

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-397/88-23  
Docket No. 50-397  
License No. NPF-21  
Licensee: Washington Public Power Supply System  
P. O. Box 968  
Richland, Washington 99352  
Facility Name: Washington Nuclear Project No. 2 (WNP-2)  
Meeting at: Region V Office  
Meeting Conducted: June 7, 1988  
Prepared by: C. W. Caldwell  
C. W. Caldwell, Project Inspector  
Approved by: P. H. Johnson  
P. H. Johnson, Chief  
Reactor Projects Section 3

6/23/88  
Date Signed  
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Summary:

A Management Meeting was held on June 7, 1988 to continue the dialogue between Region V and the Supply System on items of mutual interest and recent enhancements to programs in response to the Systematic Assessment of Licensee Performance (SALP) and the safety system functional inspection (SSFI) that were conducted in 1987. In addition, the meeting participants discussed concerns regarding the number of personnel errors and near misses that have occurred at WNP-2 since the beginning of 1988.

## DETAILS

### 1. Management Meeting Participants

#### NRC Participants

J. B. Martin, Regional Administrator  
B. H. Faulkenberry, Deputy Regional Administrator  
D. F. Kirsch, Director, Division of Reactor Safety and Projects  
R. A. Scarano, Director, Division of Radiation Safety and Safeguards  
R. P. Zimmerman, Chief, Reactor Projects Branch  
M. B. Blume, Regional Counsel  
J. L. Crews, Senior Reactor Engineer  
F. A. Wenslawski, Chief, Emergency Preparedness and Radiological Protection Branch  
P. H. Johnson, Chief, Reactor Projects Section 3  
C. J. Bosted, Senior Resident Inspector  
C. W. Caldwell, Project Inspector  
A. D. Toth, Reactor Inspector  
G. N. Cook, Public Affairs Officer

#### WPPSS Participants

D. W. Mazur, Managing Director  
G. D. Bouchey, Director, Licensing and Assurance  
A. L. Oxsen, Assistant Managing Director - Operations  
J. P. Burn, Director, Engineering  
C. H. McGilton, Manager, Operational Assurance Programs  
C. M. Powers, WNP-2 Plant Manager  
L. T. Harrold, Manager, Generation Engineering

#### Bonneville Power Administration

R. F. Mazurkiewicz, Chief, Operations Branch  
D. L. Williams, Nuclear Engineer

#### State of Washington Energy Facility Site Evaluation Council

C. Eschels, Chairman  
W. Fitch, Executive Secretary

### 2. Background

On June 7, 1988, a management meeting was held at the Region V Office with the individuals identified in paragraph 1 in attendance. The purpose of the meeting was to continue the dialogue between Region V and the Supply System on items of mutual interest and recent developments in program enhancements in response to SALP and the safety system functional inspection (SSFI) that were conducted in 1987.

Recent NRC concerns have focused on several areas since the beginning of 1988. These concerns were concentrated on personnel performance errors,

clearance order/system lineup deficiencies, engineering design errors, weaknesses in documenting/reporting plant problems, performance of root cause analysis of events, management awareness of plant problems, and follow through on commitments. Repetitive personnel errors and clearance order deficiencies which have impacted plant operations or resulted in near misses have been of particular concern. Examples included:

a. Operations personnel errors

- January 18 - Misoperation of safety/relief valves resulted in an actual low reactor pressure vessel level following a normal shutdown.
- February 13 - Erratic operation of the turbine bypass valves (following a manual scram) caused level excursions and masked a diversion of water through the reactor water cleanup system to the condenser (a path not previously known to exist).
- February 14 - Control room and equipment operator errors in restoring the reactor building heating and ventilation (HVAC) system resulted in building overpressurization and rupture of the roof.
- March 12 - Control rod 46-51 was unknowingly mispositioned from step 48 (full out) to step 36 while taking rod drive stall flow measurements.
- April 30 - Main steam isolation valves (MSIV) closed following a reactor shutdown due to failure to adequately anticipate plant conditions (underestimated rate of pressure drop).
- May 1 - Approximately 9600 gallons of reactor coolant were drained to the suppression pool due to improper control switch operation while realigning Residual Heat Removal (RHR) Train B from shutdown cooling to suppression pool cooling mode.
- May 12 - A resin spill (and consequent Unusual Event) occurred due to two open valves in a sample line.

b. Clearance order/system lineup deficiencies

- May 3 - An electrician unknowingly worked on an energized 4160 VAC potential transformer drawer due to a tagging error.
- May 6 - Reactor building vent fans automatically tripped on actual high reactor building pressure due to closure of ventilation exhaust isolation valve during surveillance (operators did not check the consequences of pulling fuses for testing).
- May 16 - An electrician was flash burned while working on an energized bus for a tower makeup pump (load side of breaker was energized since motor was powered from an alternate source).

- May 17 - Two condensate valves opened when power was restored after a Division I bus outage which resulted in draining about 200 gallons of condensate into a feedwater heater where two mechanics were working.

c. Maintenance personnel errors

- February 4 - Instrumentation and control (I&C) personnel initiated a reactor scram while performing a surveillance test (technicians tested a second trip channel without asking operators to reset the channel already tripped).
- May 25 - Electricians improperly installed a design change on No. 1 diesel generator (found during post-modification testing); local start switch would not function because one wire had been incorrectly determinated.
- April 1 - Two fuel bundles fell over onto the refueling floor after uprighting of shipping container due to the failure of mechanical maintenance personnel to attach securing brackets.
- April 11 - A mechanic stepped on a new fuel bundle while preparing the bundle for inspection.

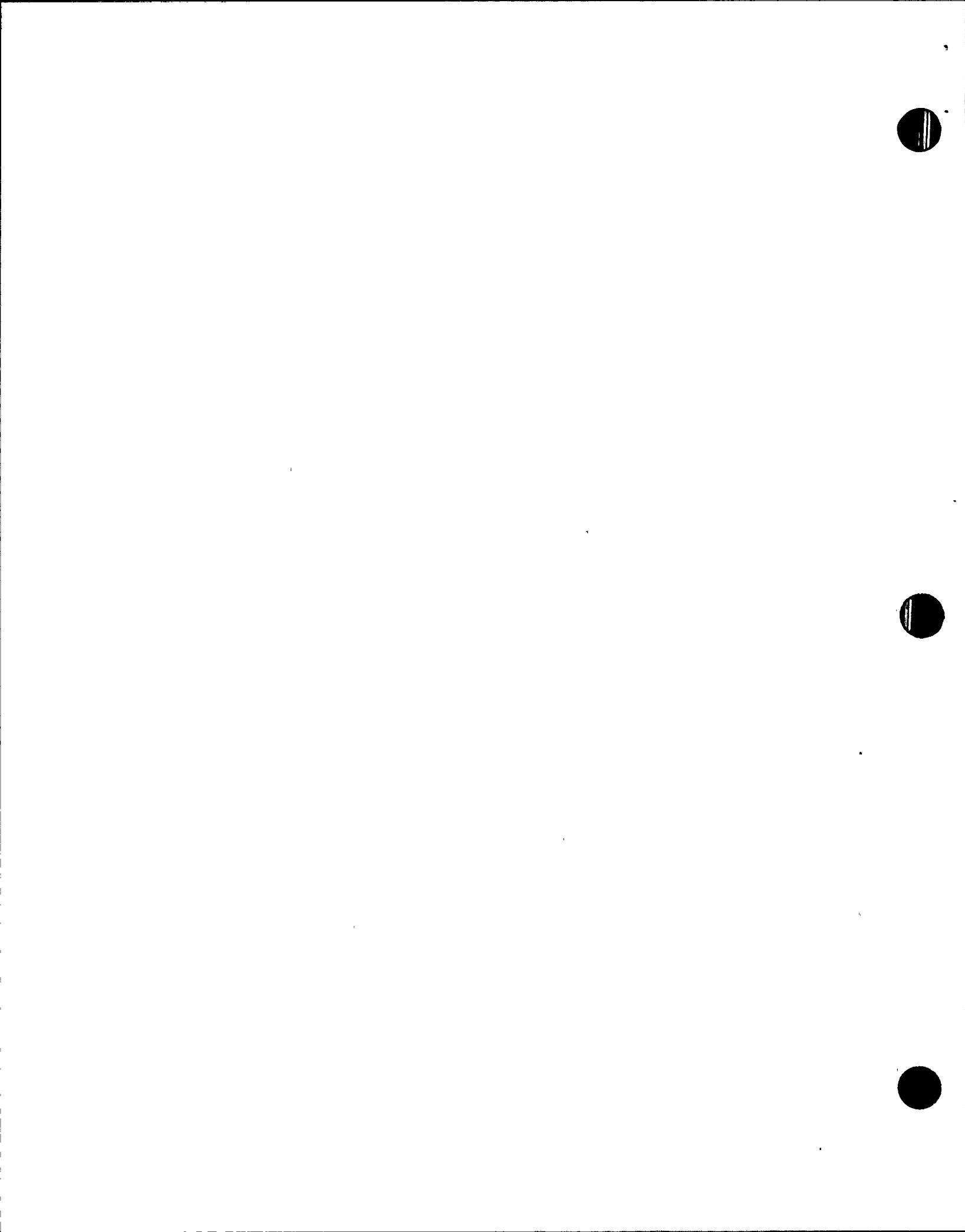
In the area of engineering design effectiveness, a number of concerns were identified by the SSFI team, the resident inspectors, and the licensee. These concerns related to inadequacies in the design data base, weaknesses in the design review process, and possible weaknesses in the design organizational structure (one manager for every 30 - 35 engineers).

Additional concerns identified during 1988 related to weaknesses in documenting/reporting plant problems and follow through on timely completion of commitments. In particular, nonconformance reports (NCRs) were not initiated on the fuel assembly that was stepped on nor on recent motor operated valve (MOV) problems. In the case of the MOVs, not issuing an NCR resulted in plant management's not being fully aware of the extent of problems with MOVs. A recent licensee event report (LER 88-06) also did not disclose that operating crews did not understand the severity of the transient described and did not identify corrective actions to prevent future backflow of reactor water through the feedwater system. With regard to follow through on commitments, the Supply System stated in LER 87-24 that, "Engineering efforts already in progress to upgrade Electrical Wiring Diagrams to top-tier status will be expedited." However, this effort was apparently discontinued in December 1987 and remained on hold thereafter due to realignment of priorities.

3. Meeting Topics

The meeting convened at 10:00 a.m.

Mr. Martin opened the meeting by stating that these meetings have been useful in maintaining communications and minimizing misunderstandings between the NRC and the Supply System.



Mr. Mazur began the Supply System's presentation by discussing the purpose of the visit and by briefly describing recent performance enhancements and prospective organizational changes at WNP-2.

After introductory remarks, Supply System representatives made presentations on the following subjects:

- **Organizational Initiatives**

Mr. Oxsen presented the agenda and discussed recent management and organizational initiatives. He identified that the last operating cycle was marred by too many personnel and performance problems. Mr. Oxsen stressed the need for more management involvement and personnel accountability in the conduct of activities at WNP-2. He stated that these enhancement efforts should result in fewer human errors, better design products, and a safer and more reliable plant.

- **Personnel Performance Issues**

Mr. Powers discussed recent problems in the area of personnel performance. He categorized the performance errors and discussed other items such as inadequate clearance orders that led to some of the recent events. Mr. Powers detailed the new discipline policy in response to poor performance and outlined proactive items designed to provide positive reinforcement to aid performance. This presentation was followed by a series of questions to further understand the licensee's enhancements. Mr. Oxsen summarized the initiatives by stating that the Supply System is unhappy with past performance and Mr. Mazur emphasized the fact that management is trying to penetrate and improve existing attitudes of personnel.

Mr. Martin responded to these initiatives by stating that correcting the problems leading to inadequate clearance orders should be a number one priority. He also identified that the NRC has become increasingly concerned over the negative trend in operations personnel performance. In particular, the February 13, 1988 reactor water level excursions and the May 12, 1988 resin spill events have raised concerns about the knowledge levels of some operators. In addition, there has been an apparent lack of penetrating management involvement and ability to turn around the operating crews' attitudes and performance. Mr. Martin stated that he sensed that no one approach would produce a change in performance. Instead, he suggested that a combination of items may be necessary to bring about an effective change in attitudes.

- **Design Issues**

Mr. Burn provided an outline of the internal and external evaluations that had been performed on engineering and design issues during the last 12 months. These evaluations were performed primarily due to deficiencies identified during the SSFI conducted by Region V in August 1987. Additional concerns were raised by the NRC in February 1988 as a result of an inadequate anticipated transient without scram (ATWS) design change that was being installed in the plant. Mr. Burn

identified that a re-review of design packages implemented during refueling outage (R-3) had been performed as a result of these internal and external concerns. He identified that no safety problems were found during these reviews. Mr. Burn also discussed the "Engineering Improvement Plan" that is being implemented to make enhancements to the design program. Mr. Powers followed by providing a description of the plant modification request (PMR) implementation improvement program. He stated that it was believed that the enhancements to these programs would minimize the possibility of inadequate design changes reaching the plant for implementation. Mr. Mazur summed up these program changes by identifying that a QA audit would be performed prior to the end of 1988 to evaluate the effectiveness of the changes.

Mr. Martin responded to these enhancements by stating that engineering is a full partner with operations in conduct of activities and must share the responsibility for plant operations. He reiterated Mr. Burns' concern that the Supply System engineering department must get over its construction mentality. Mr. Martin also stated that the Supply System must delve into problems, before they identify themselves at a significant level. He also suggested that the Supply System look at the single-unit Region V utilities and talk to them individually about engineering program enhancements.

#### - QA/QC Initiatives

Mr. Bouchey presented the QA/QC initiatives that were being instituted to enhance the effectiveness of the quality programs. In particular, a number of program improvements and management enhancements have been planned, such as the issuance of a new policy statement on quality and an increased level of management participation in quality matters.

Mr. Martin stated that QA needs to be more aggressive in identifying problems. He stated that the test will be to see if QA has a hand in identifying future significant issues before they identify themselves. Mr. Martin stressed the concern that problems need to be identified to the appropriate levels of management at an early enough time so that they can be properly dealt with. He noted that sometimes it may be necessary to raise the issue prior to finding proof that it is a bona-fide problem. Mr. Martin also stated that if the Supply System could wait until problems are self-revealing, then they would not need organizations such as QA. He further noted that opinions and intuitions are worth hearing because often they are correct. Mr. Martin summed up the NRC's concerns by stating that he sensed that the Supply System has the capability to make QA more effective.

#### - Balance-of-Plant System Survey

Mr. Powers presented a brief description of the balance of plant system survey that was instituted to assess systems for susceptibility to wiring deficiencies such as those found in the reactor building overpressure event that occurred on February 13,

1988. He described the criteria that were established as guidelines for the survey and summarized the results of the effort. The results found, in general, were that systems were adequately tested and had performed as designed. The remaining actions to be performed by the Supply System were to execute the technical support center (TSC) ventilation interlock verifications and complete the control switch verifications on 8 switches that had similar installations to the reactor building supply and exhaust fans.

- Refueling Outage Status/Restart Program

Mr. Powers provided a brief description of the restart evaluation process and its results. He identified the work that had been completed and the remaining items to be worked prior to startup. Issues assessed within the restart evaluation process were stated to include the status of 27 functional programs, the operability of balance-of-plant systems, management review of deferred maintenance tasks, and more rigorous documentation of plant readiness for restart. Mr. Powers also stated that the results of the restart evaluation would be presented to Supply System managers upon completion.

- SALP

Mr. Powers completed his portion of the agenda by identifying the scram frequency reduction efforts that were initiated in response to the 1987 SALP recommendations. The primary focus of this effort was to strengthen performance requirements and emphasize procedure compliance. In addition, such things as divisionalization of surveillance procedures had been implemented to reduce the potential for working on the wrong train while performing surveillances.

Mr. Martin suggested that it may be worthwhile to contact the Institute for Nuclear Power Operations (INPO) and other organizations to determine what efforts have already been performed in the area of scram reduction.

- Conclusions

Mr. Mazur concluded the Supply System's presentation by emphasizing that he would maintain strong vigilance on the work load, management involvement, and organizational strength of the Supply System. He stated that efforts would concentrate on the proper establishment of priorities, that "not enough time" to perform activities would not be a valid excuse, and that the threshold for questioning faulty work would be decreased. He stressed that he would open up minds and attitudes to the necessity for constructive self-criticism. Mr. Mazur identified that he was promoting an exchange program between the Supply System and the Swedish State Power Board to exchange information and personnel. He also identified that he was initiating an effort to increase the operational experience of the Corporate Nuclear Safety Review Board. Mr. Mazur stated that these additional initiatives were being established to enhance and expedite the quality of Supply System activities.

Mr. Mazur summarized the Supply System's problems as an inability to work as an effective team and to be self-critical. In the attempt to satisfy everybody, he felt that they had satisfied nobody.

Selected slides from the licensee's presentations are enclosed with this report.

4. Closing Remarks

In closing, Mr. Martin responded to the Supply System's presentation by summarizing the NRC's concerns. He restated the need for additional management emphasis on personnel performance and attitudes, for raising issues to appropriate management at an early stage, and for optimizing QA effectiveness. In addition, he also stressed the need for the proper allocation of resources to make effective changes (e.g., management involvement), and a commitment to excellence in training (e.g., simulator upgrades and adequate operator instruction). Mr. Martin stated that enhancements appeared to be well thought-out for the majority of the programs, but that operations performance needs to be turned around by more direct action and management involvement.

The meeting adjourned at 4:00 p.m.

Enclosure:  
Slides from the licensee's presentations

ENCLOSURE

SELECTED SLIDES FROM THE LICENSEE'S PRESENTATIONS

# NRC/SUPPLY SYSTEM AGENDA

JUNE 7, 1988  
WALNUT CREEK, CALIFORNIA

## AGENDA

A OPENING REMARKS	JB Martin DW Mazur
B PRESENTATION BY SUPPLY SYSTEM	
I INTRODUCTION	AL Oxsen 10
II PERSONNEL PERFORMANCE	CM Powers 30
III DESIGN ISSUES	
• Root Cause Assessment Results	GD Bouchey 50
• Integrated Plant Modification Improvement Program	JP Burn
– Design Engineering	
– Implementation Initiatives	
IV QA/QC INITIATIVES	GD Bouchey 20
V BOP SYSTEM SURVEY	CM Powers
VI R3 STATUS/RESTART PROGRAM	CM Powers
VII SALP	CM Powers 30
VIII CONCLUSIONS	DW Mazur 5
C ISSUES OF CURRENT NRC INTEREST	
• Personnel Performance/Involvement in Recent Plant Problems	
• Engineering/Design Control	
• Documentation/Reporting of Plant Problems	
• Recent Limitorque MOV Problems.	
D OTHER TOPICS OF INTEREST	
E CLOSING REMARKS	

## **II. PERSONNEL PERFORMANCE**

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### **C.M. Powers**

- Categorization of performance lapses
- Management initiatives on procedural compliance
- Selected corrective actions in each category
- Summary

# **PERSONNEL PERFORMANCE ISSUES**

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- **Categorization Of Performance Lapses**
  - **Individual Performance Errors**
    - RHR valving
    - MSIV isolation surveillance error
    - Reactor vessel level/pressure control
    - Fuel handling
    - Control rod mispositioning
    - MSIV closure

## **PERSONNEL PERFORMANCE ISSUES (cont'd)**

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- **Inadequate Clearance Order Boundary Established**
  - Reactor building overpressurization
  - Improper tagging on SM-4
  - Feedwater heater flooding
  - Electrical switchgear near misses

# **MANAGEMENT INITIATIVES ON PROCEDURAL COMPLIANCE**

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- **Discipline policy and implementation directed squarely at procedural compliance issues**
  - Meted out fairly and consistently
  - Escalating penalty for severity and repetitious performance
  - Termination of employment for failure to support our mission



## **MANAGEMENT INITIATIVES ON PROCEDURAL COMPLIANCE (cont'd)**

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- Plant management developing a "sense of stewardship" in all employees
  - Increase management's involvement in problem resolution
  - Better recognition of successes and positive feedback to individual contributors
  - Develop "quality circles" in each functional area to identify and address morale problems
  - Develop pay-for-performance compensation for employees

## **MANAGEMENT INITIATIVES ON PROCEDURAL COMPLIANCE (cont'd)**

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- Restructure Bargaining Unit contract to support complete right of selection of foreman, control room operators, and training
- Reorganize Maintenance Department to apply stronger control of work activities and better planning
- Modify problem identification programs to emphasize potential problems and implement dedicated root cause program
- Institute other reorganization initiatives to strengthen planning capabilities and build stronger station management team

## **SELECTED CORRECTIVE ACTIONS (cont'd)**

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- **Reactor Vessel Level/Pressure Control**
  - General Operating Procedures revised to direct level management strategy when isolated
  - New procedure created to direct shift from normal shutdown to hot standby
  - Upgrade simulator model to more accurately follow reactor inventory behavior



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## **SELECTED CORRECTIVE ACTIONS (cont'd)**

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- Operations Management to conduct simulator crew evaluations and guidance sessions on level management**
- Operations Management to "close ranks" on policy and plant initiatives**
- Personnel performance issues are pursued and discipline used to reinforce expectations**
- Long-term design change is to install a small capacity, motor driven feed pump**

## **SELECTED CORRECTIVE ACTIONS (cont'd)**

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- Inadequate Clearance Order Boundary
  - Suspended all high voltage, switchgear, and transformer work
  - Conducted electrical shop meetings on ramifications of near miss
  - Instituted a Clearance Order review process on outstanding R3 electrical switchgear work

## **SELECTED CORRECTIVE ACTIONS (cont'd)**

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- Required component-by-component testing for de-energization prior to work**
- Identified known backfeed circuits on switchgear**
- Established new independent Clearance Order Control Group on all remaining R3 work to ensure work description and Clearance Order boundaries are adequate**



## **SELECTED CORRECTIVE ACTIONS (cont'd)**

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- **Valve Control in Radwaste**
  - Reassess adequacy of procedure controls on deactivated solid radwaste system interface with liquid radwaste operations
  - Ensure other deactivated valves are adequately isolated
  - Modify management response to Unusual Event declarations
  - Plant Manager or Assistant will respond on all unusual events plus affected department manager

# **DESIGN ERROR ROOT CAUSE ASSESSMENT BACKGROUND INFORMATION**

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- Too many errors were being discovered during design implementation. Therefore, QA requested to do independent root cause analysis
- Polled several groups about problem PMRs plus looked at recent PMRs with numerous FCRs—initial resulting list was 23 PMRs
- Concentrated on errors that represented incorrect technical information—not opinion preference, field interferences, or administrative detail
- Screening against established error criteria resulted in the eight PMRs (approximately 11 errors) which were analyzed in detail for root causes

# **CONCLUSIONS**

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- **General**
  - Difficult data base and lack of elementary diagrams
  - Insufficient planning/scheduling
  - Management control in I&C/electrical (span of control, adequate technical oversight by managers, etc.)
  - Errors concentrated in I&C/electrical discipline, but similar problems not ruled out in other disciplines

## **CONCLUSIONS (cont'd)**

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- **Design Process**
  - Improved up front communication/design criteria definition
  - Errors could be reduced by creating "FOR CONSTRUCTION ONLY" drawings
  - Engineering department system engineers not always involved with all system changes
  - Lack of sufficient personnel feedback on problems, in-line quality measurements, and self-assessment programs

## **CONCLUSIONS (cont'd)**

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- **Checking, Verifying, and Review Processes**
  - Lack of up front communications/design criteria definition affects these functions also
  - Insufficient time scheduled for thorough checking, reviewing, and verifying
  - The necessary expertise has not always been selected for these functions
  - There has been a lack of accountability associated with reviewer signatures
  - Waiver of optional review steps has not received management scrutiny
- **QA Overview**
  - QA involvement too little and late

# **"ENGINEERING IMPROVEMENT PLAN"**

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- Post SSFI/ARI Activities
  - Design engineering meetings
  - Checking/verifying changes
  - Rereview R-3 design packages
  - Q.A. Auditing upgraded
  - Generation engineer internal evaluation

# **PMR IMPLEMENTATION IMPROVEMENT PLAN**

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- **PMR Implementation Commitments from SSFI**
  - 1. **Process improvements**
    - Focus on Closure of work-'OCS'
    - Partial implementation formalized
    - Preimplementation reviews
    - Post implementation reviews
  - 2. **Post Modification testing/training**
    - Clarified who is responsible for what (with regard to testing)
    - Mandatory use of appropriate PMT forms for each type of work performed
  - 3. **Implementation package review of selected R-3 mod's**
    - 10% sample of R3 work (significant impact)
    - Noted areas for improvement—documentation
    - Dedicated function within technical staff

## **PMR IMPLEMENTATION IMPROVEMENT PLAN (cont'd)**

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- **Additional Supply System Reviews Since SSFI**
  - Supply System audit by Q.A.-#88-434
    - Result - Similar issues as in SSFI
    - Conclusion - SSFI corrective actions still valid
  - Line verification effectiveness review
    - Reaffirmed integrity of PMR process
    - Recommended improvements:
      - Generation Engineering (Design)
      - Plant Technical (implementation)
      - Purchasing and Materials Management
      - Records Management and Plant Administration (close-out)
      - Quality Assurance (Receipt inspection, QC and QA processes)
      - Maintenance (Testing Review)

# **SAFETY ASSURANCE AND QUALITY INITIATIVES**

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## **(1) Management Enhancement Initiatives**

- Organizational & Staffing
- Training/Qualifications
- Attitudes/Organizational Norms
- Planning
- Information and Feedback Systems/Communications

## **(2) Program Improvements**

- Evaluation of Engineering Design Activities
- QA/QC Program Improvements
- Root Cause Assessment/Corrective Action Programs
- Nuclear Safety Assessment Initiatives
- Licensing/Regulatory Compliance Initiatives

# **BALANCE OF PLANT SYSTEM SURVEY**

## **(Corrective Action Follow-Up to NCR 288-050)**

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- **Objective**
  - Assess other systems for susceptibility to similar type wiring deficiencies
- **Discussion**
  - Safety related systems/components are not considered likely subjects for similar wiring errors due to technical specification surveillance tests that are routinely performed

