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# Gas removal system associated with dredge pump: Phase C status report no. 11, May 1966

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GAS REMOVAL SYSTEM ASSOCIATED  
WITH DREDGE PUMP: PHASE C

Status Report No. 11

Prepared by  
Alfred Amatangelo  
Gunnar Bagge  
Robert E. Miller  
and  
John B. Herbich

Prepared for  
U. S. Army Engineers District, Philadelphia  
Corps of Engineers  
Philadelphia, Pennsylvania

June, 1966

Bethlehem, Pennsylvania

Fritz Engineering Laboratory Report No.310.14

FRIITZ ENGINEERING LABORATORY - UNIVERSITY OF PENNSYLVANIA

310.14

CIVIL ENGINEERING DEPARTMENT  
FRITZ ENGINEERING LABORATORY  
HYDRAULIC AND SANITARY ENGINEERING DIVISION

GAS REMOVAL SYSTEM ASSOCIATED  
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## PREFACE

The following status report summarizes the progress made under Phase C of the project during the period February 1, 1966 to May 31, 1966, at the Hydraulic and Sanitary Engineering Division of the Fritz Engineering Laboratory, under the terms of contract No. DA-36-109-CIVENG-64-72. The progress on the study was reported in ten status reports dated February 1964, April 1964, October 1964, December 1964, January 1965, June 1965, August 1965, October 1965, December 1965, and February 1966. (Fritz Engineering Laboratory Report No. 310.1<sup>(1)\*</sup>, No. 310.2<sup>(2)</sup>, No. 310.4<sup>(3)</sup>, No. 310.5<sup>(4)</sup>, No. 310.6<sup>(5)</sup>, No. 310.8<sup>(6)</sup>, No. 310.9<sup>(7)</sup>, No. 310.10<sup>(10)</sup>, No. 310.11<sup>(11)</sup>, No. 310.13<sup>(13)</sup>).

Phase A and Phase B of the project were completed and summarized in Fritz Engineering Laboratory Report No. 310.3<sup>(8)</sup> (June 1964), and No. 310.7<sup>(9)</sup> (February 1965) respectively.

Dr. John B. Herbich is the project director, Mr. A. Amatangelo is the project supervisor and are assisted by Mr. G. Bagge and Mr. R. Miller, Research Assistants. Dr. L. S. Beedle is Acting Head of the Department of Civil Engineering.

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\* Numbers in parenthesis refer to references on pages 6 and 7 .

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## I. Experimental Investigation

1. A series of tests were conducted to determine if one discharge valve setting could be used for the entire test series (Reference and letter dated April 4, 1966). It was found that with one discharge valve setting and with the maximum flow rate of 1,000 gpm, the flow can only be varied between 900 gpm and 1000 gpm with orifices if cavitation is not allowed. Since this only represents narrow flow range, it is necessary to regulate the flow with a limited manipulation of the discharge valve. With less than one turn of the discharge valve the flow range could be varied from 385 gpm with a  $2\frac{1}{2}$ " orifice to 1000 gpm with a rounded inlet.

2. From visual observations it appears that the optimum position for the gas removal equipment is as close to the suction elbow as possible. It is recognized that interference with the prototype suction line valve will restrict the location. As scaled from prototype drawings the valve (flange to flange) will take  $6\frac{1}{2}$ " of the suction line measured from the elbow flange.\*

3. It is thought that the additional time required for tests at speeds other than 1440 rpm is not warranted. Instead, a few data points for other speeds will be obtained and a check made to see if they fit existing dimensionless plots of head versus capacity.

4. It was observed during the testing that a certain amount of hysteresis occurred near the air flow which caused the head to drop off. In future tests this phenomenon will be investigated.

5. Three plots (Figure 1, 2, 3) of test data are included. It can be noted from Figure 2 that the flow begins to fall off when the air volume reaches four to five percent of water flow.

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\* See Reference (9), Figure 4, page 30

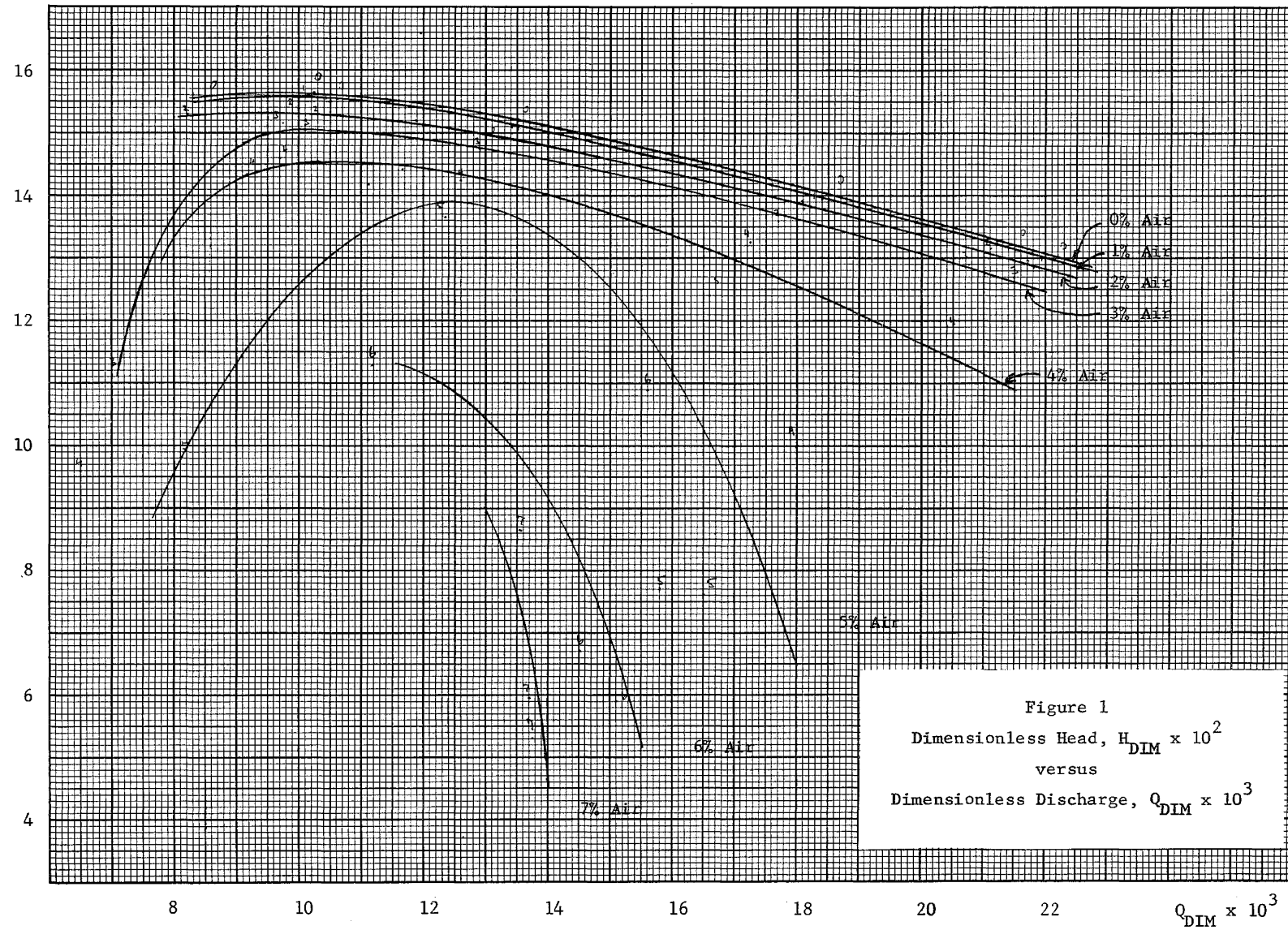
## II. Equipment Ordered

1. It was decided not to scale the height of the prototype accumulator. The accumulator will be 21 inches from pipe centerline instead of 9-3/4 inches. This will allow us to investigate other positions for the accumulator and still keep level-trol operation.

2. The following equipment was ordered:

- a. Vacuum Pump, 2 horsepower, single stage reciprocating type
- b. Level Trol, Fisher Type 2500-249
- c. Diaphragm Actuator, Fisher Type 667

$H_{DIM} \times 10^2$





Q<sub>WATER</sub> 3PM

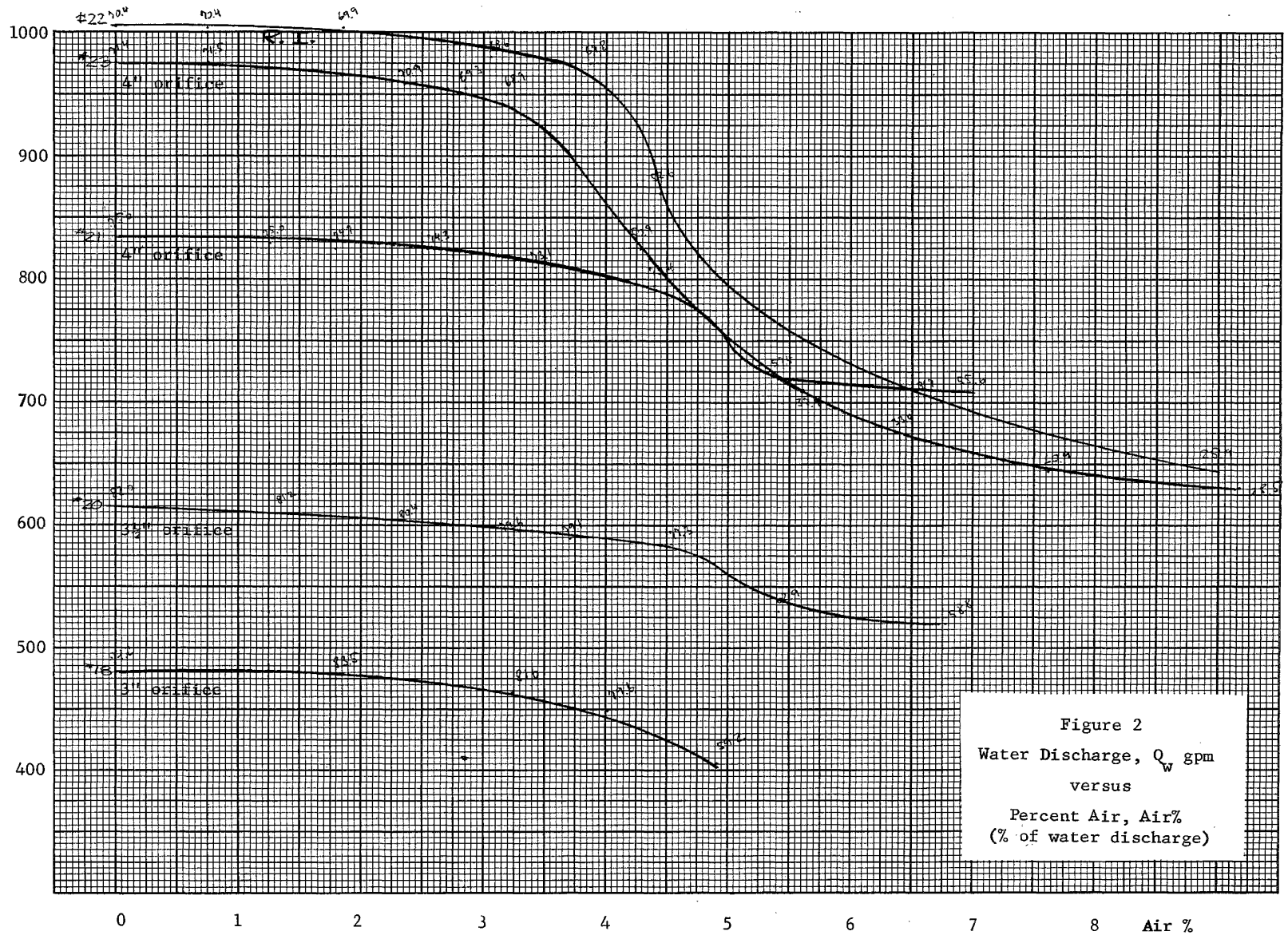


Figure 2  
Water Discharge,  $Q_w$  gpm  
versus  
Percent Air, Air%  
(% of water discharge)

$Q_{\text{water}}$  (gpm)

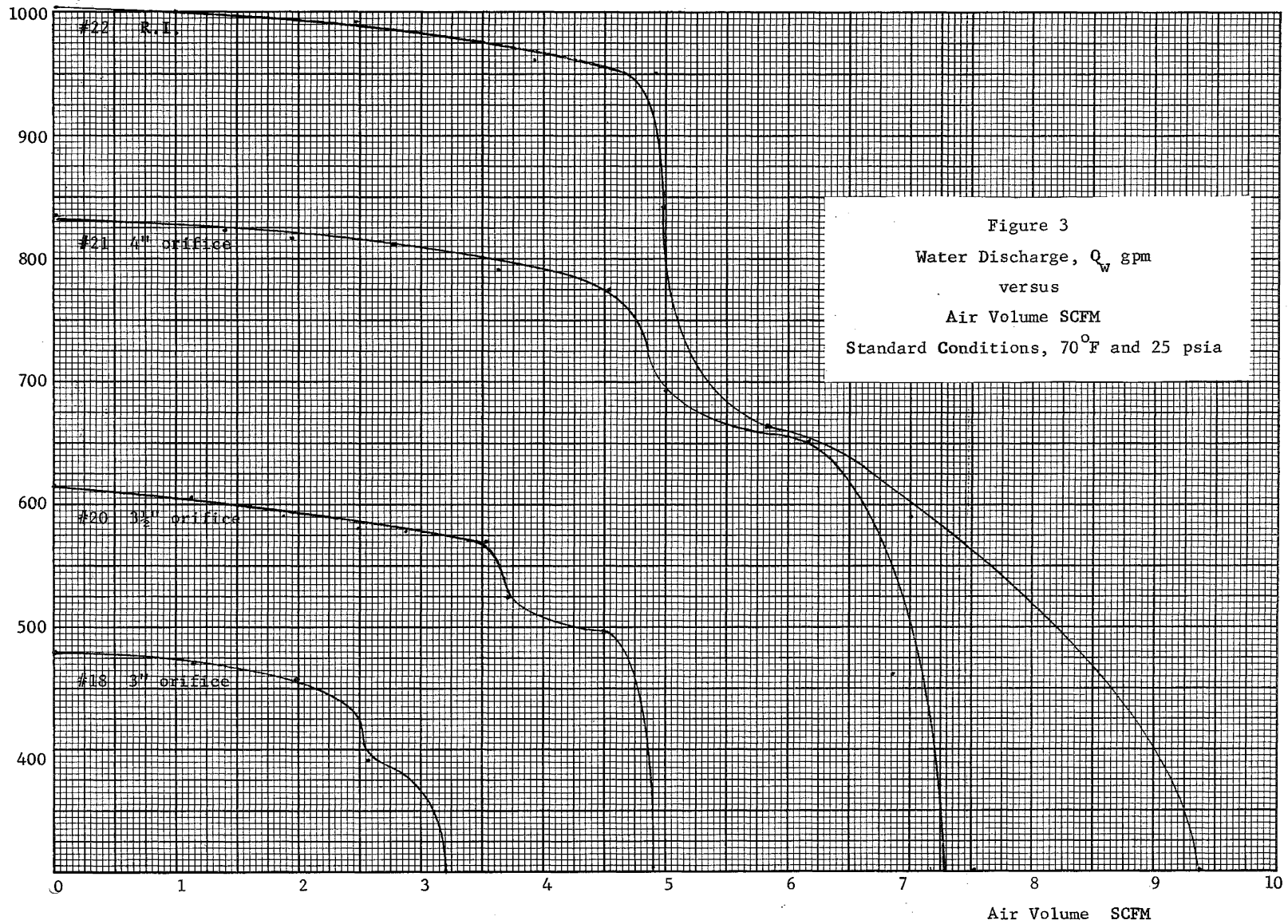


Figure 3  
Water Discharge,  $Q_w$  gpm  
versus  
Air Volume SCFM  
Standard Conditions, 70°F and 25 psia

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