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SUBJECT: LER 92-041-01:on 921027,offsite power source determined
 inoperable during brief periods of prior operaton due to low
 voltage condition on 230KV grid.Caused by design deficiency
 & inadequate mgt methods.TS procedure changed.W/921228 ltr.

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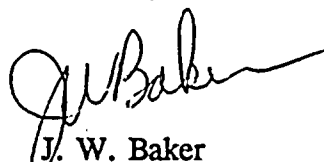
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**SUBJECT: NUCLEAR PLANT WNP-2, OPERATING LICENSE NPF-21
LICENSEE EVENT REPORT NO. 92-041-01**

Transmitted herewith is Licensee Event Report No. 92-041-01 for the WNP-2 Plant. This report is submitted in response to the report requirements of 10CFR 50.73 and discusses the items of reportability, corrective action taken, and action taken to preclude recurrence. This supplement reflects final results and conclusions from the root cause analysis of this event.

Sincerely,



J. W. Baker
WNP-2 Plant Manager (Mail Drop 927M)

JWB/REF/lr
Enclosure

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LICENSEE EVENT REPORT (LER)																															
FACILITY NAME (1) Washington Nuclear Plant - Unit 2										DOCKET NUMBER (2) 0 5 0 0 0 3 9 7						PAGE (3) 1 OF 8															
TITLE (4) OFFSITE POWER SOURCE INOPERABLE DURING SEVERAL BRIEF PERIODS OF PRIOR OPERATION DUE TO LOW VOLTAGE CONDITION ON THE 230KV GRID																															
EVENT DATE (5)			LER NUMBER (6)				REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)																					
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES						DOCKET NUMBERS(S)																
1	0	2	7	9	2	9	2	--	0	4	1	--	0	1	1	2	2	8	9	2					0	5	0	0	0		
OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)																													
POWER LEVEL (10)																															
1		<div style="display: flex; justify-content: space-between;"> <div> 20.402(b) <input type="checkbox"/> 20.405(a)(1)(i) <input type="checkbox"/> 20.405(a)(1)(ii) <input type="checkbox"/> 20.405(a)(1)(iii) <input checked="" type="checkbox"/> 20.405(a)(1)(iv) <input type="checkbox"/> 20.405(a)(1)(v) </div> <div> 20.405(C) <input type="checkbox"/> 50.36(c)(1) <input type="checkbox"/> 50.36(c)(2) <input checked="" type="checkbox"/> 50.73(a)(2)(i) <input type="checkbox"/> 50.73(a)(2)(ii) <input type="checkbox"/> 50.73(a)(2)(iii) </div> <div> 50.73(a)(2)(iv) <input type="checkbox"/> 50.73(a)(2)(v) <input type="checkbox"/> 50.73(a)(2)(vi) <input type="checkbox"/> 50.73(a)(2)(vii)(A) <input type="checkbox"/> 50.73(a)(2)(viii)(B) <input type="checkbox"/> 50.73(a)(2)(x) </div> <div> 77.71(b) 73.73(c) OTHER (Specify in Abstract below and in Text, NRC Form 366A) </div> </div>																													
LICENSEE CONTACT FOR THIS LER (12)																															
NAME R. J. Poche, Licensing Engineer										TELEPHONE NUMBER AREA CODE: 5 0 9 3 7 7 - 4 1 4 5																					
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																															
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS																						
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR																	
YES (If yes, complete EXPECTED SUBMISSION DATE) X NO																															

On October 27, 1992, it was determined that one of two offsite power sources would not have been capable of supplying design basis loads during several brief periods of prior plant operation due to low voltage conditions on the 230KV grid. The 230KV offsite power source should have been considered inoperable during these periods, and the appropriate Action Statement should have been entered. Grid voltages were well above minimum acceptance values when these low voltage conditions were identified.

The root causes of this condition were: 1) design deficiencies resulting from inadequate consideration of the need to develop grid voltage acceptance criteria and provide accurate grid voltage monitoring instrumentation, and 2) less than adequate management methods to ensure that correct acceptance criteria were used to determine the availability of offsite power sources. Contributing causes were: a technically inaccurate procedure, insufficient monitoring of grid voltage, and inadequate instruments for grid monitoring. Corrective actions include: correcting surveillance procedures, providing continuous monitoring of the offsite power sources, and formalizing the acceptance criteria development process for surveillance procedures.

Backup power sources were available during periods coinciding with low voltage conditions, and the probability of a design basis accident occurring coincident with a low grid voltage condition was extremely low. Therefore, this condition was not safety significant.

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Plant Conditions

Power Level - 100%

Plant Mode - 1 (Power Operation)

Event Description

On October 27, 1992, it was determined that one of the two offsite power sources for WNP-2 would not have been capable of supplying design basis loads during several brief periods (three times in 1988, 2 times in 1990) of prior plant operation due to low voltage conditions on the 230KV grid. The 230KV offsite power source should have been considered inoperable during these periods of low grid voltage, and the appropriate Technical Specification Action Statement should have been entered. However, the low grid voltage condition was not recognized during the times when it existed.

An Electrical Distribution System Functional Inspection (EDSFI) was conducted during the first quarter of 1992, and included a review of offsite power sources. In order to support the inspection, historical grid voltage data was collected for the offsite power sources. While collecting this data, the System Engineer noted that voltage on the 230KV grid was not as constant as expected. In response, the System Engineer initiated an independent review of the previous five years of grid voltage data for offsite power sources. This review was performed during the same approximate time period as the EDSFI.

During review of 230KV grid data, the System Engineer identified one instance when 230KV grid voltage was below the surveillance procedure acceptance criteria value of 226.2KV. Grid voltage during this occurrence was 226KV. At the time when this low voltage condition occurred, the plant was shut down and the other offsite power source was available. Consequently, this low voltage occurrence did not represent a Technical Specification violation because only one offsite power source is required to be operable when the plant is shut down. The System Engineer subsequently alerted Bonneville Power Authority (BPA) that allowing grid voltage to drop below minimum acceptable values could adversely affect operability of required offsite power sources.

The System Engineer's review of historical data for the 115KV grid concluded that voltages for this offsite power source remained above minimum acceptable values at all times when it was required to be operable. The historical data also indicated that voltages on the 115KV grid are not as sensitive to seasonal peak demands as are voltages on the 230KV grid. It is believed that there were no periods of low voltage on the 115KV grid that adversely affected operability of this offsite power source.

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Subsequent to completion of EDSFI and System Engineer reviews of historical data for the offsite power sources, the calculation for degraded voltage relay setpoints was revised in August 1992. In October 1992, after reviewing the revised calculation, the System Engineer realized that the minimum acceptable voltage for the 230KV grid was 230KV, and not 226.2KV, as previously assumed.

The acceptance criteria value of 226.2KV was based on the dropout setpoint for degraded voltage relays. However, during review of the calculation it became apparent that the minimum 230KV grid voltage had to be above the corresponding maximum reset value for these relays in order to assure availability of the 230KV offsite source under design basis conditions. Based upon his earlier review of 230KV grid voltage history, the System Engineer prepared a Problem Evaluation Request (PER) to document this discrepancy and initiated a follow-up review of historical data for the 230KV grid. This review determined that the 230KV grid had briefly dropped below 230KV on 23 occasions between 1987 and 1991.

From surveillance data, it was possible to determine the actual reset values for the degraded voltage relays during each of these low voltage periods. Out of the 23 low voltage periods, five instances of prior plant operation were identified when both offsite power sources were required to be operable and the 230KV grid voltage was below the minimum acceptable value. The five low voltage conditions coincide with seasonal peak loads, and occurred on July 21, August 23 and August 24, 1988, (2, 6 and 5 hours, respectively), and August 6 and August 9, 1990, (2 hours each).

Immediate Corrective Action

No immediate corrective actions were identified. The minimum acceptable grid voltage values for the 230KV and 115KV offsite power sources were well above the minimum acceptable values when the conditions described in this report were identified, and it was not the peak electrical demand season. WNP-2 is currently in compliance with the Technical Specifications for offsite power sources.

Further Evaluation and Corrective Action

A. Further Evaluation

1. This event is considered reportable per 10CFR 50.73(a)(2)(i)(B) as a condition prohibited by Technical Specifications. During the five low voltage conditions on the 230KV grid, the applicable Action Statement for Technical Specification 3.8.1.1 was not entered, and required operability demonstrations for A.C. power sources were not performed. Technical Specification Section 3.8.1.1 requires "As a minimum, the following A.C. electrical power sources shall be OPERABLE: a. Two physically independent circuits between the offsite transmission network and the onsite Class 1E distribution system"

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2. WNP-2 has two independent offsite power circuits: a 230KV line from the BPA Ashe substation to the WNP-2 startup transformer (TR-S), and a 115KV line from Benton substation to the WNP-2 backup transformer (TR-B). A degraded voltage condition on TR-S resulting from low voltage on the 230KV grid initiates a delay timer. If bus voltage does not recover to the degraded voltage relay reset value within the allotted time, bus loads are automatically transferred to an alternate supply. The alternate supply for loads associated with the High Pressure Core Spray (HPCS) System is the HPCS diesel generator. The alternate supply for other loads is TR-B, if it is available, or the Division 1 and 2 emergency diesel generators.

The starting currents associated with design basis loads can cause bus voltage on TR-S to drop below the dropout trip point for degraded voltage relays and initiate the time delay timer. As each sequenced motor accelerates, bus voltage will typically recover above the reset value and reset the timer. However, if bus voltage is not restored to, or above, the degraded voltage relay reset value, which is higher than the dropout trip point, before the delay timer times out, bus loads are transferred to the alternate supply.

During the five low voltage periods, voltages for the 230KV grid supply corresponded with TR-S bus voltages that are below the actual reset value for degraded bus voltage relays. If design basis loads had sequenced onto TR-S during one of these periods, the degraded voltage relays may have tripped and not reset. This condition would have resulted in automatic transfer of TR-S loads to backup sources. Therefore, the 230KV offsite power source is considered to have been inoperable during the periods of low grid voltage because it may not have been capable of supporting design basis loads.

The Action Statement for Technical Specification 3.8.1.1 was not entered during the five low voltage periods because the low grid voltage conditions were not identified during the brief periods when they existed. Surveillance related monitoring of grid voltages is only required on a weekly basis, and is not likely to detect infrequent and brief low grid voltage conditions. There are no alarms or other continuous grid monitoring provisions to inform operators when grid voltages are below minimum acceptable values. Furthermore, if a low voltage condition had existed on the 230KV during performance of surveillance testing, grid voltage acceptance criteria were not adequate to allow detection, and the voltmeters used to monitor offsite power sources do not have sufficient accuracy and resolution to support determination of grid voltage acceptability.

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Prior to June 1991, the acceptance criteria for operability of offsite power sources provided in surveillance procedures was based on whether or not the grid was energized. However, operability of offsite power sources cannot be established without a minimum acceptable voltage criteria. Grid voltage verification was not previously believed to be necessary because it was assumed that BPA would maintain grid voltage at the levels advertised in their annual voltage schedule. This deficiency in prior revisions to the surveillance procedure was first identified during the root cause evaluation for this LER.

In May 1991, a Plant Operations Engineer requested the System Engineer determine the minimum acceptable grid voltage for TR-S and TR-B for inclusion in the surveillance procedure used to verify offsite power source operability. Subsequently, in response to an informal request from the System Engineer, the Design Engineer provided a value of 226.2KV as the minimum supply voltage that could be used for determining operability of TR-S.

The 226.2KV acceptance criteria value incorrectly corresponds to the minimum analytical dropout setpoint value for degraded voltage relays instead of the minimum grid voltage assumed in the 230KV grid calculation. This incorrect acceptance criteria value was included in the June 1991, revision of the weekly surveillance procedure. As a note, 230KV has historically been assumed as the minimum grid voltage necessary to prevent load transfer during design basis conditions in calculations involving the 230KV offsite power source.

3. The root causes of the condition described in this report are: 1) plant/equipment related design deficiencies involving inadequate consideration of monitoring and operability requirements for offsite power sources, and 2) less than adequate management methods to assure sufficient information was available to support the development of adequate acceptance criteria for offsite power sources.
 - 1) The plant design did not consider the need to develop acceptance criteria for offsite grid voltages, or provide accurate monitoring of voltage levels on the offsite grid. There are no alarms or other indications to alert operators of low grid voltage conditions, and the accuracy of installed grid monitoring instruments is not sufficient to support evaluation of grid voltage acceptability.
 - 2) Formalized programs and processes were not adequate to ensure that acceptance criteria in Technical Specification surveillance procedures were based on identifiable technical references. This resulted in development and incorporation of inadequate acceptance criteria into the surveillance procedure that is used to determine operability of the 230KV grid.

Contributing causes to the condition described in this report are: 1) a technical inaccuracy in a surveillance procedure, and 2) a plant/equipment related design deficiency involving instrument display accuracy and resolution.

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- 1) Early revisions of the surveillance procedure used to perform weekly verification of the offsite power sources were inaccurate because they only verified the availability of offsite power sources, and did not verify voltage levels. Subsequent revisions incorporated an acceptance criteria for minimum 230KV grid voltage, but remained inadequate because the value was not correct. Additionally, although grid voltage verifications were scheduled on the frequency required by Technical Specifications, this was not frequently enough to allow detection of the relatively brief voltage decreases associated with summer peak load conditions.
- 2) A review of Technical Specification instrumentation used to measure the voltage of offsite power sources was performed. The results indicate that the accuracy of Main Control Room metering for the 230KV grid is inadequate to assure the operability of the offsite power source.

There were no other structures, components, or systems inoperable prior to the event which contributed to the event. Inappropriate selection of the degraded voltage relay dropout point as an acceptance criteria value for determining operability of the 230KV grid involved an error by nonlicensed, utility personnel.

Further Corrective Action Taken

1. The Technical Specification surveillance procedure used to verify offsite power source voltages has been changed to reflect the correct acceptance criteria for operability of the two offsite power sources. Additionally, this procedure now directs that voltage readings for the offsite power sources be obtained from more accurate voltmeters at BPA.
2. An agreement has been made between the Supply System and BPA for the appropriate BPA load dispatcher to immediately notify the WNP-2 Control Room if the grid voltage to either TR-S or TR-B goes below the values of 232KV and 112KV, respectively. When these values were determined, the accuracy of instrumentation used to monitor grid voltages was considered.
3. The Technical Specification Improvement Project will review the acceptance criteria for Technical Specification surveillance procedures for a technical reference. A technical basis will be identified or developed for those criteria identified as having no technical bases.

C. Further Corrective Action

1. Plant procedure PPM 1.5.1, Technical Specification Surveillance Testing Program, will be changed by December 31, 1992, to require an identifiable technical reference as the basis for all future new or revised acceptance criteria used in Technical Specification surveillance procedures.

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2. A microwave alarm system from the Ashe Substation will be installed by June 1, 1993, to provide Control Room annunciation of a low grid voltage condition to TR-S.
3. The Supply System and BPA will develop an agreement on an acceptable voltage schedule to minimize the occurrence of unacceptably low grid voltages. This action is scheduled for completion by June 1, 1993.

Safety Significance

The HPCS diesel generator and TR-B are provided as backup power sources for loads associated with TR-S. The HPCS diesel generator is required by Technical Specifications to be operable whenever HPCS is required to be operable, and TR-B was available during the periods of low 230KV grid voltage. Therefore, backup power was always available for loads associated with TR-S during the periods of low grid voltage. However, even if loads had been transferred to TR-B and the HPCS diesel generator as a result of design basis loads starting, it would not have adversely affected the availability of required equipment, and reactor operators could have transferred the loads back to TR-S once the loads had started.

A load transfer during low grid voltage conditions would most probably only occur in response to a design basis accident, which results in the highest load demand on TR-S. Backup power sources were available during periods coinciding with low voltage conditions, and the probability of a design basis accident occurring coincident with one of the five, brief periods of low grid voltage was negligibly small. Consequently, the condition described in this report posed no threat to the health and safety of plant personnel or the public, and was not safety significant.

Similar Events

An event involving a momentary fault on the 230KV grid was described in LER 85-63. The resulting low grid voltage condition during this event caused primary undervoltage relays on TR-S to trip, and the Division 1 and 2 diesel-generators to start. The condition described in this report involved degraded voltage relays, and not primary undervoltage relays, and did not involve a grid fault. Therefore, the condition described in this report differs from the low grid voltage event described in LER 85-63.

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EIIS Information

Text Reference

Annunciator System
Plant AC Distribution System
Class 1E Power System (Degraded Voltage
and Undervoltage Relays)
High Pressure Core Spray System (HPCS)
Emergency Power For HPCS

EIIS Reference

System Component

IB	
EA	
EB	RLY
BG	
EK	