

November 8, 1982

SBN- 355
T.F. B7.1.2

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Mr. George W. Knighton, Chief
Licensing Branch 3
Division of Licensing

References: (a) Construction Permits CPPR-135 and CPPR-136, Docket
Nos. 50-443 and 50-444
(b) USNRC Letter, dated February 12, 1982, "Request for
Additional Information," F. J. Miraglia to W. C. Tallman
(c) USNRC Letter, dated March 12, 1982, "Response to 440
Series RAIs; (Reactor Systems Branch)," J. DeVincentis to
F. J. Miraglia

Subject: Revised Response to 440 Series RAIs; (Reactor Systems Branch)

Dear Sir:

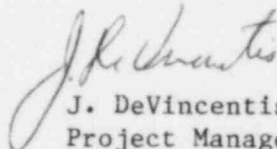
We have enclosed revised responses to the following Requests for
Additional Information (RAIs) which were forwarded in Reference (b):

440.5, 440.6, 440.8, 440.25, 440.39

Responses or revised responses to the 440 Series RAIs will be included in
Amendment 48.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY


J. DeVincentis
Project Manager

ALL/fsf

Boo1

440.5

RESPONSE:

A new analysis is being performed to demonstrate that the sizing criteria employed in the design of the Seabrook safety valves is as conservative as that recommended in SRP 5.2.2. The results of this analysis will be provided when they are available.

440.6

RESPONSE:

The assumed instrument and control errors are provided in Section 15.0.3.2 of the FSAR. They are as follows:

2% Power
5.8° Temperature
30 psi Pressure

11/1 10/12/82

RAI 440.8 (5.2.2)

Provide assurance that loading due to water relief has been considered in the support analysis, including the passage of a water slug and effects of water hammer. What liquid water relief rates were assumed in the loading analysis? Are these values consistent with experimental results obtained from similar valves?

RESPONSE:

The redesign of the pressurizer safety and relief valve piping has eliminated the water seals from the safety valve piping. The new piping configuration has been analyzed through the use of the RELAP-5 computer program to determine the loadings to which the piping will be subjected under steam discharge and also water discharge. The associated effects are then factored into the piping and support analysis. The liquid water relief rates used in the analysis were: 344,644 #/hr for the PORVs and 481,500 #/hr for the safety valves. These values were extracted from the EPRI reports as typical values for this application.

440.25 Provide or reference a discussion on methods utilized to prevent freezing of the RWST and RWST vent line.

RESPONSE: FSAR Subsection 6.2.2.3 will be updated to provide additional information, demonstrating that freezing temperatures will not occur. See RAI Response to 440.//~~2~~ for Section 6.2.2.3.

440.39

Provide a discussion of NPSH requirements for all ECCS pumps. Include in this discussion NPSH as required by pump warranty, estimated variability between pumps, and testing inaccuracies. Also provide the assumptions and calculations used to establish available NPSH.

RESPONSE: A discussion of the calculational method used to determine the NPSH for the ECCS pumps is given in Seabrook FSAR Section 6.3.2.2. For RHR pumps, see also Section 5.4.7. The required and available NPSH values are given in Table 6.3-1. Pump curves for RHR, HHSI/CH, SI pumps are attached.

For the RHR pumps, the NPSH evaluation is based on one RHR pump discharging flow to two RCS loops and both SI and HHSI/CH pump suctions. The limiting single failure is the second RHR pump, with the corresponding NPSH requirement based on the runout flow resulting from this most limiting failure.

For the SI and HHSI/CH pumps, the limiting single failure is the second SI or HHSI/CH pumps, respectively.

The corresponding NPSH requirement is based on the runout flow resulting from this most limiting single failure. Preoperational full flow tests are also performed on the systems to verify calculated maximum runout conditions. This serves as a final assurance of acceptable system performance.

ECCS pump specifications include a specified maximum required NPSH which the pump is required to meet. Pump vendors have verified that the required NPSH for the pumps was less than the maximum required NPSH through testing in accordance with the criteria established by the Hydraulic Institute Standards. Further, from the pump head/flow and NPSH required characteristic curves that are derived from the testing, Westinghouse subsequently confirmed that adequate NPSH is available based on the actual system piping layouts, and conservatively calculated maximum pump runout verified by preoperational testing.

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CONTRACTOR WESTINGHOUSE N.E.S.

CUSTOMER PUBLIC SERVICE OF NEW HAMPSHIRE

ITEM NO. NAH-01 P.O. 546-CAV-236902-BPE

IMPELLER PATTERN M-7278 M-6534

MAXIMUM DIAMETER 8 1/4" 8 1/4"

RATED DIAMETER 8 1/4" 5 1/4" 5 1/2" 8 1/4" 6 1/4"

MINIMUM DIAMETER 7 1/4" 7 1/4"

TEST PERFORMANCE CURVE NO. 27746 A

SIZE 2 1/2" RL TYPE IJ STAGES 11

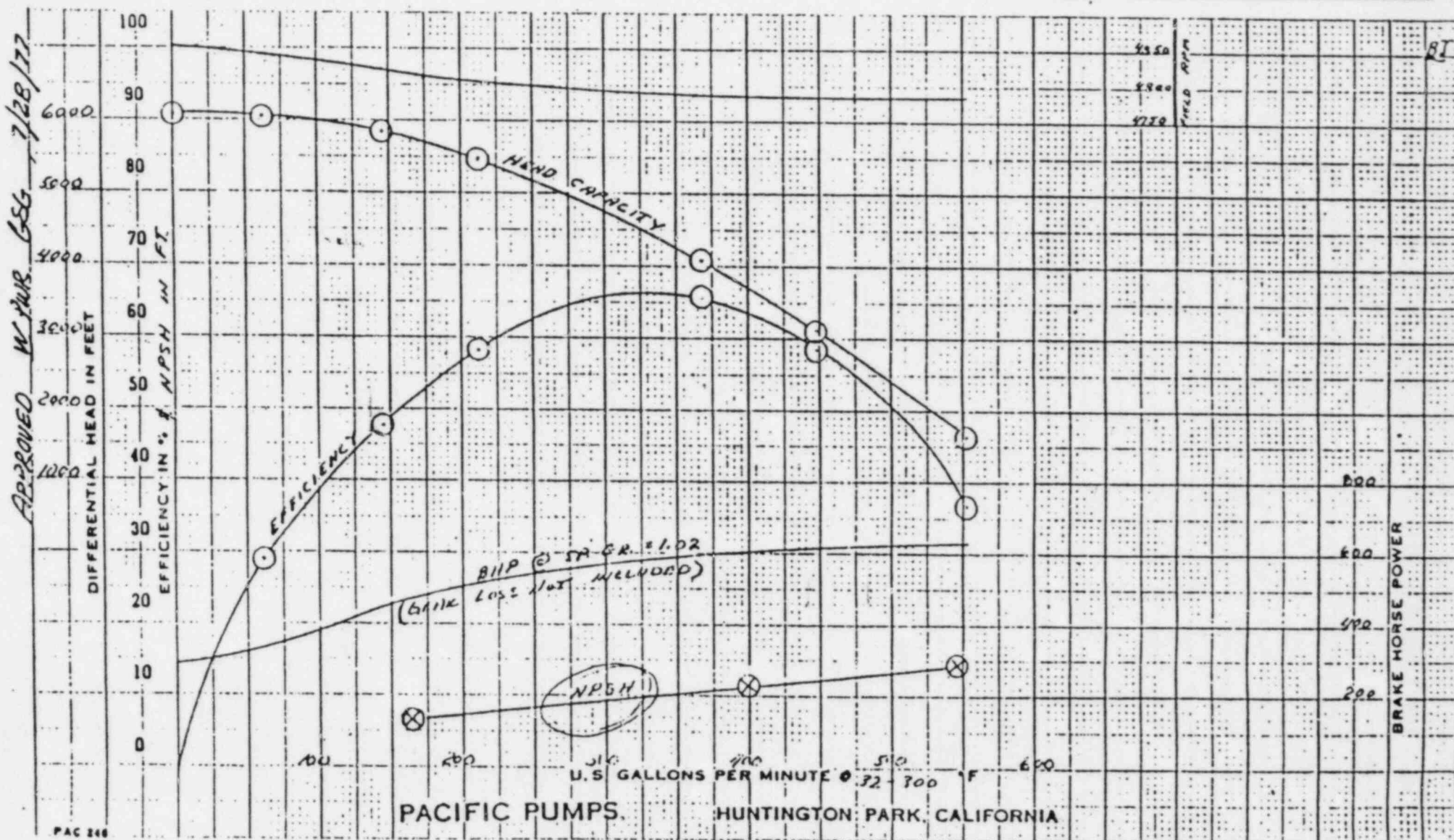
R.P.M. FIELD DATE 7-25-77

PUMP NUMBER 51683

PERFORMANCE ALSO APPLIES TO PUMP

NUMBER

Charging SI pump



CONTRACTOR WESTINGHOUSE N.E.S.

CUSTOMER PUBLIC SERVICE OF NEW HAMPSHIRE

ITEM NO. NAN-02 P.D. 546-CAV-236902-0PE

IMPELLER PATTERN M-7278 M-6534

MAXIMUM DIAMETER 8 1/4" 8 1/4"

RATED DIAMETER 8 1/4" 8 1/4"

MINIMUM DIAMETER 7 1/4" 7 1/4"

TEST PERFORMANCE CURVE NO. 37746 B

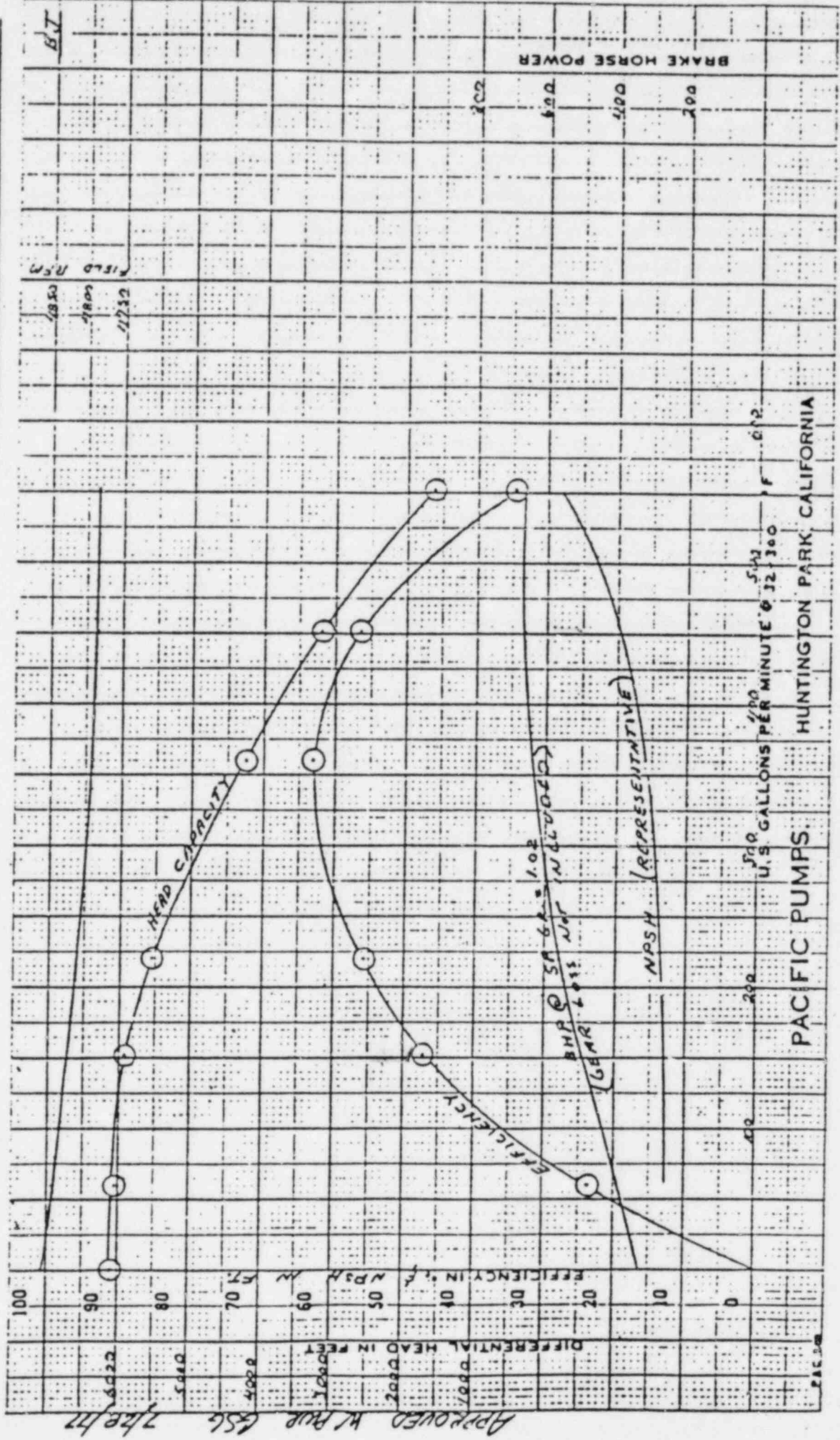
SIZE 2 1/2" FL TYPE T.T STAGES 1

R.P.M. FIELD DATE 7-21-'11

PUMP NUMBER 51684

PERFORMANCE ALSO APPLIES TO PUMP

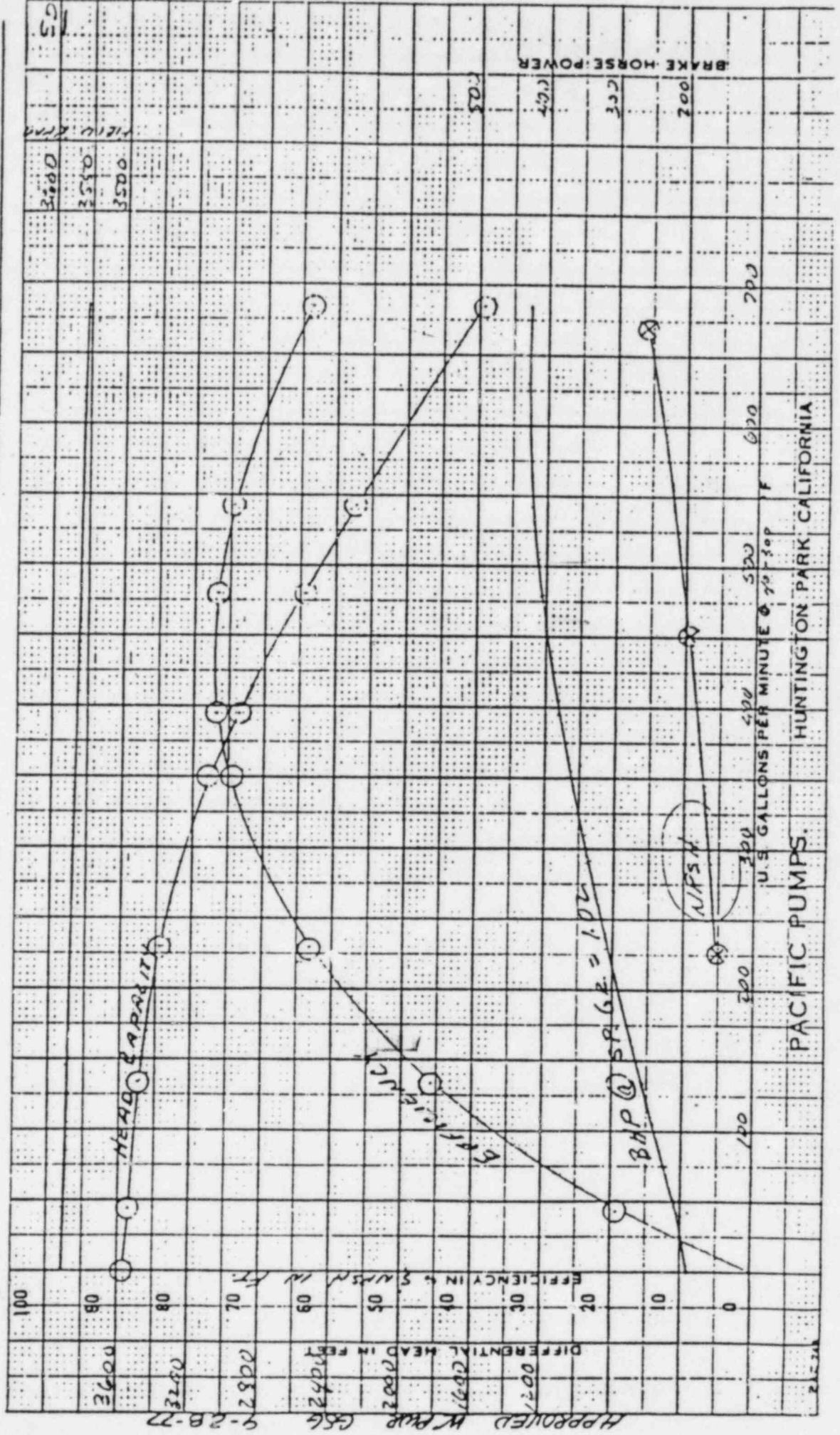
NUMBER



CONTRACTOR WESTINGHOUSE NIS
 CUSTOMER NEW HAMPSHIRE
 ITEM NO. ANN-O-L P.O. 546-CAV-216951-6PE
 IMPELLER PATTERN M-2804 M-7592
 MAXIMUM DIAMETER 7 9/16 8 1/16
 RATED DIAMETER 8 9/16 8 3/16
 MINIMUM DIAMETER 7 9/16 7 9/16

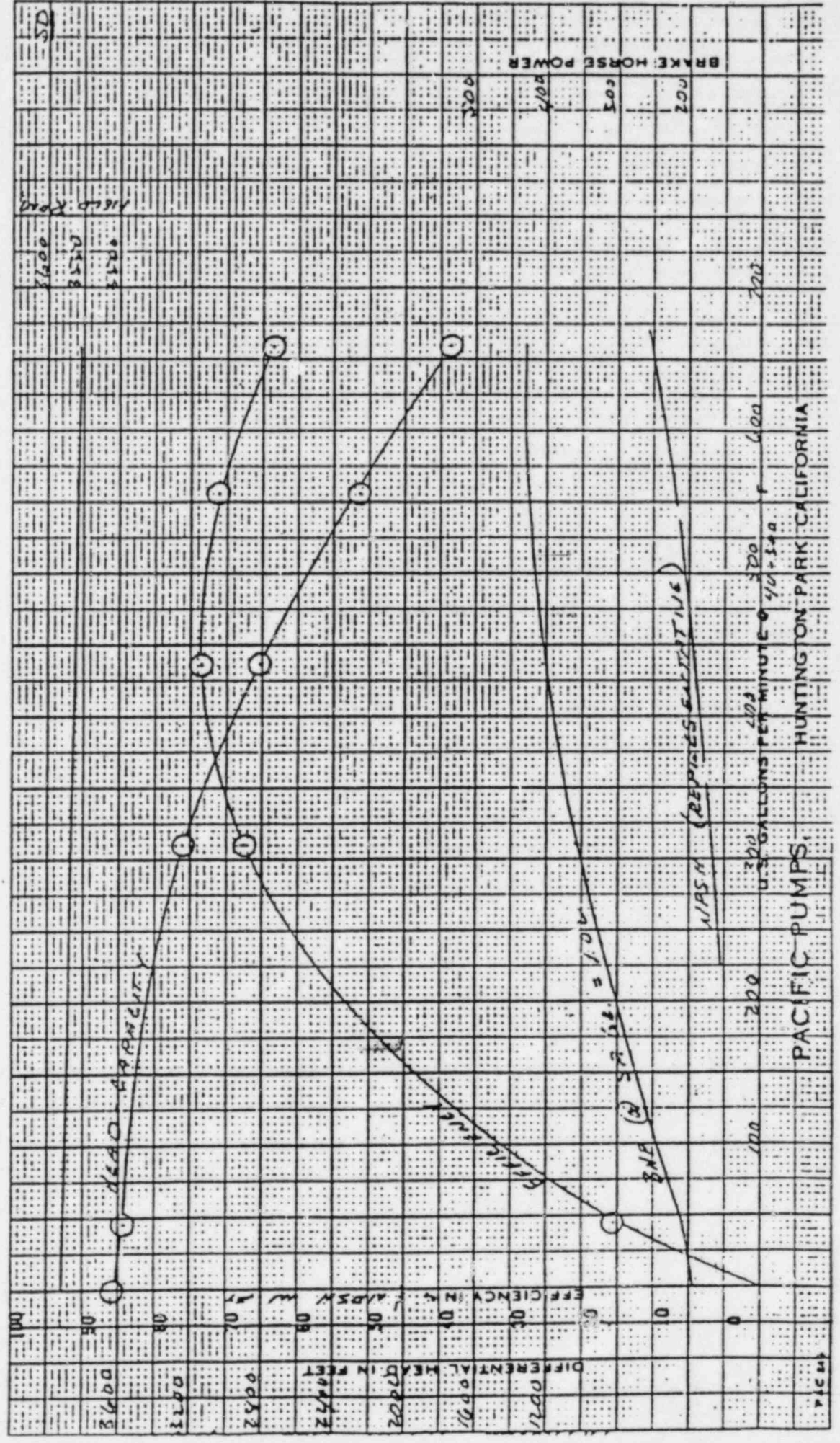
TEST PERFORMANCE CURVE NO. 37735-1
 SIZE 3" TYPE JHF STAGES 11
 R.P.M. FIELD DATE 9-21-77
 PUMP NUMBER 51661
 PERFORMANCE ALSO APPLIES TO PUMP
 NUMBER _____

SI Pump



CONTRACTOR WESTINGHOUSE A/ES.
 CUSTOMER NEW HAMPSHIRE
 ITEM NO. NH-02 P.O. 546 - CAV - 236951-B2E
 IMPELLER PATTERN M-7844 M-7592
 MAXIMUM DIAMETER 8 9/16 8 9/16
 RATED DIAMETER 8 9/16 8 9/16
 MINIMUM DIAMETER 7 9/16 7 9/16

TEST PERFORMANCE CURVE NO. 377352.1
 SIZE 3" TYPE INF STAGES 11
 R.P.M. FIELD DATE 10-3-77
 PUMP NUMBER 51662
 PERFORMANCE ALSO APPLIES TO PUMP
 NUMBER _____



RHR pump

CURVE NO. N-1037

DATE CONDUCTED 8/16/78

PUMPS ARE APPROXIMATE. PUMP GUARANTEED FOR ONE YEAR. CONDITIONS CAPACITY, HEAD AND EFFICIENCY IN HANDLING ARE BASED ON SHOT TEST AND WHEN HANDLING CLEAR, COLD, FRESH WATER AT A TEMPERATURE OF 70°F. OVER 90% OF AIR NOT DRAIN IN FOOT SUCTION LINE.

IMPELLER PART NO. 8182430 DIA. 2.01 x 1.95

DIFFUSOR PART NO.

CR 0.58 IP

BRAKE HORSE POWER

THIS CERTIFIES THAT THIS PERFORMANCE CURVE IS BASED ON ACTUAL PERFORMANCE TEST RESULTS OF PUMP NO. 12769

J. T. R. Kingdon
1845/78
Tulwuk W. & Burke-Mex

NOTE: NPSH CURVE IS BASED ON ACTUAL TEST RESULTS OF PUMP NO. 12769. SPIN NO. 12769.

VERTICAL/BRACKET SPIN/12769-1

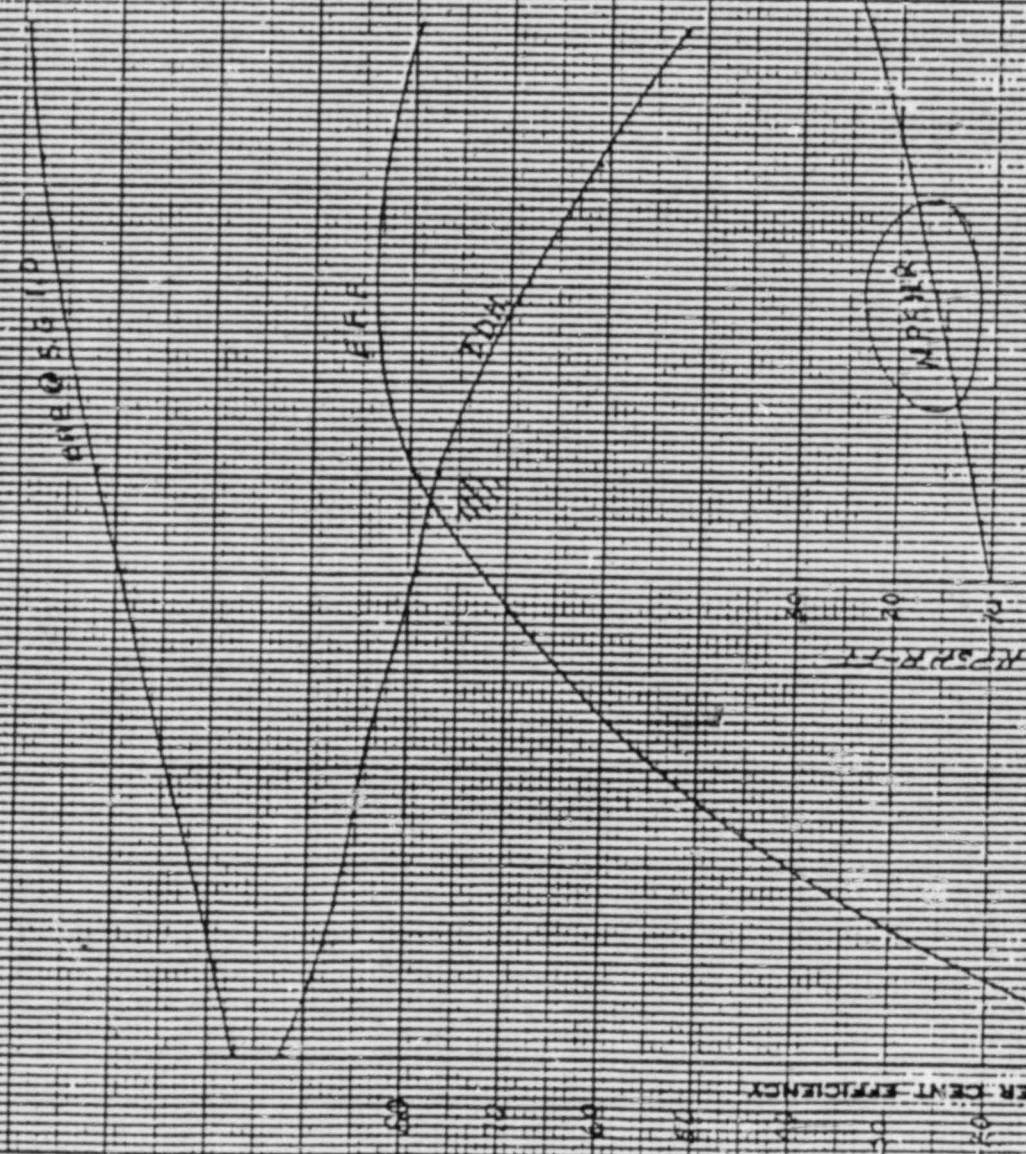
CHARACTERISTIC CURVE

NO. 8 X 20 TYPE WRT PUMP
R.P.M. 1782

PUMP NO. 12769

ORDER NO. 12769
INGERSOLL-RAND COMPANY
CAMERON PUMP DIVISION

DATE 11/10/78 CURVE NO. 1037



TOTAL HEAD IN FEET

PER CENT EFFICIENCY

3000 2000 1000
GALLONS PER MINUTE

CURVE NO. N-1038

DATE COMPLETED 8/10/74

CURVES ARE APPROXIMATE. PUMP GUARANTEED FOR FIVE YEAR SERVICE CAPACITY. HEAD AND EFFICIENCY GUARANTEES ARE BASED ON BRINE TEST AND WHEN HANDLING CLEAR, GOLD, GREEN WATER AT A TEMPERATURE OF NOT OVER 80°F. AND NOT OVER 5 FOOT SUCTION LIFT.

IMPELLER PART NO. 8X20141C

DIA. 80 X 14 1/2"

DIFFUSOR PART NO.

PUMP 8X20141C

BRAKE HORSE POWER

EFF

TRW

TRW

WASH

WESTINGHOUSE SPINTONAH-RIM 44 DE

CHARACTERISTIC CURVE

NO. 8X20 TYPE WDF PUMP

R.P.M. 2800

PUMP NO. 127410

ORDER NO. 657-3025

INGERSOLL-RAND COMPANY

DATE 8/10/74

GALLONS PER MINUTE

3000

2000

1000

500

0

DATE COMPLETED 8/10/74

CURVE NO. N-1038

TOTAL HEAD IN FEET

500

400

300

200

100

PER CENT EFFICIENCY

80

60

40

20

0

0

0

0

WASH

THIS CERTIFIES THAT THE PERFORMANCE CURVES ARE BASED ON ACTUAL PERFORMANCE TEST RESULTS OF PUMP NO. 127410
 TESTED BY BURNS & MCDONALD
 30 WILKIN B. BURNHAMMAN

NOTE: WASH CURVE IS BASED ON ACTUAL TEST RESULTS OF PUMP NO. 127410
 TESTED BY BURNS & MCDONALD