

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No: 50-397/92-11  
License No.: NPF-21  
Licensee: Washington Public Power Supply System  
P. O. Box 968  
Richland, WA 99352  
Facility Name: Washington Nuclear Project No. 2 (WNP-2)  
Meeting at: NRC Region V Office  
Walnut Creek, California  
Date of Meeting: March 27, 1992  
Prepared by: K. E. Johnston, Project Inspector, Projects Section 1  
Approved by: W. P. Aug for P. Johnson 4-9-92  
P. H. Johnson, Chief Date Signed  
Reactor Projects Section 1

Meeting Summary:

Management Meeting on March 27, 1992 (Report No. 50-397/92-11)

An open Management Meeting was held to discuss electrical safety, licensing and assurance issues, the 1992 refueling outage scope and challenges, and operations training improvements. A briefing was held on March 26, 1992 to discuss containment atmosphere control (CAC) system problems.

## DETAILS

### 1. Meeting Participants

#### Nuclear Regulatory Commission

- J. B. Martin, Regional Administrator
- B. H. Faulkenberry, Deputy Regional Administrator
- R. P. Zimmerman, Director, Division of Reactor Safety and Projects
- R. A. Scarano, Director, Division of Radiation Safety and Safeguards
- K. E. Perkins, Deputy Director, Division of Reactor Safety and Projects
- F. A. Wenslawski, Deputy Director, Division of Radiation Safety and Safeguards
- \*W. M. Dean, Project Manager, Nuclear Reactor Regulation
- G. P. Yuhas, Chief, Reactor Radiological Protection Branch
- L. F. Miller, Chief, Reactor Safety Branch
- \*S. A. Richards, Chief, Reactor Projects Branch
- \*P. H. Johnson, Chief, Reactor Projects Section 1
- \*R. C. Sorensen, Senior Resident Inspector, WNP-2
- \*D. L. Proulx, Resident Inspector, WNP-2
- \*K. E. Johnston, Project Inspector, Reactor Projects Section 1

#### Washington Public Power Supply System

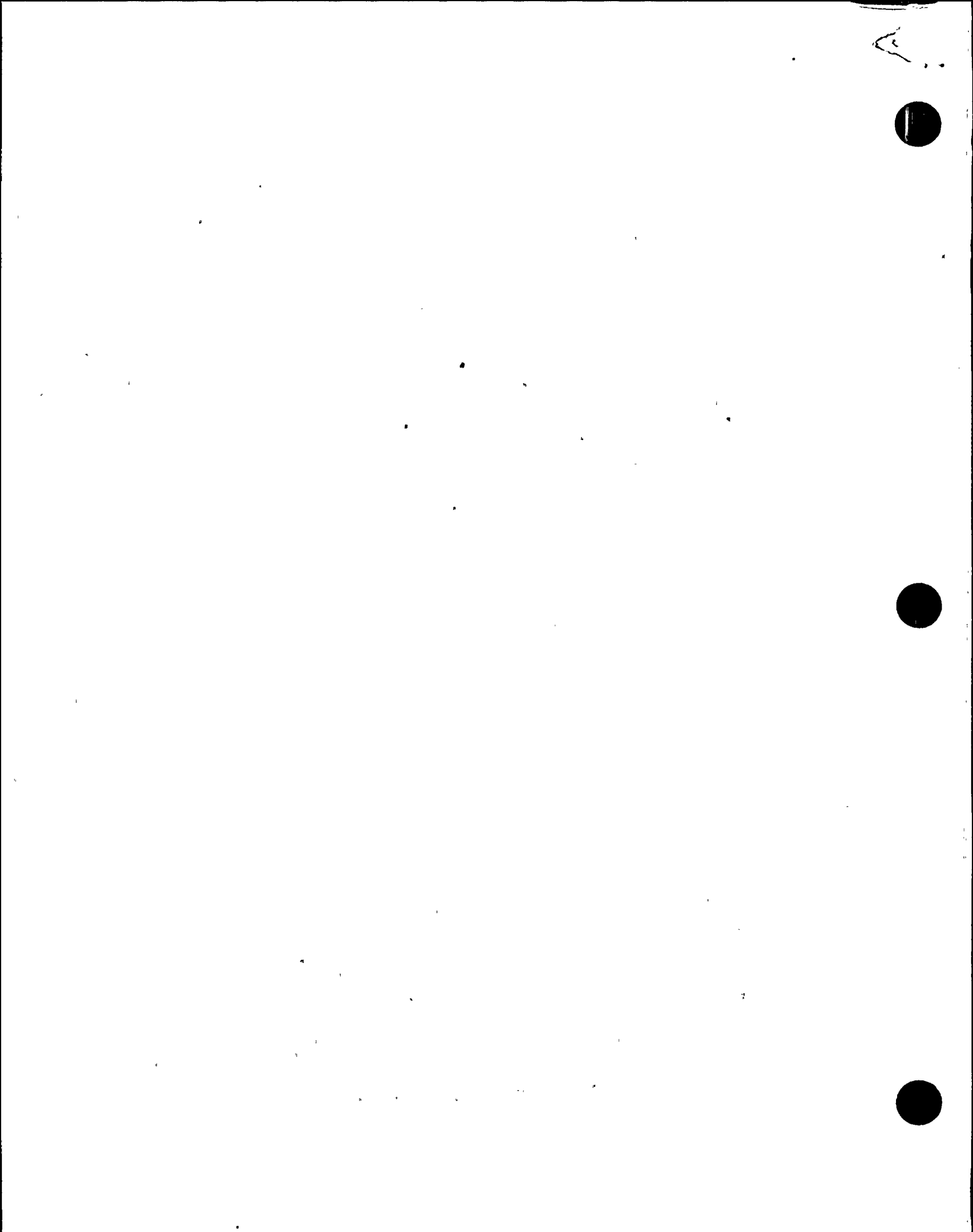
- D. W. Mazur, Managing Director
- A. L. Oxsen, Deputy Managing Director
- J. V. Parrish, Assistant Managing Director for Operations
- \*J. W. Baker, Plant Manager
- L. L. Grumme, Acting Director, Licensing and Assurance
- G. C. Sorensen, Manager, Regulatory Programs
- S. L. McKay, Operations Manager
- J. E. Wyrick, Outage Manager
- \*S. L. Washington, Manager, Nuclear Safety Engineering
- D. R. Kobus, Manager, Technical Training
- D. F. Pisarcik, Health Physics and Chemistry Manager
- \*S. L. Scammon, NSSS Systems Supervisor

\*Also attended the March 26, 1992 briefing regarding the containment atmosphere control system.

### 2. Management Meeting of March 27, 1992

On March 27, 1992, an open meeting was held at the Region V office in Walnut Creek, California, with the individuals identified in paragraph 1. The purpose of the meeting was to discuss current operations issues, including electrical safety, Licensing and Assurance issues, the 1992 refueling outage scope and challenges, and operations training improvements. The meeting convened at 8:30 a.m.

Mr. Martin opened the discussion by noting that the meeting was one in a continuing series of periodic management meetings and encouraged an open discussion. Mr. Mazur stated that the agenda was to discuss the Supply System's progress in several areas and recent items of interest.



Mr. Baker summarized a March 8, 1992 incident where an electrician was seriously injured while performing a preventive maintenance task on an electrical breaker. He stated that a review of the event was ongoing. Mr. Baker also summarized similar electrical safety incidents which occurred in 1988 and 1990 and associated corrective actions. Mr. Martin expressed concern regarding the licensee's performance in this area, noting that they were an outlier in Region V, and that careful management attention appeared warranted. Mr Parrish concurred and stated that the event will be reviewed with other similar incidents where safe work practices were not used. He also indicated that the Supply System would call on industry peers to support the assessment.

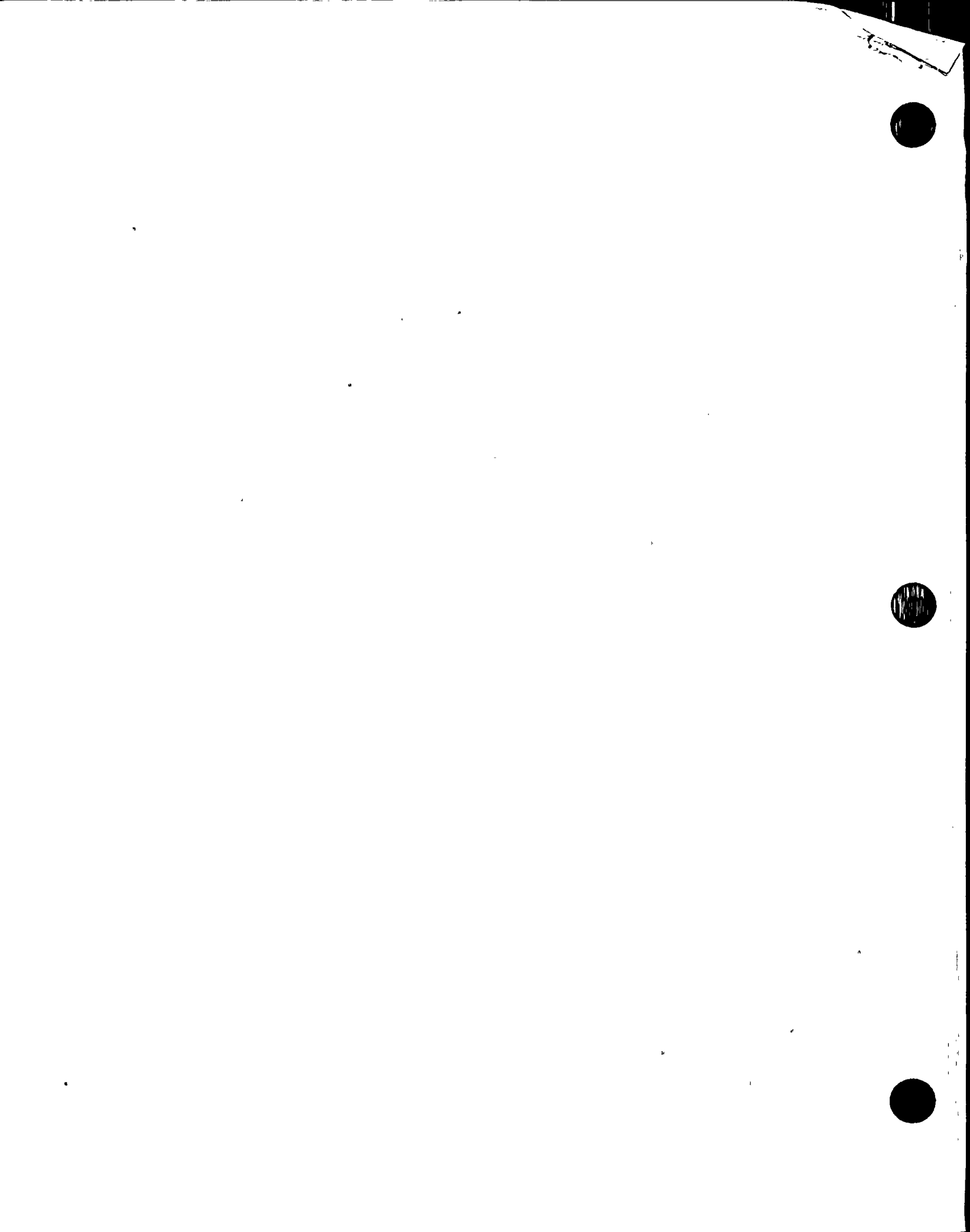
Mr. Grumme discussed current efforts of the Licensing and Assurance (L&A) organization including management initiatives to improve performance, a management processes assessment, a shutdown safety assessment, and an upcoming management effectiveness assessment. Mr. Martin questioned the status and future benefit of the management processes study which had been performed by a consultant to the licensee. Mr. Parrish stated that plans to improve the ten management processes (such as maintenance work and design changes) which were evaluated would be implemented in June, 1992, with 80% of the work to be completed in three years. Mr. Parrish expected the changes to improve efficiency, enhance safety, and focus the responsibility for work performed at WNP-2.

Mr. Perkins asked what actions had been taken to assure that past management initiatives were being implemented at the working level. Mr. Mazur stated that successful follow through on previous corrective action initiatives was a priority. He noted that his managers have in the past been too involved in the day to day operations of their organizations. He has emphasized that managers make efforts to examine the broader view and assess the effectiveness of improvement programs.

Mr. Martin observed that the L&A issues of concern, listed in the L&A Annual Report for Fiscal Year 1991 did not clearly indicate who was responsible for addressing the issues. Mr. Parrish stated that ownership of these problems had been identified and that improvements to the format of the report were pending. Mr. Martin emphasized the benefit for the Director of L&A to have frequent direct communications with the Managing Director to discuss issues and problems of concern.

Mr. Wyrick briefly discussed the scope of the outage and noted that four major efforts would be undertaken; a first time full core off-load, a reactor recirculation system chemical decontamination, a turbine rotor replacement, and the drain and inspection of the "A" service water spray pond. Mr. Martin asked how much of the outage work was planned and ready to be performed. Mr. Wyrick responded that approximately 70% of the work was planned. However, he noted that health physics planning was behind schedule.

Mr. Pisarcik described health physics challenges for the outage. He noted that they had focused on planning, recognizing that it was



essential for success. Mr. Scarano observed that in the past the Supply System has been an average performer in the area of health physics with a tendency not to be ambitious with program improvement. He stated that this outage presented an opportunity for the licensee to demonstrate improvement. Mr. Mazur agreed and noted that the planned recirculation system chemical decontamination to reduce overall exposure was a commitment to improvement. Mr. Martin expressed concern regarding the chemical decontamination, noting that if not closely monitored it presented the potential for significant exposure. Mr. Baker stated that it was not a process to take for granted and committed to proceed conservatively.

Mr. Baker discussed shutdown safety initiatives. He stated that an outage policy regarding system availability had been developed and was consistent with recent industry guidelines. Mr. Baker noted that to plan for the full core off-load, the licensee had employed a defense in depth philosophy. To supplement the normal spent fuel pool cooling system, which was not designed to remove the decay heat of a full core, the licensee plans to align the "B" train of residual heat removal (RHR). Mr. Baker also briefly described the efforts to develop contingency plans, including plans to provide back-up power to the RHR and fuel pool cooling pumps. Mr. Richards asked if a test of the back-up power capability will be performed. Mr. Baker stated that they would like to perform the test and would study its feasibility.

Mr. Martin noted that the full core off-load and the chemical decontamination presented considerable vulnerability if not provided with adequate management attention. When asked by Mr. Martin, Mr. Grumme stated that L&A would be involved in these significant efforts.

Mr. Oxsen described the development and findings of an operations/training task force. The purpose of the task force was to assess the license requalification program to create a stable, consistent, and predictable requalification process. He observed that working level groups of operators and trainers had expressed considerable concern with their recent experiences in this area. Based on the task force findings, a plan was developed identifying long term and short term actions. Mr. Kobus outlined actions to be taken in the training department and Mr. McKay described an operations department five year plan.

Mr. Perkins encouraged the licensee to provide challenging simulator scenarios, critical performance evaluations, and management support for improvements. Mr. Martin stressed the importance of a consistent format for operator communications and established command and control expectations, noting that to avoid confusion and conflicting instructions, it was necessary for managers to understand the established operations conventions.

Mr. Mazur stated that although there will be considerable pressure to control outage duration, decisions regarding safety will not be impacted. He observed that the Supply System had the potential to be a

top performer and he expected performance to improve.

Mr. Martin acknowledged that the Supply System recognized their weaknesses. However, based on past performance, he expressed concern regarding the Supply Systems commitment to ensuring identified weaknesses are comprehensively addressed. Mr. Martin provided a list of recent inspection findings to Mr. Parrish and reviewed the significant findings. He noted that while the licensee had performed a very credible electrical distribution system inspection (EDSI) two years prior to the recent NRC EDSI, he was disappointed to learn that the corrective actions had not been aggressively pursued. He expressed concern that the Supply System might not be following up other important programs and taking the opportunity to solve identified problems. Mr. Martin closed with the observation that Supply System management should ensure that it is clear at the working level that efforts to correct problems are undertaken to improve performance and not simply in response to NRC and outside pressures. The meeting adjourned at 12:30 p.m.

3. March 26, 1992 Briefing to Discuss the Containment Atmosphere Control System Improvements

On March 26, 1992, a briefing on the containment atmosphere control (CAC) system was held in the Region V office with the individuals identified in paragraph 1. The purpose of the meeting was to discuss the licensee's efforts to understand the design of the CAC system and the subsequent system improvements. The licensee's efforts were in response to NRC enforcement actions discussed in NRC Special Inspection No. 50-397/91-44. The meeting convened at 3:45 p.m.

Mr. Washington discussed the findings of the Safety System Functional Inspection (SSFI) performed by L&A on the CAC system that was initiated in response to the NRC inspection findings. Mr. Scammon discussed CAC system modifications and testing. Complete system functional testing was performed in response to commitments made to the NRC. The system modifications were developed to resolve problems identified by the SSFI, the engineering staff, and during system testing.

Mr. Richards asked how comprehensive the CAC system design review had been. Mr. Washington indicated that the SSFI had covered approximately 50% of the system design. Mr. Baker stated that based on the system functional testing, a thorough review of the hydrogen recombiner catalyst operability, and the design reviews performed by both L&A and the engineering organizations, they had a good understanding of the CAC system and were confident of its operability. The meeting adjourned at 5:00 p.m.





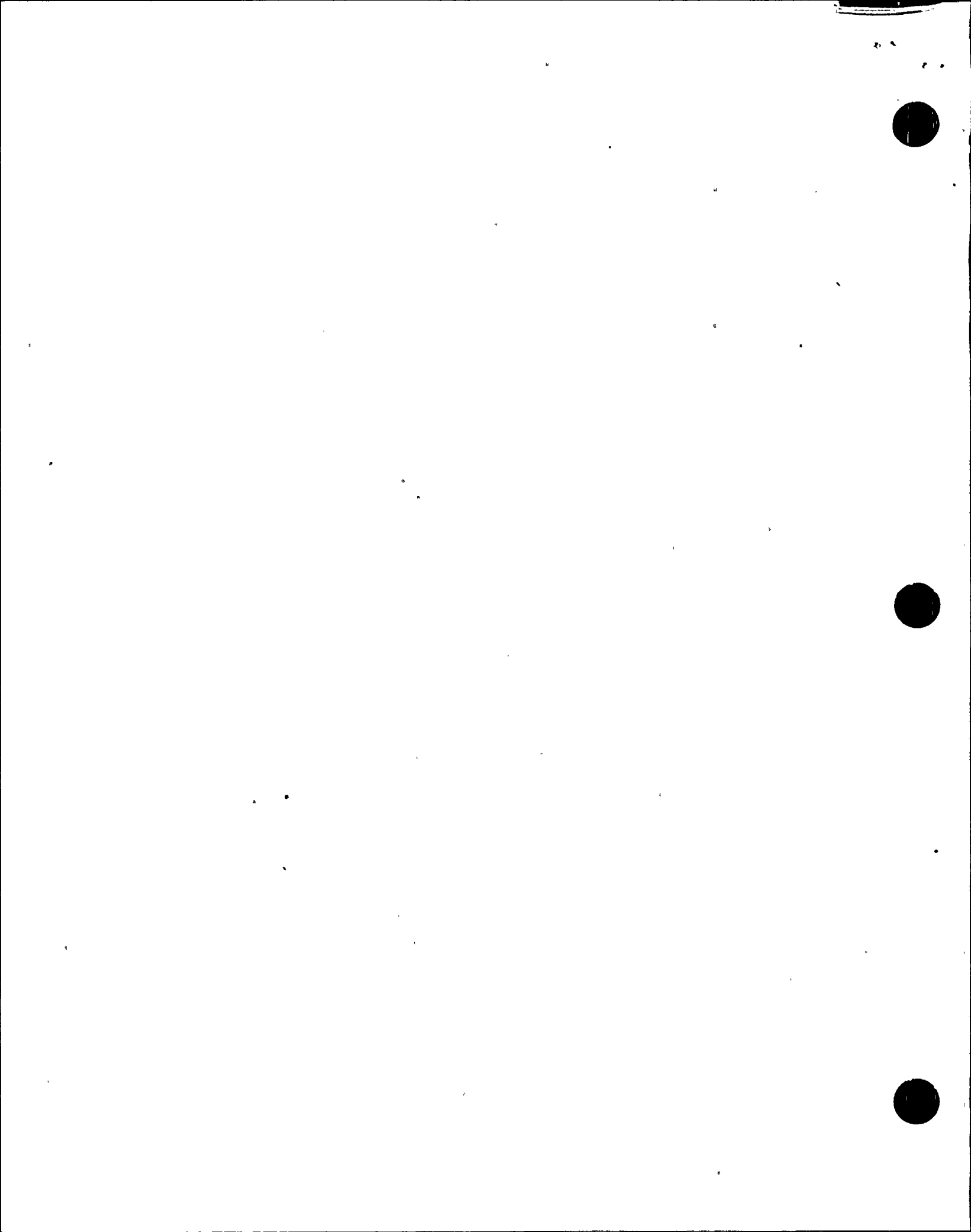
MANAGEMENT MEETING

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

March 27, 1992

AGENDA

1. Opening Remarks, Purpose of Conference -- J. B. Martin, Regional Administrator, and D. W. Mazur, Supply System Managing Director
2. Issues of NRC Interest
  - Electrical Safety
  - Spent Fuel Pool Cooling with Full Core Offload
3. Presentations by the Supply System
  - Overview -- J. V. Parrish, Assistant Managing Director for Operations
  - Licensing and Assurance Issues -- L. L. Grumme, Acting Director, Licensing and Assurance
  - 1992 Refueling Outage Scope and Challenges -- J. W. Baker, Plant Manager,
    - Outage Planning -- J. E. Wyrick, Outage Manager
    - Health Physics -- D. J. Pisarcik, HP/Chemistry Manager
    - Shutdown Safety -- J. W. Baker, Plant Manager
  - Operations/Training Task Force -- A. L. Oxsen, Deputy Managing Director
    - Training Impact -- D. R. Kobus, Technical Training Manager
    - Operations Impact -- S. L. McKay, Operations Manager
  - Conclusions -- D. W. Mazur, Managing Director
4. NRC Perspective on WNP-2 Performance
5. Closing remarks



**PLANT OPERATING HISTORY SINCE  
RESTART FROM R-6**

- 09/26/91 . . . . . Commenced Reactor Start-Up and Low Power/Post-Outage Testing**
- 10/01/91 . . . . . Plant Manually Shut Down to Correct an Oil Leak on a Turbine Reheat Stop Valve**
- 10/04/91 . . . . . Plant Returned to Service**
- 10/25/91 . . . . . Plant Down-Powered to 10% for Drywell Leakage Inspection. Leakage Corrected**
- 11/01/91 . . . . . Manual Shutdown of the Reactor Due to a Condenser Tube Leak**
- 11/04/91 . . . . . Reactor at 1000 psig/Drywell Inspection. Declared Unusual Event Due to Pinhole Leak in Weld for the Shutdown Cooling Drain Valve**
- 11/07/91 . . . . . Plant Returned to Service**
- 11/14/91 . . . . . Established 24 Hour Generation Record of 27,420 MWHe Gross**
- 11/19/91 . . . . . Automatic Reactor Scram. Unusual Event Due to Loss of Feedwater/Level 2 Isolation**
- 11/22/91 . . . . . Plant Returned to Service**



- 12/20/91 . . . . . Plant Shut Down Due to Condenser Tube Leak**
- 12/26/91 . . . . . Plant Returned to Service**
- 01/92 . . . . . Record Generation for 31-Day Month**
- 02/22/92 . . . . . Plant down-powered. Generator Removed from Grid Due to Unidentified Drywell Leakage. Isolated Leak from Control Rod Drive (CRD) Flange. Returned to Power Operation**
- 02/25/92 . . . . . Plant Shut Down Due to Problems with Containment Atmospheric Control (CAC) Drain Piping**
- 03/19/92 . . . . . Plant Returned to Service**
- 04/17/92 . . . . . Commence Shutdown for R-7**
- 03/30-04/10/92 . . . . . INPO Plant Evaluation**
- 04/27-05/01/92 . . . . . INPO Corporate Evaluation**

## **SAFETY ASSESSMENT/QUALITY VERIFICATION**

### **1) SALP REPORT ISSUES**

- **Assure a Self-Critical Approach to Improving Performance**
- **Aggressively Seek to Identify Areas of Weakness**
- **Evaluate Efforts to Resolve Previously Identified Problems**
- **Ensure Effective Corrective Actions are Taken in a Timely Manner**
- **Forcefully Bring Issues to Senior Management's Attention**
- **Assess Program for Evaluating Potentially Reportable Events**
- **Stay Abreast of Industry Issues**

### **2) MANAGEMENT INITIATIVES TO IMPROVE PERFORMANCE**

- **Structure Tree Developed**
  - **Improve regulatory performance**
  - **Improve organizational performance**
  - **Reduce cost of power**
- **Tenera Final Report Recommendations Initiated**
  - **Focused on ten process areas**
  - **Seven main teams being established**
  - **Implementation plans being developed for completion by June 30**



■ **Continuing Support to Total Quality Efforts**

- **Quality Council**
- **Management training**
- **Individual training**
- **Quality action teams**
- **Customer/supplier agreements**
- **Performance monitoring**
- **Empowerment of staff**

3) **CURRENT LICENSING AND ASSURANCE PERFORMANCE FOCUS**

- **Emphasis of Performance-Based Audits, Surveillances, and Assessments**
- **Identifying Areas of Potential Weakness**
- **Communication of Significant Technical Issues to Senior Management**
- **Increased Awareness of Status of Ongoing and Emerging Industry Issues**
- **Benchmarking Programs Against Similar Programs at Other Utilities**
- **Continuing Staff Development**
- **Self-Improvement Initiatives**





**4) LICENSING AND ASSURANCE PERFORMANCE  
IMPROVEMENT INITIATIVES**

- **Integrated Planning of Licensing and Assurance Staff**
- **Licensing and Assurance Annual Report Upgrades (Annual and Semi-Annual)**
- **Database Improvements**
- **Increased Use of Team Inspections**
- **Management Effectiveness Assessments**
- **Shutdown Safety Policy/Assessment**
- **Upgrading Cooperative Problem Solving**
- **Customer/Supplier Agreements to Improve Interface with Customers**
- **Total Quality (Quality Action Team) Involvement**
- **Structured Trending**
- **Standards of Performance**

## 5) **WNP-2 SHUTDOWN SAFETY ASSESSMENT**

- **Draft Assessment Issued:**
  - **NUMARC 91-06, "Guidelines for Industry Actions to Assess Shutdown Management", used for assessment**
- **Assessment Team Leader and Outage Manager Attended NUMARC Workshop February 13-14, 1992**
- **Information from Other Utilities Used; i.e., Susquehanna River Bend, Fermi, Grand Gulf, TMI-1, North Anna, Davis Besse, Kewaunee, Nine-Mile Point 2**
- **Corporate Level Policy Statement Approved by POC and Issued to WNP-2 Employees**
- **Contingency Plans and Procedures in Preparation for core Offload to Spent Fuel Pool During R-7 Outage**
  - **Team (Operations, Technical, Engineering, Outage management, and Licensing) meets weekly to address issues**
- **Other Procedures in Preparation:**
  - **Procedure to minimize the potential of draining the reactor vessel or the cavity**
  - **Abnormal procedure to place fuel in safe place in event of cavity or core drain-down**
- **Plan to Finalize Assessment Report before March 31, 1992**
- **Improvements Adopted from Assessment by Plant will be Implemented by December 31, 1992**



## 6) **MANAGEMENT EFFECTIVENESS ASSESSMENT**

- **Purpose:**
  - **Validates the effectiveness of attaining the corporate mission and vision**
  - **Provides senior management with an evaluation of whether key functional initiatives are achieving their intended objectives**
  
- **Represents a Lessons Learned to Our Previous Effectiveness Assessment Program. New Concept Approved by Quality Council**
  
- **Initial Phase:**
  - **Evaluation of goals and targets - established for management performance upgrades**
  - **Determine if goals are in harmony with overall Supply System plan**
  
- **Second Phase:**
  - **Assess key functional initiatives for results achieved in meeting overall strategic plan**
  - **This phase will be repeated on a rolling 24-month schedule**
  
- **Licensing and Assurance Will be Overall Coordinator, Using a Team Approach (5-6 Staff) Representing:**
  - **Licensing and Assurance senior staff**
  - **Evaluated organization**
  - **Outside industry experts**
  - **Institute of Nuclear Power Operations (INPO) and/or utility assistance**

- **Assessment Proposed Scope will be Pre-Approved by Quality Council. Scope will Include Industry Benchmarking**
- **Assessment Results are Reported to Management of Area Evaluated. Summary Presentation to Quality Council**
- **Assessment Areas:**
  - **Regulatory performance:**
    - **Maintenance (pilot)**
    - **Operations**
    - **Engineering**
    - **Support programs**
  - **Cost of power:**
    - **Outage length reduction**
    - **Plant reliability performance**
  - **Improved organizational performance:**
    - **Work process improvement**
    - **Quality improvement/performance measurement/accountability/communications**

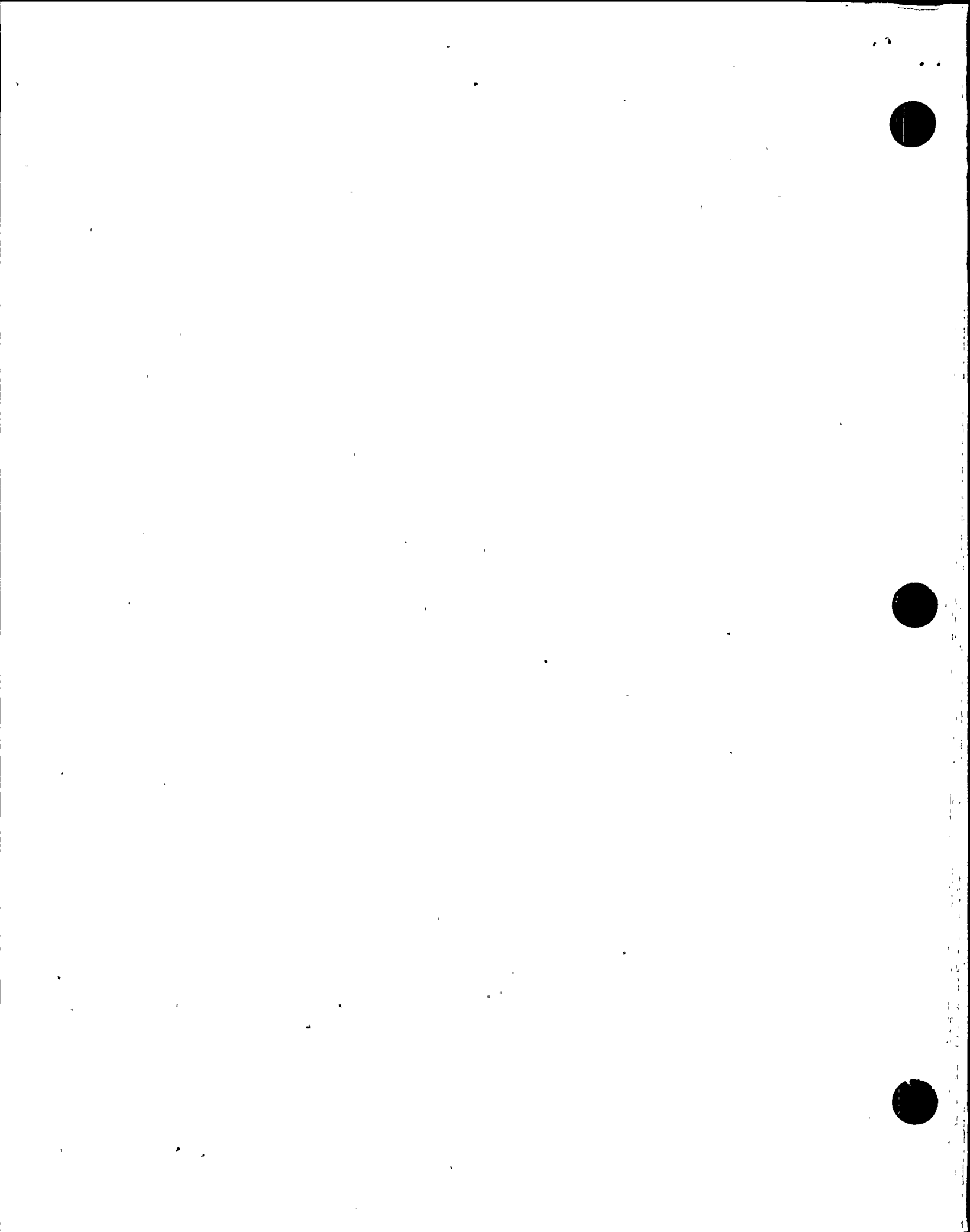


## R-7 OUTAGE

### 1) R-7 OVERVIEW

- 75 Days Breaker-to-Breaker
- 700-800 Contractor/Temporary Staff
- \$25-30 Million Budget
- Scope:
  - 1100 maintenance work requests
  - 4000 preventive maintenance tasks
  - 200 technical specification surveillances
  - 20 major maintenance/plant modification record
- Several "First Time" Tasks:
  - Full core off-load
  - Reactor recirculation system chemical decontamination
  - Turbine rotor change-out
  - Drain/inspect Service Water Spray Pond A





**2) R-7 SUMMARY SCHEDULE**

4/17	Plant Shutdown
4/20	Turbine Outage
5/5	Reactor De-Fueled
5/21	Division I Operable
5/27	Reactor Refueled
6/21	Division II Operable
6/22	Refuel Activities Complete
6/23	Turbine Restoration Complete
6/29	Plant Start-Up
7/1	Outage Finished

**3) R-7 MAJOR PROJECTS**

■ **Safety Enhancement**

- Service water spray pond drain/repair
- 250 VDC battery replacement
- Motor-operated valve program
- HFA relay preventive maintenance (reactor protection system)
- Control rod drive replace/rebuild
- Reactor pressure vessel nozzle/safe-end in-service inspection
- Main steam relief valve replace
- Reactor recirculation system pump discharge valve modification
- Reactor pressure vessel cavity crud trap removal



■ **Reliability Enhancement**

- **Turbine rotor replacement**
- **Main condenser eddy current**
- **Motor-operated valve program**
- **Control and service air compressor replacement**
- **Feedwater heater eddy current**
- **Local power range monitor replacement**
- **Recorder upgrade program**
- **Megawatt improvement program**
- **Main steam relief valve setpoint tester and valve position indication**

4) **PLANNING FOR SUCCESS**

■ **Past Practice**

- **Full utilization of available resources**
- **Full utilization of critical window durations**
- **No logic planning within window**

■ **R-7**

- **Contingency resources controlled by the outage manager**
- **70/30 concept for critical window durations**
- **Detailed planning in most outage windows**

■ **Scope Control**

- **January 6, 1992 cut-off date**
- **March 31, 1992 cut-off date**
- **Process for control of emergent work**



## HEALTH PHYSICS

### 1) HEALTH PHYSICS R-7 CHALLENGES

- Staffing for Success
- Maintaining Personnel Exposure As Low As Reasonably Achievable (ALARA)
- Controlling Contamination

### 2) STAFFING FOR SUCCESS

- Health Physics Technicians
- ALARA Planning
- Supervision

### 3) MAINTAINING PERSONNEL EXPOSURES ALARA

- Planning
- Scheduling/Sequencing
- Chemical Decontamination
- Nozzle Flushes
- Mock-Ups, Shielding, Pre-Fabrication, etc.

**4) SIGNIFICANT R-7 WORK PACKAGES:**

- **In-Service Inspection . . . . . 112 Man-Rem**
- **Main Steam Relief Valve Setpoint Tester . . . 130 Man-Rem**
- **RRC-V-67A/B . . . . . 40 Man-Rem**
- **Control Rod Drive Remove/Replace . . . . . 56 Man-Rem**
- **Snubber Optimization . . . . . 18 Man-Rem**
- **Local Power Range Monitor Replacement . . . 19 Man-Rem**

**5) CONTROLLING CONTAMINATION**

- **Potential for Loss of Control**
- **Station Buy-In to Improvement**
- **Contamination Control Coordinator**

## SHUTDOWN SAFETY

### 1) SHUTDOWN SAFETY BACKGROUND

#### ■ Industry Experience

- Events
- Challenges

#### ■ NUMARC 91-06

"Guidelines for Industry Actions to Assess Shutdown Management"

- To be fully implemented by December 31, 1992

### 2) SHUTDOWN SAFETY POLICY

#### ■ During Outages, Supply System Remains Committed to Safety

#### ■ Provide Defense in Depth for Key Safety Functions

#### ■ Key Safety Functions:

- Decay heat removal
- Coolant inventory control
- Electric power availability
- Reactivity control
- Containment





- **Defense in Depth:**
  - **Redundant**
  - **Alternate**
  - **Diverse**
  
- **Augment Technical Specification Requirements as Necessary to Provide Defense in Depth**
  
- **Implementation**
  - **Outage schedules**
  - **Control schedule changes**
  - **Understand capabilities of systems, structures, and components**
  - **Procedures**
  - **Contingency plans**
  - **Training**
  - **Commitment**

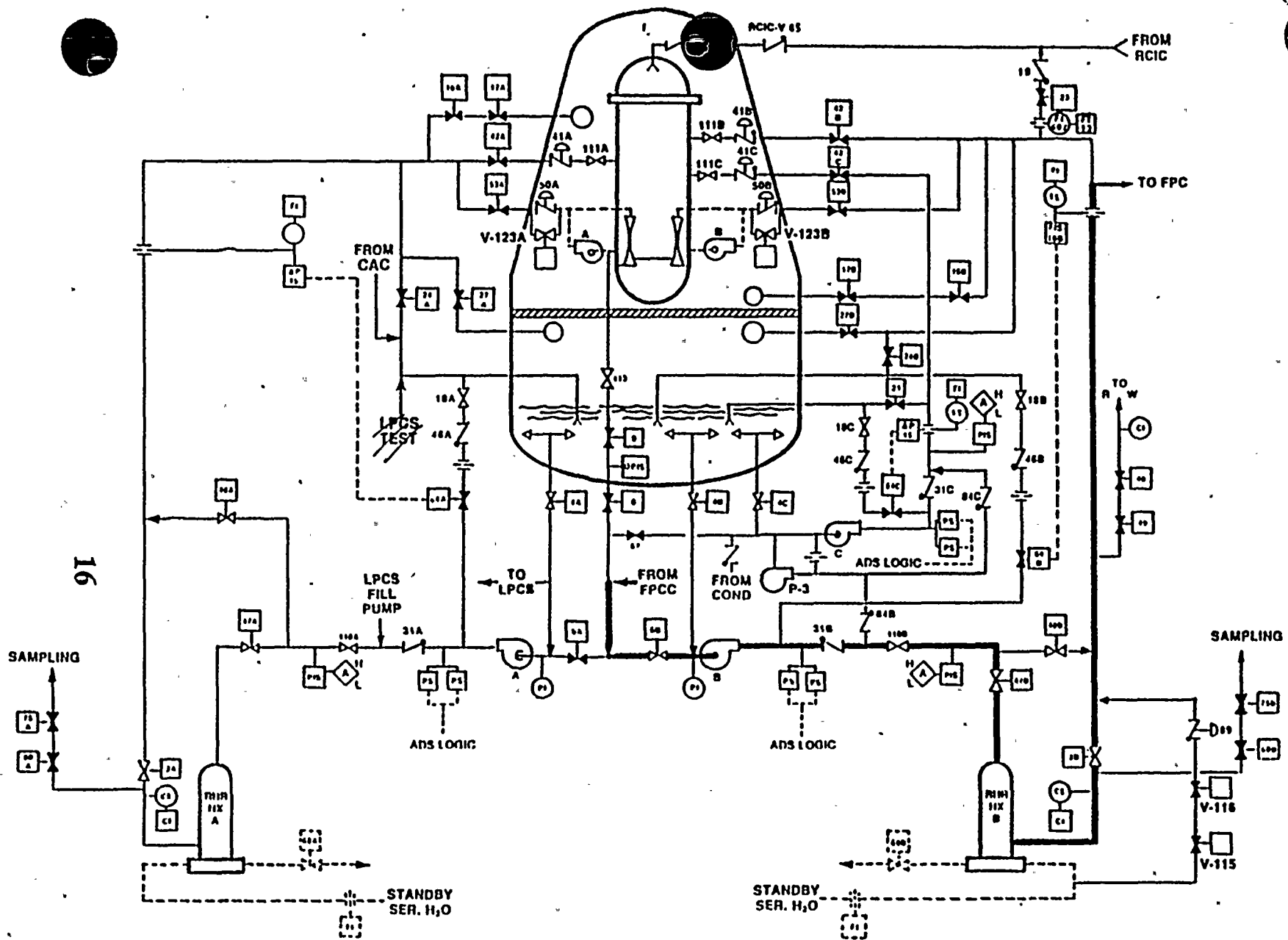


FIGURE 1F. RHR SYSTEM  
FUEL POOL COOLING ASSIST MODE

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MAY 1989 RHR

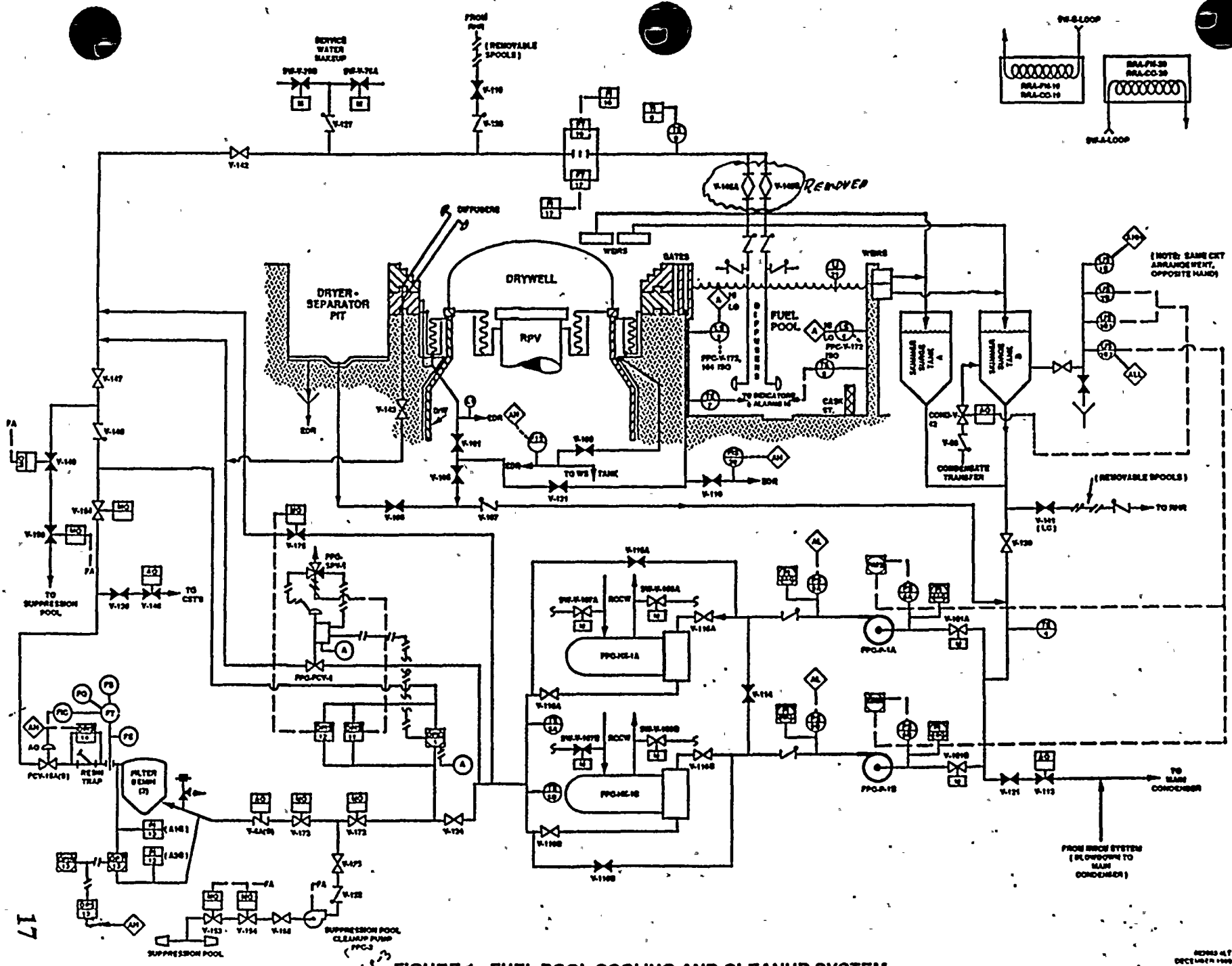
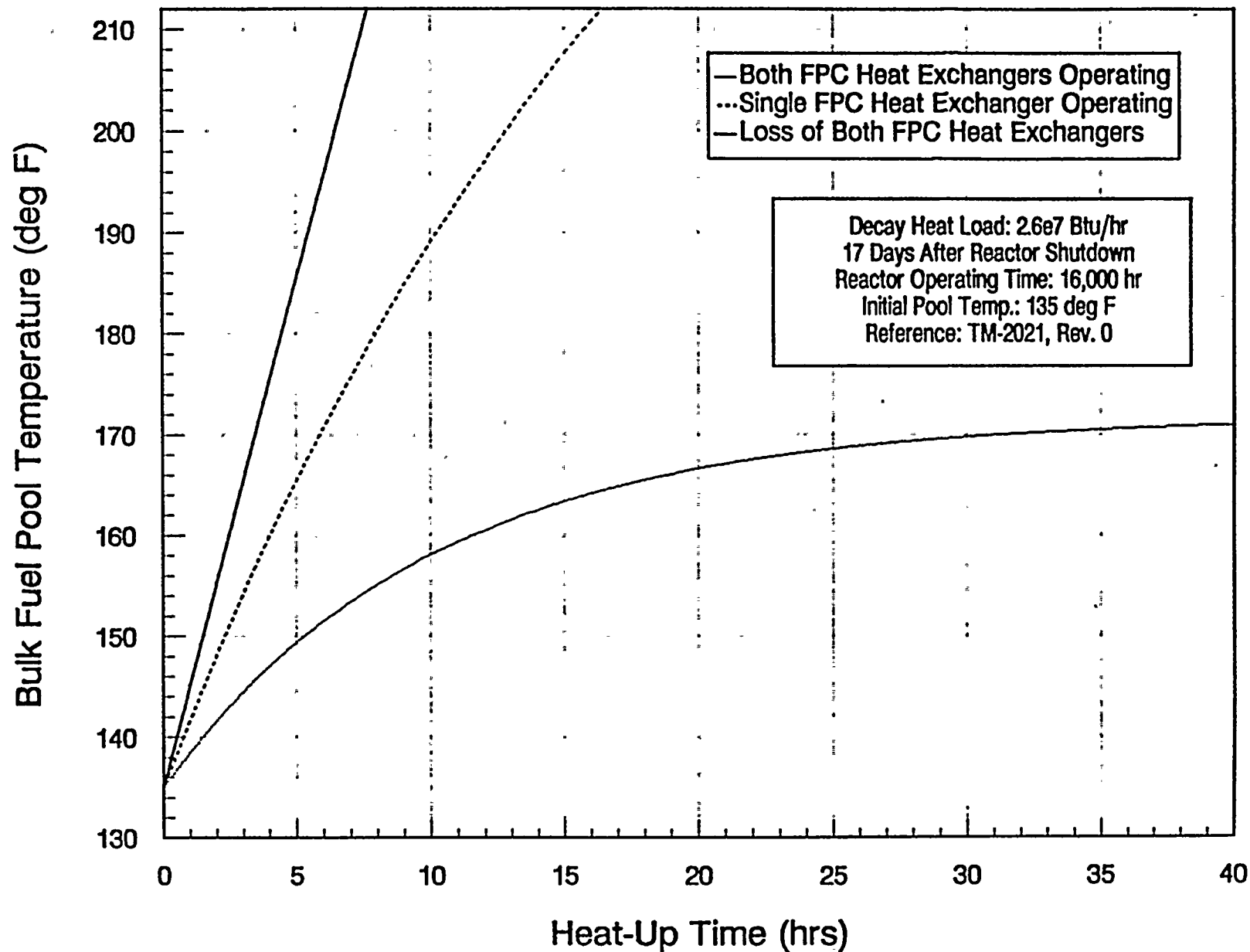


FIGURE 1. FUEL POOL COOLING AND CLEANUP SYSTEM

REVISED 11  
DECEMBER 1968  
FPC



Best Estimate Heat-Up of Spent Fuel Pool  
During R-7 Full Core Offload  
(FPC Heat Exchanger Cooling Water Inlet Temp.: 70 deg F)





## **OPERATIONS/TRAINING TASK FORCE**

### **1) MANAGEMENT CONCERNED ABOUT REQUALIFICATION PROCESS**

- **Impact on Individuals**
- **Impact on Organization**
- **Organized Task Force January 6, 1992**
  - **Operations/Training management**
  - **Administrative Auditor**
  - **Assistant Managing Director for Operations**
  - **Expanded membership to include shift managers and trainers**
- **Purpose**
  - **Build upon the 1991 performance improvement gains to create a stable, consistent, predictable operator requalification and performance process**
- **Methodology**
  - **Brainstormed list of issues (positive and negative)**
  - **Selected ten most significant issues (+/-)**
  - **Surveyed Operations, Training and oversight staffs**
  - **Sifted input; placed in categories**
  - **Feedback to participants**



■ **Results**

- **List of problem statements**
- **Action assignments**
- **Commitment to resolve significant issues**
- **Short-term/long-term actions**
- **5-year staffing plan**

■ **Conclusions**

- **Process painful; eye-opening**
- **Honest input - vented anger; frustration**
- **Staff anxious to participate in solutions**
- **Completion of action items will achieve goal**



## TRAINING

### 1) **MUST HAVE CONSISTENT AND CRITICAL SIMULATOR PERFORMANCE EVALUATION.**

- **General Physics Selected to Provide a Simulator Instructor Course (40 Hours) (First Session - April 13)**
  - **Preparation for evaluation and training**
  - **Facilitation techniques**
  - **Observation techniques**
  - **Performance feedback**
- **Instructor Evaluation Process Improvements and Completion of Evaluations of All Instructors**
- **An Internal Instructor Facilitation Techniques' Course was Presented**
- **The Requalification Schedule was Modified to Include an Instructor Week**

### 2) **INSTRUCTIONAL STAFF CREDIBILITY REQUIRES ENHANCEMENT**

- **Planned Rotational Instructor Positions (Seven Total). Two Already Exist**
- **Instructor Crew Liaison Program Started**
- **Instructor Requalification Week**

**3) PARTICIPANTS NEED MORE INPUT INTO THEIR PROGRAM**

- **Instructor Crew Liaison Program**
- **End-of-Week Debriefing with Supervisors and Operations Liaison**

**4) PROVINCIALISM MUST BE CHANGED BY EXAMPLE AND CRITICAL SELF-EVALUATION**

- **Interface and Peer Evaluation Trips to Other Utilities**
  - **Goal of at least one per year per training group**
  - **Already visited Millstone, Brunswick, Fermi, Trojan, LaSalle**
- **Regional Training Group is Being Established**
- **Lessons Learned Analysis Applied to Other Technical Training Programs**
- **Training Program Evaluation Process Overhaul**
  - **Facilitated by QA**
  - **Responsibility at the department level**
  - **Use of external reviewers**
  - **Focus on performance observation and less on process evaluation**



**5) IMPROVE THE SCHEDULING AND EFFECTIVENESS OF CONTINUED TRAINING**

- **Instructor Crew Liaison Program**
  - **Feedback for effectiveness and proper focus**
  - **Train while on shift; i.e. job performance measurements on swing shift**
- **Department Instruction Written for Proper Scheduling and Scope**
- **Added Flexibility for Specific Training Requested by the Crew or for Prior Weakness Remediation**
- **Schedule Flexibility Minimizes Perturbations and Overtime**
- **Conduct Non-Operational Training Outside the Training Week**



## **OPERATIONS IMPACT**

### **1) DEVELOPMENT AND FUNDING OF A FIVE-YEAR PLAN**

- Predictable Shift Schedule
- Reduction in Overtime
- Increased Training Hours
- Allows for Career Development
- Provides for Attrition
- Allows for Operations/Training Transfer

### **2) DEFINED CONSEQUENTIAL EXAMINATION PROCESS**

- Analysis Driven
- Mutual Training/Operations Review
- Provides Flexible Remediation

### **3) INITIATED A FOUR SENIOR REACTOR OPERATOR UPGRADE PROGRAM**

- Candidates are Selected
- Will be Calendar Year 1992 Graduates

### **4) THE DEFINITION OF EXPECTATION CONTINUES TO IMPROVE**

- PPM 1.3.1 Under Revision
- Revised Evaluation Form
- Recent Industry Peer Input
- EOP Training Manual Under Development



**5) COMMENCED OUTAGE REQUALIFICATION TRAINING**

- **Real Dollar Impact**
- **Three Days/Week R-7**
- **Five Days/Week R-8**

**6) PHASE 2 EMERGENCY OPERATING PROCEDURE IMPLEMENTATION TIMING**

- **Reduces Training Development Needs**
- **Allows For a More Timely Training Schedule**
- **Based on a Proven Phase 1 Product**

## RECENT INSPECTION FINDINGS

The following recent inspection findings represent opportunities for QA to have been more involved in licensee activities:

- Numerous findings of the EDSFI -- in general, indicate that the licensee's threshold for attention to detail and correction of problems is too high.
  - Ineffective followup on problems identified during licensee's EDSFI
  - Numerous examples of not filling out surveillance test documentation as prescribed
- Plant Operations Committee (POC) approval of a test procedure for CAC which would have violated Tech Specs (could have resulted in potential escalated enforcement if the residents had not challenged the licensee).
- Standby Gas Treatment System -- in assessing Ken Johnston's NOV, the licensee determined that the SGTS fans could have tripped on overload under limiting design conditions.
- Improper licensee handling (PER not initiated, and not reviewed for reportability) of a licensee-identified failure to properly isolate a CRD (as required by TS).
- Premature entry into Mode 2 (with only one recirculation loop in operation).
- Improper closure of main steam line drain valves (contrary to a newly issued procedure and concern for thermal cycling of the drain lines).
- Low oil levels in the Standby Liquid Control (SLC) pumps.
- Improperly posted high radiation area (no flashing lights).
- Access plugs left out of "A" and "B" RHR rooms (an SRO observed this but it was not considered a restart restraint); after resident inspector inquired, it was reported pursuant to 50.72 as a potential common mode flooding concern.
- An out-of-calibration flow indicator on the HPCS diesel.
- Valving out an RPS-enable feature (turbine first stage pressure transmitter) without proper documentation.

**CAC**

**PRESENTATION**

**Walnut Creek, CA**

**March 26, 1992**



**INTRODUCTION - J. BAKER**

**CAC SSFI - S. WASHINGTON**

**CAC SYSTEM MODIFICATIONS AND TESTINGS - S. SCAMMON**

**CAC ENGINEERING - K. WISE**



**CAC SYSTEM REVIEW**

**USING SSFI METHODOLOGY**

**BY**

**NUCLEAR SAFETY ENGINEERING**





## CAC SSFI TEAM

W. KOOY	TEAM LEADER PRINCIPAL ENGINEER
F. RIPPEE	SENIOR ENGINEER CHEMICAL PROCESSES
B. LANDER	PRINCIPAL ENGINEER MECHANICAL
B. HAHN	PRINCIPAL ENGINEER OPERATIONS - SRO
D. BIALA	BECHTEL ENGINEES ELECTRICAL
J. WORTHY	SAFETY ENGINEER SPECIALIST TENERA

# INSPECTION METHODOLOGY AND SCOPE

**ESTABLISH SYSTEM REGULATORY &  
CODE REQUIREMENTS**

**ESTABLISH CAC DESIGN BASIS**

**REVIEWED LBD DOCUMENTS**

<b>SYSTEM PURCHASED MEETS DESIGN BASIS</b>	<b>MODIFICATIONS &amp; MAINTENANCE</b>	<b>SYSTEM OPERATION MEETS DESIGN BASIS</b>
<b>REVIEWED PURCHASE SPEC</b>	<b>REVIEWED MODIFICATIONS</b>	<b>REVIEWED OPERATIONS PROCEDURES</b>
<b>VENDOR DESIGN</b>	<b>REVIEWED MAINTENANCE WORK</b>	<b>REVIEWED SURVEILLANCE PROCEDURES</b>
<b>VENDOR TESTING</b>	<b>REVIEWED EQ</b>	<b>REVIEWED EOPS</b>
<b>PREOPERATIONAL TESTING</b>	<b>REVIEWED SPARE PARTS</b>	



## CAC REVIEW CONCERNS

SYSTEM DESIGN	MAINTENANCE & MODIFICATION	OPERATIONS
<p><b>CATALYST</b> (Iodine Fouling)</p> <p><b>SYSTEM FLOW CAPABILITY</b> (Ability to Meet Design Basis Flows)</p> <p><b>CONTAINMENT SUPPRESSION</b> (Drywall/Wetwall Intertie)</p> <p><b>PRE OP TESTING</b> (System Tests) (Scrubber Tests)</p>	<p><b>LOOP SEAL</b> (Drain Properly)</p> <p><b>RHR/CAC</b> (System Interaction)</p>	<p><b>CATALYST</b> (Flooding/Degradation) (Surveillance Testing)</p> <p><b>SYSTEM CONTROL</b> (Recycle Flow)</p>

SUPPLY SYSTEM ENGINEERING  
CAC ANALYTICAL PRINCIPALS

Steve Kirkendall, MS, Mech. Engrg., PE

75 - 79, B&R  
79 - Present, Supply System

Dale Bainard, BS Che, PE

52 - 72, General Electric  
72 - Present, Supply System

Loren Sharp, MS, Nuclear, PE

74 - 77, US Army R&D  
77 - 81, Westinghouse Hanford  
81 - 84, Burns & Roe  
84 - Present, Supply System

Stan Haynes, MS, Nuclear

87 - 90, ANF  
90 - Present, Supply System

Tom Miles, I&C Engineer

67 - 74, Boeing  
74 - 76, Diablo Canyon  
76 - 78, Westinghouse Hanford  
78 - 80 Davis Besse  
80 - 86, Burns & Roe  
86 - Present, Supply System

## CAC SYSTEM EVALUATION

### BECHTEL TEAM

#### Robert Chu, Engineering Specialist

BS ChE, University of California

Eighteen years experience in process design of petroleum refining, chlorinated chemical projects, natural gas processing, etc. Use of computer simulation and design and startup of equipment and systems for chemical and petroleum products. Familiar with the types of equipment utilized in the CAC process such as catalytic reactors, blowers, scrubbers, coolers, etc.

#### Gordon K. Ashley II, Applied Physicist

BS Physics, University of Utah

PhD Physics, University of Utah

Supervisor of Special Projects Group responsible for analysis of problems requiring advanced solution techniques involving computer modeling and simulation. Co-developer of two important computer programs in use in the nuclear industry, *BALANCE* and *SCOPE*. Familiar with containment accident modeling and phenomena, including detonation of combustible materials.

#### Knut O. Larssen, Project Engineer

BS ME, Purdue University

MS ME, Purdue University

Mr. Larssen has 17 years of engineering experience in the nuclear industry and 4 years in the chemical industry. For the past three years he has been in technical interfacing work between Bechtel and WNP-2. He is familiar with both the technical and the operational aspects of nuclear power plants in general and WNP-2 in particular.

#### Anthony K. Lee, Senior Process Engineer

BS ChE, University of California, Berkeley

Seventeen years experience in process design of petroleum and chemical facilities, including nuclear waste disposal and fuel reprocessing.

Familiar with process simulation programs and a wide variety of chemical and nuclear processes.

#### Gilbert E. Kligman, Manager of Process Engineering

BS ChE, University of California

Registered Professional Engineer, California

Forty years experience in process technology research, development, design, startup, and operation. Has both technical and management experience in a wide variety of chemical processing plants.

## ISSUE RESOLUTION

### CATALYST HEALTH

- Obtain consultant assistance, selected consultant with petrochemical industry experience
- Supplemented with catalyst vendor opinions
- Performed testing responsive to consultant recommendations

### RECYCLE CONTROL

- Developed full understanding of control loop
- Investigated flow sensors, estimated inaccuracy impact
- Used original design calculation tool to study containment response to provide selection of recycle ratio
- Developed JCO, procedure changes and associated 50.59 analysis

### FLOW CAPABILITY

- Consultant analysis, using blower characteristics verified system capacity
- Incorporated in JCO

### CLOSURE ACTIONS

- Business decision on purchase of spare catalyst
- Orifice testing
- Complete Technical Memorandum and incorporate various calculations into Engineering documentation
- Technical Specification change to directly measure catalyst performance by hydrogen concentration





## **ADDITIONAL ENGINEERING ACTIONS**

**CONSULTANT WORKSCOPE WAS BROAD, NOT NARROWLY DIRECTED AT ONLY SSFI ISSUES, INCLUDING:**

- **PERFORM TECHNICAL REVIEW OF THE DESIGN OF THE CAC SYSTEM TO ESTABLISH ITS ABILITY TO PERFORM ITS INTENDED FUNCTION. THE REPORT SHALL ALSO INCLUDE:**
  - **SPECIFIC RECOMMENDATIONS OF ANY MODIFICATIONS OR IMPROVEMENTS WHICH SHOULD BE MADE TO THE DESIGN TO IMPROVE ITS RELIABILITY,**
  - **SPECIFIC RECOMMENDATIONS OF ANY CHANGES TO THE TESTING OR OPERATING PROCEDURES FOR THE CAC SYSTEM.**

11-11-68



## **ADDITIONAL ENGINEERING ACTIONS (CONTINUED)**

**TWO ENGINEERS WITH CONTROL SYSTEM EXPERTISE PERFORMED A DETAILED REVIEW OF CONTROL SYSTEM FUNCTIONS, VERIFYING PERFORMANCE EITHER THROUGH PERFORMANCE TESTING OR WIRING VERIFICATION IN THE FIELD.**

**FLOW MEASUREMENT, USING THE ECCENTRIC ORIFICES ON THE SKID WAS REVIEWED.**

**THE FEASIBILITY OF RAISING CATALYTIC BED EXHAUST TEMPERATURE LIMIT WAS INVESTIGATED, VESSEL AND PIPE CODE DESIGN WAS LIMITING.**

**PARAMETRIC STUDIES OF START TIME, RECYCLE RATE, PRESSURE AND THROUGHPUT WERE PERFORMED TO ASSURE SATISFYING BASE REQUIREMENT OF LESS THAN 5 VOLUME OF OXYGEN**

**DEVELOPMENT OF THE JCO ON RECYCLE CONTROL REQUIRED UNDERSTANDING SYSTEM PERFORMANCE. IN ORDER TO COMPLETE THE REQUIRED ANALYSIS AND TO DESCRIBE SYSTEM BEHAVIOR, A THOROUGH UNDERSTANDING OF SYSTEM COMPONENT INTERACTION AND RESPONSE TO CONTAINMENT CONDITIONS WAS DEVELOPED, ESPECIALLY AS IT RELATED TO RECYCLE FLOW RATIO. THIS RESULTED IN AN APPRECIATION FOR SYSTEM DESIGN FEATURES.**



**PLANT TECHNICAL**

**CAC TEAM**

**S. SCAMMON      SUPERVISOR - MECHANICAL**

**J. SNYDER      MECHANICAL ENGINEER LEAD**

**J. CANTRELL      SR ENGINEER - MECHANICAL**

**C. MOORE      PRINCIPAL ENGINEER - MECHANICAL**

**J. PARKER      PRINCIPAL ENGINEER - I & C**

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## CAC MODIFICATIONS AND TESTING

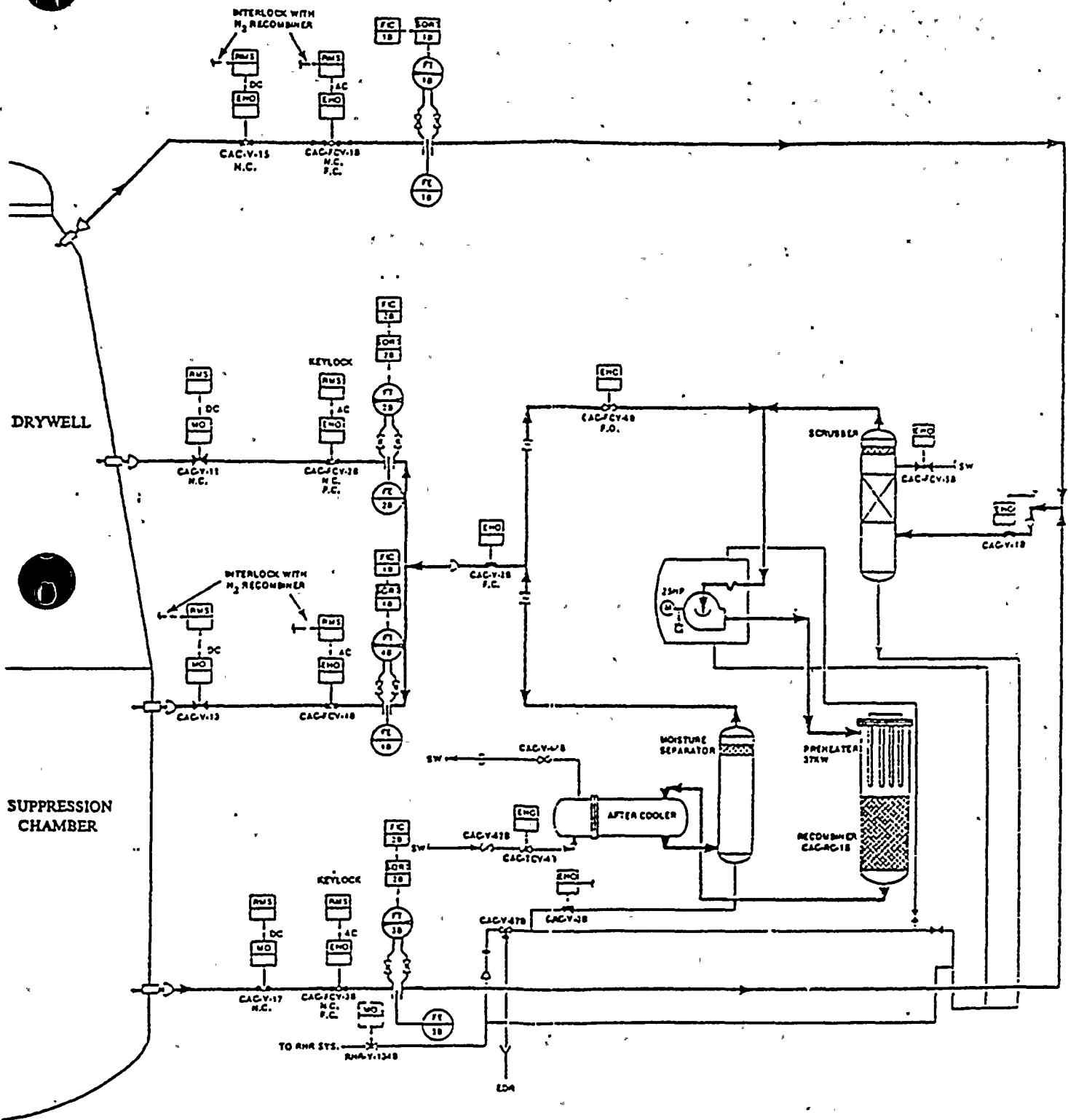
### MODIFICATIONS

- PMR 92-0029-0 WIRING CHANGE - BISI ALARM FOR TRIPPED OVERLOADS OF CAC FANS (R7 Implementation)
- PMR 92-0056-0 RELOCATION OF CAC DRAIN LINE RETURN TO CONTAINMENT (Implemented)
- PMR 92-0057-0 CAC SCRUBBER DRAIN VENT PATH (Implemented)
- PMR 92-0085-0 CAC VALVE TEST PUSH BUTTON

### TESTING

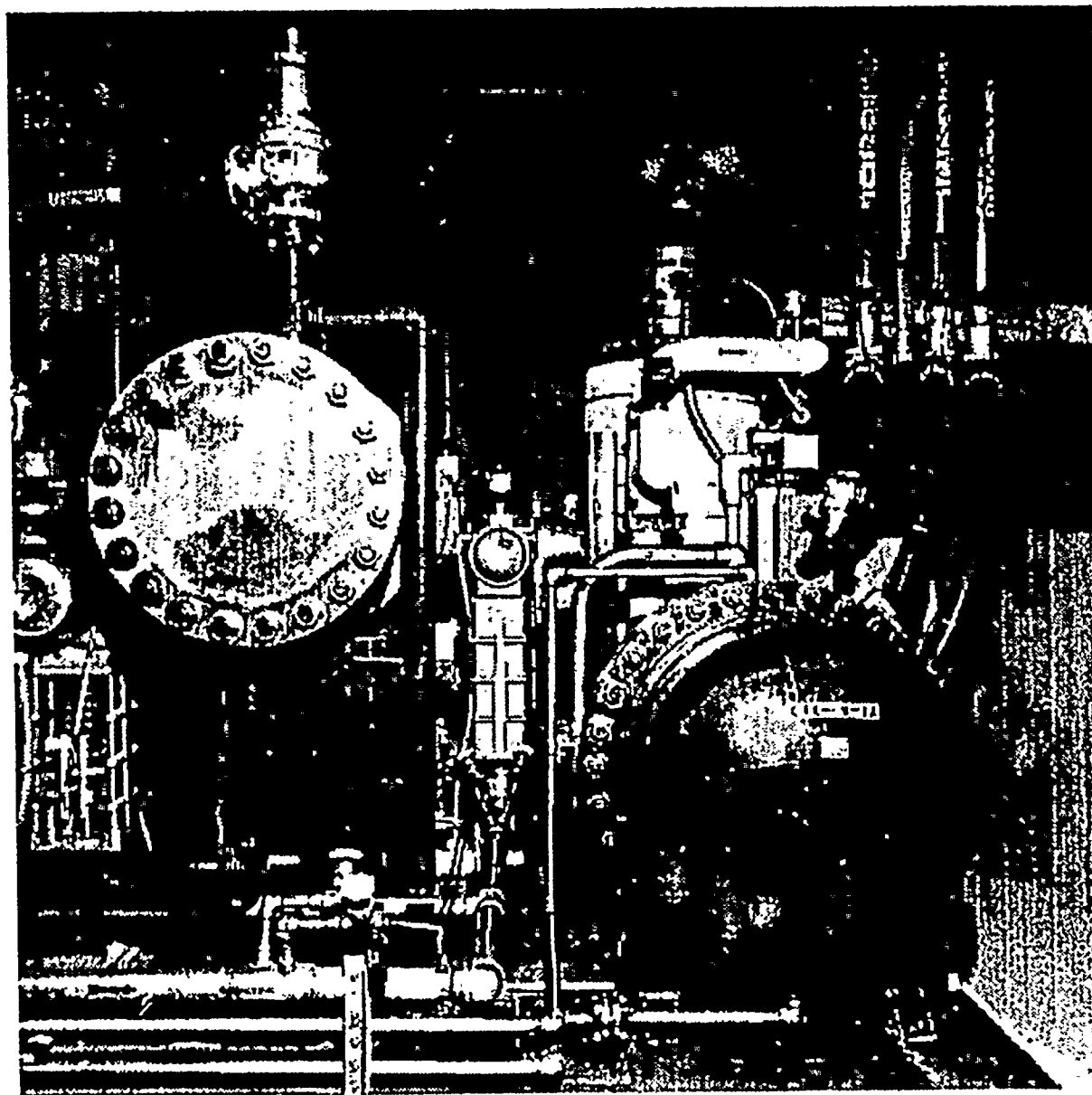
- TP 8.3.238 & TP 8.3.239 RECYCLE FLOW TESTING WITHOUT RECYCLE TO CONTAINMENT
- TP 8.3.230 CAC-HR-1B RECYCLE FLOW VERIFICATION FROM DRYWELL TO WETWELL \*
- TP 8.3.248 CAC-HR-1A RECYCLE FLOW VERIFICATION FROM DRYWELL TO WETWELL \*
- TP 8.3.246 CAC-HR-1A 2% HYDROGEN RECOMBINATION TEST \*
- TP 8.3.247 CAC-HR-1B 2% HYDROGEN RECOMBINATION TEST \*
- TP 7.4.6.6.1.4 CAC-HR-1A 1% HYDROGEN RECOMBINATION TEST \*
- TP 7.4.6.6.1.5 CAC-HR-B 1% HYDROGEN RECOMBINATION TEST \*

\* TESTING PERFORMED FROM 3-10-92 THRU 3-14-92 TO DETERMINE SYSTEM OPERABILITY



CONTAINMENT ATMOSPHERIC CONTROL SYSTEM





12-1-72



HIS 4811

A row of six small rectangular control panels or displays, each with a grid of indicators or buttons.

A rectangular control panel with several sections, possibly for monitoring or control, with various indicators and buttons.

SGT TRAM B

CAC DIV 2

A control panel with a large display area showing vertical bars or indicators, and several buttons below it.

A large vertical control panel with multiple sections, possibly for monitoring or control, with various indicators and buttons.

A control panel with a grid of indicators or buttons, possibly for monitoring or control.

A small control panel with a few buttons, possibly for monitoring or control.

A control panel with a large display area showing vertical bars or indicators, and several buttons below it.

A control panel with a grid of indicators or buttons, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

A large central display screen showing a grid of data, possibly a table or a list of information.

A control panel with a few buttons, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

A control panel with a grid of buttons and indicators, possibly for monitoring or control.

A control panel with a grid of buttons and indicators, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

A control panel with a few buttons, possibly for monitoring or control.

