U.S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No.: 50-397/93-25

Docket No.: 50-397

License No.: NPF-21

Licensee: Washington Public Power Supply System (WPPSS)

Inspection at: Washington Nuclear Plant, Unit 2
Benton County, Washington

Inspection Conducted: July 12-23, 1993

Inspectors: D. Acker, Reactor Inspector
M. Royack, Reactor Inspector
D. Corporandy, Project Inspector

Approved by: _____
L. F. Miller, Jr., Chief, Reactor Safety Branch

Inspection Summary:

Inspection during the period of July 12-23 (Report No. 50-397/93-25)

Areas Inspected:

During this routine announced inspection the inspectors reviewed selected design changes and previously identified items. Inspection Procedures 37700, "Design Changes," and 92701, "Followup," were used for this inspection.

Safety Issues Management System (SIMS) Item:

None

Results:

General Conclusions and Specific Findings:

The design changes reviewed were technically adequate.

The licensee had not updated preventive maintenance instructions to include new safety related equipment installed by three completed design changes.

Procedures for signing verification of completion of design change steps did not always include appropriate signature blocks.

Significant Safety Matters:

None

Summary of Violation or Deviations:

One violation of 10 CFR 50, Appendix B, Criterion V, was identified in Section 2.1.1.

Open Items Summary:

Three followup items were closed. One enforcement item was opened.

DETAILS

1. Persons Contacted

Washington Public Power Supply System

*#R. Barbee, Manager, System Engineering
#M. Flasch, Director of Engineering
#J. Gearhart, Director, Quality Assurance
#P. Harness, Manager, Mechanical Design
* L. Harrold, Manager, Maintenance
*#R. Koeings, Manager, Design Engineering
*#R. Mathews, Manager, Electrical/I&C, Design Engineering
#T. Messersmith, Manager, Maintenance Support
*#L. Oxsen, Deputy Managing Director
#J. Parrish, Assistant Managing Director
#K. Pisarcik, Licensing Aide
#J. Rhoads, Manager, Operating Events Analysis and Resolution
* M. Rice, Plant Support Engineer
*#J. Sorensen, Manager, Regulatory Compliance
*#J. Swailes, Plant Manager
*#D. Swank, Licensing Engineer
*#S. Washington, Manager, Nuclear Safety Engineering
#R. Webring, Manager, Technical Division

US Nuclear Regulatory Commission

* D. Acker, Reactor Inspector
* W. Ang, Engineering Section Chief
#R. Barr, Senior Resident Inspector
#K. Johnston, Project Inspector
#D. Proulx, Resident Inspector
#M. Royack, Reactor Inspector

*Denotes those attending the exit meeting on July 15, 1993
#Denotes those attending the exit meeting on July 22, 1993

The inspectors also held discussions with other licensee personnel during the course of the inspection.

2. Design Control (37700)

2.1 Design Changes

The inspectors reviewed six basic design changes (BDCs) to safety related equipment which the licensee had determined to not require prior NRC approval. The inspectors reviewed the BDCs for conformance with Technical Specifications, 10 CFR 50.59, the licensee's quality assurance program, and 10 CFR 50, Appendix B, Criterion III, "Design Control."

The inspectors reviewed the following BDCs:

- BDC 88-0442-0A, "High Pressure Core Spray (HPCS) Solenoid and Air Pressure Control Valve Replacement"
- BDC 93-0021-0A, "SM-7 and SM-8 Relay Coordination"
- BDC 93-0024-0A, "Voltage Regulator Relay Configuration Modification for DG2"
- BDC 89-0218-0A, "High Pressure Core Spray (HPCS) Test Return Line Restricting Orifice"
- BDC 90-0288-0A, "Critical Switchgear Normal Cooling"
- BDC 93-0082-0A, "Reactor Core Isolation Cooling System (RCIC)/Containment Isolation Interface"

The inspectors chose BDC 88-0442-0A for review because it had been entirely completed. BDCs 93-0021-0A and 93-0024-0A were chosen because they had been recently installed and declared operable in 1993. BDC 93-0082-0A was chosen because it was an "Urgent Modification." This allowed the inspectors to evaluate both the entire design process and recent design work.

The inspectors evaluated each BDC for approval authority, procedure control, proper testing criteria, proper licensee updating of operating procedures and training, as built drawing control, proper safety evaluations, proper licensee updating of maintenance procedures, and control and update of the Updated Final Safety Analysis Report (UFSAR)

The inspectors concluded that the BDCs reviewed met the review criteria except for one violation for failure to update preventive maintenance instructions for three newly installed safety related components.

2.1.1 Preventive Maintenance

The licensee used scheduled maintenance system (SMS) Data Input Sheets to add new equipment to their routine preventive maintenance program per licensee procedure Plant Procedure Manual (PPM) 10.1.5.

Plant Procedure Manual (PPM) 1.4.1, Revision 14, "Plant Modifications," Paragraph 5.4, Step 1 required that the assigned project engineer initiate and coordinate a Plant Modification Record (PMR) Package Checklist for design changes. The PMR package checklist included a block to check if SMS data input sheets were required.

The inspectors reviewed PMR package checklists for BDC 93-0021-0A and noted that the SMS data input sheets were not required. However, the inspectors determined that BDC 93-0021-0A was based on another recent modification, 91-0222-0A, "DG-2 Field Cutoff Relays," which did require

SMS data input sheets. The inspectors were concerned that the PMR package checklist for BDC 93-0021-0A had not been appropriately completed as required by PPM 1.4.1. PPM 1.4.1, paragraph 5.5, step 20 required that the assigned project engineer sign in the PMR Package Checklist that the SMS Data Input Sheets were completed. The inspectors noted that the PMR Package Checklist did not contain a signature block for this signature.

The inspectors reviewed the PMR checklists for BDCs 88-0442-0A, 93-0024-0A and 91-0222-0A. The inspectors noted that the licensee's project engineer had appropriately checked that SMS data input sheets were required. However, the inspectors were unable to locate any SMS data input sheets or signatures of completion of the SMS data input sheets for these three BDCs. Because SMS data input sheets had not been initiated, new safety related equipment including emergency diesel generator (EDG) solenoid valves, EDG pressure regulating valves, EDG start sequence timing relays, and 4160 volt power coordination relays had not been included in the licensee's preventive maintenance program.

In response to the inspector's concern the licensee initiated SMS data input sheets for these three BDCs. The licensee noted that for BDC 88-0442-0A they intended to include the new equipment in preventive maintenance using a procedure change. Failure to complete and sign for these SMS data input sheets is a violation of 10 CFR 50, Appendix B, Criterion V (Violation 50-397/93-25-01).

2.1.2 Updated Final Safety Analysis Report

Engineering Instruction (EI) 2.8, Revision 9, "Generating Facility Design Change Process," required that a design safety analysis be included as part of a BDC. The inspectors noted that the design safety analysis for BDC 93-0024-0A indicated that the design change affected Chapter 15 of the Updated Final Safety Analysis Report (UFSAR) and that a Safety Analysis Report Change Notice (SCN) was required to be initiated. However, the PMR package checklist for BDC 93-0024-0A was checked to indicate that an SCN was not required.

In response to the inspector's observation, the licensee reviewed BDC 93-0024-0A and concluded that an SCN was not required. The licensee noted that BDC 93-0024-0A only changed a UFSAR drawing, which was planned to be updated in the next UFSAR update. The inspectors reviewed the licensee's records and identified that the drawing in question was listed for UFSAR updating. The inspectors also reviewed the design change and concurred with the licensee that no UFSAR text changes were required.

The inspectors considered that the difference between the design analysis and the PMR Package Checklist should have been resolved by the licensee as part of their design review process. The licensee concurred.

2.1.3 Verification of Completed Actions

During review of the BDCs, the inspectors noted a number of examples where tables and checklists associated with verification of completion of a BDC did not match the associated instructions. Examples of these mismatches are listed below.

- As noted in Section 2.1.1 of this report, PPM 1.4.1, Paragraph 5.5, Step 20 required that the assigned project engineer sign in the PMR package checklist that the SMS data input sheets were completed. The PMR package checklist did not contain a signature block for this signature.

- PPM 1.4.1, Paragraph 5.5, Step 5 required that the assigned project engineer identify plant procedures affected by a BDC, initiate actions to update these procedures, and sign the appropriate blank on the PMR package checklist. The PMR package checklist did not contain a signature block for this signature.

- PPM 1.4.1, Paragraph 5.6, Step 1 required that the assigned project engineer review the entire PMR package including all appropriate checklists and then sign and date the PMR. The only signature space on the PMR for the project engineer was titled, "Critical Documents Updated."

The inspectors discussed the "Critical Documents Updated," signature space with several project engineers and got different opinions as to what this signature required. PPM 1.4.1 did not define Critical Documents.

For the BDCs reviewed, the inspectors did not identify any resulting problems due to the above procedural deficiencies, except as noted in Section 2.1.1 of this report.

2.1.4 Discussion and Conclusions

The inspectors determined that the BDCs reviewed were technically adequate.

The inspectors determined that the licensee had adequate checklists for identifying actions required to be taken as part of a design change. However, the inspectors identified examples where the procedures and checklists for verification of completion of the required actions were mismatched. In general, the inspectors also found the licensee's verification of completion of actions was not as well documented as their identification of required actions. The inspectors were concerned that the procedure format deficiencies created the potential for procedure violations since no blank spaces existed to highlight incomplete actions.

The inspectors observed that the procedures for verification of

completion of BDCs could contribute to procedure compliance problems.

In response to the inspector's concerns, the licensee committed to review and update as necessary the procedures or checklists to clearly indicate what actions and verifications were required.

2.2 Temporary Modifications

The inspectors reviewed two temporary modifications for program controls, procedure details, approval responsibility, formal records of the changes, independent verifications of the changes, functional testing, periodic licensee review and adequacy of the design.

The following temporary modification requests (TMRs) were reviewed:

- TMR 92-024: Disconnect and remove bad nitrogen system temperature switches and install pipe plugs
- TMR 92-062: Remove covers to safety related microprocessor and relay drawers

The inspectors concluded that the TMRs reviewed had adequate program control, proper level of procedural detail to complete the task, correct level of approval, records of changes, independent verification of changes, post installation testing, and periodic licensee review of design adequacy.

The inspectors determined that the licensee's quarterly report on outstanding TMRs did not accurately reflect the actual installation date for TMRs installed prior to March 1992. In March 1992 the licensee changed the TMR system, and in converting older TMRs to the new system, used the date of the conversion as the installation date in quarterly reports in lieu of the actual installation date. The inspectors considered that use of the conversion date could mislead management on the effectiveness of actions to remove and close TMRs. The licensee acknowledged the inspectors' concerns.

3. Followup (92701)

3.1 (Closed) Followup Item 50-397/92-25-07: Reactor Core Isolation Cooling Turbine Lube Oil Samples

Original NRC Open Item

NRC inspectors had previously reviewed reactor core isolation cooling (RCIC) turbine lube oil samples and had noted that the particle counts were higher than "Terry Turbine Controls Guide," NP-6909 recommended maximums. Licensee RCIC turbine lube oil samples for November 3, 1991, February 25, 1992, and April 20, 1992, indicated particle counts of 400,000, 400,000, and 238,800 particles, respectively, in the 5 - 15 micron range for a 100 milliliter lube oil sample. The inspector noted

that Terry Turbine maximum recommended standards for 5 - 10 and 15 - 25 micron was 24,000 particles and 5360 particles, respectively, for a 100 milliliter sample.

The licensee had not taken any corrective actions for the higher than normal lube oil particulate indications since RCIC turbine lube oil changes were being performed at greater than required frequencies, and since turbine vibration, lube oil differential pressure, and bearing temperatures were not increasing.

Licensee's Actions in Response to the Open Item

Problem Evaluation Request

The licensee issued problem evaluation request (PER) 292-986, "RCIC Lube Oil," to evaluate the higher than normal particulate count in the RCIC lube oil. PER 292-986 recommended the following:

- Contact Terry Turbine to request their recommendation on cleaning up the lube oil and determine if the turbine was seriously affected by the high particulate count.
- Perform the SMS task to obtain a current oil sample instead of waiting until the next scheduled oil sampling period.
- If the current oil sample particulate count was high, develop a plan to clean up the oil system.

Licensee Actions

The licensee contacted Terry Turbine Controls to determine if the higher than recommended lube oil particulate count would have an effect on the RCIC Terry Turbine or its controls. The licensee documented their conversations in records of telephone conversations dated August 20, 1992. The records of conversation concluded that lube oil particulate counts would not have an adverse affect on the control or operation of the turbine since internal filtering systems of 20 to 25 microns were installed.

The licensee sampled the RCIC turbine lube oil and additionally sampled an old and a new drum of Mobil Oil Vaprotec oil. Vaprotec oil is the type of lube oil used in the RCIC turbine. The old lube oil drum sample was taken from a drum used to fill the RCIC turbine lube oil reservoir. The lube oil analysis concluded that the turbine oil sample had particulate count levels of 269,685 for 5 - 15 micron sized particles and 2,003 for 15 - 25 micron sized particles. The 5 - 15 micron sized particle count was higher than the recommended, however, 15 - 25 micron sized particle count was lower than the recommended. The lube oil samples taken from the new and old lube oil drums also had particulate count levels of 898,790 and 281,335 for particle sizes of 5 - 15 microns, and 301,051 and 63,645 for particle sizes of 15 - 25 microns,

respectively. Therefore the licensee had concluded that the particulate were being introduced into the RCIC turbine from the lube oil.

The licensee had introduced a program to pre-filter lube oil prior to installation into equipment. The filtering process had filtered the lube oil when it was received on-site and again when it was placed into the unit. Therefore, after several RCIC turbine cycles of lube oil system changes and flushing the particulate count level could be reduced to recommended particulate count levels.

The licensee stated that they were evaluating changing the type of lube oil used in the RCIC turbine.

Inspectors' Actions During the Present Inspection

The inspectors reviewed licensee records of conversation between the licensee and the RCIC turbine control supplier. The inspectors reviewed licensee documentation of RCIC turbine lube oil samples and the new and old drum lube oil samples. The inspectors determined that both the new and the old lube oil drum samples had a higher particulate count level than the lube oil that was pre-filtered and used in the RCIC turbine. The inspectors reviewed licensee letters to lube oil suppliers confirming the acceptability of alternate lube oils for the RCIC turbine.

Discussion and Conclusion

The inspectors concluded that the licensee had verified with the RCIC turbine control supplier that the above recommended RCIC turbine lube oil particulate levels did not affect the turbine controls or operation. The inspectors concluded that higher than recommended particulate had been introduced into the RCIC turbine in the lube oil and that the licensee had initiated pre-filtering the RCIC turbine lube oil to reduce the problem. The inspectors also concluded that the licensee had taken appropriate action to determine the cause of and reduce the particulate count levels in the RCIC turbine lube oil. This item is closed.

No violations or deviations of NRC requirements were identified.

3.2 (Closed) Followup Item 50-397/92-26-01: Piping Calculations

Original NRC Open Item

This follow-up item concerned the adequacy of licensee procedural guidance for overlapping piping calculations in the absence of a single anchor-to-anchor calculation. The inspector had been concerned that (1) licensee Piping Design Guide, MES-3 suggested that two piping restraints in each of the three orthogonal directions was sufficient to establish a boundary for overlapping calculations, which was less conservative than the guidance in NUREG 1980, "Dynamic Analysis of Piping Using the Structural Overlap Method," and (2) that the licensee might have applied the less conservative criteria to safety-related piping analyses.

The licensee had committed to develop a plan to determine if any safety related piping had used the overlap method of analysis and to review the Piping Design Guide MES-3 for adequacy.

Licensee's Actions in Response to the Open Item

The licensee revised Design Guide (MES-3) to be consistent with the guidance given in NUREG 1980 for overlap criteria calculational analysis.

The licensee sampled 160 safety-related large bore piping calculations to determine if the overlap method for piping analysis was used. The 160 calculations sample was greater than 50% of the large bore piping calculations in this category. The licensee identified two calculations which were performed using the overlap method. The two calculations were performed for service water system piping. The licensee reviewed the two service water system calculations and found that both calculations met the guidance provided in NUREG 1980 for overlapping.

Inspectors' Actions During the Present Inspection

The inspectors reviewed licensee Design Guide MES-3, Revision 1, and determined that the licensee had issued procedure amendment 92-10 on October 14, 1992, for the design guide to incorporate NUREG 1980 guidance.

The inspectors determined that the licensee had sampled safety-related piping calculations to determine which calculations had used the overlap method of calculation, and that two calculations of 160 were found to have used the overlap method of analysis.

The inspectors determined that the methods used to develop the overlap model for the two service water piping calculations met the guidance of NUREG 1980.

Discussion and Conclusion

The inspectors concluded that the licensee had reviewed and appropriately revised Design Guide MES-3. The licensee had developed and implemented a plan to adequately sample large bore piping stress calculations to determine if any had used the overlap method. The licensee had determined that the calculations which used the overlap method of calculation had results which met the criteria of NUREG 1980. This item is closed.

No violations or deviations of NRC requirements were identified.

3.3 (Closed) Followup Item 50-397/92-26-02: Piping Support Calculations

Original NRC Open Item

This follow-up item concerned the licensee's calculational method for combining independent support group responses on certain ASME Code Class 1 piping response spectrum analyses as listed in WNP-2 Technical Memorandum 1303, dated August 10, 1983, "Multiple Input Response Spectrum Analysis Method of Combining Responses Due to Individual Support Excitations." The inspector had been concerned that the independent support group responses in multiple level response spectra analyses (MLRS) were being combined by the square root of the sum of the squares method (SRSS), which was a less conservative approach than the absolute summation method (ABS) recommended in NUREG 1061, Volume 4. Although the SRSS method had been used on certain Technical Memorandum 1303 calculations at the time of licensing, the inspector observed that the licensee had used the same SRSS method for performing calculations to justify piping snubber reduction for the subject piping. Since the SRSS method was less conservative than the ABS method of calculation, the inspector was concerned that the results from the SRSS method used to justify snubber reduction may not have been conservative.

In response to the inspector's concern, the licensee had committed to perform a technical evaluation of their calculations, which used the SRSS method, considering industry studies including EPRI report NP-6153, Seismic Analysis of Multiply Supported Piping Systems."

Licensee's Actions in Response to the Open Item

The licensee performed a technical evaluation of their piping calculations, which used the SRSS method, considering industry studies including EPRI report NP-6153, and Welding Research Council Bulletin 352, dated April 1990.

The licensee stated that future calculations would continue to limit the SRSS combination of independent support group responses to those calculations which were performed in a similar manner at the time of licensing.

Inspectors' Actions During the Present Inspection

The inspectors reviewed the licensee's evaluation and noted the following:

- The licensee's approach to combining independent support group responses by SRSS was consistent with the method recommended in Welding Research Council Bulletin 352, dated April 1990.
- EPRI report NP-6153 found that SRSS combination between support group responses provides generally conservative responses when compared to test data.

The inspector determined that the licensee's technical evaluation demonstrated that the use of SRSS for combining independent support motion responses was consistent with EPRI report NP-6153. The inspector also determined that the licensee's use of the SRSS method was generally conservative for the piping calculations listed in licensee Technical Memorandum 1303.

Discussion and Conclusion

The inspectors concluded that the licensee had adequately performed the technical evaluation of their calculations which used the SRSS method for combining independent support motion responses. The inspectors also concluded that the evaluation demonstrated the SRSS method to be conservative for the piping calculations listed in WNP-2 Technical Memorandum 1303. This follow-up item is closed.

No violations or deviations were noted in the areas inspected.

4. Exit Meeting

The inspectors conducted exit meetings on July 15, 1993, and July 22, 1993, with members of the licensee staff as indicated in Section 1. During these meetings, the inspectors summarized the scope of the inspection activities and reviewed the inspection findings as described in this report. The licensee acknowledged the concerns identified in the report. The licensee did not identify as proprietary any of the information provided to the inspector.

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