**Washington Public Power Supply System**

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Docket No. 50-397

August 11, 1983
G02-83-761

Mr. J. B. Martin
Regional Administrator
U.S. Nuclear Regulatory Commission
Region V
1450 Maria Lane, Suite 210
Walnut Creek, California 94596

Subject: NUCLEAR PROJECT NO. 2
10CFR50.55(e) REPORTABLE CONDITIONS: #223, STANDBY LIQUID CONTROL SYSTEM (SLCS); AND #260, STANDBY SERVICE WATER FLOW PROBLEMS

References: 1) Telecon QA2-83-029, dated January 27, 1983, L.C. Floyd to R. Dodds.

2) Telecon QA2-83-178, dated July 21, 1983, L.C. Floyd to R. Dodds.

In accordance with provisions of 10CFR50.55(e), your office was informed, by telephone, of the above subject conditions. Attachment 1 provides the Project's final report on Condition #223. Attachment II provides our interim report on Condition #260 and we will continue to provide your office with quarterly updates until resolved. The next report will be submitted by November 1, 1983.

If you have any questions, please contact Roger Johnson, WNP-2 Project QA Manager, at (509) 377-3501, extension 2712.

C. S. Carlisle
Program Director, WNP-2

LCF/kd

Attachment: AS stated

cc: W.S. Chin, BPA
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Document Control Desk, NRC



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WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PROJECT NO. 2
DOCKET NO. 50-397
LICENSE NO. CPPR-93
10CFR50.55(e) CONDITION #223
STANDBY LIQUID CONTROL SYSTEM (SLCS)

FINAL REPORT

## Description of Deficiency

The Standby Liquid Control System (SLCS), which receives supply power from AC and DC safety-related buses, is a backup to the control rods for safe shutdown. General Electric electrical elementary diagrams require reliable power sources for the SLCS equipment. The SLCS system is installed with one loop powered and controlled from safety-related (Class 1E) electrical buses, while the other loop of equipment is not. Power supplies which are not safety-related are connected to safety-related buses without isolators, and control circuits within various panels are not separated; both of which are requirements of the WNP-2 Electrical Separation Criteria.

## Safety Implication

Electrical Separation Criteria has been violated, which degrades the reliability of safety-related electrical power sources. Electrical failure of safety-related power sources could occur through interaction with the non safety-related SLCS circuits. These conditions may preclude the SLCS from performing its intended function.

## Cause of the Deficiency

The deficiency exists due to the description of the SLC system power supply requirement within GE documents. GE indicated the power supplies must be highly reliable and must function even with the loss of off-site power. The safety-related electrical power supplies meet these requirements and were considered by BRI to be the most appropriate power source. However, GE had not intended the SBLC system to be classified or treated as safety-related and therefore, GE had not designed into the various components electrical separation which would meet the final WNP-2 Electrical Separation Criteria for Class 1E equipment.

## Corrective Action

General Electric has clarified the design requirements of the SLCS and submitted recommended document changes to preclude misinterpretation of the system's function and the licensing commitments. Corrective action is proceeding in accordance with the clarification, as follows;

- The SLCS, by design, is not required to perform a "safety function," nor is it required as a safety backup system to the Reactor Protection System (RPS) or Control Rod Drive System (CRDS). The system, by design, is not required or intended to meet single failure criteria. The SLCS is a backup to the CRDS for plant shutdown for a non-transient event. All SLCS components required for boron injection shall be Seismic Category I.

- A safety-related Class 1E power source is not required for boron injection; however, the redundant pumps, explosive valves and motor operated storage tank outlet valves shall be powered from two separate buses so that a single electrical failure will not prevent the systems operation. The SLCS buses shall be connectable to a standby power source to ensure boron injection in the event of a station power failure.

Based on the above clarification from GE, the SLCS interfaces (electrical and mechanical) have been revised via BRI Project Engineering Directive (PED) 218-E-B100 and GE FDDR-KKI-1169 to bring the system into compliance with the WNP-2 Electrical Separation Criteria. This change entails that all isolation interfaces with safety related systems shall be Class 1E, the remainder of the SLCS (non-safety related interface) shall be non-safety related. Please note, that this is a change from our previous reports, in which we stated that Loop A would be totally Class 1E.

Actions to Prevent Recurrence

The Supply System Equipment Qualification Program identifies and classifies plant safety-related equipment (including equipment to prevent failures of safety related power supplies resulting from failures in non-safety related connected loads) on the safety-related electrical list (Class 1E List). This assures proper classification of equipment by function. Site Engineering personnel were provided training in the application of Electrical Separation Criteria as encompassed in Engineering Criteria Document Appendix 3, WNP-2 Electrical Separation Practice.

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PROJECT NO. 2
DOCKET NO. 50-397
LICENSE NO. CPPR-93
EVALUATION OF POTENTIAL 10CFR50.55(e) CONDITION #260
STANDBY SERVICE WATER FLOW PROBLEMS

INTERIM REPORT

## Description of Deficiency

Startup testing identified insufficient flow to several heat exchangers in Standby Service Water (SW) loops A and B.

## Safety Implication

Insufficient service water flow through heat exchangers could cause failure of safety-related equipment due to overheating. Failure of this equipment could preclude safe shutdown of the reactor. The reportability of the condition is under consideration in accordance with normal project procedures. Due to the circumstances described in the following sections of this report.

## Cause of Deficiency

The primary cause of this deficiency is due to corrosion product buildup on the inside surface of the pipe. The material buildup reduces the pipe flow area and increases resistance resulting in a low flow condition. In addition, errors in the original system pressure drop calculations have been identified. The calculations should have been considered preliminary until all system design information was available. In revising the calculation to the latest design/as-built configuration several cases have been identified where the calculated available pressure head will not provide the required design flow rate.

The design aspects of these cases are limited to circuits with low available head across small bore piped heat exchangers for which critical "as-built" information (e.g., small bore isometrics) was not available when the calculations were performed. The standby service water system is the only safety related system where this condition is applicable.

## Action to Prevent Recurrence

A chemical treatment program is required to control water quality so as to prevent future material buildup in the pipe.

Two factors should reduce the possibility of design errors in pressure drop/flow calculations in the future.

1) We are now using a computer program for such calculations. This allows modelling of all loops of large parallel systems.

2) We now have available the as-built configuration of the piping within the plant upon which to base calculations.

Corrective Action

The Standby Service Water System (58.0) was chemically cleaned to remove the deposited material. Subsequent testing and inspection has identified that excessive fouling still exists and that additional cleanup is required.

The deposited material has been analyzed and chemical treatment to inhibit future deposits has been identified. These topics are discussed in detail in Burns and Roe Technical memorandum Number 1300, dated June 9, 1983.

The system pressure drop calculations are being revised to reflect the latest design configuration. The calculations that have been revised to date indicate the existing system components can be adjusted to provide the required pressure head. This can be achieved by throttling the RHR heat exchanger discharge valves (RHR-V-68A, B) and enlarging the removable orifices (SW-FE-1A, B) in the return lines located in the SW pump houses (Figure 1). If system design changes are identified as necessary to correct the deficiency, they will be implemented as required.

BURNS AND ROE, INC.

W.O. No. _____ Date _____ Book No. _____ Page No. _____
Drawing No. _____ Calc. No. _____ Sheet _____ of _____
By PEP Checked _____ Approved _____
Title SIMPLIFIED STANDBY SERVICE WATER FLOW DIAGRAM

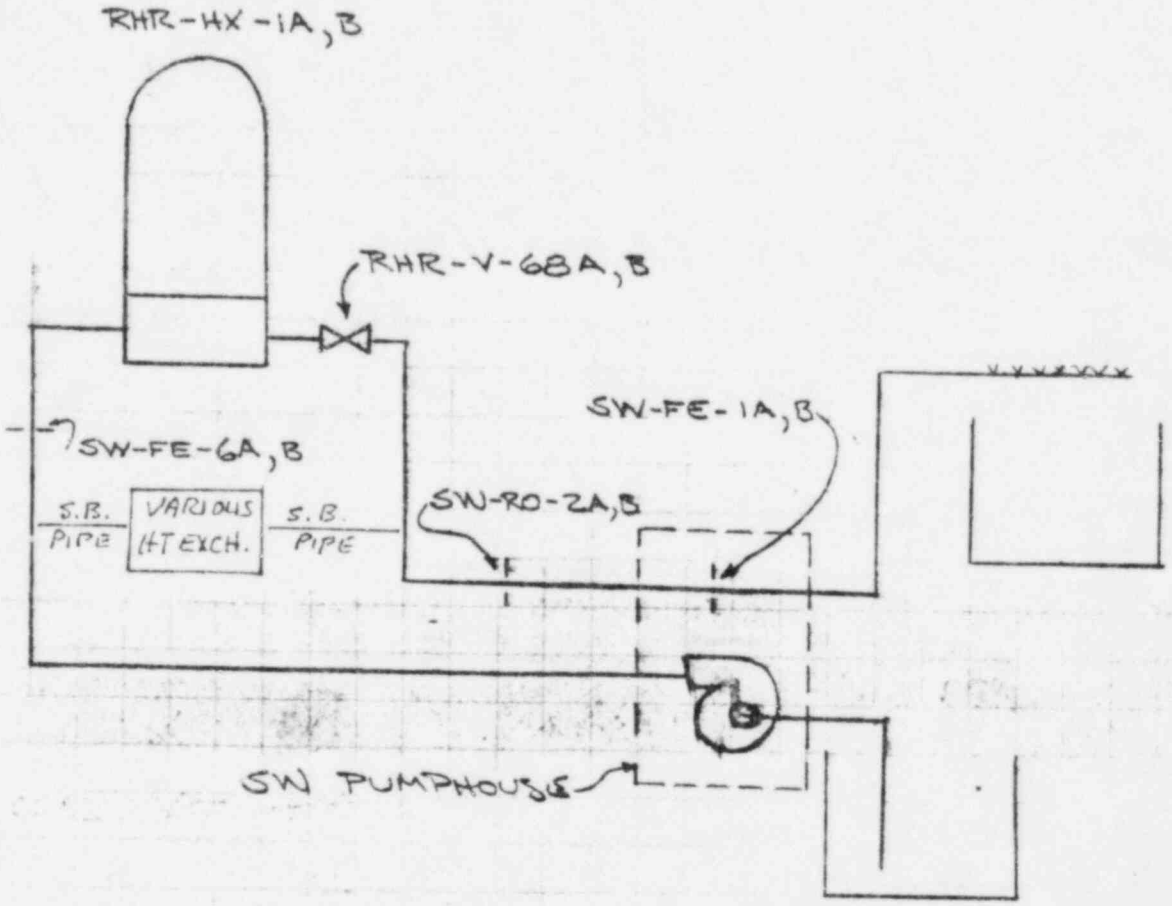


FIGURE 1