Waste Load Evaluation for the Houston Ship Channel

This report encompasses those discharges located in the following segments of the San Jacinto Basin and the Trinity-San Jacinto Estuary:

Segment 1005	-	Houston Ship Channel - Morgan's Point to San Jacinto River confluence
Segment 1006	-	Houston Ship Channel - San Jacinto River confluence to Turning Basin
Segment 1007	-	Houston Ship Channel - Turning Basin
Segment 2426	-	Tabbs Bay
Segment 2427	-	San Jacinto Bay
Segment 2428	-	Black Duck Bay
Segment 2429	-	Scott Bay
Segment 2430	-	Burnett Bay
Segment 2436	-	Barbours Cut

Prepared by

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TEXAS WATER QUALITY BOARD AUSTIN, TEXAS

ADOPTED SEPTEMBER 25, 1974

WASTE LOAD EVALUATION FOR THE HOUSTON SHIP CHANNEL AREA INCLUDING WATER QUALITY SEGMENTS 1005, 1006, 1007, 2426, 2427, 2428, 2429, 2430, and 2436

Introduction

General

This waste load evaluation is made pursuant to sections 130.24, 130.25, and 130.26 of Title 40 of the Code of Federal Regulations which requires a waste load allocation for those segments designated as water quality limiting. Some effluent limited segments are also included within this allocation as they directly affect the water quality in certain water quality limited segments.

Purpose

The purpose of this study is to define waste treatment levels that will result in the stream segment meeting applicable stream standards. The general approach followed is: a) describe the stream segment, b) define the water quality problem, c) calculate the segment assimilative capacity, d) define localized assimilative capacity by mathematical modeling, and e) establish acceptable waste discharges and schedules of implementation.

Methods

The methodology used is based on that methodology described in "A Proposal for Waste Load Allocation" prepared by the Texas Water Quality Board, July 6, 1973, with the use of mathematical models developed for the Houston Ship Channel system.

Stream Segment Description

General

Water quality Segments 1005, 1006, and 1007 constitute the main channel of the Houston Ship Channel from the Turning Basin to

Morgan's Point. Segments 2426, 2427, 2428, 2429, 2430, and 2436 are the main side bays of the ship channel system. Tidal dispersion of materials into and out of the side bays generally takes place in an unrestricted manner. Because of the physical and hydraulic connection between the side bays and the main channel, the segments listed above are analyzed together as the Houston Ship Channel system.

The Houston Ship Channel is a dredged channel which serves as an access link for ocean-going vessels to the Port of Houston. The channel extends from the Turning Basin in Houston to Galveston Bay at Morgan's Point, a distance of about 25 miles. Besides its primary function as a commerce link, the channel provides large quantities of industrial cooling water and acts as a collector and transporter of large quantities of waste from the Houston area urban-industrial complex. It is the channel's capacity as a waste receiving stream, that has produced the existing water quality problems that in turn have necessitated a waste load allocation.

Water quality Segments 1005, 1006, and 1007 are primarily suited for navigation. In addition to its navigation use, Segment 1005 has been designated as suitable for the propagation of fish and wildlife. Segments 2426, 2427, 2428, 2429, and 2430 have been designated as suitable for noncontact recreation and for the propagation of fish and wildlife. Segment 2436, Barbours Cut, is deemed suitable for noncontact recreation.

Stream Hydraulics

In an estuarine system such as the Houston Ship Channel system, the hydraulic characteristics are dominated by the back and forth translations of water resulting from tidal oscillations. While tidal fluctuations control the dispersion of waste throughout the system, the freshwater inflow controls the net transport of substances downstream and out of the system.

The major freshwater discharge to the Houston Ship Channel is the San Jacinto River, located in the downstream portion of the channel. The freshwater input from the San Jacinto River normally accounts for more than 60% of the total freshwater flow in the channel. Except during periods of high rainfall runoff, the major freshwater flow in the upper 15 miles of the channel consists of wastewater. This wastewater return flow averages approximately 530 cfs.

During high temperature, critical water quality periods, essentially all the runoff from the San Jacinto River is impounded by upstream

dams. Freshwater flow in the ship channel averages less than 1000 cfs under these conditions with the seven-day-two-year low flow being approximately 650 cfs at Morgan's Point.

Waste Discharge Description

The Houston Ship Channel and surrounding area has one of the largest concentrations of industrial and domestic wastewater treatment plants in the world and each of these plants discharge wastes of varying quantity and quality. Approximately 350 discharge points are located in the area drained by the ship channel; however, approximately 40 of these discharge points represent 95% of the municipal and industrial waste currently being discharged into the channel which contribute to the low dissolved oxygen. Seventy-five dischargers represent almost 99% of the current waste loading as indicated on Attachment A. In addition to these direct waste discharges into the system, other oxygen demanding material is conveyed into the system via major tributaries of the system. These tributaries include the San Jacinto River, Carpenter Bayou, Patrick Bayou, Greens Bayou, Hunting Bayou, Vince Bayou, Sims Bayou, Brays Bayou, Buffalo Bayou, and Goose Creek.

The location of the waste dischargers into the system is given by latitude and longitude by segment in Attachment B. A map showing the location of individual dischargers will be provided upon request.

Description of Water Quality Problems

Stream Standards for Segment 1005

Parameter	Criteria
Dissolved Oxygen (mg/l)	Not less than 4.0 mg/l
pH Range	6.2 - 8.5
Fecal Coliform/100 ml	Log avg. not to exceed 1000
Temperature °F	95°F

Stream Standards for Segment 1006

Parameter	Criteria
Dissolved Oxygen (mg/l)	Not less than 2.0 mg/l

pH Range	6.0 - 8.5
Fecal Coliform/100 ml	Log avg. not to exceed 2000
Temperature °F	95°F

Stream Standards for Segment 1007

Parameter	Criteria
Dissolved Oxygen (mg/l)	Not less than 1.5 mg/l
pH Range	6.2 - 8.5
Fecal Coliform/100 ml	Log avg. not to exceed 2000
Temperature °F	95°F

Stream Standards for Segment 2426

Parameter	Criteria
Dissolved Oxygen (mg/l)	Not less than 4.0 mg/l
pH Range	6.5 - 8.5
Total Coliform/100 ml	Median not to exceed 1000
Temperature °F	95°F

Stream Standards for Segment 2427

Parameter	Criteria
Dissolved Oxygen (mg/l)	Not less than 4.0 mg/l
pH Range	6.5 - 8.5
Total Coliform/100 ml	Median not to exceed 1000
Temperature °F	95°F

Stream Standards for Segment 2428

Parameter	Criteria
Dissolved Oxygen (mg/l)	Not less than 4.0 mg/l

pH Range	6.5 - 8.5
Total Coliform/100 ml	Median not to exceed 1000
Temperature °F	95°F

Stream Standards for Segment 2429

Parameter	Criteria
Dissolved Oxygen (mg/l)	Not less than 4.0 mg/l
pH Range	6.5 - 8.5
Total Coliform/100 ml	Median not to exceed 1000
Temperature °F	95°F

Stream Standards for Segment 2430

Parameter	Criteria
Dissolved Oxygen (mg/l)	Not less than 4.0 mg/l
pH Range	6.5 - 8.5
Total Coliform/100 ml	Median not to exceed 1000
Temperature °F	95°F

Stream Standards for Segment 2436

Parameter	Criteria
Dissolved Oxygen (mg/l)	Not less than 4.0 mg/l
pH Range	6.0 - 9.0
Total Coliform/100 ml	Median not to exceed 1000
Temperature °F	95°F

Water Quality Monitoring Stations

Water quality monitoring stations operated by the USGS, Texas Water Quality Board, and other agencies are located at various

points in the Houston Ship Channel area. The locations of these monitoring stations will be provided upon request.

Existing Water Quality Problems

Water quality monitoring data obtained from stations located in the ship channel indicate that there is a severe dissolved oxygen problem in Segments 1006 and 1007. Anaerobic conditions are common in these segments. Because of the effects of tidal action in this system, discharges into those segments other than 1006 and 1007 impact the resultant water quality in these two segments.

Segment Modeling

Mathematical Model

A one-dimensional steady-state mathematical model was used to determine the allowable waste loading condition for the Houston Ship Channel. This model allows the user to simulate dissolved oxygen concentrations within the ship channel for various projected waste loads. By comparing the simulated dissolved oxygen concentration to the established standard, an allowable waste load for the channel was determined.

In the model, the physical system is represented by 28 separate but connected segments. Each segment is characterized by a set of constant coefficients describing various physical and chemical parameters. Some of the more important physical characteristics included in the model are: the locations of major freshwater and wastewater inputs; junctions with rivers, bayous, and bays; segment width and depth; and dispersion.

The model includes two mechanisms for the addition of dissolved oxygen to the system. The primary mechanism is atmospheric reaction which is a function of the segment depth, mean tidal velocity and the temperature of the water. The second source of dissolved oxygen for the channel is the dispersion of highly oxygenated bay waters into the downstream reaches of the channel.

Dissolved oxygen is removed from the system through the oxidation of waste materials. The three model components of oxygen removal are carbonaceous degradation, nitrogenous degradation, and the benthal demand. Each of these mechanisms are handled separately by the model and their associated rates can be varied independently. All biological degradation rates are temperature dependent and are adjusted accordingly.

The dissolved oxygen model was verified against two separate conditions of freshwater flow and water temperature. Water quality data applicable to verification was found for August 14, 1973, and for the period December 20, 1971 through January 10, 1972. Both of these occasions include, or are preceded by, a minimum thirty-day period of relatively stable freshwater inflow to the channel. The model was found to adequately simulate the spacial distribution of dissolved oxygen observed in the channel during these two periods.

For the purpose of the waste load allocation, the model was exercised to simulate critical water quality conditions for flow and temperature. These critical conditions include a freshwater flow in the channel equivalent to the seven-day-two-year low flow and a water temperature of 31°C. The waste loads arrived at by the allocation, therefore, ensure the maintenance of dissolved oxygen standards under the very infrequent critical conditions.

Projected Waste Loads for 1979

The waste load allocation analysis was based on discharge rates expected for 1979. These discharge rates were calculated by applying expected annual growth rates to existing industrial and municipal dischargers. The basis for industrial growth rate was provided by the OBERS[1] indices of production; an overall growth rate of production of 5% per annum for the industrial system was utilized in the model simulations.

Expected future population growth was determined by utilizing the Houston-Galveston Area Council's "A Special Report - Population Projections 1970-2020 for the Gulf Coast Planning Region", dated April 1, 1972. These projections indicated a population growth rate of approximately 3.2% per annum. Expected flow rates for 1979 were calculated on the basis of the projected population and these flows were utilized in the model simulations.

Modeling Results

The mathematical model described in this section was exercised for various waste loading conditions until the stream standards for dissolved oxygen in the Houston Ship Channel were achieved. As a starting point for reduction of waste loads into the system, a baseline of Best Practicable Control Technology Currently Available (BPCT) was established for both municipal and industrial dischargers. This level of waste loading was equivalent

to a concentration of 20 mg/l BOD_5 for municipalities and the defined industrial BPCT values for pounds of waste load per unit of production as exist in the Environmental Protection Agency's final effluent guidelines of 1974. Additionally, Best Available Technology Economically Achievable (BAT) waste loadings were also calculated for industrial dischargers while the BAT BOD_5 concentration for municipal waste dischargers was defined as 5.0 mg/l.

As indicated earlier, a growth factor for 1979 conditions and a background waste loading for non-point sources were utilized during the modeling effort. These factors were included for each simulation.

The waste loading to the water quality segments was reduced incrementally for each discharger from the BPCT level by subtracting from the BPCT waste load a percentage of the difference between BPCT and BAT levels; i.e.:

$$\text{Reduced load} = \text{BPCT} - (R\%)(\text{BPCT} - \text{BAT})$$

These incremental reductions were applied to both municipal and industrial dischargers until the model indicated that stream standards had been met.

However, numerous simulations with the model indicated that no matter how much the NH_3-N load was reduced for other dischargers, the NH_3-N load for the City of Houston North Side Plant (WCO 10495.01) and Sims Plant (WCO 10495.02) had to be reduced to a level of 5 mg/l to meet stream standards for dissolved oxygen in the channel. Consequently, as each reduction simulation was performed, these two plants were consistently loaded at a level of 5 mg/l for NH_3-N.

A final reduction factor of 90% yielded the results shown in Figure 1, which is a plot of the resultant dissolved oxygen profile from the Turning Basin to Morgan Point. Where guidelines could be applied, this same equation was utilized for ammonia nitrogen reductions; otherwise, input received at public hearings relevant to achievable levels of ammonia nitrogen reduction was utilized.

Use of Model Output

General

The results of the model indicate the maximum load that can be discharged by all of the dischargers on the Houston Ship Channel, including background loading and growth reserve, at the same time during critical flow and temperature and still achieve stream

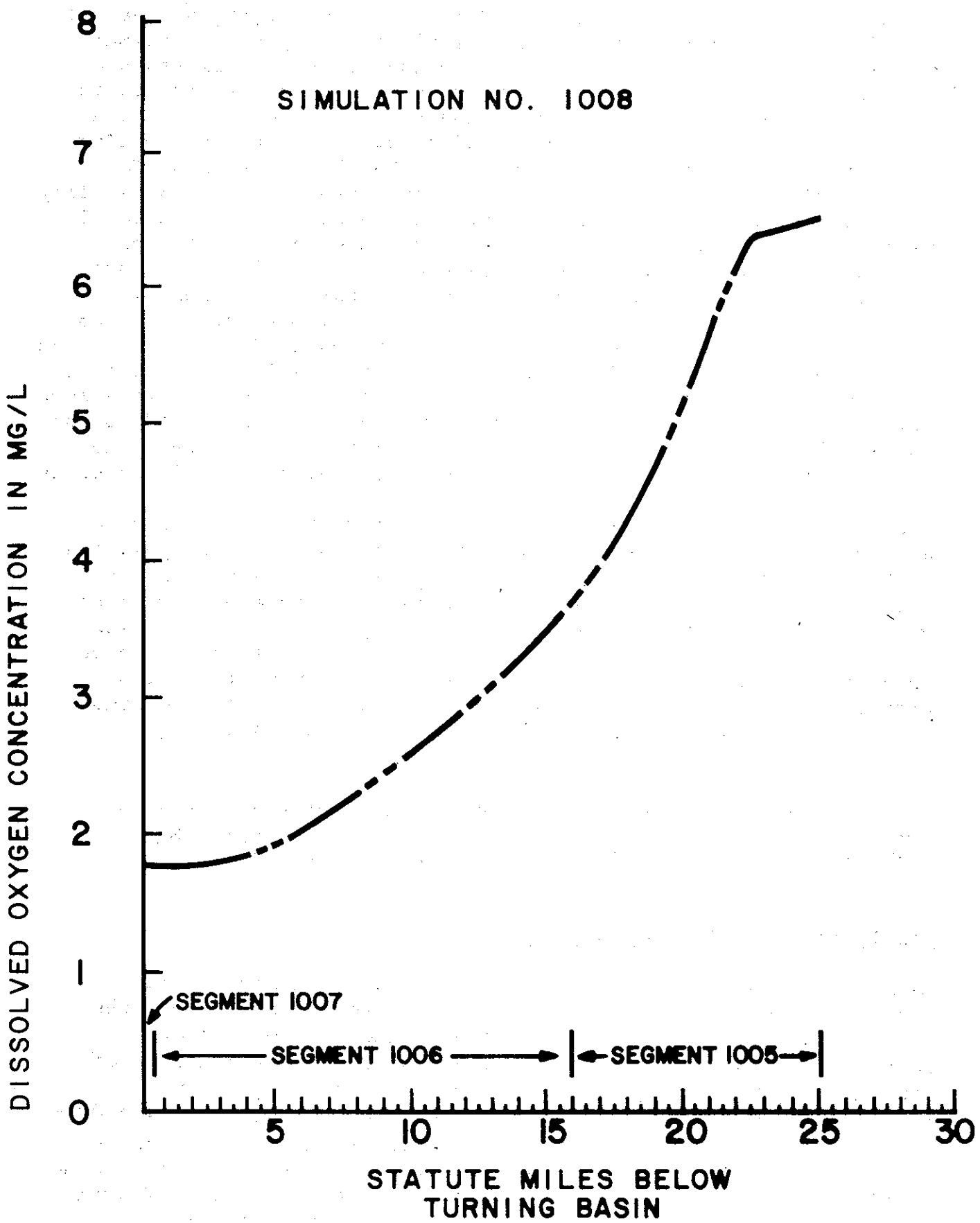
SIMULATION NO. 1008
DISSOLVED OXYGEN CONCENTRATION IN MG/L
8
7
6
5
4
3
2
1
0
SEGMENT 1007
SEGMENT 1006
SEGMENT 1005
5
10
15
20
25
30
STATUTE MILES BELOW
TURNING BASIN

FIGURE I

standards for dissolved oxygen. Since the probability of the multitude of dischargers all emitting simultaneously their maximum allowable waste load at the same time that critical temperature and flow conditions prevail in the channel is very remote, basing the waste load on unadjusted model output is too conservative and would result in a waste of money and resources. It was therefore decided to adjust the model output for the allowable loads for individual dischargers so as to take into account their variability in time, but still retain a very high probability that the total waste load actually discharged is in accord with the model predictions. Since the critical temperature and critical flow are related in time, they were considered to occur simultaneously. Based on stream standard requirements of using the seven-day-two-year low flow, the probability of all detrimental factors occurring simultaneously is less than 0.1%. From a statistical analysis of waste discharge records for the ship channel area and an exceedance level of 10%, a factor of 1.30 was determined for use in adjusting the modeling results so as to assure compliance with stream standards, yet avoid the unnecessary expenditure of money and resources.

The permit values for industrial dischargers may be calculated as described above, however, the permit values for municipalities must be determined by use of the above described method and the "Policy for Effluent Standards for Domestic Wastewater Treatment Plants" (Attachment C). Use of this policy in conjunction with the model output indicates that an Effluent Set 2 should be used as a basis of permitting waste dischargers for municipalities with the excep ion of the City of Houston's North Side and Sims plants which should be permitted for Effluent Set 2-N.

If a negotiated proposed NPDES permit was in existence with a permit value less than that derived by the allocation, this lower value was utilized as the recommended permit value.

Conclusions and Recommendations

Mathematical modeling results indicate that to achieve stream standards for dissolved oxygen in the Houston Ship Channel, the waste loading should be reduced as described above. In order to achieve the desired dissolved oxygen standards, the schedule of implementation contained in Attachment D should be followed. These schedules of implementation were based on engineering judgement and were made without the benefit of extensive conferences with the dischargers and without regard to availability of funding. Dates may be moved forward depending on the availability of grant funds and the availability of required treatment technology.

It should be realized that this allocation may be subject to deviations between dischargers as permits are written. Additionally, it should be realized that the model does not compensate for the effect of advanced waste treatment technologies on the assimulative capacity of the stream. The degradation rate of an effluent treated to a low level of oxygen demanding substances may differ substantially from the degradation rate of the current discharges which do not even achieve consistent levels of secondary treatment. When additional data is collected on the degradation rates of advanced waste treatment effluents, the model should be re-evaluated to assess the required levels of treatment.

This waste load allocation was based on the best available data. As additional data becomes available, or as conditions change, the allocation will be reassessed. Effluent limits for all dischargers are subject to change when the allocation is re-evaluated.

Shown in Attachment D is a schedule of implementation for this waste load allocation. This waste load allocation applies to all dischargers within the appropriate segments whether actually listed in Attachment D or not. If any dischargers have been omitted, it was inadvertently and their ommission should not be considered as significant.

Nothing in this allocation precludes the Texas Water Quality Board from imposing additional permit conditions whenever the Board determines that such additional provisions are warranted.

REFERENCES

(1) Population and Economic Activity in the United States and Standard Metropolitan Statistical Areas, Environmental Protection Agency and U.S. Department of Housing and Urban Development, July, 1972.

ATTACHMENT A

GALVESTON BAY PROJECT WASTE LOADING REPORT
FOR MONTH 01-74

** BIOCHEMICAL OXYGEN DEMAND **

WCD NUMBER	NAME OF DISCHARGER	BOD LOAD FOR MONTH 01-74	PER CENT OF TOTAL	CUMULATIVE PER CENT	MEAN BOD FOR PERIOD 04-73 TO 03-74
1. 10495 01	HOUSTON CITY OF	88750.44	58.2	58.2	65053.67
2. 10495 02	HOUSTON CITY OF	8702.87	5.7	63.9	7706.08
3. 01740 01	GULF COAST WASTE DISPOSAL AUTH	7087.12	4.6	68.5	6340.99
4. 00458 01	ROHM AND HAAS CO	5656.52	3.7	72.2	2063.69
5. 00392 02	ATLANTIC RICHFIELD CO	5154.12	3.4	75.6	5875.87
6. 00587 02	PETRO TEX CHEM CORP	3234.19	2.1	77.7	2397.45
7. 01160 01	SOUTHLAND PAPER MILLS INC	2829.76	1.9	79.6	1643.75
8. 00592 02	EXXON COMPANY, U.S.A.	1826.46	1.2	80.8	1457.07
9. 10495 37	HOUSTON CITY OF	1681.93	1.1	81.9	1008.56
10. 00477 01	HARRIS CO FWSD NO 63	1545.49	1.0	82.9	177.36
11. 00402 01	SHELL CHEMICAL CO	1311.09	0.9	83.8	2095.99
12. 00649 06	OLIN CORPORATION	1226.98	0.8	84.6	579.03
13. 00474 01	E I DU PONT DE NEMOURS E CO	1189.28	0.8	85.4	1341.49
14. 10053 01	PASADENA CITY OF	1162.91	0.8	86.2	861.06
15. 00509 04	ARMCO STEEL CORPORATION	1049.37	0.7	86.9	817.15

GALVESTON BAY PROJECT WASTE LOADING REPORT
FOR MONTH 01-74

** BIOCHEMICAL OXYGEN DEMAND **

WCC NUMBER	NAME OF DISCHARGER	BOD LOAD FOR MONTH 01-74	PER CENT OF TOTAL	CUMULATIVE PER CENT	MEAN BOD FOR PERIOD 04-73 TO 03-74
16. 00492 01	ETHYL CORPORATION	907.93	0.6	87.5	821.63
17. 00305 01	DIAMOND SHAMROCK CORP	808.65	0.5	88.0	504.14
18. 10053 05	PASADENA CITY OF	750.30	0.5	88.5	1485.86
19. 10495 09	HOUSTON CITY OF	738.09	0.5	89.0	820.11
20. 00392 05	ATLANTIC RICHFIELD CO	698.06	0.5	89.5	647.20
21. 00002 01	TENNECO CHEMICALS INC	680.04	0.4	89.9	346.69
22. 00305 03	DIAMOND SHAMROCK CORP	678.04	0.4	90.3	555.53
23. 00535 01	CHARTER INTERNATIONAL OIL CO	667.87	0.4	90.7	614.13
24. 00749 01	DIAMOND SHAMROCK CORP	627.28	0.4	91.1	348.84
25. 00403 10	SHELL OIL CO	619.83	0.4	91.5	367.88
26. 01308 02	GEN AMERICAN TRANSPORTATION	609.34	0.4	91.9	321.11
27. 10495 30	HOUSTON CITY OF	575.46	0.4	92.3	1107.54
28. 00520 02	GOODYEAR TIRE & RUBBER CO	437.54	0.3	92.6	269.10
29. 10058 01	WEST UNIVERSITY PLACE CITY OF	425.34	0.3	92.9	332.78
30. 00492 02	ETHYL CORPORATION	410.73	0.3	93.2	542.21

GALVESTON BAY PROJECT WASTE LOADING REPORT
FOR MONTH 01-74

** BIOCHEMICAL OXYGEN DEMAND **

WCC NUMBER	NAME OF DISCHARGER	BOD LOAD FOR MONTH 01-74	PER CENT OF TOTAL	CUMULATIVE PER CENT	MEAN BOD FOR PERIOD 04-73 TO 03-74
31. 10495 76	HOUSTON CITY OF	410.06	0.3	93.5	344.39
32. 00393 01	SINCLAIR KOPPERS CO	369.90	0.2	93.7	152.78
33. 00492 03	ETHYL CORPORATION	368.02	0.2	93.9	453.55
34. 10495 03	HOUSTON CITY OF	330.80	0.2	94.1	80.71
35. 00663 01	UPJOHN CO THE	290.57	0.2	94.3	124.86
36. 00305 05	DIAMOND SHAMROCK CORP	279.67	0.2	94.5	682.40
37. 10570 01	HARRIS CO WCID	270.47	0.2	94.7	69.72
38. 10495 49	HOUSTON CITY OF	262.08	0.2	94.9	211.42
39. 00815 02	PHILLIPS PETROLEUM CO	239.44	0.2	95.1	197.19
40. 10495 10	HOUSTON CITY OF	204.21	0.1	95.2	142.03
41. 01731 01	ROBERTSON TERMINALS, INC.	203.14	0.1	95.3	87.38
42. 00509 01	ARMCO STEEL CORPORATION	201.04	0.1	95.4	71.98
43. 10495 16	HOUSTON CITY OF	198.90	0.1	95.5	94.00
44. 00391 01	ARCO CHEMICAL CO	198.53	0.1	95.6	66.16
45. 00403 12	SHELL OIL CO	190.82	0.1	95.7	135.76

GALVESTON BAY PROJECT WASTE LOADING REPORT
FOR MONTH 01-74

** BIOCHEMICAL OXYGEN DEMAND **

WCC NUMBER	NAME OF DISCHARGER	BOD LOAD FOR MONTH 01-74	PER CENT OF TOTAL	CUMULATIVE PER CENT	MEAN BOD FOR PERIOD 04-73 TO 03-74
46. 10550 01	BELLAIRE CITY OF	172.64	0.1	95.8	174.63
47. 10495 43	HOUSTON CITY OF	169.36	0.1	95.9	229.40
48. 10495 45	HOUSTON CITY OF	162.63	0.1	96.0	131.49
49. 00392 01	ATLANTIC RICHFIELD CO	162.63	0.1	96.1	393.46
50. 01308 01	GEN AMERICAN TRANSPORTATION	160.13	0.1	96.2	109.76
51. 10495 41	HOUSTON CITY OF	142.20	0.1	96.3	97.67
52. 10495 46	HOUSTON CITY OF	141.19	0.1	96.4	190.47
53. 10053 04	PASADENA CITY OF	138.71	0.1	96.5	128.47
54. 10495 85	HOUSTON CITY OF	133.44	0.1	96.6	54.30
55. 10195 01	JACINTO CITY CITY OF	132.27	0.1	96.7	134.38
56. 10584 01	MEMORIAL VILLAGES WATER AUTH	127.50	0.1	96.8	83.71
57. 10495 23	HOUSTON CITY OF	125.03	0.1	96.9	154.89
58. 10680 01	JERSEY VILLAGE CITY OF	123.87	0.1	97.0	31.66
59. 10495 78	HOUSTON CITY OF	122.88	0.1	97.1	96.26
60. 00639 01	LUBRIZOL CORP	117.34	0.1	97.2	71.00

GALVESTON BAY PROJECT WASTE LOADING REPORT
FOR MONTH 01-74

** BIOCHEMICAL OXYGEN DEMAND **

	WCP NUMBER	NAME OF DISCHARGER	BOD LOAD FOR MONTH 01-74	PER CENT OF TOTAL	CUMULATIVE PER CENT	MEAN BOD FOR PERIOD 04-73 TO 03-74
61.	01031 02	HOUSTON LIGHTING & POWER CO	112.79	0.1	97.3	113.79
62.	10287 01	SOUTH HOUSTON CITY OF	112.42	0.1	97.4	203.43
63.	10495 77	HOUSTON CITY OF	107.19	0.1	97.5	76.13
64.	10495 47	HOUSTON CITY OF	105.08	0.1	97.6	163.61
65.	10495 15	HOUSTON CITY OF	105.08	0.1	97.7	87.08
66.	10960 01	GREEN RIDGE M U D	103.16	0.1	97.8	46.61
67.	10495 53	HOUSTON CITY OF	101.79	0.1	97.9	105.38
68.	10395 04	BAYTOWN CITY OF	99.68	0.1	98.0	105.55
69.	00542 01	STAUFFER CHEM CO	98.96	0.1	98.1	56.88
70.	10105 01	HARRIS CO WCID NO 021	98.33	0.1	98.2	81.05
71.	00534 01	U S INDUSTRIAL CHEM CO	98.21	0.1	98.3	107.99
72.	01045 01	PREMIER PETROCHEMICAL CO	98.13	0.1	98.4	78.19
73.	00587 03	PETRO TEX CHEM CORP	96.55	0.1	98.5	71.78
74.	00635 01	REED TOOL COMPANY	96.23	0.1	98.6	49.99
75.	10495 50	HOUSTON CITY OF	95.58	0.1	98.7	66.34

ATTACHMENT B

Segment 1005 (Houston Ship Channel)

Dischargers	WCO No.	Latitude/Longitude
Celanese Plastics Co.	00544.01	29°43'10"/95°05'20"
Diamond Shamrock Corp.	01000.01	29°43'40"/95°05'20"
Diamond Shamrock Corp.	01539.01	29°43'40"/95°05'20"
Exxon Company, U.S.A.	00592.01	29°42'10"/95°00'20"
Exxon Company, U.S.A.	00592.02	29°42'10"/95°00'20"
Tenneco Oil Co.	00440.01	29°41'00"/95°01'30"
Texas Alkyls Inc.	01689.01	29°42'00"/95°05'00"
Texas Highway Dept.	01786.01	29°42'20"/95°01'00"
City of Baytown	10395.04	29°43'20"/95"00'40"

Segment 1006 (Houston Ship Channel)

Dischargers	WCO No.	Latitude/Longitude
Airco Welding Products	00655.01	29°47'50"/95°20'40"
Amerada Hess Corp.	00671.01	29°44'10"/95°12'10"
Anchor Hocking Glass Corp.	01170.01	29°46'00"/95°15'20"
Armco Steel Corporation	00509.01	29°45'20"/95°11'30"
Armco Steel Corporation	00509.02	29°45'20"/95°11'30"
Armco Steel Corporation	00509.03	29°45'20"/95°11'30"
Armco Steel Corporation	00509.04	29°45'20"/95°11'30"
Armco Steel Corporation	00509.05	29°45'20"/95°11'30"
Armco Steel Corporation	00509.06	29°45'20"/95°11'30"
Armco Steel Corporation	00509.07	29°45'20"/95°11'30"
Armco Steel Corporation	00509.08	29°45'20"/95°11'30"
Armco Steel Corporation	00509.09	29°45'20"/95°11'30"
Armco Steel Corporation	00509.10	29°45'20"/95°11'30"
Armco Steel Corporation	00509.11	29°45'20"/95°11'30"
Ashbrook Corporation	01536.01	29°53'00"/95°23'00"
Atlantic Richfield Co.	00392.01	29°43'20"/95°13'10"
Atlantic Richfield Co.	00392.02	29°43'20"/95°13'10"
Atlantic Richfield Co.	00392.03	29°43'20"/95°13'10"
Atlantic Richfield Co.	00392.04	29°43'20"/95°13'10"
Atlantic Richfield Co.	00392.05	29°43'20"/95°13'10"
Atlantic Richfield Co.	00392.06	29°43'20"/95°13'10"
C. F. Braun and Co.	01707.01	29°45'20"/95°06'10"
Cargill, Inc.	01247.01	29°44'30"/95°06'50"
Charter International Oil Co.	00535.01	29°43'20"/95°16'20"
Charter International Oil Co.	00535.02	29°43'20"/95°16'20"
Chemical Exchange Processing Co.	00786.01	29°43'50"/95°13'40"
Coastal Transport Co., Inc.	01706.01	29°47'30"/95°16'30"
Crown Central Petro Corp.	00574.01	29°43'20"/95°13'10"
Crown Central Petro Corp.	00574.02	29°43'20"/95°13'10"
Crown Central Petro Corp.	00574.03	29°43'20"/95°13'10"
C-B Southern	01583.01	29°45'10"/95°06'00"
Diamond Paint Co.	01538.01	29°38'00"/95°24'30"
Diamond Shamrock Corp.	00305.01	29°44'00"/95°06'40"
Diamond Shamrock Corp.	00305.02	29°44'00"/95°06'40"
Diamond Shamrock Corp.	00305.03	29°44'00"/95°06'40"
Diamond Shamrock Corp.	00305.04	29°44'00"/95°06'40"
Diamond Shamrock Corp.	00305.05	29°44'00"/95°06'40"
Diamond Shamrock Corp.	00749.01	29°45'30"/95°10'10"
Dresser Industries, Inc.	01262.01	29°44'30"/95°06'50"
Dresser Industries, Inc.	01262.02	29°44'30"/95°06'50"
Dresser Magcobar	01211.01	29°40'20"/95°23'40"

Segment 1006 (Houston Ship Channel)

Dischargers	WCO No.	Latitude/Longitude
Dundee Cement Co.	01585.01	29°44'30"/95°06'40"
Dundee Cement Co.	01585.02	29°44'30"/95°06'40"
Eastern Products Corp.	01533.01	29°45'00"/95°06'20"
Eddy Refining Co.	01018.01	29°43'10"/95°16'40"
Ethyl Corporation	00492.01	29°44'30"/95°10'00"
Ethyl Corporation	00492.02	29°44'30"/95°10'00"
Ethyl Corporation	00492.03	29°44'30"/95°10'00"
Exxon Chemical Company USA	00610.01	29°45'10"/95°17'00"
Gen. American Transportation	01308.01	29°44'00"/95°12'20"
Gen. American Transportation	01308.02	29°44'00"/95°12'20"
Gen. American Transportation	01586.01	29°43'30"/95°13'50"
Goodpasture, Inc.	00733.01	29°43'10"/95°14'30"
Goodpasture, Inc.	00733.02	29°43'10"/95°14'30"
Goodpasture, Inc.	00733.03	29°43'10"/95°14'30"
Goodyear Tire & Rubber Co.	00520.01	29°42'20"/95°15'20"
Goodyear Tire & Rubber Co.	00520.02	29°42'20"/95°15'20"
Gulf Coast Waste Disposal Auth.	01740.01	29°43'20"/95°13'10"
Gulf Oil Co. - US	01745.01	29°44'20"/95°12'20"
Gulf States Asphalt Co., Inc.	01058.01	29°39'30"/95°13'50"
Harris Co. FWSD No. 63	00477.01	29°44'10"/95°36'20"
Horton and Horton, Inc.	00839.01	29°44'00"/95°12'00"
City of Houston	01788.01	29°40'00"/95°22'30"
Houston Lighting & Power Co.	01027.01	29°37'10"/95°26'50"
Houston Lighting & Power Co.	01031.01	29°49'20"/95°13'10"
Houston Lighting & Power Co.	01031.02	29°49'20"/95°13'10"
Houston Lighting & Power Co.	01032.01	29°43'20"/95°13'30"
Houston Lighting & Power Co.	01032.02	29°43'20"/95°13'30"
Houston Lighting & Power Co.	01032.03	29°43'20"/95°13'30"
Houston Lighting & Power Co.	01032.04	29°43'20"/95°13'30"
Houston Lighting & Power Co.	01032.05	29°43'20"/95°13'30"
Houston Lighting & Power Co.	01039.01	29°57'00"/95°32'00"
Houston Natural Gas	01286.01	29°42'10"/95°24'00"
Hughes Tool Co.	01046.01	29°44'10"/95°18'50"
Hughes Tool Co.	01046.02	29°44'10"/95°18'50"
Hughes Tool Co.	01046.03	29°44'10"/95°18'50"
Hughes Tool Co.	01046.04	29°44'10"/95°18'50"
Hughes Tool Co.	01046.05	29°44'10"/95°18'50"
Ideal Cement Co.	00456.01	29°43'40"/95°15'00"
Ideal Cement Co.	00456.02	29°43'40"/95°15'00"
Ideal Cement Co.	00456.03	29°43'40"/95°15'00"
Kocide Chemical Corp.	01260.01	29°37'10"/95°24'50"
Koppers Co., Inc.	01034.01	29°43'30"/95°12'30"

Segment 1006 (Houston Ship Channel)

Dischargers	WCO No.	Latitude/Longitude
Lone Star Industries, Inc.	00580.01	29°43'20"/95°16'00"
Lubrizol Corp.	00639.01	29°43'30"/95°13'50"
Lubrizol Corp.	00639.02	29°43'30"/95°13'50"
Magna Corporation	00761.01	29°40'10"/95°23'30"
Mecom & Proler Steel Corp.	01017.01	29°43'40"/95°15'30"
Merichem Company	00485.01	29°45'20"/95°10'30"
National Biscuit Company	01298.01	29°42'20"/95°23'00"
National Biscuit Company	01298.02	29°42'20"/95°23'00"
National Biscuit Company	01298.03	29°42'20"/95°23'00"
Olin Corporation	00649.04	29°44'30"/95°11'40"
Olin Corporation	00649.06	29°44'30"/95"11'40"
Parker Bros. & Co., Inc.	00801.01	29°45'20"/95°11'10"
Parker Bros. & Co., Inc.	00809.01	29°54'00"/95°18'30"
Pennwalt Chemical Corp.	00445.01	29°45'30"/95°10'50"
Petro Tex Chemical Corp.	00587.01	29°41'30"/95°15'30"
Petro Tex Chemical Corp.	00587.02	29°41'30"/95°15'30"
Petro Tex Chemical Corp.	00587.03	29°41'30"/95°15'30"
Petrolite Corp.-Petreco Div.	00347.01	29°42'40"/95°19'30"
Petrolite Corp.-Petreco Div.	00347.02	29°42'40"/95°19'30"
Phillips Petroleum Co.	00815.01	29°44'40"/95°10'40"
Phillips Petroleum Co.	00815.02	29°44'40"/95°10'40"
Phillips Petroleum Co.	00815.03	29°44'40"/95"10'40"
Phillips Petroleum Co.	00975.01	29°44'00"/95°18'30"
Pilot Industries of Texas, Inc.	01688.01	29°39'20"/95°15'00"
PPG Industries, Inc.	01224.01	29°47'40"/95°18'00"
PPG Industries, Inc.	01224.02	29°47'40"/95°18'00"
Premier Petrochemical Co.	01045.01	29°43'40"/95°11'40"
Proler Steel Corp.	01809.01	29°47'20"/95°17'30"
Proler Steel Corp.	01809.02	29°47'20"/95°17'30"
Reichhold Chemicals, Inc.	00662.01	29°46'00"/95°11'10"
Richardson Co.	01310.01	29°45'00"/95°07'20"
Robertson Terminals, Inc.	01662.01	29°43'20"/95°14'10"
Robertson Terminals, Inc.	01731.01	29°45'10"/95°05'50"
Rohm and Haas Co.	00458.01	29°43'40"/95°05'50"
Rohm and Haas Co.	00458.02	29°43'40"/95°05'50"
Rohm and Haas Co.	00458.03	29°43'40"/95°05'50"
Rollins Environmental Services	01429.01	29°43'50"/95°05'30"
Rollins Environmental Services	01429.02	29°43'50"/95°05'30"
Rollins Environmental Services	01429.03	29°43'50"/95°05'30"
Rollins Environmental Services	01429.04	29°43'50"/95°05'30"
Shell Chemical Co.	00402.01	29°43'00"/95°07'00"
Shell Chemical Co.	00402.02	29°43'00"/95°07'00"

Segment 1006 (Houston Ship Channel)

Dischargers	WCO No.	Latitude/Longitude
Shell Oil Co.	00403.01	29°43'50"/95°07'40"
Shell Oil Co.	00403.02	29°43'50"/95°07'40"
Shell Oil Co.	00403.03	29°43'50"/95°07'40"
Shell Oil Co.	00403.04	29°43'50"/95°07'40"
Shell Oil Co.	00403.05	29°43'50"/95°07'40"
Shell Oil Co.	00403.06	29°43'50"/95°07'40"
Shell Oil Co.	00403.07	29°43'50"/95°07'40"
Shell Oil Co.	00403.08	29°43'50"/95°07'40"
Shell Oil Co.	00403.09	29°43'50"/95°07'40"
Shell Oil Co.	00403.10	29°43'50"/95°07'40"
Shell Oil Co.	00403.11	29°43'50"/95°07'40"
Shell Oil Co.	00403.12	29°43'50"/95°07'40"
Sinclair Koppers Co.	00393.01	29°41'30"/95°15'30"
Southern Pacific Transportation Co.	01180.01	29°47'50"/95°17'20"
Southland Paper Mills, Inc.	01160.01	29°44'10"/95°07'40"
Stauffer Chemical Co.	00541.01	29°45'40"/95°11'20"
Stauffer Chemical Co.	00541.02	29°45'40"/95°11'20"
Stauffer Chemical Co.	00542.01	29°43'20"/95°16'20"
Stauffer Chemical Co.	01194.01	29°44'40"/95°11'00"
Superior Oil Co.	01232.01	29°44'10"/95°35'40"
S&R Oil Co.	01063.01	29°38'00"/95°30'10"
Tenneco Chemicals, Inc.	00002.01	29°44'00"/95°09'00"
Texaco, Inc.	00413.01	29°44'00"/95°12'50"
Texaco, Inc.	00413.02	29°44'00"/95°12'50"
Texaco, Inc.	00413.03	29°44'00"/95°12'50"
Texaco, Inc.	00413.04	29°44'00"/95°12'50"
Texaco, Inc.	01172.02	29°47'20"/95°20'40"
Texaco, Inc.	01172.04	29°47'20"/95°20'40"
Texas Instruments, Inc.	01225.01	29°38'20"/95°34'20"
Texsteam Corp.	01650.01	29°44'10"/95°18'50"
Todd Shipyards Corp.	01159.01	29°45'00"/95°10'20"
Truck Harbor, Inc.	01265.01	29°57'50"/95°25'20"
Tube Associates, Inc.	01423.01	29°50'40"/95°11'00"
Union Carbide Corp. (Linde Div.)	01173.01	29°43'00"/95°06'30"
Union Equity Coop Exchange	01205.01	29°45'00"/95°07'30"
United States Gypsum Co.	00353.01	29°43'20"/95°14'30"
US Plywood Champion Papers, Inc.	00640.02	29°43'20"/95°13'10"
US Plywood Champion Papers, Inc.	00640.03	29°43'20"/95°13'10"
Airport Realty Company	11145.01	29°53'00"/95°17'10"

Segment 1006 (Houston Ship Channel)

Dischargers	WCO No.	Latitude/Longitude
Airways Utility Company	11182.01	29°56'00"/95°20'30"
Aldine Independent School District	10953.01	29°54'20"/95°21'50"
Allen Field Enterprises	10980.01	29°58'50"/95°17'00"
Ashland Katy Company	11073.01	29°57'00"/95°22'20"
City of Bellaire	10550.01	29°44'20"/95°27'00"
Bissonnet Municipal Utility District	11461.01	29°40'30"/95°36'50"
Blue Belle Manor Utilities Co.	11473.01	29°54'00"/95°25'40"
Blue Ridge West Mun. Util. Dist.	11553.01	29°36'00"/95°30'30"
Brookfield Mun. Utility Dist.	11088.01	29°41'10"/95°35'30"
Chatwood Place, Inc.	10812.01	29°54'00"/95°18'52"
Harold A. Clark & Company	11161.01	29°57'10"/95°15'40"
Crest Sanitary Corporation	10436.01	29°54'20"/95°21'30"
Crest Sanitary Corporation	11158.01	29°55'30"/95°17'50"
J. A. Davenport	11228.01	29°54'40"/95°27'40"
City of Deer Park	10519.02	29°42'40"/95°07'00"
Douglas Utility Company	11200.01	29°56'10"/95°19'00"
El Dorado Utility District	11302.01	29°57'10"/95°15'40"
Emerald Forest Utility Dist.	11201.01	29°56'20"/95°33'30"
Fall Brook Utility District	10919.01	29°54'40"/95°25'50"
Flour Engrs. & Contractors, Inc.	11250.01	29°44'10"/95°06'00"
Forty Five Mt. Houston Center	11443.01	29°53'50"/95°24'40"
Galco Utilities Co.	10453.01	29°52'40"/95°23'00"
City of Galena Park	10831.01	29°44'10"/95°14'50"
City of Galena Park	10831.02	29°45'20"/95°13'00"
Golden Key Airport Inn	11272.01	29°58'30"/95°16'50"
Greenwood Utility District	11061.01	29°51'00"/95°13'30"
James Griffith PS DBA	11160.01	29°59'40"/95°18'30"
Harris Co. FWSD No. 006	10184.01	29°46'00"/95°06'30"
Harris Co. FWSD No. 045	10648.01	29°57'10"/95°24'30"
Harris Co. FWSD No. 047	10794.01	29°46'30"/95°09'30"
Harris Co. FWSD No. 051	10032.01	29°47'30"/95°09'00"
Harris Co. FWSD No. 063	00477 01	29°44'10"/95°36'20"
Harris Co. MUD No. 005	11238.01	29°57'00"/95°26'40"
Harris Co. MUD No. 011	11351.01	29°53'30"/95°27'30"
Harris Co. WCID	10570.01	29°37'50"/95°30'50"
Harris Co. WCID No. 021	10105.01	29°47'00"/95°06'20"
Harris Co. WCID No. 036	10012.01	29°46'10"/95°10'50"
Harris Co. WCID No. 069	10737.01	29°53'00"/95°17'10"
Harris Co. WCID No. 074	10679.01	29°54'00"/95°19'20"
Harris Co. WCID No. 076	10451.01	29°54'50"/95"17'30"

Segment 1006 (Houston Ship Channel)

Dischargers	WCO No.	Latitude/Longitude
Harris Co. WCID No. 078	10157.01	29°42'30"/95°34'50"
Harris Co. WCID No. 084	10558.01	29°48'00"/95°06'40"
Harris Co. WCID No. 090	10832.01	29°40'40"/95°34'20"
Harris Co. WCID No. 094	10761.01	29°42'00"/95°34'00"
Harris Co. WCID No. 096	11062.01	29°54'50"/95°14'40"
Harris Co. WCID No. 104	11019.01	29°41'50"/95°37'50"
Harris Co. WCID No. 109	11026.01	29°58'20"/95°29'40"
Harris Co. WCID No. 111	11128.01	29°40'00"/95°36'20"
Harris County Rehabilitation Center	10870.01	29°57'30"/95°14'00"
Jerry Hays	10694.01	29°54'50"/95°23'10"
Heather Glen Company	11231.01	29°54'40"/95°26'00"
Holiday Mobile Homes Park	10985.01	29°57'00"/95°24'00"
City of Houston	10336.01	29°56'10"/95°17'00"
City of Houston	10495.02	29°42'30"/95"15'30"
City of Houston	10495.03	29°37'50"/95°24'40"
City of Houston	10495.07	29°38'10"/95°28'30"
City of Houston	10495.09	29°38'40"/95°20'20"
City of Houston	10495.10	29°44'30"/95°16'10"
City of Houston	10495.14	29°51'10"/95°17'30"
City of Houston	10495.15	29°45'40"/95°16'30"
City of Houston	10495.16	29°50'40"/95°16'30"
City of Houston	10495.21	29°38'30"/95°12'30"
City of Houston	10495.22	29°38'30"/95°13'43"
City of Houston	10495.37	29°41'10"/95°27'00"
City of Houston	10495.41	29°47'40"/95°16'00"
City of Houston	10495.43	29°46'20"/95°11'50"
City of Houston	10495.45	29°51'10"/95°18'20"
City of Houston	10495.46	29°51'20"/95°17'50"
City of Houston	10495.50	29°38'50"/95°13'20"
City of Houston	10495.53	29°37'00"/95°27'00"
City of Houston	10495.65	29°38'40"/95°16'00"
City of Houston	10495.69	29°37'30"/95°29'50"
City of Houston	10495.71	29°51'40"/95°15'00"
City of Houston	10495.77	29°46'40"/95°12'50"
City of Houston	10495.78	29°57'40"/95°21'30"
City of Houston	10495.81	29°36'10"/95°28'20"
Houston Lighting & Power Co.	11555.01	29°46'30"/95°09'00"
Houston Lighting & Power Co.	11556.01	30°00'00"/95°16'20"
Hunterwood Mun. Util. District	11355.01	29°48'40"/95°12'10"
Imperial Valley Mun. Util. District	10756.01	29°55'40"/95°23'50"
City of Jacinto City	10195.01	29°46'00"/95°13'20"

Segment 1006 (Houston Ship Channel)

Dischargers	WCO No.	Latitude/Longitude
Jacintoport Corp.	11127.01	29°46'00"/95°08'40"
Jacintoport Corp.	11127.02	29°45'00"/95°06'40"
Jetero Hotel Development LTD	11069.01	29°58'00"/95°17'50"
Manning Utility District	11354.01	29°42'30"/95°35'10"
Mayflower Investment Co.	10699.01	29°53'40"/95°25'50"
Joe A. McDermott, Inc.	11082.01	29°53'40"/95°19'10"
Meadows MUD Of Ft. Bend Co.	11039.01	29°39'20"/95°35'10"
A. J. Nitsch	10419.01	29°52'40"/95°23'10"
North Forest Mun. Util. Dist.	10905.01	30°00'10"/95°26'30"
North Gate Utility District	11373.01	29°56'50"/95°24'10"
Northline Corporation	10518.01	29°52'30"/95°24'20"
Oakwilde Water Co.	10236.01	29°52'20"/95°24'30"
Parkglen Mun. Util. District	10906.01	29°39'30"/95°34'20"
City of Pasadena	10053.01	29°43'00"/95°13'20"
City of Pasadena	10053.02	29°42'39"/95°09'40"
City of Pasadena	10053.03	29°39'50"/95°08'30"
City of Pasadena	10053.04	29°38'00"/95°11'00"
City of Pasadena	10053.05	29°42'30"/95°15'30"
Peoples Utility Co.	11255.01	29°52'30"/95°20'20"
C. L. Powell	10825.01	29°54'10"/95°24'00"
Properties International, Inc.	11066.01	29°48'40"/95°12'30"
Bruce J. Robbins	11067.01	29°50'20"/95°14'00"
Royalwood MUD	10608.01	29°50'10"/95°11'30"
Royalwood MUD	10608.02	29°50'10"/95°11'30"
Sentinel American Life Ins. Co.	11083.01	29°57'20"/95°25'30"
Sequoia Improvement District	10785.01	29°55'10"/95°18'40"
Sheldon ISD	11004.01	29°51'00"/95°12'30"
City of South Houston	10287.01	29°40'10"/95°14'00"
Southern Sanitary Corp.	10610.01	29°54'10"/95°25'00"
City of Southside Place	10712.01	29°42'20"/95°26'00"
Spring Ind. School District	11237.01	30°00'20"/95°27'10"
Standley Util. Serv. Corp.	10854.01	29°46'10"/95°09'20"
Strathmore Building Co.	11453.01	29°52'10"/95°14'50"
Texas Parks & Wildlife Dept.	11214.01	27°44'50"/95°04'20"
United Inns, Inc.	11159.01	29°56'20"/95°19'50"
Urban Utility Co.	11154.01	29°54'30"/95°26'50"
West Road Improvement District	10809.01	29°55'40"/95°24'30"
City of West University Place	10058.01	29°41'50"/95°25'10"
Westheimer Road Mun. Util. District	10912.01	29°44'20"/95°38'10"
Wheel Inn, Inc.	11056.01	29°56'40"/95°36'00"
Yancy-Richardson Investments	11376.01	29°55'50"/95°17'00"
Carl Zucker Investments	11055.01	29°58'10"/95°17'40"

Segment 1007 (Houston Ship Channel)

Dischargers	WCO No.	Latitude/Longitude
American Porcelain Enameling	01851.01	29°47'20"/95°26'50"
Brown Oil Tools	00687.01	29°47'30"/95°29'20"
Brown Oil Tools	00687.02	29°47'30"/95°29'20"
Brown Oil Tools	00687.03	29°47'30"/95°29'20"
Cameron Iron Works	00357.01	29°47'10"/95°27'40"
Cameron Iron Works	00357.02	29°47'10"/95°27'40"
Cameron Iron Works	00357.03	29°47'10"/95°27'40"
Cameron Iron Works	01402.01	29°56'10"/95°39'20"
Celotex Corporation	00660.01	29°47'40"/95°27'30"
Cook Paint & Varnish Co.	00427.01	29°46'20"/95°23'10"
Dresser Systems, Inc.	00469.01	29°43'50"/95°33'30"
General Portland Cement Co.	00312.01	29°45'30"/95°20'00"
Gulf Coast Portland Cement	01021.01	29°45'10"/95°18'20"
Horton and Horton Inc.	00683.01	29°45'40"/95°20'30"
Houston Lighting & Power Co.	01033.01	29°45'50"/95°21'10"
Houston Natural Gas Corp.	01743.01	29°45'20"/95°22'00"
Houston Natural Gas Corp.	01743.02	29°45'20"/95°22'00"
J. W. Jones, Inc.	01801.01	29°46'00"/95°10'50"
Ladish Company - Texas Div.	01544.01	29°47'00"/95°33'50"
Lead Products Co. Inc.	01030.01	29°45'30"/95°20'00"
Missouri Kansas Texas RR	01197.01	29°48'00"/95°25'10"
Murray Rubber Co.	01222.01	29°52'40"/95°37'20"
National Supply Div.	01036.01	29°45'00"/95°18'40"
Parker Bros. & Co., Inc.	00668.01	29°43'10"/95°31'50"
Parker Bros. & Co., Inc.	00797.01	29°50'00"/95°30'20"
Parker Bros. & Co., Inc.	00806.01	29°45'00"/95°19'00"
Phillips Petroleum Co.	01061.01	29°45'52"/95°18'15"
Reddy Ice Division	01279.01	29°46'00"/95°21'40"
Reed Tool Company	00635.01	29°45'20"/95°18'10"
Shell Development Co.	01690.01	29°47'00"/95°37'20"
Southern Pacific Transportation Co.	01181.01	29°46'20"/95°21'00"
Stran Steel Corp.	01259.01	29°52'40"/95°35'20"
Swift Agricultural Chemical Corp.	01421.01	29°46'50"/95°24'30"
Uvalde Rock Asphalt Co.	00785.01	29°46'20"/95°23'20"
Brittmore Utility, Inc.	11193.01	29°52'00"/95°34'00"
N. V. Cameo	11051.01	29°52'50"/95°32'10"
Chicago Bridge & Iron Co.	11389.01	29°54'40"/95°31'30"
Green Ridge MUD	10960.01	29°36'10"/95°28'40"
Gulf Coast Waste Disposal Authority	11538.01	29°53'10"/95°33'00"

Segment 1007 (Houston Ship Channel)

Dischargers	WCO No.	Latitude/Longitude
Harris Co. FWSD No. 061	10876.01	29°56'20"/95°37'20"
Harris Co. MUD No. 006	11273.01	29°54'20"/95°30'50"
Harris Co. MUD No. 023	11485.01	29°52'40"/95°31'10"
Harris Co. MUD No. 070	11486.01	29°52'50"/95°41'20"
Harris Co. WCID No. 133	11153.01	29°55'00"/95°29'40"
Harris Co. WCID No. 134	11152.01	29°47'00"/95°45'10"
Harris County	10932.01	29°49'50"/95°37'30"
City of Houston	10495.01	29°45'20"/95°19'10"
City of Houston	10495.23	29°48'30"/95°17'30"
City of Houston	10495.29	29°46'27"/95°29'10"
City of Houston	10495.30	29°45'50"/95°33'40"
City of Houston	10495.44	29°43'20"/95°33'10"
City of Houston	10495.47	29°38'40"/95°22'10"
City of Houston	10495.49	29°37'20"/95°21'50"
City of Houston	10495.76	29°50'40"/95°27'40"
City of Houston	10495.84	29°46'00"/05°36'00"
City of Houston	10495.85	29°46'20"/95°37'10"
Jackrabbit Rd. Public Utility District	11290.01	29°49'50"/95°39'20"
City of Jersey Village	10680.01	29°53'10"/95°33'00"
City of Katy	10706.01	29°46'30"/95°49'30"
Katy Independent School District	11124.01	29°46'40"/95°38'40"
Larfin Corporation	11375.01	29°52'40"/95°31'50"
Memorial Villages Water Authority	10584.01	29°44'50"/95°30'30"
Mischer Corp.	11093.01	29°52'40"/95°31'30"
Park 10 Municipal Utility District	11455.01	29°47'30"/95°41'20"
Rolling Fork Public Utility District	11188.01	29°53'20"/95°32'00"
Gary S. Sequeira	11414.01	29°52'40"/95°37'10"
Sherwood Oaks Utilities, Inc.	10559.01	29°48'11"/95°34'50"
Spencer Road Public Utility District	11472.01	29°52'40"/95°37'30"
United Salt Corporation	11243.01	29°34'50"/95°29'34"
West Montgomery Utility Co., Inc.	11005.01	29°53'10"/95°27'40"
Westlake Municipal Utility District No. 1	11284.01	29°48'10"/95°42'20"

Segment 1007 (Houston Ship Channel)

Dischargers	WCO No.	Latitude/Longitude
Westway Utility District	11330.01	29°50'40"/95°30'50"
White Oak Municipal Utility District	11207.01	29°52'40"/95°29'50"
White Oaks Developing Co.	10620.01	29°52'00"/95°28'00"

Segment 2426 (Tabbs Bay)

Dischargers	WCO No.	Latitude/Longitude
Helmerick & Payne, Inc.	01385.01	29°45'40"/95°00'50"
Marbon Chemical Division	01206.01	29°45'50"/95°01'10"
Robertson Tank Lines, Inc.	01593.01	29°46'30"/95°00'50"
City of Baytown	10395.02	29°43'40"/95°59'50"
City of Baytown	10395.06	29°45'20"/95°01'30"
Harris Co. FWSD No. 001A	11195.01	29°48'20"/95°01'00"

Segment 2427 (San Jacinto Bay)

Dischargers	WCO No.	Latitude/Longitude
Air Products & Chemicals Inc.	01280.01	29°42'10"/95°04'10"
E. I. DePont De Nemours & Co.	00474.01	29°42'00"/95°01'50"
Grief Brothers Corp.	01217.01	29°04'00"/95°41'10"
Houston Lighting & Power Co.	01026.01	29°43'30"/95°03'30"
Ohmstede Machine Works, Inc.	01318.01	29°41'20"/95°02'20"
Pearsall Chemical Co.	01785.01	29°42'10"/95°04'30"
Southwest Chemical & Plastics Co.	01229.01	29°42'10"/95°04'30"
U. S. Industrial Chemical Co.	00534.01	29°42'40"/95°04'05"
U. S. Industrial Chemical Co.	00534.02	29°42'40"/95°04'05"
The Upjohn Company	00663.01	29°43'20"/95°05'00"
R. G. Florence	10725.01	29°41'10"/95°01'40"

Segment 2429 (Scott Bay)

Dischargers	WCO No.	Latitude/Longitude
Ashland Chemical Co.	00549.01	29°45'20"/95°01'30"
Exxon Chemical Company USA	01215.01	29°43'50"/95°01'00"

Segment 2430 (Burnett Bay)

Dischargers	WCO No.	Latitude/Longitude
SMS Industries, Inc.	01062.01	29°49'00"/95°03'10"
City of Baytown	10395.05	29°45'50"/95°02'10"
Texas Highway Dept.	10842.01	29°47'40"/95°02'30"

Segment 2436 (Barbours Cut)

Dischargers	WCO No.	Latitude/Longitude
City of Morgans Point	10779.01	29°40'50"/95°00'30"

ATTACHMENT C

A Policy for Effluent Standards for Domestic Wastewater Treatment Plants *(As Revised)*

Approved by THE TEXAS WATER QUALITY BOARD
February 26, 1975

INTRODUCTION

Various attempts have been made at the staff level, in the past several years, to describe effluent quality requirements for sanitary sewage treatment plants, particularly for those discharging into sensitive water quality areas. As a result of these efforts, many variations in effluent quality criteria have appeared in waste control orders describing similar plants with similar treatment requirements based on water quality needs. The N.P.D.E.S. program instituted by the Federal Water Quality Act Amendments of 1972 wherein a federal permit must be issued to all waste dischargers offers a singular opportunity to improve the existing situation. From the standpoint of proper management of a system of permits, or waste control orders, and with the onset of federal regulations and standards for municipal effluents, it now appears appropriate to promulgate a set of effluent quality standards which would be consistent with given classes of treatment processes and which would be applied as necessary to meet treatment requirements based on water quality conditions.

"Secondary Treatment" by a publicly owned treatment plant is being defined by EPA as reduction to the following effluent quality:

	30-Day Average	7-Day Average
BOD, mg/l	30	45
Suspended Solids (TSS), mg/l	30	45
Fecal Coliform, Number/100 ml*	200	400
pH, units	Within limits of 6.0-9.0	

*Geometric Mean

Furthermore, in this definition, the reduction of BOD and TSS through a treatment plant shall be a minimum of 85 percent.

Based on substantial experience in enforcing a secondary treatment requirement for wastewater treatment plants, it is generally accepted, by the Board, that a higher quality of effluent, i.e., 20 mg/l of BOD and TSS, should be expected from most sewage treatment plants. Furthermore, it has been recognized that maintenance of water quality standards will, in many locations, require even higher effluent quality standards.

Pursuant to the requirements of the federal law, the Texas Water Quality Board has established a State Water Quality Management Program and a Continuing Planning Process which set forth the strategy and procedures for accomplishing the management program's objectives. Essential elements of the program comprise basin planning and waste load allocations by basin segments. In order to achieve compliance with water quality standards within certain segments, it is necessary to establish effluent quality standards for basic secondary treatment plants as well as for the "tertiary" treatment processes required to protect water quality. Of necessity, due to time restrictions, the basin planning is proceeding on the basis of assumptions regarding possible quality conditions which could be imposed for wastewater treatment plant effluents.

RATIONALE FOR EFFLUENT SETS

Realistically, it is not ordinarily possible to decrease the concentration of a pollutant in wastewater from its initial concentration in the raw wastewater to the concentration desired as is shown in Figure 1.

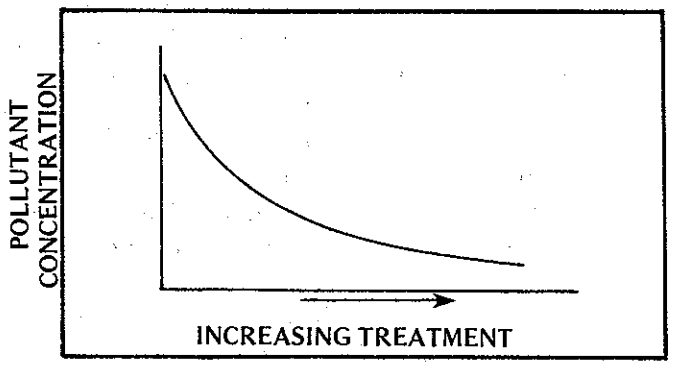

FIGURE 1

Rather, the pollutant concentration is decreased either gradually, as the limitation of a particular unit process is approached, or stepwise, as additional unit processes are employed. This is illustrated in Figure 2.

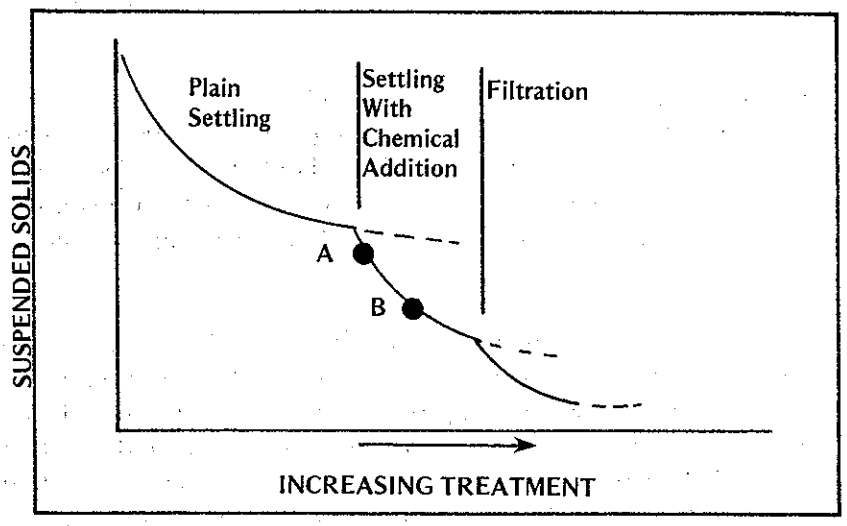

FIGURE 2

Effluent criteria specified in permits should recognize the manner in which pollutant concentrations respond to various treatment processes. A pollutant concentration beyond the capability of one unit process, while not adequately utilizing the potential of the next unit process, should not ordinarily be specified. Point A on Figure 2 would be such a point. Engineering judgement would ordinarily dictate specifying Point B which utilizes the majority of the process capability, avoids the diminishing return portion of the curve beyond Point B, and allows for the normal variations in plant efficiencies due to the influences of operational modes, seasonal and climatic differences, etc. The proposed effluent numbers are intended to provide for such an approach to waste treatment.

With the objectives of avoiding irrational and random variations in effluent criteria and of enumerating sets of effluent criteria for use under defined circumstances, the following effluent standards table and instructions have been prepared. When occasions arise where departures from a uniform set of effluent criteria are indicated, as will undoubtedly be the case, departures will be fully justified in a hearing commission report or other appropriate document. Slight adjustments to existing orders are indicated in the "Instructions"; however, these will not appreciably impact enforcement of presently existing permit conditions.

INSTRUCTIONS

A. N.P.D.E.S. Permits for Existing Waste Control Orders

1) Effluent Limitation Segment

Oxygen Resources: Use Effluent Set 1 to replace existing 18/18 and 20/20 permits for other than oxidation pond systems.

2) Water Quality Segment

Oxygen Resources: Where a waste load allocation has been completed, use the first effluent set meeting allocation. If no allocation yet made and permit must be written, use Set 2 to replace 16/16, 12/12 and 10/10 permit, and Set 4 to replace 5/5 permits.

B. N.P.D.E.S. Permits for New Sources

1) Effluent Limitation Segment

Oxygen Resources: Compute stream assimilative capacity, compare Effluent Set 1 with allowable capacity and evaluate effects on stream quality and local conditions; if no conflict would result, use Effluent Set 1. If required due to immediate impact, adjust to appropriate higher Effluent Set.

2) Water Quality Segment

Oxygen Resources: Compare load based on Effluent Set 1 with load allocation for segment and evaluate effects on stream quality and local conditions; if no conflict would result, use Set 1. If necessary to satisfy above conditions, use appropriate higher Effluent Set.

C. Disinfection and Discharges into Certain Reservoirs

Any discharge made within five miles of a reservoir or lake covered by a septic tank Board Order or which serves as a source for domestic drinking water, shall be governed by Effluent Set 2 and A. Five miles shall be measured in stream miles and will be measured from the normal conservation pool elevation. Any departures from this instruction will be fully justified in a hearing commission report or other appropriate document. Disinfection for all dischargers shall be as outlined in Effluent Set A.

TABLE 1
EFFLUENT STANDARDS FOR DOMESTIC WASTEWATER TREATMENT PLANTS

	Effluent Set	30-Day Average BOD	TSS	NH_3 N	P	F.C. (5)	7-Day Average BOD	TSS	NH_3 N	P	F.C. (5)	24-Hr. Composite BOD	TSS	NH_3 N	P	Grab Samples Column I (1) BOD	TSS	NH_3 N	P	Column II (2) BOD	TSS	NH_3 N	P	O_2	Cl_2 (3)	t (4)
Oxygen Demand	0	30	30	-	-	-	45	45	-	-	-	70	70	-	-	50	50	-	-	100	100	-	-	-	-	-
	1	20	20	-	-	-	30	30	-	-	-	45	45	-	-	35	35	-	-	65	65	-	-	-	-	-
	2	10	15	-	-	-	15	25	-	-	-	25	40	-	-	20	25	-	-	35	60	-	-	2	-	-
	3	5	10	-	-	-	10	20	-	-	-	20	35	-	-	10	20	-	-	30	60	-	-	4	-	-
	4	5	5	-	-	-	10	10	-	-	-	20	20	-	-	10	10	-	-	30	30	-	-	4	-	-
	2-N	10	15	5	-	-	15	25	10	-	-	25	40	15	-	20	25	15	-	35	60	15	-	2	-	-
	3-N	5	10	5	-	-	10	20	10	-	-	20	35	15	-	10	20	15	-	30	60	15	-	4	-	-
	4-N	5	5	3	-	-	10	10	6	-	-	20	20	10	-	10	10	8	-	30	30	15	-	4	-	-
Disinfection	A(6)	-	-	-	-	200	-	-	-	-	400	-	-	-	-	-	-	-	-	-	-	-	-	-	1	20
Nutrient Removal	3-P	5	10	-	2	-	10	20	-	4	-	20	35	-	7	10	20	-	4	30	60	-	10	4	-	-
	4-P	5	5	-	1	-	10	10	-	2	-	20	20	-	4	10	10	-	2	30	30	-	6	4	-	-

(1) When examining 5 consecutive grab samples randomly collected on separate days by the same entity, the pollutant concentration shall not exceed the specified level.
(2) Single grab sample (instantaneous) limit
(3) Not less than
(4) Detention time in minutes
(5) Log. average fecal coliform organisms per 100 ml
(6) Any combination of detention time and chlorine residual where the product of Cl_2 (mg/l) x t (min.) equals or exceeds 20 is satisfactory except that the minimum detention time shall be 20 minutes and the minimum residual shall be 0.5 mg/l. If the required chlorination criteria do not achieve the fecal coliform count required by the permit, a modification of disinfection requirements may be necessary.

Treatment Process Corresponding to Effluent Set

Set 0 - oxidation ponds (existing ponds only)
1 - secondary (conventional design)
2 - modified secondary (enhanced solids separation)
3 - set 2 with chemical addition
4 - set 3 with filters

Set 2-N - set 2 with biological nitrification
3-N - set 3 with biological nitrification
4-N - set 4 with biological nitrification
3-P - chemical addition in biological process
4-P - chemical precipitation after biological treatment

ATTACHMENT D

ATTACHMENT D

This attachment includes the Schedule of Implementation for the waste load allocation and a separate, more detailed municipal compliance schedule. The Schedule of Implementation is divided by water quality segment, and the individual dischargers are grouped into either municipal or industrial categories within each segment.

For industrial entities with multiple waste outfalls, no attempt was made to distribute the allowable load among the various discharge locations. The listed allowable waste load is based on total plant production and represents the entire allowable discharge for that entity, excluding any stormwater discharges and noncontact cooling water. For convenience, the allowable load is listed under the first page of each company's waste control order.

The following explanatory notes refer to the numbered footnotes included in the Schedule of Implementation:

1* Recommended treatment levels refer to the effluent standards established by the Texas Water Quality Board for domestic wastewater treatment plants. A description of these standards is included as Attachment C.

2* Administratively inactive waste control order.

3* Permit value may be calculated based on methodology presented herein. Only the principal industrial allowable waste discharges have been calculated for this evaluation report.

4* Waste treated at Gulf Coast Waste Disposal Authority's Washburn Tunnel Plant.

5* **Discharge should not occur during critical flow conditions.**

Municipal Compliance Schedule

The permits issued to municipal dischargers contain the following compliance schedule:

A. For those dischargers not included on the FY 1975 Municipal Facilities Construction Grant Priority Funding List, the following schedule applies.

1. By October 31, 1974, apply for Step 1 Grant for initiating evaluation and design of facilities required to meet the level of treatment recommended in this document pursuant to the requirements of PL 92-500.
2. By October 31, 1975, apply for Step 2 Grant for preparation of plans and specifications for facilities selected to achieve the objective of the Step 1 Grant.
3. By October 31, 1976, apply for Step 3 Grant to construct required facilities.
4. By May 1, 1977, begin construction on required facilities.
5. By May 1, 1979, complete required facilities.

B. For those dischargers included on the FY 1975 Municipal Facilities Construction Grant Priority Funding List for a Step 1 Grant, the following schedule applies.

1. By March 1, 1975, apply for Step 2 Grant for preparation of plans and specifications for facilities selected to achieve the objectives of the Step 1 Grant.
2. By March 1, 1976, apply for Step 3 Grant to construct required facilities.
3. By October 1, 1976, begin construction on required facilities.
4. By October 1, 1978, complete required facilities.

C. For those dischargers included on the FY 1975 Municipal Facilities Construction Grant Priority Funding List for a Step 2 Grant, the following schedule applies.

1. By March 1, 1975, apply for Step 3 Grant to construct required facilities.
2. By October 1, 1975, begin construction on required facilities.
3. By October 1, 1977, complete required facilities.

D. For those dischargers included on the FY 1975 Municipal Facilities Construction Grant Priority Funding List for a Step 3 Grant, the following schedule applies.

1. By October 1, 1974, begin construction on required facilities.
2. By October 1, 1976, complete required facilities.

SCHEDULE OF IMPLEMENTATION

Segment 1005 (Houston Ship Channel) Municipal Waste Dischargers

Waste Source	WCO No.	Recommended Treatment Level 1.*	Target Implementation Date
City of Baytown	10395.04	2	1979
City of Morgans Point	10779.01	2	1979

Segment 1005 (Houston Ship Channel) Industrial Waste Dischargers

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
Celanese Plastics Co.	00544.01	3*	3*	1977
Diamond Shamrock Corp	01000.01	3*	3*	1977
Diamond Shamrock Corp.	01539.01	3*	3*	1977
Exxon Company, U.S.A.	00592.01	2434	1102	1977
Exxon Company, U.S.A.	00592.02	-	-	1977
Tenneco Oil Company	00440.01	3*	3*	1977
Texas Alkyls Inc.	01689.01	3*	3*	1977
Texas Highway Dept.	01786.01	3*	3*	1977

Segment 1006 (Houston Ship Channel) Municipal Waste Dischargers

Waste Source	WCO No.	Recommended Treatment Level[1.*]	Target Implementation Date
Airport Realty Company	11145.01	2	1979
Airways Utility Company	11182.01	2	2*
Aldine Independent School District	10953.01	2	2*
Allen Field Enterprises	10980.01	2	1979
Ashland Katy Company	11073.01	2	1979
City of Bellaire	10550.01	2	1979
Bissonnet Municipal Utility District	11461.01	2	1979
Blue Belle Manor Utilities Co.	11473.01	2	1979
Blue Ridge West Mun. Utility District	11553.01	2	1979
Brookfield Municipal Utility District	11088.01	2	1979
Chatwood Place, Inc.	10812.01	2	1979
Harold A. Clark & Co.	11161.01	2	1979
Crest Sanitary Corp.	10436.01	2	1979
Crest Sanitary Corp.	11158.01	2	1979
J. A. Davenport	11228.01	2	2*
City of Deer Park	10519.02	2	1979
Douglas Utility Company	11200.01	2	1979
El Dorado Utility Dist.	11302.01	2	1979
Emerald Forest Utility District	11201.01	2	2*
Fallbrook Utility Dist.	10919.01	2	1979
Flour Engineers & Contractors, Inc.	11250.01	2	1979
Forty Five Mt. Houston Center	11443.01	2	1979
Galco Utilities Co.	10453.01	2	1979
City of Galena Park	10831.01	2	1979
City of Galena Park	10831.02	2	1979
Golden Key Airport Inn	11272.01	2	1979
Greenwood Utility Dist.	11061.01	2	1979
James Griffith PS DBA	11160.01	2	1979
Harris County FWSD No. 006	10184.01	2	1978
Harris Co. FWSD No. 045	10648.01	2	1979

Segment 1006 (Houston Ship Channel) Municipal Waste Dischargers

Waste Source	WCO No.	1.* Recommended Treatment Level	Target Implementation Date
Harris Co. FWSD No. 047	10794.01	2	1979
Harris Co. FWSD No. 051	10032.01	2	1979
Harris Co. MUD No. 005	11238.01	2	1979
Harris Co. MUD No. 011	11351.01	2	1979
Harris Co. WCID	10570.01	2	1979
Harris Co. WCID No. 021	10105.01	2	1979
Harris Co. WCID No. 036	10012.01	2	1979
Harris Co. WCID No. 069	10737.01	2	1979
Harris Co. WCID No. 074	10679.01	2	1979
Harris Co. WCID No. 076	10451.01	2	1979
Harris Co. WCID No. 078	10157.01	2	1979
Harris Co. WCID No. 084	10558.01	2	1979
Harris Co. WCID No. 090	10832.01	2	1979
Harris Co. WCID No. 094	10761.01	2	1979
Harris Co. WCID No. 096	11062.01	2	1979
Harris Co. WCID No. 104	11019.01	2	1979
Harris Co. WCID No. 109	11026.01	2	1979
Harris Co. WCID No. 111	11128.01	2	1979
Harris County Rehabilitation Center	10870.01	2	1979
Jerry Hays	10694.01	2	1979
Heather Glen Company	11231.01	2	1979
Holiday Mobile Homes Park	10985.01	2	1979
City of Houston	10336.01	2	1979
City of Houston	10495.02	2N	1979
City of Houston	10495.03	2	1978
City of Houston	10495.07	2	1979
City of Houston	10495.09	2	1979
City of Houston	10495.10	2	1979
City of Houston	10495.14	2	1979
City of Houston	10495.15	2	1979
City of Houston	10495.16	2	1979
City of Houston	10495.21	2	1979
City of Houston	10495.22	2	1979
City of Houston	10495.37	2	1979
City of Houston	10495.41	2	1979
City of Houston	10495.43	2	1979
City of Houston	10495.45	2	1979

Segment 1006 (Houston Ship Channel) Municipal Waste Dischargers

Waste Source	WCO No.	1.* Recommended Treatment Level	Target Implementation Date
City of Houston	10495.46	2	1979
City of Houston	10495.50	2	1979
City of Houston	10495.53	2	1979
City of Houston	10495.65	2	1977
City of Houston	10495.69	2	1979
City of Houston	10495.71	2	1979
City of Houston	10495.77	2	1979
City of Houston	10495.78	2	1979
City of Houston	10495.81	2	1979
Houston Lighting & Power Co.	11555.01	2	1977
Houston Lighting & Power Co.	11556.01	2	1977
Hunterwood Mun. Utility District	11355.01	2	2*
Imperial Valley Mun. Utility District	10756.01	2	1979
City of Jacinto City	10195.01	2	1979
Jacintoport Corp.	11127.01	2	1979
Jacintoport Corp.	11127.02	2	1979
Jetero Hotel Development LTD	11069.01	2	1979
Manning Utility Dist.	11354.01	2	2*
Mayflower Investment Company	10699.01	2	1979
Joe A. McDermott, Inc.	11082.01	2	1979
Meadows MUD of Ft. Bend Co.	11039.01	2	1979
A. J Nitsch	10419.01	2	1979
North Forest Municipal Utility District	10905.01	2	1979
Northgate Utility Dist.	11373.01	2	2*
Northline Corporation	10518.01	2	1979
Oakwilde Water Co.	10236.01	2	1979
Parkglen Municipal Utility Dist.	10906.01	2	1979
City of Pasadena	10053.01	2	1977
City of Pasadena	10053.02	2	1979
City of Pasadena	10053.03	2	1979
City of Pasadena	10053.04	2	1979

Segment 1006 (Houston Ship Channel) Municipal Waste Dischargers

Waste Source	WCO No.	Recommended Treatment Level 1.*	Target Implementation Date
City of Pasadena	10053.05	2	1979
Peoples Utility Co.	11255.01	2	1979
C. L. Powell	10825.01	2	1979
Properties International Inc.	11066.01	2	1979
Bruce J. Robbins	11067.01	2	1979
Royalwood MUD	10608.01	2	2*
Royalwood MUD	10608.02	2	2*
Sentinel American Life Insurance Co.	11083.01	2	1979
Sequoia Improvement District	10785.01	2	1979
Sheldon ISD	11004.01	2	1979
City of South Houston	10287.01	2	1979
Southern Sanitary Corp.	10610.01	2	1979
City of Southside Place	10712.01	2	1979
Spring Ind. School District	11237.01	2	1979
Standley Utility Serv. Corp.	10854.01	2	1979
Strathmore Building Co.	11453.01	2	2*
Texas Parks & Wildlife Dept.	11214.01	2	1979
United Inns, Inc.	11159.01	2	1979
Urban Utility Co.	11154.01	2	1979
West Road Improvement District	10809.01	2	1979
City of West University Place	10058.01	2	1979
Westheimer Road Mun. Utility District	10912.01	2	1979
Wheel Inn, Inc.	11056.01	2	1979
Yancey-Richardson Investments	11376.01	2	1979
Carl Zucker Investments	11055.01	2	1979

Segment 1006 (Houston Ship Channel) Industrial Waste Dischargers

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
Airco Welding Products	00655.01	3*	3*	1977
Amerada Hess Corp.	00671.01	3*	3*	1977
Anchor Hocking Glass Corp.	01170.01	3*	3*	1977
Armco Steel Corporation	00509.01	88	31	1977
Armco Steel Corporation	00509.02	-	-	1977
Armco Steel Corporation	00509.03	-	-	1977
Armco Steel Corporation	00509.04	-	-	1977
Armco Steel Corporation	00509.05	-	-	1977
Armco Steel Corporation	00509.06	-	-	1977
Armco Steel Corporation	00509.07	-	-	1977
Armco Steel Corporation	00509.08	-	-	1977
Armco Steel Corporation	00509.09	-	-	1977
Armco Steel Corporation	00509.10	-	-	1977
Armco Steel Corporation	00509.11	-	-	1977
Ashbrook Corporation	01536.01	3*	3*	1977
Atlantic Richfield Co.	00392.01	4*	4*	1977
Atlantic Richfield Co.	00392.02	4*	4*	1977
Atlantic Richfield Co.	00392.03	4*	4*	1977
Atlantic Richfield Co.	00392.04	4*	4*	1977
Atlantic Richfield Co.	00392.05	4*	4*	1977
Atlantic Richfield Co.	00392.06	4*	4*	1977
C. F. Braun and Co.	01707.01	3*	3*	1977
Cargill Inc.	01247.01	3*	3*	1977
Charter International Oil Co.	00535.01	152	134	1977
Charter International Oil Co.	00535.02	-	-	1977
Chemical Exchange Processing Co.	00786.01	3*	3*	1977
Coastal Transport Co., Inc.	01706.01	3*	3*	1977
Crown Central Petro Corp.	00574.01	4*	4*	1977

Segment 1006 (Houston Ship Channel) Industrial Waste Dischargers

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
Crown Central Petro Corp.	00574.02	4*	4*	1977
Crown Central Petro Corp.	00574.03	4*	4*	1977
C-B Southern	01583.01	3*	3*	1977
Diamond Paint Co.	01538.01	3*	3*	1977
Diamond Shamrock Corp.	00305.01	3*	-	1977
Diamond Shamrock Corp.	00305.02	-	-	1977
Diamond Shamrock Corp.	00305.03	-	-	1977
Diamond Shamrock Corp.	00305.04	-	-	1977
Diamond Shamrock Corp.	00305.05	-	-	1977
Diamond Shamrock Corp.	00749.01	3*	3*	1977
Dresser Industries, Inc.	01262.01	3*	3*	1977
Dresser Industries, Inc.	01262.02	3*	3*	1977
Dresser Magcobar	01211.01	3*	3*	1977
Dundee Cement Co.	01585.01	3*	3*	1977
Dundee Cement Co.	01585.02	3*	3*	1977
Eastern Products Corp.	01533.01	3*	3*	1977
Eddy Refining Co.	01018.01	2*	2*	1977
Ethyl Corporation	00492.01	512	191	1977
Ethyl Corporation	00492.02	-	-	1977
Ethyl Corporation	00492.03	-	-	1977
Exxon Chemical Company USA	00610.01	3*	3*	1977
Gen. American Transportation	01308.01	3*	3*	1977
Gen. American Transportation	01308.02	-	-	1977
Gen. American Transportation	01586.01	3*	3*	1977
Goodpasture, Inc.	00733.01	3*	3*	1977
Goodpasture, Inc.	00733.02	-	-	1977
Goodpasture, Inc.	00733.03	-	-	1977
Goodyear Tire & Rubber Co.	00520.01	324	383	1977
Goodyear Tire & Rubber Co.	00520.02	-	-	1977

Segment 1006 (Houston Ship Channel) Industrial Waste Dischargers

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
Gulf Coast Waste Disposal Authority	01740.01	7001	1446	1977
Gulf Oil Co-US	01745.01	3*	3*	1977
Gulf States Asphalt Co., Inc.	01058.01	3*	3*	1977
Harris Co. FWSD No. 63	00477.01	3*	3*	1977
Horton and Horton, Inc.	00839.01	3*	3*	1977
City of Houston	01788.01	3*	3*	1977
Houston Lighting & Power Co.	01027.01	3*	3*	1977
Houston Lighting & Power Co.	01031.01	3*	3*	1977
Houston Lighting & Power Co.	01031.02	-	-	1977
Houston Lighting & Power Co.	01032.01	3*	3*	1977
Houston Lighting & Power Co.	01032.02	-	-	1977
Houston Lighting & Power Co.	01032.03	-	-	1977
Houston Lighting & Power Co.	01032.04	-	-	1977
Houston Lighting & Power Co.	01032.05	-	-	1977
Houston Lighting & Power Co.	01039.01	3*	3*	1977
Houston Natural Gas	01286.01	3*	3*	1977
Hughes Tool Co.	01046.01	3*	3*	1977
Hughes Tool Co.	01046.02	-	-	1977
Hughes Tool Co.	01046.03	-	-	1977
Hughes Tool Co.	01046.04	-	-	1977
Hughes Tool Co.	01046.05	-	-	1977
Ideal Cement Co.	00456.01	3*	3*	1977
Ideal Cement Co.	00456.02	-	-	1977
Ideal Cement Co.	00456.03	-	-	1977
Kocide Chemical Corp.	01260.01	3*	3*	1977
Koppers Co., Inc.	01034.01	3*	3*	1977
Lone Star Industries, Inc.	00580.01	3*	3*	1977
Lubrizol Corp.	00639.01	50	108	1977
Lubrizol Corp.	00639.02	-	-	1977
Magna Corporation	00761.01	3*	3*	1977

Segment 1006 (Houston Ship Channel) Industrial Waste Dischargers

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
Mecom & Proler Steel Corp.	01017.01	3*	3*	1977
Merichem Company	00485.01	3*	3*	1977
National Biscuit Company	01298.01	3*	3*	1977
National Biscuit Company	01298.02	-	-	1977
National Biscuit Company	01298.03	-	-	1977
Olin Corporation	00649.04	5*	5*	1977
Olin Corporation	00649.06	-	-	1977
Parker Bros & Co., Inc.	00801.01	3*	3*	1977
Parker Bros & Co., Inc.	00809.01	-	-	1977
Pennwalt Chem. Corp.	00445.01	3*	3*	1977
Petro Tex Chemical Corp.	00587.01	1360	151	1977
Petro Tex Chemical Corp.	00587.02	-	-	1977
Petro Tex Chemical Corp.	00587.03	-	-	1977
Petrolite Corp-Petreco Div.	00347.01	3*	3*	1977
Petrolite Corp-Petreco Div.	00347.02	-	-	1977
Phillips Petroleum Co.	00815.01	315	48	1977
Phillips Petroleum Co.	00815.02	-	-	1977
Phillips Petroleum Co.	00815.03	-	-	1977
Phillips Petroleum Co.	00975.01	3*	3*	1977
Pilot Industries of Texas, Inc.	01688.01	3*	3*	1977
PPG Industries, Inc.	01224.01	3*	3*	1977
PPG Industries, Inc.	01224.02	-	-	1977
Premier Petrochemical Co.	01045.01	11	53	1977
Proler Steel Corp.	01809.01	3*	3*	1977
Proler Steel Corp.	01809.02	-	-	1977
Reichhold Chemicals, Inc.	00662.01	3*	3*	1977
Richardson Co., The	01310.01	3*	3*	1977
Robertson Terminals Inc.	01662.01	3*	3*	1977

Segment 1006 (Houston Ship Channel) Industrial Waste Dischargers

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
Robertson Terminals, Inc.	01731.01	3*	3*	1977
Rohm and Haas Co.	00458.01	3342	2000	1977
Rohm and Haas Co.	00458.02	-	-	1977
Rohm and Haas Co.	00458.03	-	-	1977
Rollins Environmental Services	01429.01	3*	3*	1977
Rollins Environmental Services	01429.02	-	-	1977
Rollins Environmental Services	01429.03	-	-	1977
Rollins Environmental Services	01429.04	-	-	1977
Shell Chemical Co.	00402.01	1605	381	1977
Shell Chemical Co.	00402.02	-	-	1977
Shell Oil Co.	00403.01	1160	706	1977
Shell Oil Co.	00403.02	-	-	1977
Shell Oil Co.	00403.03	-	-	1977
Shell Oil Co.	00403.04	-	-	1977
Shell Oil Co.	00403.05	-	-	1977
Shell Oil Co.	00403.06	-	-	1977
Shell Oil Co.	00403.07	-	-	1977
Shell Oil Co.	00403.08	-	-	1977
Shell Oil Co.	00403.09	-	-	1977
Shell Oil Co.	00403.10	-	-	1977
Shell Oil Co.	00403.11	-	-	1977
Shell Oil Co.	00403.12	-	-	1977
Sinclair Koppers Co.	00393.01	80	-	1977
Southern Pacific Transportation Co.	01180.01	3*	3*	1977

Segment 1006 (Houston Ship Channel) Industrial Waste Dischargers

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
Southland Paper Mills, Inc.	01160.01	2800	195	1977
Stauffer Chemical Co.	00541.01	3*	3*	1977
Stauffer Chemical Co.	00541.02	-	-	1977
Stauffer Chemical Co.	00542.01	-	-	1977
Stauffer Chemical Co.	01194.01	-	-	1977
Superior Oil Co.	01232.01	3*	3*	1977
S&R Oil Co.	01063.01	3*	3*	1977
Tenneco Chemicals Inc.	00002.01	416	1042	1977
Texaco, Inc.	00413.01	3*	3*	1977
Texaco, Inc.	00413.02	-	-	1977
Texaco, Inc.	00413.03	-	-	1977
Texaco, Inc.	00413.04	-	-	1977
Texaco, Inc.	01172.02	-	-	1977
Texaco, Inc.	01172.04	-	-	1977
Texas Instruments, Inc.	01225.01	3*	3*	1977
Texsteam Corp.	01650.01	3*	3*	1977
Todd Shipyards Corp.	01159.01	3*	3*	1977
Truck Harbor, Inc.	01265.01	3*	3*	1977
Tube Associates, Inc.	01423.01	3*	3*	1977
Union Carbide Corp. Linde Division	01173.01	3*	3*	1977
Union Equity Coop Exchange	01205.01	3*	3*	1977
United States Gypsum Co.	00353.01	3*	3*	1977
US Plywood Champion Papers, Inc.	00640.02	4*	4*	1977
US Plywood Champion Papers, Inc.	00640.03	-	-	1977

Segment 1007 (Houston Ship Channel) Municipal Waste Dischargers

Waste Source	WCO No.	Recommended Treatment Level 1.*	Target Implementation Date
Brittmore Utility, Inc.	11193.01	2	2*
N. V. Cameo	11051.01	2	1979
Chicago Bridge & Iron Co.	11389.01	2	1977
Green Ridge MUD	10960.01	2	1976
Gulf Coast Waste Disposal Authority	11538.01	2	1979
Harris Co. FWSD No. 061	10876.01	2	1979
Harris Co. MUD No. 006	11273.01	2	2*
Harris Co. MUD No. 023	11485.01	2	2*
Harris Co. MUD No. 070	11486.01	2	1979
Harris Co. WCID No. 133	11153.01	2	1979
Harris Co. WCID No. 134	11152.01	2	1979
Harris County	10932.01	2	1979
City of Houston	10495.01	2N	1978
City of Houston	10495.23	2	1979
City of Houston	10495.29	2	1979
City of Houston	10495.30	2	1979
City of Houston	10495.44	2	1979
City of Houston	10495.47	2	1979
City of Houston	10495.49	2	1979
City of Houston	10495.76	2	1977
City of Houston	10495.84	2	1979
City of Houston	10495.85	2	1979
Jackrabbit Rd. Public Utility District	11290.01	2	2*
City of Jersey Village	10680.01	2	1979
City of Katy	10706.01	2	1979
Katy Independent School District	11124.01	2	1979
Larfin Corporation	11375.01	2	2*
Memorial Villages Water Authority	10584.01	2	1979
Mischer Corp.	11093.01	2	1979
Park 10 Municipal Utility District	11455.01	2	2*
Rolling Fork Public Utility District	11188.01	2	1979
Gary S. Sequeira	11414.01	2	1979

Segment 1007 (Houston Ship Channel) Municipal Waste Dischargers

Waste Source	WCO No.	Recommended Treatment Level[1.*]	Target Implementation Date
Sherwood Oaks Utilities Inc.	10559.01	2	1979
Spencer Road Public Utility District	11472.01	2	1979
United Salt Corporation	11243.01	2	1977
West Montgomery Utility Co., Inc.	11005.01	2	1979
Westlake Municipal Utility District #1	11284.01	2	1979
Westway Utility District	11330.01	2	2*
White Oak Municipal Utility District	11207.01	2	1979
White Oaks Developing Company	10620.01	2	1979

Segment 1007 (Houston Ship Channel) Industrial Waste Dischargers

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
American Porcelain Enameling	01851.01	3*	3*	1977
Brown Oil Tools	00687.01	3*	3*	1977
Brown Oil Tools	00687.02	-	-	1977
Brown Oil Tools	00687.03	-	-	1977
Cameron Iron Works	00357.01	3*	3*	1977
Cameron Iron Works	00357.02	-	-	1977
Cameron Iron Works	00357.03	-	-	1977
Cameron Iron Works	01402.01	3*	3*	1977
Celotex Corporation	00660.01	3*	3*	1977
Cook Paint & Varnish Co.	00427.01	3*	3*	1977
Dresser Systems Inc.	00469.01	3*	3*	1977
General Portland Cement Co.	00312.01	3*	3*	1977
Gulf Coast Portland Cement	01021.01	3*	3*	1977
Horton and Horton, Inc.	00683.01	3*	3*	1977
Houston Lighting & Power Co.	01033.01	3*	3*	1977
Houston Natural Gas Corp.	01743.01	3*	3*	1977
Houston Natural Gas Corp.	01743.02	-	-	1977
J. W. Jones, Inc.	01801.01	3*	3*	1977
Ladish Company-Texas Div.	01544.01	3*	3*	1977
Lead Products Co. Inc.	01030.01	3*	3*	1977
Missouri Kansas Texas RR	01197.01	3*	3*	1977
Murray Rubber Co.	01222.01	3*	3*	1977
National Supply Division	01036.01	3*	3*	1977
Parker Bros. & Co., Inc.	00668.01	3*	3*	1977
Parker Bros. & Co., Inc.	00797.01	3*	3*	1977
Parker Bros. & Co., Inc.	00806.01	3*	3*	1977
Phillips Petroleum Co.	01061.01	3*	3*	1977
Reddy Ice Division	01279.01	3*	3*	1977

Segment 1007 (Houston Ship Channel) Industrial Waste Dischargers

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
Reed Tool Company	00635.01	3*	3*	1977
Shell Development Co.	01690.01	3*	3*	1977
Southern Pacific Transportation Co.	01181.01	3*	3*	1977
Stran Steel Corp.	01259.01	3*	3*	1977
Swift Agricultural Chemical Corp.	01421.01	3*	3*	1977
Uvalde Rock Asphalt Co.	00785.01	3*	3*	1977

Segment 2426 (Tabbs Bay) Municipal Waste Dischargers

Waste Source	WCO No.	Recommended Treatment Level 1.*	Target Implementation Date
City of Baytown	10395.02	2	1979
City of Baytown	10395.06	2	1979
Harris Co. FWSD No. 001A	11195.01	2	1979

Segment 2427 (San Jacinto Bay) Municipal Waste Dischargers

Waste Source	WCO No.	Recommended Treatment Level 1.*	Target Implementation Date
R. G. Florence	10725.01	2	1979

Segment 2428 Black Duck Bay (No Dischargers)

Segment 2430 (Burnett Bay) Municipal Waste Dischargers

Waste Source	WCO No.	Recommended Treatment Level 1.*	Target Implementation Date
City of Baytown	10395.05	2	1979
Texas Highway Dept.	10842.01	2	1979

Segment 2436 (Barbours Cut) Municipal Waste Dischargers
(No Industrial Dischargers)

Waste Source	WCO No.	Recommended Treatment Level 1.	Target Implementation Date
City of Morgans Point	10779.01	2	1979

Segment 2426 (Tabbs Bay) Industrial Waste Dischargers

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
Helmerick & Payne, Inc.	01385.01	3*	3*	1977
Marbon Chemical Division	01206.01	3*	3*	1977
Robertson Tank Lines, Inc.	01593.01	3*	3*	1977

Segment 2427 (San Jacinto Bay) Industrial Waste Dischargers

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
Air Products & Chemicals Co.	01280.01	3*	3*	1977
E. I. DuPont De Nemours & Company	00474.01	468	500	1977
Grief Brothers Corp.	01217.01	3*	3*	1977
Houston Lighting & Power Co.	01026.01	3*	3*	1977
Ohmstede Machine Works Inc.	01318.01	3*	3*	1977
Pearsall Chemical Co.	01785.01	3*	3*	1977
Southwest Chemical & Plastics	01229.01	3*	3*	1977
U. S. Industrial Chemical Co.	00534.01	281	13	1977
U. S. Industrial Chemical Co.	00534.02	-	-	1977
The Upjohn Company	00663.01	147	89	1977

Segment 2429 (Scott Bay) Industrial Waste Dischargers (No Municipal Dischargers)

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
Ashland Chemical Co.	00549.01	3*	3*	1977
Exxon Chemical Company USA	01215.01	3*	3*	1977

Segment 2430 (Burnett Bay) Industrial Waste Dischargers

Waste Source	WCO No.	Recommended Permit BOD_5 (ppd)	Recommended Permit NH_3-N (ppd)	Target Implementation Date
SMS Industries, Inc.	01062.01	3*	3*	1977