Job Report

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Project No. MP-1-R-1 Date: July 29, 1959.

Project Name: Industrial Waste Control in Region MP-1.

Period Covered: June 11, 1958 through June 11, 1959. Job No. F-3-f

Bio-assay and Chemical Analysis of Gulf Oil Corporation Refinery's Waste Waters, Port Arthur, Texas.

Abstract: Gulf's Port Arthur Refinery is one of the oldest and largest in the U.S. Gulf is in the midst of a long range plan for curbing their pollution problems. Old, obsolete process units are being replaced, new cooling towers are being planned that will cut down on the volume of effluent and installation of equipment to take care of acid sludges, oils and solids are being built.

Objectives: To determine effects of refinery's waste on marine life and to encourage management to take necessary steps to eliminate pollution.

Procedure: Collect wast samples from Gulf's outfall and analyze for toxic materials. Run bio-assays on wastes. Confer with refinery officials on effects of their water on marine life.

Findings: Records of sampling trips to Gulf's outfalls date back to May, 1954. On each trip heavy concentrations of oils were noted in the effluent and receiving waters. The shoreline of lower Taylors Bayou and adjoining canals have been saturated with oil since the early '20's. Should all pollution cease today it would be several years before all the oils on the bottoms and shorelines would be broken down biologically and the canals would be safe for marine life.

Gulf's Refinery has a total daily capacity of 250,000 barrels of crude. The present wast flow is approximately 50,000 gallons per minute plus 20,000 gallons per minute once-through cooling water. Future waste flow after installation of new equipment and cooling towers is estimated at 15,000 to 20,000 gallons per minute.

Gulf has two major and one minor outfall. The two major outfalls each have a large oil separating unit (A.P.I.). The separators are not very efficient due to emulsions and overloading.

Gulf's Ethylene Plant outfall is picked up with the refinery water intake system for process and cooling, therefore, no pollution from the ethylene plant occurs.

The attached copy of a letter from Mr. J.O. Timms, General Manager of Gulf's Refinery to Mr. W.J. Cutbirth, Jr., Assistant Executive Secretary of the Texas Game and Fish Commission, outlines some of the major steps in Gulf's pollution abatement program. Some of the projects outlined in the letter have been completed and some are near completion.

The new clarifying unit has been completed but will not be in operation until sometime in August, 1959. The clarifier is designed to handle

5,000 gallons per minute of waste waters as a pilot plant study to determine if such an installation will successfully treat Gulf's waste. If successful, more of the clarifiers will probably be planned.

One set of samples collected June 11, 1958, showed an extremely high oil content, total solids, and a dangerously low pH of 2.9. The toxic range of the waste was approximately in the 30% concentration range. (SEE CHEMICAL AND BIO ASSAY DATA SHEET).

Prepared by R. Marek, Jr.
Marine Chemist.

Approved by Howard T. Lee
Howard T. Lee

Date Approved 7 August 1959

(C o p y)

GULF OIL CORPORATION

Port Arthur, Texas.

December 17, 1957.

Mr. W.J. Cutbirth, Jr.
Assistant Executive Secretary
Game and Fish Commission
Austin, Texas.

Dear Sir:

As outlined to you in our conversation in my office on December 6, 1957, we have, during the eighteen months since your last visit here, taken several positive, major steps in our long-range program for eliminating stream pollution.

To provide you with a more detailed progress report, supplementing Mr. Faulkner's letter of June 17, 1956, these steps are described below:

1. The installation of decomposers for sulfuric acid sludge has been completed. Although these units are not yet operating as smoothly as they eventually will, they have distinctly raised the pH of the effluent waters.

2. Reduction in total volume of effluent water is proceeding. One of the new cooling towers mentioned in the June, 1956 letter is now operating. The other tower is scheduled to go into service about March 1, 1958. The recent shutdown of an old, major, process unit reduced effluent water volume by 20,000 gallons per minute. The volume after next March should be about 65,000 gallons per minute, compared to 115,000 gallons per minute at the time of your last visit.

3. A presently authorized revision in process units will reduce this volume by another 30,000 gallons per minute. In addition, we are now considering further steps which may reduce the volume to an eventual 15,000 to 20,000 gallons per minute.

   Such reduction in effluent water volume will have a two-fold effect on stream pollution. In the first place, our present separators will be more effective, thus reducing the oil content of the effluent water. This coupled with the reduced water volume will reduce the oil, and oily silt, discharge, in pounds per day greatly.

4. In addition to the above-mentioned direct changes from one-thru to re-circulated cooling water, it is worth noting that several new process units now authorized or

planned will be served by new cooling towers, thus preventing an increase in effluent water volume.

5. Improved facilities for handling recovered emulsions from the separators were being considered at the time of your previous visit. These are now under actual construction and should be finished by mid 1958. This step will help reduce the oil content of effluent water.

6. Also under consideration last year were facilities for clarifying effluent water by chemical flocculation. One such clarifier is now being built. It should be operating by next fall. This unit is designed for 5,000 gallons per minte and is primarily extended to guide us in an eventual installation which will clarify all effluent water. The volume reduction mentioned above is, obviously, important in relation to this clarifier program.

7. Elimination of sulfide pollution was not under consideration last year. However, since then, we have embarked on a program on this subject. A stripper which will remove about 30% of the sulfides now being discharged will be ready for operation in January, 1958. After a trial period with this first unit, other units are planned which will eliminate most of the remaining sulfide.

Please be assured that we are keenly interested in the water pollution problem andthat you have our cooperation in its solution. We shall inform you from time to time as the various steps in our program are completed.

Yours very truly,

/s/ J.O. Timms.

J.O. Timms,
General Manager.

Analysis and Bio Assay of Gulf Refinery Waste Water - Port Arthur, Texas.

June 11, 1958.

Oil---------- 2,461 ppm
Total Solids ---------- 9,000 ppm
pH---------- 2.9
Sulfides ---------- Pos. Test.

Test Animals	Concentration of Waste	Physiological Observations
5 sailfin mollies (Mollienesia latepinna)	Control	All okay after 48 hours.
5 sailfin mollies (Mollienesia latepinna)	8%	Slight discomfort noted but all alive after 48 hours.
5 sailfin mollies (Mollienesia latepinna)	16%	Some discomfort noted. Increased respiration. All alive after 48 hours.
5 sailfin mollies (Mollienesia latepinna)	30%	Fish showed signs of irritation after 2 hours. Increased respiration. Swam in circles near the surface. 2 deaths in 8 hours. Other 3 fish survived 48 hours but were in poor condition.
5 sailfin mollies (Mollienesia latepinna)	50%	Extreme irritation noted in all specimens. Some tried to jump out of the test tanks. Loss of equilibrium after 1 hour. 2 deaths within 1½ hours. All dead within 4 hours.