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GAS REMOVAL SYSTEM ASSOCIATED
WITH DREDGE PUMP: PHASE C

Status Report No. 13

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FRITZ ENGINEERING LABORATORY
HYDRAULIC AND SANITARY ENGINEERING DIVISION**

**GAS REMOVAL SYSTEM ASSOCIATED
WITH DREDGE PUMP: PHASE C**

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Prepared for

U. S. Army Engineers District, Philadelphia

Corps of Engineers

Philadelphia, Pennsylvania

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Bethlehem, Pennsylvania

Fritz Engineering Laboratory Report No. 310.16

PREFACE

The following status report summarizes the progress made under Phase C of the project during the period August 1, 1966 to September 30, 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 twelve status reports dated February 1964, April 1964, October 1964, December 1964, January 1965, June 1965, August 1965, October 1965, December 1965, February 1966, June 1966 and August 1966. (Fritz Engineering Laboratory Report No. 310.1^{(1)*}, No. 310.2⁽²⁾, No. 310.4⁽³⁾, No. 310.5⁽⁴⁾, No. 310.6⁽⁵⁾, No. 310.8⁽⁶⁾, No. 310.9⁽⁷⁾, No. 310.10⁽¹⁰⁾, No. 310.11⁽¹¹⁾, No. 310.13⁽¹³⁾, No. 310.14⁽¹⁴⁾, No. 310.15⁽¹⁵⁾).

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

Dr. John B. Herbich is the project director, Mr. D. Basco is the project supervisor. They are assisted by Mr. S. Ko and Mr. R. Miller, Research Assistants. Dr. L. S. Beedle is Acting Chairman of the Department of Civil Engineering

* Numbers in parenthesis refer to references on pages 5 and 6 .

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I. Progress on Installation

The plexiglas accumulator was received and has been installed in the suction line of the model pump. The Level-Trol and the diaphragm actuator have been mounted and flexible hose connections to the accumulator have been installed.

The electrical contractor has completed wiring for the electric pump motor and the magnetic starter. Also the vacuum line to the accumulator has been installed. This line contains the scrubber tank and filter.

The sales representative from Schutte and Koerting has informed us, after a long delay, that the high specific volume of air under a vacuum and the pulsating nature of the vacuum pump will preclude using a rotameter type flow meter. This was quite a disappointment since the supplier had been most encouraging at an earlier meeting. The laboratory has a laminar air flow meter which was made by the Merian Instrument Company. It is hoped that this instrument can be used to measure the air removed by the vacuum pump. The laminar flow meter is being installed between the accumulator and the vacuum pump and will be tested to determine its possible use at this location.

II. Experimental Investigation

Several test runs have been made to see if the changes in suction pipe geometry have changed the pump performance. This data is now being processed.

The vacuum pump has been tested and it is capable of pulling a 29 inch of mercury vacuum.

Preliminary observations seem to indicate that large quantities of air still go into the pump, but no quantitative tests can be run until installation of the laminar flow meter is completed.

Difficulties have been experienced in measuring the air flow evacuated from Tank A. In many cases water finds its way into the meter preventing an accurate measurement of air flow. It is anticipated that the flow meter will be re-located to prevent water getting into it.

III. Future Program

The Supplemental Agreement of Modification No. 2 calls for installation of apparatus to include items necessary to permit the following testing procedure:

1. The variable proximity of the draghead to the channel bottom shall be simulated by using several orifices for suction entrance.

2. The position of the accumulator shall be fixed at a point as near the dredge pump suction as practicable. No variation of this location is desired.

3. The effect of accumulator fluid level shall be studied, and equipment shall be included which will maintain each of several preset fluid levels.

4. The feasibility of direct vacuum control shall be studied, and equipment shall be included which will regulate the rotary vacuum pump in response to dredge pump vacuum.

5. The effectiveness of water eductor types of vacuum pump shall be studied and a sufficient water supply shall be provided for this purpose. Suction control of the water eductor is not required.

It will be noted that the accumulator has been located as closely to the suction pipe elbow as possible. The actual location was dictated by physical prototype dimensions inside the hull. Although no variation in the location of the accumulator is anticipated, it is planned to tilt the accumulator in an effort to determine the most efficient position. (This somewhat in variance with item (2) above).

Items (4) and (5) appear to be repetitive, the vacuum in the accumulator may be achieved by either the vacuum pump, or by the water eductor. It is suggested that the need of a water eductor study should be discussed in the near future. The water eductor will not be ordered until we have a chance to discuss items (4) and (5) on the preceding page with the Sponsor.

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