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Status report on research project on improving design of a hopper dredge pump, October 1960

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FRITZ ENGINEERING LABORATORY

HYDRAULICS DIVISION

Memorandum No. M-17

F.L. Report No. 277-M-17

STATUS REPORT ON RESEARCH PROJECT
ON
IMPROVING DESIGN OF A HOPPER DREDGE PUMP

Prepared by

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Prepared for

U.S. ARMY ENGINEER DISTRICT, PHILADELPHIA

Corps of Engineers

Philadelphia 29, Pennsylvania

Contract No. DA-36-109-CIVENG-59-112

October 1960

Bethlehem, Pennsylvania

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STATUS REPORT OF RESEARCH PROJECT

ON

IMPROVING DESIGN OF A HOPPER DREDGE PUMP

I. INTRODUCTION

The following report summarizes the studies performed during the month of September 1960, at the Hydraulics Division of Fritz Engineering Laboratory, under terms of Contract No. DA-36-109-CIVENG-59-112. Earlier work was described in Status Reports dated: December 1958(1)*, February 1959(2), April 1959(3), June 1959(4), December 1959(6), March 1960(9), April 1960(10), May 1960(11), June 1960(12), July 1960(13), August 1960(15), September 1960(16), and a Project Report dated September 1959(5).

II. EXPERIMENTAL STUDIES

A. General Comments

After completion of experimental tests on impeller of Trial Design No. 6, the volute casing was removed from the test stand for inspection. Only very slight wear of the pump impeller was observed, but noticeable wear was found on the volute casing, particularly around the circumference of the flanges adjacent to the shrouds of the impeller.

- - - - -
* Numbers in parenthesis are listed in REFERENCES

It was decided to send the volute casing for repairs, and the casing will be bored out to receive a steel wearing ring, which will be fabricated and brazed into the bore of the volute casing. This will restore the original dimensions and clearances. It is hoped to have the pump in operation again by November 15, 1960.

B. Characteristic Curves

Some of the characteristic curves for the pump with impellers No. 5 and 6 have been prepared and are presented in the Appendix.

Figures A-1, A-2, and A-3, present the summary Brake Horse Power and Head curves as a function of Flow for Impeller TD-5 and the following concentrations: 1240, 1320, and 1380 grams/liter.

Figures A-4, A-5, and A-6 are the summary curves for Impeller TD-6 and concentrations of 1240, 1320, and 1380 grams/liter.

Figures A-7 to A-11 present the characteristic curves for two impellers: TD-5 and TD-6 for various pump speeds:

<u>Figure</u>	<u>Speed (rpm)</u>
A-7	1150
A-8	1300
A-9	1440
A-10	1550
A-11	1650

Additional characteristic curves are being prepared and will be submitted in the next Memorandum.

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- (4) Herbich, J. B. STATUS REPORT OF RESEARCH PROJECT ON IMPROVING DESIGN OF A HOPPER DREDGE PUMP. Fritz Engineering Laboratory Memorandum No. M-4
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A P P E N D I X

Figures A-1 - A-11

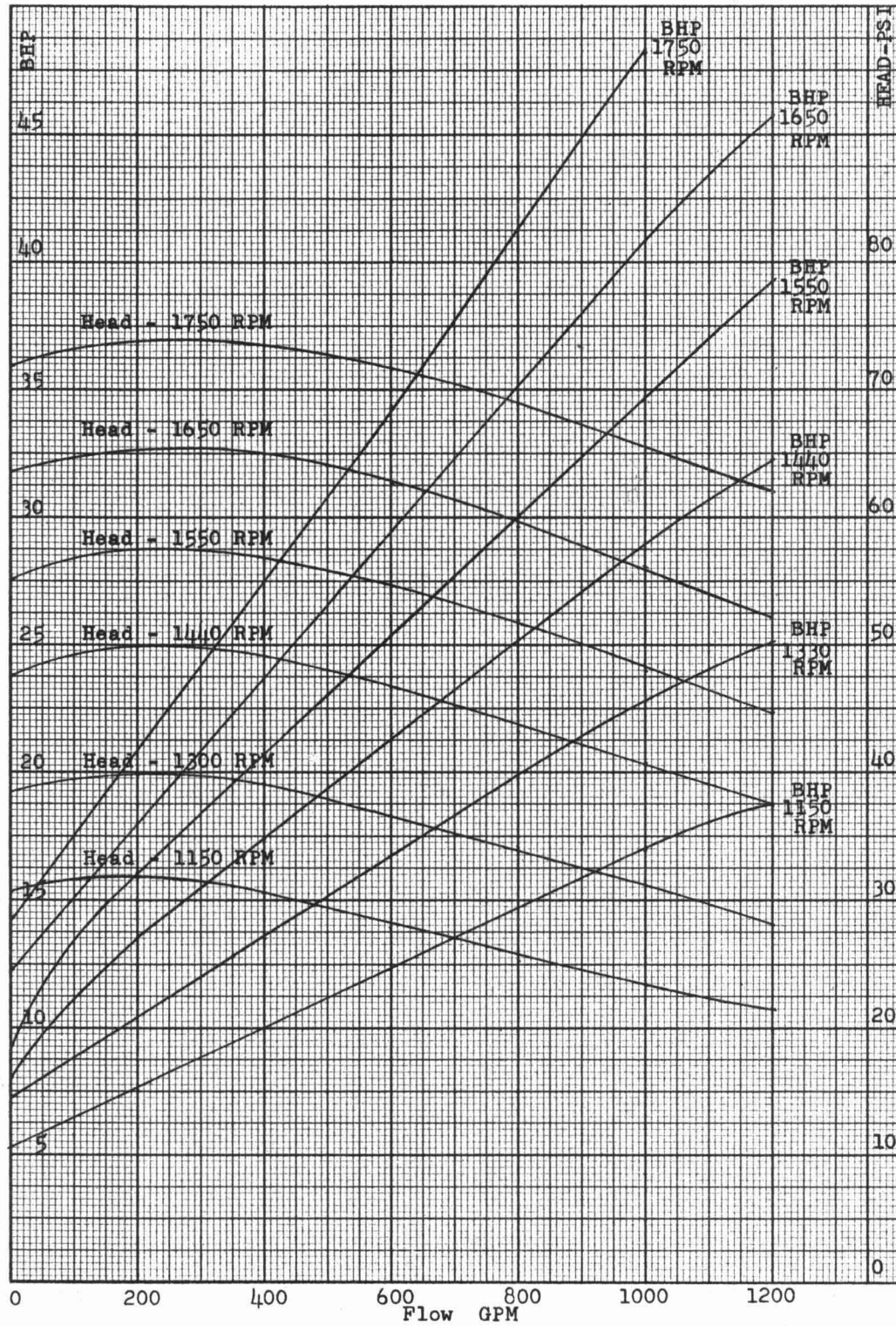


Fig. A-1 - MODEL DREDGE PUMP CHARACTERISTICS
 Impeller TD-5
 Concentration: 1240 grams/liter

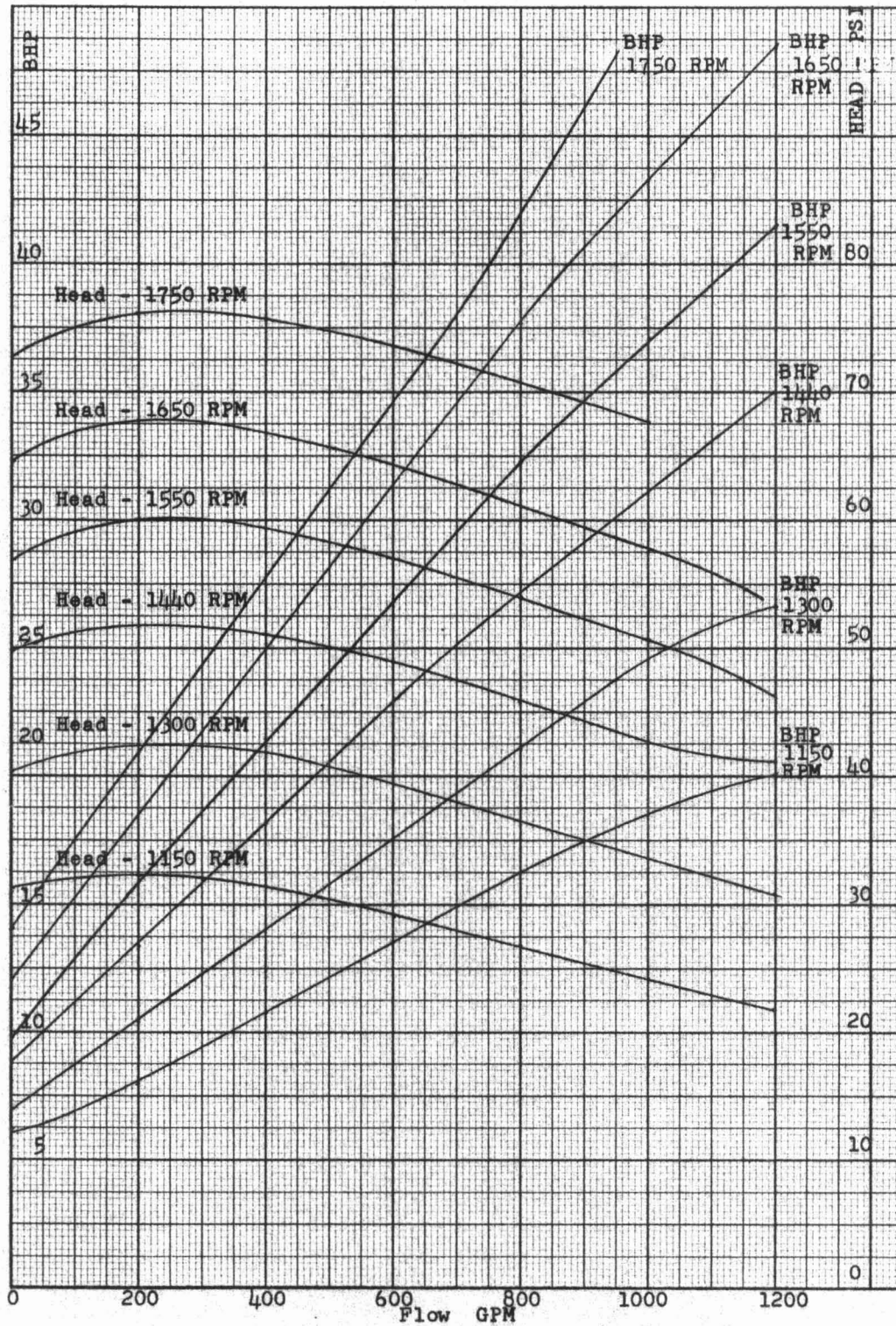


Fig. A-2 - MODEL DREDGE PUMP CHARACTERISTICS
 Impeller TD-5
 Concentration: 1320 grams/liter

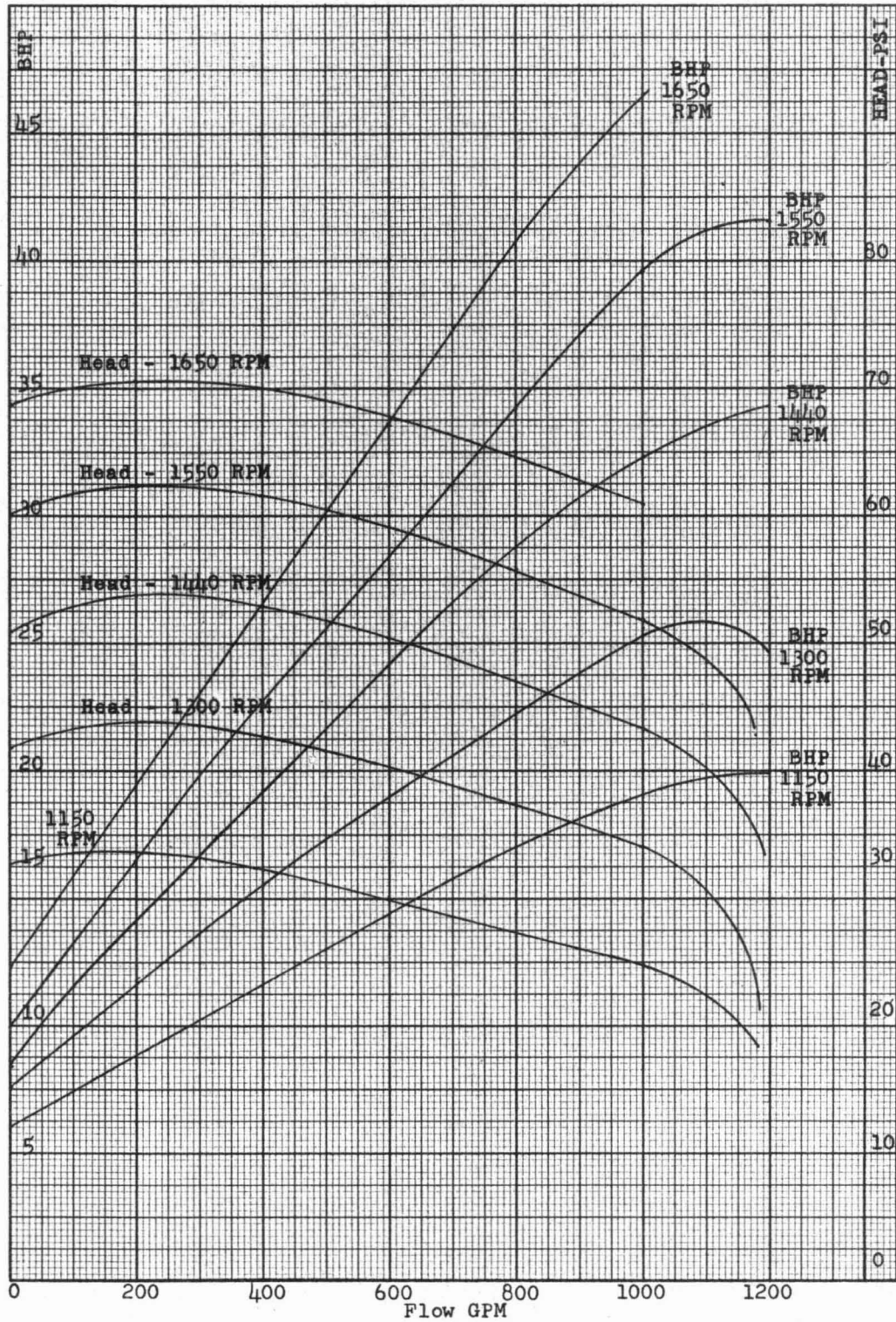


Fig. A-3 - MODEL DREDGE PUMP CHARACTERISTICS
 Impeller TD-5
 Concentration: 1380 grams/liter

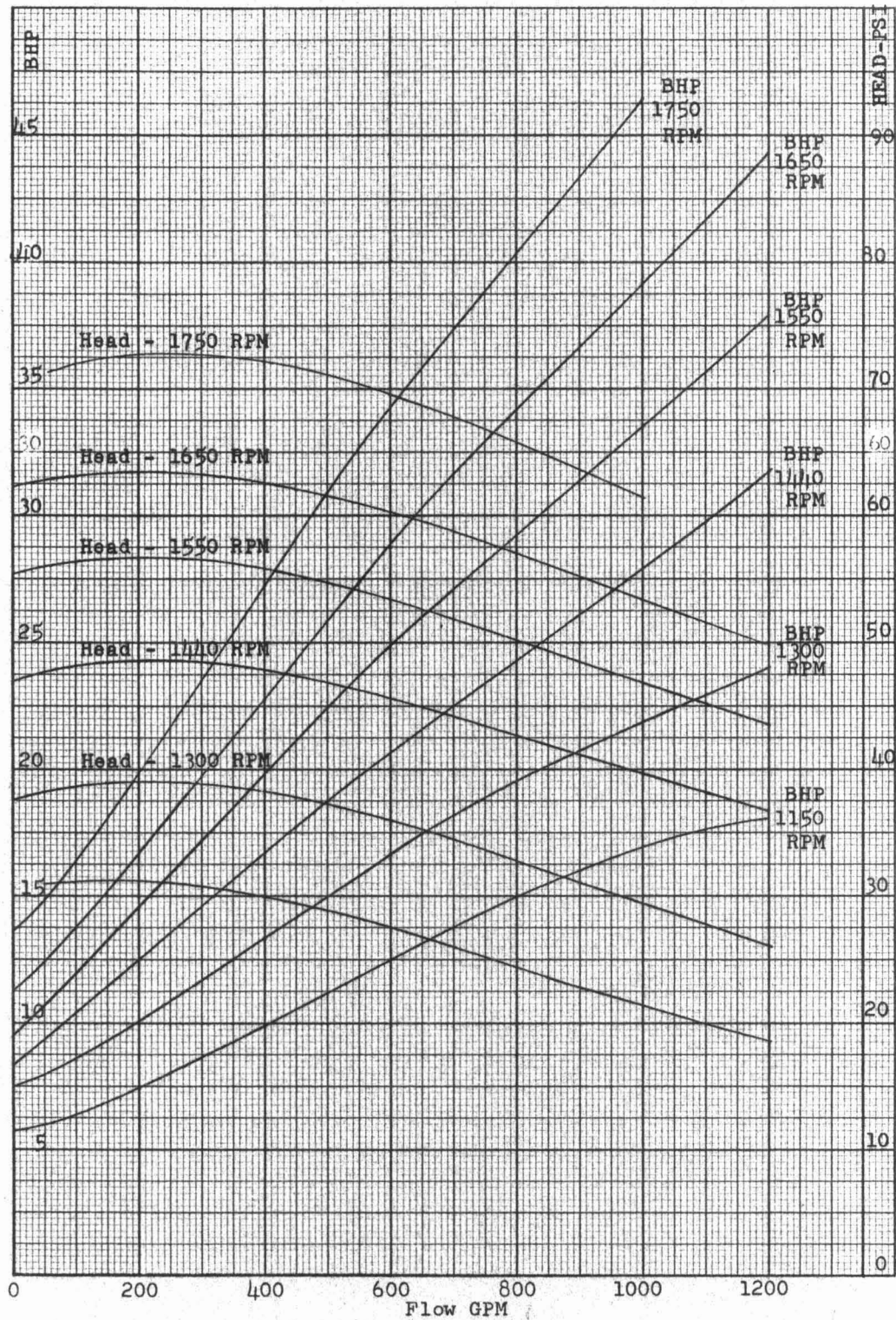


Fig. A-4 - MODEL DREDGE PUMP CHARACTERISTICS
 Impeller TD-6
 Concentration: 1240 grams/liter

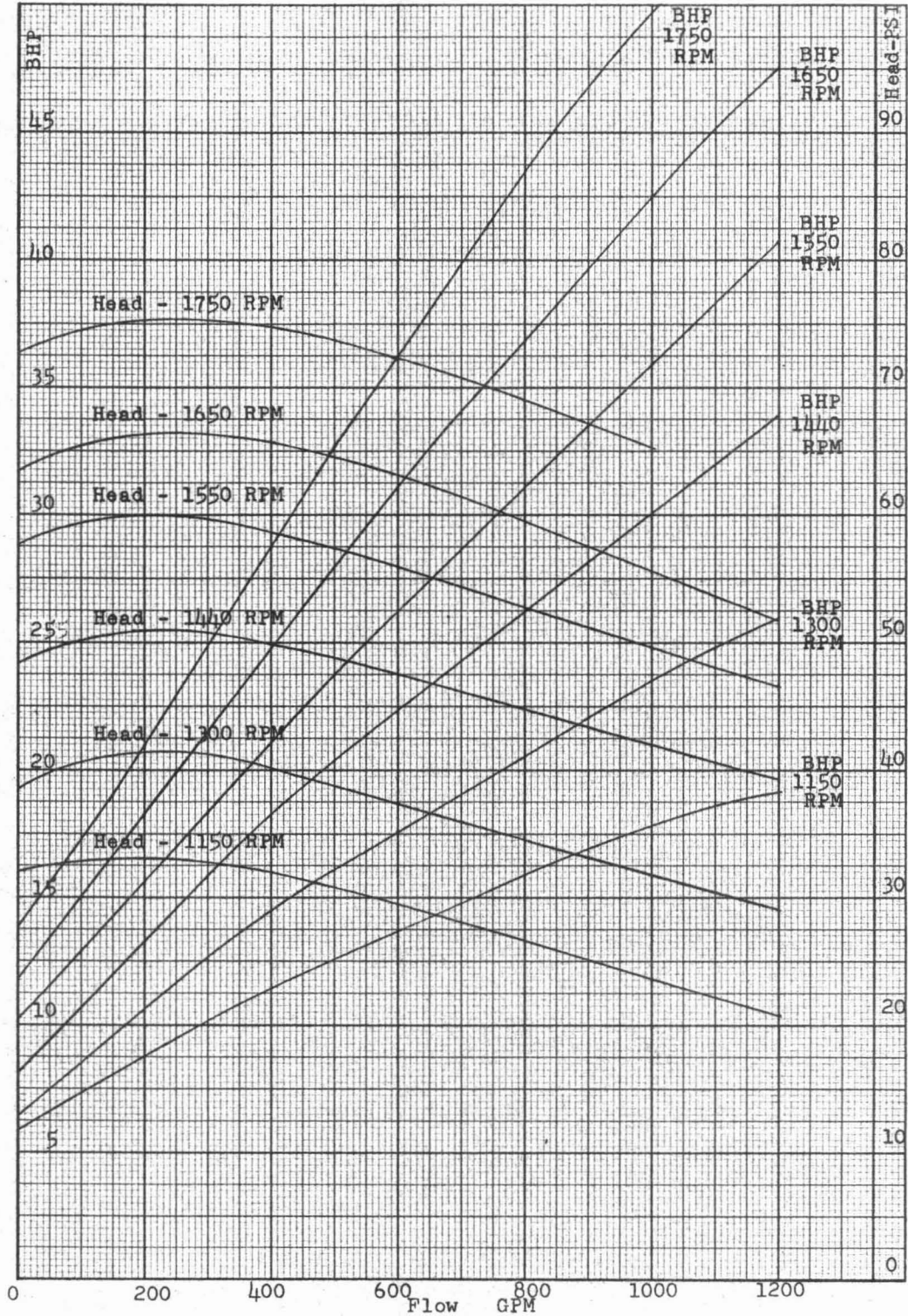


Fig. A-5 - MODEL DREDGE PUMP CHARACTERISTICS
 Impeller TD-6
 Concentration: 1320 grams/liter

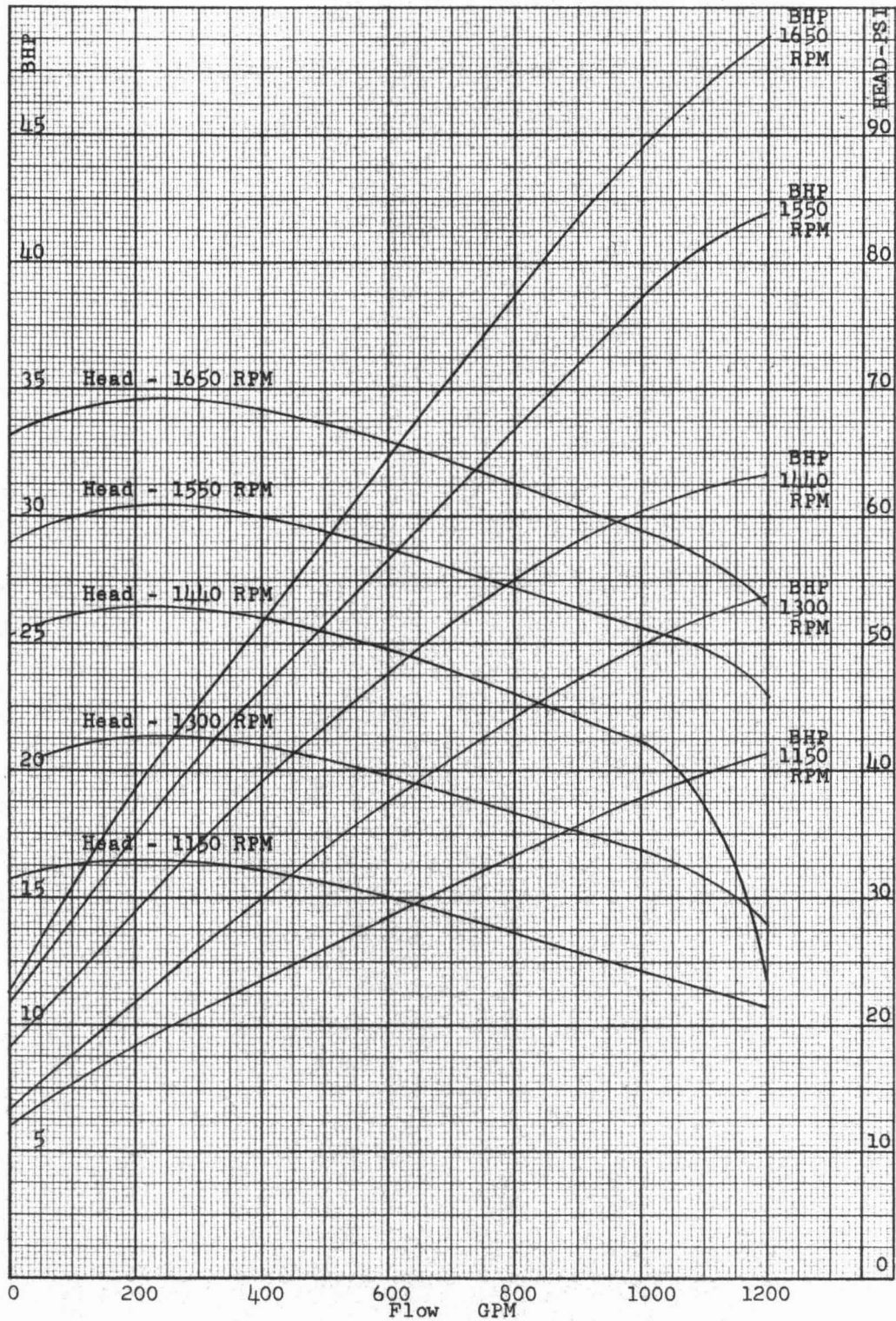


Fig. A-6 - MODEL DREDGE PUMP CHARACTERISTICS
 Impeller TD-6
 Concentration: 1380 grams/liter

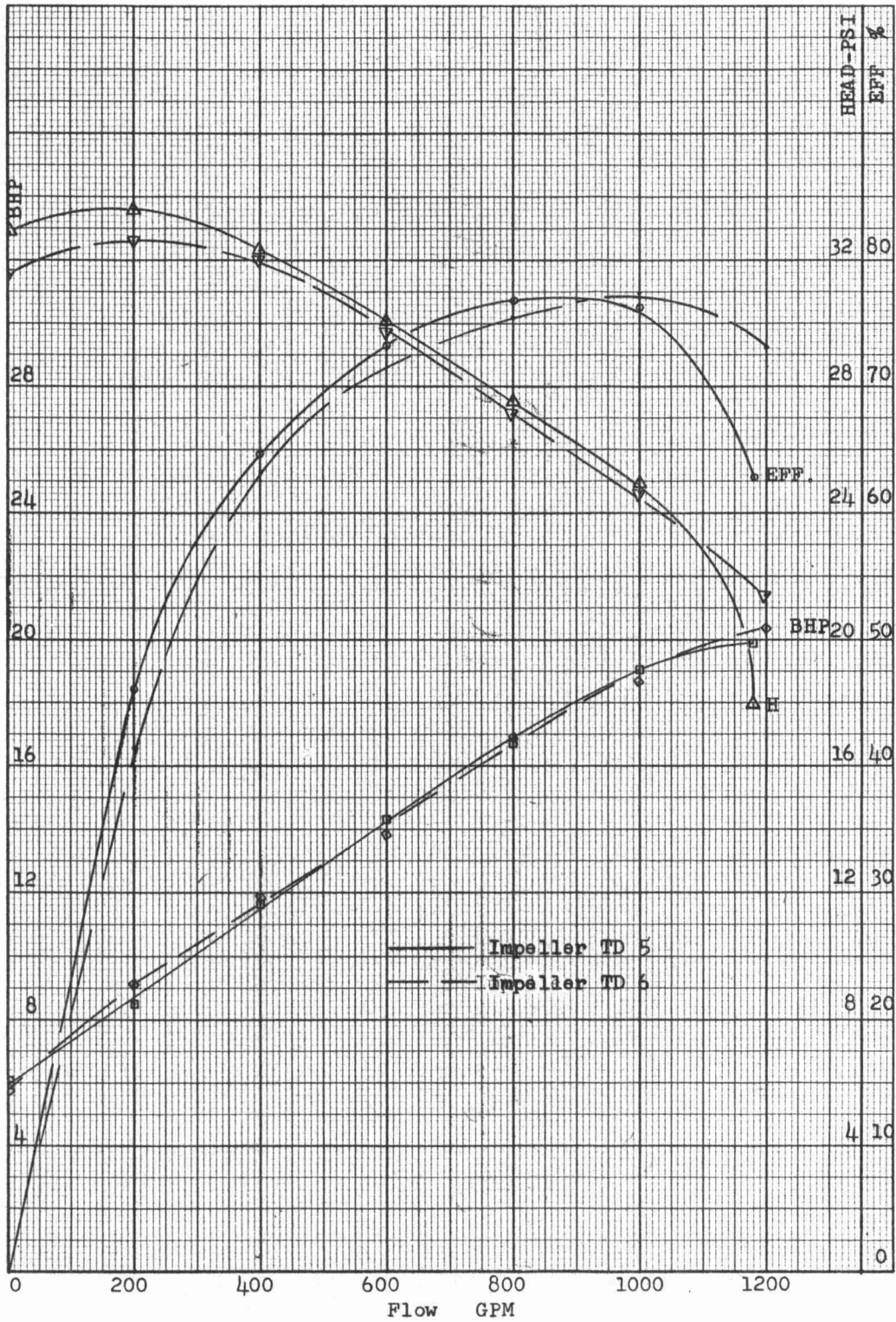


Fig. A-7 - MODEL DREDGE PUMP CHARACTERISTICS
 Impellers TD-5 and TD-6
 Concentration: 1374 grams/liter
 Speed: 1150 rpm

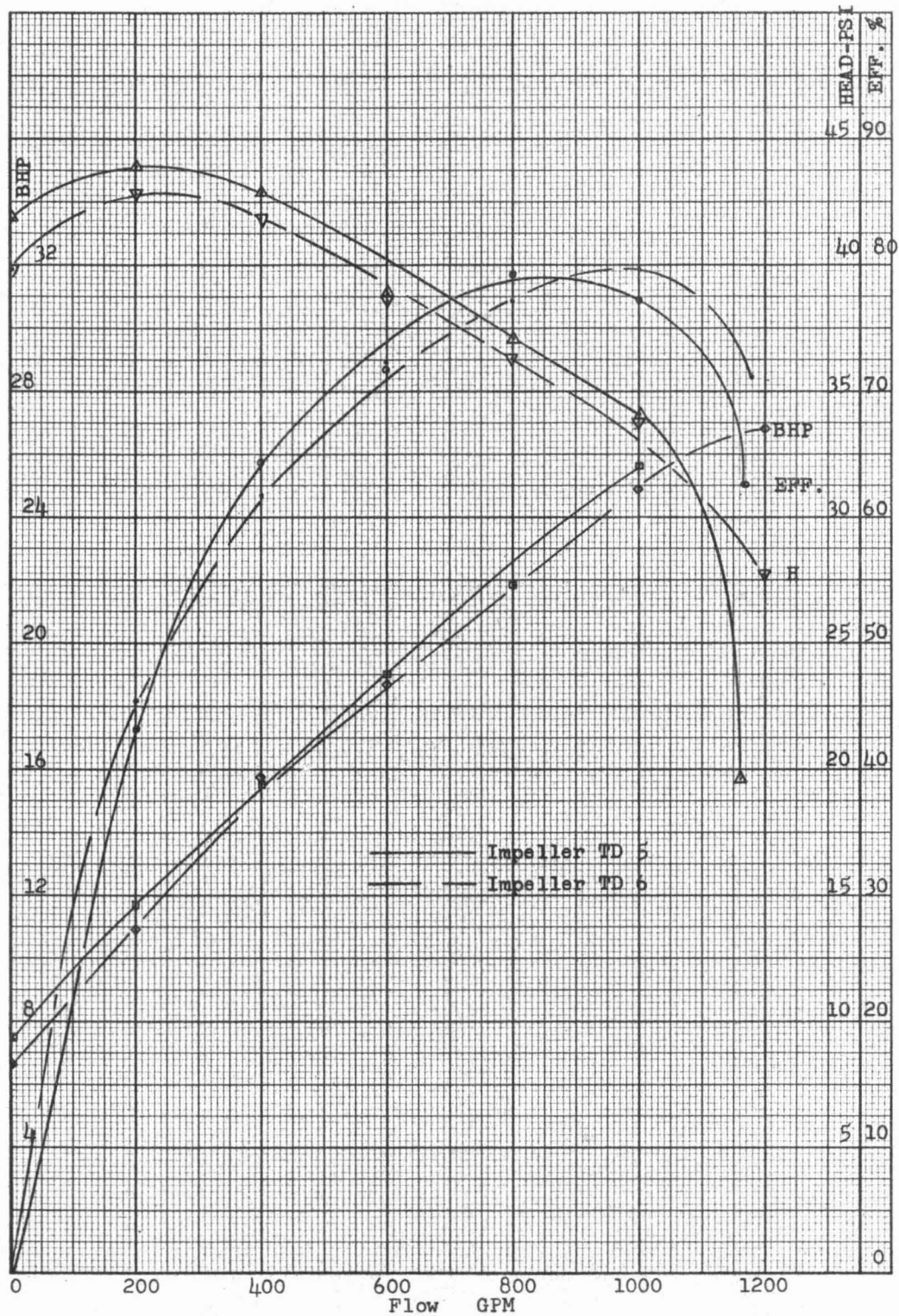


Fig. A-8 - MODEL DREDGE PUMP CHARACTERISTICS
 Impellers TD-5 and TD-6
 Concentration: 1374 grams/liter
 Speed: 1300 rpm

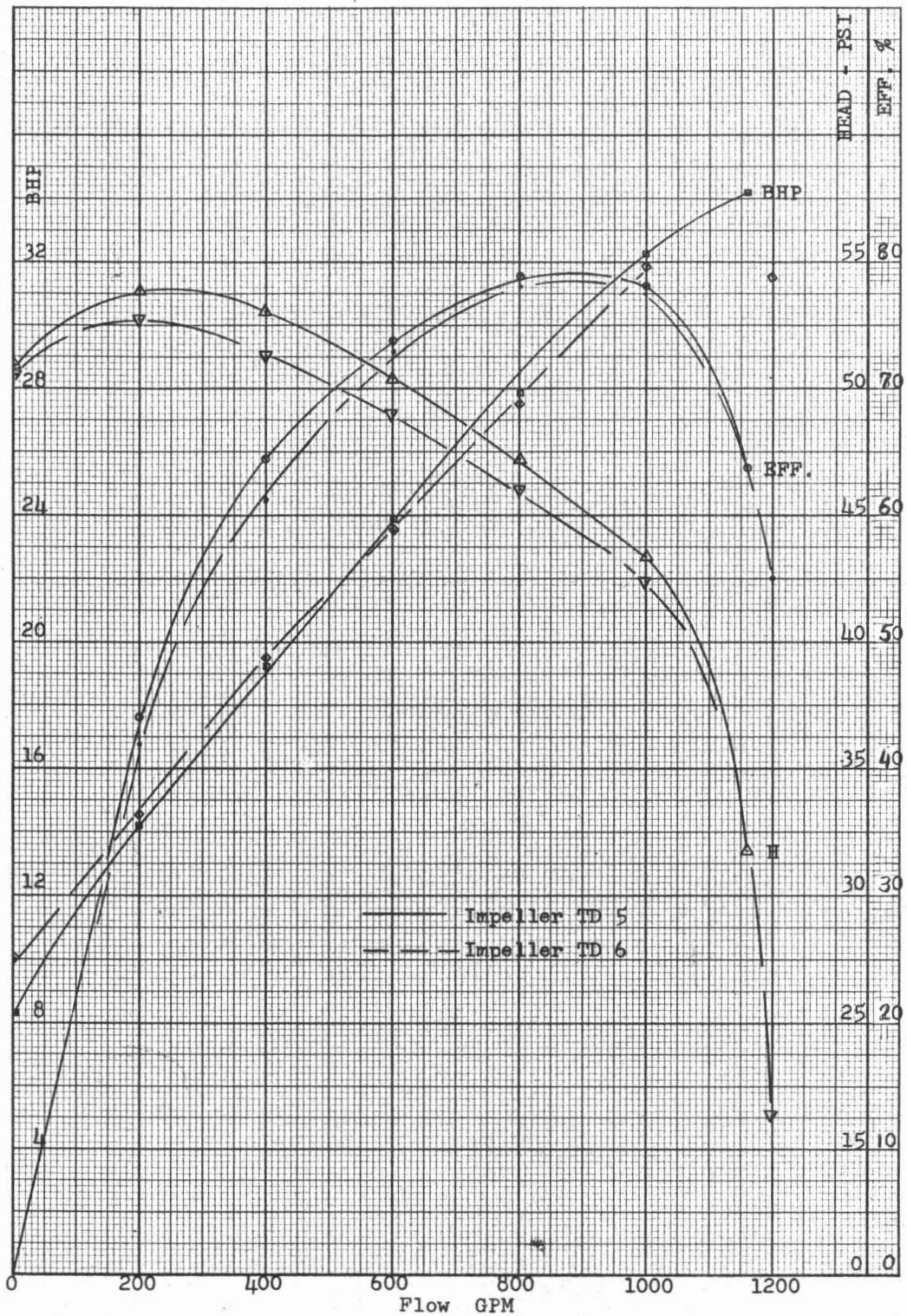


Fig. A-9 - MODEL DREDGE PUMP CHARACTERISTICS
 Impellers TD-5 and TD-6
 Concentration: 1374 grams/liter
 Speed: 1440 rpm

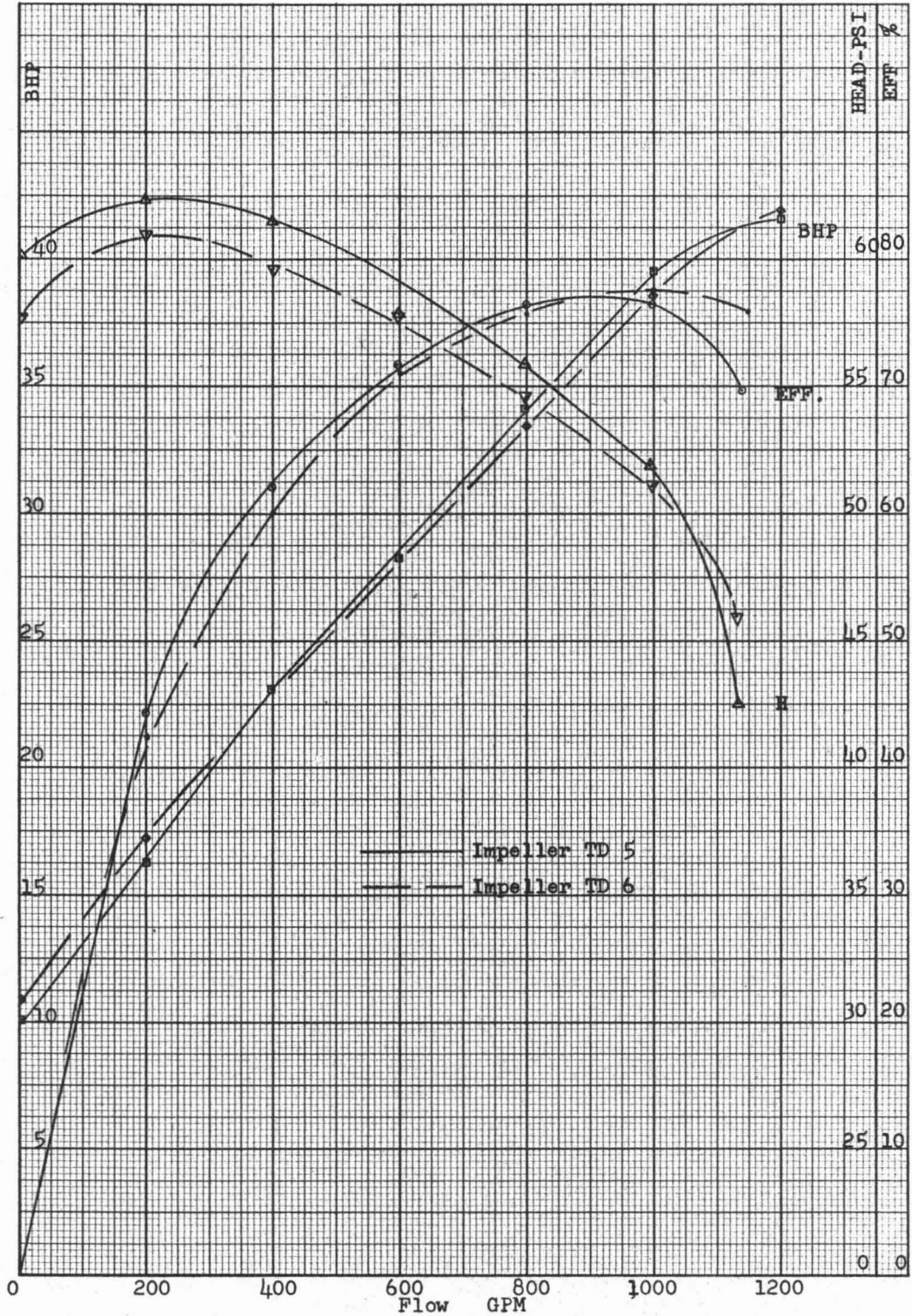


Fig. A-10 - MODEL DREDGE PUMP CHARACTERISTICS
 Impellers TD-5 and TD-6
 Concentration: 1374 grams/liter
 Speed: 1550 rpm

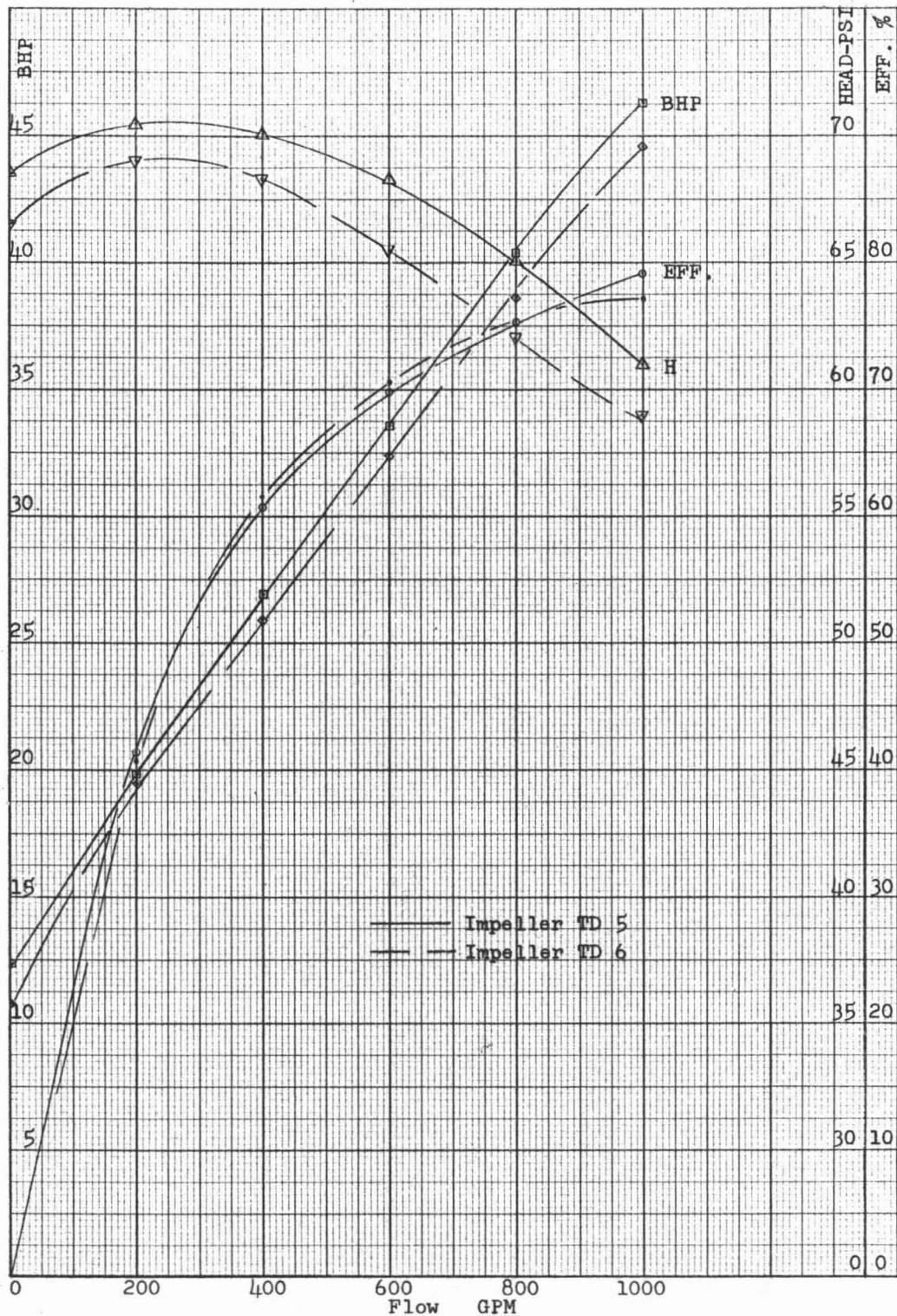


Fig. A-11 - MODEL DREDGE PUMP CHARACTERISTICS
 Impellers TD-5 and TD-6
 Concentration: 1374 grams/liter
 Speed: 1650 rpm