PSNH PUBLIC SERVICE
Company of New Hampshire

SEABROOK STATION
Engineering Office:
1671 Worcester Road
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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

B001

8211100396 821108
PDR ADOCK 05000443
A PDR

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

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 440.112 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.

CONTRACTOR WESTINGHOUSE N.E.S.

CUSTOMER PUBLIC SERVICE OF NEW HAMP.

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

IMPELLER PATTERN	M-7278	M-6524
MAXIMUM DIAMETER	8 1/4"	8 1/11"
RATED DIAMETER	8 1/4"	5th 1-4 8 1/11" 5th 5-11 6 1/8"
MINIMUM DIAMETER	7 1/4"	7 1/4"

Charging 5th pump

TEST PERFORMANCE CURVE NO. 37746 A

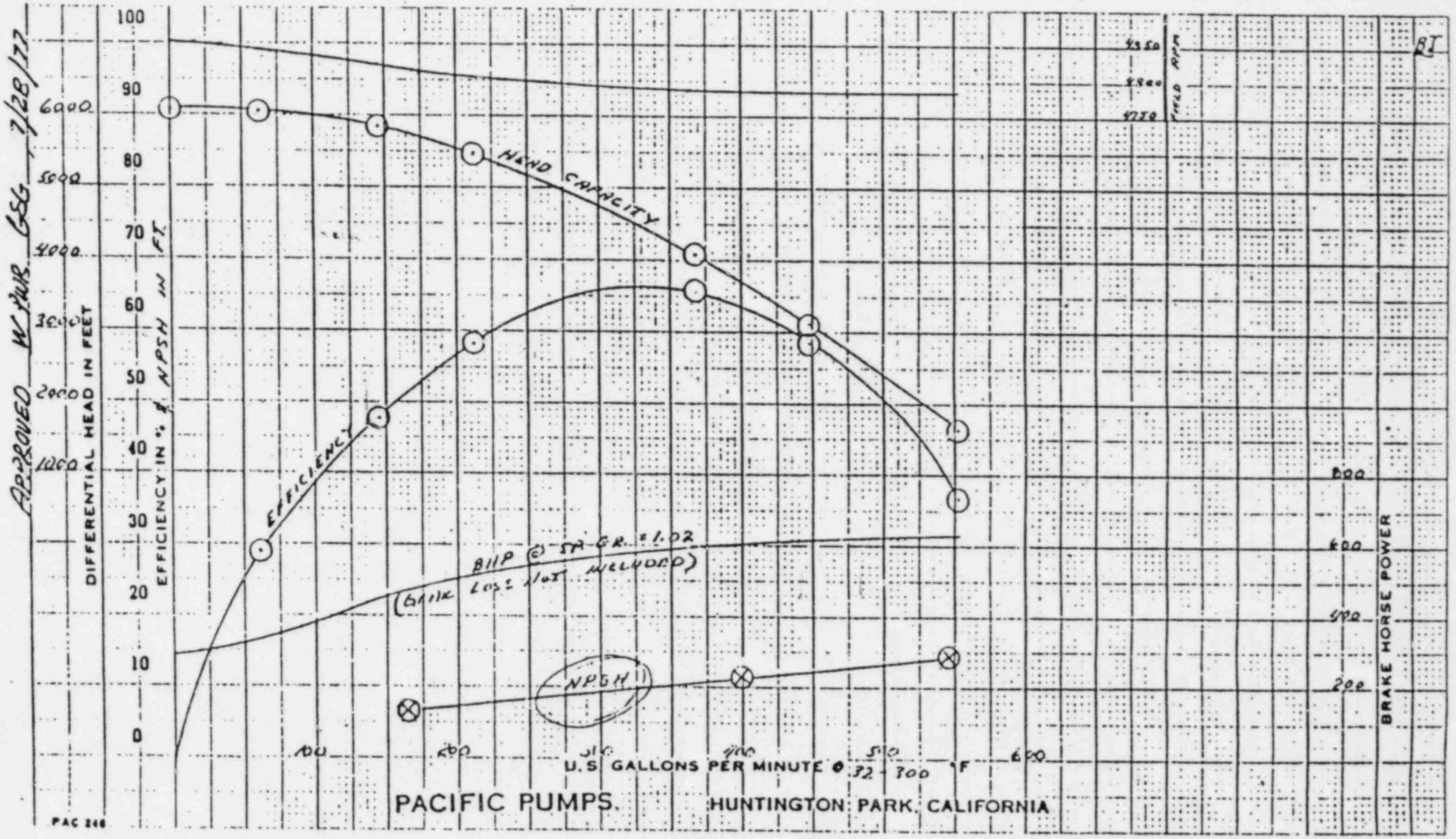
SIZE 2 1/2" RL TYPE IJ STAGES 11

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

PUMP NUMBER 51683

PERFORMANCE ALSO APPLIES TO PUMP NUMBER

APPROVED W.H.R. GSG 7/28/77



PACIFIC PUMPS. HUNTINGTON PARK, CALIFORNIA

PAC 246

CONTRACTOR WESTINGHOUSE N.E.S.

CUSTOMER PUBLIC SERVICE OF NEW HAMP.

ITEM NO. NAH-92 P.O. 546-CAV-236902-BPE

IMPELLER PATTERN	M1-7278	M1-6534
MAXIMUM DIAMETER	8 1/4"	8 1/4"
RATED DIAMETER	8 1/4"	ST 1-4 8 1/4" ST 5-11 8 1/4"
MINIMUM DIAMETER	7 1/4"	7 1/4"

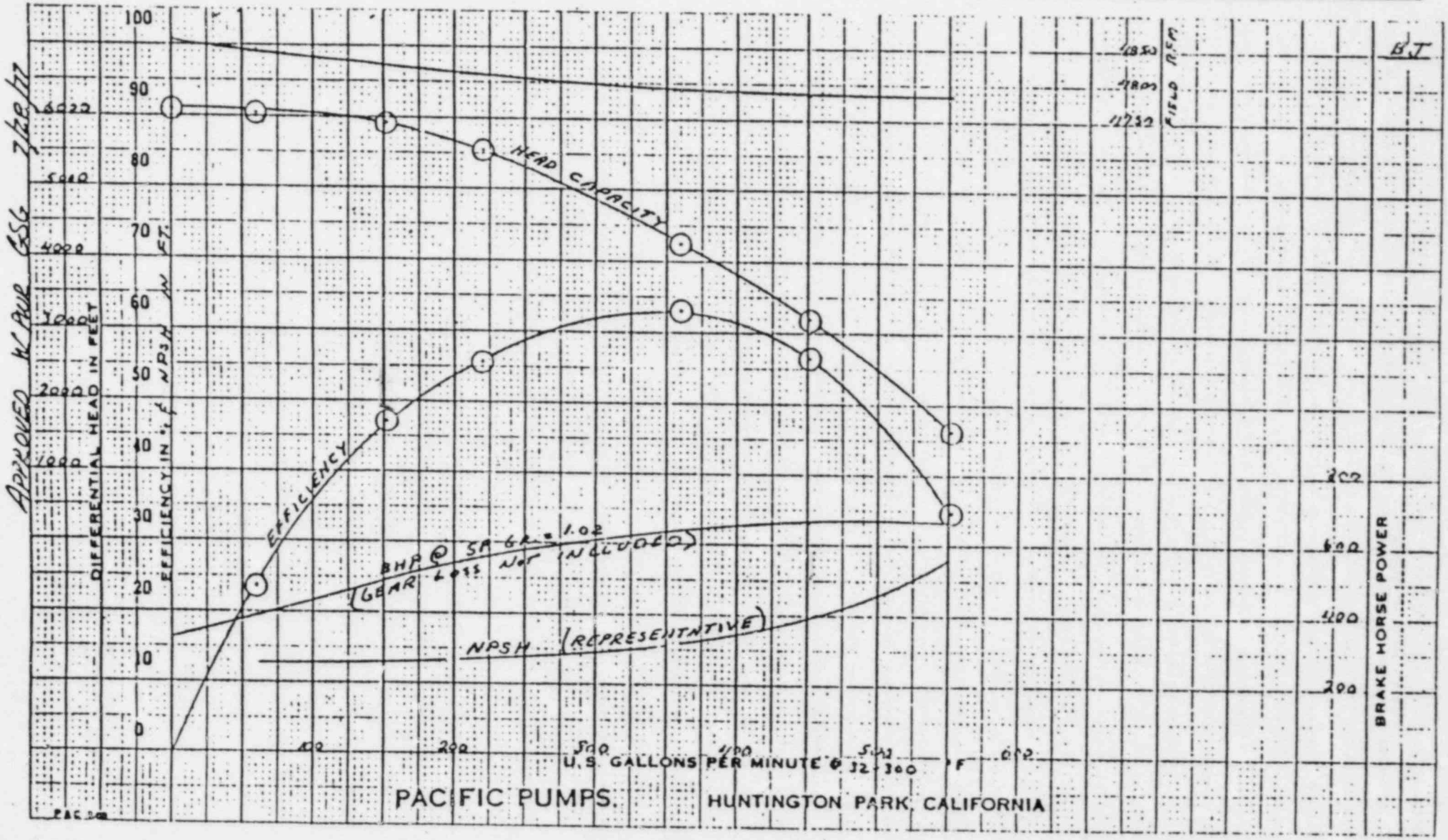
TEST PERFORMANCE CURVE NO. 37746 B

SIZE 2½" EL TYPE T.T STAGES 11

R.P.M. FIELD DATE 7-21-71

PUMP NUMBER 5164

PERFORMANCE ALSO APPLIES TO PUMP NUMBER



PACIFIC PUMPS. HUNTINGTON PARK, CALIFORNIA

CONTRACTOR WESTINGHOUSE NES

CUSTOMER NEW HAMPSHIRE

ITEM NO. AHN.-01 P.O. 546 - CAV - 216951 - GPE

SI Pump

IMPELLER PATTERN	M-7814	M-7592
MAXIMUM DIAMETER	8 9/16	8 9/16
RATED DIAMETER	8 9/16	STGS 2-4: 8 9/16 ; 5-11: 8 3/16
MINIMUM DIAMETER	7 9/16	7 9/16

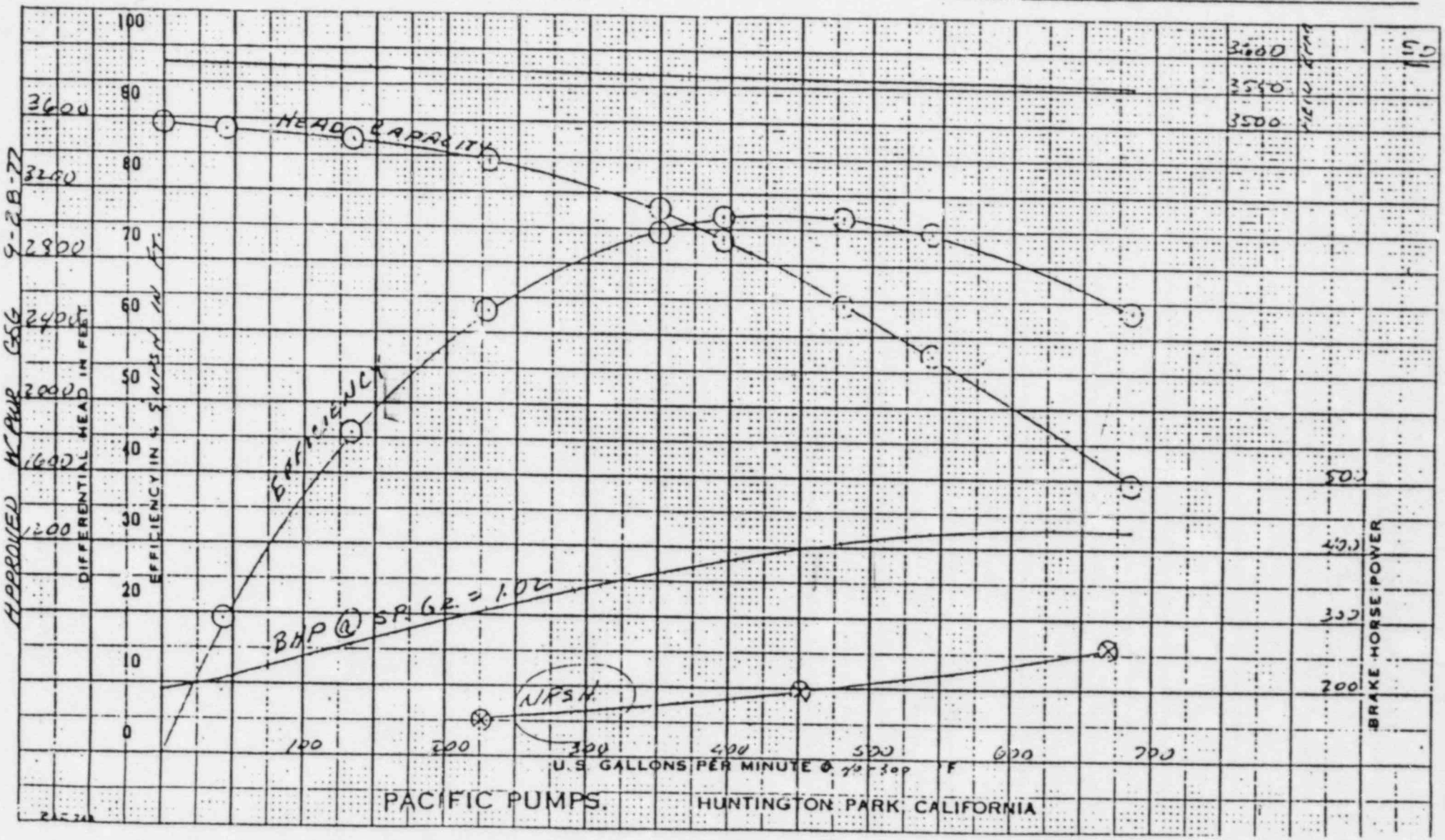
TEST PERFORMANCE CURVE NO. 37735 A1

SIZE 8" TYPE JHF STAGES 11

R.P.M. FIELD DATE 9-21-77

PUMP NUMBER 51661

PERFORMANCE ALSO APPLIES TO PUMP NUMBER



CONTRACTOR WESTINGHOUSE AIES.

CUSTOMER NEW HAMPSHIRE

ITEM NO. NHH-02 P.O. 546 - CHV - 236951 - BPE

IMPELLER PATTERN	M-7844	M-7592
MAXIMUM DIAMETER	8 9/16	8 9/16
RATED DIAMETER	8 9/16	3 to 5: 8 9/16 ; 6-11: 8 5/16
MINIMUM DIAMETER	7 9/16	7 9/16

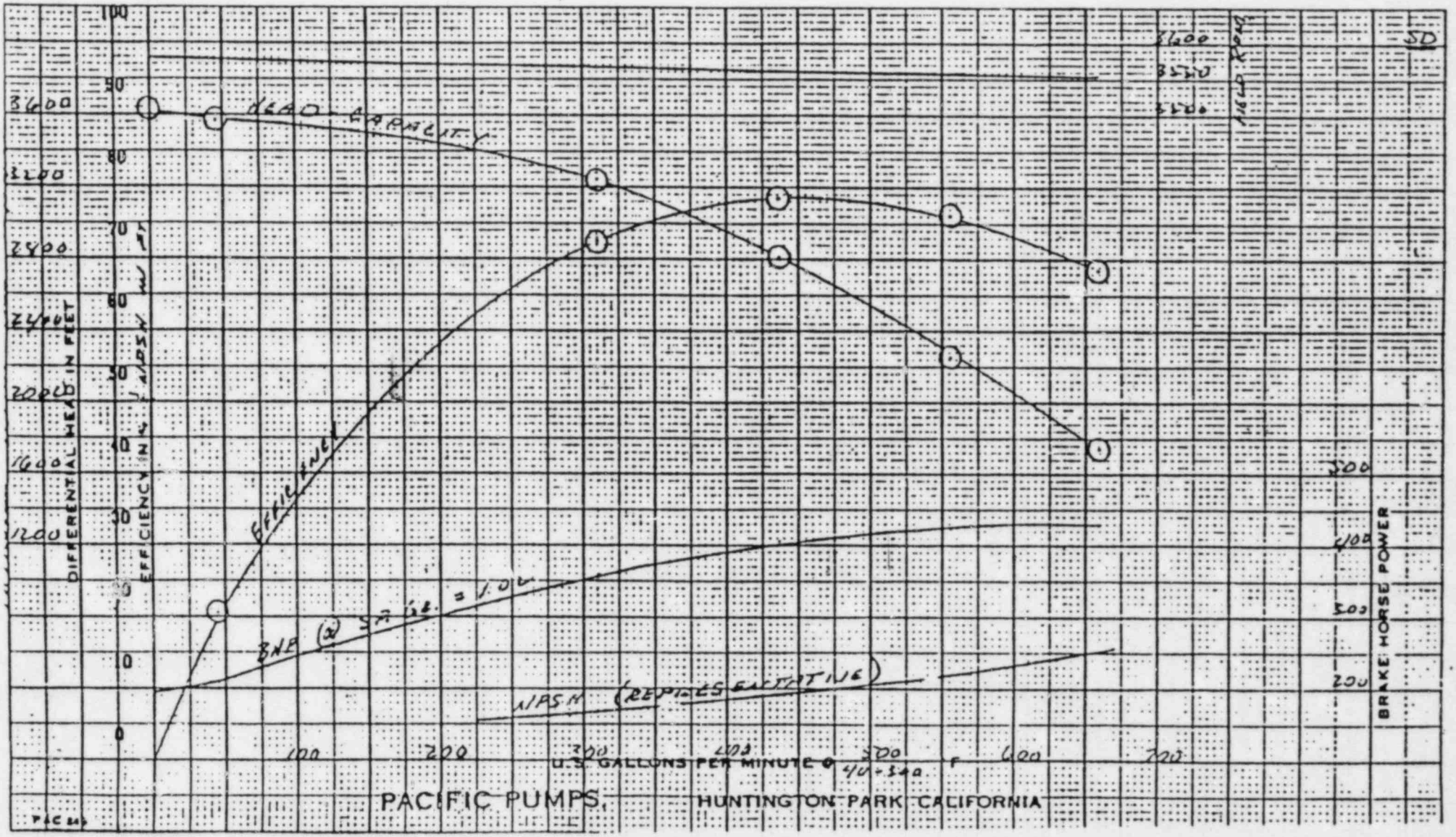
TEST PERFORMANCE CURVE NO. 37755 2. 1

SIZE 3" TYPE JHF STAGES 11

R.P.M. FIELD. DATE 10-3-77

PUMP NUMBER 51662.

PERFORMANCE ALSO APPLIES TO PUMP NUMBER



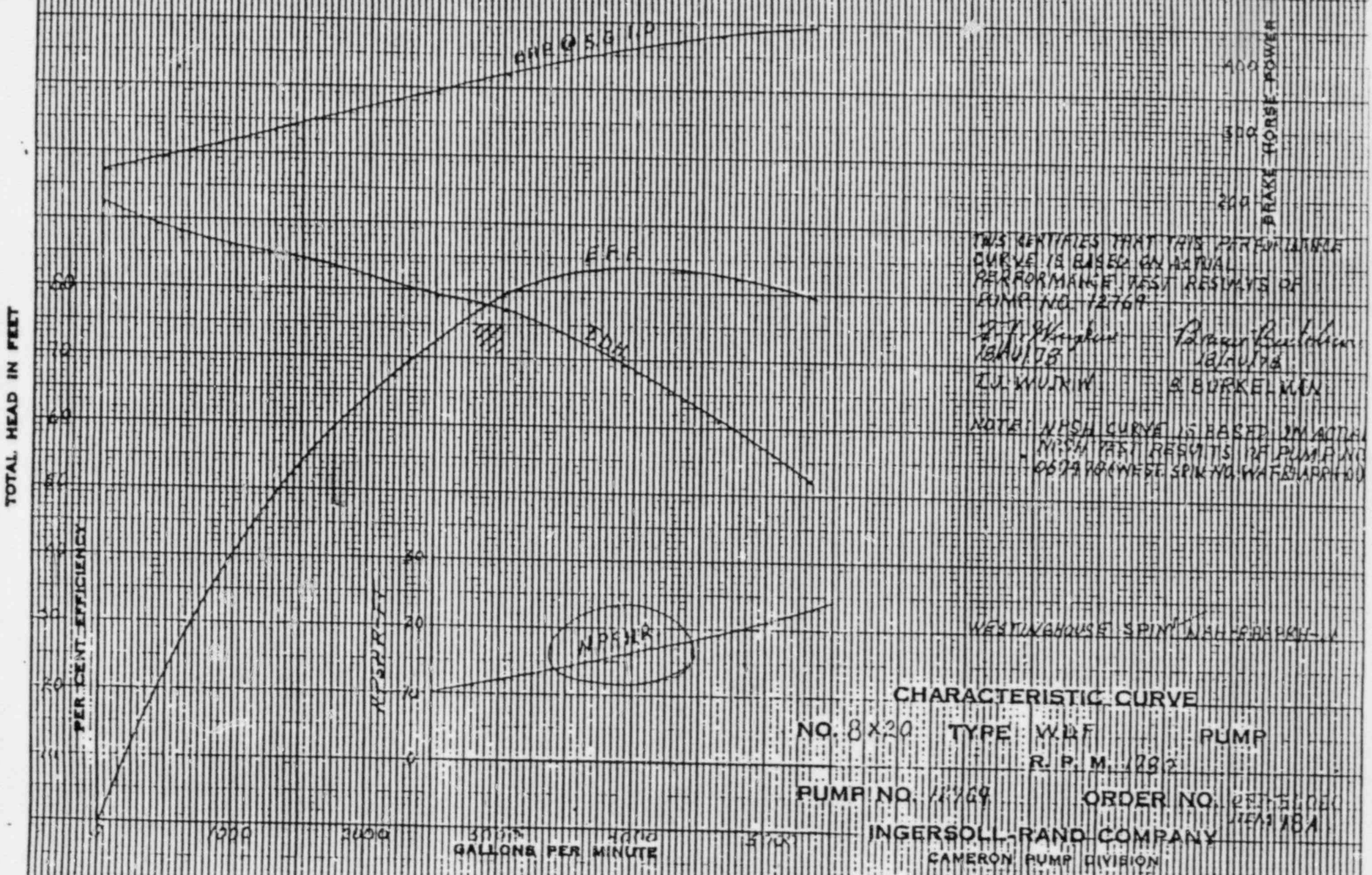
RHR pump

CURVE NO. N-1037
DATE CONDUCTED 8/16/78

CURVES ARE APPROXIMATE. PUMP GUARANTEED FOR ONE SET OF CONDITIONS CAPACITY, HEAD AND EFFICIENCY GUARANTEES ARE BASED ON SHOP TEST AND WHEN HANDLING CLEAR, COLD, FRESH WATER AT A TEMPERATURE OF NOT OVER 85° F. AND NOT OVER 15 FOOT SUCTION LIFT.

IMPELLER PATT. NO. 8X20A5C DIA. 20" x 19 32"

DIFFUSOR PATT. NO.



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

18/AU/78 18/AU/78

I.J. WUJKW B. BURKELMAN

NOTE: NPSH CURVE IS BASED ON ACTUAL NPSH TEST RESULTS OF PUMP NO. 0679 78 (WEST SPIN NO. WAF-BHAPRH-0)

WESTINGHOUSE SPIN NAH-BHAPRH-1

CHARACTERISTIC CURVE

NO. 8X20 TYPE W.D.F. PUMP

R. P. M. 1782

PUMP NO. 12769 ORDER NO. [illegible] ITEM 18A

INGERSOLL-RAND COMPANY

CAMERON PUMP DIVISION

DATE CONDUCTED 8/16/78 CURVE N-1037

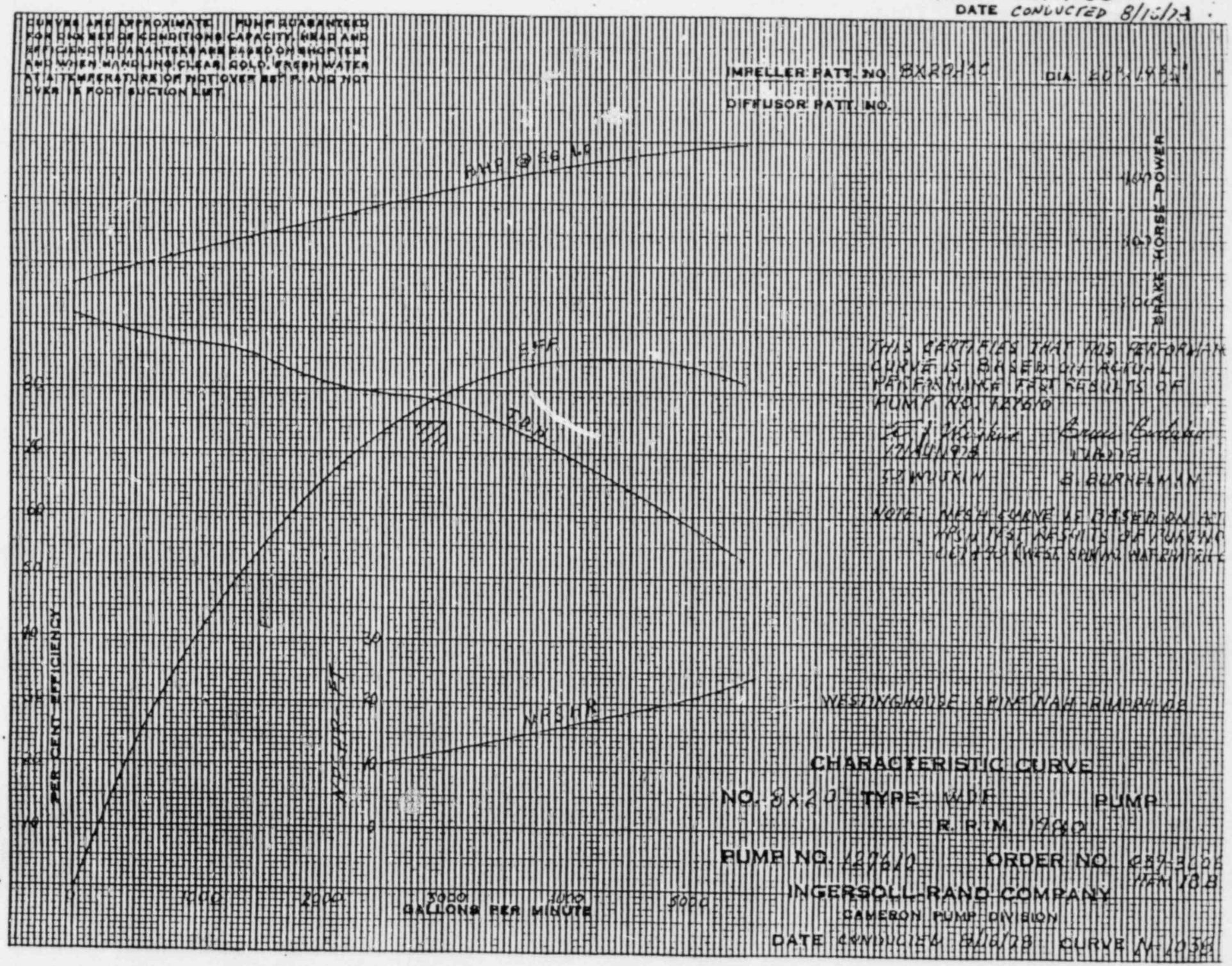
G-1220 BM 4-66

CURVE NO. N-1038
DATE CONDUCTED 8/15/72

CURVES ARE APPROXIMATE. PUMP GUARANTEED FOR ONE SET OF CONDITIONS. CAPACITY, HEAD AND EFFICIENCY GUARANTEES ARE BASED ON SHOP TEST AND WHEN HANDLING CLEAR, COLD, FRESH WATER AT A TEMPERATURE OF NOT OVER 85° F. AND NOT OVER 15 FOOT SUCTION LIFT.

IMPELLER PATT. NO. 8XR0A1C DIA. 20 1/4 x 4 5/8"

DIFFUSOR PATT. NO.



THIS CERTIFIES THAT THIS PERFORMANCE CURVE IS BASED ON ACTUAL PERFORMANCE TEST RESULTS OF PUMP NO. 429640

TESTED AT INGERSOLL-RAND WORKS
BY Bruce Cardoza
Burke
B. BURNELMAN

NOTE: MESH CURVE AS BASED ON ACTUAL SHOP TEST RESULTS OF PUMPING CLEAR COLD FRESH WATER

WESTINGHOUSE 6 PRIMA NAH-R HAPPA-DB

CHARACTERISTIC CURVE

NO. 8 x 20 TYPE MDF PUMP

R. P. M. 1780

PUMP NO. 429640 ORDER NO. 687-3605 ITEM 10 B

INGERSOLL-RAND COMPANY

CAMERON PUMP DIVISION

DATE CONDUCTED 8/16/72 CURVE N-1038