generic issue was apparent.

   Since the issue of unidentified reactor coolant system leakage involves a myriad of plant system interfaces and system barriers, the scope of the condition investigation is extensive in scope by definition. The evaluation found that past occurrences and associated investigations did involve an adequate scope definition.

2. **Discuss the effectiveness of prior corrective actions for similar identified conditions (if applicable). How are currently proposed preventive action(s) different so as to be more effective (if applicable)?**

   Corrective actions from previous efforts relied primarily on continued monitoring and inspection methods that involved the search for visible and obvious points of leakage during MODE 3 walk-downs and brief containment entries made at power. Since the results of such investigations did not reveal significant contributors, additional action was not deemed necessary. The actions were effective in that the result were reflective of the level of effort employed.

   Corrective actions proposed by this investiagtion will also include continued monitoring. Additionally, actions will include more aggressive methods, such as the use of thermography to identify intersystem leakage, the proposed removal of additional insulation on major components in containment for inspection during the refueling outage, and the use of advanced video capabilities and robotics for remote inspection.

   It has been validated on several occasions that current ispection methodologies have not revealed sources of what appears to be baseline leakage within the containment building. The Team proposes more agreesive methods to further eliminate potential "target". It is recognized that this will involve additional outage time, resources, and dose.

Extent Of Condition Questions:

3. **Based on your knowledge and the results of the database review, is the condition present in other identical or similar equipment, processes, programs or applications?**

   The issue of unidientified reactor coolant system leakage does not involve a specified component or system. The condition can be influenced by multiple points of origin and the complex interface between a number of plant systems. As such, the failure mechanism, if known, is not generically applicable to other systems, components, or

GENERIC IMPLICATIONS

CR Number 01-2862

NOP-LP-2001-02

processes.

4. Was a new CR initiated? No

5. Why / Why Not?

A generic failure mechanism could not be applied, therefore, no additional documentation or evaluaiton is warranted.

Completed By:	**DATE:**
MCCLOSKEY, P	12/9/2001

Past Site Occurrences (Continuation Sheet)

Previous occurrences of increased unidientified leakage were experienced in Operating Cycles 7, 8 and 12. Refer to Basic Cause Report for detailed discussion.

Past Industry Occurrences (Continuation Sheet)

Refernce SER - "Recent Events Involving RCS Leakage at Pressurized Water Reactors".

Refernce: Procedure S2.OP-SO-RC-0004(Q); Identifying and Measuring Leakage - PSEG Nuclear LLC; Salem Hope Creek

10CFR21 Decision Applicability Checklist

NOP-LP-2001-04

CR Number

01-2862

Does the Condition Report involve:

Information obtained or an observation made of a BASIC COMPONENT that could compromise safety. ☐ Yes ☑ No

(See logic flow diagram defining terms and applicability information on the next page.)

If the answer is No, Stop here (sign and date on the Originator Signature Tab)

If the answer is Yes, Items A & B must be answered. (Parts A & B tab)

A. Does the Condition Report involve a:

BASIC COMPONENT of a plant structure, system, component, or part thereof necessary to assure:

1. The Integrity of the reactor coolant pressure boundary. ☐ Yes ☐ No
2. The capability to shutdown the reactor and maintain it in safe shutdown condition. ☐ Yes ☐ No
3. The capability to prevent or mitigate the consequences of accidents which could result in potential offsite exposures comparable to those referred to in 10CFR100.11. ☐ Yes ☐ No

B. Does the potential issue or defect involve:

1. A deviation in a delivered component? ☐ Yes ☐ No
2. Deviation in a portion of a facility offered for acceptance? ☐ Yes ☐ No
3. Design installation test, use, or operation of a defective structure, system or component? ☐ Yes ☐ No
4. A condition or circumstance that could contribute to exceeding a Technical Specification safety limit? ☐ Yes ☐ No

If any items in A are marked 'Yes' AND any items in B are marked 'Yes', contact Regulatory Personnel immediately to discuss and determine if a SUBSTANTIAL SAFETY HAZARD may exist, or if the issue is reportable.

Based on discussions with Regulatory Personnel that a SUBSTANTIAL SAFETY HAZARD or reportability issue does not exist, provide explanation / justification below:

Based on the determination that a SUBSTANTIAL SAFETY HAZARD or reportability issue may exist, draft a Corrective Action Form (CAF) to be accepted by the Regulatory Personnel to complete the 10CFR Part 21 requirements for the CR.

CAF Generated? ☐ Yes ☐ No **(If no, provide explanation / justification above)**

If Yes, CAF# _____

Completed By:	**DATE:**
MCCLOSKEY, P	12/9/2001