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FROM: Carolina Power & Light Co. Raleigh, N.C. 27602 E.E. Utley	DATE OF DOC: 4-27-72	DATE REC'D 5-1-72	LTR X	MEMO	RPT	OTHER
TO: DRL	ORIG 1	CC	OTHER	SENT AEC PDR X SENT LOCAL PDR X		
CLASS: (U)/ PROP INFO	INPUT	NO CYS REC'D 1		DOCKET NO: 50-261		

DESCRIPTION: Ltr re our 4-3-72 ltr...furnishing comments on the performance of the leak detection systems for the H.B. Robinson Plant Unit 2.... & trans the following:

ENCLOSURES: (1) Graphs showing 3 seperate months of operation....
(2) H.B. Robinson Steam Electric Plant Unit 2 Abnormal Procedure CPL-AP-16 April 14, 1972 Excessive Primary Plant Leakage....

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ACKNOWLEDGED

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(1 cy ea encl rec'd)

FOR ACTION DL 5-2-72

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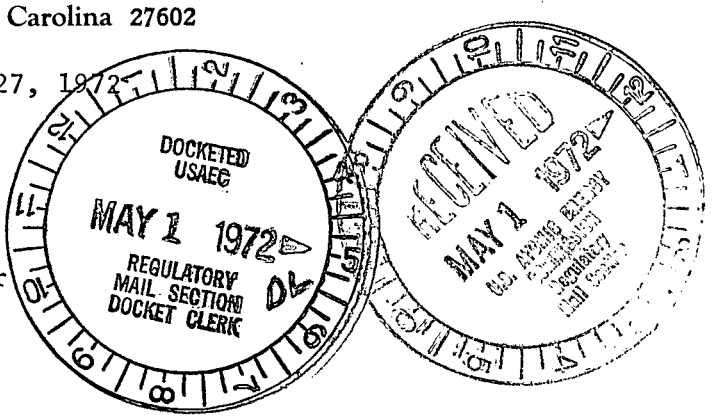
Regulatory File

50-261

Carolina Power & Light Company

Raleigh, North Carolina 27602

April 27, 1972



Mr. Edward J. Block, Acting Director
Directorate of Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

H. B. ROBINSON PLANT
LICENSE DPR-23
LEAK DETECTION SYSTEMS

Dear Mr. Block:

In accordance with paragraph 6.6.3, Technical Specifications and as requested in the letter from Mr. Lawrence D. Low, Director, Division of Compliance, dated April 3, 1972, the following comments are submitted concerning the performance of the leak detection systems.

Carolina Power & Light Company believes the necessity for identifying and measuring primary system leakage is of prime importance and recognizes the importance of identifying as soon as technically possible significant change in primary system leakage. From the outset of plant operations, meticulous care has been exercised in determining primary leakage and in keeping the total primary leakage to a bare minimum. Modifications to equipment such as installing new charging pump seals and systematically correcting small leaks has been a continuing effort. As a result, the total primary unidentified leakage, not just leakage into the containment, has been consistently less than 1 gpm and is currently less than .5 gpm. Enclosure 1 is representative of three separate months of operation. Experience has confirmed that with the low leakage rates experienced and the low activity levels in the primary coolant, the only valid quantitative measurement of leakage is the daily periodic test (PT8), Reactor Coolant System Leakage Evaluation. In this test, a physical inventory of the coolant volumes are compared over a period of approximately one hour. It should be emphasized that this method measures total primary system leakage and not just the contribution released to the containment.

It has been our understanding that the leak detection systems described in Section 6.5 FSAR and referenced in the Basis to Section 3.1.5, Technical Specifications, provide leakage detection rather than leakage measurement. As stated in the Design Basis, Section 6.5.1 FSAR "This equipment provides indication of normal background which is indicative of a basic level

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L6

of leakage from primary system and components. Any increase in the observed parameters is an indication of change within the containment, and the equipment is capable of monitoring this change. The basic design criterion is the detection of deviations from normal containment environmental conditions including air particulate activity, radiogas activity, humidity, condensate runoff and in addition, in the case of gross leakage, the liquid inventory in the process systems and containment sump."

The four methods of containment leak detection are: (1) Containment Air Particulate Monitor; (2) Containment Radioactive Gas Monitor; (3) Humidity Detector, and (4) Condensate Measuring System. Experience has confirmed that each of these redundant monitors will detect changes in environmental conditions which may indicate leaks in the containment. On several occasions these systems have been helpful in recognizing increases in the normal leakage and in confirming the existence of known leaks. As indicators of change in leak rates they have been an asset to operational personnel in recognizing and identifying leaks within the containment. However, indications from these monitors has been more qualitative than quantitative. This is due primarily to the many variables which affect the sensitivity, response, and accuracy of each monitor.

The threshold of leakage detection of each of the methods of containment leakage detection is very difficult to determine precisely in an operational environment. The description submitted in Section 6.5, FSAR, and in the Basis of Section 3.1.5 Technical Specifications depends to a large degree on various assumptions used in calculations and were intended to indicate the order of magnitude sensitivity of these instruments. The conservatism in these calculations are, in a large measure, matters of judgment. Though actual or experimental data is not available to correlate indications on the air particulate monitor with low leak rates (especially in the absence of failed fuel), it is believed that the monitor is a sensitive method of leak detection and that a change leak rate of .5 gpm would, with a high degree of certainty, be recognized within an hour. The following calculations based on conservative assumptions demonstrate this degree of certainty. Assuming a .5 gpm leak and $0_{4}01$ $\mu Ci/cc$ of particulate activity that becomes airborne, a total of 1.14×10^{4} μCi_{-8} would be released to the containment in one hour. This will result in 2×10^{-8} $\mu Ci/cc$ of particulate activity within the containment atmosphere at the end of an hour. Sufficient mixing in the containment should occur in this time to ensure that the containment atmosphere is fairly homogenous no matter where the leak may occur in the containment. With these conditions, a reading of about 15,000 cpm would be indicated on the air particulate monitor, R11. The background readings on the air particulate monitor, (R-11), have been 2,000 to 3,000 cpm and the instrument is set to alarm at about 7,000 cpm above background. Thus, R-11 would alarm, on a conservative basis, within an hour with a .5 gpm leak. Other factors such as location of the leak in the vicinity of R-11, higher particulate activity in the coolant, or lower background activity would lower this assured response time. A program to correlate indications of the various leak detection systems with actual measured leakage is in progress; however, it is estimated that at least a year of operational data will have to be accumulated and analyzed before valid conclusions

can be made. The analysis is complicated by the small leakage rate that has been experienced, by the large volume in the Robinson containment, by the difficulty in precisely measuring the leakage to the containment as a fraction of the total leakage, and, more importantly, by the low activity levels that have been experienced in the primary coolant. It is doubtful whether the leak detection systems can be correlated precisely with leakage in the containment to be completely relied on as quantitative leak measurement system. However, Carolina Power & Light Company has confidence that the systems can and will identify small changes in leak rate and thereby alert the operator. Operator action can then be taken to assess the changes that have occurred in the plant and prudent response initiated.

As indicated in enclosure 2, it is Carolina Power & Light's practice to visually inspect the containment each shift when total leakage, identified and unidentified, is determined to be greater than 1 gpm.

In summary, it is the belief of Carolina Power & Light Company that the Design Basis for the leak detection system has been achieved and that these systems, evaluated collectively, will give the operating personnel timely indication of deviations from normal containment environmental conditions. The discussion stated in the Basis of paragraph 3.1.5 Technical Specifications describing anticipated performance of the leak detective systems was not considered to be a commitment of equipment performance but rather to indicate an order of magnitude performance level of the various devices based on assumptions stated in the FSAR, Section 6.5. If there be continued concern about the leak detection systems or the documentation describing these systems, Carolina Power & Light Company would appreciate the opportunity to discuss the resolution with the DRL staff. It is the desire of this Company that there be no doubt concerning the adequacy of the leak detection system and the Company desires to resolve all the issues as expeditiously as possible.

Yours very truly,

E. E. Utley
Manager
Bulk Power Supply

NBB:jb

Enclosures

cc: Mr. Lawrence D. Low
Mr. G. P. Beatty
Mr. N. B. Bessac
Mr. C. D. Barham

9-2-71 R-11 & R-12 Filter Paper Not Advancing Properly
9-6-71 & 9-11-71 Pressure relief valves open
9-24, 25, & 26-71 Reactor in hot shutdown condition
9-9-71 & 9-11-71 Flushing hot leg and Pzr sample line to sample sink at a rate of .5 gpm.
9-22-71 thru 9-30-71 Excessive leakoff from RHR 750, RC-455 A & B, and charging pump packings.

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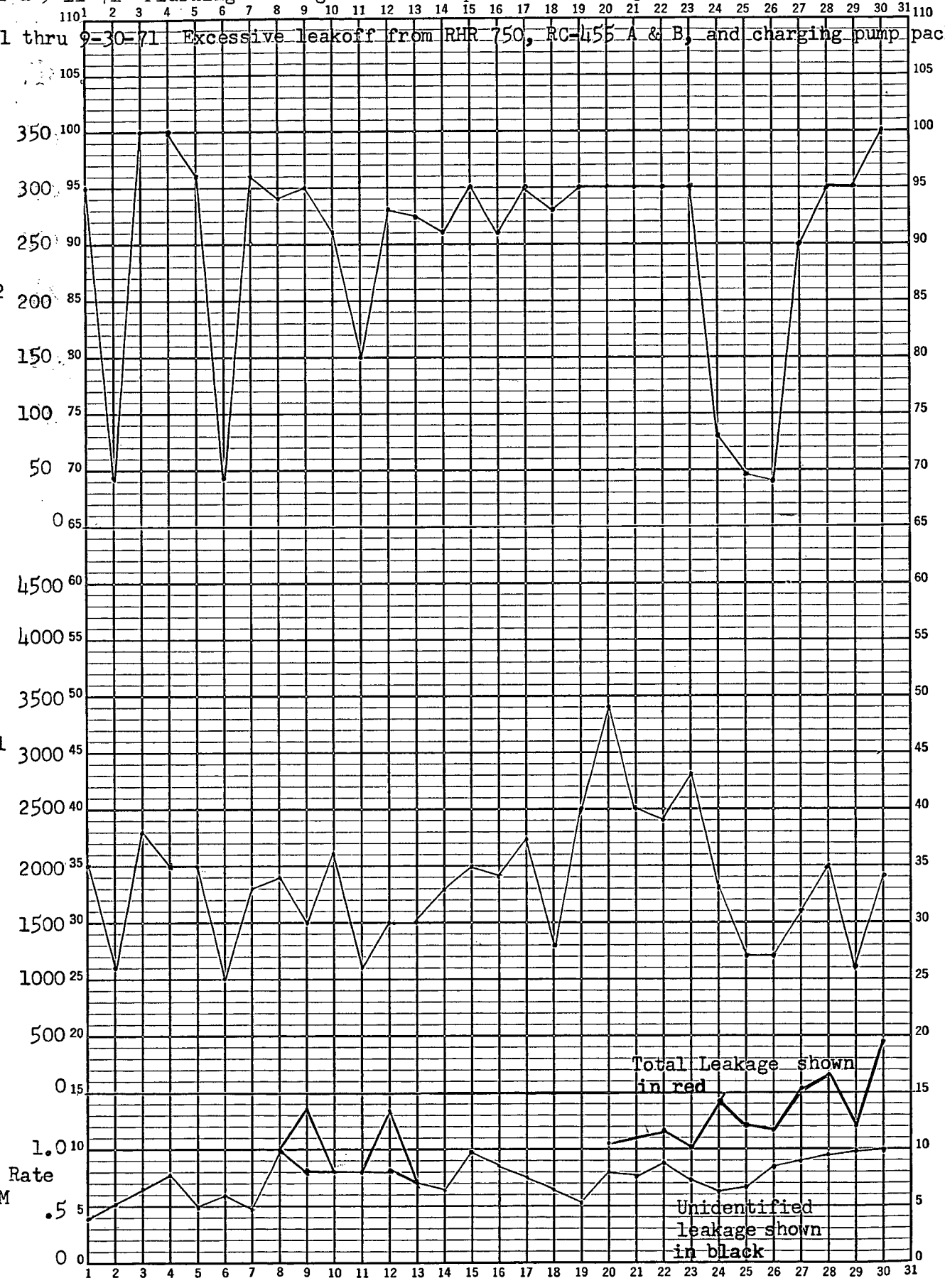
Received w/Ltr Dated 4-27-72



1 MONTH BY DAYS X 110 DIVISIONS KEUFFEL & ESSER CO. MADE IN U.S.A. 46 2290

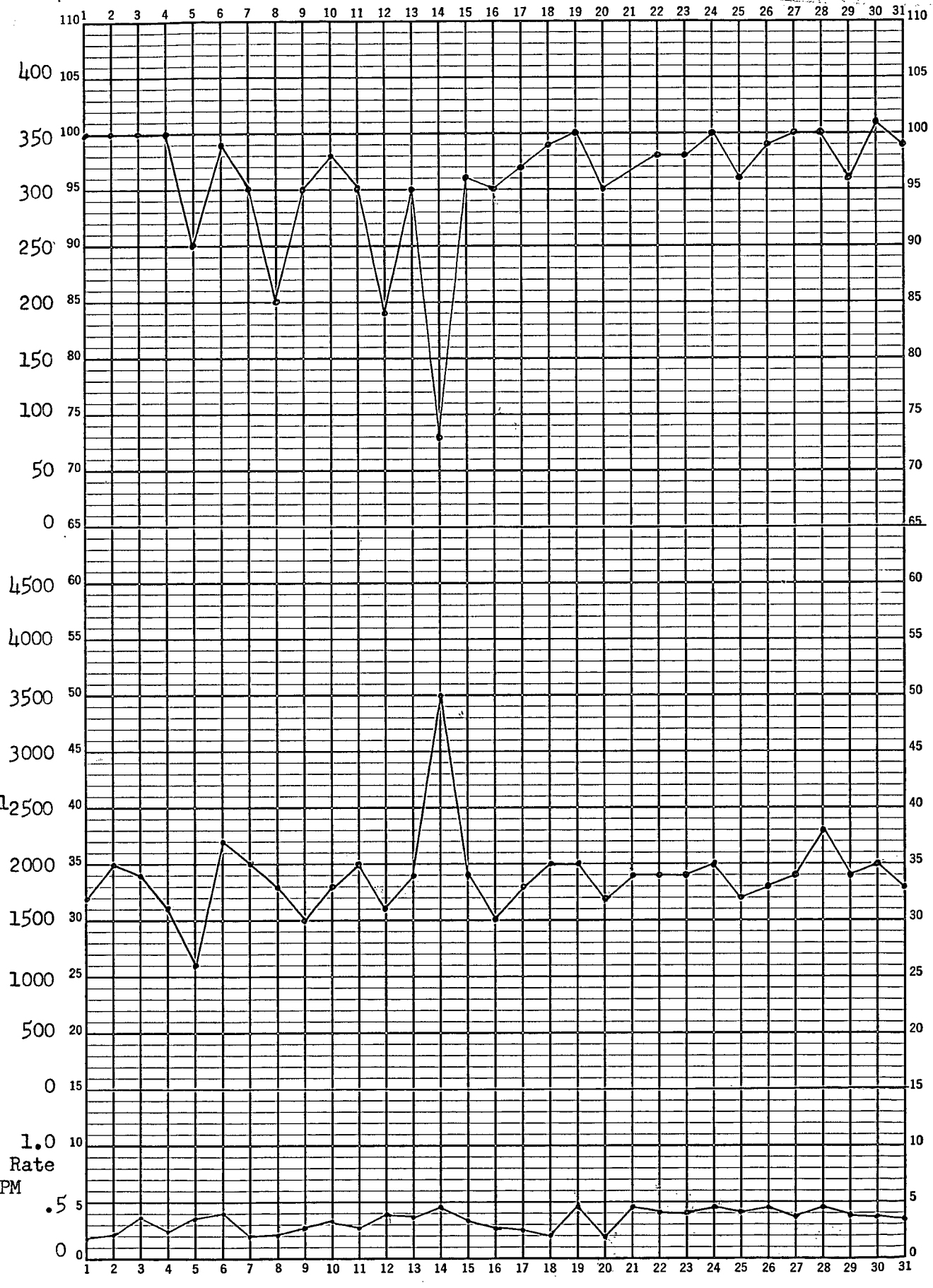
Month September 1971

Enclosure 1

12-14-71 Reactor in hot shutdown condition,
on line on 12 to 8 shif

Regulatory File Cy.

Received w/Ltr Dated 4-27-72

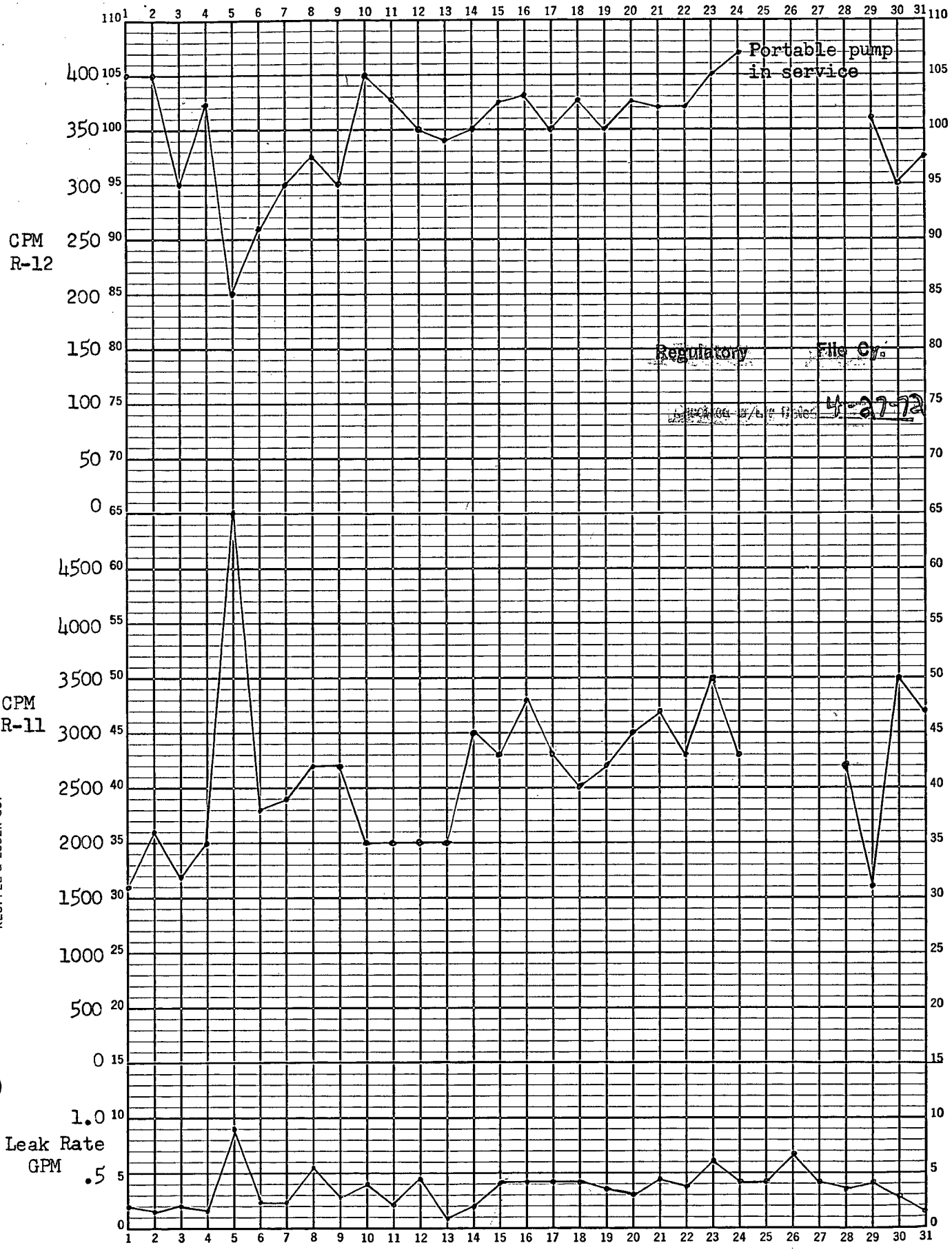


1 MONTH BY DAYS
X 110 DIVISIONS
KEUFFEL & ESSER CO.
MADE IN U.S.A.
46 2290

Month December 19 71

3-5-72 Unit on line on 8 to 4 shift

Days not indicated is due to R-11 & R-[redacted] having portable pump connected to them



Month March 19 72

H. B. ROBINSON STEAM ELECTRIC PLANT

UNIT NO. 2

4-27-72

ABNORMAL PROCEDURE CPL-AP-16

APRIL 14, 1972

EXCESSIVE PRIMARY PLANT LEAKAGE

1.0 DISCUSSION

Leakage from the Reactor Coolant System cannot be tolerated if it is in excess of one (1) gpm and the source of leakage has not been identified. If the source of leakage has been identified and does not exceed 10 gpm, plant operation is permitted.

The plant is equipped with several means of detecting Reactor Coolant leakage. They include air particulate and gas monitors, humidity detectors, a condensate measuring system capable of detecting and measuring leakage to the containment atmosphere and radiation monitors on the component cooling system, steam generator blowdowns, condenser air ejector exhaust and service water return from the HVH unit cooling coils to detect leakage into these systems. Should leakage from the primary system into these closed systems occur, that system radiation detector and/or the system inventory will indicate the leakage.

A primary system leakage rate (PT-8) will be performed by shift personnel on a daily basis during routine operations.

A visual inspection of the containment vessel will be made each shift by the Shift Foreman or his appointed representative and a member of the Health Physics Group when leakage is determined to be greater than one (1) gpm.

2.0 SYMPTOMS

Any appreciable leakage from the Reactor Coolant System will be detected by the particulate monitor in the containment. Gross leakage may be determined by changes in make-up water inventory. Leakage to the containment atmosphere

can be determined by the condensate collection system or the humidity detection system. The rate of leakage to the containment may be determined by the condensate measuring system as described by Section F of this procedure.

Leakage into a closed system will be detected by system radiation monitors or system inventory. Leakage may be indicated as follows:

1. Air Particulate Monitor Alarms
2. Gaseous Monitor Alarms
3. Condensate Measuring System Alarm
4. Change in Charging Pump Speed
5. Change in Pressurizer Level
6. Change in Dewpoint Recorder Indications
7. C.C. System Radiation Monitor
8. S.G. Blowdown Radiation Monitor
9. Service Water Return from HVH Units Radiation Monitor
10. Condenser Air Ejector Radiation Monitor

If deviations in any of these systems parameters indicate a change in the known leakage rate, a primary leakage rate test (PT-8) will be performed immediately. If the above test indicates a leak rate greater than 1 gpm and the source of leakage cannot be determined, proceed with the actions as stated in Section 3.0 of this procedure.

3.0 IMMEDIATE ACTIONS

A. Notify the Operating Supervisor or Plant Superintendent if excessive leakage is detected.

B. Leakage 10 gpm

1. Within 12 hours, place the reactor in a hot shutdown condition using normal procedures. (Technical Specification 3.1.5.2)
2. If leakage exceeds 10 gpm for 24 hours, place the reactor in a cold shutdown condition using normal operating procedures. (Technical Specification 3.1.5.2)

C. Leakage 10 gpm

1. For leakage between 1 gpm and 10 gpm.
   a. Make all effort to determine the source of leakage.
   b. If leak is identified and safe operation is assured, reactor operation shall be permitted. (Technical Specification 3.1.5.2)
   c. If leak is unidentified within 12 hours, place the reactor in a hot shutdown condition using normal operating procedures. (Technical Specification 3.1.5.1)
   d. If the leak is unidentified within 24 hours, place the reactor in a cold shutdown condition. (Technical Specification 3.1.5.1)

D. Leakage into a closed system.
   1. Determine, by equipment isolation, the source of leakage.
   2. Isolate the leaking component if possible.
   3. If leak cannot be isolated, initiate action as described in Section 3.0 B & C.

E. Supplementary Actions
   1. Any leak from the primary plant requires continuous monitoring, by leak rate test, condensate measuring system evaluation and visual inspection as stated in the discussion section of this procedure.
   2. A leak rate can be determined by the condensate collection system and/or primary system inventory.
   3. If the rate exceeds one (1) gpm and the source of leakage is not known, place the reactor in a hot shutdown condition within 12 hours. (Technical Specification 3.1.5.2)
   4. If the rate exceeds ten (10) gpm, place the reactor in a hot shutdown condition within 12 hours using normal operating procedures and in a cold shutdown condition within 24 hours. (Technical Specification 3.1.5.2)

F. Use of the Condensate Measuring System
   1. Operator Action:
      a. Check local panel to determine which units are in the alarm condition.
      b. Determine the condensation rate using the following procedure:
         b.1 Read the level indication as accurately as possible and close the solenoid valve. Note the time when solenoid valve is closed.

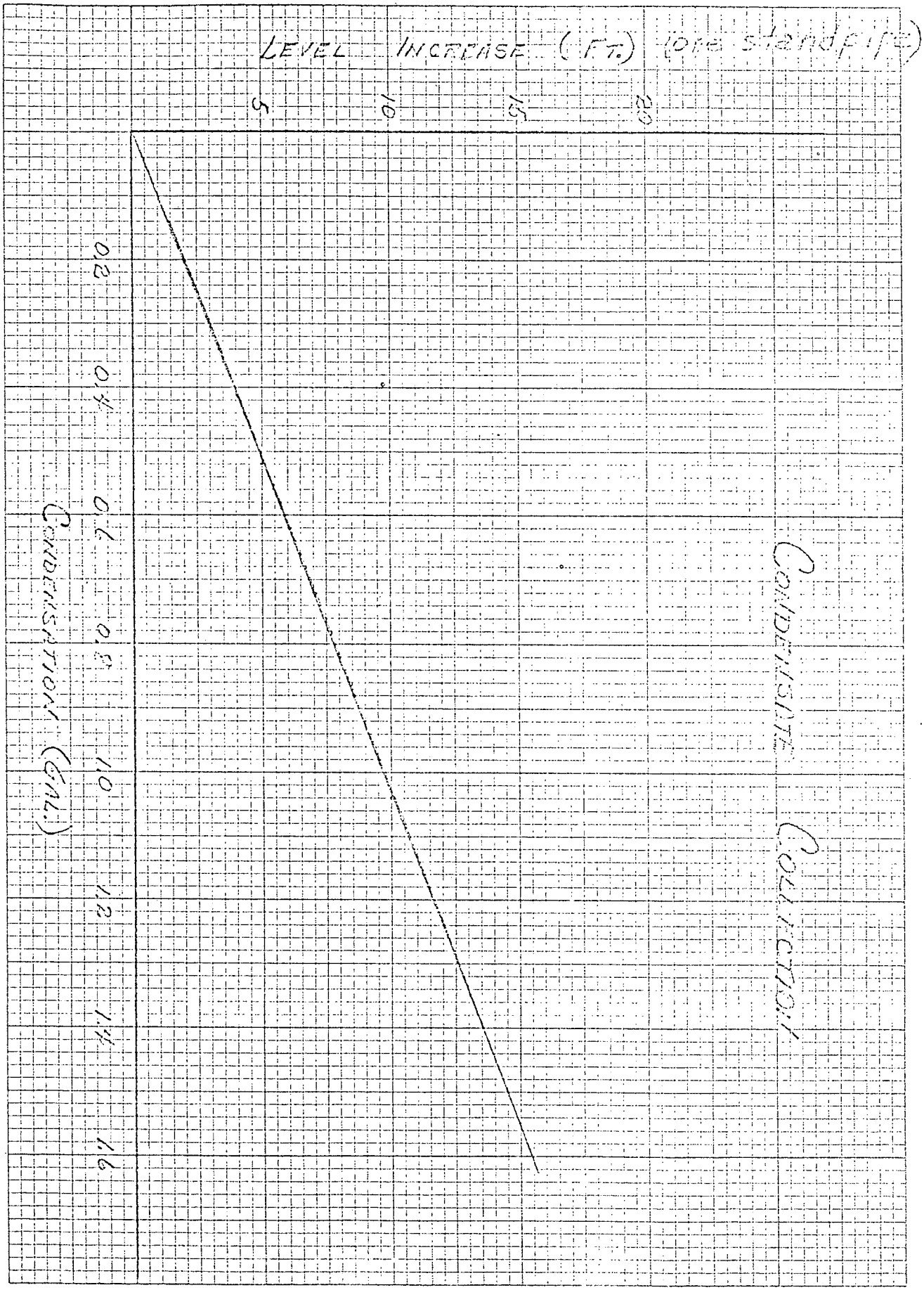
b.2 Allow the level to increase in standpipe until a positive difference of at least one foot has been collected. (A larger level increase produces more accurate results.)

b.3 Take a final level reading and time with solenoid still closed. Open solenoid to drain column and return system to normal.

b.4 To calculate the condensation rate, determine the level difference ($Level_{Final} - Level_{Initial}$). Using the attached calibration curve determine the equivalent gallons collected. Divide the gallons by the time difference ($Time_{Final} - Time_{Initial}$) in minutes to get condensation rate in gallons per minute.

2. A test (PT-8.1) of the alarms associated with this system will be performed on a weekly basis.

3. A leak rate test (PT-8.1) will be performed on a weekly basis to verify the results obtained on the daily primary leak rate test (PT-8).



Regulatory File Cy.

April 3, 1972

Received w/Ltr Dated 4-27-72

Docket No. 50-261

Carolina Power and Light Company
ATTN: Mr. Shearon Harris
President
336 Fayetteville Street
Raleigh, North Carolina 27602

Gentlemen:

Thank you for your letter of February 7, 1972, in reply to our notice dated January 18, 1972.

Your response to Item No. 14 of our list of items of noncompliance with Regulatory requirements stated that the basis for this violation was not understood by your staff. The specific citation relates to the failure of Carolina Power and Light Company (CP&L) to submit to the Director, Division of Reactor Licensing (DRL), a written report within thirty days of a substantial variance in the performance of your primary system leak detection systems from performance specifications contained in the Technical Specifications or in the Final Safety Analysis Report (FSAR) for the H. B. Robinson No. 2 facility. Based on our review of Abnormal Procedure CPL-AP-16, results of your daily primary system leakage evaluations, minutes of your Company Nuclear Safety Committee meetings held on May 15, 1970, and August 27, 1970, and your resulting letter to Westinghouse titled, "Primary System Leak Detection," and interviews with plant personnel by our inspectors, we concluded that the performance of your primary system leak detection systems was at substantial variance with the performance specifications discussed in Section 6.5 of the FSAR and with the basis for Paragraph 3.1.5 of the Technical Specifications. A summary of our inspection findings in this regard is provided as an enclosure. For this reason it is requested that a report be submitted to the Division of Reactor Licensing (DRL) in accordance with Paragraph 6.6.3 of the Technical Specifications.

In view of the AEC's concerns regarding the sensitivity and reliability of installed primary system leak rate monitoring systems, it is requested that your report to DRL include the following additional information for each of your leak detection systems:

a. A comparison of actual measurements and operational data with corresponding design specifications or FSAR commitments for sensitivities (gpm) and response times of installed systems.

OFFICE ▶	CO	CO	CO	CO	DRL	CO
SURNAME ▶	FJNolan:nw *	MSHildreth *	JGKeppler*	RHEngelken*	DJSkovholt*	LDLow
DATE ▶	3/29/72	3/29/72	3/29/72	3/29/72	3/31/72	

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b. Plans for establishing action limits for primary system leakage rates in facility operating procedures. These plans should include instructions for when visual inspections within containment are necessary.

c. Based on operating history, discuss (1) the adequacy of the installed leak detection systems to differentiate between identified and unidentified leaks from components within the primary reactor containment, and (2) the minimum sensitivity of each installed system that has been routinely available to the operator.

We will review the corrective action taken by you regarding the other items discussed in our January 18, 1972 notice during our next inspection.

Very truly yours,

Original signed by
L. D. Low

Lawrence D. Low, Director
Division of Compliance

Enclosure:
Summary of Inspection
Findings

bcc:w/copy of Licensee's Reply
dtd. February 7, 1972
P. A. Morris, DRL
D. J. Skovholt, DRL
R. J. Schemel, DRL
DR Reading File
DR Central File
PDR
R. L. Shannon, OR
NSIC

bcc:w/o Enclosure 3 to Licensee's
Reply dtd. February 7, 1972
R. F. Fraley, ACRS (3)
J. P. O'Reilly, CO:I
J. G. Davis, CO:II
B. H. Grier, CO:III
J. W. Flora, CO:IV
R. W. Smith, CO:V

*SEE ATTACHED YELLOW FOR CONCURRENCES

OFFICE ▶	CO	CO	CO	CO	DRL	CO
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