ILLINOIS POWER
CLINTON POWER STATION, P.O. BOX 678, CLINTON, ILLINOIS 61727-0678, TELEPHONE (217) 935-8881

U-601768
L30-90(12-19 -LP
1A.120

10CFR2
JSP-0977-90
December 19, 1990

Docket No. 50-461

Mr. James Liberman, Director
Office of Enforcement
U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Subject: Illinois Power Company's Response to Notice of Violation and Proposed Imposition of Civil Penalty Dated November 26, 1990, Docket No. 50-461, EA 90-108

Dear Mr. Liberman:

On November 26, 1990, the Nuclear Regulatory Commission (NRC) issued a Notice of Violation and Proposed Imposition of Civil Penalty (Notice), EA 90-108, to Illinois Power Company (IP). The Notice was based upon the results of NRC inspections conducted durin the period March 14 - May 14, 1990, and May 18-31, 1990, at Clinton Power Station (CPS) and documented in NRC Inspection Reports 50-461/90005 (DRS) and 50-461/90012 (DRP). The Notice proposes a civil penalty in the amount of $112,500.

IP does not contest the violations included in the Notice, and a check in payment of the proposed penalty is enclosed. The Attachments to this letter provide IP's reply to the items listed in the Notice, and describe the results of IP's investigation into the causes of the violations, the corrective action taken in response to the violations, and corrective action to avoid further violations. IP recognizes the significance of the violations, and is committed to preventing their recurrence. In particular, the actions described in section II of Attachment A provide reasonable assurance that there are not design or test control discrepancies that could prevent CPS systems, structures, and components from performing their intended safety functions.

Should you have a questions regarding this response, please call me or Mr. Frank A. Spangenberg, Manager - Licensing and Safety.

Sincerely yours,

J. S. Perry
Vice President

Attachments

cc: NRC Clinton Licensing Project Manager
NRC Resident Office
NRC Region III, Regional Administrator
Illinois Department of Nuclear Safety

w/check $112,500 #291103
IE14 1/1

9012210002 901219
PDR ADOCK 05000461
Q PDR

2000

J. STEPHEN PERRY, being first duly sworn, deposes and says: I am Vice President of Illinois Power Company. The foregoing Response to Notice of Violation and Proposed Imposition of Civil Penalty (Letter No. U-601768), dated December 19, 1990, and the attached Reply to Notice of Violation (Attachment to Letter No. U-601768), were prepared under my supervision and direction. To the best of my knowledge and belief the facts contained therein are true and correct.

J. Stephen Perry

Dated: December 19, 1990

Subscribed and sworn to
before me this 19 day of December, 1990

Sharon E. Harris
Notary Public

My Commission Expires:

03/09/91

"OFFICIAL SEAL"
Sharon E. Harris
Notary Public, State of Illinois
My Commission Expires 3/9/91

ATTACHMENT A

Illinois Power Company's Reply to Notice of Violation

The Notice of Violation and Proposed Imposition of Civil Penalties (Notice) identifies three alleged violations. The first two alleged violations describe three examples of violation of 10CFR50, Appendix B. The third alleged violation describes an example of violation of a Technical Specification Limiting Condition for Operation (LCO). Illinois Power Company's (IP) reply pursuant to 10CFR2.201 is organized into three sections, corresponding to each of the three violations. Within each of these sections, the specific issues required to be addressed by 10CFR2.201, the Notice of Violation, and the accompanying cover letter are addressed. The second alleged violation has two parts, each of which is addressed in a separate subsection.

I. Violation of 10CFR Part 50, Appendix B, Criterion XVI, "Corrective Action"

The Notice of Violation states in part:

> Contrary to [Criterion XVI], on January 24, 1990, Plant Technical Staff engineers identified a potentially significant condition adverse to quality relating to low flow indications through the shutdown service water (SX) pump room heat exchanger 1VH07SA, but failed to promptly initiate a Condition Report or determine its cause. Though the low flow data was initially reported to the Nuclear Station Engineering Department (NSED) for trending on that date, the licensee failed to identify the potential significance of the condition and initiate appropriate corrective action until the Supervisor, Plant Testing, reviewed the data on February 15, 1990.

This violation was described in NRC Inspection Report No. 50-461/90005 (DRS).

A. Admission or Denial of the Violation

IP admits that the violation occurred.

B. Reasons for the Violation

This violation occurred because the IP test engineers and Nuclear Station Engineering Department (NSED) personnel did not recognize that the test data they had gathered presented an operability concern.

ATTACHMENT A (cont.)

On January 24, 1990, test engineers were measuring the hydraulic resistance of heat exchangers in the Clinton Power Station (CPS) Shutdown Service Water (SX) system. These resistance data were needed to respond to Generic Letter 89-13, "Service Water System Problems Affecting Safety Related Equipment," and were intended to establish a baseline for determining the effectiveness of heat exchanger cleaning and inspection activities scheduled for the plant's third planned maintenance outage (PO-3). Using Polysonics and Panametrics flow meters, test engineers identified an as-found flow of thirty-two gallons per minute (gpm) through the Division I SX pump room cooling coil 1VH07SA. This as-found flow was lower than the value of eighty-two gpm required by design documents.

These test results were not immediately reported to the Shift Supervisor because test engineers did not recognize these results as an operability concern, but considered them an indication that the cooling coil needed cleaning. The perception that no operability concern existed was supported by 1) the differential pressure indication recorded for the cooling coil during testing was consistent with the value provided by the cooling coil vendor, 2) the flow measuring equipment used during the testing had been showing spurious "alarms" that made the accuracy of the measurements questionable, and 3) the reason for the testing was not to measure flow rates, but to obtain a value of hydraulic resistance as a baseline for measuring heat exchanger cleaning effectiveness as requested in Generic Letter 89-13. Since cooling coil 1VH07SA was already scheduled for cleaning and inspection during PO-3, the test engineers took no further action.

The test engineers reported the flow test results to engineering for trending purposes to indicate the condition of the cooling coil prior to the inspection and cleaning of Division I heat exchangers. The engineering review of these test results compared the design flow to the measured flow, but did not result in a prompt follow-on investigation because 1) the as-recorded differential pressure for the cooling coil was consistent with the value provided by the coil vendor, 2) the reason for testing was not to measure flow rates but to obtain a value of hydraulic resistance as a baseline for measuring heat exchanger cleaning effectiveness, 3) the affected coil was already scheduled for cleaning and inspection during PO-3.

On February 15, 1990, the flow test data for 1VH07SA were reviewed by the Supervisor-Plant Testing and he determined that the Shift Supervisor should be notified of the as-found flow rate. The Shift Supervisor was immediately notified of this condition.

ATTACHMENT A (cont.)

The root cause of the failure to promptly recognize the operability issue raised by the test data was that personnel conducting the testing were focused on the immediate purpose of the testing (to collect baseline data in accordance with IP's plan in response to Generic Letter 89-13) and on the functioning of the test equipment, but not on operability implications. Similarly, the engineering review was overly narrow.

C. Steps Taken to Correct the Problem and Results Achieved

As soon as the condition was identified by the Supervisor-Plant Testing as a potentially significant condition adverse to quality, he notified the Shift Supervisor of the as-found flow rate. On February 15, 1990, the Shift Supervisor directed test engineers to calibrate the test equipment and to measure the flow rate again. Once the test equipment was verified to be in calibration, the test engineers measured the flow rate at three different locations and found it to be fifty-five gpm. The Shift Supervisor directed the area operator to restore design flow through 1VH07SA by adjusting the flow through valve 1SX009A to approximately eighty-five gpm and relocking the valve. The Shift Supervisor further directed that engineering evaluate the operability of cooling coil 1VH07SA. Condition Report (CR) 1-90-02-046 was initiated on February 15, 1990, to track the problem. Further corrective actions taken following additional investigations of flows i SX system are described in section II.B.3.

D. Corrective Steps to Avoid Further Violation

Several actions were taken to assure that the problems associated with the timeliness of corrective action for the SX flow problem do not recur. The individual test engineers who first noted the discrepancy were counselled that their response, particularly the failure to initiate a Condition Report, was not acceptable. Additionally, briefings were provided to appropriate testing and engineering personnel on this event and the weaknesses in the response to it. During these briefings, particular emphasis was placed on the responsibility of individuals to initiate Condition Reports in response to discrepancies noted between design requirements and conditions observed during testing, and on the importance of promptly notifying others and pursuing resolution of any issues that present potential operability concerns.

In addition to these specific actions, during the past year IP has been engaged as part of its 1990 Initiatives in an overall effort to improve the effectiveness of the CPS corrective action program. Elements of this effort that have been implemented to improve the identification and response to problems include:

ATTACHMENT A (cont.)

- Revision of the CPS procedure for the initiation of Condition Reports to require: prompt and accurate identification of the precise problem; the initiation of immediate corrective actions; and the immediate notification of all departments affected by the condition.

- Briefings of CPS personnel were conducted during December 1989-March 1990 to emphasize the importance of the corrective action program, including the responsibility of all individuals at CPS to accurately identify and promptly respond to problems. These briefings were provided to Plant Staff (including the test engineers involved in the SX flow issue) in February and March 1990.

- A Corrective Action Board, which was reestablished in 1989, has been reviewing selected significant problems to ensure proper problem identification, root cause analysis, and corrective action identification.

- Additionally, a Corrective Action Review Board (CARB) has been established as part of CPS 1990 Initiatives for improving the Corrective Action Program effectiveness. The CARB is currently comprised of management representatives from key departments including Plant Staff and NSED. The CARB reviews Condition Reports (CR) as they are initiated (normally, within one-to-two days of initiation) and reviews the root cause and corrective action plans for significant CRs. The CARB review of new CRs includes a review of the adequacy of problem definition, immediate actions, assignment, and due date.

These and other actions to improve the CPS corrective action program were described in IP's response to the CPS Systematic Assessment of Licensee Performance (SALP) 9 report, which was submitted to the Nuclear Regulatory Commission (NRC) by Letter U-601609, dated February 23, 1990.

E. <u>Date When Full Compliance Will Be Achieved</u>

IP is currently in full compliance.

ATTACHMENT A (cont.)

II. Violation of 10CFR Part 50, Appendix B

This violation consists of two parts which have been aggregated in the Notice of Violation. Section II.A responds to the portion of the violation involving design control (Criterion III of Appendix B) and section II.B responds to the portion of the violation involving test control (Criterion XI of Appendix B).

A. Violation of 10CFR Part 50, Appendix B, Criterion III, "Design Control"

The Notice of Violation states in part:

> Contrary to [Criterion III], prior to initial plant startup on April 17, 1987, the licensee failed to assure that the design bases of the shutdown service water and control room heating, ventilation, and air conditioning (HVAC) chilled water systems were correctly translated into specifications, drawings, procedures and instructions, and that design control measures properly verified or checked the adequacy of the design. Specifically, the performance of these systems did not meet the design basis requirements specified respectively in Sections 9.2.1.2 and 9.4.1.1 of the Final Safety Analysis Report, due in part to inadequate design input supplied by an equipment vendor that resulted in less than design specified cooling water flow to numerous system components. Design control measures for verifying or checking the adequacy of the vendor supplied data failed to note that data was not appropriate for the type of cooling coils purchased.

This violation was described in NRC Inspection Report No. 50-461/90005 (DRS).

1. Admission or Denial of the Violation

IP admits that the violation occurred.

2. Reasons for the Violation

This violation was due to the provision by American Air Filter (AAF) of pressure drop data that were not correct for the type of cooling coils purchased and specified for delivery to CPS. AAF supplied inaccurate pressure drop data to Sargent & Lundy (S&L), the CPS architect/engineer, either directly or through Baldwin Associates, the CPS construction contractor. The data did not include appropriate head losses for clean-out plugs in the cooling coils. S&L provided these inappropriate data to IP for incorporation into the CPS pre-operational test of the SX system (PTP-SX-01). These inappropriate data contributed to less-than-design-specified cooling water flow being supplied to cooling coils. The affected cooling coils are identified in Attachment B, Tables I, II, III and IV. The discrepancy was not detected during subsequent design work and testing.

ATTACHMENT A (cont.)

3. Steps Taken to Correct the Problem and Results Achieved

Pressure drop data for all AAF-supplied cooling coils associated with the SX system were reevaluated and corrected by S&L. The corrected data were incorporated into test procedure 2800.10, "SX System Flow Balance Verification." Flow through the three divisions of the SX system was balanced using the corrected data, and the resulting flows have been verified to be adequate, as discussed in detail in section II.B.3.

4. Corrective Steps to Avoid Further Violations

IP undertook a systematic examination of flow and pressure drop data provided by the manufacturers of cooling coils used in the SX system and subsequently of data for the Control Room Heating, Ventilation, and Air Conditioning (HVAC) (VC) system. This examination determined that vendor flow data for other cooling coils are correct, with the exception of the data provided for the specific type of AAF cooling coils in which the flow problem was initially detected. These coils are used in the SX and VC systems (inaccurate data were provided by AAF for a total of twenty-four cooling coils, all of the same type). Acceptable SX system cooling water and VC chilled water flow rates were restored for those components where as-found flow conditions were less than design values and acceptable rates were verified for all cooling coils. On the basis of this effort, IP has concluded that design deficiencies similar to those involving the AAF cooling coils are not present in other similar components.

In addition to these measures, several other activities have been implemented during CPS design, construction and operation which provide confidence that no generic problem exists with the accuracy of vendor-supplied information at CPS, including:

- IP, S&L, and Baldwin Associates (the CPS construction contractor) had programs to evaluate the quality assurance (QA) programs of vendors of equipment for CPS during construction of CPS. Vendor QA programs were reviewed and were required to meet appropriate standards before a vendor was permitted to supply safety-grade equipment for CPS. Audits and surveillances were performed that evaluated whether vendor activities complied with QA program requirements, and findings from these audits and surveillances were required to be resolved. Since the commencement of operations, IP has continued this program for vendors of safety-grade equipment for CPS. IP also actively participates in the Nuclear Procurement Issues Committee, an industry group that shares information and resources concerning procurement quality issues, and performs periodic audits of nuclear equipment vendors.

ATTACHMENT A (cont.)

- In August 1984 - January 1985, an Independent Design Review was conducted at CPS. Although some issues were identified, the overall conclusion of the review was that the overall design was technically adequate and would meet Final Safety Analysis Report (FSAR) commitments. Identified issues were resolved.

- During 1982-1986, IP conducted extensive overinspection programs covering various electrical, mechanical and structural systems and components at CPS. During the course of this program, as-built conditions in the plant were compared to the design drawings and instructions, and discrepancies were noted for resolution.

- As systems at CPS were completed, walkdowns were performed prior to turnover of the systems to startup for testing. These walkdowns verified that the as-installed equipment matched the governing design documents.

- IP conducted extensive pre-operational and low-power testing of CPS systems and components prior to power operation. This testing was designed to detect cases in which equipment did not meet performance requirements specified in the CPS design.

- IP has implemented programs for in-service inspections and surveillance tests of equipment at CPS since the commencement of commercial operation in 1987. These activities are designed to detect problems with equipment conditions or performance.

- IP has conducted extensive preventive and corrective maintenance on equipment at CPS. During the course of these efforts, personnel can observe whether the equipment is functioning properly or whether conditions indicate a problem with the equipment. The causes of equipment problems (including potential design issues) are analyzed.

- IP reviews and responds to NRC Bulletins, Information Notices, and Generic Letters, which often identify problems with vendor-supplied equipment. IP also reviews and responds to industry-sponsored information, such as Institute of Nuclear Power Operations (INPO) Significant Operating Event Reports and General Electric Service Information Letters that frequently deal with vendor design issues; and IP reviews and evaluates 10CFR Part 21 reports by vendors.

ATTACHMENT A (cont.)

Although a number of these activities are not focused specifically on the accuracy of vendor design data, each of them has provided the occasion for discrepant data or performance to be identified and evaluated to determine its root cause. Collectively, these activities make it highly likely that discrepant vendor data having a significant effect on equipment or system performance will be identified, as was the case with the AAF cooling coil data. To date, these activities have not produced evidence that there is a generic problem with the quality of vendor design information supplied to CPS.

5. <u>Date When Full Compliance Will Be Achieved</u>

IP is currently in full compliance.

B. <u>Violation of 10CFR Part 50, Appendix B, Criterion XI, "Test Control"</u>

The Notice of Violation states in part:

> Contrary to [Criterion XI], on March 15, 1990, it was determined that SX pre-operational test, PTP-SX-01, Revisions, 0, 1, and 2 were deficient in that:
>
> 1. Inaccurate design flow differential pressure (dP) data was used for the American Air Filter heat exchangers;
> 2. Non-conservative flow measurement acceptance criteria were applied without a technical basis;
> 3. The dP flow balance measurement did not account for pressure losses between the dP tap and the component being measured; and
> 4. Flow balancing of the SX system was not performed after installation of the flow restricting orifices.

This item was discussed in NRC Inspection Report No. 50-461/90005 (DRS).

1. <u>Admission or Denial of the Violation</u>

IP admits that the violation occurred.

2. <u>Reasons for the Violation</u>

AAF-supplied inaccurate pressure drop data either directly to S&L or to S&L via Baldwin Associates. S&L provided these inappropriate data to IP for incorporation into pre-operational test procedure (PTP) SX-01.

PTP-SX-01 was not consistent with the requirements of the design specifications. Th acceptance criteria for flow balancing the loads served by th. SX system were assigned a non-conservative plus-or-minus ten percent allowable deviation from design flows. This non-conservative allowable deviation contributed to the acceptance of flow rates less than design specifications.

IP was unable to determine the origin of the ten percent allowable deviation value. Normal practice during the pre-operational test program required issuance of a Field Problem Report (FPR) to determine tolerances on design specifications when those tolerances were not provided in design documents. However, review of FPRs for the SX system did not identify any issued to obtain this allowable deviation value.

PTP-SX-01 also failed to account for pressure drop for pipe head loss between the differential pressure tap and the component being measured. PTP-SX-01 contained specific information on test equipment to be utilized during the performance of flow balancing; however, it did not specify the locations at which dP or Clampatron flow measurement devices should be attached. It was left to the discretion of the Startup test engineer to determine the specific locations at which to connect test equipment. Failure to account for pipe head loss resulted in errors when flow values were calculated.

In addition, following the initial pre-operational testing, flow restriction orifices were installed to obtain required flow through certain heat exchangers so that excessive valve throttling would not be required. Adequate pre-operational retesting was not performed for all affected components following installation of the flow restriction orifices. The precise reason for failure to perform adequate retesting cannot be determined because the extent and basis for retesting on the specific heat exchangers were poorly documented in the test log.

3. Steps Taken to Correct the Problem and Results Achieved

IP has taken action to correct the low flow conditions that resulted from the improper test procedure, and to assure that current procedures are adequate, as follows:

a. Correction of Inaccurate Vendor Data in Test Procedure

Pressure drop data for all AAF-supplied cooling coils associated with the SX system were reevaluated and corrected by S&L. The corrected data were incorporated into test procedure 2800.10, "SX System Flow Balance Verification." Flow through the three divisions of the SX system was balanced using the data. IP submitted information to the NRC under the provisions of 10CFR21 by Letter U-601636, dated April 3, 1990, regarding the inaccurate pressure drop data supplied by AAF.

ATTACHMENT A (cont.)

b. Flow Balancing of Division I of SX

The flow rates through components that rely on Division I of the SX system for cooling water were measured and the as-found flow rates for thirteen of twenty-one components were less than design values as indicated in Table I of Attachment B. Following flow balancing, adequate flow rates were achieved for the components indicated in Table I of Attachment B. The design flow rate for the Residual Heat Removal (RHR) system Heat Exchanger (HX) Room cooling coil 1VY03S was achieved by modifying (relocating) the piping downstream of the coil in accordance with Field Alteration (FA) SXF012. FA SXF014 was implemented to increase flow through RHR HX 1E12B001A and other components on the same branch of the SX system by throttling Fuel Pool Cooling and Cleanup HX 1A outlet valve 1SX062A. Design flow rates were achieved for the remaining components by adjusting the throttle valves of the components. As-left flow rates less than original design values were reviewed by engineering and verified to be acceptable prior to startup from PO-3.

Additionally, FA SXF017 was implemented during the plant's second refueling outage (RF-2) to enlarge orifice 1SX12MA to RHR HX 1E12B001A in order to increase the margin of SX flow through that HX.

c. Flow Balancing of Division II of SX

The flow rates through components that rely on Division II of the SX system for cooling water were measured, and the as-found flow rates for eleven of twenty-one components were found to be less than design values as indicated in Table II of Attachment B. Following flow balancing, adequate flow rates for these components were achieved as indicated in Table II of Attachment B. The design flow rate for the RHR system HX Room Cooling Coil 1VY05S was achieved by modifying (relocating) the piping downstream of the coil in accordance with FA SXF013. FA SXF015 was implemented to enlarge orifice 1SX12MB to RHR HX 1E12B001B in order to increase SX flow through that HX. In addition, FA SXF016 was implemented to provide additional flow to RHR HX 1E12B001B and other components on the same branch of the SX system by throttling Fuel Pool Cooling and Cleanup HX 1B outlet valve 1SX062B. Design flow rates were achieved for the remaining components by adjusting the throttle valves of the components. As-left flow rates less than original design values were reviewed by engineering and verified to be acceptable prior to startup from PO-3.

ATTACHMENT A (cont.)

d. Flow Balancing of Division III of SX

The flow rates through components that use Division III of the SX system for cooling water were measured and the as-found flow rates for three of six components were found to be less than design values as indicated in Table III of Attachment B. As-left flow rates were subsequently restored to design values by adjusting the throttle valves of the components. These as-left flow rates were reviewed by engineering and determined to be acceptable.

e. Elimination of Non-Conservative Tolerances from Test Procedure

The non-conservative tolerance of plus-or-minus ten-percent applied to minimum flow specifications in PTP-SX-01 was corrected by implementing test procedure 2800.10 for all three divisions of the SX system. Test procedure 2800.10 supersedes PTP-SX-01 and does not provide such a tolerance. In addition, the minimum design flows used in performance of 2800.10 were increased by a minimum of five percent to allow for instrument error. Test procedure 2800.10 requires an engineering evaluation of flow values found to be less than the 105-percent minimum design flow values.

f. Accounting for Pipe Head Losses and Specification of Locations for Attachment of Measurement Devices

The failure of PTP-SX-01 to correctly consider pressure drop for pipe head loss between the differential pressure tap and the component being measured has been corrected by implementing test procedure 2800.10 for all three divisions of the SX system. The SX system flow verification data sheets included in procedure 2800.10 incorporate pressure drop for pipe head loss. Test procedure 2800.10 specifies the locations for installation of differential pressure flow measurement devices. Also, IP no longer relies on dP measurements across a component to determine flow. IP has confidence in the accuracy of nonintrusive liquid velocity flow measurement devices (such as Controlotron, Polysonics, and Panametrics flow meters) which are currently used to measure flow.

g. Accounting for Effects of Flow Orifices Installed After Pre-operational Testing

The failure to perform pre-operational retesting of the SX system after installation of flow restricting orifices was corrected by implementing test procedure 2800.10 for all three divisions of the SX system. Acceptable flow rates have been achieved for all SX components.

ATTACHMENT A (cont.)

h. Safety Significance of SX Flow Design and Testing Issues

IP's investigation of this issue identified as-found flow rates less than original design for twenty-seven heat exchangers/cooling coils using the SX system for cooling water. In addition, IP identified as-found flow rates less than original design for two Control Room HVAC system cooling coils using a closed loop chilled water system for cooling water.

An evaluation was performed to determine if the twenty-seven heat exchangers/cooling coils using the SX system for cooling water could have performed their design safety function with their as-found flow rates. This evaluation included the effects of the as-found flow rates on: direct heat rejection; room temperature increases; and subsequent effects on environmental qualification, building steel/concrete, secondary containment drawdown time, and radiological release rates.

The evaluation concluded that temperatures would have increased in several areas of the plant, but these temperature increases would have had no detrimental effect on the operability or environmental qualification of the applicable safety-related components in these areas. The evaluation further concluded that the less-than-design flow rates did have an impact on secondary containment drawdown ability but would not result in release rates that would exceed off-site radiological dose limits or Main Control Room radiological dose limits. Based on this evaluation of as-found flow rates, the ability of the SX system heat exchangers/cooling coils to support safe shutdown of the plant and maintain the plant in a safe shutdown condition was not exceeded.

4. Corrective Steps to Avoid Further Violation

IP and S&L reviewed selected safety-related pre-operational tests to determine if discrepancies similar to those found in the SX pre-operational tests existed in tests performed on other systems where measurement of liquid or gas flows was required. Selection of these pre-operational tests for review was based on 1) Similar type safety-related systems that have flow rate requirements, 2) Tests that may have been authored by the same individual (review of other pre-operational tests identified that the only pre-operational test prepared by this individual was PTP-SX-01), 3) Tests that may have been written in the same time period as the SX test. The reviews included evaluation of the acceptance criteria, test methodology, flow calculations and other aspects of those tests.

On April 3, 1990, while reviewing selected safety-related pre-operational test reports, S&L identified that flow of chilled water through Division I and II VC Cooling Coils 0VC06AA and 0VC06AB, and Division I and II Control Room HVAC Equipment Room Cooling Coils 0VC18AA and 0VC18AB might not be in accordance with design requirements. This condition was documented in CR 1-90-04-

ATTACHMENT A (cont.)

014. The Shift Supervisor was immediately notified of this potential flow problem and he declared Division I and II of the VC system inoperable. Investigation of this potential flow problem determined that chilled water flow through 0VC06AA and 0VC06AB was within design requirements; however, chilled water flow through 0VC18AA and 0VC18AB was less than design requirements. The cause for the less-than-design flow through cooling coils 0VC18AA and 0VC18AB is attributed to inaccurate pressure drop data supplied by American Air Filter. Table IV of Attachment B provides further information regarding these cooling coils. Flow rates were subsequently restored to design values by adjusting the throttle valves of the components. These as-left flow rates were reviewed by engineering and determined to be acceptable.

Based on an evaluation of the as-found flow rates for the two Control Room HVAC system cooling coils using a closed loop chilled water system for cooling water, IP concluded that these as-found flow rates would provide the cooling capability required for the normal and accident functions of the coils. Therefore the as-found flow rates were not safety significant.

In other respects, the reviews confirmed that the test program problems on safety-related systems were limited to the SX system and to American Air Filter heat exchangers in the VC system. In addition, as described in section II.A.4. above, a number of other programs and ongoing activities at CPS provide confidence that equipment that underwent pre-operational testing does in fact perform as designed.

5. <u>Date When Full Compliance Will Be Achieved</u>

IP is currently in full compliance.

ATTACHMENT A (cont.)

III. Violation of Operating License Technical Specifications

The Notice of Violation states in part:

> Technical Specification Limiting Condition for Operation (LCO) 3.8.1.1.B requires, as a minimum, that three separate and independent diesel generators be operable in Operational Conditions 1, 2, and 3. Action Statement 3.8.1.1.g requires that with diesel generators 1A and 1B INOPERABLE, restore at least one to OPERABLE status within 2 hours or be in Hot Shutdown within the next 12 hours and Cold Shutdown within the following 24 hours.
>
> Technical Specification LCO 3.0.4 requires that entry into an Operational Condition, or other specified condition, not be made unless the conditions for the limiting condition for operation are met without reliance on provisions contained in the action requirements.
>
> Technical Specification 1.27, OPERABLE, states that a system, subsystem, train or component shall be OPERABLE when it is capable of performing its specified function and all necessary attendant instrumentation, controls, electrical power, cooling or seal water or other auxiliary equipment required for that system, subsystem, train or component to perform its function are also capable of performing their related support function.
>
> Contrary to the above, on May 14, 1990, the licensee commenced a reactor startup from cold shutdown (Operational Condition 4), reaching startup (Operational Condition 2) at 10:40 a.m., where it remained for a period in excess of 31 hours with diesel generators 1A and 1B inoperable. Diesel generators 1A and 1B were inoperable in that SX valves 1SX005A & B, 1SX064A, and 1SX065B were incorrectly positioned, preventing the SX system from performing its necessary attendant cooling support function.

This violation was described in NRC Inspection Report No. 50-461/90012 (DRP).

A. Admission or Denial of the Violation

IP admits that the violation occurred.

B. Reasons for the Violation

The causes of this violation included insufficiently specific instructions on how to position butterfly valves for throttling purposes, inadequate communication between operators and technical staff concerning correct valve positioning, and failure to specify

ATTACHMENT A (cont.)

post-maintenance testing that would detect the lack of flow once valve repositioning was completed.

To provide isolation to permit repair of the SX bellow on the Division I and II diesel generator (DG1A and DG1B) heat exchangers described in LER 90-010-00, the SX inlet and outlet isolation valves to the DG1A and DG1B heat exchangers were danger tagged shut. The inlet isolation valves are used as throttle valves to regulate flow to the DG1A and DG1B heat exchangers. The DG SX inlet isolation valves are Posi-Seal model 1144 butterfly valves. One characteristic of butterfly valves is that, when the valve is fully closed, the handwheel can be turned (in some cases a number of turns) without repositioning the valves.

During the process of flow balancing the SX system (discussed in section II.B.3. above), Plant Staff-Technical personnel made interim measurements of the position of the inlet isolation valves. These measurements were made in terms of the number of handwheel turns from the reference "closed" position, which was the point where the valve disk came off the shut seat. Operations tagouts 90-213 and 90-302 were implemented in March and April, 1990, respectively, following completion of flow balancing of Divisions I and II of the SX system. These tags specified the required SX valve position as determined from the interim measurements, but the reference position upon which these measurements were based was not noted on the caution tags.

On May 11, 1990, during restoration from the maintenance performed on the DG1A and DG1B SX bellows, operators did not know what reference had been used as the basis for the number of turns of the valve handwheel. They questioned the Assistant Shift Supervisor about the proper way to throttle the valves and he directed them to use the "full shut" position, rather than the point at which the valve disc came off the shut seat, as the reference point for counting handwheel turns during throttling of the valves. As a result, the SX inlet isolation valves to the DG1A heat exchangers, valves 1SX064A and 1SX005A, and to the DG1B heat exchangers, valves 1SX065B and 1SX005B, were restored to a position causing insufficient flow to the heat exchangers.

In addition, even if the correct reference point had been used, the position on the caution tags did not accurately reflect the final required position as determined by Plant Staff-Technical during flow balancing. Plant Staff-Technical had informed Operations management of the final required position, but the caution tags were not revised or removed, nor was the appropriate system procedure promptly revised. The final required positions were a number of turns less than the interim positions indicated on the caution tags. Post maintenance testing of the SX system following the work on the bellows did not detect this problem.

ATTACHMENT A (cont.)

CPS entered Mode 2 (STARTUP) following PO-3 on May 14, 1990. The throttle valve mispositioning was discovered during a routine test of diesel generator operability on May 15, 1990.

C. Steps Taken to Correct the Problem and Results Achieved

On May 15-16, 1990, the caution tags hanging on the DG SX throttle valves were replaced with tags which included sufficient information, including the reference point used to properly position the valves in accordance with the final flow balance. Operators properly positioned the DG SX throttle valves in accordance with these tags. Operability surveillances were satisfactorily completed for each of the three (Divisions I, II, and III) diesel generators.

On May 24, 1990, CPS Procedure 3211.01, "Shutdown Service Water," was revised to indicate the correct required position of the SX valves as determined by system flow balancing. The caution tags were removed subsequent to the revision.

D. Corrective Steps to Avoid Further Violations

IP conducted a review of other safety tagouts initiated since March 1990 to verify that no other throttle valve positions were inappropriately being controlled by caution tags and to verify that the other throttle valves were correctly positioned. No similar problems were discovered during the review.

To ensure that post-maintenance testing determines that flows have been properly restored, an Operations Standing Order (OSO) 073, "Positioning of Throttle Valves," was issued. The OSO requires that Plant Staff-Technical measure flow across the SX inlet valves to the DG heat exchangers. For valves other than butterfly throttle valves in the SX system, Plant Staff-Technical must evaluate proper flow across the affected component to ensure correct position. This OSO also establishes guidelines and consistency in the manner of positioning throttle valves. The reference point for the number of turns is that position where flow is first indicated or observed. This OSO will ensure that personnel are consistent in positioning throttle valves.

Appropriate Plant Staff-Operations personnel were trained on the content and intent of the OSO.

IP is developing a plan to eliminate the use of butterfly valves as the throttle mechanism for DG SX heat exchanger flow. This plan will be completed by January 31, 1991.

F. Date When Full Compliance Will Be Achieved

IP is currently in full compliance.

ATTACHMENT B

TABLE I

Division I SX System

EQUIPMENT NUMBER	EQUIPMENT DESCRIPTION	DESIGN FLOW RATE (gpm)	AS-FOUND FLOW RATE (gpm)	AS-LEFT FLOW RATE (gpm)	EQUIPMENT MODEL NUMBER/ MANUFACTURER []
1) 1VH07SA	SX Pump Room Cooling Coil	82	20.5[1]	102[1]	24-61-3CW5-8 [d]
2) 1VY03S	ECCS RHR Hx Room Cooling Coil	60	23[1]	70.9[b][1]	22-47-4CW5-8 [d]
3) 1VY02S	ECCS RHR Pump Room Cooling Coil	60	52[1]	88.1[1]	22-47-4CW5-8 [d]
4) 1VY01S	Low Pressure Core Spray Pump Room Cooling Coil	90	57.5[1]	106.8[1]	28-48-4CW5-8 [d]
5) 1VY04S	ECCS RCIC Pump Room Cooling Coil	18	10.1[1]	17.5[a][1]	18-35-4CW5-8 [d]
6) 0VG07SA	Hydrogen Recombiner Poom Cooling Coil	90	50.8[1]	92.6[1]	28-48-4CW5-8 [d]
7) 1VX13SA	Inverter Room Cooling Coil	20	15.7[1]	23.7[1]	8-18-3CW5-8 [d]
8) 1VY09S	Main Steam Isolation Valve (MSIV) Leakage Inboard Room Cooling Coil	60	43.3[1]	58 [a][1]	18-32-4CW5-8 [d]
9) 1VR09S	Combustible Gas Control System Room Cooling Coil	36	7.1[1]	27.4[a][1]	18-38-4CW5-8A[d]
10) 0VG05SA	Standby Gas Treatment System (SGTS) Room Cooling Coil	90	40.3[1]	98.6[1]	28-48-4CW5-8 [d]

ATTACHMENT B (cont.)

TABLE I (cont.)

EQUIPMENT NUMBER	EQUIPMENT DESCRIPTION	DESIGN FLOW RATE (gpm)	AS-FOUND FLOW RATE (gpm)	AS-LEFT FLOW RATE (gpm)	EQUIPMENT MODEL NUMBER/ MANUFACTURER []
11) 0PR13A	SGTS Exhaust Hi-Range Radiation Monitor Cooler	20	13.8[1]	19.3[a][1]	FNB6133 [f]
12) 1E12B001A	RHR Hx	5800	4532[k][1]	5605.1[m][a]	767E786 [e]
13) 1FC01AA	Fuel Pool Cooling and Cleanup Hx	4143	3376 [k][1]	3681 [m][a]	76-N-014-1 -1AB[g]
14) 1DG11AA	Diesel Generator Hx	450	1139[1]	552.8[m]	[j]
15) 1DG12AA	Diesel Generator Hx	600	1092[1]	742.8[m]	[j]
16) 1E12-C002A	RHR Pump Seal Cooler	20[o]	22[1]	22[1]	[j]
17) 1VP04CA	Drywell Chiller	2000	2140[1]	2058.5[m]	[j]
18) 0VC13CA	Control Room h. .ting, Ventilating and Air Conditioning System Water Chiller	800	874[1]	8.9.38[m]	[j]
19) 1VX06CA	Switchgear Heat Removal Condensing Unit	160	230.6[1]	207.5[1]	[j]
20) 1SX01PA	SX Pump Motor Bearing Cooler	7	21.9[1]	25.1[1]	[j]
21) 1FC02PA	Fuel Pool Cooling and Cleanup Pump	25	26.5[1]	21.2 [a][1]	[j]

ATTACHMENT B (cont.)

TABLE II

DIVISION II SX SYSTEM

EQUIPMENT NUMBER	EQUIPMENT DESCRIPTION	DESIGN FLOW RATE (gpm)	AS-FOUND FLOW RATE (gpm)	AS-LEFT FLOW RATE (gpm)	EQUIPMENT MODEL NUMBER/ MANUFACTURER []
1) 1VH07SB	SX Pump Room Cooling Coil	82	38[1]	99.5[1]	24-61-3CW5-8 [d]
2) 0VG05SB	SCTS Room Cooling Coil	90	40.3[1]	114.3[1]	28-48-4CW5-8 [d]
3) 0VG07SB	Hydrogen Recombiner Room Cooling Coil	90	20.9[1]	[illegible][1]	28-4[illegible]-4CW5-8 [d]
4) 1VY05S	ECCS RHR HX Room Cooling Coil	60	26[c][1]	76.5[1]	22-47-4CW5-8 [d]
5) 1VX13SB	Division II Inverter Room Cooling Coil	20	15.4[1]	20.9[1]	8-18-3CW5-8 [d]
6) 1VY10A	MSIV Leakage Outboard Room Cooling Coil	10	12[1]	11.0[1]	[j]
7) 1VX14S	Division IV Inverter Room Cooling Coil	60	28.4[1]	66.5[1]	28-24-4CW5-8 [d]
8) 1VY07S	ECCS RHR 1C Pump Room Cooling Coil	60	35.8[1]	64.2[1]	22-47-4CW5-8 [d]
9) 1VY06S	ECCS RHR 1B Pump Room Cooling Coil	60	34.7[1]	75.4[1]	22-47-4CW5-8 [d]
10) 1VR12S	Combustible Gas Control System Room Cooling Coil	36	9.2[1]	20.3[1]	18-38-4CW5-8A[d]
11) 1DG11AB	Diesel Generator HX	450	1326[m]	625.6[m]	[j]
12) 1DG12AB	Diesel Generator HX	600	1362[m]	751[m]	[j]
13) 1E12C002B	RHR Pump Seal Cooler 1B	20[o]	12.95[o][1]	21.1[o][1]	[j]

ATTACHMENT B (cont.)

TABLE II (cont.)

EQUIPMENT NUMBER	EQUIPMENT DESCRIPTION	DESIGN FLOW RATE (gpm)	AS-FOUND FLOW RATE (gpm)	AS-LEFT FLOW RATE (gpm)	EQUIPMENT MODEL NUMBER/ MANUFACTURER []
14) 1E12B001B	RHR HX	5800	5643[m]	6342[m]	767E786 [e]
15) 1VP04CB	Drywell Chiller	2000	2301[m]	2230[m]	[j]
16) 0VC13CB	Control Room HVAC System Chiller	800	905.6[m]	872[m]	[j]
17) 1FC01AB	Fuel Pool Cooling and Cleanup HX	4143	4847.1[m]	3609[m]	[j]
18) 1VX06CB	Switchgear Heat Removal Condensing Unit	160	129.0[l]	178.8[l]	5H60 [i]
19) 1SX01PB	SX Pump Motor Bearing Cooler	7	18.6[l]	18.2[l]	[j]
20) 1FC02PB-M	Fuel Pool Cooling and Cleanup Pump	25	28.5[l]	21[l]	[j]
21) 1E12C002C	RHR Pump Seal Cooler 1C	20[o]	11.6[o][l]	18.2[o][l]	[j]

ATTACHMENT B (cont.)

TABLE III

DIVISION III SX SYSTEM

EQUIPMENT NUMBER	EQUIPMENT DESCRIPTION	DESIGN FLOW RATE (gpm)	AS-FOUND FLOW RATE (gpm)	AS-LEFT FLOW RATE (gpm)	EQUIPMENT MODEL NUMBER/ MANUFACTURER []
1) 1VH07SC	SX Pump Room Cooling Coil	16	9.4[1]	20.9[1]	32-36-4CW5-8 [d]
2) 1VY08SA	High Pressure Core Spray (HPCS) Pump Room Cooling Coil 1A	60	54[1]	70.2[1]	22-47-4CW5-8 [d]
3) 1VY08SB	HPCS Pump Room Cooling Coil 1B	60	52[1]	73.2[1]	22-47-4CW5-8 [d]
4) 1DG13A	Diesel Generator Hx	650	811[1]	671[1]	[j]
5) 1SX01PC	SX Pump Seal Cooler	3	3.9[1]	3.4[1]	[j]
6) 1VX06CC	Switchgear Heat Removal Condensing Unit	50	71[1]	78.4[1]	[j]

ATTACHMENT B (cont.)

TABLE IV

DIVISION I AND II VC SYSTEM

	EQUIPMENT NUMBER	EQUIPMENT DESCRIPTION	DESIGN FLOW RATE (gpm)	AS-FOUND FLOW RATE (gpm)	AS-LEFT FLOW RATE (gpm)	EQUIPMENT MODEL NUMBER/ MANUFACTURER [ ]
1)	0VC06AA	Division I Control Room HVAC Cooling Coil	435	461.5[n]	444.5[n]	[j]
2)	0VC06AB	Division II Control Room HVAC Cooling Coil	435	451[n]	442.7[n]	[j]
3)	0VC18AA	Division I Control Room HVAC Equipment Room Cooling Coil	35	18.5[1]	35.5[1]	16-45-6CW5-8[d]
4)	0VC18AB	Division II Control Room HVAC Equipment Room Cooling Coil	35	24[1]	37.3[1]	16-45-6CW5-8[d]

ATTACHMENT B (cont.)

TABLE I, II, III, & IV NOTES:

[a] As-left flow rates are less than original design values. These as-left flow rates were reviewed by engineering and verified to be acceptable prior to startup from PO-3.

[b] Existing piping was modified (Plant Modification SXF012) to achieve acceptable flow through 1VY03S.

[c] Existing piping was modified (Plant Modification SXF013) to achieve acceptable flow through 1VY05S.

[d] Equipment manufactured by American Air Filter Company.

[e] Equipment manufactured by General Electric Company.

[f] Equipment manufactured by Sentry Equipment Corporation.

[g] Equipment manufactured by Yuba Heat Exchanger.

[i] Equipment manufactured by Carrier Corporation.

[j] Equipment Model Number/Manufacturer [] identification not indicated because the as-found flow rate met the design value.

[k] These are values initially determined using Polysonics. Use of Polysonics was later determined to be inaccurate for measuring flow through piping of the size installed to these heat exchangers. Polysonics proved to read low on piping of this size (12 inches in diameter and greater).

[l] Flow measured using Polysonics instruments.

[m] Flow measured using Caldon instruments.

[n] Flow measured using a combination of permanent flow elements and Polysonics instruments.

[o] Cooling required for shutdown cooling mode only; not required for accident conditions (suppression pool cooling mode).