PVNGS INCIDENT INVESTIGATION PROGRAM

COVER SHEET

INCIDENT INVESTIGATION REPORT NUMBER: 3 - 3 - 89 - 019

TITLE: Procedure 43OP-3ZZ16, RCS Drain Operations, Not Appropriate for Circumstances

EVENT DATE: March 11, 1989

REPORT APPROVAL DATE: 10/5/89

PVNGS INCIDENT INVESTIGATION PROGRAM

REVIEW & APPROVAL SHEET

INCIDENT INVESTIGATION REPORT NUMBER: 3 - 3 - 89 - 019

TITLE: Procedure 43OP-3ZZ16, RCS Drain Operations, Not Appropriate for Circumstances

Prepared by: M.R. Halpin M R Halpin 8-29-89
Lead Investigator Date

Reviewed By: [signature] 8/31/89
Date

Reviewed By: _____
Date

Reviewed By: _____
Date

Reviewed By: _____
Date

Reviewed By: _____
Date

Approved by: [signature] 10/5/89 9/3/89
Affected Plant Manager Date

EVENT DATE: March 11, 1989

REPORT APPROVAL DATE: _____

PVNGS INCIDENT INVESTIGATION PROGRAM

CONCURRANCE SHEET

The following signatures indicate concurrence with the assigned corrective action. They do not indicate a review of the completeness or thoroughness of the investigation process or the report.

Item: 1,3 - Director, Standards & Technical Support

Concurrence: _____ 9/26/89
Responsible Manager Date

Item: 2 - Director, Engineering & Construction

Concurrence: _____ 10/5/89
Responsible Manager Date

Item: _____

Concurrence: _____
Responsible Manager Date

Item: _____

Concurrence: _____
Responsible Manager Date

Item: _____

Concurrence: _____
Responsible Manager Date

Item: _____

Concurrence: _____
Responsible Manager Date

PVNGS INCIDENT INVESTIGATION PROGRAM

TEAM MEMBERS SHEET

INCIDENT INVESTIGATION REPORT NUMBER: 3 - 3 - 89 - 019

TITLE: Procedure 43OP-3ZZ16, RCS Drain Operations Not Appropriate for Circumstances

INCIDENT INVESTIGATION TEAM MEMBERS

Team Leader: M.R. HALPIN MRHalpin Operations Strandards 8-29-89
Print Name - Signature - Department Date

Team Member: N/A
Print Name - Signature - Department Date

Team Member: N/A
Print Name - Signature - Department Date

Team Member: N/A
Print Name - Signature - Department Date

Team Member: N/A
Print Name - Signature - Department Date

Team Member: N/A
Print Name - Signature - Department Date

Team Member: N/A
Print Name - Signature - Department Date

EVENT DATE: March 11, 1989

REPORT APPROVAL DATE: _____

INCIDENT INVESTIGATION REPORT CHECKLIST

PART I

- ☑ Executive Summary
- ☑ Event Description
- ☑ Facts Sheet
- ☑ Conclusions Identified
- ☑ Corrective Actions Identified
- ☑ Responsible Organization & Individual Identified for each Corrective Action
- ☑ Due Dates for all Corrective Actions Identified

PART II Category 1 & 2 Events only

- N/A Nuclear Safety Assessment
- N/A Personnel Performance Evaluation
- N/A Plant Protection System Response
- N/A Control System Evaluation

PART III

- ☑ Cover Page
- ☑ Review and Approval Page(s)
- ☑ Concurrence Page
- ☑ All Departments with Corrective Actions specified are included on the Concurrence page.
- ☑ Appropriate charts (EBT or E&CF) are included.
- N/A Concern Summary (If multiple concerns).
- ☑ Index of Attachments included
- ☑ All Attachments numbered and marked
- ☑ Appendix A completed

EXECUTIVE SUMMARY

On March 11, 1989 procedure 43OP-3ZZ16, RCS Drain Operations, was implemented to direct reduced inventory operations, including "mid-loop" evolutions, during the Unit 3 first refueling outage. Then, during an NRC inspection, conducted from March 20 through April 26, 1989, it was determined that the operating procedure 43OP-3ZZ16 was not appropriate in that the RCS temporary level versus shutdown cooling flow correction curve was incorrect which resulted in a Severity Level IV Violation. This resulted in a discrepancy between the two temporary level indicators and the pressurizer level indicator during the RCS drain operation.

The procedure writer incorporated the wrong data into the procedure through an oversight. The procedure writer did realize that the data received in an Engineering Action Request (EAR) was not for the same point in the system that a temporary level indicator was to be installed. This lead to a larger difference in a level error due to shutdown cooling flow than anticipated.

The corrective action is to counsel the procedure writer on attention to detail.

DETAILS

On March 11, 1989 procedure 43OP-3ZZ16, RCS Drain Operations, was implemented to direct the operation of the unit during reduced inventory conditions including "mid-loop" evolutions. This procedure was generated as a result of NRC Generic Letters 87-12 and 88-17, Loss of Decay Heat Removal While in a Partially Drained Condition. and the ANPP Responses to NRC Generic Letters, dated September 21, 1987 (87-12) and January 6, 1989 (88-17). The new procedure was utilized for the first time during the Unit 3 first refueling outage which started in March, 1989.

During an NRC inspection, conducted from March 20 through April 26, 1989, it was determined that operating procedure 43OP-3ZZ16, RCS Drain Operations, was not effective in providing guidance to control RCS inventory during reduced inventory conditions. It was determined that the procedure was not appropriate in that the RCS temporary level versus shutdown cooling flow correction curve was incorrect. A Severity Level IV Violation (Supplement I) was received.

The procedure 43OP-3ZZ16, RCS Drain Operations, utilized curves to correct RCS level indication for shutdown cooling flow to determine the actual level in the reactor vessel during reduced inventory evolutions. To obtain this information a verbal request for an Engineering Action Request (EAR 88-1671) was made on March 13, 1989 though the Nuclear Engineering Department (NED), in accordance with procedure 81DP-4EE03, Task Control Within Nuclear Engineering, for a curve for the Train B temporary tygon level indicator. The request was for the Train B temporary tygon level indicator only because a Train A level compensation curve already existed in 43OP-3ZZ06, Mode 5 Operations, and 43OP-3ZZ12, Mode 6 Operations, which had provided sufficient information for previous partial drain evolutions

NED answered EAR 88-1671 December 27, 1988 with a letter to J.T. Pollard dated December 23, 1988 stating that the data collected in Unit 2 for RCS level differences due to shutdown cooling flow was applicable to all three units due to similar configurations. The Unit 2 data for Train A and Train B level compensation curves were included in the EAR answer.

The level compensation curve for the Train B level indicator was based on data collected from drain valve SIB-V057, which was the point the temporary refueling level indicator and the permanent Refueling Water Level Indicating System modification was to be installed. The level compensation curve for the Train A level indicator was based on data collected from drain valve SIA-V056, which was the point the permanent Refueling Water Level Indicating System modification was to be installed. These curves.were incorporated into the 43OP-3ZZ16 procedure as provided in EAR 88-1671.

The existing plant design identified RCE-V214 on the Train A shutdown cooling loop as the refueling level indication connection. This connection is used for the temporary tygon level indicator which has been used to provide RCS partial drained and mid-loop level indication in the past.

When the procedure writer incorporated the level compensation curves into the procedure 43OP-3ZZ16, RCS Drain Operations, he did not realize that the Train A level compensation curve was designed for the level indicating system to be connected at SIA-V056 instead of RCE-V214. This point was stated in the Unit 2 Shutdown Cooling (SDC) Flow Data letter but not identified on the curve attached to the letter. The procedure writer was not aware that there would be an impact on the level compensation from the difference in location between SIA-V056 and RCE-V214.

DETAILS
(con't)

The procedure 43OP-3ZZ16, RCS Drain Operations, went for cross-discipline review which included the Engineering Evaluations Department (EED) System Engineer but did not include the NED Design Engineer who wrote the EAR. Per 01AC-0AP02, Review and Approval of Nuclear Administrative and Technical Procedures, a cross-discipline review is required when "more than one section has a major role in the performance of the task described by the procedure" or "an intent change is made to a system operating procedure". The cross-discipline review "should occur when more than one section has established expertise in the area covered by the procedure and the Technical Reviewer determines the need for a confirming opinion". No comments were received concerning the flow compensation curves on the EED cross-discipline reviews. The difference between the location of the temporary level indication, at RCE-V214, and the point the level compensation curve data was collected at SIA-V056 was also missed by the Technical Reviewer. Per 01AC-0AP02, Review and Approval of Nuclear Administrative and Technical Procedures the Technical Reviewer "conducts a detailed technical review to ensure that the procedure: (1) accomplishes its purpose; (2) has valid acceptance criteria; (3) has clearly defined responsibilities; (4) is consistant with applicable licensing and regulatory documents, other higher tier documents, and applicable technical requirements". The procedure was approved and implemented with the discrepancy in place.

During the evolution of lowering RCS level, the procedurally required level cross checks between level indications did not meet the "within +/-six inches" criteria between the Train B and the Train A temporary tygon level indicators. However, both indicators were within +/-six inches of the pressurizer level indication. The Train B level indication was lower than the pressurizer level indication which was expected due to the lag of draining the pressurizer through the surge line to the RCS and venting the pressurizer through a one inch vent line. The Train A level indication was higher than the pressurizer level indication due to the compensation error using the incorrect curve. The drain down was stopped and the EED System Engineer was contacted at home. He recommended continuing the drain down using the temporary level indicator that did not use compensation (i.e.; the tygon level indicator on the non-operating shutdown cooling loop) since only one temporary level indicator was required until the RCS level was at the 111ft elevation. The drain down continued to the 113ft 6in elevation.

When the EED System Engineer arrived at the site, troubleshooting was conducted to identify the problem with the temporary level indication. The troubleshooting involved switching operating trains of shutdown cooling, stopping all shutdown cooling flow and letting level stabilize (at that time both levels stabilized within 1/2 inch of each other). At that time the EED System Engineer determined that the Train A Level Compensation Curve for Shutdown Cooling Flow was incorrect and the original curve used in the 43OP-3ZZ12, Mode 6 Operations procedure was correct. The original curve was incorporated into the RCS Drain Operations procedure and the incorrect curve was removed through the use of a temporary procedure change (TPCN). The rest of the RCS drain down evolution was then continued.

FACTS LIST

1. March 11, 1989 RCS Drain Operations procedure, 43OP-3ZZ16 was implemented.

2. 43OP-3ZZ16 was written to implement NRC Generic Letters 87-12 & 88-17 and the PVNGS Response Letters dated September 21, 1989 (87-12) and January 6, 1989 (88-17).

3. 43OP-3ZZ16 was used for the first time during the Unit 3 Refueling Outage which started in March, 1989.

4. A verbal request for an Engineering Action Request (EAR) was made on March 13, 1989 though the Nuclear Engineering Department (NED) for a curve for the Train B temporary tygon level indicator,

5. Verbal requests for EARs are in accordance with procedure 81DP-4EE03 Task Control Within Nuclear Engineering.

6. A compensation curve for the Train A temporary level indicator connected to RCE-V214 already existed in 43OP-3ZZ06, Mode 5 Operations, and 43OP-3ZZ12

7. NED answered the EAR (88-1671) on December 27, 1988.

8. The EAR answer stated that the data collected in Unit 2 for RCS level decreases due to shutdown cooling flow was applicable to all three units due to similar configurations.

9. The EAR answer included Unit 2 data for Train A and Train B level compensation.

10. The level compensation curve for the Train B level indicator was based on data collected from drain valve SIB-V057.

11. Drain valve SIB-V057 is the point the temporary refueling level indicator is connected.

12. Drain valve SIB-V057 is the point the permanent Refueling Water Level Indicating System modification is to be installed.

13. The level compensation curve for the Train A level indicator was based on data collected from drain valve SIB-V056.

14. Drain valve SIB-V056 is the point the permanent Refueling Water Level Indicating System modification is to be installed.

15. The existing plant design identified RCE-V214 on the Train A shutdown cooling loop as the refueling level indication connection used for the temporary level indicator.

16. The procedure writer incorporated the data from the EAR as curves directly into 43OP-3ZZ16.

FACTS LIST
(con't)

17. EAR 88-1671 identified SIA-V056 & SIB-V057 as the data collection points in the letter attached to the EAR.

18. The data sheets attached to EAR 88-1671 were identified as Level Decrease Data for Train A and Level Decrease Data for Train B.

19. 43OP-3ZZ16 cross-discipline review included the EED System Engineer.

20. 43OP-3ZZ16 cross-discipline review did not include the NED Design Engineer who wrote the EAR.

21. Per 01AC-0AP02, Review and Approval of Nuclear Administrative and Technical Procedures, the Technical Reviewer shall determine the need for a cross-discipline review

22. Per 01AC-0AP02 guidance, a cross-discipline review is required when more than one section has a major role in the performance of the task described by the procedure or an intent change is made to a system operating procedure.

23. Per 01AC-0AP02, the cross-discipline review should occur when more than one section has established expertise in the area covered by the procedure and the Technical Reviewer determines the need for a confirming opinion.

24. No comments were received concerning the flow compensation curves on the EED cross-discipline reviews.

25. Per 01AC-0AP02, the Technical Reviewer conducts a detailed technical review to ensure that the procedure:

    (1) accomplishes its purpose;
    (2) has valid acceptance criteria;
    (3) has clearly defined responsibilities;
    (4) is consistant with applicable licensing and regulatory documents, other higher tier documents, and applicable technical requirements.

26. The procedure was approved and implemented with the discrepancy in place.

CONCLUSIONS

1. The procedure writer missed the detail in the NED EAR that the Level Decrease Data for Train A flow was obtained from a point different than the point the temporary level indication was to be installed.
(Fact Number: 2,4,6,7,8,9,10,11,12,13,14,15,16,17,18,26)

2. The point that the procedure writer missed the detail that the Level Decrease Data for Train A flow was obtained from a point different than the point the temporary level indication was to be installed might have been made more visable to the procedure writer if the the individual that answered the EAR had identified on the data form that the data was for instrumentation installed at SIA-V056 instead of just "Train A".
(Fact Number: 4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,26)

3. The EED System Engineer should have indentified the difference between the point that the level curve data was obtained and the point at which the temporary tygon level was installed and that this difference would effect the level indication during the cross-discipline review. However, the procedure 01AC-0AP02, Review and Approval of Nuclear Administrative and Technical Procedures does not provide sufficient information to the cross-discipline reviewer as to what a cross-discipline review is to accomplish, the "depth" and detail the review is to take.
(Fact Number: 19,20,21,22,23,24,25,26)

RECOMMENDED CORRECTIVE ACTIONS

1. The procedure writer is to be counseled on the importance of identifying all details when preparing any portion of a procedure. The smallest oversight or conclusion can lead to items of major impact.
(Conclusion Number: 1)

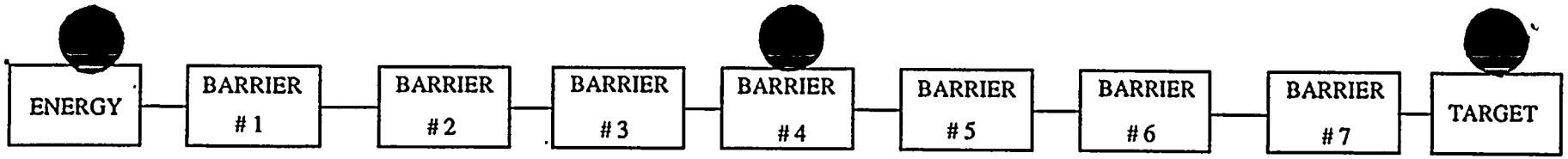
   Responsibility: Operations Standards Supervisor
   Due Date: 30 days after report approval.

2. NED shall develop specific guidelines of ensuring that engineering information transmitted to the site has clearly stated assumptions and limitations.
(Conclusion Number: 2)

   Responsibility: Nuclear Engineering Manager
   Due Date: 60 days after report approval.

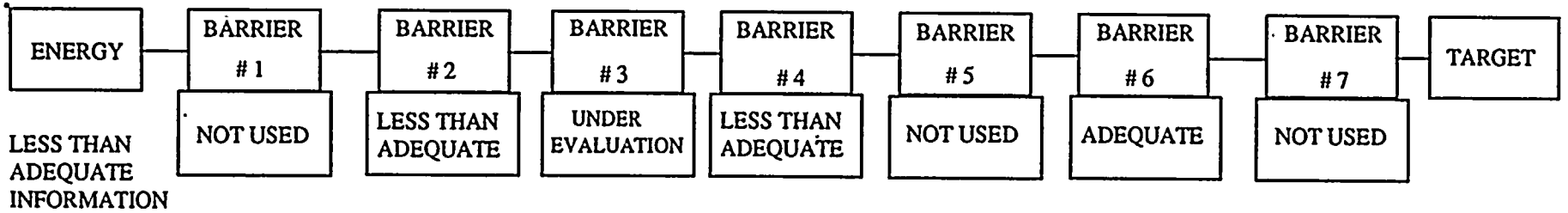
3. Enhance the procedure 01AC-0AP02, Review and Approval of Nuclear Administrative and Technical Procedures to provide the technical reviewer and the cross-discipline reviewer guidance and details as to what a cross-discipline review is to accomplish, the "depth" and detail the review is to take, and who should conduct the cross-discipline reviewer (i.e.; the cross-discipline review is a technical review in the cross-discipline reviewer's area of expertise: engineering to review the procedure from an engineering viewpoint verifying the accuracy, adequacy, applicability, etc., of the types of evolutions, calculations, curves, formulas, etc.; operations to review the procedure from and operations viewpoint, verifying that the evolution is accomplished adequately, it does not create operability and/or operational concerns, chemistry to review the procedure for chemistry concerns/impact; etc.) ICR 08713 submitted to Plant Standards and Control.
(Conclusion Number: 3,5)

   Responsibility: Plant Standards and Control Manager
   Due Date: 120 days after report approval.



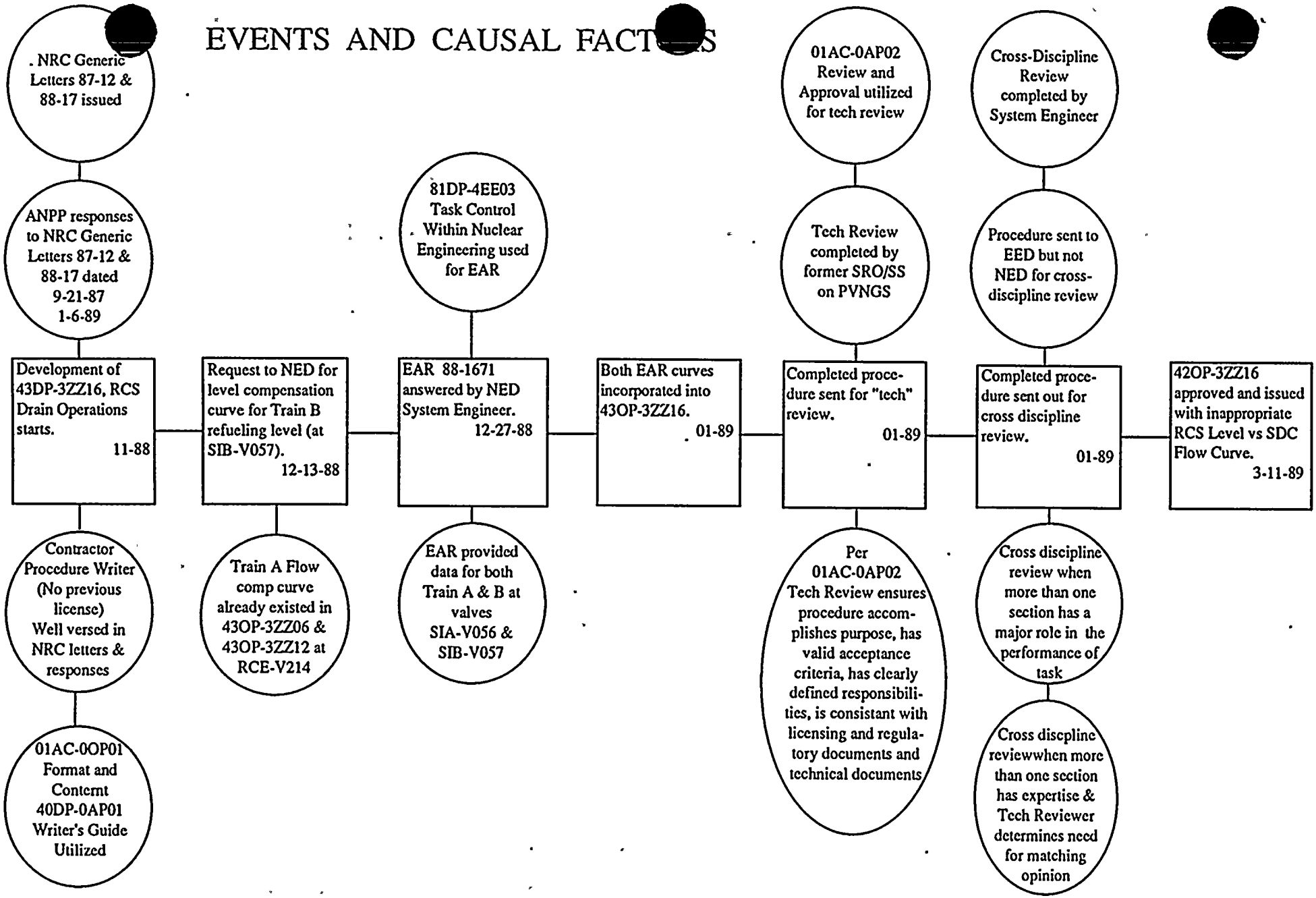
NOTE: THIS GRAPHICAL REPRESENTATION OF THE ENERGY-BARRIER-TARGET ANALYSIS IS ONLY INTENDED TO INDICATE WHICH CATAGORIES OF BARRIERS WERE EFFECTIVE FOR THIS EVENT AND WHICH WERE NOT. WHILE IT IS RECOGNIZED THAT THERE ARE MANY POSSIBLE PARALLEL AND SERIES COMBINATIONS OF THESE CATAGORIES OF BARRIERS, IT IS NOT THE INTENT OF THIS REPRESENTATION OF THE E-B-T ANALYSIS TO SHOW THOSE COMBINATIONS.

ENERGY-BARRIER-TARGET ANALYSIS FOR IIR# 3-3-89-019



BARRIER NUMBER AND DESCRIPTION	BARRIER EFFECTIVENESS						CONCERN NUMBER
	ADEQUATE	LESS THAN ADEQUATE	UNDER EVALUATION	USED	NOT USED	NOT APPLICABLE	
1. EQUIPMENT PERFORMANCE							* N/A
2. PERSONNEL PERFORMANCE							* #1
3. PROCEDURES							* N/A
4. TRAINING							* N/A
5. DESIGN							* N/A
6. MANAGEMENT							* N/A
7. OTHER							* N/A

EVENTS AND CAUSAL FACTORS



EVENT CATEGORIZATION WORK SHEET

NOTE: ALL KEYWORDS UTILIZED IN THIS CATEGORIZATION MUST BE OBTAINED FROM THE KEY WORD LIST IN APP. H OF 79DP-0IP01, INCIDENT INVESTIGATION REPORT PREPARATION.

I. System/Components Affected By The Event

A. Component: NA

B. SIMS ID Number: NA

C. NPRDS Code: NA

D. Subject — Primary: OPERATIONS — Secondary: Procedures/Indexing

E. System Affected:

II. Failure Mode (for component failure only) ☒ N/A

III. Generic Root Cause(s)

A. Major Category: Personnel Performance

B. Causal Factors Categories: WCOMM | WC3I

IV. Plant Status Prior to Event: Refueling

V. Reactor Trip Signal: ☒ N/A

VI. ESFAS Signal Generated ☒ N/A

VII. Event Classification:

VIII. Affected Unit: Unit 3

IX. Responsible Work Group: Operations/Operations Standards

Type of Activity Initiating the Event: RCS Drain Operation

ATTACHMENTS

A1 - NRC Notice of Violation May 26, 1989

A2 - PVNGS Response to NRC Notice of Violation June 26, 1989

A3 - NRC Request for Incident Investigation Report July 3, 1989

A4 - Personnel Statement - Dave Faulkner August 1, 1989

A5 - Engineering Action Request - EAR 88-1671 December 13, 1989

A6 - ICR 08713 for Corrective Action #3

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CALIFORNIA 94596

A1

MAY 26 1989

Docket Numbers 50-528
50-529
50-530

Arizona Nuclear Power Project
P. O. Box 52034
Phoenix, Arizona 85072-2034

Attention: Mr. William F. Conway,
Executive Vice President Nuclear

Gentlemen:

Subject: NRC Inspection of Palo Verde Units 1, 2 and 3

This refers to the inspection conducted by Messrs. T. Polich, D. Coe and G. Fiorelli of this office on March 20 through April 26, 1989, of activities authorized by NRC License Nos. NPF-41, NPF-51 and NPF-74, and to the discussion of our findings held by the inspectors with members of the Arizona Nuclear Power Project staff at the conclusion of the inspection.

Areas examined during this inspection are described in the enclosed inspection report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observations by the inspectors.

Based on the results of this inspection, it appears that several of your activities were not conducted in full compliance with NRC requirements, as set forth in the Notice of Violation, enclosed herewith as Appendix A.

We are particularly concerned with the adequacy of your preparation for, and execution of Reactor Coolant System (RCS) mid-loop operations. The procedures for this activity appeared incomplete. Engineering data was not properly incorporated, and adequate contingency actions were not specified. Furthermore, your oversight organizations did not provide timely, critical assessments commensurate with the importance of this evolution. We request that you address these concerns in your response to Item A of the Notice of Violation.

Your response to this Notice is to be submitted in accordance with the provisions of 10 CFR 2.201 as stated in Appendix A, Notice of Violation.

In accordance with 10 CFR 2.790(a), a copy of this letter and the enclosures will be placed in the NRC Public Document Room.

The response directed by this letter and the accompanying Notice are not subject to the clearance procedure of the Office of Management and Budget as required by the Paperwork Reduction Act of 1980, PL 96-511.

A1

APPENDIX A

NOTICE OF VIOLATION

Arizona Nuclear Power Project
Palo Verde Units 1, 2, and 3

Docket Numbers 50-528, 50-529, and 50-530
License Numbers NPF-41, NPF-51, and NPF-74

During an NRC inspection conducted from March 20 through April 26, 1989. two violations of NRC requirements were identified. Violation A pertains to Unit 3, while Violation B pertains to Units 1, 2, and 3. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C (1988), the violations are listed below:

A. 10 CFR Part 50, Appendix B, Criterion V states in part: "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings."

Contrary to the above, on March 11, 1989, the licensee issued procedure 43OP-3ZZ16, "RCS Drain Operations", which was not appropriate to activities affecting the quality of Reactor Coolant System (RCS) operation during reduced RCS inventory conditions. This procedure was not appropriate to the circumstances in that (1) Appendix D, Page 1 of 2, was an incorrect RCS level versus shutdown cooling flow correction curve for the RCS temporary level indication system configuration used, and (2) procedural provisions intended to prevent vortexing and air entrainment were ineffective, resulting in actual air entrainment even though procedural requirements were met.

This is a Severity Level IV Violation (Supplement I).

B. Technical Specification 6.8.1 states, in part: "Written procedures shall be established, implemented, and maintained covering ... the recommendations in Appendix A of Regulatory Guide 1.33, Revision 2, February, 1978 ..." (RG 1.33).

1. RG 1.33 is implemented in part by ANPP procedure 01AC-0AP01, Revision 0, "Format and Content of Nuclear Administrative and Technical Procedures," Section 3.4.2, which states: "Each document, or changes thereto, shall be reviewed and approved prior to use in accordance with 01AC-0AP02, "Review and Approval of Nuclear Administrative and Technical Procedures."

Contrary to the above, between September 1 and December 23, 1988, surveillance test procedures 72ST-9CL04, 73ST-9CL06, and 73ST-0CL07 were conducted using criteria which had not been reviewed and approved prior to use in accordance with 01AC-0AP02.

A1

corroded and to combine the efforts of EERs 88-DG-58, 59, and 60. This EER incorporated drain plugs with zinc anodes and allowed for carbon steel plugs to be used prior to manufacture of the zinc anode plugs.

On September 9, 1988, an intercooler drain plug failed on the Unit 2 "A" DG. This failure was attributed to the same corrosion mechanism exhibited in the Unit 1 and 3 DG intercooler plugs. A work order to inspect/replace Unit drain plugs had not been completed prior to this second event. As discussed in the most recent SALP report, this was an example of weak problem identification since the same event had occurred on Unit 3 less than three months before.

EER-88-DG-064 was closed on November 7, 1988. That EER stated that as of October 4, 1988, no work order had been initiated to install the new drain plugs in Units 1 and 3 and that the installation of the plugs should be raised to the highest priority. Work orders initiated at Unit 2 were scheduled to be completed before October 5, 1988. The EER also recommended establishing a Preventive Maintenance (PM) task to monitor the corrosion of the zinc anodes. The initial frequency of the PM was suggested to be semi-annual.

The inspectors review of the April 12, 1989 intercooler elbow leak indicated that Work Order (WO) 00237201 was performed on September 15, 1987, to replace a similar elbow on Unit 2 "A" DG intercooler. The WO indicated the elbow was removed in pieces but did not explicitly indicate corrosion was the cause of the damage to the elbow. However, the WO indicated water was spraying from the elbow and the drawing and part number were the same as the April 12, 1989 failure.

The inspector made the following conclusions:

- Failure of the Unit 3 drain plug was not acted on aggressively to preclude a similar occurrence at Unit 2.
- The corrective action for the Unit 3 drain plug was not thorough in that it only addressed the specific problem of drain plugs and did not address other carbon steel components in the system susceptible to the same corrosion mechanism.

The matter was first discussed with the licensee at the time of the September 9, 1988, failure of the Unit 2 drain plug and in the most recent SALP report.

The subject was again discussed with the licensee's management who acknowledged the licensee's comments and indicated agreement.

No violations or deviations of NRC requirements were identified.

12. Mid-Loop Operations - Unit 3 (71707)

The inspector observed mid-loop operation preparations, entry and exit in Unit 3. The licensee's mid-loop activities, including

A1

problem resolution and responsiveness to NRC Generic Letter 88-17 "Loss of Decay Heat Removal" were reviewed. Finally, the effectiveness of the Quality Audits and Monitoring (QA and M), and Independent Safety Engineering (ISE) oversight groups was assessed. The inspector made the following observations:

a. Procedural adequacy.

1) Procedure 43AO-3ZZ22, "Loss of Shutdown Cooling (SDC)", stated that if SDC flow were totally lost while in Mode 5, operators should feed and bleed the steam generator secondary sides to provide for reactor coolant system (RCS) heat removal. No recommended actions existed for the Mode 5 conditions when steam generators were unavailable due to mid-loop operations. The NRC inspector identified this discrepancy and it was corrected by the licensee prior to mid-loop operations.

2) Procedure 430P-3ZZ16, "RCS Drain Operations", did not provide guidance for when or how to vent the SDC system. Precursor indications such as abnormal flow noise or the appearance of air bubbles in the tygon tube level indicator were not addressed. Specific valve numbers, and sequencing for venting operations were not addressed.

3) Procedure 430P-3ZZ16, "RCS Drain Operations", as originally issued, contained an incorrect correction factor curve for the "A" RCS loop tygon tube level indication. The incorrect curve assumed a different tygon tube connection point to the RCS than the one actually used. Operators discovered the error during RCS drain operations when "A" and "B" loop levels became significantly different. They stopped draining and corrected the error before proceeding. However, the inspector noted that correction curve data supplied by engineering had been incorrectly incorporated into the procedure. This is considered a violation of regulatory requirements (530/89-16-01).

4) The surveillance test calibration procedure for the SDC flow meter, used to ensure Technical Specification minimum flow requirements, was found by the licensee to indicate approximately 160 gpm greater than actual flow due to the in-use fluid temperature of 90 degrees F being lower than the calibration temperature of 300 degrees F. This instrument is an orifice flow restriction device with a differential pressure detector. The inspector noted that this was a case of engineering data incorporated into a calibration procedure which resulted in an initially unrecognized actual difference between indicated and actual flow. The licensee subsequently determined that due to conservatism of the minimum flow requirement, the indicated flow may be used without correction.

Based on the above observations, the inspector concluded that; 1) procedures related to mid-loop operations were in some cases incomplete and inaccurate, and 2) there appeared to be a lack of control over the inclusion of engineering supplied data into operations and instrument calibration procedures. Licensee management committed to a reassessment of the mid-loop operations procedures, including loss of SDC, with the objective of reverifying Generic Letter 88-17 requirements, ensuring the adequacy of engineering input, and incorporating all lessons learned from Unit 3, and completing the necessary revisions and training prior to any further mid-loop operations with fuel in the vessel (530/89-16-02). Second, licensee management committed to reviewing the policies and controls associated with the exchange and review of information between the engineering and standards organizations. This item will be followed up in a future inspection (530/89-16-04).

b. Operations during mid-loop condition.

1) Following entry into mid-loop operation, operators attributed the appearance of "growling" and "rumbling" flow noises, emanating from specific locations in the SDC flow path, to be caused by normal flow dynamics. Consideration of possible air entrainment was apparently not made, even though the noises appeared only after the plant was placed in a mid-loop condition. Operators were aware of the noises for approximately two days prior to notifying a system engineer.

2) On March 26, 1989, operators attempted to minimize or eliminate the flow noise by slightly adjusting various throttle valves. In doing so, they increased SDC flow from 4100 gpm, the maximum flow recommended by procedure, to 4250 gpm. The procedure indicated that the 4100 gpm recommendation was based on preventing vortexing or air entrainment in the SDC flow path.

3) On March 27, 1989, subsequent to increasing SDC flow to 4250 gpm, air bubbles appeared in the tygon tube level indicator associated with the operating SDC train. Operators reduced SDC flow and eliminated the air bubbles. A system engineer walked down the flow path, but made no immediate recommendations.

4) On March 28, 1989, one day later, air bubbles reappeared in the same tygon tube indicator, and the system engineer concurred with operations that the SDC system should be vented. An estimated 100 gallon volume of air was then vented from the system.

Based on the above observations, the inspector concluded that the plant experienced vortexing and air entrainment during mid-loop operations. This is considered a violation of regulatory requirements (530/89-16-03). In addition, operators appeared to

A1

inappropriately attempt to reduce flow noise by exceeding procedural recommendations to limit total SDC flow. Finally, the onsite engineering staff was slow to recommend corrective action. Licensee management restated their commitment to ensuring that all appropriate operations and engineering staff, including management, are briefed on the significance of these events prior to the next mid-loop operation with fuel in the vessel. Furthermore, licensee management commited to establishing, by adequate technical means, the actual margin to vortexing prior to the next mid-loop operation. This is part of open item (530/89-16-02), addressed earlier in the section.

In addition, the inspector noted that the licensee was pursuing a change to the minimum SDC flow required by Technical Specifications.

c. Evaluation of Oversight Group Effectiveness.

The inspector reviewed QA Monitor Report No. MOR89-0025 and Independent Safety Engineering (ISE) surveillance report No. 89-012, both covering Unit 3 mid-loop operations. The inspector assessed the degree to which these reports formed a self critical review of the Unit 3 mid-loop operation, and their emphasis on corrective actions needed prior to another unit entering a mid-loop condition. The inspector determined that neither report recommended any corrective action to be completed prior to the next mid-loop operation. The QA report was critical only of some differences between the training lecture given to the Technical Staff and the final approved RCS Drain Operation procedure. The ISE report, under "Recommendations and Future Actions", only committed the ISE group to evaluate the inaccuracy of the SDC flow instrument and to review changes to the licensee's commitment to monitor the tygon tube level indications. Neither the QA or the ISE reports were critical of the adequacy of procedures in use.

The inspector concluded that the QA and ISE critiques were ineffective in recognizing the scope and depth of needed changes to procedures, organizational interfaces, and operating policy. Licensee management acknowledged these concerns and stated that renewed emphasis would be given for these groups to provide more critical reviews.

In conclusion, the licensee's preparations and conduct of mid-loop operations, following their commitments to NRC Generic Letter 88-17, did not prevent several problems from occurring, including entry of the plant into a vortexing condition which is a precursor to air binding a SDC pump and loss of SDC flow. The licensee's corrective action in response to these concerns will be carefully reviewed.

No violations or deviations of NRC requirements were identified.

A2

Arizona Public Service Company
P.O. BOX 53999 • PHOENIX, ARIZONA 85072-3999

102-01315-WFC/TDS/JJN
June 26, 1989

WILLIAM F. CONWAY
EXECUTIVE VICE PRESIDENT
NUCLEAR

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555

Reference: Letter from M. M. Mendonca, Acting Chief, Reactor Projects Branch, U. S. Nuclear Regulatory Commission to Arizona Nuclear Power Project, Attn. W. F. Conway, Executive Vice President, dated May 26, 1989

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Docket No. STN 50-528 (License No. NPF-41)
STN 50-529 (License No. NPF-51)
STN 50-530 (License No. NPF-74)
Reply to Notice of Violations - 528/89-16-01, 528/89-16-03, 528/89-16-04, 530/89-16-01, 530/89-16-03

File: 89-070-026

This letter is provided in response to the inspection conducted by Messrs. T. Polich, D. Coe and G. Fiorelli on March 20 through April 26, 1989. Based upon the results of this inspection, violations of NRC requirements were identified. These violations are discussed in Appendix A of the referenced letter. A restatement of the violations and PVNGS's responses are provided in Appendix A and Attachments 1 and 2, respectively, to this letter.

Very truly yours,

William F. Conway

William F. Conway
Executive Vice President,
Nuclear

WFC/TDS/JJN/kj

Attachment

cc: J. B. Martin
M. J. Davis
T. L. Chan
T. J. Polich
A. C. Gehr

A2

102-01315-WFC/TDS/JJN
June 26, 1989

APPENDIX A

NOTICE OF VIOLATION

Arizona Nuclear Power Project
Palo Verde Units 1, 2, and 3

Docket Numbers 50-528, 50-529, and 530
License Numbers NPF-41, NPF 51, and NPF-74

During an NRC inspection conducted from March 20 through April 26, 1989 two violations of NRC requirements were identified. Violation A pertains to Unit 3, while Violation B pertains to Units 1, 2, and 3. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," 10 CFR Part 2, Appendix C, 1980, the violations are listed below:

A. 10 CFR Part 50, Appendix B, Criterion B states in part: "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings."

Contrary to the above, on March 11, 1989, the licensee issued procedure 43OP-3ZZ16, "RCS Drain Operations", which was not appropriate to activities affecting the quality of Reactor Coolant System (RCS) operation during reduced RCS inventory conditions. This procedure was not appropriate to the circumstances in that (1) Appendix D, Page 1 of 2, was an incorrect RCS level versus shutdown cooling flow correction curve for the RCS temporary level indication system configuration used, and (2) procedural provisions intended to prevent vortexing and air

entrainment were ineffective, resulting in actual air entrainment even though procedural requirements were met.

This is a Severity Level IV Violation (Supplement I).

B. Technical Specification 6.8.1 states, in part: "Written procedures shall be established, implemented, and maintained covering... the recommendations in Appendix A of Regulatory Guide 1:33, Revision 2, February, 1978 ..." (RG 1.33)

1. RG 1.33 is implemented in part by ANPP procedure 01AC-0AP01, Revision 0, "Format and Content of Nuclear Administrative and Technical Procedures," Section 3.4.2, which states: "Each document, or changes thereto, shall be reviewed and approved prior to use in accordance with 01AC-0AP02, "Review and Approval of Nuclear Administrative and Technical Procedures."

   Contrary to the above, between September 1 and December 23, 1988, surveillance test procedures 72ST-9CL04, 73ST-9CL06, and 73ST-0CL07 were conducted using criteria which had not been reviewed and approved prior to use in accordance with 01AC-0AP02.

2. RG 1.33 paragraph 2, "General Plant Operating Procedures," recommends procedures for "Operation at Hot Standby."

   RG 1.33 is implemented in part by ANPP procedure 41OP-1SG01,

Revision 8, "Main Steam," which requires in part, in paragraph 4.0, "Placing the Main Steam Lines in Service with the Main Steam Isolation Valves Open," completion of Appendix C, "Atmospheric Dump Valve Line Up." Appendix C indicates that accumulator isolation valve SG-V354 is to be open.

Contrary to the above, Unit 1 Atmospheric Dump Valve (ADV) No. 178 nitrogen isolation valve SG-V354 was closed on April 10, 1989, rendering the ADV inoperable from the Control Room.

3. RG 1.33, Paragraph 9, "Procedures For Performing Maintenance," recommends procedures for the control of maintenance, repair, and replacement.

RG 1.33 is implemented by ANPP procedure 30DP-9MP01, Revision 1, "Conduct of Maintenance," which states in paragraph 3.3.3 that "Maintenance and Contractor Support Personnel Shall Perform Work in Accordance With Approved Procedures and Work Documentation".

Contrary to the above, on April 4, 1989, the installation of a fuel line on the Unit 1 "A" emergency diesel was not performed in accordance with the instructions in approved work package No. 351776, resulting in the fuel line's disconnection from the cylinder while the engine was running.

This is a Severity Level IV Violation (Supplement I).

ATTACHMENT 1

Reply to Notice of Violation

530/89-16-01, 530/89-16-03

A.I REASON FOR VIOLATION (530/89-16-01)

On March 11, 1989, APS issued an Administrative Control procedure "Reduced Inventory Operation", (40AC-90P20) and Operating Procedure "RCS Drain Operations" (43OP-3ZZ16) to control plant operations and evolutions during mid loop operations. In March, 1989 Palo Verde Unit 3 entered its first reduced inventory operations during a refueling outage. This refueling outage was the first time that the procedures governing reduced inventory operations were used.

On March 11, 1989, "RCS Drain Operations" procedure, 43OP-3ZZ16, was issued which incorporated a correction curve for the "A" RCS loop level indication. The correction curve was generated in response to an NRC generic letter, which requires two trains of temporary level indication, and is used to correct for the effects of shutdown cooling flow on the indicated level. However, when the correction curve was incorporated into the procedure, it was not recognized that the curve was for a permanent level indicator to be installed in the future rather than the location currently used for tygon tubing.

During drain-down of the RCS, the level indicators for the pressurizer level and the tygon tubing did not meet the cross check

criteria of ±6 inches specified in the procedure (430P-3ZZ16). The tygon hoses were walked down to check for any kinks or loop seals. No discrepancies were noted which would account for the approximately 1 foot difference in levels. During the draining process, both of the temporary level indicators and the cold calibrated pressurizer level instrument were tracking consistently. The System Engineer was contacted at home and recommended continuing the RCS drain-down, using the level indicator which did not require flow compensation, while he was in transit to the site. This decision was acceptable based on the fact this is the accepted method of monitoring level and only one temporary level indicator is required to be used until RCS level is below the 111 foot elevation. Drain-down was recommenced and continued until an indicated pressurizer level of 1 percent was reached.

When the System Engineer arrived on site, troubleshooting was conducted which involved switching the operating trains of SDC and letting the indicated levels stabilize while both trains of SDC were secured for a short period of time. When both trains were secured, the levels stabilized to within 1/2 inch of each other. The "A" train of SDC was then started, and indicated level data was collected while slowly increasing flow to the normal operating flow rate. Analysis of this data showed that the "A" train level dynamic correction curve was not correct and that the data taken matched with the correction curve that was originally in the Mode 6 General Operating Procedure (GOP).

The original Mode 6 GOP curve was incorporated into 430P-3ZZ16 via a Temporary Procedure Change Notice (TPCN) and drain-down operations resumed. No other problems with level cross checks were noted.

Research into the origins of the level correction curves utilized in 430P-3ZZ16 revealed that the curves had been provided in response to an NRC generic letter (via an Engineering Action Request) which required that two trains of temporary level indication be provided. The Engineering Action Request (EAR) was dispositioned and provided level correction curves for both trains in all three Units. Both curves were derived from empirical data obtained from Unit 2 utilizing level indicators which were connected to the same locations that would be used for the permanent level indicating system (vice the locations used for tygon tubing).

During incorporation of these curves into 430P-3ZZ16, the fact that the location used for connecting the reference leg of the "A" train tygon level indicator via the MT procedure was different than the one which would be used for the same train in the permanent installation was missed. The dynamic head loss difference between these two connection points caused the one foot difference between the two level correction factors. This was overlooked during the preparation, review, and approval of 430P-3ZZ16 for Unit 3.

An investigation of this event is continuing, however, based on the information currently available, it has been determined that the

request for engineering to provide correction curves for the effect of shutdown cooling flow did not specify the location of the instrument taps for the tygon level indicator. The letter transmitting the correction curves clearly indicated that the curves were generated for the instrument taps associated with a planned permanent level indication system. The procedure writer did not recognize this fact or the potential effect on the correction curve.

Additionally, during the technical review of the procedure, the engineering organization which generated the curves was not specified as a cross disciplinary reviewer. Administrative control procedures require a review by individuals with the requisite technical expertise but does not provide sufficient guidance for determining which group is responsible for performing the cross disciplinary review and the requirements for the review.

Although the procedure was reviewed by the system engineer, he did not recognize that different instrument taps were utilized for the generation of the curves than are used for the tygon tubing level indicator.

A.1.II CORRECTIVE STEPS TAKEN AND RESULTS ACHIEVED

As immediate corrective action, Unit 3 issued a TPCN to 430P-3ZZ16 to incorporate the original Mode 6 level correction curve. An Engineering Evaluation Request was also generated to document the

cause of the level difference. The results of the evaluation have been incorporated into 410P-1ZZ16 (Unit 1), and will be incorporated into 420P-2ZZ16 (Unit 2) prior to their use.

A.1.III CORRECTIVE STEPS THAT WILL BE TAKEN TO AVOID FURTHER VIOLATIONS

An incident investigation for this event is in progress. As part of this investigation, the findings noted in Section A.1.I will be reviewed. Upon completion of this investigation, appropriate corrective action will be developed, assigned, and due dates will be scheduled for implementation.

A.1.IV DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

Full compliance was achieved on March 27, 1989 when 430P-3ZZ16 was revised to incorporate the correct level correction curves.

A.2.I REASON FOR VIOLATION (530/89-16-03)

After a period of time at mid loop operations, Unit 3 personnel noted a flow noise developing in the vicinity of the shutdown cooling (SDC) injection valves for the "A" train. Operations attempted to determine the source of the noise by varying the flow through the various flow control valves to try to determine whether the noise could be minimized by a particular flow path lineup. SDC flow rate was increased to approximately 4250 gpm (the band allowed by procedure is 4000 to 4400 gpm) from approximately 4100 gpm. At this flow rate, operators noted small air bubbles and air slugs in the tygon hose level indicator which was connected to the RCS loop with the operating train of SDC. Flow was then throttled back to 4150 gpm and the system allowed to stabilize. Small bubbles were still observed in the tygon tubing, so flow was further throttled to 4070 gpm. After further stabilization no bubbles were observed. The RCS water level was unchanged throughout this evolution and the flow noise continued as before.

Since the SDC cross connect piping to the containment spray (CS) pump provides a natural high point in a stagnant flow area for collection of non-condensable gasses, it was suspected that gas had collected in this area and may be contributing to the problem. The cross connect piping was vented for approximately 6-8 minutes before a steady stream of water issued from the vent, indicating a gas pocket had existed in this high point of the SDC piping. The

displacement of the gas pocket resulted in a drop of the RCS level of approximately 3/4 of an inch.

It is believed that the increase in flowrate to approximately 4250 gpm caused additional air entrainment. The flow noise remained after the venting operation and continued until RCS level was raised out of the mid loop condition. Nominal flow noise is an expected occurrence for acceptable levels of air entrainment flowing through valves and system piping. Additional periodic venting of the system yielded no significant amounts of gas, and venting was discontinued after several days.

Prior to this event, an engineering evaluation of the allowable SDC flowrate during mid loop conditions was performed. The flowrate specified in the procedure was selected to meet Technical Specification requirements (i.e., > 4000 gpm) and plant operational requirements (i.e., < 4400 gpm to prevent gas binding or pump failure). The upper flowrate limit (i.e., 4400 gpm) was determined to be acceptable based on flowrate testing and data collection performed during startup. Gas binding or pump failure did not occur up to flowrates of 4400 gpm; however, expected air entrainment occurred and was determined not to adversely effect the system at flowrates of 4000 to 4400 gpm during mid loop operations.

A.2.II CORRECTIVE STEPS TAKEN AND RESULTS ACHIEVED

To minimize the effects of excessive air entrainment and potential adverse affects on the RCS level indication, engineering guidance has been provided that SDC flow should be maintained between 4000 and 4100 gpm when the RCS level is below 104 feet. This requirement has been incorporated into 430P-3ZZ16 and 410P-1ZZ16. This requirement and/or additional guidance will be provided in the initial issue of 420P-2ZZ16.

A.2.III CORRECTIVE STEPS THAT WILL BE TAKEN TO AVOID FURTHER VIOLATIONS

A test has been performed to determine the actual flow conditions in the RCS and SDC piping while at or near mid loop operations. The test involved varying the SDC flowrate at various RCS levels. This test was performed in Unit 3 after fuel off-load was completed and the RCS level was lowered back to a mid loop condition. The results of the testing will be used to determine the required SDC operating parameters for applicable RCS levels. These results are expected to be incorporated into the appropriate operating procedures by September 30, 1989.

Further guidance will be given in the RCS drain operations procedure training that Auxiliary Operators (AOs) should be aware of increased pump noise, bubbles in the tygon hoses, flow noises/rumble when touring in the areas of the operating SDC loop. If these conditions

are noted, then venting of the system high points is recommended and closer observation of the system will be required to monitor for further symptoms of impending vortexing. This training is expected to be completed by September 30, 1989.

A.2.IV DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

Although APS believes that 430P-3ZZ16 provided appropriate guidance to prevent gas binding and SDC pump failure, on April 17, 1989 430P-3ZZ16 was revised to require shutdown cooling flow be less than 4100 gpm.

AB 89-070-02
89-019-02
CC: NRC Resident

UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION V
1450 MARIA LANE, SUITE 210
WALNUT CREEK, CALIFORNIA 94596

JUL 13 1989

Docket Nos. 50-528, 50-529, 50-530

Arizona Nuclear Power Project
P. O. Box 52034
Phoenix, Arizona 85072-2034

Attention: Mr. W. F. Conway
Executive Vice President

Gentlemen:

Thank you for your letter of June 26, 1989, in response to our Notice of Violation and Inspection Report No. 50-528/89-16, 50-529/89-16 and 50-530/89-16, dated May 26, 1989, informing us of the steps you have taken to correct the items which we brought to your attention. Paragraph A.1.III of your response states that an incident investigation of the problems encountered with mid-loop operation at Unit 3 is in progress. We request that you provide us the results of your investigation and your planned corrective actions, following the completion of your investigation. As discussed between Mr. S. Richards of my staff and Mr. T. Shriver of your staff, we understand that your investigation will be completed by August 30, 1989.

Our Inspection Report 50-528/89-16 and the Office of Nuclear Reactor Regulation letter (Chan to Karner) dated May 5, 1989, which addressed your response to Generic Letter 88-17, "Loss of Decay Heat Removal," both have questioned whether you have thoroughly reviewed and addressed the issue of decay heat removal during mid-loop reactor coolant system operation. As stated in Inspection Report 50-528/89-16, paragraph 12, we understand that you are reassessing the actions taken in response to Generic Letter 88-17 and will complete this reassessment and appropriately brief management, engineering, and operations personnel, prior to any further mid-loop operations with fuel in the reactor vessel. We want to again reemphasize the importance the NRC places in being properly prepared for the conduct of mid-loop operations. Your actions regarding the above issues will be reviewed during a future inspection.

Your cooperation with us is appreciated.

Sincerely,

R P Zimmerman

R. P. Zimmerman, Acting Director
Division of Reactor Safety
and Projects

REPORT NUMBER: _____

PERSONNEL STATEMENT

NAME: Dave FAULKNER EXT. 2707 STA. 6070

Position/Title: Operations Standards Procedure Writer.

Your statement should include Unit conditions prior to the event, what indications you noted that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies and noted procedural deficiencies. Include any information, no matter how seemingly unimportant which might be important to review of this event as well as actions you recommend to avoid recurrence, if any.

During procedure development, a compensation curve for Train B typon level indicator was requested from NED. One had not previously been provided and as such, SDC operation were limited to only Train A when drained.

NED, Steve Garrett, generated EAR 88-1671 and its response, letter 167-03167-JWR/SLG dated 12/23/88 (both are attached). The disposition included a compensation curve for the Train A RWLIS system. I incorporated this Train A compensation curve, not realizing that there was an elevation difference between RCTE-V214 and SIA-V056. This difference in elevation caused the indications to be out of the "within 6 inches" tolerance specified by the

See last page.

Signature Date/Time

REPORT NUMBER: _____

A4

PERSONNEL STATEMENT

NAME: Dave Faulkner EXT. STA.

Position/Title: See pg 1

Your statement should include Unit conditions prior to the event, what indications you noted that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies and noted procedural deficiencies. Include any information, no matter how seemingly unimportant which might be important to review of this event as well as actions you recommend to avoid recurrence, if any.

operating procedure (430P-3ZZ16). This was noted and pursued by U-3 operations staff while lowering level to the 113 Ft 6 in. elevation. Only one indicator is required for draining operations between 10% PZR level and 111 Ft elevation (Entry into a Reduced Inventory condition). The System Engineer was contacted early on and concurred with the draining to the 113 Ft 6 in elevation. The EAR was provided to the control room staff and system Engineer. The system engineer immediately pinched out the cause of the problem when he was shown the EAR even though the curve used had been included on a cross discipline review performed by him prior to the procedure issue.

See last page.

Signature Date/Time

REPORT NUMBER:_____

PERSONNEL STATEMENT

NAME: Dave Faulkner EXT. 2707 STA. 6020

Position/Title: See pg one

Your statement should include Unit conditions prior to the event, what indications you noted that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies and noted procedural deficiencies. Include any information, no matter how seemingly unimportant which might be important to review of this event as well as actions you recommend to avoid recurrence, if any.

The correct compensation curve was TPCW into the procedure, correct instrument correlation were obtained and the RCS was then drained to Mid-Loop without further related incident.

The guidance provided in 430P-3226, Rev 0, concerning SDC flow rates came from EER 87-SE-134 and 87-SE-205 (attached). Specifically, the flow required by the EER's and by 430P-3226 when in Mid-Loop (below the 64" elevation per the EER's & per 430P-3226) was 4000-4400 gpm. ~~7~~ 7/31/87 This lower flow was intended to minimize the vortexing and to thereby minimize the potential of air binding of a SDC pump/loop while in a Reduced Inventory condition.

See last page

Signature Date/Time

REPORT NUMBER:_____

8g 4 of A.4

PERSONNEL STATEMENT

NAME: Dave Faulkner EXT. 2707 STA. 6070

Position/Title: see pg 1

Your statement should include Unit conditions prior to the event, what indications you noted that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies and noted procedural deficiencies. Include any information, no matter how seemingly unimportant which might be important to review of this event as well as actions you recommend to avoid recurrence, if any.

In a period of time it was believed necessary to compensate SDC flow for temperature. This came about & was removed from the procedures as a result of EER's 89-SI-030 & 89-SI-063 (neither are attached as they are not truly germane to the notice of violation). Due to the temperature compensation being performed, the new band for SDC flow (actual vice indicated) became 4000 to 4100 gpm. When the temperature compensation was determined to be no longer necessary, the tighter band of 4000 to 4100 was kept due to potential problems addressed by EER 89-SI-031. (This EER is still open pending evaluation of data from testing conducted in unit 3.) This was due to the concern that a vortex was

see last page

Signature Date/Time

REPORT NUMBER: _____

Pg 5 of A-4

PERSONNEL STATEMENT

NAME: Dave Faulkner EXT. 2707 STA. 6070

Position/Title: see pg 1

Your statement should include Unit conditions prior to the event, what indications you noted that a problem existed, your actions as a result of those indications, noted equipment malfunctions or inadequacies and noted procedural deficiencies. Include any information, no matter how seemingly unimportant which might be important to review of this event as well as actions you recommend to avoid recurrence, if any.

forming, and air was being drawn into the SDC pump suction line. An interim solution to this is to periodically vent points of known gas/air accumulation (based on operating experience). This venting, coupled with the reduction in recommended SDC flow has shown itself to be sufficient to prevent accumulation of large gas/air pockets in the SDC piping. This minimizes the likelihood of a loss of SDC due to an air/gas bound SDC pump/loop.

Current plans call for a change to the Tech Specs. to allow flow rates below the current Tech Spec minimum of 4700 gpm. As it is made available, new guidance will be incorporated.

DE Faulk 8/1/89 1730

Signature Date/Time

ANPP ENGINEERING ACTION REQUEST (EAR)

EAR NO.: 88-1671 | LOG DATE: 12-13-88 | Page 1 of 1 Sub 12/19/88

REQUESTOR NAME (PLEASE PRINT): DAVE FAULKNER | EXT.: 2707 | STA.: 6070 | REQUESTED PRIORITY CODE:

DEPARTMENT/ORGANIZATION: OPS STD | REQUESTOR AUTHORIZATION (DEPT. HEAD): | DATE: | REQUESTED COMPLETION DATE:

PART A — REQUEST

DESCRIBE ENGINEERING ACTION REQUESTED. INDENTIFY/LIST IMPORTANT SOURCE AND REFERENCE DOCUMENTS. ATTACH ADDITIONAL PAGES AS NECESSARY.

PROVIDE THE FOLLOWING:

1.) COPY OF U2 SDC FLOW DATA LETTER

2.) PLOT OF B TRAIN CURVE (TAPPED OFF V057)

3.) OFFICIAL MEMO FROM JWR TO JOHN POLLARD (COPY DAVE FAULKNER)

PART B — PLAN (COMPLETED BY R.E.)

TASK TITLE: (PLEASE PRINT): SDC TRAIN B CORRECTION CURVE DATA

SOURCE/REFERENCE DOCUMENT(S) NO.: 167-02375-EC5/SLG 5/23/88 | TASK CODE: H24 | PRIORITY CODE: B1 | REQ. ANAL. SCH. COMPL.:

RESPONSIBLE ENGINEER: (PLEASE PRINT): S.L. GARRETT | UNIT: 91.44 | EXT.: 4264 | ESTIMATED START DATE: 12/13/88

WBS NO.: MM9E0051 | TOTAL ESTIMATED COST($): $120 | ESTIMATED COMPLETION DATE: 12/23/88

REQUEST CONFIRMATION: (REQUESTOR'S NAME): DAVE FAULKNER (TELECON) | DATE: 12/9/88

RESPONSIBLE SUPERVISOR: J.W. Rowland | DATE: 12/9/88

PEM/NEM (REQUIRED APPROVAL - OVER 200 EST. M.H.): N/A | DATE:

ESTIMATED MANHOURS

M/C	
E	
A/C	
IC	1
NA	
HP/C	
OTHER	
TOTAL	4

ACTUAL START DATE 12/12/88

TOTAL ACTUAL HOURS 2.5

PART C — DISPOSITION (COMPLETED BY R.E.)

DISPOSITION/RESULTS SUMMARY (INCLUDE NECESSARY FOLLOW-UP ACTIONS):

REQUESTED INFO PROVIDED.

SEE ATTACHED MEMO

167-03167-JWR/SLG

DATED 12/23/88

LIST NEW ENG. DOCUMENTS PREPARED TO DISPOSITION THE EAR	DOCUMENT ISSUE DATE	LIST AFFECTED DESIGN AND LICENSING DOCUMENTS	REVIEW COMPLETION REFERENCE (DOCUMENT NO. OR RESP. DEPT.)

CLOSEOUT APPROVALS (SIGNATURE/DATE)

RE: 12/23/88

AS: J.W. Rowland

PEM/NEM: (AS REQUIRED)

EAR CLOSEOUT DATE: 12/27/88

PV411-90M Rev 4-86

FM16.01.10A

A5

Arizona Nuclear Power Project

ID# 167-03167-JWR/SLG

DATE: December 23, 1988

TO: J. T. Pollard
Sta.# 2706
Ext. 6070

Prepared by:
Signature S. L. Garrett
Name/Ext./Sta. S. L. Garrett/4264/7010

Reviewed By:
Signature J. H. Hesser
Name/Ext./Sta. J. H. Hesser/4233/7010

Approved by:
Signature J. W. Rowland
Name/Ext./Sta. J. W. Rowland/4059/7010

File: 88-159-419

SUBJECT: SDC Train B Level Decrease Data

PURPOSE

The purpose of this memo is to provide SDC Train B Level Decrease Data for the Refueling Water Level Indicator (Tygon Tube) as requested by Dave Faulkner (EAR 88-1671).

DISCUSSION

During the design of the Refueling Water Level Indication System (permanent system), level decrease data due to shutdown cooling flow was taken on Unit 2. The results of this data collection are shown in Attachment 1. As can be seen from the results, both Train A and Train B data was taken. The Train A Tygon tube was connected at valve P-SIA-V056 and the Train B tube was connected at valve P-SIB-V057.

Per drawings 01-P-SIF-105, Rev. 10 and 23-P-SIF-105, Rev. 12, the applicable configurations are similar for all three (3) units. Therefore, the Unit 2 data obtained should apply to Units 1 and 3 as well.

For your convenience, plots of both trains data are attached. This same set of data will be used for the permanent Refueling Water Level Indication System.

Should any question arise, contact S. L. Garrett at extension 4264.

JWR/SLG/jle

1542A/2306A

A5

Attachments: (1) Letter 167-02375-ECS/SLG, dated May 23, 1988
(2) Refueling Water Level Monitoring System LOOP A
△ P versus Shutdown Cooling System Flow
(3) Refueling Water Level Monitoring System LOOP B
△ P versus Shutdown Cooling System Flow
(4) Portion of 01-P-SIF-105, Revision 10
(5) Portion of 23-P-SIF-105, Revision 12

cc: D. Faulkner
E. C. Sterling
R. W. Burge

A5

Arizona Nuclear Power Project
P O BOX 52034 • PHOENIX, ARIZONA 85072-2034

167-02375-ECS/SLG
May 23, 1988

Impell Corporation
350 Lennon Lane
Walnut Creek, CA 94598

Attention: Emerson McFarland
Project Manager

Gentlemen:

Subject: Refueling Water Level Indication System
(DCP 1/2/3FJ-RC-151, Rev. 1) Level Decrease
Data due to Shutdown Cooling Flow
File: 88-159-419

ANPP is herein attaching the level decrease data due to shutdown cooling flow for the Refueling Water Level Indication System (DCP 1/2/3FJ-RC-151, Rev. 1). The data was taken by A. Hartwig on May 17, 1988 and he confirmed that the shutdown cooling flow passing by the applicable taps (i.e., V056 and V057) was the same as that passing by the applicable flow transmitters (i.e., FT-306 and 307).

Should any questions arise, contact S. L. Garrett at (602) 371-4264.

Very truly yours,

Edward C. Starling

E. C. Starling
Manager Engineering

ECS/SLG/jle
Attachment

cc: A. W. Hartwig
J. W. Rowland
J. H. Hasser
J. B. Hebison
G. W. Sowers
L. L. Hanson
G. E. Hanson (Impell)

A5

ATTACHMENT

Level Decrease Data for Train A

Initial level 103'-1-1/2" as read on "B" Train indication.

SDC Flow	Level	Remarks
5000 GPM	98'-10"	Approximate value. This reading was difficult to obtain because the tygon tube passes through the 100' level.
4500 GPM	99'-8-1/2"	
4000 GPM	100'-4-1/4"	
3500 GPM	101'-0"	
3000 GPM	101'-6"	
2500 GPM	101'-11"	
2000 GPM	102'-4-3/4"	
1500 GPM	102'-8-1/4"	
1000 GPM	102'-8-3/4"	

These readings are average values. Due to difficulty in maintaining a stable flow rate, the level oscillated as much as ± 1/2".

A5

ATTACHMENT

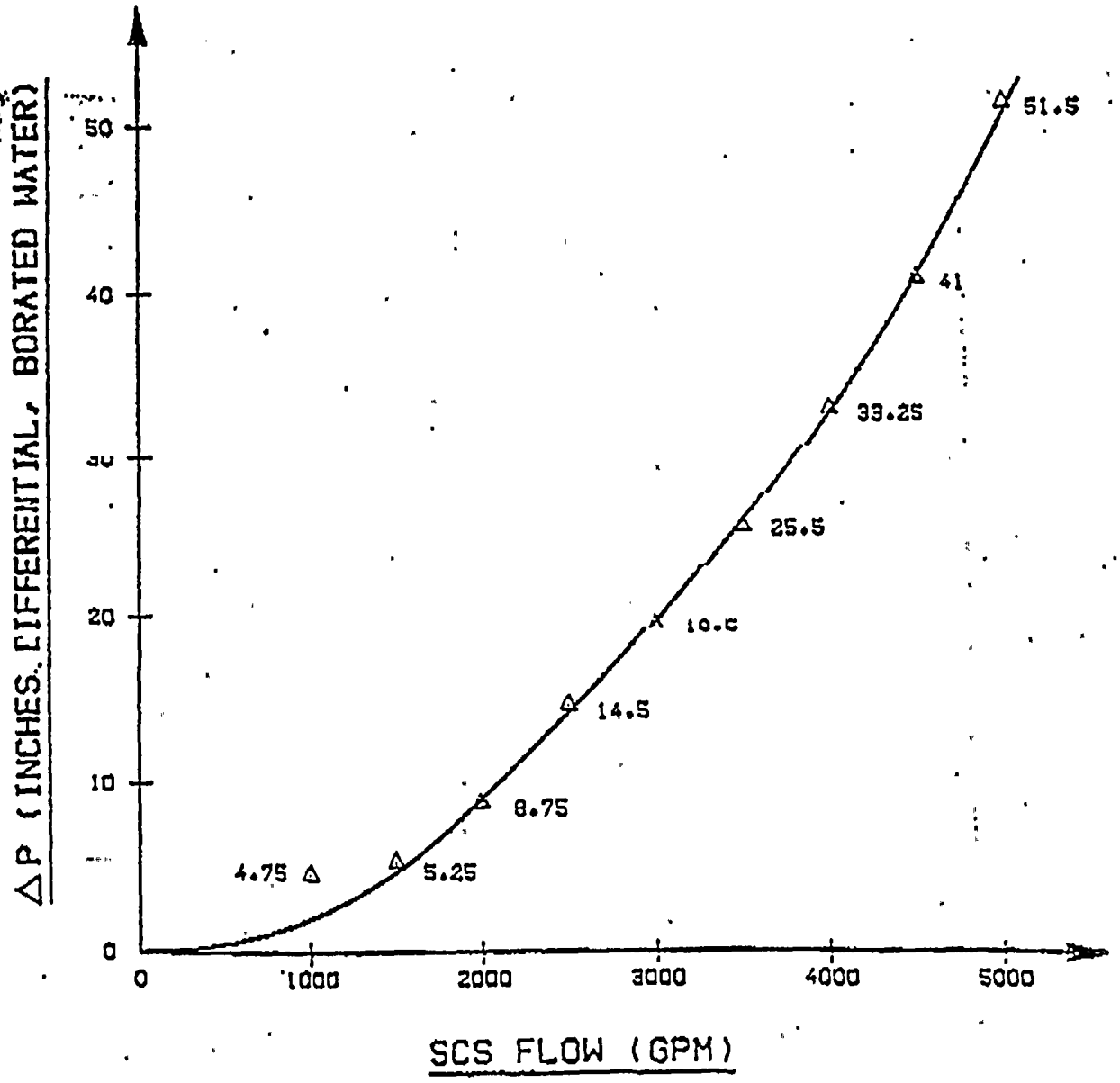
Level Decrease Data for Train B

Initial level 102'-10-3/4" as read on "A" Train indication.

SDC Flow	Level	Remarks
5000 GPM	99'-2"	
4500 GPM	99'-11"	Variations of ± 1 inch at this flow rate
4000 GPM	100'-5-1/4"	
3500 GPM	100'-10-1/2"	
3000 GPM	101'-5-1/2"	
2500 GPM	101'-9-3/4"	
2000 GPM	102'-2-1/2"	
1500 GPM	102'-7-1/2"	Variations of ± 1 inch at this flow rate
1000 GPM	102'-9-1/2"	

These readings are average values. Due to difficulty in maintaining a stable flow rate, the level oscillated between 1/8" and 1/2" except where noted.

A5



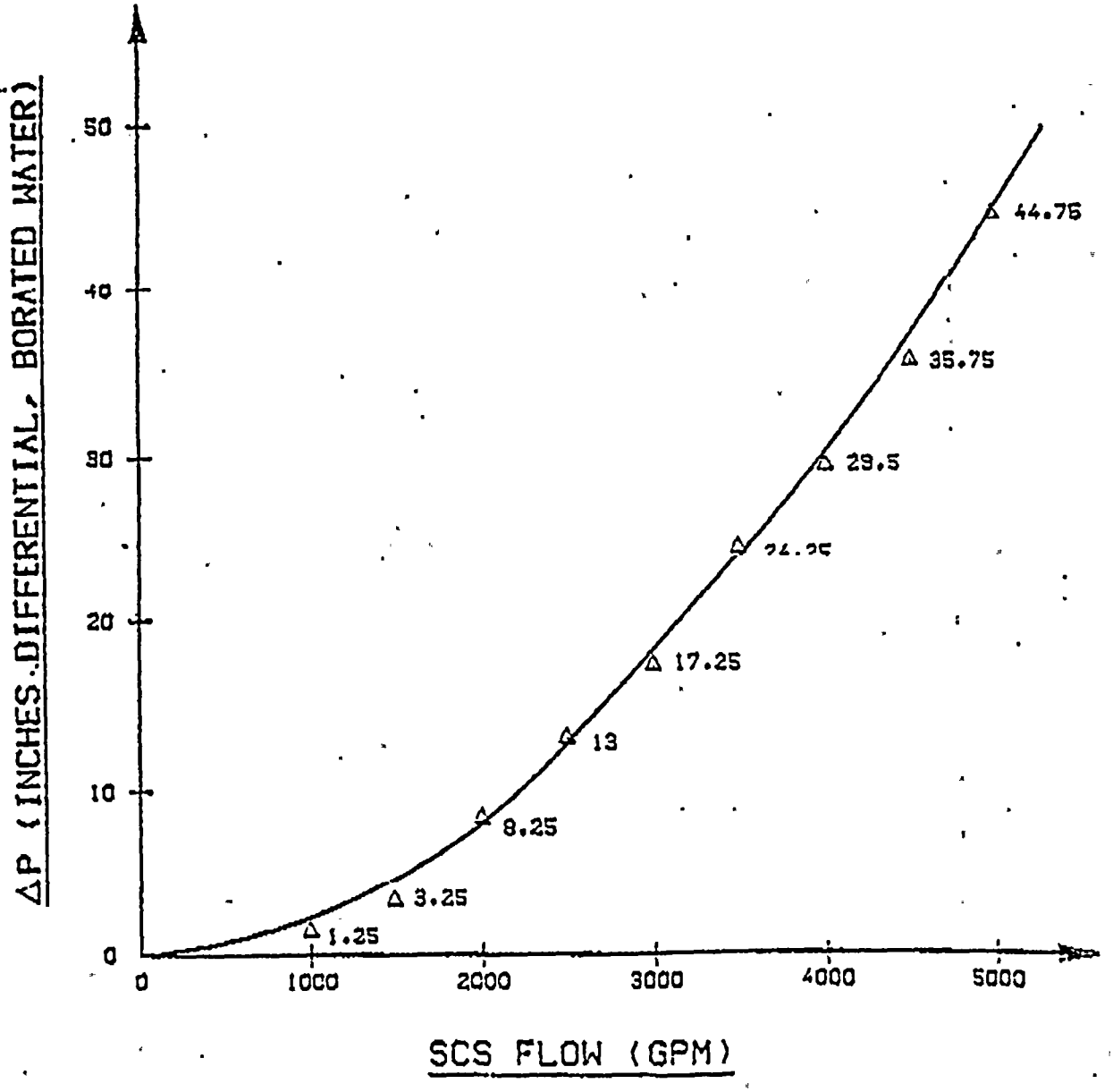
CHG. NO.	REFERENCE	NO.	DATE	REVISIONS	DR	CH'K	ENG	DS	QAE	R

Arizona Nuclear Power Project

REFUELING WATER LEVEL MONITORING SYSTEM
LOOP A ΔP VERSUS SHUTDOWN COOLING SYSTEM FLOW

SCALE	DRAWING NO.	REV
NONE	ATTACHMENT 2	

A5



CHG. NO.	REFERENCE	NO.	DATE	REVISIONS	DR	CHK	ENG	OS	QAE

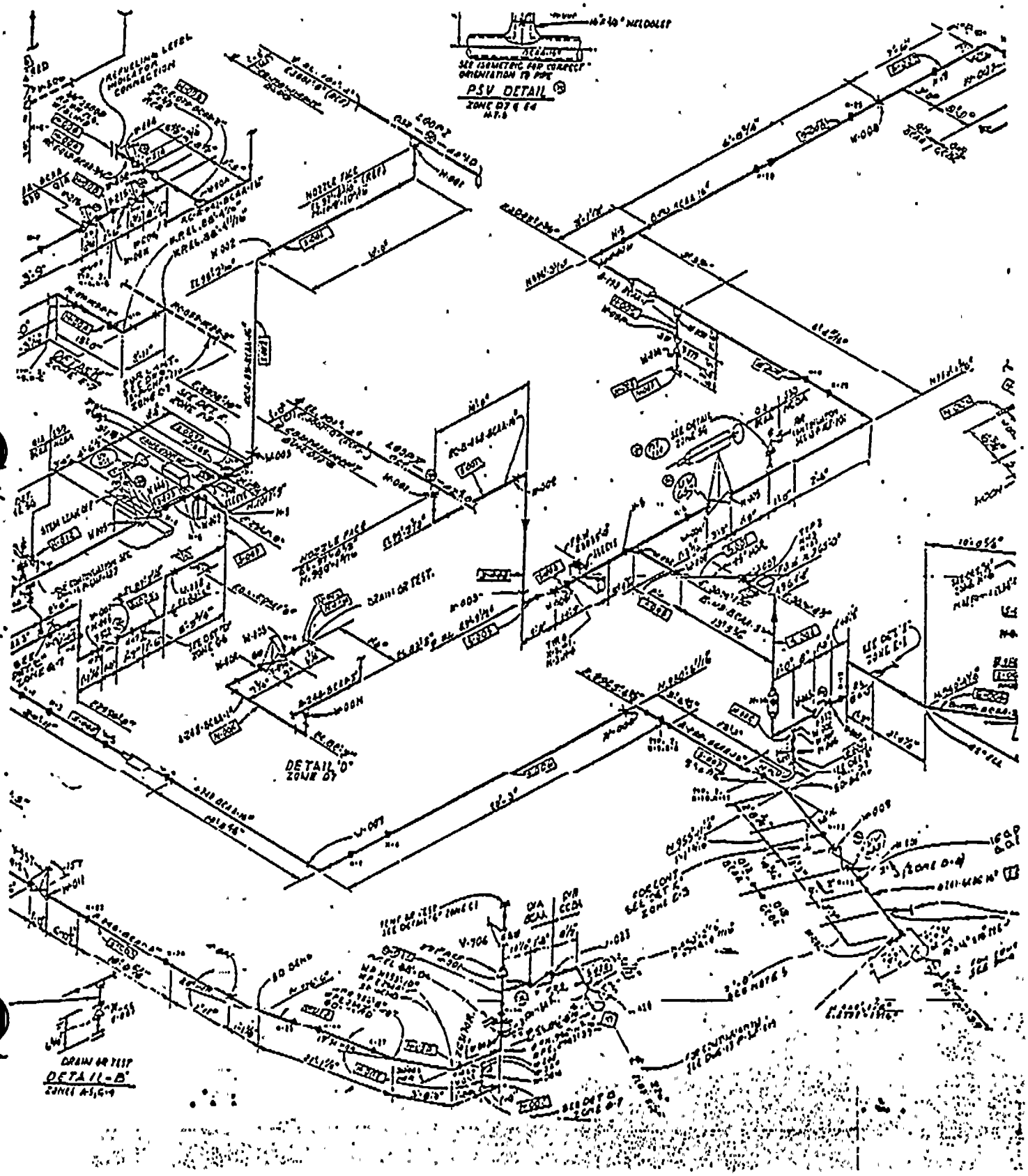
Arizona Nuclear Power Project

REFUELING WATER LEVEL MONITORING SYSTEM
LOOP B ΔP VERSUS SHUTDOWN COOLING SYSTEM FLOW

SCALE	DRAWING NO.	RE
NONE	ATTACHMENT 3	

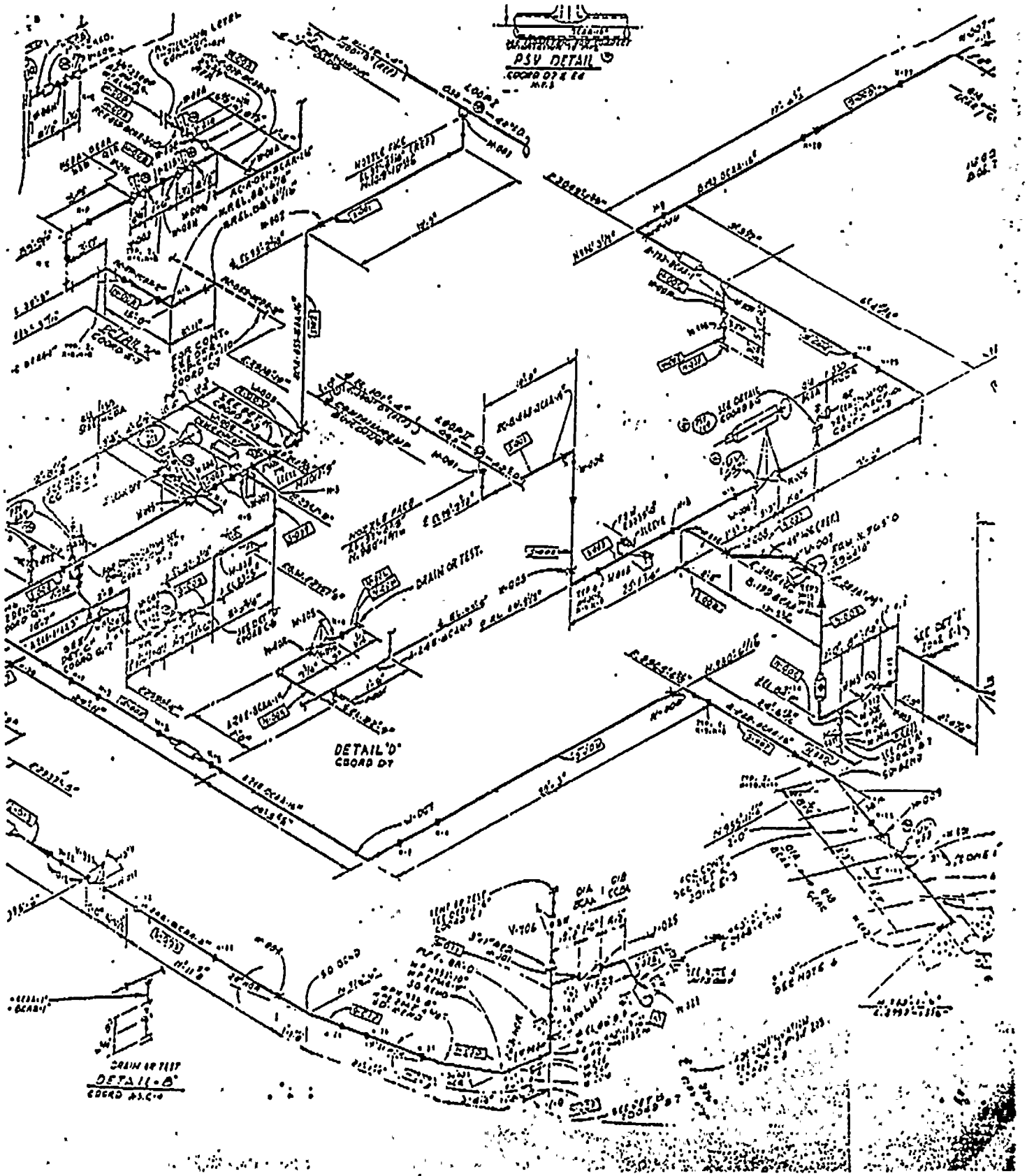
AS

Portion of 01-P-SIF-105 Rev. 10



AS

Portion of 23-P-SIF-105 Rev. 12



A6

№ 08713

ANPP INSTRUCTION CHANGE REQUEST

INITIATION

ORIGINATOR

ORIGINATOR'S NAME:	STA. NO.:	EXT.:	DATE:	SHIFT:
M R Halpin	6070	2710	8-1-89	☐ D ☐ S ☐ M

SUBJECT

PROCEDURE OR TASK NO.:	T.S.'S RELATED? (Check One)	(Check One)	SYSTEM: (If Applicable)
01AC-0AP02	☐ Yes ☐ No	☐ QR ☐ QAG ☐ NQR	

PROBLEM DESCRIPTION

IIR 3-3-89-019 Action #3 identifies the need to implement increased guidance and details for the technical reviewer and cross discipline reviewer. (See Attached) Action is 120 days from Report Approval and Approved Date was 10-5-89

SUGGESTED RESOLUTION:
Enhance 01AC-0AP02 to provide increased guidance to the Technical reviewer & cross discipline reviewer

REFERENCES (P & I.D.'S, TECH. MANUALS, ETC.):	ADDITIONAL INFORMATION ATTACHED:
IIR-3-3-89-019	☒ Yes ☐ No

REVIEW

FORWARD TO ORGANIZATION:	FROM ORGANIZATION:
Plt Stds	OPS Stds

ORIGINATOR'S SUPERVISOR:	DATE:	(Check One)	EXPECTED FEEDBACK DATE:
[signature]	9/1/89	☒ Priority ☐ Enhancement	

RESOLUTION

ASSIGNED TO:	DATE:	PRIORITY:

RESPONSIBLE INDIVIDUAL:	ORIGINATOR CONTACTED:
	☐ Yes ☐ No
RESPONSIBLE SUPERVISOR OR DESIGNEE:	DATE:

CHANGE COMPLETE:	PCN NO.:	REV. NO.:	TASK REVIEW DATE:
☐ Yes ☐ No ☐ N/A			

RESPONSIBLE SUPERVISOR'S COMMENTS:

WHITE Copy - FILE • CANARY Copy - ORIGINATOR FEEDBACK • PINK Copy - ORIGINATOR

PV 216-06BA (5-88)

RECOMMENDED CORRECTIVE ACTIONS

1. The procedure writer is to be counseled on the importance of identifying all details when preparing any portion of a procedure. The smallest oversight or conclusion can lead to items of major impact.
(Conclusion Number: 1)

   Responsibility: Operations Standards Supervisor
   Due Date: 30 days after report approval.

2. NED shall develop specific guidelines of ensuring that engineering information transmitted to the site has clearly stated assumptions and limitations. .
(Conclusion Number: 2)

   Responsibility: Nuclear Engineering Manager
   Due Date: 60 days after report approval.

3. Enhance the procedure 01AC-0AP02, Review and Approval of Nuclear Administrative and Technical Procedures to provide the technical reviewer and the cross-discipline reviewer guidance and details as to what a cross-discipline review is to accomplish, the "depth" and detail the review is to take, and who should conduct the cross-discipline reviewer (i.e.; the cross-discipline review is a technical review in the cross-discipline reviewer's area of expertise: engineering to review the procedure from an engineering viewpoint verifying the accuracy, adequacy, applicability, etc., of the types of evolutions, calculations, curves, formulas, etc.; operations to review the procedure from and operations viewpoint. verifying that the evolution is accomplished adequately, it does not create operability and/or operational concerns, chemistry to review the procedure for chemistry concerns/impact; etc.) ICR 08713 submitted to Plant Standards and Control.
(Conclusion Number: 3,5)

   Responsibility: Plant Standards and Control Manager
   Due Date: 120 days after report approval.