

# JOB REPORT

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Project No. MP-1-R-2 Date 31 January 1960.  
Project Name: Industrial Waste Control in Region MP-1.  
Period Covered: December 1, 1958 - December 1, 1959. Job No. F3-8

Bio-Assay and Chemical Analysis of Atlantic Refining Company's Waste Waters, Port Arthur Plant.

Objectives: (1) To determine the toxic effects of wastes on marine life; (2) Check for toxic compounds in waste waters; (3) Improve quality of waste waters.

Procedures: (1) Collect water samples from plant's waste water system and run toxicity tests on fish life and run chemical analyses; (2) meet with Atlantic Refinery officials to discuss results of our tests and assist and urge improvements in waste water quality.

Findings: Atlantic Refining Company refines 62,000 barrels of crude oil daily. Approximately 2,000 gallons per day of waste water are discharged to the Neches River just above the Port Arthur - Orange high bridge.

In 1955 Atlantic installed an Infilco accelator-type flocculation system to remove most of the oils and black solids. Lime and aluminum sulfate were used as the flocculating agents. Considerable improvement in the appearance of the waste waters was noticed within a few days after operation of the treatment system began. The water was almost clear and free of oils and suspended matter, however the wastes were still toxic to pin perch (Lagodon rhomboides) and shrimp (Penaeus setiferus) in the 20% concentration range.

During our visit to Atlantic Refinery on December 2, 1958 we found the waste waters to be of extremely poor quality. Toxicity studies on mollies (Mollienisia latipinna) showed harmful effects in the 10% concentration range. See Table 1 for toxicity data.

Chemical analysis of the waste waters showed a considerable amount of settleable sludge and oxygen consuming materials. See Table 2 for chemical data.

It was learned by conferring with Mr. P.L. Robitson, the plant manager, and Mr. Martin Mandell, process supervisor, that one of the large catalytic cracking units was being repaired and cleaned. In cleaning the units an uneven flow of waste waters causes an upset in the Infilco clarifier. This slugging or increased flow to the clarifier causes the sludges to be stirred up and overflow the clarifier.

After the waste flow returned to normal the waste waters leaving the clarifier began to slowly clear up.

Comments: The company was urged to exercise more caution when cleaning units in the refinery to prevent future upsets in their treatment system. It was believed the condition in which the waste waters were found on December 2, 1958, could have been avoided had proper caution been exercised.

Prepared by R. Marek, Jr.

Marine Chemist.

Accepted by Howard T. Lee  
Howard T. Lee

Date 10 January 1961

Table 1

Bio-Assay of Atlantic Refinery Waste Waters, Port Arthur, Texas, 2 p.m.,  
December 2, 1958

Species	Concentration of Waste	Physiological Observations
<u>Mollienisia latipinna</u>	Control	All alive after 48 hours.
"	1%	"
"	2%	"
"	3%	"
"	4%	"
"	5%	"
"	10%	Discomfort noted almost immediately. Respiration increased. All fish swam near surface for first 20 hrs. After 24 hours fish appeared fully recovered and normal.
"	11%	"
"	12%	"
"	13%	"
"	14%	"
"	25%	Extreme irritation noted immediately. Fish tried to jump out of test jars. All dead within 10 minutes.
"	50%	Same as in 25% concentration except all dead within 5 minutes.

Table 2

Chemical Analysis of Waste Water (Grab Sample at Treater)

pH .....	8.8
Cl .....	788 ppm
H <sub>2</sub> S .....	Pos. to Lead Acetate
Color .....	Black
Oil .....	Trace
1 Hr. Settleable Sludge .....	30 ml/l
Oxygen Consumed .....	130 ppm