

NECHES RIVER AND TRIBUTARIES, SALT WATER  
BARRIER AT BEAUMONT, TEXAS

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COMMUNICATION

FROM  
THE ASSISTANT SECRETARY OF THE ARMY  
(CIVIL WORKS)

TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY, SUBMITTING A REPORT ON NECHES RIVER AND TRIBUTARIES, SALT WATER BARRIER AT BEAUMONT, TEXAS, IN PARTIAL RESPONSE TO TWO FLOOD CONTROL ACTS APPROVED MAY 15 AND JUNE 22, 1936, A RIVER AND HARBOR ACT APPROVED MARCH 12, 1945, A RESOLUTION OF THE HOUSE COMMITTEE ON FLOOD CONTROL ADOPTED MARCH 20, 1945, AND A RESOLUTION OF THE HOUSE COMMITTEE ON RIVERS AND HARBORS ADOPTED MAY 24, 1946



SEPTEMBER 27, 1976.—Referred to the Committee on Public Works and Transportation and ordered to be printed with illustrations.

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WASHINGTON : 1976

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LETTER OF TRANSMITTAL



DEPARTMENT OF THE ARMY  
OFFICE OF THE ASSISTANT SECRETARY  
WASHINGTON, D.C. 20310

September 17, 1976

Honorable Carl Albert  
Speaker of the House of Representatives  
Washington, D. C. 20515


Dear Mr. Speaker:

I am transmitting herewith a favorable report dated 12 April 1976, from the Chief of Engineers, Department of the Army, together with accompanying papers and illustrations, on Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas, in partial response to two Flood Control Acts approved 15 May 1936 and 22 June 1936, a River and Harbor Act approved 2 March 1945, a resolution of the Committee on Flood Control House of Representatives, adopted 20 March 1945, and a resolution of the Committee on Rivers and Harbors of the House of Representatives, adopted 24 May 1946.

The views of the Governor of Texas, the Departments of the Interior, Agriculture, Transportation, Health, Education, and Welfare, and the Environmental Protection Agency are set forth in the inclosed communications, together with the replies of the Chief of Engineers to the Governor of Texas and the Secretaries of the Interior and Agriculture. The environmental statement required by the National Environmental Policy Act of 1969 has been submitted to the Council on Environmental Quality.

The Office of Management and Budget advises that there is no objection to the submission of the proposed report to the Congress; however, it states that no commitment can be made at this time as to when any estimate of appropriation would be submitted for construction of the project, if authorized by the Congress, since this would be governed by the President's budgetary objectives as determined by the then prevailing fiscal situation. A copy of the letter from the Office of Management and Budget is inclosed as part of the report.

Sincerely,

  
Victor V. Veysey  
Assistant Secretary of the Army  
(Civil Works)

COMMENTS OF THE OFFICE OF MANAGEMENT AND BUDGET



EXECUTIVE OFFICE OF THE PRESIDENT  
OFFICE OF MANAGEMENT AND BUDGET

WASHINGTON, D.C. 20503

7 September 1976

Honorable Martin R. Hoffman  
Secretary of the Army  
Washington, D.C. 20310

Dear Mr. Secretary:

Assistant Secretary Victor V. Veysey's letter of May 26, 1976, submitted a report of the Chief of Engineers on Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas and requested advice as to its relationship to the program of the President, pursuant to Executive Order No. 9384, dated October 4, 1943.

There would be no objection to the submission of this report to the Congress. No commitment, however, can be made at this time as to when any estimate of appropriations would be submitted for construction of the project, if authorized by the Congress, since this would be governed by the President's budgetary objectives as determined by the then-prevailing fiscal situation.

Sincerely yours,



James L. Mitchell  
Associate Director

COMMENTS OF THE GOVERNOR OF TEXAS



OFFICE OF THE GOVERNOR  
STATE CAPITOL  
AUSTIN, TEXAS 78711

DOLPH BRISCOE  
GOVERNOR

March 15, 1975

W. C. Gribble, Jr.  
Lieutenant General, USA  
Chief of Engineers  
Department of the Army  
Office of the Chief of Engineers  
Washington, D. C. 20314

Dear General Gribble:

Under the provisions of Section 6.073(b), Texas Water Code, I directed that the Texas Water Rights Commission evaluate the report, "Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas," and related papers which you transmitted by letter of November 18, 1974, pursuant to Public Laws 78-534, 85-624, and 91-190.

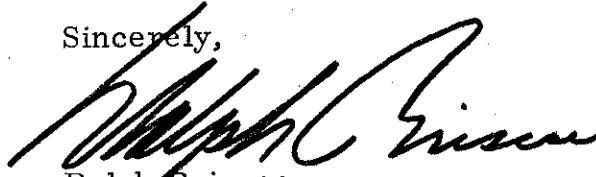
The Texas Water Rights Commission recommends adoption of the Corps of Engineers conclusions and recommendations urging, however, that careful reconsideration be given to the data and analysis submitted by local sponsors regarding the Calcasieu River, Louisiana, project precedent, the historical cause-effect relationship between extensive navigation improvements and salt water intrusion in the Neches River, and a more equitable cost-sharing determination. Attached is a copy of the Commission Order of February 25, 1975.

Pursuant to the said Commission Order, I concur in your endorsement of the project scope proposed by the Galveston District and Southwestern Division Engineers, and the Chairman of the Board of Engineers for Rivers and Harbors. And, I urge that before you finalize your recommendations to the Secretary of the Army and to the Congress, you consider without delay the special report presented by the local sponsors, the City of Beaumont and the Lower Neches Valley Authority. Their report has been appended to, and is part of the attached Commission's Order.

Finally, in response to your request for comments on the project environmental statement, the State reaffirms its comments submitted in letters of February 21, 1973 and May 15, 1973, to the Galveston District Engineer, relative to the Preliminary Draft Environmental Impact Statement. The Revised Draft Environmental Statement of August 1974 which you forwarded by letter of November 18, 1974, properly incorporates the views of the appropriate State of Texas agencies. The Statement appears to conform adequately to the provisions of Section 102(2)(C), Public Law 91-190. I suggest that a copy of this letter be included in the Final Environmental Impact Statement.

I will appreciate your sending to me a copy of the report transmittal letter from the Secretary of the Army to the Congress, as indicated in your letter of November 18, 1974.

Sincerely,

A handwritten signature in cursive script, appearing to read "Dolph Briscoe".

Dolph Briscoe  
Governor of Texas

DB:ll

Attachment  
As stated.



# TEXAS WATER RIGHTS COMMISSION



AN ORDER of the Texas Water Rights  
Commission Making Recommendations  
Concerning the Feasibility of the United  
States Army, Corps of Engineers  
Proposed Project Report, "Neches  
River and Tributaries, Salt Water  
Barrier at Beaumont, Texas."

On February 5, and 24, 1975, came on to be considered before the Texas Water Rights Commission pursuant to Section 6.073, Texas Water Code, jurisdiction having been established, the project report of the United States Army Engineer District, Corps of Engineers, Galveston, Texas, entitled "Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas," dated May 31, 1973; and modifications thereto, of July 9, 1974 and November 18, 1974, by the Chief of Engineers and the Chairman, Board of Engineers for Rivers and Harbors, respectively.

After evaluating the captioned report and the evidence submitted at the public hearings, the Commission finds that:

1. The proposed salt water barrier project meets the feasibility criteria set forth in Section 6.073(e), Texas Water Code.
2. There is a vital need for the project and the public interest would be served favorably thereby.
3. The preponderance of evidence and data supports the conclusions reached in the basic report of the Galveston District Engineer that salt water intrusion on the Neches River is attributable to the long succession of Federal navigation improvements.

4. The Chief of Engineers and the Chairman, Board of Engineers for Rivers and Harbors, should reconsider following the precedent cited in the Galveston District Engineer's report regarding the Corps of Engineers salt water barrier project in the Calcasieu River at Lake Charles, Louisiana, where the Corps of Engineers determined, pursuant to Public Law 87-874 (October 23, 1962), that salt water intrusion damage was caused by navigation improvements and, therefore, damage mitigation costs were borne entirely by the Federal Government.

5. The local sponsors, the City of Beaumont and the Lower Neches Valley Authority, have submitted extremely strong evidence in rebuttal to the determinations made by the Chief of Engineers and the Chairman, Board of Engineers for Rivers and Harbors. The local sponsors show that even if it is decided as a matter of new policy by the Federal Government, that salt water intrusion on the Neches River at Beaumont is not due entirely to successive navigation improvements and that mitigation of the salt water intrusion at Beaumont is not a wholly Federal responsibility, a proper analysis of the problem indicates that the maximum local cost responsibility is about 3.9 percent rather than 25 percent of the project cost as proposed by the Chief of Engineers and the Chairman, Board of Engineers for Rivers and Harbors.

6. The proposed project possesses significant environmental enhancement features.

7. The detailed analysis of the foregoing major findings presented by the local sponsors at the public hearing of


February 5, 1975, warrants careful consideration by the Corps of Engineers prior to finalizing its recommendations to the Secretary of the Army and to Congress. Therefore, the Commission hereby appends and makes the local sponsors' analysis report a formal part of this Order.

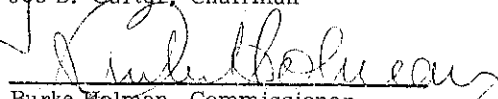
NOW, THEREFORE, BE IT ORDERED BY THE TEXAS WATER RIGHTS COMMISSION that the Commission does recommend to the Governor of the State of Texas that the proposed project of the United States Army, Corps of Engineers, described in their report, "Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas," be considered feasible and that its design and construction be pursued with diligence.

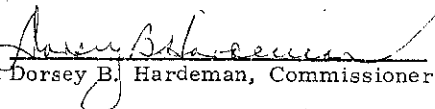
And, the Commission does urge that special reconsideration be given by the Chief of Engineers and the Chairman, Board of Engineers for Rivers and Harbors to their findings, in the light of the precedent established in the Calcasieu River, Louisiana, salt water barrier project, and in the light of the rationale, analysis, and justification submitted by the local sponsors regarding the historical cause-effect relationship between navigation improvements and salt water intrusion, and the equitable sharing of costs between the Federal Government and local sponsors.

Executed and entered of record, this the 25th day of February, 1975.

TEXAS WATER RIGHTS COMMISSION

  
Joe D. Carter, Chairman

  
Burke Holman, Commissioner

  
Dorsey B. Hardeman, Commissioner

1 Attachment  
As stated.

ATTEST:  
  
Audrey Strandtman, Secretary

STATE OF TEXAS       X  
                          X  
COUNTY OF TRAVIS    X

I, Audrey Strandtman, Secretary of the Texas Water Rights Commission, do hereby certify that the foregoing and attached is a true and correct copy of an order of said Commission, the original of which is filed in the permanent records of said Commission.

Given under my hand and the seal of the Texas Water Rights Commission, this the 27th day of February, A.D. 1975.

  
\_\_\_\_\_  
Audrey Strandtman, Secretary

STATEMENT OF THE CITY OF BEAUMONT  
AND THE LOWER NECHES VALLEY AUTHORITY

CONCERNING THE PROPOSED REPORT  
OF THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY, ENTITLED  
"NECHES RIVER AND TRIBUTARIES, SALT WATER BARRIER  
AT BEAUMONT, TEXAS"

PRESENTED TO THE  
TEXAS WATER RIGHTS COMMISSION  
FEBRUARY 5, 1975

## INTRODUCTION

Fresh water supply from the Neches River is vital to the municipalities, industries, and rice irrigation farming of the Beaumont and Jefferson County area. Over the years, as Sabine Lake and the channel of the river have been progressively modified to accommodate navigation by sea-going vessels, the problem of salt water intrusion from the Gulf of Mexico has become more and more severe. A permanent salt water barrier is urgently needed to maintain fresh water conditions in the reaches of the river above Beaumont and protect the area's fresh water resource.

The proposed report by the Chief of Engineers in relation to the Neches salt water barrier consists basically of three parts:

- (1) A detailed study which the Galveston District of the Corps completed in 1973. This study outlines the history and facts of the matter and recommends construction of a permanent barrier. It concludes that resolution of the problem should be a Federal responsibility and that the United States should pay the full construction cost of a barrier at the most economical site (Site No. 4), with local interests paying any incremental cost attributable to moving the structure to an alternative site (Site No. 1) which is more desirable for environmental reasons.
- (2) A letter of comment to the Chief of Engineers from the Board of Engineers for Rivers and Harbors, dated 9 July, 1974. This letter concurs generally in the findings of the Galveston District, except that it proposes a different view regarding

local sharing of the project costs. Based on a separate study, which had been requested by the Board of Engineers for Rivers and Harbors and prepared by the Waterways Experiment Station at Vicksburg (Miscellaneous Paper H-74-9, Neches River Saltwater Barrier, by Carl J. Huval, final report published August 1974), the Board recommended that 25% of the construction cost of the barrier at the most economical site should also be allocated to the local interests.

- (3) A proposed letter from the Chief of Engineers to the Secretary of the Army, concurring with the comments of the Board of Engineers for Rivers and Harbors and submitting the report for transmission to Congress on that basis.

#### SUMMARY

In summary, the views of the City of Beaumont and the Lower Neches Valley Authority are as follows:

- a. There is a clear need for the permanent salt water barrier.
- b. The barrier is feasible and should be constructed as proposed.
- c. As concluded in the study by the Galveston District, responsibility for the problem should be attributed to Federal navigation improvements.
- d. The cause-and-effect relationship between the navigation improvements and salt water intrusion on the Neches River has long been recognized and has been acknowledged repeatedly in past documents of the Corps of Engineers and the United States Congress.

- e. The precedent of a similar project on the Calcasieu River at Lake Charles, Louisiana, where the full cost of resolving a comparable problem was borne by the Federal government, should also be followed in this instance.
  
- f. Even if it were ultimately concluded, at the Federal level, that mitigation of the salt intrusion problem at Beaumont is not a wholly Federal responsibility, proper analysis of the problem would indicate the maximum local responsibility to be on the order of 3.9%, rather than 25% as now proposed.

#### NEED FOR THE PERMANENT BARRIER

The study by the Galveston District clearly outlines the seriousness of the salt water intrusion problem. Temporary barriers of steel sheet piling are now required nearly every year during the season of lowest river flow, which also coincides with the months of heaviest demand for fresh water diversions. A flow in the river of 1,900 cubic feet per second or more is estimated to be required to keep salt water away from the fresh water intakes. During the last seven years of published records, the natural flow of the river, without upstream regulation and without fresh water diversions, would have been less than that amount approximately 42% of the time, or an average of five months out of the year. Unless the salt contamination is prevented, adequate water supply cannot be provided for the Jefferson County area. A permanent barrier structure, with provision for regular passage of boating traffic, is the logical solution to the problem.



## FEASIBILITY

Construction of a salt water barrier on the Neches River below the mouth of Pine Island Bayou was recommended by the Lower Neches Valley Authority in its master plan for the Neches River Basin, which was published in 1960. The investigation by the Galveston District of the Corps of Engineers has confirmed the technical feasibility of the project, which offers a practical solution to a long-standing problem and also will provide concurrent environmental benefits. Appendix F of the Galveston District report determines that the project is economically feasible, with a favorable 1.86 ratio of annual benefits to annual costs.

## RELATIONSHIP TO NAVIGATION IMPROVEMENTS

The syllabus on the first page of the detailed report by the Galveston District states the matter very concisely, in the following words:

"The study finds that the cause of the salinity intrusion problem is the progressive improvement of the stream for navigation over a period of many years by the Federal Government between Beaumont and the Gulf of Mexico, culminating in the recent completion of improvement of the Sabine-Neches Waterway generally to a depth of 40 feet; that measures to mitigate the problem are a Federal responsibility in furtherance of navigation improvements previously undertaken, subject to the usual requirements of local cooperation attached to navigation projects; that the basis for this finding was implied in the Congressional authorization for the most recent navigation improvements (House Document No. 553, 87th Congress, 2nd Session, pages 15 and 32)."

## CAUSE AND EFFECT

That the salt encroachment problem is basically related to enlargement of the river channel for navigation is not a new concept, but is a fact that has been recognized for more than sixty years.

Executive Document No. 84, 43rd Congress, 1st Session, 1874, entitled Examination of Rivers and Harbors, discussed possible construction of wooden jetties in Sabine Lake at the mouth of the Neches River and (on Page 62) referred to the water as fresh: "The water being fresh, such a jetty would remain for years."

In 1876, the natural bar at Sabine Pass, between Sabine Lake and the Gulf, was removed by dredging, and in 1883 the first jetty was constructed at Sabine Pass to keep the bar from reforming. In 1879-1880, a 5-foot channel was cut through the natural bar at the mouth of the Neches River. During the 1880's, a 5-foot navigation channel was dredged and maintained from Sabine Pass to the mouth of the Neches. This was subsequently deepened to 6 feet in 1896.

House Document No. 634, 58th Congress, 2nd Session, published in 1902 and entitled Sabine Lake and Sabine and Neches Rivers, Texas, noted that salt water intrusion on Taylors Bayou and Hillebrandt Bayou had become serious in 1901 and 1902 and that local rice growers attributed the problem to the navigation improvements. The same document also commented (Page 8) on the fact that some salt water had by then been noticed above Beaumont but that

"No serious results, however, have been experienced from this source on the Neches, owing to the short duration of the salt-water period, but on Taylors and Hildebrandts bayous the loss to the rice producers from salt water has been heavy."

Commenting on the Taylors Bayou situation, the U.S. Department of Agriculture, in its Bulletin No. 113, 1902, Irrigation of Rice in the United States, observed as follows:

"In view of the statement of the rice growers along Taylors Bayou, that prior to the year 1901 they had always had sufficient water for the irrigation of their crops, it is quite natural to conclude that the Port Arthur Canal is wholly responsible for the condition which prevailed this year."

House Document No. 836, 61st Congress, 2nd Session, in 1910, discussed the proposed dredging of a navigation channel from the mouth of the Neches River to Beaumont. It stated (on Page 13) that:

"The rice growers claim, and apparently with good reason, that the deeper channels will cause salt water to reach their pumping plants much sooner than it otherwise would."

That document also discussed the concept of a lock or guard gates to keep the salt water from coming upstream and concluded (Page 21) that "a deep channel should not be dredged without providing some means whereby the rice-growing industry can be protected from the dangers of salt water. . ."

The first navigation channel to Beaumont was 25 feet deep and was constructed in 1914-1915. In 1914, the City of Beaumont had to move its fresh water intake 4 miles upstream, to Lawsons Crossing, and then in 1915 another 4 miles farther upstream, to Bunns Bluff (river mile 30).

A guard lock was built in the Sabine-Neches Canal, below the mouth of the Neches River, in 1916, but it was bypassed as an obstruction to navigation under authority of the River and Harbor Act of March 3, 1925.

From 1924 through 1929, the navigation channel on the Neches River was deepened to 30 feet. In 1926, owners of the irrigation system that is now operated by the Lower Neches Valley Authority built an intake canal from Pine Island Bayou to Lakeview, at mile 38 on the Neches River. In 1927, the City of Beaumont carried its intake upstream to Wiess Bluff, at mile 41.7.

Between 1937 and 1943, the Neches River channel to Beaumont was again deepened, to 34 feet. Beginning in 1944, it began to be necessary in some years for the Lower Neches Valley Authority to install temporary sheet pile barriers across either the Neches River or Pine Island Bayou or both, to keep the water fresh at the entrance of the Lakeview Canal, and at the L.N.V.A. pumping plant at Voth.

These barriers were needed about one year out of two, on the average, until 1947, when the channel was enlarged to a depth of 36 feet. Since then, temporary barriers have been needed during the dry season almost every year. The channel depth is now 40 feet, and further enlargement to 45 feet is currently being considered.

#### PRECEDENT

The Galveston District report (Page 37) notes the similarity of the Neches River situation to a previous project at Lake Charles, Louisiana:

"In a similar case involving a salt water barrier on the Calcasieu River, Louisiana, the Congress stated in the River and Harbor Act approved 23 October 1962 (Public Law 87-874) that "..... measures for mitigation of damages from navigation improvements will be a Federal responsibility and enhancement effects will be shared on the basis of a 50 per centum Federal and 50 per centum non-Federal." It ultimately was determined that no enhancement effects were involved, and the Calcasieu River salt water barrier was constructed with no apportionment of costs to local interest."

The Calcasieu problem was fundamentally the same as that on the Neches. Construction of the deep-draft navigation channel had led to salt water intrusion to the extent that a river flow of some 8,000 cfs was required to keep the river fresh at Lake Charles. The river was the source of water for irrigation of an estimated 132,000 acres of rice,

some 78% of which were affected by the salt water encroachment. After careful review of the question of relative obligations for Federal and local participation in the cost of corrective measures, it was concluded that the entire construction cost of the salt water barrier was a Federal responsibility.

#### RELATIVE SIGNIFICANCE OF DIVERSIONS AND NAVIGATION IMPROVEMENTS

If, after due deliberation, the Chief of Engineers and the Federal Congress determine that the conclusions of the Galveston District investigation and the precedent of the Calcasieu Salt Water Barrier should not be followed, and that there should be required some degree of local participation in the initial cost of the Neches barrier project, then presumably the system of evaluation developed by the Waterways Experiment Station in the Huval report would be used. Thus, although that study was not included among the materials incorporated in the subject report, it is potentially of considerable importance to the matter.

The basic reasoning of the Huval study is easily described. It is based on comparisons of natural river flows versus the actual net flows remaining after diversions, and also on the fact that a flow of at least 1,900 cfs is now required to keep the salt water pushed downstream whereas a much lower "pre-project" flow (estimated by Huval to be 400 cfs) was needed to accomplish the same thing before construction of navigation works. Using published records of historical measurements at stream gaging stations, Huval derived estimates of the natural flows of the river and of the net flows remaining after diversions during the period from 1945 through 1973. He then reasoned essentially as follows:

- a. The degree to which salt water intrusion has worsened since pre-project conditions could be estimated by comparing (a) the average number of months per year that the actual net flows have been less than 1,900 cfs versus (b) the average number of months per year that the natural flows would have been less than the pre-project flow (400 cfs in his calculations).
- b. Although navigation improvements were apparently a major cause of the problem, part of the difficulty might also be attributed to water supply diversions.
- c. The portion of the problem due to diversions could be estimated based on the difference between (a) the average number of months per year that the actual net flows have been less than the pre-project flow requirement and (b) the average number of months per year that the natural flows would have been less than that amount if there had been no diversions.
- d. The portion attributable to navigation improvements might also be based on the difference between (a) the average number of months per year that the natural flows would have been less than 1,900 cfs and (b) the average number of months per year that such flows would have been less than the pre-project flow. And the portion not assigned to navigation on this basis could then be assumed to be due to diversions.
- e. Since the two approaches described in "c" and "d" above overlap and do not give identical answers, the final evaluation should be based on averaging the two sets of results.

Although the basic rationale of the Huval study is not unreasonable, there were several secondary assumptions employed in his detailed calculations which lead to results that over-estimate the effect of water supply diversions in comparison to the navigation works. Because the Huval report is the basis of the conclusions and recommendations of the Board of Engineers for Rivers and Harbors in regard to cost allocations, it is believed that the following points should be considered:

- a. The assumed pre-project condition should be based on the original state of the river and of Sabine Lake, before any effect of navigation improvements. The Huval report assumes that conditions as of the years 1900-1910 represented the situation prior to the effect of navigation work. However, navigation improvements affecting the salinity of Sabine Lake, and therefore of the lower reaches of the Neches as well, began substantially before 1900. It is apparent that earlier actions, such as removal of the natural bar at Sabine Pass in 1876 and dredging of a navigation channel around and through Sabine Lake in the 1890's would materially influence the ease of access allowed to water from the Gulf. It is clear that conditions as of 1900-1910 are not appropriate for pre-project conditions.

The City of Beaumont was able to operate its fresh water intake on the Neches at a location just downstream from the proposed salt water barrier site until 1914. Records of the Evadale gaging station show that, during the years when Beaumont was still pumping at the original location, river flows of little more than 200 cfs prevailed for over a month in the fall of 1904.

Records were not kept at Evadale from January 1907 through March 1921, but records from the Rockland gage, which has been operating continuously since 1903, show that flows there averaged only 12 cfs for a month or more in the fall of 1910, which is equivalent to an estimated flow at Beaumont of less than 40 cfs.

In effect, the evidence indicates that salt water intrusion at Beaumont under true pre-project conditions was probably non-existent. The Galveston District report states unequivocally that "Prior to 1900 there was no salinity problem in the Neches River." It is apparent that 400 cfs is too high to use for the pre-project condition in the analysis.

Before navigation channels were cut through Sabine Pass, Sabine Lake, the bar at the mouth of the Neches, and the bed of the river itself, it is probable that the river could have fallen to zero flow for a substantial period without causing salt water to reach Beaumont. Based on actual observed stream flows at the Rockland gage in 1910, it appears that the Beaumont water works was able to function while the river flow at Beaumont averaged less than 40 cfs for a month or longer.

- b. In computing both the natural flows and the actual net flows, the contribution of the full drainage area of the Neches Basin should be included. The calculations in the Huval study do not count any runoff from below the Evadale and Kountze gaging stations and thus omit the flow from nearly 1,000 square miles of contributing watershed.



- c. The flows derived to show the extent of salt water intrusion in a state of nature should reflect conditions as they would be without the benefit of upstream flow regulation. In recent years, a substantial part of the flow passing the Evadale gage in summer months of low flow has consisted not of natural flows, but of regulated releases from Steinhagen Reservoir and Sam Rayburn Reservoir, which have been constructed by the Corps of Engineers and in which the Lower Neches Valley Authority has participated as local sponsor. The L.N.V.A. is contributing \$15 million to pay for the water supply benefits of those projects. Particularly in times of low flow, the Evadale gaging station does not show a state-of-nature condition but the result of regulation by the upstream projects. In computing the natural flows, the methods should be such as to eliminate the effects of Sam Rayburn and Steinhagen. The Huval analysis did not make allowance for this and thus treated the upstream releases as natural runoff in times of low flow.
- d. The records utilized in the analysis to establish actual net flows after diversions should reflect conditions as they are at the present time, so that the effect attributed to water supply operations is based on the net result of diversions at present levels plus supplemental upstream releases obtained through L.N.V.A. participation at Sam Rayburn and Steinhagen Reservoirs. The Huval analysis uses records extending back as far as 1945. Conditions on the river have changed continually during much of that period. In particular, the actual net flows in the summer months now that there is major regulating

storage at Sam Rayburn Reservoir are not comparable to those in years before the Sam Rayburn project was built. It is not believed possible to get meaningful answers regarding present-day actual net flows from records taken prior to the present levels of diversion pumpage and upstream flow regulation. The fairest and soundest basis for evaluation would be to use the records beginning with Water Year 1967 (the first year after Sam Rayburn Reservoir filled to above the minimum power pool level) and extending through the latest published records, Water Year 1973. During that period, the diversion pumpage went up and down somewhat from year to year but experienced relatively little over-all change. These records represent 84 months of essentially stable conditions, comparable to the present situation, and they are a much more suitable basis for the analysis than are the older records.

The factors listed above can significantly affect the results of the calculations. As used in the Huval study, they lead to under-estimation of the available flow and over-estimation of the impact of the water supply pumpages. They result in counting releases from upstream storage as part of the natural flow and counting the diversion of such releases as contributing to salt water intrusion.

If the basic philosophy developed in the Huval study is to be used to apportion costs between the Federal government and the local sponsors, the L.N.V.A. and the City of Beaumont suggest that the detailed analysis should be re-evaluated, with attention given to the foregoing points. Attachment "A" presents calculations comparable to those of the Huval

study, using the same fundamental line of reasoning but with the computations handled so as to allow for those considerations. Answers were derived for assumed pre-project flow requirements of zero and 40 cfs, as shown in the following table. For purposes of comparison, the results for a pre-project flow of 400 cfs are also shown.

<u>Pre-Project Flow Required</u>	<u>Present-Day Flow Required</u>	<u>Relative Contribution</u>	
		<u>Diversions</u>	<u>Navigation</u>
zero cfs	1,900 cfs	3.9%	96.1%
40 cfs	1,900 cfs	3.9%	96.1%
400 cfs	1,900 cfs	11.7%	90.3%

Also in relation to this point, it must be recognized that the effect attributable to navigation now is almost certainly less than it will be in the future. In 1961, when the Lower Neches Valley Authority presented its views on this subject at a public hearing called by the District Engineer of the Galveston District, the navigation channel was 36 feet deep, and the flow required to prevent salt water encroachment was 1,500 cfs. Subsequent deepening of the channel to 40 feet has raised the required flow rate to 1,900 cfs. Further enlargement, which is now under consideration, will raise the necessary flow to a still higher amount. Thus, analysis based on 1,900 cfs as the "after-project" condition is not a final result, but only a relative guideline, indicating the current state of the problem.

### CONCLUSIONS

In conclusion, it is the position of the City of Beaumont and the Lower Neches Valley Authority that the proposed salt water barrier on the Neches River at Beaumont is a much-needed project and has been for

many years, but that proper allocation of construction costs should recognize full Federal responsibility to mitigate damages caused by Federal navigation works. There is ample precedent for this approach, and it is believed to be the correct one to follow in this instance.

In the alternative, if the established precedents are to be abandoned and part of the basic construction cost is to be allocated to local interests, it is requested that the analysis leading to the apportionment of costs be re-evaluated. It is the belief of the City of Beaumont and the Lower Neches Valley Authority that correct application of the basic rationale developed by the Waterways Experiment Station would indicate the local share to be 3.9%, rather than the 25% presently under consideration.

Analysis of Neches River Flows to Estimate the Relative Significance of Navigation Improvements and Water Supply Diversions in Relation to Salt Water Intrusion: Water Years 1967-1971

(Using the Basic Approach Proposed in Waterways Experiment Station Miscellaneous Paper H-74-9)

1. Derivation of Natural Flows:
  - a. Runoff above Dam B was derived from gaged flows at the Rockland, Lufkin and Chireno gaging stations, multiplied by the ratio of total contributing drainage area above Dam B to that above the gaging stations.
  - b. Runoff below Dam B was derived from gaged flows at the Kountze and Sour Lake gaging stations, multiplied by the ratio of total contributing drainage area below Dam B to that above the gaging stations.
2. Derivation of Actual Flows:
  - a. The actual gross flow available was derived from measured flows at the Evadale gaging station; plus observed flows at the Kountze and Sour Lake gaging stations multiplied by the ratio of the total contributing area below the Evadale gage to that above the Kountze and Sour Lake gages.
  - b. The actual net flows were derived by subtracting the diversions of the L.N.V.A. and the City of Beaumont from the actual gross flows.
3. Flows Required to Keep Salt Water Away:
  - a. Before any navigation improvements ("pre-project"), records indicate that a flow of 40 cfs or less could be tolerated in any given month.
  - b. At the present time, it takes a flow of 1,900 cfs to keep the salt water away.
4. Difference Between Natural and Actual Flows:
  - a. The natural flows would have been less than 40 cfs during no months, and less than 1,900 cfs during 35 months out of the seven years.
  - b. The actual net flows were less than 40 cfs during no months, and less than 1,900 cfs during 38 months out of the seven years.
5. Results:
  - a. Total worsening of salt water intrusion is the difference between zero months with natural flow, pre-project, versus 38 months with actual net flows and the present-day flow requirement, or an over-all increase of 38 months.
  - b. If there had been no navigation improvements, there would have been no change in the number of months of intrusion problems, and from this viewpoint the effect due to diversions is zero.
  - c. If there had been no diversions and no change in flow conditions, the increased intrusion due to the navigation improvements would have been 35 months out of the total of 38 months, and from this viewpoint the remaining 3 months might be attributed to the diversions.
  - d. Averaging the results of the two alternative viewpoints (b and c), the estimated contributions of diversions and navigation works are:
 

Attributable to diversions:  $\frac{(0+3)/2}{38} \times 100 = 3.9\%$

Attributable to navigation:  $\frac{(38+35)/2}{38} \times 100 = 96.1\%$
  - e. Results for a pre-project flow requirement of zero are the same as for a pre-project flow requirement of 40 cfs.

## 6. Summary of Flows

On the following page is a tabulation of the derived natural flows, actual gross flows (i.e., before diversions) and actual net flows for the Neches River just below the mouth of Pine Island Bayou for the period since Sam Rayburn Reservoir became effective. Although the actual net flows are generally less than the natural flows, there are many times, especially during the dry summer months, when the releases from upstream storage add more water to the river than the diversions take away. On the average, there is more flow left in the river now, during the months of June through October, even after the diversion pumpage, than there would have been with no diversions if the upstream reservoirs had not been constructed. Thus, the cooperative participation of the L.N.V.A., in joining with the Corps of Engineers to help provide the regulating storage, has served to substantially compensate for the water supply diversions during many months of the most critical low flow conditions. These data emphasize the importance of giving correct treatment to the effects of upstream regulation releases when applying the basic method suggested by the Waterways Experiment Station.

SUMMARY OF NATURAL AND ACTUAL FLOWS  
OF THE NECHES RIVER BELOW THE MOUTH OF PINE ISLAND BAYOU  
WATER YEARS 1967-1973

-cfs-

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
<u>W.Y. 1967</u>												
Natural Flow	1,163	1,046	1,459	2,060	2,337	1,986	4,543	2,810	2,951	748	254	253
Actual Gross Flow	2,347	1,890	2,041	2,447	2,018	2,151	4,312	2,736	2,552	1,269	1,146	977
Actual Net Flow	2,087	1,647	1,795	2,207	1,756	1,692	3,354	1,824	1,232	224	247	308
<u>W.Y. 1968</u>												
Natural Flow	141	235	870	6,891	3,873	6,688	23,103	15,818	14,958	9,155	1,563	3,332
Actual Gross Flow	587	506	826	3,813	3,023	4,454	14,430	14,637	15,958	10,736	4,438	2,258
Actual Net Flow	186	227	616	3,593	2,796	4,160	13,668	13,539	14,915	9,329	3,280	1,698
<u>W.Y. 1969</u>												
Natural Flow	1,691	2,699	13,240	6,651	13,377	28,516	26,047	32,458	4,561	1,010	372	403
Actual Gross Flow	3,373	4,366	9,803	8,238	12,118	18,190	23,197	30,818	14,863	2,963	2,562	1,902
Actual Net Flow	2,963	4,059	9,570	8,008	11,896	17,900	22,408	29,856	13,346	1,672	1,528	1,072
<u>W.Y. 1970</u>												
Natural Flow	340	1,352	3,368	4,435	4,081	9,139	6,768	6,253	1,757	476	306	522
Actual Gross Flow	1,343	1,085	2,257	3,380	2,978	5,544	6,426	6,816	2,752	1,485	945	1,271
Actual Net Flow	869	722	1,999	3,111	2,689	5,148	5,630	5,806	1,551	188	100	727
<u>W.Y. 1971</u>												
Natural Flow	2,761	2,723	1,337	1,522	1,457	2,090	1,162	2,669	466	295	789	424
Actual Gross Flow	2,800	2,559	1,409	1,515	1,469	1,972	1,826	1,901	1,568	1,387	840	597
Actual Net Flow	2,466	2,252	1,090	1,213	1,126	1,251	727	787	158	119	309	91
<u>W.Y. 1972</u>												
Natural Flow	834	780	9,199	7,962	6,098	5,390	3,240	8,372	914	1,139	448	487
Actual Gross Flow	918	720	8,948	6,775	5,268	5,191	4,113	9,080	3,232	2,605	2,133	1,910
Actual Net Flow	482	372	8,581	6,479	4,947	4,488	3,076	7,958	1,951	1,668	1,518	1,310
<u>W.Y. 1973</u>												
Natural Flow	945	5,987	7,673	15,602	14,624	17,326	29,764	17,241	25,974	7,790	4,295	9,139
Actual Gross Flow	1,690	4,023	6,174	11,501	17,204	17,220	30,339	22,928	22,679	15,221	6,166	10,741
Actual Net Flow	1,306	3,630	5,898	11,240	16,935	16,902	29,817	21,781	21,333	13,594	5,190	10,316

Notes: Natural flow is amount that would be experienced without upstream regulation or diversions. Actual gross flow is historical flow, including effect of upstream regulation but before diversions. Actual net flow is actual gross flow minus water supply diversions.

LETTER TO THE GOVERNOR OF TEXAS



DEPARTMENT OF THE ARMY  
OFFICE OF THE CHIEF OF ENGINEERS  
WASHINGTON, D.C. 20314

REPLY TO  
ATTENTION OF:

DAEN-CWP-C

17 July 1975

Honorable Dolph Briscoe  
Governor of Texas  
Austin, Texas 78711

Dear Governor Briscoe:

This is in reply to your letter of 15 March 1975 concerning my proposed report on the Neches River and Tributaries, Saltwater Barrier at Beaumont, Texas.

I am pleased that you concur in my conclusion and recommendation that a saltwater barrier on the Neches River is needed and should be constructed. I note that you urge consideration be given to the data and analysis prepared by local sponsors regarding the historical cause-effect relationship between extensive navigation improvements and salt water intrusion in the Neches River in support of a different apportionment of project costs. I also note that you consider the revised draft environmental impact statement to properly incorporate the views of the appropriate state agencies. You may be assured that a copy of your letter will be included in the final environmental impact statement.

In the statement prepared by the City of Beaumont and the Lower Neches Valley Authority (LNVA), there is agreement in principle with the study made for the Board of Engineers by the Waterway Experiment Station (WES). However, four main points of disagreement are addressed. These are: assumed pre-project conditions, contributing drainage area, effects of Sam Rayburn and Steinhagen Reservoirs, and the period of record.

The statement has been considered by the Resident Member of the Board of Engineers, the Director of the Waterways Experiment Station and my staff. The following paragraphs include our findings.

Pre-project conditions - The city contends that action such as removal of the natural bar at Sabine Pass in 1867 and dredging of a navigation channel around and through Sabine Lake in the 1890's materially influenced the ease of access of saltwater from the Gulf into the river. Therefore, they believe



that the conditions as of 1900-1910 are not appropriate for pre-project conditions as assumed in the WES study.

The WES study and the Division Engineer's report point out that there did not appear to be a salinity problem in the Neches River prior to 1900, because water demands were moderate, and because there was a natural bar at the mouth of the river. The picture began to change with the introduction of rice cultivation in Jefferson County and construction of the deep-draft channel. Of importance, too, is the fact that the navigation channel is not continuously interconnected to Sabine Lake due to a landfill between the channel and the lake. Dredging the natural bar between the mouth of the Neches River and Sabine Lake in 1896 to 6 feet deep and 100 feet wide may have contributed to the problem. However, even as late as 1908, when the Sabine-Neches Channel (9 ft by 100 ft) between Port Arthur and the mouths of the Neches and Sabine Rivers was completed, the LNVA indicated that the canal did not cause any appreciable amount of saltwater intrusion in the Neches River. According to the LNVA, the turning point was when the Sabine-Neches Canal and the Neches River to Beaumont were dredged to a depth of 25 feet in 1914. Both the withdrawals and channelization appear to have had some effect prior to 1900; however, the evidence indicates that the significant turning point was around 1914. Therefore, I believe that using the 1900-1910 period as a pre-project condition is appropriate.

Drainage area - The city considered that nearly 1,000 square miles of contributing watershed below the Evadale gaging station on the Neches River and Kountze gaging station on Village Creek should have been included in the WES study. The drainage area above these gages is approximately 10% of the total. We recognize that the accuracy of the estimates in the WES report could be 10% high or low. The influence of using a smaller drainage area is in my opinion offset by the omission of the withdrawals by the city and the Eastex paper company.


Effects of Sam Rayburn and Steinhagen Reservoirs and the Period of Record - The city contends that the period 1967 to 1974 should be utilized in the analysis to establish actual net flows after diversion to reflect conditions as they are at the present time.

Using only 7 years out of the 29 years of record is questionable since the salinity problem is prevalent with or without the reservoirs. I consider that the longest available period of record should be used to determine the actual cause of saltwater intrusion and the relative influences of pumping and channel deepening.

In view of the foregoing, I believe that the conclusions reached in the WES study are basically sound. Therefore, I consider that the division of project costs recommended by the Board of Engineers is appropriate.

A copy of your letter and this reply will be included with the report when it is sent to the Congress.

Sincerely yours,

  
W.C. GRIBBLE, JR.  
Lieutenant General, USA  
Chief of Engineers

COMMENTS OF THE GOVERNOR OF TEXAS



OFFICE OF THE GOVERNOR  
STATE CAPITOL  
AUSTIN, TEXAS 78711

DOLPH BRISCOE  
GOVERNOR

October 20, 1975

Lieutenant General W. C. Gribble, Jr.  
Chief of Engineers  
U. S. Army Corps of Engineers  
Washington, D. C. 20314

Dear General Gribble:

Thank you for your letter of July 17, 1975, concerning the proposed report on the Neches River salt water barrier at Beaumont. I am pleased that we concur regarding the favorable environmental impact of the project as proposed and the need for the barrier. Your letter also addresses points raised in a statement by the City of Beaumont and the Lower Neches Valley Authority at the public hearing held at my request by the Texas Water Rights Commission on February 5, 1975. Your interpretation of their comments appears to be different from my own, and I believe that those points merit further discussion.

The issue here is fair allocation of costs to correct a critical salt water intrusion problem at Beaumont. There is general agreement that the problem has been caused primarily by federal navigation works, which have enlarged the natural channel and increased the amount of river flow needed to keep salt water away from local fresh water intakes. It has been pointed out that correction of almost identical difficulties elsewhere has formerly been recognized as a fully federal responsibility. The local interests contend, and I agree, that the federal government should recognize a similar obligation to correct the unfavorable side-effects of navigation works at Beaumont.

You have had a study of the Neches River situation prepared by the Waterways Experiment Station. It finds that salt water intrusion would be less serious if there were no withdrawals of river water for beneficial use, and concludes that 25% of the difficulty should be attributed to fresh water diversions rather than to navigation. Based on the study, you have proposed to recommend to Congress that local interests be required to pay 25% of the cost of the salt water barrier.

Although your letter expresses the view that Beaumont and the L.N.V.A. agree in principle with the Waterways Experiment Station, I do not understand that to be their position. Instead, their statement clearly urges

that the established precedent of full federal responsibility for a problem of this nature should again be acknowledged in this instance. They then go on to say that, if the precedent should be set aside, and if the basic reasoning of the Waterways Experiment Station should be adopted instead, there are aspects of that study which should be re-worked so as to properly reflect the physical facts of the case. They point out several fundamental corrections which should be made in the analysis before it could be considered a valid basis for allocation of costs. Specifically, I refer to the following:

- a. The study should use a valid estimate of the rate of river flow originally needed to keep salt water away from Beaumont under natural conditions. Actual records show this minimum "pre-project" flow to have been 40 cubic feet per second or less. The Waterways Experiment Station assumed a pre-project flow requirement of 400 cfs, or ten times as much as the records indicate. Your letter does not speak directly to this point, but instead discusses whether salt water intrusion had moved up the river as far as Beaumont prior to 1910. The question is obviously not the date at which Beaumont became unable to pump fresh water from the river, but rather the proper value of the minimum river flow necessary to protect Beaumont before effects of navigation dredging were introduced.
- b. The study should consider the entire drainage area. In its present form, it omits all runoff contributed by approximately 1,000 square miles of watershed immediately upstream from Beaumont. Your letter tends to minimize this on the grounds that it represents only ten percent of the Neches River Basin. However, in any study of this type, where results are determined by the difference between available flows and diversions, an error of ten percent in the data can lead to errors of several hundred percent in the answers. You also suggest that omission of part of the runoff is balanced by not counting diversions on the part of Beaumont and the Eastex Paper Mill. Beaumont diversions were included in analysis supplied with the statement of local interests. Eastex gets part of its supply from wells and returns more water to the river than it diverts.
- c. The study should not count releases from upstream reservoir storage as part of the state-of-nature runoff. The Waterways Experiment Station analysis is essentially a comparison of natural flows versus the actual flows after the effects of man on the river. In its present form it treats all recorded flows of the Neches River as if they were natural runoff, disregarding the fact that much of the flow in critical dry months has been released from conservation storage in Sam Rayburn and Steinhagen Reservoirs. This storage, for which the Lower Neches Valley Authority as local sponsor in contributing \$15 million to the federal government, generally offsets the effects of diversions with respect to salt water intrusion at Beaumont. As it now

stands, the analysis operates to penalize the local interests for these major conservation efforts, rather than to give proper credit for their beneficial effects. For valid estimates of natural flow, the records should be adjusted to deduct the ustream releases. Your letter does not discuss this point.


- d. On the other hand, the study should reflect the full benefit of upstream releases as part of the actual flow that is now available. The local interests have suggested that the river records after 1967 (where Sam Rayburn Reservoir first filled) do reflect this correctly, but that earlier records do not. Your letter does not respond directly to the basic point, which is that a fair appraisal of the actual flows must allow for benefits of L.N.V.A. participation in Sam Rayburn and Steinhagen. You do state that the study should be based on the longest available period of record. Clearly a longer period of misleading records is not to be preferred over a not-so-long span of valid data.

In my opinion, the statement of the Lower Neches Valley Authority and the City of Beaumont gives a balanced presentation of views which are significant not only to their local area but also to Texas and the United States as a whole. The basic approach to curing this kind of problem should be consistent and what is applicable in one state should be applicable in another. If, as a matter of national policy, it is decided to adopt a new approach, the underlying reasoning for any alternative method should be sound and free from obvious shortcomings.

As a part of the local interests' statement, there is included a detailed evaluation using the basic rationale of the Waterways Experiment Station but with consideration given to the factors discussed above. The indicated percentage responsibility attributable to diversions is found to be not 25% but 3.9%. This represents a very substantial change in the result, due to correction of the items to which they call attention.

I believe that this is a significant difference, which deserves your thoughtful review. As we have said to you in connection with salt water pollution control works in the Brazos River Basin, we believe substantial changes in cost allocation policies related to water quality should be undertaken only after in-depth discussion with the states. We would again welcome the opportunity for such discussions with you.

Sincerely,



DOLPH BRISCOE  
Governor of Texas

DB/kdw

LETTER TO THE GOVERNOR OF TEXAS



DEPARTMENT OF THE ARMY  
OFFICE OF THE CHIEF OF ENGINEERS  
WASHINGTON, D.C. 20314

REPLY TO  
ATTENTION OF:

DAEN-CWP-C

27 JAN 1976

Honorable Dolph Briscoe  
Governor of Texas  
Austin, Texas 78711

Dear Governor Briscoe:

This is in reply to your letter of 20 October 1975 commenting further on the cost sharing arrangement recommended in my proposed report on Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas.

Although the study basically is concerned with the problem of salt water intrusion in the lower Neches River, we must consider all factors that could possibly impact on this problem. Any action by man to alter the shape of or enlarge the natural river outlet can provide one avenue for increasing the intrusion of salt water further and further upstream. On the other hand, the impoundment of portions of the total basin stream-flow in upstream reservoirs can also contribute to the problem, even in the absence of any alteration of the natural outlet. In the Neches River basin there are several reservoirs which include storage for municipal and industrial water supply and agricultural purposes. The existing Sam Rayburn Reservoir (Corps of Engineers) includes a pool for temporary storage of flood flows and a permanent pool for municipal and industrial water supply, hydroelectric power and other beneficial uses. The B. A. Steinhagen Lake (Corps of Engineers) was built as a reregulating facility for the releases from Sam Rayburn Reservoir. In the upper basin non-Federal interests have constructed several reservoirs with permanent storage, including one where water is diverted from the basin. All of these projects will have some influence on the problem in the lower Neches River basin.

The Board of Engineers recognized that factors in addition to continued enlargement of the Neches River outlet were responsible for the progressive upstream intrusion of the salt water wedge during periods of low stream flows. The special study undertaken by the Waterways Experiment Station for the Board of Engineers was made to gain further insight into the problem. This special study considered that the salt water intrusion problem was due to improvements for water supply, as well as for navigation, and that a reasonable assignment of cause was on the order of


75 percent to navigation and 25 percent to water supply. This study recognized that the available historic data on streamflow was somewhat sparse.

After further review of the matter I am still convinced that this 75-25 assignment of cause as the means for establishing the share of the project cost is reasonable. This recognizes the numerous water supply storage and stream diversion projects for municipal, industrial and agricultural use throughout the Neches River basin, including the lower basin and adjacent areas in the vicinity of Beaumont.

There are other precedents for sharing costs on projects for the prevention of salinity intrusion, in addition to that on the Calcasieu River in Louisiana. In the report on a study involving the lower Trinity River in Texas (Wallisville Reservoir) the sharing of project costs was based on a determination that the salt water intrusion was caused about equally by navigation improvements and natural causes and thus 50 percent of the costs assigned to salinity intrusion were Federal and 50 percent non-Federal. The Wallisville project with the 50-50 cost sharing arrangement was authorized by Congress in the Rivers and Harbors Act of 1962.

Your views expressed in this letter and your 15 March 1975 letter, together with all supplemental information inclosed therewith, will be submitted to the Congress, together with my report, for their consideration.

Sincerely yours,

  
W. C. GRIBBLE, JR.  
Lieutenant General, USA  
Chief of Engineers

COMMENTS OF THE DEPARTMENT OF THE INTERIOR



United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240

In Reply Refer To:  
PEP ER-74/1457

March 18, 1975

Dear General Gribble:

Thank you for your letter of November 18, 1974, requesting our views and comments on the revised draft environmental statement and interim review of reports, for the Saltwater Barrier on Neches River at Beaumont, Texas. Comments on both documents are presented below.

General Comments

We have some doubts about the benefits to be derived from this proposed project in view of the economically attractive and effective temporary saltwater barriers now being used. The reports should provide a sound analysis of technical, engineering and economic features that clearly demonstrate that the proposed project is superior to the existing one.

The review reports and the draft environmental statement do not evaluate the possibility that continuing subsidence along the Gulf Coast may nullify project benefits within a relatively brief period. Continuing development in this area necessitates greater groundwater withdrawals, that will accelerate land subsidence and tend to reduce the 1-foot differential at the proposed structure, thereby reducing or negating the usefulness of the proposed project. Additional information pertaining to the adequacy of the 1-foot differential is desired.

The revised draft environmental statement adequately addresses the concerns of outdoor recreation and fish and wildlife resources.

Interim Review Reports

We concur with the Corps of Engineers statements of mineral commodities produced in Jefferson County, Texas, as set forth in the Main Report (page 4) and in Appendix 1 (page B-1). We also agree that the proposed project should not significantly affect mineral resource development (environmental



statement, page 16). However, the section titled "Natural Resources" (Appendix 1, page B-6) should contain maps and explain in more detail the cited mineral resources in the project area.

The report indicates that saltwater intrusion has plagued this portion of the Neches River since the nineteenth century, before the installation of any navigation improvements. The problem of saltwater intrusion appears to be the result of inadequate flows in the Neches River which, in turn, is directly attributable to upstream impoundment of water for conservation and recreation and to excessive withdrawals of water for irrigation and municipal use. Aggravation of the problem by continuing development should be discussed.

The proposed action will not adversely affect any proposed or existing unit of the National Park System, including the nearby Big Thicket National Preserve. No site eligible for registration as a National Historic, Natural or Environmental Education Landmark will be affected.

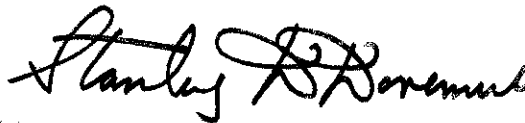
#### Revised Draft Environmental Statement

Results of the archeological survey mentioned on page 15, paragraph 1 of the environmental statement should be included in the final statement. If the survey locates sites that will be disturbed by the project, the final statement should also include actions that will be taken to mitigate the impact on non-renewable archeological resources.

If operational procedures proposed by the Corps of Engineers, on pages 12 and 13 of the environmental statement are strictly adhered to freshwater return flows to the Sabine Lake Estuary should not be significantly reduced below historically recorded values. In addition, approximately 17 miles of the Neches River and Pine Island Bayou will be improved in water quality as a result of the project.

We hope these comments will be of assistance to you in preparing your final documents.

Sincerely yours,



Deputy Assistant Secretary of the Interior

W.C. Gribble, Jr.  
Lieutenant General, USA  
Department of Army  
Washington, D.C. 20314

LETTER TO THE SECRETARY OF THE INTERIOR



DEPARTMENT OF THE ARMY  
OFFICE OF THE CHIEF OF ENGINEERS  
WASHINGTON, D.C. 20314

REPLY TO  
ATTENTION OF:

DAEN-CWP-C

28 May 1975

Honorable Kent Frizzell  
Acting Secretary of the Interior  
Washington, D. C. 20240

Dear Mr. Secretary:

This is in reply to your Department's comments on the proposed report and draft environmental impact statement concerning Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas.

The letter expresses doubts about the benefits to be derived from the proposed project in view of the economically attractive temporary barriers now being used, and states that the report should demonstrate that the proposed project is superior to the existing one. As stated in the formulation section of our report, the essential elements of an acceptable plan are that it should permanently control salinity intrusion in the river; provide for free and reasonably unobstructed use of the river by existing and prospective recreational and commercial navigation; be compatible with any future plan for extension of a barge channel above Beaumont; and preserve or enhance the natural environment of the river and its flood plain. Although the temporary barriers are effective and economical, they obstruct existing navigation when in place and are incompatible with proposals to extend navigation. Therefore, the temporary barriers are unacceptable as a permanent solution.

In response to the Department's comment on the possibility that continuing subsidence along the Gulf Coast may nullify project benefits, Section B of Appendix 1 of the Galveston District Engineer's report indicates that most of the land surface of Jefferson County subsided less than 0.25 foot between 1918 and 1954. Recently the National Geodetic Survey furnished information on the 1973 releveing. Between 1959 and 1973 seven bench marks in the Beaumont area subsided an average of about 0.5 foot. At this rate of subsidence, about 100 years will elapse before the 3.5-foot freeboard at the barrier reduces to zero. Installation of the proposed salt water barrier will insure the reliability of the existing surface water supplies, and retard the development of additional ground water withdrawals. We have no evidence to indicate that other demands will produce either a significant

future increase in withdrawals of ground water in Jefferson and Orange Counties, or a significant increase in the rate of subsidence.

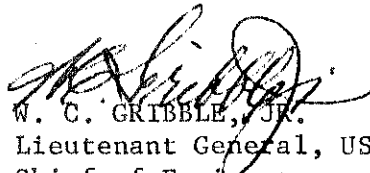
With respect to the request for additional information pertaining to the one-foot head differential between the upstream and downstream pool elevations, we believe that a one-foot differential is adequate to minimize upstream penetration of salt water through the navigation gate when it is opened for navigation.

The possibility that continuing development will aggravate the problem of salt water intrusion by depleting freshwater flows in the Neches River has also been considered. Future increases in the demand for surface water for municipal, industrial, and agricultural uses in the lower portion of the Neches River basin are expected to increase the number of months that a salt water barrier will be necessary for the protection of the surface water supplies. The project has been designed to accommodate this expected increase.

The comments on the draft environmental statement have been considered in the final statement together with our responses thereto.

A copy of the Department's letter and this reply will accompany my report to Congress.

Sincerely yours,



W. C. GRIBBLE, JR.  
Lieutenant General, USA  
Chief of Engineers

COMMENTS OF THE DEPARTMENT OF AGRICULTURE



DEPARTMENT OF AGRICULTURE  
OFFICE OF THE SECRETARY  
WASHINGTON, D. C. 20250

March 7, 1975

Lt. General William C. Gribble, Jr.  
Chief of Engineers  
Office of the Chief of Engineers  
Department of the Army

Dear General Gribble:

This is in response to your letter of November 18, 1974, transmitting for our review and comments your proposed report, together with pertinent papers, and the draft environmental statement for Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas.

The Main Report on page 38 states "The costs of a salt water barrier and navigation gate at site 4 are attributable to mitigation of damages that result from dredging of the Federal navigation project." Thus, the \$11,853,000 cost would appear to be additional costs for the navigation project and should be justified by navigation benefits rather than benefits from prevention of salinity damages to the rice crop. The use of benefits from prevention of salinity damages to the rice crop appears to be further questionable since the report states on page 32 that potential damages at present are effectively prevented by existing fixed salt water barriers and, therefore, must be assessed on a hypothetical basis rather than established fact. If the proposed project is truly mitigation, you may wish to consider supplementing the existing federal navigation project.

The Draft Environmental Statement meets the requirements of the National Environmental Policy Act of 1969.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert W. Long".

**Robert W. Long**  
Assistant Secretary for Conservation,  
Research and Education

LETTER TO THE SECRETARY OF AGRICULTURE



DEPARTMENT OF THE ARMY  
OFFICE OF THE CHIEF OF ENGINEERS  
WASHINGTON, D.C. 20314

REPLY TO  
ATTENTION OF:

DAEN-CWP-C

28 May 1975

Honorable Earl L. Butz  
Secretary of Agriculture  
Washington, D. C. 20250

Dear Mr. Secretary:


This is in reply to your Department's comments on the proposed report and draft environmental impact statement concerning Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas. The comments on the mitigation aspects of the project and the crediting of benefits for preventing salinity damage to crops have been carefully considered.

We recognize the fact that the construction of the ship channel to Beaumont and its subsequent progressive enlargement have been a contributing factor in the upstream penetration of salt water. We recognize also the close relationship that exists between the recently completed deepening of the ship channel to 40 feet and the proposed salt water barrier. The salt water barrier would have been a logical element to include in the recommended plan for deepening the Sabine-Neches Waterway. However, this would have resulted in delaying the needed deepening and, since we had separate Congressional study authorization for the Neches River and Tributaries, we decided to study the salinity problem separately. In either case, however, incremental justification of the salt water barrier would be required.

The benefits from the proposed salt water barrier do not stem from improvements to navigation or from prevention of damages to navigation. The principal benefits of the proposal are from mitigation of damages to the rice crop which we believe would be caused from salt water intrusion in the absence of the temporary barriers. Although the temporary barriers are effective and economical, they obstruct navigation when in place, and are, therefore, undesirable as a permanent solution.

A copy of the Department's letter and this reply will accompany my report to Congress.

Sincerely yours,

  
W. C. GRIBBLE, JR.  
Lieutenant General, USA  
Chief of Engineers

COMMENTS OF THE DEPARTMENT OF TRANSPORTATION



DEPARTMENT OF TRANSPORTATION  
UNITED STATES COAST GUARD

MAILING ADDRESS:  
U.S. COAST GUARD (G-WS/73)  
400 SEVENTH STREET SW.  
WASHINGTON, D.C. 20590  
PHONE: (202) 426-2262

20 Feb 1975

- Lieutenant General W. C. Gribble, Jr.  
Chief of Engineers  
Department of the Army  
Washington, D. C. 20314

Dear General Gribble:

This is in response to your letter of 18 November 1974 addressed to Secretary Claude S. Brinegar concerning a proposed report on Neches River and Tributaries, Salt Water Barrier, Beaumont, Jefferson County, Texas.

The concerned operating administrations and staff of the Department of Transportation have reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

The opportunity to review this proposed report is appreciated.

Sincerely,

W. E. CALDWELL  
Captain, U.S. Coast Guard  
Deputy Chief, Office of Marine  
Engineering and Systems  
By direction of the Commandant

COMMENTS OF THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
REGIONAL OFFICE  
1114 COMMERCE STREET  
DALLAS, TEXAS 75202

OFFICE OF  
THE REGIONAL DIRECTOR

Our Reference: EI# 1274-453

13 December 1974

Lt. Gen. W. C. Gribble, Jr.  
Chief of Engineers  
Department of the Army  
Washington, D.C. 20314

Dear Gen. Gribble:

RE: Revised: Neches River & Tributaries,  
Salt Water Barrier, Beaumont, Texas

Pursuant to your request, we have reviewed the Environmental Impact Statement for the above project proposal in accordance with Section 102(2) (C) of P. L. 91-190, and the Council on Environmental Quality Guidelines of April 23, 1971.

Environmental health program responsibilities and standards of the Department of Health, Education, and Welfare include those vested with the United States Public Health Service and the Facilities Engineering and Construction Agency. The U. S. Public Health Service has those programs of the Federal Food and Drug Administration, which include the National Institute of Occupational Safety and Health and the Bureau of Community Environmental Management (housing, injury control, recreational health and insect and rodent control).

Accordingly, our review of the Draft Environmental Statement for the project discerns no adverse health effects that might be of significance where our program responsibilities and standards pertain, provided that appropriate guides are followed in concert with State, County, and local environmental health laws and regulations.

We therefore have no objection to the authorization of this project insofar as our interests and responsibilities are concerned.

Very truly yours,

A handwritten signature in cursive script, appearing to read "William F. Crawford".

William F. Crawford  
Environmental Impact Coordinator

cc: Phyllis Hayes, OEA/Wash  
Warren Muir, Council on Environmental Quality

DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

Reaction Review and Comments on Environmental Impact Statement for Project Proposal:

Draft Environmental Impact Statement Reviewed With Objections

Draft Environmental Impact Statement Reviewed With No Objections

Date: 12-13-74

EI# 1274-453

Agency/Bureau: DHEW/PHS

Project Proposal: Neches River and Tributaries, Texas  
Saltwater Barrier on Neches River at Beaumont, Texas

Comments: Review of draft of this plan revealed no areas of concern in regard to compliance with Section 102(2)(c) of Public Law 91-190. This revised impact statement is still in compliance with these criteria and no changes are recommended.



COMMENTS OF THE ENVIRONMENTAL PROTECTION AGENCY



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI  
1600 PATTERSON  
DALLAS, TEXAS 75201

January 27, 1975

Colonel Marvin W. Rees  
Executive Director of Civil Works  
Department of the Army  
Office of the Chief of Engineers  
Washington, D. C. 20314

Dear Colonel Rees:

We have reviewed the Revised Draft Environmental Impact Statement for "Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas." The proposal calls for the construction of a permanent salt water barrier across the Neches River at Beaumont, Texas. The proposed barrier will consist of a gated dam in the river, a gated navigation by-pass channel, an auxiliary dam in a small tributary bayou, an access and service bridge, and other related works.

The statement covers most of the possible environmental impacts of the proposed project; however, we offer the following comments for your consideration in preparing the Final Environmental Impact Statement:

1. The statement indicates that the Lower Neches River Authority "periodically" constructs temporary salt water barriers to protect the fresh water supply. The frequency with which these barriers have been constructed in the past should be described. For example, are the temporary barriers needed every year? This information would further aid in better understanding the need for the project.

2. An earth fill and concrete auxiliary dam are proposed to be constructed across the canal which drains the southern end of Baird's Bayou. However, no discussion as to the need for such a structure is given in the statement. This aspect of the project, including the associated environmental impacts, should be discussed in the Final Environmental Impact Statement.

3. The statement indicates that should the local interests not make the required cash contributions for a project at river mile 23.0, the project is proposed to be built at river mile 26.3. Further discussion should be included as to possible impacts associated with a barrier at

this location. For example, will an earth fill auxiliary structure still be required for Baird's Bayou, and if so, what will its function be? Also, if navigation lock and canal is needed for alternate sites, these areas should be clearly illustrated on an appropriate map.

We would also suggest that consideration be given to the preparation of a revised or supplemental Environmental Impact Statement for the proposed project should the barrier be placed at an alternate location. For example, at river mile 26.3, spoil from the construction of a navigation lock and channel will have to be disposed of in alternate sites. A revised statement would help to ensure that an adequate assessment has been made of the possible environmental impacts associated with construction of the project at the alternate site in question.

4. The statement contains no data as to the existing quality of water in the Neches River. This information is necessary in order that an adequate assessment of the possible impacts to water quality can be made. The water quality data should include levels of dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, existing nutrient concentrations, salinities, and concentrations of toxic pollutants (heavy metals, pesticides). If data is available, an effort should be made to compare the water quality both above and below the temporary barriers. These comparisons could help in substantiating statements as to the seasonally dependent decrease in the quality of water in the lower reaches of the proposed project area.

5. Another alternative to the navigation lock and canal which should be discussed is the incorporation of a navigation lock into the salt water barrier. The salt water intrusion problem would be mitigated and still allow barge traffic to continue on the river. It appears that building the proposed by-pass channel, which could be expanded to accommodate larger barges, could actually induce an increase in barge traffic with accompanying pollutants.

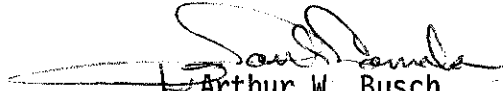
6. Possible adverse secondary impacts which could be induced by the project should also be discussed in the statement. For example, increased barge traffic and a more reliable water supply could induce an increase in industrialization in the area accompanied by increased noise, air, solid waste, and water pollution. Increased demands and dependence on the water supply provided by the Neches River may require that the salt water barrier be closed for a longer time period during the year. This could represent a potential impact to downstream estuarine areas bringing about a decline in productivity. Such an impact would be of a long-term nature and may represent an essentially irretrievable commitment of resources. Such possible long-term impacts need to be discussed in the statement.

These comments classify your Draft Environmental Impact Statement as LO-2. Specifically, we have no objection to the proposed project. However, additional information on the existing water quality of the Neches River and the possible long-term secondary impacts which the project may have on downstream estuarine areas is needed in the final statement. The classification and the date of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions, under Section 309 of the Clean Air Act.

Definitions of the categories are provided on the attachment. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and on the adequacy of the impact statement at the draft stage, whenever possible.

We appreciate the opportunity to review the Draft Environmental Impact Statement and would be happy to discuss our comments with you. Please send us two copies of the Final Environmental Impact Statement at the same time it is sent to the Council on Environmental Quality.

Sincerely yours,

  
Arthur W. Busch  
Regional Administrator

Enclosure

## ENVIRONMENTAL IMPACT OF THE ACTION

### LO - Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

### ER - Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to re-assess these aspects.

### EU - Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

## ADEQUACY OF THE IMPACT STATEMENT

### Category 1 - Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

### Category 2 - Insufficient Information

EPA believes the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

### Category 3 - Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement. If a draft statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.

# NECHES RIVER AND TRIBUTARIES, SALT WATER BARRIER AT BEAUMONT, TEXAS

## REPORT OF THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY



REPLY TO  
ATTENTION OF:

DAEN-CWP-A

12 April 1976

SUBJECT: Neches River and Tributaries, Salt Water Barrier at Beaumont,  
Texas

THE SECRETARY OF THE ARMY

1. I submit herewith for transmission to Congress the report of the Board of Engineers for Rivers and Harbors, accompanied by the reports of the District and Division Engineers, concerning the feasibility of a project for salinity control at Beaumont, Texas, in partial response to two Flood Control Acts adopted 15 May 1936 and 22 June 1936, a River and Harbor Act adopted 2 March 1945, a resolution of the Committee on Flood Control of the United States House of Representatives, adopted 20 March 1945, and a resolution of the Committee on Rivers and Harbors of the House of Representatives, adopted 24 May 1946.
2. The City of Beaumont, Texas and the Lower Neches Valley Authority draw most of their fresh water supply from the Neches River. This source of supply is threatened by salt water intrusion up the Neches River, during periods of low river flow and high water withdrawals. The problem is attributed, in part, to the construction and progressive improvement of the Sabine-Neches Waterway to the Gulf of Mexico over a period of years by the Federal Government. At present, the Lower Neches Valley Authority constructs temporary salt water barriers in the Neches River and in Pine Island Bayou to prevent contamination of the fresh water source. Although effective, these temporary barriers interfere with navigational use of the river and are considered by the reporting officers to be an unacceptable long term solution to the problem of salinity intrusion.
3. The District and Division Engineers recommend construction of improvements for salinity control at Beaumont, Texas, consisting of a gated dam with seven, 40 x 24.5 foot tainter gates, at river mile 23 in the Neches River, a two sector navigation gate and bypass channel which will provide a clear opening of 56 feet and a depth of 16 feet, an access road, a levee and an auxiliary dam across an adjacent bayou. The proposed structure will prevent salt water intrusion as well as

provide for free and unobstructed use of the existing navigable portion of the Neches River. The reporting officers estimate the total construction cost of the proposed project to be \$11,853,000, of which \$11,174,000 would be Federal cost and \$679,000 would be non-Federal, at 1972 price levels. The average annual charges are estimated to be \$974,100, including \$194,800 for Federal maintenance, operation, and major replacement, and the average annual benefits are estimated at \$1,812,500. The benefit-cost ratio, based on an interest rate of 5-1/2 percent, is 1.9.

4. The Board of Engineers for Rivers and Harbors concurs generally in the findings of the reporting officers that the proposed improvements are needed and economically justified. However, the Board concludes, based on subsequent studies, that the progressive enlargement of Sabine-Neches Waterway to Beaumont, Texas, has caused about 75 percent of the salinity intrusion and the remainder of the salinity intrusion problem is caused by irrigation and municipal and industrial water supply withdrawals. Therefore, the Federal share of the construction costs of the recommended plan should be limited to 75 percent of the construction costs of the least costly barrier at site 4, river mile 26. The Board also finds that operation and maintenance of the recommended improvements should be performed by non-Federal interests with 75 percent of the incurred cost reimbursed by the United States. Thus, the cost to the United States and to non-Federal interests for the plan recommended by the Board is presently estimated to be \$8,405,000 and \$3,448,000 (1972 price level), respectively, for construction and \$146,100 and \$51,000, respectively, for annual operation and maintenance.

5. Subsequent to approval of the report by the Board of Engineers the Governor of Texas, although concurring in the project scope in my proposed report, urged that reconsideration be given to the historical cause-effect relationship between navigation improvements and salt water intrusion and the equitable sharing of costs between the Federal Government and local sponsors. Accordingly, the supplemental information furnished by the Governor has been reviewed with the assistance of the staff of both the Waterways Experiment Station and the Board of Engineers. This review disclosed that the supplemental information was essentially the same as data available to the Board of Engineers for Rivers and Harbors and upon which the Board reached its decision on sharing of costs. In addition, I note that impoundments of portions of the total basin stream flow in upstream reservoirs, including transbasin diversion therefrom, will have some influence on the problem. Therefore, I find no basis for modifying my recommendations concerning the division of project costs between the Federal Government and local interests.


6. I have given further consideration to the basis for selection of the location of the salt water barrier. I note there is a choice between two sites which provide the primary purpose; prevention of salinity intrusion at the existing fresh water intakes. The proposed barrier if constructed at the upstream site, river mile 26.3, has the lowest first cost and provides the greatest excess of benefits to costs. However, the barrier if constructed at the downstream site, river mile 23.0, will restore a dependable fresh water environment in an additional 3.3 miles of river and in about 7,100 acres of swamp adjacent to the city of Beaumont. This area adjacent to the river and the city could restore itself to a semblance of its original natural beauty and provide an improved habitat for all wildlife dependent on freshwater environment. The downstream site would assure freshwater year-around recreation at a proposed city park adjacent to the river. A salt water barrier at the upstream site could not prevent periodic salt water intrusion in that reach. In view of these and other intangible environmental factors, I believe the plan selected by the reporting officers and approved by the Board of Engineers meets the environmental objectives under Principles and Standards. Therefore, I recommend construction of the environmental quality plan which is the salt water barrier at river mile 23. As part of the review we have considered further the responsibility for the additional costs for construction at the environmental quality site rather than at the most economical site. I believe that the responsibility for restoration and preservation of freshwater in the additional 3.3 miles of river and 7,100 acres of adjacent swampland should not be considered as local. The actions by the Federal Government and non-Federal entities over a period of many years in meeting water resources needs for navigation in the lower basin and municipal, industrial and agricultural water supply needs throughout the basin have each contributed to the problem. Therefore, I believe that the costs for the environmental plan should be shared on the same basis as recommended by the Board for the most economical plan. Reformulation of the plan in accordance with the Water Resources Council's Principles and Standards would not change other findings in my report. The Addendum required by the Council's Procedure Number 1 is attached.

7. I note, however, that subsequent to the Board's consideration an interest rate of 6-1/8 percent was prescribed for water resources planning. I further note that the October 1974 estimated first cost of construction is \$13,939,000. Applying the 6-1/8 percent interest rate the annual charges are estimated to be \$1,242,400, including \$223,000 for operations, maintenance and major replacements, and the average annual benefits are estimated to be \$2,749,000. The benefit-cost ratio is 2.2. Since the selected site is recommended as the Federal project non-Federal interests would be required to contribute 25 percent of the

first cost of the project, with credit for the value of lands, easements and rights-of-way, and alterations and relocations. This would reduce the non-Federal cost by about \$570,000 and increase the Federal cost by the same amount. On this basis the Federal cost is estimated to be \$10,454,000 and the non-Federal cost \$3,485,000.

8. After due consideration of the reports of the District and Division Engineers, the Board of Engineers for Rivers and Harbors, and the foregoing discussion, I recommend construction of a salt water barrier at river mile 23 in the Neches River at an estimated cost to the United States of \$10,454,000 for construction. However, with regard to the requirements of local cooperation, item b of the Board's recommendation is amended to read "Contribute 25 percent of the first cost of the barrier located at the environmental quality site the sum of the non-Federal contributions currently being estimated at \$3,485,000, including the value of lands, easements, and rights-of-way and alterations and relocations, to be paid either in a lump sum prior to commencement of construction, or in installments prior to commencement of pertinent work items, in accordance with construction schedules as required by the Chief of Engineers, the final apportionment of costs to be made after actual costs have been determined." All other requirements of local cooperation recommended by the Board remain the same.

1 Incl  
Addendum

  
W. C. GRIBBLE, JR.  
Lieutenant General, USA  
Chief of Engineers



INTERIM REVIEW OF REPORTS  
ON  
NECHES RIVER AND TRIBUTARIES, TEXAS  
COVERING  
SALT WATER BARRIER  
AT BEAUMONT, TEXAS

ADDENDUM CALLED FOR BY  
WATER RESOURCES COUNCIL PROCEDURE NO. 1  
PUBLISHED IN FEDERAL REGISTER ON 24 JULY 1974

1. Introduction. The purpose of this addendum is to provide supplemental information in compliance with the Principles and Standards for Planning Water and Related Land Resources. It establishes the basis for plan selection and recommendation in the Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas. This addendum has been prepared in accordance with Procedure No. 1 of the United States Water Resources Council, published in the Federal Register, Volume 39, No. 143, 24 July 1974.

2. Planning Objectives. Annually the fresh water supplies of the City of Beaumont and the Lower Neches Valley Authority drawn from the Neches River are threatened by salt water intruding up the river during periods of low river flow and high water withdrawals. At present, to avoid damages, the Lower Neches Valley Authority constructs temporary salt water barriers in the Neches River and Pine Island Bayou. Although effective and economical, these temporary barriers interfere with navigational use of the waters and are not an acceptable long-term solution to the problem of salinity intrusion. The purposes of this study are to develop a plan that will permanently control salinity intrusion in the Neches River at Beaumont, Texas; provide for free and reasonably unobstructed use of the river by existing and prospective recreational and commercial navigation; be compatible with any future plan for extension of a barge channel above Beaumont; preserve the natural environment of the river and its flood plain; and to determine the nature and extent of Federal interest in the plan.

3. Summary of Study Area Concerns.

a. Description of study area. The study area is located in southeast Texas adjacent to the lower reaches of the Neches River and Taylors Bayou. This area, comprised of most of Jefferson County, includes a heavily industrialized section along the Neches River and Sabine Lake, an irrigated agricultural section, and the business and industrial sections of the cities of Beaumont and Port Arthur. The existing Federal navigation project for the Sabine-Neches Waterway, Texas, provides a depth of 40 feet

Rev 15 Sep 1975

in the Neches River from the mouth to the turning basin at Beaumont; a depth of 34 feet in the turning basin and turning basin extension; and a depth of 30 feet from the turning basin extension to the Bethlehem Shipyard.

b. Study area concerns. The study area concerns pertinent to this report are protection of the surface water supplies of the Lower Neches Valley Authority (LNVA) and the City of Beaumont, removal of obstructions to existing recreational and commercial navigation, protection and enhancement of environmental features, and compatibility with plans for long-term development.

(1) Protection of surface water supplies. The LNVA and the City supply surface water from the Neches River and Pine Island Bayou to irrigate about 48,000 acres of rice annually and to six communities, including the cities of Beaumont and Port Arthur, to several small water districts, and to 16 refineries and chemical plants. Concern for permanent protection of the surface water supplies was expressed by two state agencies, the Texas Water Development Board, and the Lower Neches Valley Authority, and by the City of Beaumont.

(2) Removal of obstructions to navigation. Approximately 500 recreational craft of various kinds and several towboats and barges presently navigate the Neches River above the upstream end of the Federal project, are restricted to reaches of the Neches River and Pine Island Bayou below the temporary salt water barriers during the approximate six-month period each year when the barriers are in place. The Beaumont Boat Club, the Neches Boat Club, the Beaumont Country Club, the First Neches Ski Club, and Mr. J.L.C. McFaddin, a prominent landowner, voiced concern about recreational navigation.

(3) Protection and enhancement of environmental features. Environmental concerns are improvement of water conditions over as long a reach of the Neches River and Pine Island as possible, and preservation and improvement of conditions in the Big Thicket National Preserve. The Big Thicket National Preserve, authorized by Public Law 93-429, approved 11 October 1974, will consist of twelve units totalling 84,550 acres, situated in the area along and north of Pine Island Bayou and along and west of the Neches River. Environmental concern was voiced by the following agencies, groups, and individuals:

Federal agencies: U. S. Environmental Protection Agency, U.S. Fish and Wildlife Service, National Marine Fisheries Service, and the National Park Service.

State agencies: Lower Neches Valley Authority, Texas Water Rights Commission, Texas Water Quality Board, and the Texas State Historical Survey Committee.

County agencies: Environmental Control Department, Jefferson County.

Cities: City of Beaumont

Groups: ~~Beaumont~~ Boat Club, Beaumont Chamber of Commerce, Beaumont Council of Garden Clubs, Clean Air & Water, Inc., ~~Shepherds Cleaners -~~ Launderers, Sierra Club, and the Texas Committee on Natural Resources.

Individuals: Mr. F. M. Adams, Dr. E. A. Eads, Dr. R. C. Harrel, Mr. J. L. C. McFaddin, and Miss Geraldine E. Watson.

(4) Compatibility with plans for long-term development. Any plan for control of salinity intrusion should be compatible with any future plan for extension of a barge channel above Beaumont. Concern for this was expressed by the Texas Water Development Board; Lower Neches Valley Authority; Upper Neches River Municipal Water Authority; Beaumont Navigation District of Jefferson County; Beaumont Chamber of Commerce; Cherokee County Development Council; Eastex, Inc.; Intracoastal Canal Association of Louisiana and Texas; Jacksonville Chamber of Commerce; and the Rusk Chamber of Commerce.

4. Description of the National Economic Development Plan. The NED plan is the least costly plan which will prevent salt water intrusion, preserve the public right of navigation, and preserve the natural environment. The NED plan consists of a salt water barrier with seven 40 - by 24.5-foot tainter gates and appurtenant structures at mile 26.3 on the Neches River, including a navigation gate 56 feet deep and 76 feet wide on bottom, an access road, and an earth levee 700 feet long. Approximately 34 acres of right-of-way and 23 acres of leveed disposal area would be required for the NED plan.

5. Description of the Environmental Quality Plan (Recommended Plan). The EQ plan is the recommended plan. The recommended (EQ) plan consists of a salt water barrier with seven 40- by 24.5-foot tainter gates and appurtenant structures at mile 23.0 on the Neches River, one-half mile upstream from the Interstate Highway 10 bridge at Beaumont, including a navigation gate east of the barrier consisting of two sector gates providing a clear opening 56 feet wide and 16 feet deep over the sill; a navigation by-pass channel 2,500 feet long, 16 feet deep and 76 feet wide on bottom; an access road on the west side of the river; an earth levee 2,500 feet long extending southwestward from the east end of the navigation gate along the east side of the navigation by-pass channel to high ground north of Interstate Highway 10; and an auxiliary dam with three 10- by 8-foot slide gates and two 10-by 2-foot flap gates across a canal which drains the southern end of Bairds Bayou, at a location immediately south of old U.S. Highway 90. The recommended (EQ) plan was developed through coordination with local agencies, public preferences expressed at the second public meeting and by professional analytical judgement to protect the environment over as much of the impacted area of the Neches River and Pine Island Bayou as possible. The recommended (EQ) plan will improve environmental conditions in 3.3 more miles of the Neches River and in 7,100 more acres of adjacent swampland than would the NED plan. The recommended (EQ) plan has an estimated first cost of \$13,939,000 (October 1974 prices), and estimated annual charges of \$1,242,400 (6-1/8 percent interest, 50-year period of analysis). The Chief of Engineers submitted the Revised Draft Environmental Statement to other Federal agencies and the Governor of Texas for review on 18 November 1974.

6. Impact Assessment. Impact assessments for the recommended (EQ) plan and the NED plan are shown in Table 1. The assessments were extracted from information included in the report and the environmental statement. This information was prepared by Engineers and biologists of the Corps of Engineers based on their personal reconnaissance of the affected area, professional judgement, published data, and consultation with a local biologist and representatives of the Texas Parks and Wildlife Department, the U. S. Fish and Wildlife Service, the Lower Neches Valley Authority, and the City of Beaumont. Significant field level review comments on the report and the environmental statement also are reflected in the assessments. The NED and EQ plans were developed following the second public meeting on 9 December 1970. The EQ plan was presented as the recommended plan at the third public meeting on 24 March 1972, and was slightly revised as a result of comments received at the public meeting. Approximately 3 acres of land in Jefferson County and 54 acres of land in Orange County will be required as right-of-way for the proposed project, including 16 acres of severed land in Orange County. Additionally, approximately 14 acres of leveed disposal area, tentatively in Jefferson County, will be required for disposal of excavated material in excess of that needed for construction of the levee and service area. Approximately 41 acres of the right-of-way will be entirely cleared of existing trees and vegetation, and selective cutting and clearing will be performed on approximately 16 acres of severed land. The recommended (EQ) plan will assure the reliability of municipal, industrial and agricultural fresh water supplies which are vital to the economic well being of the area's inhabitants. It will restore a dependable fresh water environment in all of the river and swamp areas above Interstate Highway 10, except for 600 acres of swamp drained by Brakes Bayou. Approximately 16.7 miles of the Neches River and Pine Island Bayou between the permanent barrier location and the existing temporary barrier locations will be improved for fresh water fishing, as will the canals and bayous leading into the swamp. Until downstream sources of municipal and industrial water pollution are cleaned up or eliminated, the recommended (EQ) plan will enhance the environment by barring the upstream movement of polluted water. The effluent outfall from the Eastex, Inc., paper mill at Evadale, Texas, presently discharges into the Neches River at mile 25.3. The recommended (EQ) plan will not be constructed until the relocation of the outfall to a new location downstream from Interstate Highway 10, which is planned by that company independently of construction of a salt water barrier, has been completed.

7. Evaluation. Both the NED plan and the recommended (EQ) plan permanently control salinity intrusion, facilitate existing recreational and commercial navigation, and are compatible with long-term development. The recommended (EQ) plan will improve environmental conditions in an additional 3.3 miles of the Neches River and in 7,100 more acres of adjacent swampland than would the NED plan. Table 2 summarizes the benefits and costs for the recommended (EQ) plan and the NED plan.

8. Summary of Unresolved Problems. There are no unresolved problems.

9. Mitigation Measures. There is no need for any mitigation measures.

10. Determination of Need for Reformulation. There is no need for reformulation.

TABLE 1  
SUMMARY COMPARISON OF ALTERNATIVE PLANS  
NECHES RIVER AND TRIBUTARIES, SALT WATER BARRIER AT BEAUMONT, TEXAS

Significant Impacts, Plan Evaluation, and Implementation Responsibility

15 September 1975

FACTORS	ALTERNATIVE PLANS	
	: RECOMMENDED : (EQ) Plan	: NED Plan
I. Plan Data		
A. Structural Measures	Gated barrier and appurtenances at mile 23.0 on Neches River.	Gated barrier and appurtenances at mile 26.3 on Neches River.
B. Non-Structural Measures	None	None
II. National Economic Development		
A. Benefits	\$2,749,000	\$2,682,000
(1) Prevention of agricultural damage	Protects the surface water supplies of the Lower Neches Valley Authority and the City of Beaumont from contamination by salt water. <u>1/</u>	Same
(2) Fish and Wildlife		
(a) Increase fresh water sport fishing	5,400 man-days	6,100 man-days
(b) Increase freshwater commercial fish catch	400 pounds per year	Same
(3) Environmental enhancement	Improve 16.7 miles of Neches River and Pine Island Bayou and adjacent swamp areas for recreational uses, such as swimming, boating, hunting and freshwater fishing.	Improve 13.4 miles of Neches River and Pine Island Bayou and adjacent swamp areas for recreational uses, such as swimming, boating, hunting and freshwater fishing.
B. Project first cost	\$13,939,000	\$13,178,000

1/ Increase yield to 48,000 acres of irrigated rice crop.

TABLE 1 (CONT'D)

FACTORS	ALTERNATIVE PLANS	
	RECOMMENDED (EQ) Plan	NED Plan
C. Loss of tax revenues	54 acres of right-of-way and severed land.	34 acres of right-of-way and 23 acres of disposal area.
D. Loss of fresh water during operation of the navigation gate	10,000 acre-feet per year.	Same
III. Environmental Quality <sup>1/</sup>		
A. Improve reach of Neches River and Pine Island Bayou and the canals and bayous leading into the adjacent swamp areas, for recreational uses such as swimming, boating, hunting and fresh water fishing. <sup>2/</sup>	16.7 miles. 7,100 addition acres of swampland protected from pollution.	13.4 miles.
B. Effect on existing recreational and commercial navigation	Eliminate the restriction during the approximate 6-month period each year when the temporary barriers are in place on the Neches River and Pine Island Bayou.	Same
C. Effect on fresh water sport fishing	Increase 5,400 man-days	Increase 6,100 man-days
D. Backwater effects	Reduce backwater effects in Big Thicket National Preserve.	Same
E. Effect on proposed City Park to located in the area west of the Neches River and east of the Lawson Canal	Enhance the recreational value of the park.	No effect.

<sup>1/</sup> In addition to the effects itemized, the EQ account should reflect the short-term benefit of barring the upstream movement of water polluted by municipal and industrial wastes from the Beaumont area, during the period prior to the time these discharges are either cleaned up or eliminated.

<sup>2/</sup> The project will restore the river and adjoining marshes and swamps to a clear fresh water condition above the barrier.

TABLE 1 (CONT'D)

FACTORS	ALTERNATIVE PLANS	
	RECOMMENDED	
	(EQ) Plan	NED Plan
F. Effect on known archeological or historical resources	No adverse effect.	Same
G. Effect on estuarine animals	Impede upstream movement of estuarine animals; however in view of the distance of the project above the estuary (Sabine Lake) and the many miles of polluted water below the proposed barrier, the practical effect is considered negligible.	Same
H. Effect on wildlife habitat	Loss of 57 acres of right-of-way and severed land as wildlife habitat; however, small animals and birds are expected to return to the 16 acres of severed land after completion of construction.	Loss of 34 acres of right-of-way and 23 acres of disposal area as wildlife habitat.
I. Effect on trees and vegetation	Loss of all existing trees and vegetation from 41 acres of right-of-way and loss of less desirable trees and some of the underbrush from 16 acres of severed land.	Loss of all existing trees and vegetation from 34 acres of right-of-way and 23 acres of disposal area.
IV. Social Well-Being		
A. Improve reach of Neches River and Pine Island Bayou and the canals and bayous leading into the adjacent swamp areas, for recreational uses such as swimming, boating, hunting and fresh water fishing. The project will enhance esthetic appeal for human enjoyment.	Same as for EQ account.	Same as for EQ Account

TABLE 1 (CONT'D)

FACTORS	ALTERNATIVE PLANS	
	RECOMMENDED (EQ) Plan	NED Plan
B. Effect on existing recreational and commercial navigation.	Same as for EQ account.	Same as for EQ account.
C. Effect on fresh water sport fishing	Same as for EQ account.	Same as for EQ account.
D. Backwater effects	Same as for EQ account.	Same as for EQ account.
E. Effect on proposed City Park to be located in the area west of the Neches River and east of Lawson Canal.	Same as for EQ account.	Same as for EQ account.
F. Displacement of individuals	No direct displacement of individuals.	Same.
G. Effect on noise levels	No material increase.	Same.
H. Effect on esthetic values	No significant adverse effect.	Same.
I. Social effects	No adverse social effects.	Same.
J. Loss of tax revenues	Same as for NED account.	Same as for NED account.
K. Effect on wildlife habitat	Same as for EQ account	Same as for EQ account.
L. Effect on trees and vegetation	Same as for EQ account.	Same as for EQ account.
V. Regional Development	Same as for NED account.	Same as for NED account.
VI. Plan Acceptance	Plan is acceptable, strongly supported and documented to that effect in the report, Appendix 2.	Two written objections to the NED plan were received from local groups in Beaumont.
VII. B/C Ratio	2.2	2.3
VIII. Implementation Responsibility. The Lower Neches Valley Authority has agreed to provide the necessary items of local cooperation for the project.		



TABLE 2  
 UPDATED BENEFIT/COST COMPARISON  
 NECHES RIVER AND TRIBUTARIES, SALT WATER BARRIER AT BEAUMONT, TEXAS

15 September 1975

	Recommended (EQ) Plan		: NED Plan
	As formulated	Using current values	Using current values
Interest rate	5-1/2%	6-1/8%	6-1/8%
Period of analysis	50 years	50 years	50 years
Plan benefits			
Prevention of agricultural damage	\$ 1,762,000	\$ 2,676,000	\$ 2,676,000
Fish and wildlife	6,000	6,000	6,000
Environmental enhancement	44,500	67,000	-
Total avg. annual benefits	<u>1,812,500</u>	<u>2,749,000</u>	<u>2,682,000</u>
Plan costs			
Total first cost	11,853,000	13,939,000	13,178,000
Total investment cost	13,156,800	15,646,500	14,792,300
Total annual charges	974,100	1,242,400	1,175,400
B/C ratio	1.9	2.2	2.3



# REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS



REPLY TO  
ATTENTION OF:

**DEPARTMENT OF THE ARMY**  
**BOARD OF ENGINEERS FOR RIVERS AND HARBORS**  
**KINGMAN BUILDING**  
**FORT BELVOIR, VIRGINIA 22060**

DAEN-BR

9 July 1974

**SUBJECT:** Neches River and Tributaries, Salt Water Barrier at  
Beaumont, Texas

Chief of Engineers  
Department of the Army  
Washington, D. C.

1. Authority. -- This interim report is in partial response to the following acts and resolutions which are quoted in full in Section A, Appendix 1, of the report of the District Engineer:

Flood Control Act approved 15 May 1936;

Flood Control Act approved 22 June 1936;

River and Harbor Act approved 2 March 1945;

Resolution of the Committee on Flood Control of the United States House of Representatives adopted 20 March 1945; and

Resolution of the Committee on Rivers and Harbors of the House of Representatives adopted 24 May 1946.

2. Description. -- The main area under study lies essentially in Jefferson County, Texas, and includes a heavily industrialized section along the Neches River and Sabine Lake, an irrigated agricultural section in the northwest portion of the county, and the business and industrial sections of the cities of Beaumont and Port Arthur. The Neches River drains an area of about 10,000 square miles. It empties into Sabine Lake, 4 miles west of the mouth of the Sabine River, and flows to the Gulf of Mexico through the Lake and Sabine Pass. Major tributaries in the lower portion of the basin are Village Creek and Pine Island Bayou, which enter the Neches River near river miles 40 and 30, respectively. The average annual flow of the river is 5,600,000 acre-feet per year. Tidal effects extend to river mile 42 near Wiess Bluff, and most of the flood plain in the tidal reach is swampland with elevations of 5 feet or less.

3. Economic development. --The population of Jefferson County in 1970 was 245,000, of which 115,920 and 57,370 were located in Beaumont and Port Arthur, respectively. The major business activities are petroleum production and processing, petrochemical manufacturing, shipbuilding, and port activities associated with the Sabine-Neches Waterway and the Gulf Intracoastal Waterway. Minerals produced in Jefferson County include petroleum, natural gas, sulphur, salt, sand, gravel, and clay. Agricultural production is centered on rice and beef cattle.

4. Existing improvements. --Existing Federal projects in the Neches River basin include Sam Rayburn Dam and Reservoir, Town Bluff Dam-B. A. Steinhagen Lake, and the deep-draft Sabine-Neches Waterway. Sam Rayburn Reservoir, with its dam at mile 25.2 on the Angelina River, has a total storage capacity of 3,998,000 acre-feet for flood control, hydroelectric power, water conservation, and sediment storage. B. A. Steinhagen Lake, located downstream, has a storage capacity of 69,700 acre-feet and is used primarily for regulation of power discharges from Sam Rayburn Dam. The Sabine-Neches Waterway has a depth of 40 feet and a bottom width of at least 400 feet from the Gulf of Mexico to the turning basin at Beaumont, a depth of 34 feet and varying widths in the turning basin and its extension, and a depth of 30 feet and bottom width of 200 feet from the turning basin to the Bethlehem Shipyard. The total length of the dredged channel in the Neches River is 19.7 miles.

5. Problems and needs. --The Lower Neches Valley Authority (LNVA) provides surface water from Pine Island Bayou and the Neches River to approximately 48,000 acres of rice land, several small water districts, 15 refineries and chemical plants, and five communities, including the city of Port Arthur. The city of Beaumont provides surface water from the Neches River and ground water from Hardin County for municipal use in the city and to one major petroleum refinery. Recent combined surface water usage by Beaumont and the LNVA has been about 495,000 acre-feet per year.

6. During periods of low flow and high water use, saltwater from the Gulf of Mexico moves up the Neches River and threatens the surface water supplies of the city of Beaumont and the LNVA. To prevent this contamination, the LNVA constructs temporary saltwater barriers in Pine Island Bayou and the Neches River almost every year. These temporary barriers, although effective in blocking upstream penetration of saltwater, may remain in place from 4 to 6 months and obstruct free navigation of the river by about 500 pleasure craft and several commercial towboats and barges.

7. Improvements desired. --Local interests desire construction of a permanent saltwater barrier on the Neches River in the vicinity of the Interstate Highway 10 bridge at Beaumont. The structure would control salinity intrusion, provide free and reasonably unobstructed use of the river by existing and prospective recreational and commercial navigation, and provide environmental enhancement through improved conditions for freshwater boating and fishing.

8. Improvements considered. --The District Engineer found that the primary cause of salinity intrusion was the construction and subsequent progressive enlargement of the Federal navigation channel to Beaumont. He considered various alternative solutions, including continuation of the present practice of installing temporary saltwater barriers each year, flushing the saltwater wedge downstream with freshwater, extension of the freshwater intake canals to points above the limit of tidewater, increased use of ground water as a substitute for surface water from the river, and construction of a permanent barrier in the river channel. He found that continuation of the present practice of installing temporary barriers, although effective and economical, is not an acceptable long-term solution to the problem because of the long-range adverse effects on the flora and fauna in the Big Thicket area, the interference with navigation use of the river, and the susceptibility of the temporary barriers to breaching during floods. He also found that flushing would be an uneconomic use of a valuable resource, that extension of the intake canals would have economic and environmental disadvantages as compared to other alternatives, and that the volume of flushing water used will be needed to augment ground water supplies to satisfy future municipal, industrial, and agricultural water demands. Therefore, construction of a permanent barrier in the river channel was found to be the most desirable.

9. Several alternative permanent barrier designs and locations were studied, including fixed weir, flap-gated, inflatable fabric, and tainter-gated dams. Because of the sedimentation and backwater effects associated with the fixed weir dam, and uncertainties associated with the performance of the flap-gated and inflatable fabric dams, the District Engineer recommends the tainter-gate design. He finds that, since the estimated first costs of the flap-gated and inflatable dams are less than the selected design dam, further consideration should be given to these designs during detailed preconstruction planning. Of seven possible sites on the Neches River considered, he found that the most economical location would be at site 4, river mile 26.

10. Improvements proposed. --Although the most economical location for a permanent saltwater barrier would be at site 4, local interests prefer that a functionally equivalent, but more costly structure be

located at site 1, river mile 23, because it would bar further upstream movement of municipal and industrial pollution, and would provide environmental enhancement for a correspondingly greater length of river. The District Engineer indicates that the environmental enhancement benefits stem primarily from barring pollution from the lower 3 miles of the project area. Since these pollutants bear no direct relationship to the Federal navigation improvements, and since the problem may be mitigated under State and Federal pollution control programs in the foreseeable future, the District Engineer considers that the additional cost of a structure at site 1, related solely to solution of a nonproject-related pollution problem, should be entirely a local expense. Local interests accept this finding and have indicated a willingness to pay the difference in costs between sites 1 and 4 in order to obtain these additional benefits. Therefore, the District Engineer recommends construction of a permanent saltwater barrier with tainter-gates and appurtenant structures at site 1, river mile 23, on the Neches River. Also included in the plan is a navigation gate and bypass channel, an access road, a levee, and an auxiliary dam across an adjacent bayou.

11. Economic evaluation. --The District Engineer concludes that measures to mitigate the saltwater intrusion problem are a Federal responsibility. Using September 1972 prices and a 5-1/2 percent interest rate, he estimates the first cost of the project at \$11,853,000, of which \$11,174,000 would be Federal, and \$679,000 would be non-Federal. He estimates the annual charges at \$974,100, of which \$927,200, including \$194,800 for annual operation, maintenance, and replacement, would be Federal, and \$46,900, including \$2,300 for annual operation, maintenance, and replacement, would be non-Federal. The benefit-cost ratio is 1.9 based on a 50-year period of analysis.

12. Other considerations. --The District Engineer has considered the impact of construction of the project on ecological, esthetic, fish and wildlife, recreational, and other human and natural environmental resources in the area, and concludes that where the proposed project has an adverse effect, this effect is either ameliorated or substantially outweighed by other considerations of national policy. He also considered the effects of the proposed project on the objectives of regional development and social well-being, and concludes that the proposed project will contribute to enhancing the regional economy and improving social well-being.

13. Recommendations of reporting officers. --Subject to certain conditions of local cooperation, including a cash contribution toward the cost of a project at river mile 23, site 1, presently estimated at \$667,000, the

District Engineer recommends construction of a permanent saltwater barrier at Beaumont, Texas, generally in accordance with plans described in his report. The Division Engineer concurs.

14. Public notice. --The Division Engineer issued a public notice stating the recommendations of the reporting officers and affording interested parties an opportunity to present additional information to the Board. Careful consideration has been given to the communications received.

Views and Recommendations of the Board of Engineers for Rivers and Harbors.

15. Views. --The Board of Engineers for Rivers and Harbors concurs in general in the findings of the reporting officers that the proposed improvements are needed and economically justified. The Board notes that saltwater intrusions are attributable to three major causes; naturally insufficient flows in the river, upstream withdrawals for irrigation and water supply, and progressive enlargement of the Sabin-Neches Waterway to the city of Beaumont. While the natural flows and the withdrawals alone, or in combination, cause such intrusions, the Board agrees that the navigation project is the major cause of the problem, and that there is a Federal responsibility associated with it. In a subsequent study made for the Board, it was estimated that the adverse effects caused by the works of man are assignable to the navigation project and to upstream withdrawals in the relative proportions of about 75- and 25-percent, respectively. Therefore, the Board believes that the Federal share of the construction costs of the recommended barrier at site 1, of river mile 23, should be limited to 75 percent of the construction costs of the least costly barrier at site 4, river mile 26. It also finds that operation and maintenance of the recommended improvements should be a non-Federal responsibility, 75 percent of the incurred cost of which should be reimbursed by the United States.

16. The Board has carefully considered the environmental effects of the proposed project, including those discussed in the Revised Draft Environmental Impact Statement dated May 1973 and concludes that although there will be some adverse effects on the environment, the positive effects of the project will outweigh the adverse impacts. The Board finds that the plan recommended by the reporting officers will restore a dependable freshwater environment in almost all of the river and swamp areas above Interstate Highway 10, thereby creating approximately 17 miles of additional fresh, unpolluted water for fishing, reducing the present adverse salinity effect on the forest resources of the area, and, in general, rendering the waterway clean, useful, and attractive for man's overall enjoyment and recreation.

17. In addition to national economic efficiency and environmental quality, the Board also considered the effects of the proposed project on the objectives of social well-being and regional economic development as required by the Principles and Standards for Planning and Related Land Resources recently established by the Water Resources Council. The Board believes that the reduction in saltwater intrusion resulting from the proposed works will contribute significantly to the regional economy and the improvement of social well-being.

18. The Board notes that there are technical alternatives to the permanent, gated structure recommended by the reporting officers, such as pneumatic barriers and fabric dams, which have definite cost advantages but are of uncertain reliability because of lack of experience data. The Board believes that these alternatives may have merit and should be thoroughly investigated during postauthorization planning investigations.

19. Recommendations. --Accordingly, the Board recommends construction of improvements for salinity control at Beaumont, Texas, consisting of a gated dam at river mile 23 in the Neches River, a navigation gate and bypass channel, an auxiliary dam, and appurtenances; all generally in accordance with the plans of the District Engineer and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable at a presently estimated cost to the United States of \$8,405,000 for construction and \$146,100 annually for operation and maintenance: Provided that, prior to commencement of construction, non-Federal interests will agree to:

a. Provide without cost to the United States all lands, easements, and rights-of-way necessary for construction and subsequent maintenance of the project and for aids to navigation upon the request of the Chief of Engineers, including suitable areas determined by the Chief of Engineers to be required in the general public interest for initial and subsequent disposal of excavated materials, and including necessary retaining dikes, bulkheads, and embankments therefor, or the costs of such retaining works;

b. Contribute 25 percent of the first cost of the least costly alternative at site 4, plus 100 percent of the difference in cost required as a result of moving to the locally preferred site 1, the sum of the contributions currently being estimated at \$3,448,000, to be paid either in a lump sum prior to commencement of construction, or in installments prior to commencement of pertinent work items, in accordance with construction schedules as required by the Chief of Engineers, the final apportionment of costs to be made after actual costs have been determined;



c. Accomplish, without cost to the United States, all alterations and relocations of structures, pipelines, powerlines, cables, utility facilities, sewers, and highway facilities made necessary by the construction of the project;


d. Maintain and operate all the works after completion in accordance with regulations prescribed by the Secretary of the Army and bear 25 percent of the incurred cost;

e. Arrange, without cost to the United States, for construction and maintenance of a suitable connecting road from the project to the city street system;

f. Hold and save the United States free from damages that may result from construction, maintenance, and operation of the project; and

g. Obtain, without cost to the United States, all water rights needed for operation of the project in the interest of navigation and prevention of salinity intrusion, and resolve any conflicts in water rights necessary for effective operation of the project.

FOR THE BOARD:

  
D. A. RAYMOND  
Major General, USA  
Chairman



## REPORT OF THE DISTRICT ENGINEER

# *Syllabus*

The purposes of this study are to develop a plan that will permanently control salinity intrusion in the Neches River at Beaumont, Texas; provide for free and reasonably unobstructed use of the river by existing and prospective recreational and commercial navigation; be compatible with any future plan for extension of a barge channel above Beaumont; and preserve the natural environment of the river and its flood plain; and to determine the nature and extent of Federal interest in the plan.

Annually the fresh water supplies of the City of Beaumont and the Lower Neches Valley Authority drawn from the Neches River are threatened by salt water intruding up the river during periods of low river flow and high water withdrawals. At present, to avoid damages, the Lower Neches Valley Authority constructs temporary salt water barriers in the Neches River and in Pine Island Bayou. Although effective and economical, these temporary barriers interfere with navigational use of the waters and are not an acceptable long term solution to the problem of salinity intrusion.

The study finds that the cause of the salinity intrusion problem is the progressive improvement of the stream for navigation over a period of many years by the Federal Government between Beaumont and the Gulf of Mexico, culminating in the recent completion of improvement of the Sabine-Neches Waterway generally to a depth of 40 feet; that measures to mitigate the problem are a Federal responsibility in furtherance of navigation improvements previously undertaken, subject to the usual requirements of local cooperation attached to navigation projects; that the basis for this finding was implied in the Congressional authorization for the most recent navigation improvements (House Document No. 553, 87th Congress, 2nd Session, pages 15 and 32).

The study discloses that a gated barrier, including provisions for the passage of navigation, would be technically and environmentally feasible and economically justified. It finds that the most economical plan would provide such a structure at mile 26.3 on the Neches River (site 4) at an estimated first cost, exclusive of preauthorization studies, of \$11,206,000 including Federal and non-Federal first costs of \$11,174,000 and \$32,000, respectively, estimated annual maintenance, operation and major replacement costs to the United States of \$194,800, and estimated annual non-Federal costs of \$300 for spoil areas, levees and spillways.

The study also finds, however, that substantial environmental enhancement would accrue from a functionally equivalent but more costly structure located farther downstream at mile 23.0 (site 1), said enhancement resulting from the incidental effect of the structure in barring the upstream movement of water degraded by municipal and industrial pollutants, and that the local interests are desirous of realizing this additional benefit and are willing to pay the difference in cost to obtain it. The difference in estimated first costs of the two plans is \$647,000, including an increase of \$14,000 in the non-Federal cost of usual items of local cooperation, and a cash contribution of \$633,000. The plan preferred by local interests is selected based on their willingness to pay for their preference. The selected plan provides for a gated main barrier, navigation gate, bypass channel, auxiliary dam and appurtenances at site 1, mile 23.0 on the Neches River. The estimated first cost of the proposed improvements, exclusive of preauthorization studies is \$11,853,000. The total annual cost of operation, maintenance and major replacement is estimated to be \$197,100, including \$196,800 Federal and \$300 non-Federal.

This represents an increase of \$2,000 in the average annual operation, maintenance, and major replacement to be accomplished by the Federal Government, an increase attributable to design features associated with selection of the site preferred by local interests. It is proposed that the local interests, in addition to their contribution to first cost, contribute also a lump sum amount, presently estimated at \$34,000, representing the capitalized equivalent of the increased annual Federal cost for operation, maintenance, and major replacement. Thus the total advance contribution of funds required of local interests is presently estimated at \$667,000.

It is recommended that, subject to the usual conditions of non-Federal cooperation for navigation projects and cash contributions toward the first cost of construction and the increased annual costs of operation, maintenance, and major replacement, the proposed plan of improvement for a salt water barrier at site 1 in the Neches River at Beaumont, Texas, be adopted, at a presently estimated first cost to the United States of \$11,174,000 and an estimated net annual maintenance, operation, and major replacement cost to the United States of \$194,800. Non-Federal first costs are estimated at \$679,000, including a cash contribution presently estimated to be \$633,000, and non-Federal annual costs for disposal areas, levees and spillways are estimated at \$300, plus an advance contribution of \$34,000 to increased Federal operation, maintenance, and major replacement.

It is recommended further that, if at the time of construction the required non-Federal cash contribution should for any reason be not forthcoming, the plan of improvement shall revert to that most economical to the United States.

**GALVESTON DISTRICT, CORPS OF ENGINEERS**

**31 MAY 1973**

**INTERIM REVIEW OF REPORTS  
ON  
NECHES RIVER AND TRIBUTARIES, TEXAS  
COVERING  
SALT WATER BARRIER AT BEAUMONT, TEXAS**

***THE STUDY AND REPORT***

Almost every year the surface water supplies of the municipalities, industries and rice farmers in Jefferson County, Texas, are threatened by salt water intruding upstream in the Neches River and Pine Island Bayou, a principal tributary. Local interests presently control the upstream penetration of the salt water by constructing temporary barriers, which, although effective and economical, are objectionable as a long-term solution because they interfere with existing recreational and commercial navigation. The objective of this study is to find an acceptable permanent solution to the problem of salinity intrusion, and one that will preserve or enhance the environment.

***Purpose and Authority***

This interim report is submitted in partial response to the following Congressional authorizations:

- Act to provide for preliminary examination of the Sabine and Neches Rivers, approved 15 May 1936.
- Section 6 of the Flood Control Act, approved 22 June 1936.
- Section 6 of the River and Harbor Act, approved 2 March 1945.
- House Committee on Flood Control Resolution, adopted 20 March 1945.
- House Committee on Rivers and Harbors Resolution, adopted 24 May 1946.

R 5-31-73

On 10 March 1972 the Chief of Engineers approved the submission of an interim report on the proposed Neches River salt water barrier.

### ***Scope of the Study***

Detailed field and office studies have been made to explore the possible alternatives and find a permanent solution which is technically and economically feasible and which will

- prevent salinity intrusion
- not unreasonably obstruct navigation
- preserve the environment
- be compatible with long-term development.

A primary objective of the study is to determine the extent of Federal interest in the problem and responsibility for its mitigation.

### ***Study Participants and Coordination***

Agencies which either have actively participated in the study or have been extensively consulted during its progress include the Lower Neches Valley Authority, the City of Beaumont, the U. S. Fish and Wildlife Service, the National Marine Fisheries Service, and the Texas Parks and Wildlife Department.

Public meetings were held in Beaumont on 14 November 1961, 9 December 1970, and 24 March 1972 to obtain information as to needs and public desires and to inform the public of the progress of the study and of its findings.

### ***The Report***

This main report is designed to give the general reader an informative summary of the problems and needs, the studies and findings, and the recommended action.

Two appendixes support the main report. Appendix 1 is a technical report with the same general outline as the main report,

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but containing additional detailed information for the technical reviewer. The similar format will facilitate the finding of more detailed information on topics in the main report which are of particular interest. Appendix 2 contains copies of pertinent correspondence.

### ***Prior Studies and Reports***

A complete list of prior Corps of Engineers reports on the Neches River was included as exhibit 1 in the report on the Sabine-Neches Waterway, Texas, published as Senate Document No. 80, 83rd Congress, Second Session. The following reports are pertinent wholly or in part to the current investigations:

- A report on the Sabine-Neches Waterway, Texas, published as House Document No. 553, 87th Congress, Second Session.

- A report on the Neches River, Texas, published as Senate Document No. 98, 76th Congress, First Session.

The following reports by other agencies have been consulted in the study:

- The Texas Water Plan, The Texas Water Development Board, November 1968.

- Texas Basins Project, unpublished feasibility report by Bureau of Reclamation, U. S. Department of the Interior, January 1964.

- The Report of the U. S. Study Commission-Texas, U. S. Study Commission on the Neches, Trinity, Brazos, Colorado, Guadalupe, San Antonio, Nueces, and San Jacinto River Basins and Intervening Areas, March 1962.

### **RESOURCES AND ECONOMY OF STUDY AREA**

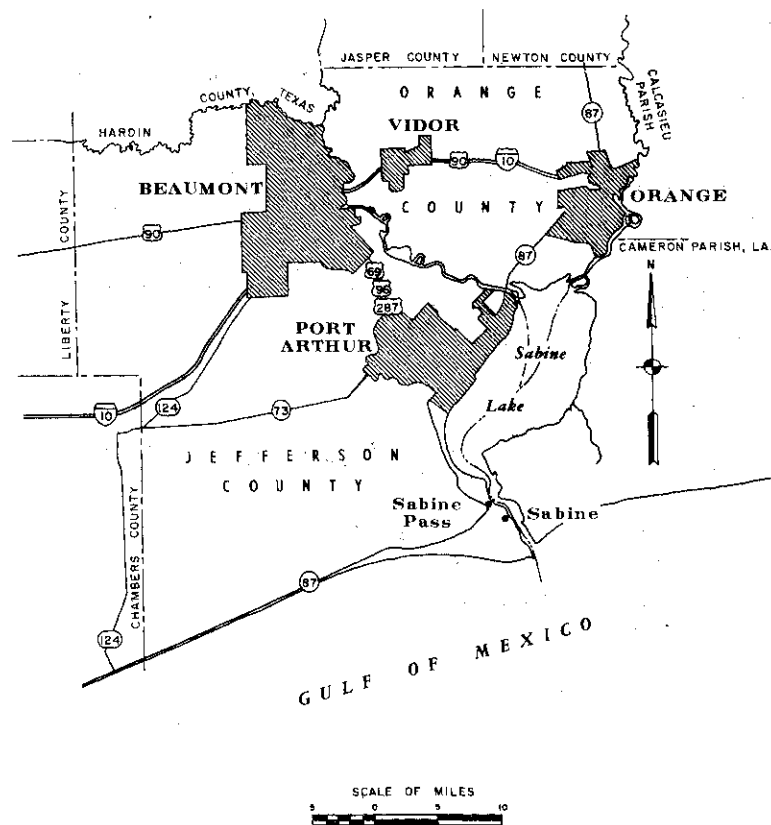
A general understanding of the resources and developmental trends of the study area is helpful in identifying its problems and needs and evaluating the available solutions.

## The Study Area

The area of concern in this study is that which depends on surface water from the Neches River and Pine Island Bayou as supplied by the City of Beaumont and the Lower Neches Valley Authority. This area comprises most of Jefferson County, including the cities of Beaumont, Port Arthur, and four other communities; several small water districts; sixteen major oil refineries and petrochemical plants; and an irrigated agricultural area between the Neches River and Taylors Bayou.

The major business activities in Jefferson County are production and processing of petroleum, manufacture of petrochemicals, and ship-building and port activity. Minerals produced include petroleum, natural gas, sulphur, natural gas liquids, salt, sand and gravel, and clay. Rice and beef are the main sources of agricultural income in the county.

The following illustration shows the study area:





The Neches River rises in Van Zandt County and empties into the head of Sabine Lake about 6 miles northeast of Port Arthur, and 4 miles west of the mouth of the Sabine River. From there the rivers flow to the Gulf of Mexico via Sabine Pass. The river, which drains an area of about 10,000 square miles, has an average flow of 5,600,000 acre-feet per year. Principal existing and authorized reservoirs in the Neches River basin are shown on plate 2. The major tributaries in the portion of the basin below B. A. Steinhagen Lake are Village Creek, which drains an area of 1,113 square miles and enters the Neches River near mile 40 and Pine Island Bayou. The bayou, which is the northern boundary of Jefferson County, has a drainage area of 657 square miles and enters the Neches River near mile 30. Tidal effects extend from the mouth to river mile 42 near Wiess Bluff.

### ***Agriculture***

There are about 190,000 acres of cropland in Jefferson County, of which 69,250 acres were harvested in 1971, including 60,250 acres of rice, 5,400 acres of hay, 2,900 acres of soybeans, and 700 acres of grain sorghums. Rice growers commonly plant rice on approximately one-third of their land each year. Most of the remainder is used as pasture for beef cattle. Rice is the most important crop, and beef cattle are the second largest source of farm income.

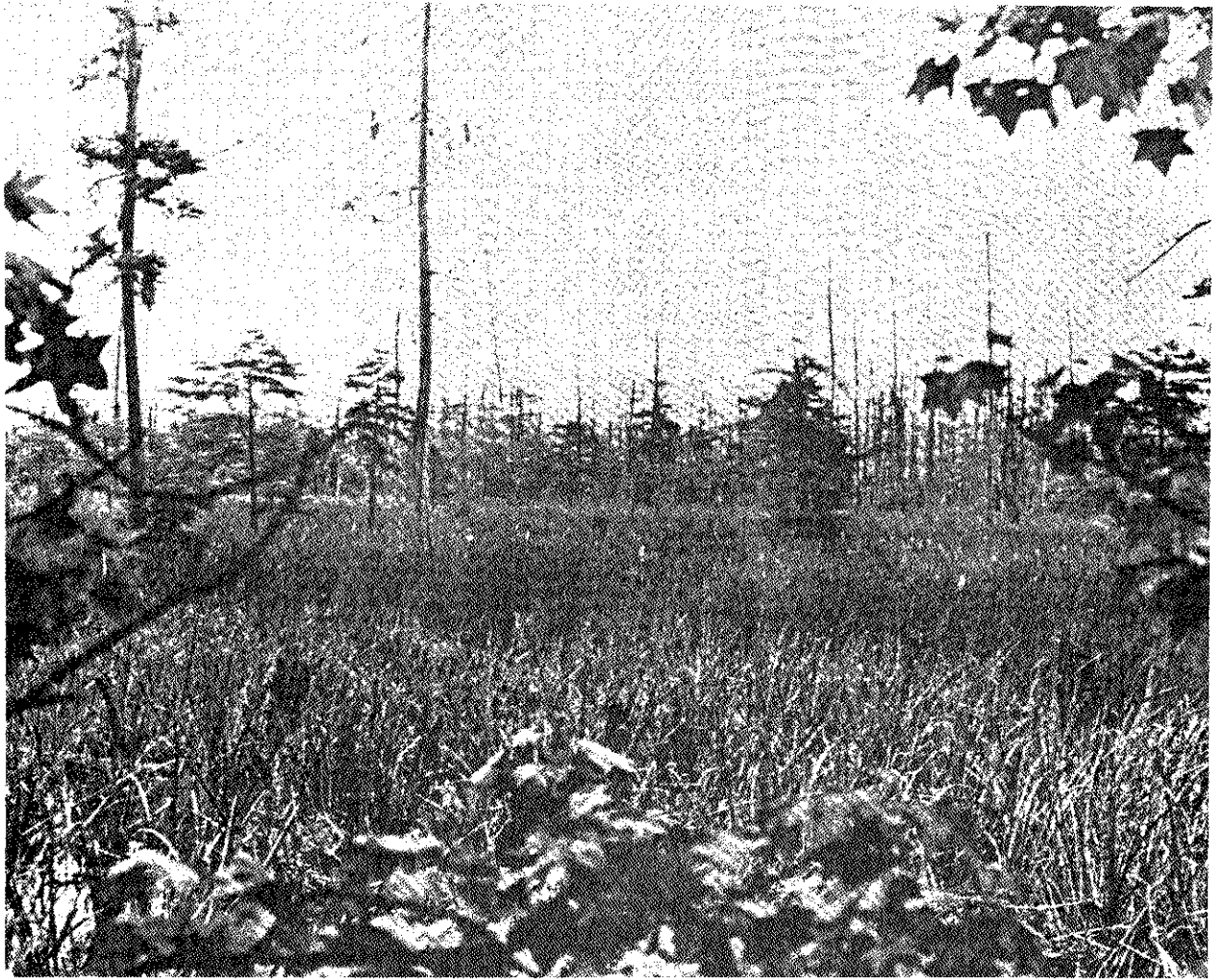
The Lower Neches Valley Authority supplies irrigation water for an average of 48,000 acres of rice per year in Jefferson, Liberty and Chambers Counties. An additional 10,000 to 20,000 acres planted in rice in Jefferson County are irrigated with water from Taylors Bayou and its tributaries, which largely is return flow from fields irrigated with water from the Neches River. Approximately 141,600 tons of rough rice were produced in Jefferson County in 1971. About 25 percent of the rice crop is exported through the Port of Beaumont.

### ***Existing Development***

The City of Beaumont occupies 11 miles of the west bank of the Neches River between river miles 19 and 30. The flood plain in this reach of the river is largely low swamp land having ground elevations of 5 feet or less. The character of the land is illustrated in the photograph which follows.

Existing developments in the flood plain include the Bethlehem Shipyard on the west bank (miles 21-22), the Beaumont Boat Club on the west bank, the G & W Marine, Inc. on the east bank (just above Interstate Highway 10, mile 22.5), the City of Beaumont's sanitary landfill

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*Typical swamp area west of Neches River and north of Interstate Highway 10*

**Photograph courtesy City of Beaumont**

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on the west bank (extending upstream from mile 22.6 between Lawson Canal and the Neches River), the Eastex, Inc. effluent outfall on the east bank (mile 25.3), the Neches Boat Club on the west bank (mile 25.9), the City of Beaumont's siphon under the river at Lawson Crossing (mile 26), and a public boat launching area and the Beaumont Country Club on the west bank (mile 26.5). The locations of these existing developments are shown in the following aerial photograph and on plates 1 and 3.

### ***Population***

The 1970 population of Jefferson County was 244,773, slightly less than in 1960. The two largest cities in the county, Beaumont and Port Arthur, had 1970 populations of 115,919 and 57,371, respectively. Beaumont, Port Arthur and Orange are the largest cities in a standard metropolitan statistical area which includes Jefferson and Orange Counties and which had a 1970 population of 315,943. The projected population, value of farm products sold and value added by manufacture for Jefferson County are shown in the following illustrations.

### ***PROBLEMS AND NEEDS***

The problems and needs considered in this study concern the protection of existing surface water supplies, the preservation of natural navigability, and the preservation and enhancement of the natural environmental resources.

### ***Demand for Surface Water***

The Lower Neches Valley Authority (LNVA) provides surface water from Pine Island Bayou and the Neches River to approximately 48,000 acres of rice land, several small water districts, 15 refineries and chemical plants, and five communities, including the city of Port Arthur. Under three permits from the Texas Water Rights Commission, the LNVA is entitled to use approximately 876,000 acre-feet of surface water per year from Pine Island Bayou and the Neches and Angelina Rivers at a rate not to exceed 2,075 cubic feet per second. The estimated actual water used by LNVA in 1971 was 156.2 billion gallons (479,144 acre-feet). The LNVA's installed pumping capacity is 1,916 cubic feet per second, and the experienced daily peak has approached this capacity.

The City of Beaumont provides surface water from the Neches River and ground water from Hardin County for municipal use in the city and to one major petroleum refinery. The city's peak pumping day was 23 December 1963, when approximately 27.6 million gallons (42.7 cubic feet per second) of surface water was used. Under permits from the

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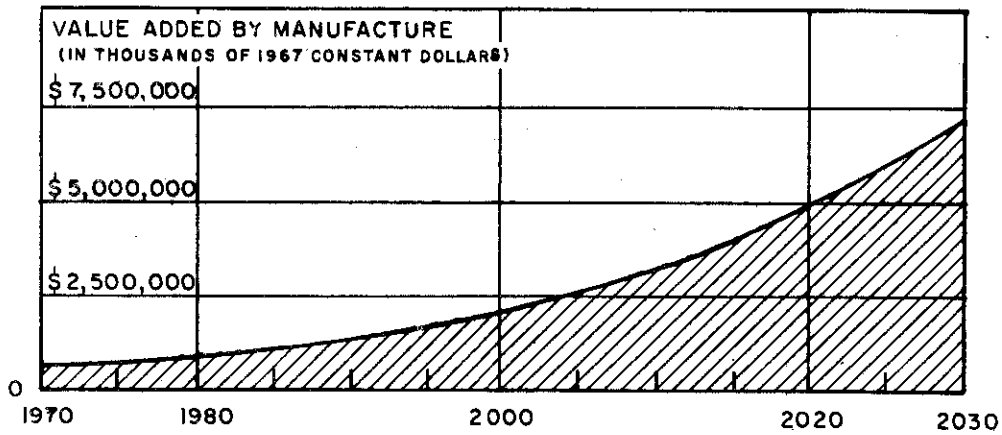
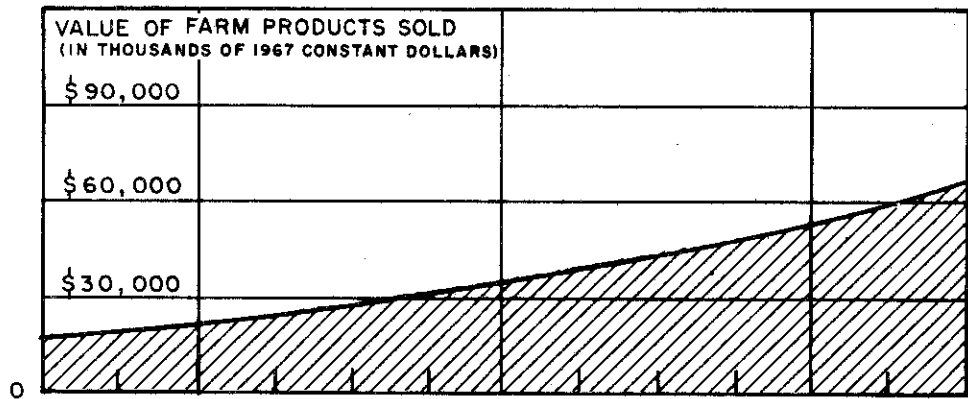
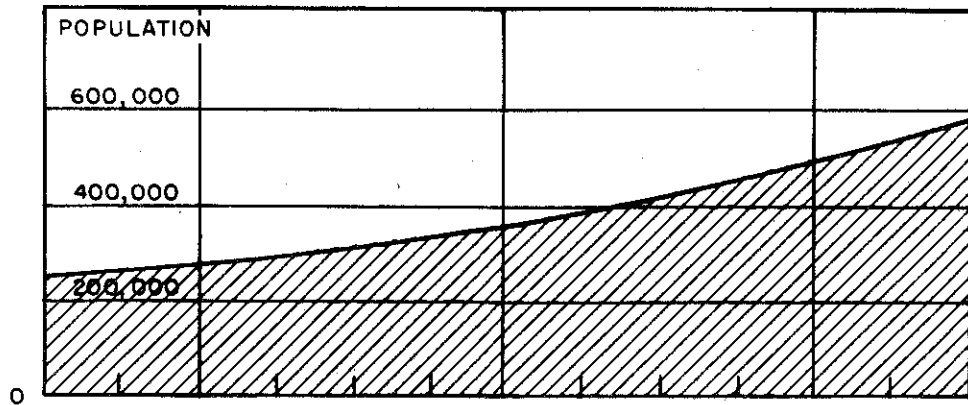


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Southwest Bendry & Development Industrial Trac

INDUSTRIAL DISTRICT  
BEAUMONT EASTWARD

INDUSTRIAL DISTRICT  
BEAUMONT EASTWARD



**PROJECTIONS FOR JEFFERSON COUNTY, TEXAS**

Texas Water Rights Commission, the city is entitled to 56,467 acre-feet per year of Neches River water at 78 cubic feet per second. The estimated actual water used by the city in 1970 was 16,500 acre-feet.

The Texas Water Development Board estimates that by the year 2020 municipal and industrial demand for Neches River water in the lower Neches River basin and adjacent coastal area will be 1,140,000 acre-feet per year, and that the irrigation demand in the same area will be 425,000 acre-feet per year for irrigation of approximately 109,000 acres, a total annual demand of 1,565,000 acre-feet.

### *Demand for Ground Water*

Ground water is being used at present by municipalities and industries in Jefferson County. The City of Beaumont in 1970 pumped 6,700 acre-feet of underground water from Hardin County and other municipalities and industries in Jefferson County used about 5,100 acre-feet from wells in Jefferson County and 4,500 acre-feet from wells in Orange County. At present a total of about 16,400 acre-feet of ground water is used in Jefferson County, which is expected to double by 1980.

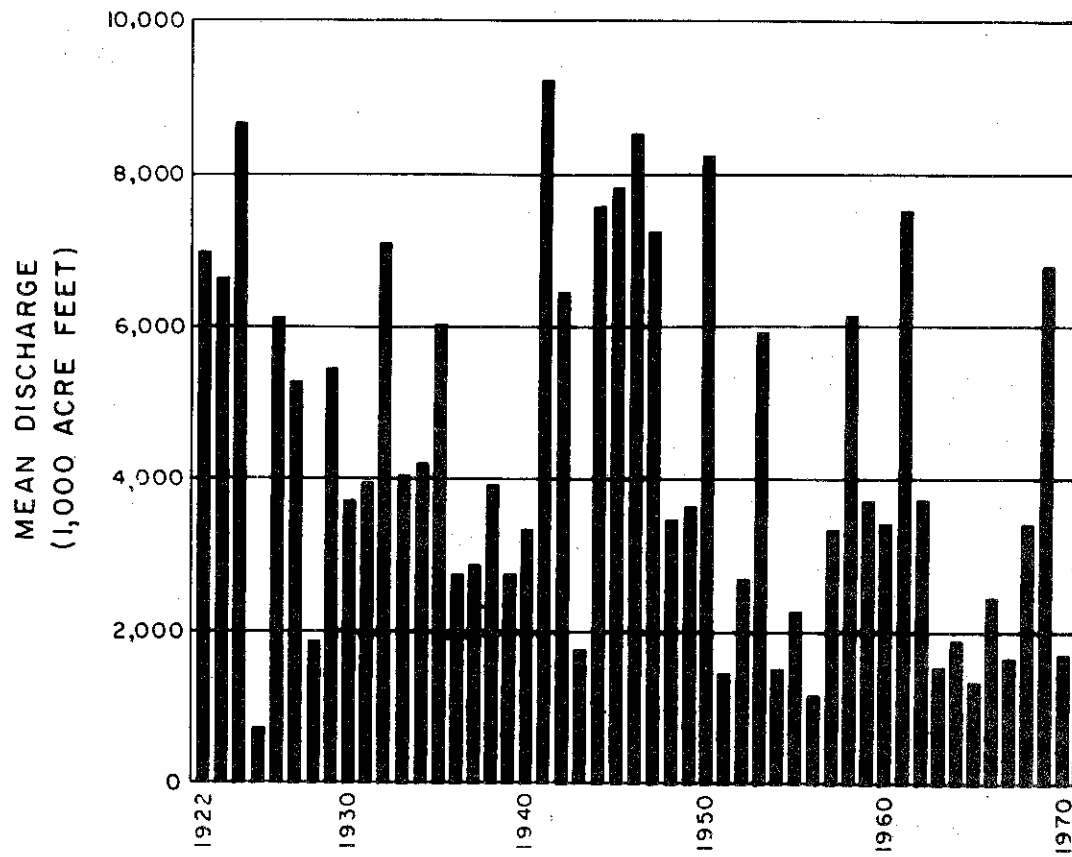
### *Availability of Surface Water*

The average flow of the Neches River is approximately 5,600,000 acre-feet per year. The following graph summarizes the records of the U. S. Geological Survey gage on the Neches River at Evadale, Texas, for water years 1922 through 1970.

The existing reservoir system should be adequate to guarantee a supply of surface water to the lower portion of the Neches River basin until about 1990. Although formulation of the overall basin plan is incomplete as of the time of this report, it is possible that the authorized but unconstructed Rockland Reservoir on the Neches River may be recommended for construction to satisfy the excess demand after 1990.

### *Availability of Ground Water*

The Texas Water Development Board estimates that approximately 350,000 acre-feet of ground water is available annually on a safe yield basis in the lower Neches River basin below the north borders of Tyler and Jasper Counties from the Gulf Coast Aquifer, and estimates



ANNUAL RUNOFF, NECHES RIVER AT EVADALE, 1922-1970

that in the year 2020 use will be about 265,000 acre-feet per year. The yield in Jefferson County is small and the ground water in the upper reaches of the lower basin would not be accessible to users in Jefferson County. The total available ground water to meet the demand in Jefferson County is not known, but would be appreciably less than 350,000 acre feet annually.

### ***Quality of Surface Water***

The quality of water in the reach of the Neches River between B. A. Steinhagen Lake and Wiess Bluff is generally excellent, with dissolved solids concentrations less than 150 milligrams per liter about 50 percent of the time.

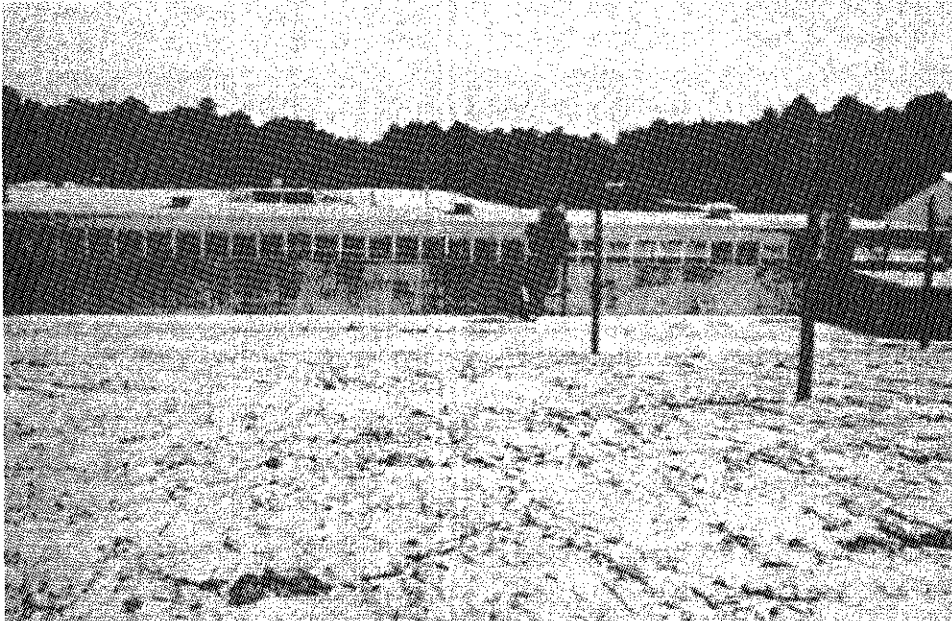
The tidal reaches of Pine Island Bayou and the Neches River below Wiess Bluff are frequently contaminated by salt water and municipal and industrial wastes. Effluent from the Eastex, Inc. paper mill at Evadale is discharged into the Neches River at mile 25.3, immediately downstream from the mouth of Lake Bayou. This effluent, black in color, was reported in 1969 to have a flow rate of 55 cubic feet per second and a 5-day biochemical oxygen demand of 73 milligrams per liter. The Neches River below Beaumont is heavily polluted by municipal and industrial wastes.

During periods of low flow and high water withdrawals, salt water from the Gulf of Mexico intrudes up the Neches River in sufficient concentrations to contaminate the fresh water supplies of the City of Beaumont and the LNVA. The City of Beaumont normally withdraws water from the Neches River at a gravity intake at Bunns Bluff, mile 30.6, but when salt water intrudes up to Bunns Bluff the city utilizes an alternate pumping plant on the Neches River at Wiess Bluff, mile 41.7. The LNVA withdraws water from Pine Island Bayou at Voth, 6 miles above its mouth, and from the Neches River at Lakeview, mile 38. Photographs of two of the LNVA pumping plants are shown on the following page. The initials "B.I." stand for the Beaumont Irrigating Company, the former owner.

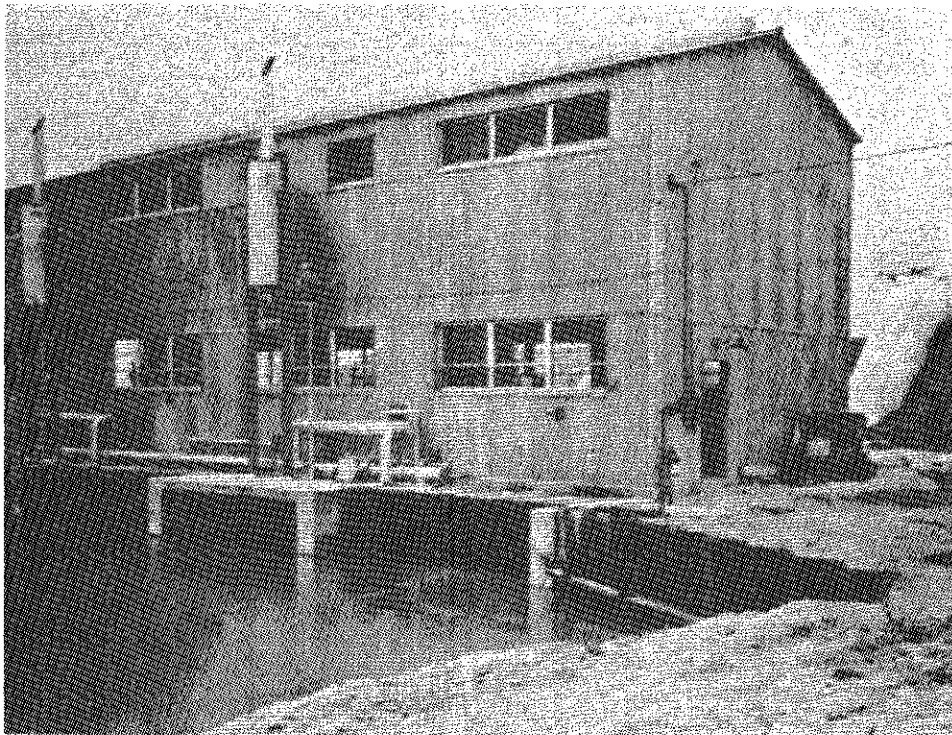
Prior to 1900 there was no salinity problem in the Neches River. Water demands were moderate, and there was a natural bar at the mouth of the river. With the introduction of rice cultivation in Jefferson County about 1895, and the construction of the deep-draft channel to Port Arthur by the Port Arthur Canal & Dock Co. in 1897-1898, the situation began to change. By 1901 rice growers along Taylors Bayou were experiencing a problem with salt water contamination of their irrigation water supply. When the deep-draft channel was extended to Beaumont in 1914-1916, salt water intrusion became a major problem on the Neches River at Beaumont. In 1915 the City of Beaumont extended its water intake canal from Lawson Crossing to Bunns Bluff (mouth of Pine Island Bayou) at mile 30.6 on the Neches River. Salt

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*Neches first lift pumping plant*



*B. I. second lift pumping plant*

Photographs courtesy Lower Neches Valley Authority

water was prevented from reaching the City of Beaumont's water intake on the Neches River at Bunns Bluff and the pumping plants on Pine Island Bayou by temporary sand dams constructed by local interests below the mouth of Pine Island Bayou in 1917, 1918 and 1925.

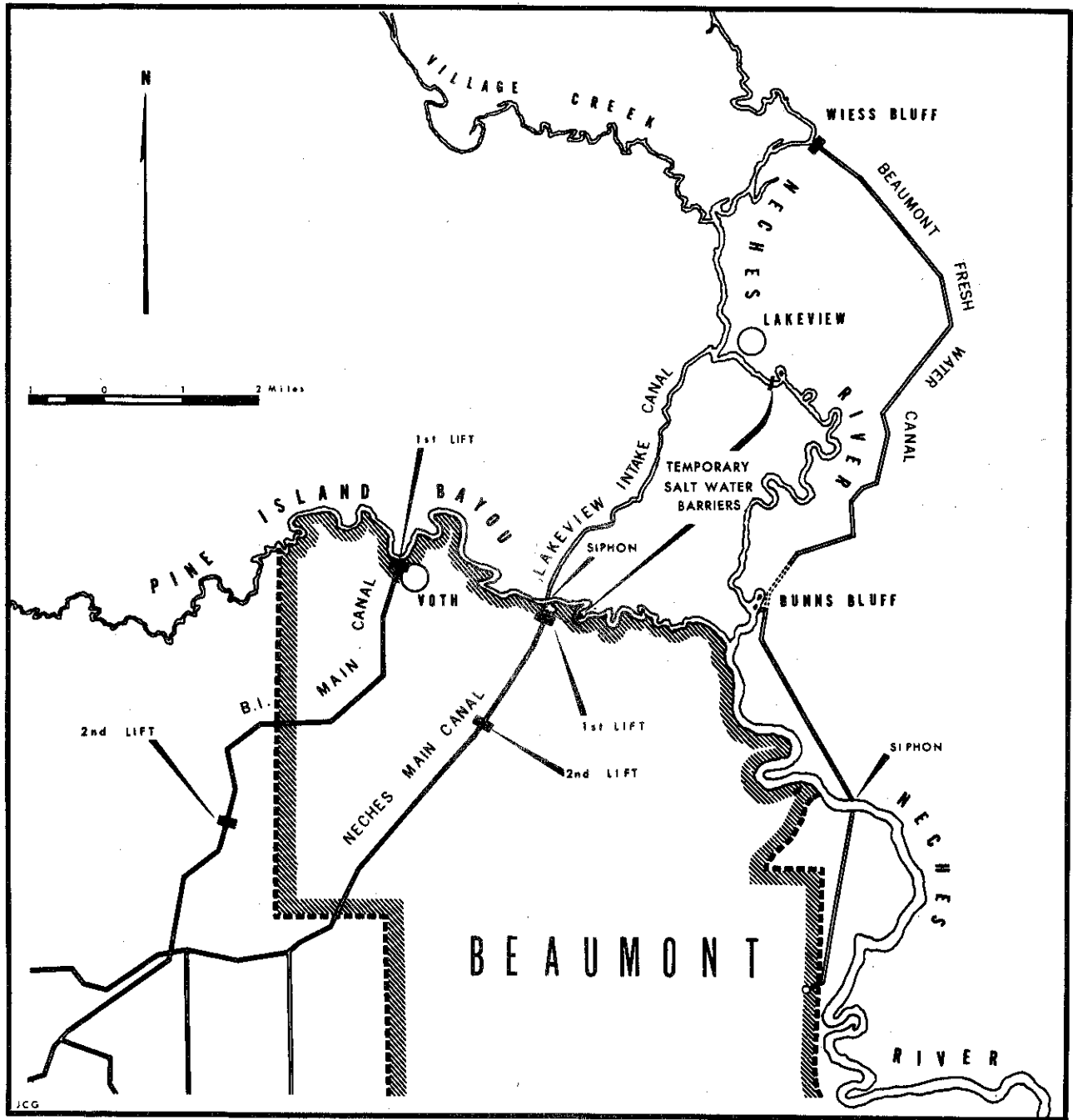
In 1926 the predecessor owner of the irrigation system now owned by the Lower Neches Valley Authority extended its water intake canal from Voth on Pine Island Bayou to Lakeview at mile 38 on the Neches River. In 1927 the City of Beaumont further extended its water intake canal from Bunns Bluff to Wiess Bluff at mile 41.7 on the Neches River. Both actions were an upstream retreat from salt water contamination. The progressive enlargement of the deep-draft channel from the Gulf of Mexico to Beaumont since 1916 has intensified the salt water intrusion problem. To prevent contamination of its water supply the LNVA adopted a practice of installing temporary sheet pile barriers on the Neches River below Lakeview and on Pine Island Bayou below Voth and has kept these barriers in place for 4 to 6 months almost every year. During the period 1952 through 1971 a barrier was placed across the Neches River all years except 1961, 1968 and 1969, and across Pine Island Bayou all years except 1953 and 1968. When the temporary barriers are in place they completely block navigation by recreational and commercial vessels. The locations of the water intakes and the temporary salt water barriers are shown in the following illustration.

### *Navigation*

The existing Federal navigation project for the Sabine-Neches Waterway, Texas, provides for a depth of 40 feet and bottom width of at least 400 feet from the Gulf of Mexico to the turning basin at Beaumont, Texas; a depth of 34 feet and varying widths in the turning basin and turning basin extension; and a depth of 30 feet and a bottom width of 200 feet from the turning basin extension to the Bethlehem shipyard.

Approximately 500 recreational craft and several barges navigate the Neches River in its natural state upstream of the improved channel. One firm in Beaumont presently dredges sand from the Neches River and transports the sand to Beaumont in 30- by 200-foot barges with loaded drafts of 5-1/2 feet. Approximately 90 round trips were made annually in 1970 and 1971. The dredging, which is authorized by a Federal permit under the regulatory authority of the Corps of Engineers, involves the river from 500 feet above Interstate Highway 10 to 1-1/2 miles above the mouth of Village Creek. Records of the movements of recreational craft in the locality are not maintained. However, it is apparent from observation that they amount to thousands of trips annually. The temporary

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LOCATIONS OF TEMPORARY SALT WATER BARRIERS

salt water barriers, when in place, block all vessel movements past their sites.

The recreational craft are primarily based or launched on the Neches River at the Beaumont Boat Club (mile 22.5), Neches Boat Club (mile 25.9) and the public boat launching area and Beaumont Country Club (mile 26.5), shown in the following photograph. Random small craft may, however, enter the river at various points. It is to be expected that a continuing growth of recreational boating will occur in the area, following the national trend, and that a progressively increasing demand for an unobstructed waterway will result.

### ***Environmental Factors***

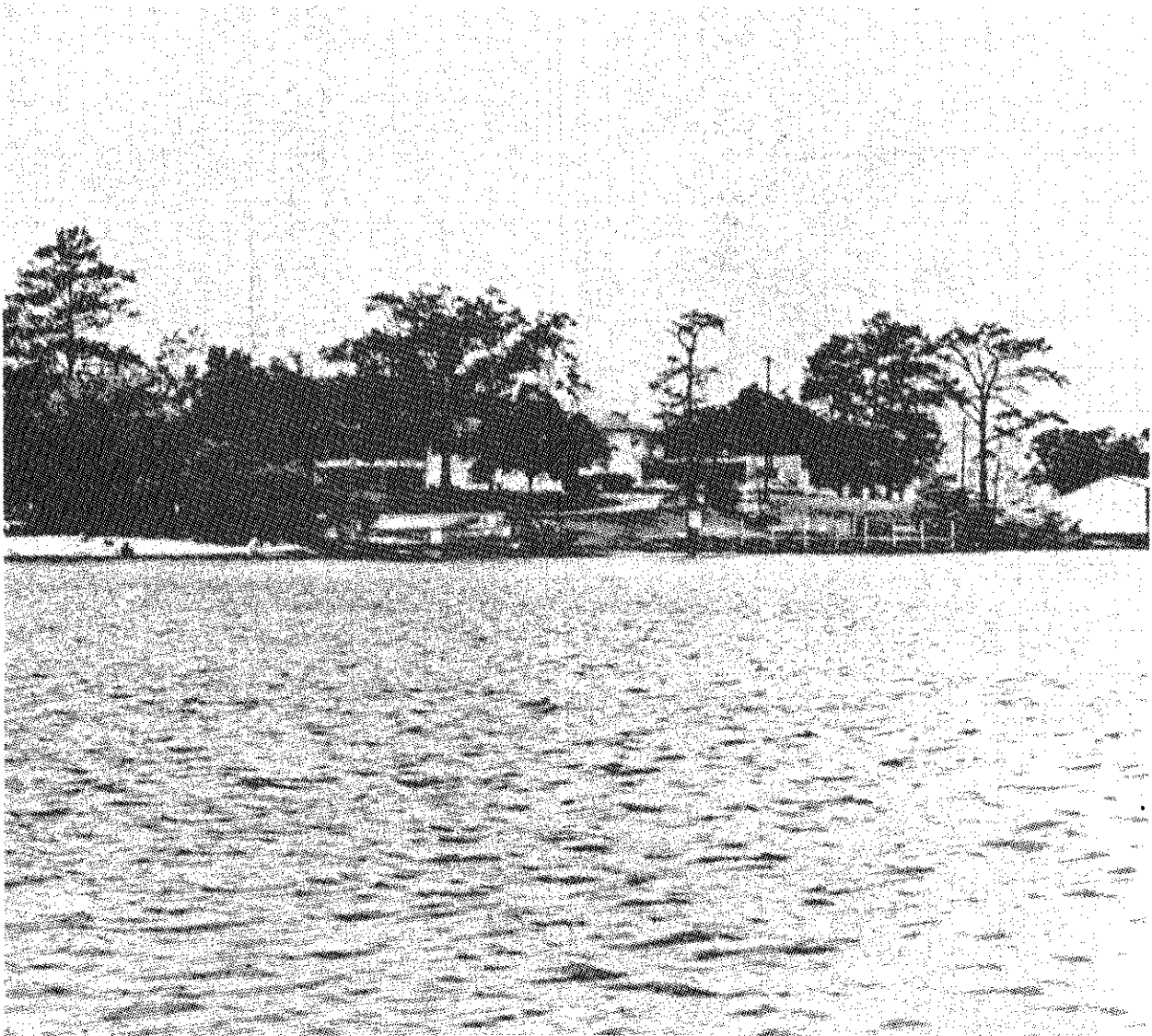
The most notable environmental feature in the lower Neches River basin is the Big Thicket area, which contains rare and unusual flora and fauna and the Alabama and Coushatta Indian Reservation. Several bills have been introduced in the Congress to authorize a Big Thicket National Park of approximately 100,000 acres, which would be situated in the area along and north of Pine Island Bayou and along and west of the Neches River.

For about 6 to 8 months each year, when the net flow in the river is adequate to control pollution by salt water and municipal and industrial effluents, the portion of the Neches River and its adjacent flood plain within the project area furnishes a favorable environment for numerous fish, mollusca, waterfowl, aquatic mammals, aquatic reptiles, and amphibians. Under natural conditions prior to the construction of the ship channel to Beaumont and industrial development in the area, the river provided a good year-around freshwater environment. Under present conditions, brackish and otherwise generally poor water conditions which occur usually from June through September upset the natural ecological balance, causing kills of fish, invertebrates, and algal forms. The bayous and swamps adjacent to the river are spawning and nursery areas for fish and shellfish and other organisms that form an important part of the food web of many fish and wildlife species. The swamp and land vegetation is especially important as a source of food and cover. The natural values of these areas are also adversely affected by poor water quality in the stream. Typical conditions in the cypress swamps are shown in the following photographs.

### ***Improvements Desired***

In a public hearing in Beaumont on 14 November 1961, the Texas Board of Water Engineers (now the Texas Water Development Board) requested that the Corps of Engineers consider a salt water barrier and reservoir on the Neches River near Colliers Ferry, providing 17,000

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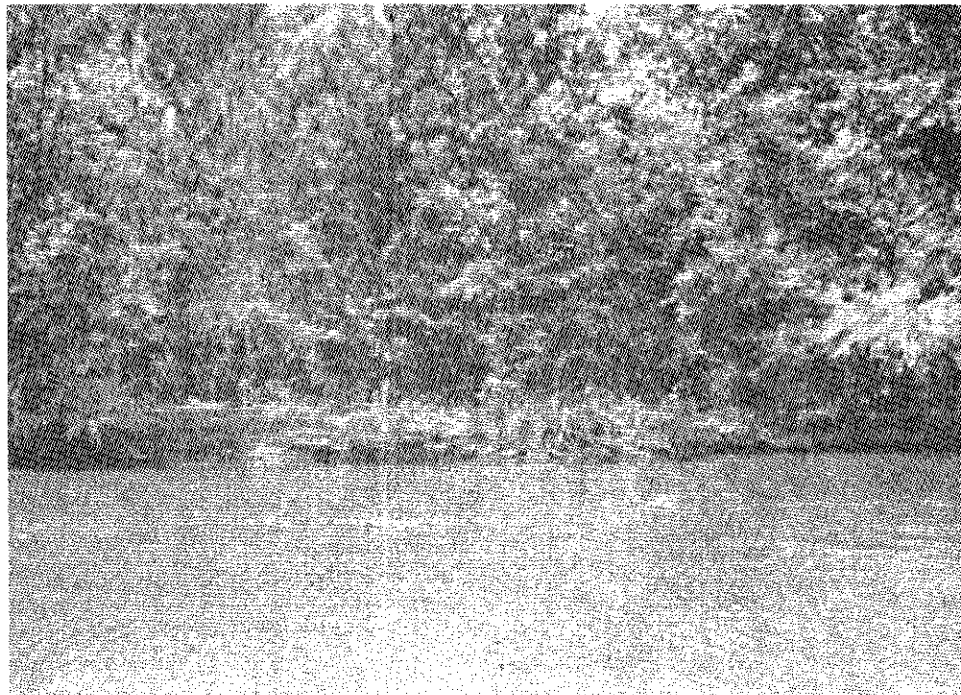
*Public boat launching area and Beaumont Country Club*

Photograph courtesy City of Beaumont

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*North bank of Tenmile Bayou, about 2,000 feet upstream from mouth*



*South bank of Tenmile Bayou, about 2,000 feet upstream from mouth*

acre-feet of conservation storage and having gates, with sills at stream-bed elevation, of sufficient size to pass large flows to facilitate the periodic flushing of accumulated sediment. The proposed project would have served the purposes of both navigation and recreation. The Lower Neches Valley Authority submitted a brief stating that Dam B Reservoir, (now B. A. Steinhagen Lake), McGee Bend Reservoir (now Sam Rayburn Reservoir) and the authorized Rockland Reservoir would be adequate to supply the estimated water requirements below Dam B to the year 2000, and that provision of conservation storage at the salt water barrier was not justified. The Authority alternatively requested consideration of a salt water barrier 2,300 feet below the mouth of Pine Island Bayou which would have had a maximum normal pool elevation of 5 feet above mean sea level. Related requests were presented for boat launching ramps at points of access, provision for passage through one of the gate openings of barges 40 feet wide with a loaded draft of 12 feet, and provisions for a future navigation lock adjacent to the barrier.

A prominent landowner requested consideration of two salt water barriers, one on Pine Island Bayou and one on the Neches River at or above Four Oaks Ranch, instead of a single barrier below the mouth of Pine Island Bayou, citing as reasons the extensive recreational boating and existing barge traffic. Requests also were made for construction of a barge channel in the Neches River from Beaumont to Evadale and on to other upstream points. Upstream navigation needs are being evaluated in the overall Neches River basin study, but are relevant to this interim report on a salt water barrier only insofar as concerns compatibility of the proposed barrier with future navigation needs.

At the second public meeting in Beaumont on 9 December 1970 several requests were made that the proposed salt water barrier be sited in the vicinity of the Interstate Highway 10 bridge, mile 22.5, in order to restore clean, fresh water conditions to as much of the river as possible.

### **FORMULATING A PLAN**

The essential elements of an acceptable plan are that it should permanently control salinity intrusion in the river; provide for free and reasonably unobstructed use of the river by existing and prospective recreational and commercial navigation; be compatible with any future plan for extension of a barge channel above Beaumont; and preserve or enhance the natural environment of the river and its flood plain.

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## *Alternatives Considered*

The alternate solutions which have been considered are continuation of the present practice of installing temporary salt water barriers each year; flushing the salt water wedge downstream with fresh water; extension of the fresh water intake canals to points above the limit of tide water; increased use of ground water as a substitute for surface water from the river; and construction of a permanent barrier in the river channel. Several alternate locations and alternate methods of constructing a permanent salt water barrier have been studied.

● Temporary salt water barriers.- The most economical solution to the problem of salinity intrusion in terms of monetary costs is continuation of the present practice of installing temporary salt water barriers across Pine Island Bayou and the Neches River each year. The average annual cost of this practice is approximately \$80,000. However, there are three reasons for discontinuing the practice of using temporary barriers. The first is to eliminate periodic and prolonged interference with public use and enjoyment of the naturally navigable waterway. The second is elimination of water level increases caused in Pine Island Bayou and the Neches River by the backwater effects of the fixed barriers. The third reason is to relieve local interests from an annual cost for mitigating a problem which is considered to be a Federal responsibility related to navigation improvements previously installed. Secondly, a permanent barrier appropriately located will significantly enhance environmental conditions. The determination of the Federal interest in the prevention of salinity intrusion is discussed in the section of this report on Division of Plan Responsibilities. It will be necessary that the Lower Neches Valley Authority continue to install the temporary salt water barriers until such time as permanent improvements for the prevention of salinity intrusion have been constructed.

● Flushing.- An alternative of flushing the salt water below Bunns Bluff with water released from an upstream reservoir, such as Sam Rayburn Reservoir, has been suggested. With the existing 40- by 400-foot channel to Beaumont, it is estimated that a net flow of approximately 1,900 cubic feet per second would be required to depress the nose of the salt water wedge below the fresh water intake at Bunns Bluff. This net flow would be in addition to water withdrawn from the river for municipal, industrial and agricultural uses. This flow would be required for an average of 111 days per year.

The amount of water required annually would be about 418,000 acre-feet. For evaluation, the proposal has been related to use of water from the proposed Rockland Reservoir. This would be preferable to altering the functioning of the existing Sam Rayburn Reservoir to the detriment of its extensive recreational developments. Approximately

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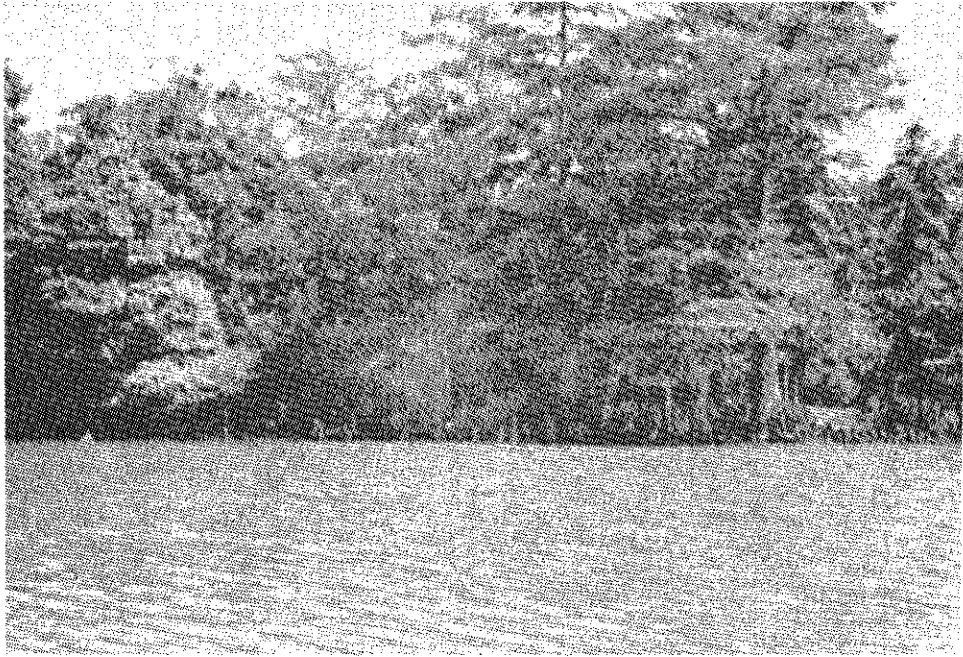
40 percent of the yield of the proposed Rockland Reservoir would be required at an estimated annual cost of \$4,133,000, or several times the estimated annual cost of any other plan considered. Flushing could improve water quality in the Neches River below Beaumont and might enhance the habitat for fish and shellfish in Sabine Lake during periods of reduced natural flows. Any benefits would be indeterminate and cannot be evaluated at this time. In addition to the economic disadvantage, the projected state-wide increase in demand for water for municipal, industrial and agricultural uses precludes consideration of such a water use as a realistic long-range alternative.

● Extension of intake canals.- Extension of the LNVA and City of Beaumont water canals to intakes above the influence of tide water and any possible salt water intrusion would be technically feasible. The first cost and annual charges of such a plan are estimated at \$15,132,000 and \$1,046,000, respectively. In addition to its greater cost, this plan not only offers none of the environmental advantages of the selected plan but would cause extensive disruption of the natural environment in the clearing and excavation of large rights-of-way and the relocation or alteration of roads and utilities conflicting with the canals.

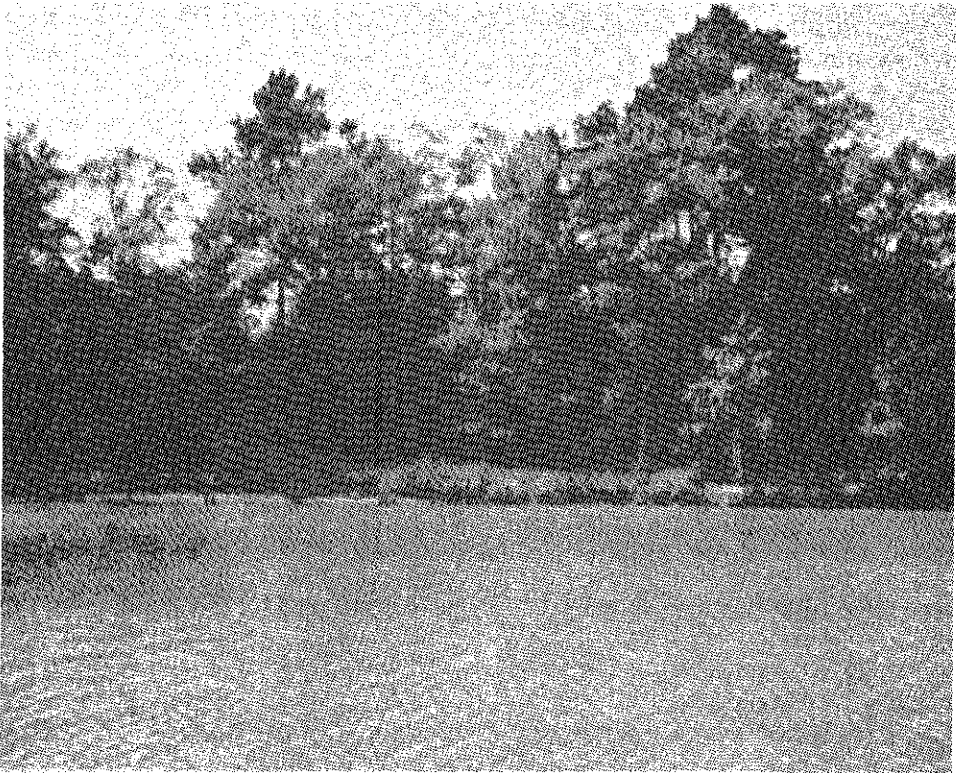
● Use of ground water.- If municipal, industrial and agricultural water demands could be satisfied entirely from ground water, there would be no need for a barrier. The present total water demand is about 500,000 acre-feet per year, of which about 190,000 acre-feet per year is required for municipal and industrial uses. The estimated safe yield of the aquifers in the lower Neches River basin generally below the northern boundaries of Tyler and Jasper Counties, is 350,000 acre-feet per year, which could supply the present municipal and industrial water demand, but, even if it could all be made available to Jefferson County, it is inadequate for the agricultural needs. Ground water therefore is not an adequate substitute for surface water, and the full use of available supplies would not preclude the need for a salt water barrier.

● Selection of location for permanent barrier.- Seven sites have been considered as locations for a salt water barrier on the Neches River, six of which are shown on plate 1. The seventh site would be at or below the Interstate Highway 10 bridge. It would not be possible to construct a salt water barrier and navigation gate there without alteration of the bridge, which eliminates the site as uneconomical. A barrier at site 4 at river mile 26.3 would be the most economical, while a barrier at site 1 at river mile 23 is preferred by local interests. The accompanying photographs illustrate existing conditions at the two sites.

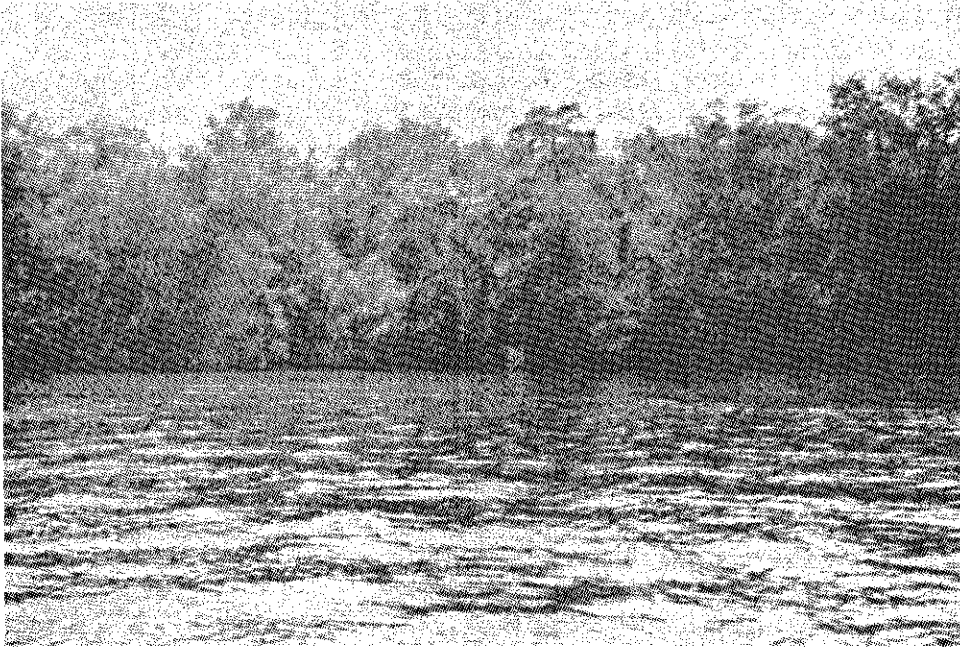
It is estimated that the cost of a salt water barrier at site 1 would exceed that of an equivalent barrier at site 4 by \$647,000. Most of the additional cost relates to a need for an auxiliary dam to block salinity intrusion via an existing adjacent drainage canal. A barrier at either site would function equally well in satisfying the Federal



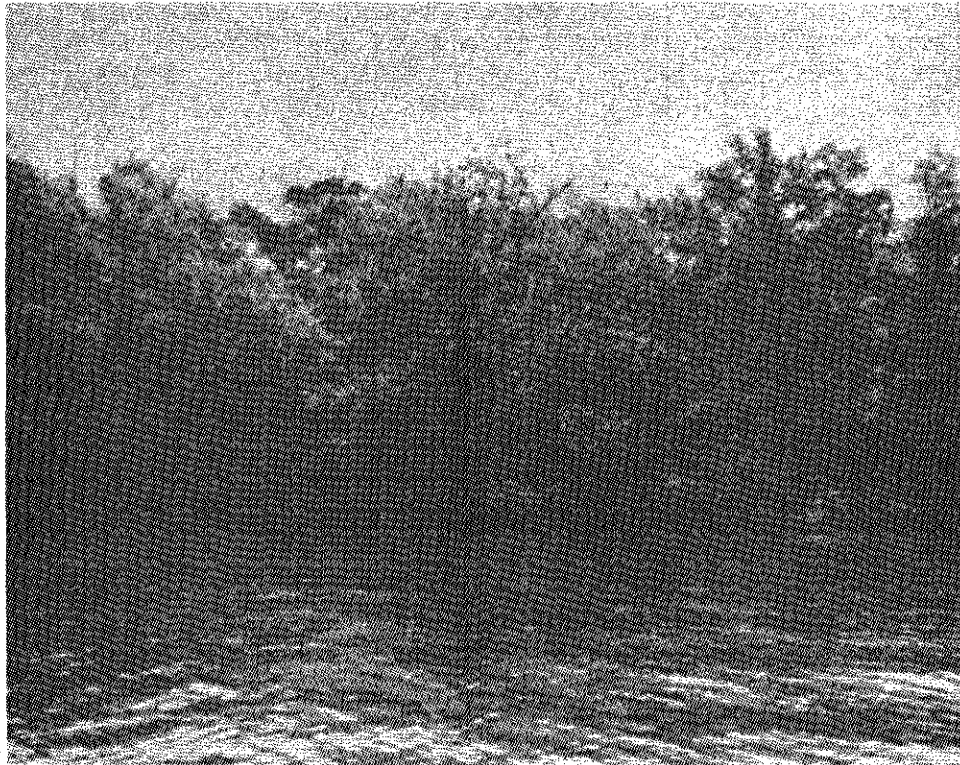
*East bank of river at site 4*



*West bank of river at site 4*



*East bank of river at site 1*



*West bank of river at site 1*

responsibility for mitigation of salt water intrusion. However, their secondary effects, primarily in terms of environmental benefits, would differ materially. Each, in addition to barring upstream movement of salt water, would act as a pollution barrier, precluding the upstream movement of waters polluted with municipal and industrial wastes and thus establishing clean fresh water conditions above the barrier. The tenure of this as an environmental gain will, of course, depend on the length of time that polluted water conditions will continue to prevail in the face of current and future regulatory and other corrective actions devoted to their mitigation. In the meantime, a barrier at site 1 would apply the environmental improvement to 3.3 more miles of river and 7,100 more acres of swampland than would a barrier at site 4.

The feasibility of adopting site 1 in preference to site 4 as the location of the proposed Federal project is contingent upon two conditions. First, a major industrial effluent canal (owned by Eastex, Inc.) now discharging into the river above site 1 must be relocated downstream of the site at non-project expense. The responsible industry proposes to do this. Second, the excess cost relating solely to the mitigation of a non-project related pollution problem or, otherwise stated, the cost of a localized environmental gain involving a pollution condition of local origin should be entirely a local expense, if the measures are to be undertaken. Local interests accept this premise and have formally indicated a willingness to pay for the environmental gain.

Therefore, with no difference in Federal cost, selection of site 1 for the proposed project is based on obvious environmental advantages, the preference of local interests, and their willingness to pay for their preference.

● Alternate barrier designs.- Four design concepts have been considered for the barrier: a dam with flap-gated outlets; an inflatable dam commonly known as a Fabridam; a tainter-gated dam; and a fixed, weir-type dam. A fixed or weir-type dam would be less costly than the other three types but the severe sedimentation problems and increased backwater effects that are inherent in such a structure remove it from further consideration.

Preliminary designs and cost estimates for the first three indicate the following construction costs:

- |    |   |             |
|----|---|-------------|
| a. | A flap-gated dam with eight 40-by 30-foot steel flap gates - - - - -      | \$1,853,000 |
| b. | A Fabridam consisting of three 146-by 15.2-foot inflatable bags - - - - - | 2,988,000   |
| c. | A dam consisting of seven 40-by 24.5-foot tainter gates - - - - -         | 5,077,000   |

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The first is an untried design of uncertain reliability and maintenance characteristics. The second, although in apparently successful use in various locations for similar purposes, presents unusual maintenance and replacement problems in regard to which experience data are limited. The tainter gate design is one of reliability and reasonable maintenance. In view of the apparent cost advantages of other designs, however, more detailed study of available alternatives will be warranted in the pre-construction planning stage if the project should be authorized.

● Navigation features.- In judging what navigation features should be incorporated in the proposed project, it has been necessary to consider both existing use of the stream in its natural condition and future navigational use should the waterway ever be improved. Although the proposed project is justified solely by the requirement for mitigation of salinity intrusion and thus bears a responsibility to provide only for such navigation as may be incidental to limited use of the waterway in its natural state, it appears prudent to invest in compatibility with possible future needs.

Principal shallow-draft waterways in the region, primarily the Gulf Intracoastal Waterway, generally provide a channel depth of 12 feet. Gated structures feature sill depths of 16 feet, the additional depth providing for future channel deepening. A width of 56 feet is a minimum standard for barge traffic. Thus, for consistency with current standards, this plan of improvement contemplates a clear gate opening 56 feet wide, 16 feet of depth over the gate sill, and approach channels 100 feet wide at a depth of 12 feet. The central portion of the channel will be deepened over a width of about 76 feet to 16 feet corresponding to the gate sill depth to minimize shoaling at the gate.

The dimensions selected are more than adequate for the maximum size vessels now using the waterway, barges 30 feet wide and 200 feet long, with loaded drafts of  $5\frac{1}{2}$  feet, and are suitable for future expansion into a lock of standard dimensions.

## **THE SELECTED PLAN**

This section of the report summarizes the engineering features and environmental effects of the selected plan of improvement. The economics of the plan are summarized in a later section.

### ***Plan Description***

The selected plan consists of a dam and navigation gate and various related features. The dam will be a gated structure with seven 40- by 24.5-foot tainter gates. The gates will have a top elevation in the

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closed position of 4.5 feet, a bottom elevation in the raised position of 16 feet, and a sill depth of 20 feet. The top elevation of 4.5 feet will provide a moderate degree of protection from overtopping of the system by abnormal tides. A pool elevation of one foot will normally be maintained behind the dam when salinity intrusion control is needed. A navigation structure with two sector gates, providing a clear opening 56 feet wide and a depth of 16 feet over the sill, will be located in a 16- by 76-foot by-pass channel east of the dam. The navigation gate will be designed for adaptability to a navigation lock if such a feature should ever be warranted by increased navigation and authorized by Congress. An access road, constructed on an earth fill, will extend from a proposed city park road on the west side of the river to the dam and gate. A service bridge will be provided across the dam for access to the gate. An earthen levee will be constructed from the east end of the navigation gate southwestward along the east side of the by-pass channel to high ground north of Interstate Highway 10. An auxiliary dam with two 10- by 2-foot flapgates and three 10- by 8-foot slidegates will be constructed across the canal which drains the southern end of Bairds Bayou, at a location south of old U. S. Highway 90.

No recreational facilities are included in the plan. However, a factor considered in site selection is the enhancement of potential recreational usefulness of the area west of the river if and as local authorities develop plans for its use.

The details of the plan of improvement are shown on plates 3, 4, and 5.

### *Plan Accomplishments*

The barrier will under normal conditions protect the surface water supplies of the municipalities, industries and farms served by the water delivery systems of the Lower Neches Valley Authority and the City of Beaumont from contamination by salt water moving up the Neches River during periods of low flow and high water withdrawals. The barrier will serve as a hurricane-flood barrier only incidentally to its elevation of 4.5 feet. Tides in excess of that level will overtop the dam and contaminate the water behind it, requiring, after subsidence of the tide, that the gates be opened and the salt water flushed downstream.

### *Effect of Plan on the Environment*

The proposed project will benefit man's environment by permanently assuring the reliability of municipal, industrial and agricultural fresh water supplies which are vital to the economic well

being of the area's inhabitants. It will restore a dependable fresh water environment in all of the river and swamp areas above Interstate Highway 10, except for 600 acres of swamp drained by Brakes Bayou on the west side of the Lawson Canal.

Thus it will eliminate the intrusion of polluted water from downstream, rendering the waterway useful and attractive for enjoyment by man. Approximately 16.7 miles of the Neches River and Pine Island Bayou between the permanent barrier location and the existing temporary barrier locations will be improved for fresh water fishing, as will the canals and bayous leading into the swamp. During the period of the year when flows in the river are sufficient to overcome salinity and downstream pollution and to obviate the need for operation of the barrier, the tainter gates and the navigation gate will be left open and natural river conditions will prevail. The polluted water below the permanent barrier will be confined to a shorter reach of the river than is presently the case with the temporary barriers, but this should have only a negligible effect on dissolved oxygen, temperature and salinity in the river below the barrier.

The LNVA, with a grant from the Texas Water Quality Board, had a study performed during the period 1969-1971 on the Lower Neches River Area Comprehensive Sewage Plan 1970-1990. Based on this study the LNVA is planning one or more regional sewage treatment plants for the area. The study has encouraged similar planning by concerned industries and municipalities in Jefferson County, which should eventually result in improvement of the quality of effluent discharged into the Neches River and Taylors Bayou. This planning has been coordinated with the Texas Water Quality Board and the U. S. Environmental Protection Agency.

Excavated material from the navigation by-pass channel in excess of that needed for construction of the levee and the service area will be placed on shore in 14 acres of leveed disposal areas. Although the exact location of these disposal areas has not yet been determined, it is proposed that the surplus excavated material be deposited on the west side of the river, between the Lawson Canal and the river, on land presently used by the City of Beaumont for a sanitary landfill and proposed for eventual use as a city park. Approximately 57 acres of land will be acquired, in addition to the disposal areas, for construction of the project. Approximately 41 acres will be entirely cleared of existing trees and vegetation, and selective cutting and clearing will be performed on approximately 16 acres of severed land. The 57 acres of land will be lost as wildlife habitat. The following photographs show typical scenes in the severed land area.

During periods when the gates are closed, the one-foot normal pool elevation behind the dam will slightly raise water surface elevations

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*Typical scenes in severed land area at site 1*



along the river for several miles upstream and in the sloughs and bayous which lead away from the river. No significant environmental effects are expected to result from such seasonal increases in water levels. No adverse effect on the proposed Big Thicket National Park, which is to be located along and north of Pine Island Bayou and along and west of the Neches River, is foreseen.

At the present time during the average 111-day period each year when the temporary salt water barrier is in place in the Neches River below Lakeview, water released from B. A. Steinhagen Lake does not reach the estuary unless the temporary barrier is overtopped or breached by a sudden rise on the river. It is estimated that when the permanent salt water barrier is in place, the gates in the barrier will be closed for an average period of 111 days each year to bar upstream movement of salt water. When the gates in the barrier are closed, about 100 acre-feet of fresh water will be released to the estuary each time the navigation gate is opened for vessel passage. It is estimated that about 10,000 acre-feet of water will be released each year through the navigation gate, which will incidentally improve water conditions in the estuary slightly during periods when there would be no flow from the Neches River under present conditions.

Neither National Historic Landmarks, sites included on the National Register of Historic Places, nor any known sites of local or state significance will be affected by the project. A map indicating known archeological sites in the area has been secured from the Texas Historical Survey Committee. Examination of the map indicates that none of these sites will be disturbed by construction or operation of the project either at site 1 or site 4. The Texas Historical Survey Committee further advises, however, that the probability of finding additional archeological sites in the project area is high. Therefore, an archeological survey of the construction area will be undertaken during preconstruction planning.

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## ***Design***

A one-foot head or differential in water levels above and below the dam will be adequate to minimize leakage of salt water through the closed gates of the dam and the closed navigation gate, and will be adequate also to minimize salt water intrusion through the navigation gate when it is opened for passage of recreational and commercial vessels.

## ***Operation and Maintenance***

The project will be maintained and operated by the Corps of Engineers. During periods when the barrier is needed to prevent salinity or pollution intrusion, the gates in the barrier dam and auxiliary dam will be closed and the navigation gate will be placed in operation. These periods are expected to correspond to those when the temporary salt water barriers have been needed in the past. Such periods have averaged 111 days during June to October, but the temporary barriers occasionally have been placed as early as March and left in place until as late as December. In 1956-57 they were in place until February 1957. The proposed project will provide a flexibility to adjust to varying conditions which is not available in the present fixed barriers, and will be operated to take advantage of conditions permitting the navigation gate to remain open.

In the event of abnormally high tides accompanying a hurricane or other severe weather disturbance, all gates will be closed. Salt water will overtop the dam if the tide level exceeds 4.5 feet. After subsidence of the tide, the gates will be opened and the salt water behind the dam will be flushed downstream by the natural river flow, often intensified by run-off from heavy rainfall which usually accompanies hurricanes.

When flows are adequate to prevent salt water or pollution intrusion, the navigation gate and the tainter gates in the barrier dam and slidegates in the auxiliary dam will be left open. During floods the gates will be open and the flapgates in the auxiliary dam will be self-operating.

Under normal operating conditions the tainter gates and slidegates will be operated as necessary to maintain the one-foot water level behind the dam.

An operating procedure for the navigation gate will be adopted consistent with the reasonable needs of navigation and economy of operation. With the navigation use expected in the early years of the

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project, limiting of gate operation to daylight hours will probably be satisfactory.

It is estimated that the navigation gate will be open an average of 15 minutes each time the gate is opened for barge tows, cabin cruisers, etc., and that approximately 100 acre-feet of fresh water will be passed in each opening. The total yearly water loss is estimated at 10,000 acre-feet. As navigation increases, it may be necessary, under drought conditions, to limit the number of openings and to delay vessel passages accordingly.

### **ALTERNATE PLAN**

In the event the local interests do not make the required cash contribution for a project at site 1, it is proposed that the project be built at site 4, which would not require a cash contribution. This site at river mile 26.3 about 3.3 miles upstream from site 1, is about halfway between Lawson Crossing and the Beaumont Country Club. The design of the barrier and navigation gate and by-pass channel would be the same as of these features at site 1, with the same channel and gate dimensions and the same elevations of sills and tops of gates and abutments. An access road would be provided on the west bank of the river and a service bridge would extend across the barrier to a short access road to the navigation gate on the east side of the river. A levee would connect the east side of the navigation gate to an existing levee along the City of Beaumont's water supply canal.

When in operation a minimum pool elevation of 1 foot above mean sea level would be maintained. Operation and maintenance procedures would be essentially the same as described for a project at site 1 except that there would be no auxiliary features at site 4. A barrier at site 4 would have generally similar effects on the environment as the project at site 1, though to a lesser extent in the river bottom swamp and length of river channel that would be restored to fresh water conditions.

### **ECONOMICS OF SELECTED PLAN**

This section of the report summarizes the economic analysis of the recommended plan of improvement and the methodology of evaluation of costs and benefits.

#### **Methodology**

The economic justification for the proposed improvements based on national efficiency is demonstrated by comparing the estimated annual charges for interest, amortization, maintenance, operation and

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major replacement with the estimated average annual equivalent benefits which could be realized over a 50-year period of analysis. The selected period is 1980 to 2030. Costs and benefits incurred or accruing at a future date are converted to present worth using an interest rate of 5-1/2 percent.

### **Costs**

The estimated first costs and annual charges of the plan of improvement, based on September 1972 prices, are summarized in the following table. All estimates include appropriate allowances for contingencies, engineering and design and supervision and administration, based on costs experienced on similar projects. The investment cost includes interest on the average investment during the estimated 4-year construction period. The annual charges include interest and amortization, maintenance, operation and major replacement. For ready comparison the estimates for both the selected plan, plan 1, and the most economical plan, plan 4, are shown.

### **Benefits**

Benefits will be derived from the project primarily through prevention of damages related to salt water contamination of fresh water supplies. The potential damages must be assessed on a hypothetical basis, inasmuch as at present they are effectively prevented by the existing fixed salt water barriers. The rationale for acceptance of benefits in terms of damages prevented hinges on the unacceptability of the present method of prevention, as demonstrated earlier in this report.

Assuming the absence of a salt water barrier, a potential for major damage lies in the two major uses of surface water supplies, industrial and agricultural. A shortage of fresh water would mean curtailment of production in the vast petro-chemical industry involved at an extremely high cost. The loss to rice agriculture would be in the form of reduced crop yields and quality because of curtailed irrigation or the use for irrigation of water containing injurious quantities of salt.

In terms of relative value and water requirements, industry is a high value, low water consumption use, whereas agriculture represents a low value, high water consumption use. In the case of competition between these uses for a limited supply of fresh water, it is to be assumed that the low value use would be sacrificed to the high value need. This assumption, taken together with the fact that industrial needs could, if necessary, be substantially satisfied by development of alternate ground water supply, as previously discussed herein, eliminates the prevention of industrial damage as a creditable benefit.

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ESTIMATED PROJECT COSTS

Item (1)	Plan 1	Plan 4
<u>FIRST COST</u>		
Lands and damages, acquisition	\$ 450	\$ 450
Dams		
Main river barrier	5,077,000	5,121,000
Auxiliary dam	592,000	-
Navigation gate	3,977,000	3,977,000
Access road	74,400	139,200
Channel	87,000	105,000
Levee	147,000	61,600
Buildings, grounds & utilities	244,000	244,000
Permanent operating equipment	65,000	65,000
Engineering and design	821,000	777,000
Supervision and administration	718,150	679,750
Aids to navigation	4,000	4,000
Rights-of-way, easements, levees & spillways	<u>46,000</u>	<u>32,000</u>
Total	11,853,000	11,206,000
<u>INVESTMENT</u> (2)	13,156,800	12,438,600
<u>ANNUAL CHARGES</u>		
Interest (3)	723,600	684,100
Amortization (3)	53,400	50,400
Maintenance, operation and major replacement	<u>197,100</u>	<u>195,100</u>
Total	974,100	929,600

(1) September 1972 prices

(2) Includes interest during 4-year construction period.

(3) Based on a 50-year project life and an interest rate of 5.5 percent.

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Conversely the rice agriculture would inevitably suffer damage in the absence of a salt water barrier and the estimated amount of damages prevented is creditable to the proposed project. The estimated average annual amount of these benefits is \$1,762,000. The methodology for developing this value is presented later herein.

Direct benefit will accrue from the project's effect of establishing a clean, fresh water condition upstream of the dam. Based on an appraisal of the U. S. Fish and Wildlife Service of increases in fresh water sport and commercial fishing, the annual fish and wildlife benefits are estimated at \$6,300 for site 4 and \$5,600 for site 1. For purposes of this report the figures are rounded to \$6,000.

Benefits will also accrue incidentally from the project in the form of environmental enhancement. The barrier will, in addition to barring the upstream movement of salt water, also bar water pollution originating downstream, thus restoring the river above the dam and most of the adjoining marshes and swamps to a clean, fresh water condition, enhancing their esthetic appeal for human enjoyment and recreation. The selected site offers greater benefit in this respect than others because it is farther downstream and provides the benefit to a correspondingly greater length of the river. Local interests have indicated a willingness to pay for this increased benefit in the amount of the difference in cost of the project at the selected site (site 1) and the most economical site (site 4). The enhancement relates primarily to industrial and municipal pollution which is of uncertain duration inasmuch as it should and probably will be mitigated under State and Federal pollution control programs in the foreseeable future. In any case, the industrial and municipal pollution has no relationship to the downstream Federal navigation improvements which are judged to be the cause of salt water intrusion, and there is no Federal obligation for mitigation or control of these pollutants in connection with a salt water barrier project. It is therefore reasonable that any cost incurred be entirely non-Federal. No rational method is known for quantifying or attaching monetary value to the anticipated environmental benefits. However, the local interests' willingness to pay, despite the uncertain tenure of the benefits, is judged to be a reasonable measure of the value of the benefits to them, and the amount of the benefits is therefore established in the amount of additional costs to be accepted by local interests, \$647,000, reduced to an average annual equivalent of \$42,500 and \$2,000 annual costs of operation, maintenance, and major replacement, for a total of \$44,500.

No benefits are attributed to recreation since the project plan includes no recreational facilities. Obviously the environmental enhancement previously described will improve recreation opportunities and encourage general recreational use of the waters. However, it is considered that the value of these benefits is included in the enhancement benefits already accepted.

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● Derivation of agricultural benefits.- As indicated previously, the agricultural crop which will benefit from the project in terms of damages prevented is rice. The acreage of rice irrigated with Neches River water supplied by the LNVA has averaged 48,000 acres over a 28-year period through 1971, ranging from approximately 37,000 to approximately 60,000 acres. The irrigated areas in 1971 totalled almost 48,000 acres. Information as to the yield of this acreage specifically is not available. However, records are available for some 58,000 to 68,000 acres of rice in Jefferson County, much of which is the acreage under consideration here. The rest is irrigated from other sources. The records indicate a trend toward an average yield of 26 barrels per acre. The price currently averages about \$9.00 per barrel. It is considered that these values are representative of the acreage under consideration and are valid for use in economic evaluation of this project.

A precedent study of salinity damage to rice crops under comparable climatic and other growing conditions is available in a study by the New Orleans District, Corps of Engineers, which led to authorization and construction of a salt water barrier in the Calcasieu River, Louisiana. This study, which was published as House Document No. 582, 87th Congress, 2nd Session, and the economics appendix of which is appended to this report as exhibit F-1, indicates that saline irrigation water would reduce yield by about 13 percent and quality by about 3 percent and that the reduced quality would be reflected in a correspondingly reduced price. The conclusions of the Calcasieu River study are accepted for purposes of this report and applied to the yields and values previously cited in determining hypothetical damages prevented. Thus the annual values adopted are:

Acreage	48,000 acres
With salinity control:	
Yield	26 bbls/acre
Unit value	\$ 9.00/bbl
Total value	
48,000 x 26 x \$9.00	= \$11,232,000
Without salinity control:	
Yield (reduced 13%)	22.6 bbls/acre
Unit value (reduced 3%)	\$ 8.73/bbl
Total value	
48,000 x 22.6 x \$8.73	= <u>\$9,470,000</u>
Annual damage	<u>\$1,762,000</u>

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## *Comparison of Benefits and Costs*

The combined agricultural and fish and wildlife benefits to be realized from the project will amount to \$1,768,000 annually. These benefits will accrue from a project at either of the two sites under consideration, site 4, the least costly, and site 1, preferred by local interests. The latter, however, as previously discussed, will produce additional benefits in the form of environmental enhancement for which the local interests are willing to pay the additional cost. Based on the principle of willingness to pay, this report accepts the incremental costs as the measure of the benefits; that is, the benefits equal the costs.

### SUMMARY OF AVERAGE ANNUAL BENEFITS AND CHARGES

	<u>Plan 1</u>	<u>Plan 4</u>
<u>Average annual benefits:</u>		
Prevention of agricultural damage	\$ 1,762,000	\$ 1,762,000
Fish and wildlife	6,000	6,000
Environmental enhancement	44,500	
Total average annual benefits	<u>\$ 1,812,500</u>	<u>\$1,768,000</u>
<u>Annual charges</u>	974,100	929,600
<u>Ratio of benefits to charges</u>	1.86	1.90

### ***DIVISION OF PLAN RESPONSIBILITIES***

This section of the report discusses the determination of the nature and extent of Federal interest in the proposed salt water barrier and navigation gate, the apportionment of costs between Federal and non-Federal interests, and the determination of Federal and non-Federal responsibilities.

#### ***Determination of Federal Interest***

It is considered that the construction of the ship channel to Beaumont and its subsequent progressive enlargement have been the primary causes of upstream penetration of salt water. The relation between the enlargement of the ship channel and the upstream penetration of salt water was recognized in 1962 in the most recent report on the Sabine-Neches Waterway, and in several earlier reports. The 1962 report, which led to Congressional authorization of the recently completed 40-foot project and which was printed as House Document No. 553, 87th Congress, 2nd Session stated on page 15: "3. Investigations and

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studies for comprehensive river basin survey reports on the Neches and Sabine Rivers for navigation, flood control, water supply, and other related purposes are in progress. These reports will consider salt water barrier structures and navigation improvements for the Neches River above Beaumont, and for the Sabine River above Echo." and on page 32: "Increasing the dimensions of the Neches River channel would increase the possibility of movement of the salt water wedge upstream during periods of low flow in the river. Such movement of the salt water wedge might endanger municipal and industrial water supply intakes located on the Neches River and its tributary, Pine Island Bayou. The need for construction of a salt water barrier in the Neches River is being investigated under a comprehensive survey of the Neches River basin now in progress." This report is in furtherance of that expressed intention.

Historically, the prevention of salinity intrusion in this project area has been left to the devices of local interests. They constructed a salt water barrier and navigation lock on Taylors Bayou about 1914, and constructed a replacement structure about 1935. They paid for a salt water guard lock constructed in 1916 in the Sabine-Neches Canal, downstream from the mouth of the Neches River, and maintained it until its abandonment. In 1929 they obtained from Congress special authority to construct temporary salt water barriers across the Neches River.

In recent years, however, Federal responsibility for mitigation of salinity intrusion related to Federal navigation improvements has become generally recognized. A variety of cost sharing principles have been applied depending on the individual circumstances of the various projects.

In a similar case involving a salt water barrier in the Calcasieu River, Louisiana, the Congress stated in the River and Harbor Act approved 23 October 1962 (Public Law 87-874) that "..... measures for mitigation of damages from navigation improvements will be a Federal responsibility and enhancement effects will be shared on the basis of a 50 per centum Federal and 50 per centum non-Federal." It ultimately was determined that no enhancement effects were involved, and the Calcasieu River salt water barrier was constructed with no apportionment of costs to local interests.

The historical acceptance by local interests of responsibilities for prevention of salinity intrusion represents a "no choice" situation involving a compelling need for deep-water navigation for economic development of the area and a compelling need for fresh water to satisfy municipal, industrial and agricultural uses. Continued deferral of Federal responsibility for mitigation measures in connection with Federal navigation improvements will merely prolong an inequitable situation. A salt water barrier might well have been included in the

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most recent navigation project rather than being recognized in the authorizing document as a subject for later study. In any case, this report recognizes the Federal interest as an overdue responsibility in extension of its responsibility for navigation improvements and proposes that the mitigation measures be provided entirely at Federal expense, except for items of local cooperation which are typically required in navigation projects - lands, rights-of-way, relocations, spoil disposal areas, spoil retention works, and an agreement to hold and save the United States harmless from damages incidental to construction of the project.

A further exception is any additional cost represented by the local interests' preference as to site related to the obtainment of environmental benefits.

The Federal responsibility for mitigation measures would be satisfied by provisions for construction and operation of a salt water barrier on the Neches River, limited to the cost of the minimum acceptable project that would effectively prevent salt water intrusion without adverse environmental or other effects, preserve the natural navigability of the river, and provide reasonable adaptability to possible future upstream navigation improvements. A salt water barrier and navigation gate at site 4 has been determined to be the minimum acceptable project. As previously discussed, the local interests, with the objective of enhancement of the environment, have offered to contribute the incremental cost of an environmentally more desirable project at site 1.

### ***Cost Apportionment***

The costs of a salt water barrier and navigation gate at site 4 are attributable to mitigation of damages that result from dredging of the Federal navigation project. The cost sharing policy for navigation is assignment of all costs except lands and damages and relocations to the United States. The additional benefits of a project at site 1 represent environmental enhancement, the additional cost of which will be allocated to that purpose. If for any reason the local contribution to environmental enhancement should not be forthcoming, it is proposed that the project revert to site 4 and be constructed entirely at Federal expense, except for lands and damages and relocations.

### ***Federal Responsibilities***

The Federal share of the total first cost of the proposed improvements is presently estimated at \$11,174,000 which is the estimated construction cost of a barrier at site 4. In addition, the Federal

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COST APPORTIONMENT  
PLAN 1

	Estimated first costs			Annual maintenance, operation and major replacement costs		
	Navigation (Mitigation)	Environmental enhancement	Total (1)	Navigation (Mitigation)	Environmental enhancement	Total
<u>Salt water barrier and navigation gate</u>	\$ 11,206,000	\$ 647,000	\$ 11,853,000	\$ 195,100	\$ 2,000	\$ 197,100
Federal	11,174,000	0	11,174,000	194,800	0	194,800
Non-Federal	32,000	647,000(2)	679,000	300	2,000(3)	2,300

- (1) All lands, easements and relocations included in non-Federal amounts.
- (2) The difference in cost of projects at sites 1 and 4 includes \$633,000 in construction costs to be contributed in cash prior to start of construction and \$14,000 in lands, easements and relocations.
- (3) To be contributed in cash prior to start of construction in amount equal to the capitalized value of \$2,000 annually for 50 years and 5½ percent interest. The computed amount is rounded to \$34,000.

Government would assume the annual maintenance, operation, and major replacement costs, other than those associated with environmental enhancement, disposal areas, levees, and spillways. The Federal share of the annual maintenance, operation and major replacement costs would be limited to those applicable to site 4, presently estimated at \$194,800.

### *Non-Federal Responsibilities*

The non-Federal share of the total first cost of the recommended improvements is presently estimated at \$679,000. This is comprised of the cost of all lands, easements and relocations, estimated at \$46,000, and the additional cost of environmental enhancement afforded by site 1 over site 4 estimated at \$633,000. In addition, non-Federal interests would assume the annual costs associated with disposal areas, levees and spillways, estimated at \$300, and contribute in cash the capitalized equivalent of the excess operation, maintenance and major replacement costs attributable to site 1, a sum presently estimated at \$34,000. If, for any reason, a proposed city park road upon which the project will depend for access to the city street system should not materialize as expected, local interests will be required to arrange for construction and maintenance of a suitable connecting road at no cost to the Government. Other requirements of local cooperation are set forth in the recommendations.

Construction of the salt water barrier and navigation gate would not be undertaken until the relocation of the Eastex, Inc. effluent outfall to a new location downstream from Interstate Highway 10, which is planned by that company independently of construction of a salt water barrier, has been completed. This condition would not apply if for any reason the plan of improvement should revert to site 4, upstream of the outfall.

The costs of a project at site 1, apportioned to local interests, include a cash contribution of the differences in first cost and annual maintenance, operation and advance replacement costs, which, as shown above, are presently estimated at \$667,000. The final amount will be determined after construction is completed and the actual costs become known. However, rather than depend on estimates of cost of a hypothetical project at site 4 and an estimate of the annual maintenance, operation and advance replacement costs at both sites at that time, it is considered preferable to fix in advance a percentage of the actual first cost based on estimates presented in this report. This percentage

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applied to the actual cost upon completion should be an equitable determination of the local cash contribution. The percentage determined from the presently estimated costs is computed at 5.97 percent, as follows:

$$\frac{\text{Estimated cash contribution}}{\text{Estimated Federal First cost}} = \frac{667,000}{11,174,000} = 5.97\%$$

## **PROJECT IMPLEMENTATION**

The steps necessary for the plan of improvement for the Neches River, as proposed herein, to materialize are generally summarized as follows:

- Review of the District Engineer's report by the Division Engineer, Southwestern Division, the Board of Engineers for Rivers and Harbors, and the Chief of Engineers.
- Solicitation by the Chief of Engineers of formal review and comment by the Governor of Texas and interested Federal agencies.
- Following the state and interagency review and after receipt of comments of the Office of Management and Budget regarding the relationship of the project to the program of the President the final report of the Chief of Engineers will be forwarded by the Secretary of the Army to the Congress.
- If all reviews find the project to be favorable, it will need Congressional authorization and will be submitted to the appropriate Congressional committee for consideration. Congressional procedure includes review and hearings by the Public Works Committees and authorization by inclusion in a public works act. Presidential approval of this act concludes the authorizing actions.
- If the project is authorized, the Chief of Engineers will include funds in his budget requests for detailed preconstruction planning and later for construction.
- When Congress appropriates the necessary initial funds, formal assurances of local cooperation will be requested from local interests by the District Engineer and preconstruction planning will begin.
- The early stages of preconstruction planning will include a complete review of project needs, engineering, economic, and environmental considerations, public attitudes, and all other factors originally considered in the pre-authorization planning process. The process will include public meetings as necessary to assure that the public interest then prevailing is recognized and served. The project plan will be subject to such revisions as may be indicated by thorough reevaluation of all relevant considerations.

● Once the project plan of improvement has been either reaffirmed or revised, final preconstruction planning will be undertaken. Plans, specifications, and detailed estimates will be completed preparatory to advertising for bids and award of a construction contract.

● Once the construction funds are appropriated, local interests will be called upon to satisfy the requirements of local cooperation, including execution of a contract indicating their willingness and legal and financial capability to do so. After all necessary lands have been furnished, relocations completed, if any, and any necessary cash contribution furnished, a construction contract will be awarded and the project will be carried to completion.

### ***VIEWS OF NON-FEDERAL INTERESTS***

The development of the plans for a salt water barrier was coordinated with the local and state agencies and interested parties during the progress of the study and after formulation of a plan, a public meeting was held on 24 March 1972 to present to all interested parties the proposed plan of improvement. Notice of the meeting was furnished the United States Senators and Congressmen from the area, Federal and state agencies, city and county authorities, and interested organizations, individuals and property owners. An environmental assessment and list of questions raised at a prior public meeting on 9 December 1970 together with answers thereto were included with the public notice. A total of 81 persons attended the public meeting.

All views and comments received during the planning studies were given full consideration and if feasible were incorporated in the plan of improvement. A draft report on the plan was prepared and submitted on 28 December 1972 to all interested Federal, state, and local agencies and private interests. The views and comments that were received are included in appendix 2 and are summarized with responses thereto in the following paragraphs.

● Agencies of the State of Texas.- The Director, Division of Planning Coordination, Office of the Governor of Texas, in a letter dated 21 February 1973, summarized and inclosed copies of comments on the interim report by the Texas Water Quality Board, the Bureau of Economic Geology of The University of Texas at Austin, the Texas Water Rights Commission, the Texas Parks and Wildlife Department, and the Texas Water Development Board. These comments are summarized as follows:

a. The Director, Central Operations, Texas Water Quality Board, by letter dated 5 February 1973, stated that "the staff of the Texas Water Quality Board feels that the Corps' report should include an evaluation of downstream water quality problems that might result from construction of the salt water barrier. An assessment of the effects of confining

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wastewater discharges in lower reaches of the river during low flow periods (usually about 4 months each year) should be made to particularly reflect dissolved oxygen, temperature and salinity changes. In addition, the relocation of the Eastex, Inc., effluent outfall line, downstream from the barrier, will require an amendment to their existing waste control order by formal Board action."

The effect of construction of the barrier is discussed in the section on Effect of Plan on the Environment. At the present time, during the approximate 6-month period when the temporary salt water barriers are in place on the Neches River and Pine Island Bayou, there is no flow of fresh water past the barriers unless they are overtopped or breached by a sudden rise in the river or bayou. If a permanent barrier is constructed, there would be a small flow of fresh water through the navigation gate when it is opened for passage of commercial and pleasure craft, even during the period when the gates in the salt water barrier are closed. The polluted water below the permanent barrier will be confined to a shorter reach of the river than is presently the case with the temporary barriers, but this should have only a negligible effect on dissolved oxygen, temperature and salinity below the barrier. The relocation of the Eastex, Inc. effluent outfall line is a non-projection action and need to obtain an amendment to the existing waste control order is a responsibility of the owner.

b. The Director, Bureau of Economic Geology, The University of Texas at Austin, by letter dated 18 January 1973, stated "In recent surface mapping we have completed in this area, we have defined a photographic linear extending along the north end of the proposed salt water barrier, approximately paralleling the proposed city road. Many of these kinds of linears are coincident with active faults in the Houston area, and although we have no indication that this particular linear represents an active surface fault, some field observation might be worthwhile. We can provide the Corps with a map showing the location of the linear if they desire."

A map of the photographic linear has been obtained from the Bureau of Economic Geology. When funds are made available for detailed preconstruction planning, surface and subsurface investigations will be made to determine whether a fault exists and, if so, whether modification of the project will be necessary.

c. The Executive Director, Texas Water Rights Commission, by letter dated 7 February 1973, made the following comments:

1. "Our staff finds that the salt water barrier project, described in referenced Interim Review of Reports, is conceptually sound."

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2. "The local sponsor should submit an application for permit either to reaffirm that existing permits are not affected, or to formalize justifiable changes in the existing permits, if applicable." The requirements of local cooperation have been modified to include an item providing that the local sponsor will obtain all necessary water permits from the Texas Water Rights Commission.

3. "In this regard, the staff believes that the referenced documents would be enhanced if further informative details were given concerning water quality management planning being done by Federal or non-Federal agencies in the Lower Neches River and Estuary downstream from the site of the proposed project." Additional information regarding planning for pollution control has been included in the section on Effect of Plan on the Environment.

d. The Executive Director, Parks and Wildlife Department, by letter dated 23 January 1973, stated "Our Department has reviewed this report and agrees with the enclosed findings. We would hope to press the Corps of Engineers for a barrier at Site 1 rather than the other locations." This comment with respect to alternate project site 4 is similar to those of Clear Air & Water, Inc., and the Neches Boat Club, which are discussed below.

e. The Executive Director, Texas Water Development Board, by letter dated 5 February 1973, stated that "In the opinion of Water Development Board staff, benefits to be derived from the proposed action will far outweigh any adverse effects" and "we strongly recommend construction of this Corps of Engineers facility, as proposed, and believe that the draft environmental impact statement sufficiently complies with the provisions of NEPA."

● Council of Governments.- The South East Texas Regional Planning Commission is the Council of Governments for Jefferson and Orange Counties. The Executive Director by letter dated 23 February 1973 stated that the report had been reviewed by the Planning Commission's Project Review Committee on 13 February 1973 and by the Planning Commission's Executive Committee on 21 February 1973. He stated the Executive Committee's opinion that the proposed project would have a favorable environmental impact, and that the present temporary salt water barriers would be more properly called semi-permanent, since they often are left in place for six to nine months. The Executive Committee held an open meeting on 21 February 1973 to discuss the proposed project. A total of 64 persons attended the meeting including 20 members, 24 staff members, and 20 guests. A representative of the Galveston District Engineer attended the meeting.

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● Local agencies and groups.- The following comments were received from the Lower Neches Valley Authority, City of Beaumont, Clean Air & Water, Inc., and the Neches Boat Club:

a. The President, Lower Neches Valley Authority, by letter dated 9 April 1973, stated "The Authority has examined this Review of Reports and approves the findings, conclusions and recommendations contained therein for the construction of the Salt Water Barrier at Site 1."

b. The Mayor, City of Beaumont, by letter dated 29 January 1973, stated that the city had made a tentative agreement with the Lower Neches Valley Authority to cooperate in the project, and that "The City of Beaumont endorses this project and feels that the project will greatly enhance the fresh water environment upstream from the project."

c. The President, Clean Air & Water, Inc., Beaumont, by letter dated 24 February 1973, stated that his association opposed the alternate project site 4, and tentatively approved project site 1. He questioned the requirement for a local cash contribution toward a project at preferred site 1 instead of at the most economical location, site 4. The Commodore, Neches River Boat Club also, in letter dated 26 February 1973, endorsed the project at site 1 but opposed construction at site 4. The report recommends construction of a project at site 1, that preferred by local interests, subject to a cash contribution by local interests of the difference in cost between that site and the most economical site, site 4. It also recommends, however, that if, for any reason, the local cash contribution should not be forthcoming, the project should revert to the most economical site, site 4. The local interests have reaffirmed their intention to contribute the excess cost for the project at site 1.

## REVIEW BY OTHER FEDERAL AGENCIES

The views and comments of other Federal agencies on the draft report are summarized as follows:

a. U. S. Environmental Protection Agency: The Chief, Federal Assistance Branch, Region VI, in letter dated 13 February 1973 commented as follows:

1. "In the discussion of the existing environment, reference is made to the City of Beaumont's sanitary landfill on the west bank of the river upstream from mile 22.6. We suggest that a discussion of the leachate from this fill be included in the report and the statement..... The City of Beaumont should be consulted and their plans for the sanitary landfill and any provisions for abating possible pollution by leachates should be included in the report." The City of Beaumont has several test wells in the sanitary landfill and continuously monitors conditions by taking water samples from the test wells and from the river adjacent to the landfill.

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So far there has been no water quality problem. If a problem should develop in the future, as the sanitary landfill is extended northward, the city proposes to increase the width of the earth barrier between the landfill and the river sufficiently to prevent leaching into the river.

2. "Reference is made in several sections of the report and the statement to 'local interest.' The 'local interest' should be identified in the first part of the report and statement and possibly be substituted for 'local interest' throughout the report." The words "local interests" are commonly used in Corps of Engineers reports to refer both to concerned local citizens and groups and to the local agency which assumes responsibility for the non-Federal share of the project. In this instance the local financial sponsor is the Lower Neches Valley Authority.

3. "We do not understand why the salt water wedge is 'a Federal responsibility related to navigation improvements previously installed.'" The reasons for recommending that the Federal Government accept responsibility for prevention of salinity intrusion are discussed in the section of the report on Determination of Federal Interest. Additional background information is contained in section C, appendix 1.

4. "It is not clear from the discussion on the alternative for flushing the salt water from the channel how the 1900 cfs that would be required to keep the salt water wedge below the fresh water intake at Brinns Bluff was computed." Section C, appendix 1, paragraphs 28 - 31, contains the computations indicating that a net river flow of 1,900 cubic feet per second is sufficient to prevent salt water from contaminating the fresh water supply at the intake at Bunns Bluff.

5. "We suggest that a combination of surface water and ground water to supply municipal, industrial and agricultural demands be considered as an alternative to the salt water barrier." Consideration of this proposed alternative shows that while the available ground water supply in the lower Neches River basin of 350,000 acre-feet per year is adequate to meet the present municipal and industrial water demands, it is much less than would be required for future municipal and industrial uses. If surface water were to be reserved for irrigation use, it would still be necessary to construct a salt water barrier to protect the water supply from contamination by salt water during periods of low net flow in the river. The irrigation water demand is much larger and more concentrated than the municipal and industrial water demands, as shown in table C-2, appendix 1, and the peak rate of withdrawal of surface water for irrigation use alone would be almost as great as the present peak rate of withdrawal for municipal, industrial and irrigation uses.

6. "The statement that the proposed barrier will have little effect on fresh water flows to the estuary should be discussed in detail." The proposed method of operation of the project will not change the permitted withdrawals of water from the river system above the barrier, nor will

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maintenance of a 1-foot head of water above the barrier require use of water from river flow except for initial raising of the water surface. Operation of the navigation gate will require use of an estimated 10,000 acre-feet of water annually. The release of this water during low flow periods will be beneficial from the standpoint of diluting pollution but the effect will be incidental to gate operations and will not be material.

b. National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Department of Commerce: The Regional Director, St. Petersburg, Florida, in letter dated 4 April 1973 stated:

1. "Generally, our views on the proposed project are reflected in the revised report submitted by the Bureau of Sport Fisheries and Wildlife on July 24, 1972, to which our letter of concurrence was attached." A copy of this letter is included in appendix 2 of the report.

2. "Our views concerning the presentation of alternative designs to the project are presented in the comments concerning your draft Environmental Impact Statement for this project which was forwarded to you from the Office of the Assistant Secretary of Commerce on February 15, 1973." These views and responses thereto are presented in the coordinated environmental statement to which they apply.

3. "According to information furnished us, the barrier would be located far enough upstream to preclude any significant loss of normally estuarine habitat while some increase in potential commercial fresh water fish harvests could be expected. The project could, however, have an indirect adverse effect on the productivity of the Sabine estuary system if it enables a much greater reduction of fresh water inflows to the estuary."

4. "Section 42 of Appendix 1 (page C28) should apparently read 'for about 6 to 8 months ...etc' instead of '60 to 8 ...' Also, unless it comes from mining or industry, 'salt water' penetration in the upper reaches of an estuarine system, though sporadic in occurrence, is not considered 'pollution.'" The typographical error has been corrected.

c. National Park Service, Department of the Interior: The Assistant Director, Cooperative Activities, Southwest Region, in letter dated 5 February 1973 stated that "the reports make no mention of archeological and historical resources or the effect of this project on such materials. As planning progresses on this project, particularly at the 'Environmental Impact Statement' stage, full consideration must be given to archeological and historical values. We will be available to assist in

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setting up these research studies." As suggested an archeological survey will be made in the project area during preconstruction planning. The Assistant Director further notes that "mention is made of the Big Thicket proposal. At present, several proposals have been made including one segment in or near Beaumont City limits. It doesn't appear that your proposal for a Salt Water Barrier would affect any of the Big Thicket proposals adversely."

d. Bureau of Outdoor Recreation, Department of the Interior: The Regional Director, South Central Regional Office, in letter dated 26 April 1973, stated that "The plan recognizes the potential recreation benefits of a fresh water lake and provides for the use of spoil material for development of future recreation sites. We recommend the project be implemented as described in the report."

e. National Weather Service, National Oceanic and Atmospheric Administration, Department of Commerce: The Regional Hydrologist, Southern Region, in letter dated 14 February 1973 stated that "It appears that a thorough treatment of the problem and various alternatives has been provided with due consideration of the environmental and ecological factors," and that "From the standpoint of the National Weather Service Hydrologic Field Program and the attendant responsibility of providing a river forecast and flood warning service, there is no indication that the proposed project would have any adverse effect."

f. Soil Conservation Service, U. S. Department of Agriculture: The State Conservationist of Texas, in letter dated 9 February 1973, stated that "The proposed salt water barrier will have no adverse effects on proposed projects of the Soil Conservation Service. In fact, they may complement each other." He further points out three applications for Federal assistance on three watersheds above the proposed barrier.

g. Bureau of Mines, Department of the Interior: The Chief, Intermountain Field Operation Center in letter dated 14 February 1973 stated that "Our primary interest in the project is possible involvement of mineral resources and mineral-production facilities, and our office review indicates that the proposed improvements would have no adverse effect thereon."

h. The Bureau of Sport Fisheries and Wildlife, Fish and Wildlife Service, Department of the Interior: The Acting Regional Director in letter dated 20 March 1973, stated that other than a typographical error he had no further comment on the report.

i. Forest Service, Department of Agriculture: The Area Environmental Coordinator in letter dated 4 April 1973, stated that their comment on the environmental impact statement, that it adequately describes the situation and predicts probable changes, covers the review of reports.

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## EFFECTS ASSESSMENT

In compliance with Section 122 of the River and Harbor and Flood Control Act of 1970, consideration has been given to the possible adverse social, economic, and environmental effects that the project will develop. The assessment of these effects is summarized in the following paragraphs.

● Social effects.- The physical features of the selected plan will be located in the river bottoms immediately adjacent to a generally undeveloped area. Within a mile of site 1 are several large industrial plants including a ship building and repair plant, the city water supply pumping plant and filtration plant, a portion of Interstate Highway 10, and several marinas for small pleasure boats. On high ground above the river bottom but subject to flooding by major floods and a little less than a mile from the project is the closest habitation, a development of low income housing. Site 4, about 2 miles airline upstream from site 1, is farther from these developments but is within a mile of the Beaumont Country Club and a nearby launching area for trailered boats. The small head of water maintained above the barrier will remain within the banks of the river and the bayous and sloughs throughout the river bottoms. The proposed structures and impoundment will not require direct displacement of any inhabitants. The labor force in the city of Beaumont is sufficiently large to provide the labor required for construction and operation of the project and no influx of workers requiring housing will be entailed by the project.

Construction and operation of the project will not generate noise in sufficient intensity to be objectionable to the nearest residents. The reach of the Neches River above the proposed sites is used presently by pleasure craft and at times for motor boat races. The noises of the racing boats are intense, but it is considered that the distance to the nearest inhabitants would be sufficient to avoid adverse reaction. It is to be expected that this type of traffic will increase materially in the future along with possible increases in commercial barge traffic. Attendant increases in noise levels, however, should not create excessive adverse effects.

The concrete gate structures in the river and navigation by-pass canal, the levees and canal as man-made alterations to the natural scene may appear esthetically undesirable to some; however, plantings of trees, shrubs, and grasses and treatment of concrete surfaces will appreciably improve the appearance of the project structures. It is believed that any adverse effect on esthetic values will be minor.

The effect of the project on community cohesion will be nominal. There was no divisive reaction at any of the public meetings on the project. Since the project will be a continuance of an existing procedure for protecting the fresh water supplies for municipal, industrial,

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and agricultural use, its construction and operation, in the interest of improved reliability of such supply, should tend to stabilize both the farming and industrial sectors of the community. The protection of the public right of navigation in the river and the esthetic improvement of a long reach of river will add to the recreational enjoyment of the segment of the populace interested in boating and other water-oriented recreation. These factors should contribute to desirable community growth. Insofar as can be foreseen there do not appear to be any adverse social effects associated with construction and operation of the project.

● Economic effects.- The effects of the project on local government finance will be generally favorable. Some property required for project purposes will be taken from the tax rolls, but the improvement in the river waters will encourage development in marine facilities that will compensate for any immediate loss in tax revenue. The project will cause no widespread changes in taxable properties. The major effect will be to relieve a local political subdivision, the Lower Neches Valley Authority, of the annual cost of providing facilities for prevention of salinity intrusion resulting from channel dredging by the Federal Government. The cost of lands and rights-of-way to this agency would be less than its benefits. The City of Beaumont will incur some costs in raising and improving a road to be used for access to the project but will gain in assurance of its municipal water supply and in improved environmental quality of the stream which represents a major scenic feature of the city and its environs. There will be no apparent adverse effects on public facilities and services. The proposed project will be of negligible impact on the economy of the Beaumont-Port Arthur industrial complex and the agricultural economy in Jefferson County, except to the extent that it affords insurance to the continuity of the municipal, industrial, and agricultural water supplies that are being adequately provided by existing facilities. To this limited extent the project will promote desirable regional growth. The construction work on this project will employ approximately 200 construction workers over a period of four years. The workers will largely come from the labor market in the Beaumont-Port Arthur-Orange Standard Metropolitan Statistical Area, which in July 1972 is reported by the Texas Employment Commission as 122,900 non-farm employment with an unemployment rate of 5.3 percent.

The project will be beneficial to business, industry, and agriculture in the Jefferson County area through its assurance of a dependable fresh water supply. There will be no change in the irrigation facilities and availability of water for agricultural uses and no displacement of farms to accommodate the project works and functions.

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● Environmental effects.- The impact of the proposed project on the local environment has been considered in detail in the studies made in preparation of this report. The assessment of the effects of the project on the environment was discussed at several public meetings held in Beaumont. It has been found that the project will be generally beneficial by protecting the surface water supplies of the municipalities, industries and farm lands served by the water delivery systems of the Lower Neches Valley Authority and the City of Beaumont from contamination by salt water and pollution moving upstream during periods of low river flow and high fresh water withdrawals. Furthermore, nearly all of the swamp areas upstream from the project site will be restored to freshwater conditions and 16.7 miles or 13.4 miles, depending on the site of actual construction, of the Neches River and Pine Island Bayou channels will be improved for recreational swimming, boating, hunting, and freshwater fishing.

The apparent adverse effects on the local ecology will result from the use of land for project purposes. About 57 acres will be lost as wildlife habitat. The barrier, when closed, will impede upstream migration of estuarine animals; however, in view of the distance and many miles of polluted water below the barrier, the practical effect is considered negligible.

The project operation will not contribute to air pollution since machinery will be electrically operated. Construction, however, will involve internal combustion engines that will contribute some pollution materials to the air, as will the exhaust from the engines of the water craft utilizing the improved river channel. These emissions should be subject to control under state laws to meet state air pollution standards. No adverse effect from the standpoint of water pollution is envisaged from the proposed project; rather, it is considered that the effect on water pollution will be beneficial in the reach of the Neches River and Pine Island Bayou between the project site and the temporary barriers that are constructed by the Lower Neches Valley Authority. In this reach the project will prevent salt water intrusion throughout the life of the project and will prevent the intrusion of municipal and industrial wastes discharged into the Neches River below Beaumont until such wastes are purified at their sources or are no longer discharged into the river.

Under existing conditions the natural ecosystem has been severely disturbed by the intrusion of pollutants from the lower river. During periods of low river flow and high withdrawal of fresh water, the water in the river channel below the temporary barriers becomes deoxygenated, and most of the organisms are killed. The proposed project will rectify this condition and restore the fresh water habitat that is conducive to the growth and preservation of the natural resources of the portion of

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the river and marshes above the barrier site. There will be some loss of wildlife because of the use of land for project purposes and destruction of wildlife habitat. Furthermore, the river below the proposed barrier will continue to become polluted in times of low flow but this will be neither aggravated nor diminished by the proposed project.

There will be no adverse effect on man-made resources in the area. The recreational qualities of a reach of the river will be materially improved, and the fresh water supply for irrigation to produce crops will be insured. The navigation improvements will not be affected, and navigation in the open river above the barrier will be improved by removal of the impediment to vessel traffic represented by the temporary barriers when in place.

## STATEMENT OF FINDINGS

I have reviewed and evaluated, in light of the overall public interests, the documents concerning the proposed action, as well as the stated views of other interested agencies and the concerned public, relative to the various practicable alternatives in developing a plan that will permanently control salinity intrusion in the Neches River; provide for free and reasonably unobstructed use of the river by existing and prospective recreational and commercial navigation; be compatible with any future plan for extension of a barge channel above Beaumont; and preserve or enhance the natural environment of the river and its flood plain.

The following alternatives were considered:

● Temporary salt water barriers.- The "no action" alternative would mean continuation of the present practice of installing temporary salt water barriers in Pine Island Bayou and the Neches River each year. This is the most economical alternative, but I have found it unacceptable as a permanent solution to the problem of salinity intrusion, because the temporary barriers interfere with public use and enjoyment of the naturally navigable waterway; because the temporary barriers cause higher backwater effects upstream on Pine Island Bayou and the Neches River than permanent gated structures would cause; and because local interests should be relieved from an annual cost for mitigating a problem which I consider to be a Federal responsibility related to navigation improvements previously installed.

● Flushing.- Flushing the salt water below Bunns Bluff with fresh water would require about 418,000 acre-feet of water per year. I have rejected this alternative because it would represent uneconomical use of a valuable natural resource which should be conserved for more beneficial uses.

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● Extension of intake canals.- I have rejected the alternative of extending the water intake canals above the limit of salt water intrusion, because it would be more costly than a barrier and would entail detrimental environmental effects related to the extensive construction involved.

● Use of ground water.- I have found that ground water supplies are not adequate to supply the existing municipal, industrial and agricultural water demands, and that use of ground water in lieu of surface water is not an adequate alternative.

● Site selection.- Of seven possible sites on the Neches River considered for a permanent, gated barrier, I find that a site at mile 26.3, site 4, would be the most economical in terms of first cost of construction. I find also, however, that locating the barrier at a site farther downstream at mile 23.0, site 1, will offer, at additional cost, substantial environmental advantages which are attractive to local interests and for which they are willing to pay the additional cost. The barrier incidentally to its primary function will bar the upstream movement of waters polluted by municipal and industrial wastes and will restore a dependable fresh water environment in the upstream waters and adjacent swamps and marshes. The downstream site, which local interests prefer and which I have selected based on their preference and willingness to pay the excess cost, will restore fresh water conditions to 3.3 miles more of river and to 7,100 acres more of swampland than would the most economical project at site 4.

● Barrier design.- For purposes of this report, I have selected a barrier design incorporating seven tainter gates and providing a navigation opening gated with two sectors and suitable for adaptation to a lock for barge navigation in the event future navigation improvements should be authorized. I recognize that more detailed consideration of design concepts may later develop more economical designs, particularly with respect to alternatives to the tainter gates, and I recommend that such consideration be given in preconstruction planning.

● Environmental and other effects.- The proposed project will require an estimated 57 acres of right-of-way and 14 acres of leveed spoil disposal areas. About 41 acres of the right-of-way will be entirely cleared of existing trees and vegetation, and selective cutting and clearing will be performed on 16 acres of severed land. The 57 acres of land will be lost as wildlife habitat; however, enough ground cover will be retained to encourage small animals and birds to return to the severed land area after completion of construction. I do not foresee any other significant adverse environmental effects.

Conversely, the project will provide substantial environmental benefits by restoring a dependable fresh water condition of high water quality upstream of the barrier, providing for a permanent and reliable

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source of fresh water supply essential to the economic well being of the inhabitants of the area; improving the esthetic quality of the stream and its environs for the enjoyment of man; restoring the navigability of the natural stream for recreational and commercial use; and restoring the habitat for fish and wildlife to a consistently beneficial and productive condition. I find that the environmental benefits to be realized from the project outweigh any adverse environmental effects.

The possible consequences of the alternatives have been studied according to environmental, social well being, and economic effects, including regional and national development and engineering feasibility. Other factors bearing on my review include compatibility with plans for water resources development in the Neches River basin and the remainder of the state.

In evaluation, the following points were considered pertinent:

- Environmental considerations
- Social well being considerations
- Engineering considerations
- Economic considerations
- Other public interest considerations.

I find that the proposed action, as developed in the Conclusions and Recommendations, is based on thorough analysis and evaluation of various practicable alternative courses of action for achieving the stated objectives; that wherever adverse effects are found to be involved they cannot be avoided by following reasonable alternative courses of action which would achieve the specified purposes; that where the proposed action has an adverse effect, this effect is either ameliorated or substantially outweighed by other considerations of national policy; that the recommended action is consonant with national policy, statutes, and administrative directives; and that on balance the total public interest would be served best by the implementation of the recommendation.

## **CONCLUSIONS**

It is concluded that a gated salt water barrier at site 1, mile 23.0 on the Neches River, with navigation gate, by-pass channel, auxiliary dam, and appurtenances, represents the best solution to the problem of salinity intrusion in the Neches River at Beaumont, Texas.

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It is further concluded that Federal interest in and responsibility for solution to the problem rests in the need to mitigate damages caused by the construction and subsequent progressive enlargement of the Federal navigation channel in the Neches River and the Sabine-Neches Waterway and that this Federal interest is limited to the Federal cost of the least costly, acceptable alternative solution, which would be a gated barrier at site 4, mile 26.3 on the Neches River.

## RECOMMENDATIONS

● It is recommended that a Federal project be authorized at mile 23.0 on the Neches River at Beaumont, Texas, to provide a salt water barrier, including navigation features, gated dam in the river, auxiliary dam, and appurtenances, substantially as outlined in this report, at a total estimated first cost to the United States of \$11,174,000 and an estimated annual cost of \$194,800 for maintenance, operation and major replacement.

● The foregoing recommendation shall be subject to the provision that prior to construction, in accordance with section 221, Public Law 91-611, the local interests enter into a written agreement with the United States to:

a. Provide without cost to the United States all lands, easements, and rights-of-way required for construction and subsequent maintenance of the project and of aids to navigation upon request of the Chief of Engineers, including suitable areas determined by the Chief of Engineers to be required in the general public interest for initial and subsequent disposal of excavated materials and necessary retaining dikes, bulkheads and embankments therefor or the costs of such retaining works;

b. Provide fair and equitable relocation payments and assistance to displaced persons, including relocation assistance advisory services, assurance of available decent, safe, sanitary and reasonably accessible replacement dwellings, and reimbursement for necessary expenses, all in accordance with and guided to the greatest extent practicable by the provisions of Public Law 91-646, the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970.

c. Contribute prior to start of construction a cash contribution toward the project cost equal to 5.97 percent of the Federal first cost, which represents the difference in Federal cost between a project at site 4 and a project at site 1. The contribution is presently estimated at \$667,000, the sum of amounts of \$633,000 and \$34,000, representing, respectively, the estimated difference in first cost of construction and the capitalized difference in annual costs of operation, maintenance, and major replacement.

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d. Accomplish, without cost to the United States, all relocations and alterations of structures, pipelines, powerlines, cables, utility facilities, sewers, and highway facilities when and as required for construction of the project;

e. Arrange, without cost to the United States, for construction and maintenance of a suitable connecting road from the project to the city street system, if, for any reason, a presently proposed city park road on which the project depends should not materialize as expected.

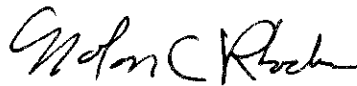
f. Hold and save the United States free from damages that may result from construction and maintenance of the project, and from operation of the project to prevent salt water intrusion and to provide for the passage of navigation; and

g. In accordance with applicable Federal, state, and local laws and authorities, establish regulations or otherwise promote the adoption of measures to prohibit the discharge of pollutants into the waters of the Neches River upstream of the proposed improvement.

h. Obtain, without cost to the United States, all water rights needed for operation of the project in the interests of navigation and prevention of salinity intrusion and resolve any conflicts in water rights necessary for effective operation of the project.

● It is further recommended that:

If, at any time after authorization and prior to initiation of construction of the project, local interests should for any reason declare their inability to provide the necessary cash contribution, the authorization will permit construction of the project at site 4, in which case special conditions c and e will not apply.

  
NOLAN C. RHODES  
Colonel, CE  
District Engineer

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SWDPL-F

SUBJECT: Interim Review of Reports on Neches River and Tributaries,  
Texas, Covering Salt Water Barrier at Beaumont, Texas

DA, Southwestern Division, Corps of Engineers, 1114 Commerce Street,  
Dallas, Texas 75202 26 June 1973

TO: Chief of Engineers

I concur in the conclusions and recommendations of the District Engineer.



FRANK A. LABOON

Colonel, CE

Acting Division Engineer



**INTERIM REVIEW OF REPORTS  
ON  
NECHES RIVER AND TRIBUTARIES, TEXAS  
COVERING  
SALT WATER BARRIER AT BEAUMONT, TEXAS**

*Pertinent  
Correspondence*

**PREPARED BY  
U. S. ARMY ENGINEER DISTRICT, GALVESTON  
CORPS OF ENGINEERS GALVESTON, TEXAS**

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R 5-31-73



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Appendix 2  
ii  
R 5-31-73

# LOWER NECHES VALLEY AUTHORITY

MUNICIPAL, INDUSTRIAL AND AGRICULTURAL WATER

7850 NORTH ELEVENTH STREET -- P. O. BOX 3007

BEAUMONT, TEXAS

77704

December 17, 1971

Colonel Nolan C. Rhodes  
District Engineer  
Galveston District  
U.S. Army, Corps of Engineers  
Galveston, Texas 77550

Dear Colonel Rhodes:

Reference is made to your letters, file SWGED-B, pertaining to a salt water barrier dam on the Neches River, dated:

- a. 10 June 1971
- b. 1 September 1971
- c. 3 November 1971

The Lower Neches Valley Authority Board of Directors has considered the various plans/sites, outlined in the above referenced correspondence, in conjunction with appropriate public and private interests directly concerned with project implementation. These considerations have resulted in the conclusion that the public interest best will be served by a salt water barrier dam being constructed on the Neches River, in accordance with Plan and Site No. 1, located at river mile 23, just north of Interstate Highway 10.

It is understood that the current revised estimate of cost, for Plan No. 1, contained in reference c above indicates a proposed local share of \$496,000 for construction costs, and \$46,000 for lands, etc., for a total of \$542,000. It is further understood that these estimated costs are based upon approximately 1/2 mile of the access road having been constructed by the City of Beaumont.

It is requested that this letter serve as assurance of local sponsorship for the Salt Water Barrier Dam Project on the Neches River as outlined above. The Lower Neches Valley Authority (LNVA) agrees that upon authorization of the project to provide, at the appropriate time, the cash contribution currently estimated at \$496,000 for construction costs, and arrange

for such lands, (estimated cost \$46,000), rights-of-way, and relocations as may be required of the local sponsor. LNVA further agrees to hold and save the United States free from damages due to the construction works in accordance with pertinent requirements as apply to local cooperation.

To insure a water supply of proper quality for municipal, industrial, and agricultural uses, and in view of the general public benefits to be provided by this project, it is requested that this project be considered urgent and expedited for authorization and construction.

Sincerely yours,



W. F. Weed  
President

CC: Mr. Charles Hill, City Manager  
City of Beaumont  
Beaumont, Texas

Mr. R.M. Buckley  
Eastex, Inc.  
Silsbee, Texas



IN REPLY REFER TO:

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
POST OFFICE BOX 1306  
ALBUQUERQUE, NEW MEXICO 87103

RB

May 8, 1972

District Engineer  
Corps of Engineers, U. S. Army  
Post Office Box 1229  
Galveston, Texas 77550

Dear Sir:

Enclosed are ten copies of the Bureau of Sport Fisheries and Wildlife report, dated April 26, 1972, on the six alternative plans for a saltwater barrier dam on the Neches River at Beaumont, Texas.

Mr. D. T. Graham's letter of February 24, 1972, advised that a saltwater barrier at site 1, mile 23.0 on the Neches River, would be feasible and would be recommended if it meets with public approval. Mr. Graham suggested that the Bureau's report be revised to relate to site No. 1 only.

In view of this new development, we will prepare a revised report giving consideration to fish and wildlife aspects of a saltwater barrier at site 1. We have considered it advisable, however, to complete and distribute the enclosed report as part of the record of planning on this project.

Sincerely yours,

Deputy Regional Director

Enclosures 10

cc:

Field Supervisor, BSWF, Div. of River Basin Studies, Fort Worth, Texas



IN REPLY REFER TO:

RB

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
POST OFFICE BOX 1306  
ALBUQUERQUE, NEW MEXICO 87103

April 26, 1972

District Engineer  
Corps of Engineers, U. S. Army  
Post Office Box 1229  
Galveston, Texas 77550

Dear Sir:

This letter constitutes the Bureau of Sport Fisheries and Wildlife report on the fish and wildlife resources to be affected by each of six alternative plans under study for the proposed Saltwater Barrier Dam on the Neches River at Beaumont, Texas. The project is an element of the authorized basinwide survey for the Neches River and Tributaries, Texas. The purpose of the project is to protect freshwater supplies in Pine Island Bayou and the Neches River from contamination by salt water moving upstream during periods of low flow.

This report, which is intended to accompany your interim report on the project, has been prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Texas Parks and Wildlife Department cooperated in the fish and wildlife investigations and has concurred with the views expressed herein as indicated by the enclosed copy of a letter dated March 7, 1972, signed by Executive Director, James U. Cross.

The Neches River Basin lies between the Sabine River Basin to the east and the Trinity River Basin to the west. The lowermost 21.5 miles of the Neches River above its mouth at Sabine Lake have been straightened and deepened to form a portion of the Sabine-Neches Waterway. The watershed above the mouth of the river encompasses about 10,000 square miles.

The project area lies principally in the Gulf Coast Prairie ecological region although the upper two sites lie within the East Texas Timber Country region. The river in this area meanders through a low-lying forested floodplain which varies from 1 to 4 miles in width. The swamp-type forest is dominated by water-loving hardwoods.

Within the project area, the river varies in width between 300 and 400 feet and has an average depth of about 20 feet. Stream flows are variable and the water is usually a muddy brown except during low-flow periods when it turns almost black due to the backwash of downstream industrial pollutants.

At the Evadale Gaging Station (river mile 55), a 50-year period of record reveals that the average flow of the river at that point has been about 6,100 second-feet (4,419,000 acre-feet per year) with a minimum flow of 63 second-feet in 1956 and a maximum flow of 92,100 second-feet in 1944.

Flat Creek, Palestine, Jacksonville, Tyler, Mud Creek, Striker Creek, Kurth, Sam Rayburn, and B. A. Steinhagen Reservoirs comprise the existing upstream impoundments. Major upstream water diversions below the lowermost reservoir, B. A. Steinhagen, include those operated by the Lower Neches Valley Authority, the city of Beaumont, and Eastex, Incorporated. Temporary saltwater barriers of steel sheet piling are located at about river mile 3.8 on Pine Island Bayou and at river mile 37.0 on the Neches River.

The human population within 50 miles of the project area, in the State of Texas, which includes the Beaumont and Port Arthur metropolitan areas, in 1970 was about 450,000. By 2020 the population is expected to be about 820,000 within the same radius.

The six project sites being considered as alternates are located at river-mile sites 23.0, 24.5, 25.5, 26.2, 28.5, and 29.5 on the Neches River. One site of the six will be selected for eventual development. Location of the six sites is depicted on Plate I.

The basic design of the barrier structure for any plan would consist of a dam in the natural river channel and a navigation lock located adjacent to the dam in a parallel navigation channel. The barrier, to be constructed of concrete and steel, would have 7 tainter-type gates, each measuring 40 feet wide and 23 feet high, spanning the width of the channel. The sill of the dam would be at elevation -20.0 feet mean sea level (MSL). With the gates fully lowered onto the sill, the upper lip of the gate would be at +3.0 feet MSL.

The navigation lock would involve a land-cut channel adjacent to the barrier. Both lock and channel would be designed to accommodate existing and proposed recreational and commercial traffic. The approach channel would measure 125 feet in width at its bottom

depth of -14 feet mean low tide (MLT). Two pairs of sector-gate locks with open door widths of 56 feet and a lock sill depth of -16 feet MLT would be required. The intermediate chamber, 400 feet in length, would be of earthen construction with riprapped sides.

The barrier dam and navigation lock would be operational only during periods of low stream flow when saltwater would intrude to the barrier site. Such periods normally occur during the summer and fall and may vary in duration from 4 to 6 months of any given year. During such times, the tainter gates would be lowered into position and the locks would be closed and operational. The lowered gates and closed locks would stop upstream saltwater intrusion while lock operation would permit continuance of boat traffic.

During the period of operation, a one-foot head would be maintained upstream of the barrier. This head would be controlled by regulating the releases from upstream reservoirs. Any excess head would be further regulated by the partial raising of one or more tainter gates. All flood flows originating below the upstream reservoirs, and occurring during the normal period of barrier operation, would be released at the barrier dam at such a rate that a constant pool elevation of +1 foot MSL would be maintained above the dam.

Once in operation, it is anticipated that maintenance of a one-foot head would be controlled effectively by upstream reservoir releases and that essentially no natural stream flow would be released at the barrier site to the downstream channel. Thus, the downstream flow would be dependent upon return flows originating below the damsite, upon runoff from the associated downstream area, and upon freshwater discharges from operation of the locks.

During the remainder of the year when the river flow would be sufficient to hold the saltwater wedge below the barrier site, the gates would be fully raised and the lock gates opened to allow normal flow of the river and unrestricted river boat traffic.

The project period of analysis is 50 years, 1980 to 2030.

## FISH

### Without the Project

The areas of influence for fish would vary from 11.8 to 17.8 miles of streams and 100 to 350 acres of oxbows and sloughs, dependent upon the barrier site selected. Stream reaches included extend from the temporary saltwater barriers on the Neches River and on Pine Island Bayou downstream to the proposed project barriers on the Neches River. For site No. 1, about 17.8 miles of streams and 350 acres of oxbows and sloughs would be involved. For sites Nos. 2 through 6, 16.3 miles and 240 acres, 15.3 miles and 200 acres, 14.6 miles and 100 acres, 12.3 miles and 100 acres, and 11.8 miles and 100 acres of streams and oxbows and sloughs, respectively, would be involved. The project would have no effect on the fishery resources downstream from the proposed saltwater barriers.

Historically, the project streams, oxbows, and sloughs provided a good quality freshwater fishery. The tidal reach of these waters also provided a good quality saltwater fishery. In recent years, however, industrial discharges have progressively lowered the quality of fish habitat in the lower 25 miles of the Neches River. Furthermore, diversions of fresh water from the lower reaches of the Neches River and Pine Island Bayou for municipal, industrial, and irrigation purposes have helped lower the water quality in this same reach to the extent that aquatic life has virtually disappeared.

Above the lower 25-mile reach of the Neches River, the quantity and quality of fresh water is adequate for 6 to 8 months of the year. In low-flow periods, however, temporary saltwater barriers are installed in the Neches River and in Pine Island Bayou. During such times, all stream flows originating above the barriers are diverted into canals for distribution to various water users. The only freshwater inflows to the lower reach of the Neches River come from runoff and from poor quality return flows originating downstream from the barriers. As a result, salt water backs upstream to the barriers carrying heavy concentrations of industrial pollution which degrade the quality of the fish habitat.

Common fish species in the project streams and other waters include blue catfish, smallmouth buffalo, freshwater drum, river carpsucker, gizzard shad, spotted gar, longnose gar, sand seatrout, croaker, menhaden, striped mullet, bay anchovy, and various minnows. Important crustaceans and mollusks occurring in these waters include



brown shrimp, white shrimp, grass shrimp, blue crabs, and brackish water clams.

At present, freshwater sport fishing above river mile 25 is of moderate intensity. Freshwater commercial fishing in these waters is slight. Below river mile 25, freshwater and saltwater sport and commercial fishing are insignificant. In the future, increased water demands and consequent decrease in stream flow are expected to increase the period of temporary barrier use to 6 to 8 months a year. Freshwater flows downstream from the temporary barrier sites would be reduced accordingly. Under these conditions sport and commercial fishing would continue to decline.

During the period of analysis, freshwater sport fishing would range from 4,600 to 3,000 man-days annually depending upon the barrier site involved and the associated area of influence. Freshwater commercial fishing in these waters would amount to 800 pounds annually with any of the plans.

#### With the Project

Construction of a saltwater barrier at any one of the proposed six sites would result in year-round improvement in freshwater fish habitat between the barrier site and the upstream sites of the temporary saltwater barriers by preventing upstream encroachment of heavily polluted salt water. The amount of improved freshwater fish habitat would depend on the location of the barrier plan selected. However, fish habitat in those waters above sites Nos. 3 to 6 would be of better quality than that in the environs above sites Nos. 1 or 2 because of wood pulp mill discharge into the Neches River above these latter sites. During low-flow periods, which normally coincide with high water temperatures, oxidation of fibrous materials in the discharge may lower the oxygen content in these waters, thereby reducing the quality of habitat.

Freshwater sport fishing would range from 6,200 to 10,000 man-days annually in the areas of influence depending upon the site selected. Freshwater commercial fishing in these waters would amount to about 1,200 pounds of fish annually for any one of the six saltwater barrier locations.

An annual summary of freshwater sport and commercial fishing in project waters, without and with the project, is presented in Table I.

Table 1. Annual Summary of Man-days of Freshwater Sport Fishing and Pounds of Commercial Fishing

Sites	Without Project	With Project	Gain or Loss
<u>Sport Fishing (Man-Days)</u>			
1	4,600	6,200	1,600
2	4,400	6,200	1,800
3	4,200	10,000	5,800
4	3,900	10,000	6,100
5	3,300	7,500	4,200
6	3,000	7,500	4,500
<u>Commercial Fishing (Pounds)</u>			
1 - 6	800	1,200	400

### Wildlife

#### Without the Project

The area of influence for wildlife would consist of streams, other water areas, and low-lying floodplains characterized by tupelo gum-cypress swamps, between the sites of the temporary saltwater barriers and the proposed saltwater barriers. The project would have no effect on wildlife habitat downstream from the proposed saltwater barriers.

Much of the timber in the area is in various stages of second growth and logging is not now being practiced. Human activities center around a few summer cabins, two boat clubs, and a country club. There is one public boat-launching ramp at about river mile 26.5, between barrier sites Nos. 4 and 5. A portion of the proposed Beaumont Unit of the Big Thicket Area lies in the project's area of influence. This tract lies to the north of Pine Island Bayou and to the west of the Neches River and is bordered on the west and north by the Lower Neches Valley Authority water diversion canal.

Important wildlife in the project area includes the white-tailed deer, fox and gray squirrels, swamp rabbit, red and gray foxes, raccoon, and waterfowl. Principal species of waterfowl are the

wood duck and mallard. Other wildlife in the area includes bobwhite, mourning dove, cottontail, opossum, skunk, beaver, river otter, nutria, mink, bobcat, coyote, and various song and wading birds. Rare or endangered species listed in the Bureau of Sport Fisheries and Wildlife Publication No. 34, "Rare and Endangered Fish and Wildlife in the United States", are the American alligator, southern bald eagle, ivory-billed woodpecker, northern red-cockaded woodpecker, and red wolf. The presence of the ivory-billed woodpecker is considered questionable by many.

The amount of hunting is moderate to slight due to poor accessibility. The species hunted are primarily squirrels, rabbits, deer, raccoon, fox, and waterfowl. Trapping in the area is slight. Wildlife-oriented recreation, including bird watching, wildlife photography, and wildlife-directed educational activities, is a major pastime.

During the period of analysis, big-game hunting would amount to 200 man-days annually, while upland-game hunting would be about 500 man-days annually. Hunting for waterfowl would amount to 300 man-days annually, and hunting for other remaining forms of wildlife would be about 300 man-days also. Wildlife-oriented recreation would amount to 1,000 man-days annually.

#### With the Project

Construction of a saltwater barrier would result in year-round freshwater conditions in the wooded swamp upstream from the site. Brackish water and pollution from the lower reach of the Neches River would be prevented from encroaching into these environs.

The one-foot head impounded by a saltwater barrier would, for the most part, be contained in the stream channels, oxbows, and sloughs. Only for short periods of less than 24 hours would water levels exceed the design pool level. Such occurrences would be so infrequent as to have insignificant effects on wildlife habitat.

Hunting of big game, upland game, other wildlife, and waterfowl and the trapping of fur animals would not change significantly over without-the-project conditions. The amount of wildlife-oriented recreation in the Big Thicket Area would be reduced by the construction of a barrier at either site No. 5 or 6. Longer periods of time required to travel to the Big Thicket Area by boat through the lock would deter visits to this area. For the project area as a whole wildlife-oriented recreation would be reduced to about 500 man-days annually.

Table 2 presents a summary of hunting and wildlife-oriented recreation without and with the project.

Table 2. Annual Summary of Man-days of Hunting and Other Wildlife-oriented Recreation

Item	Without Project	With Project	Gain or Loss
Big-game hunting	200	200	
Upland-game hunting	500	500	
Waterfowl hunting	300	300	
Other wildlife hunting	300	300	
Wildlife-oriented recreation	1,000	500	-500

#### DISCUSSION

A saltwater barrier dam as proposed would enhance the sport and commercial freshwater fishing in the area of project influence by improving water quality. On the other hand, wildlife habitat would not be materially affected so that project-induced changes in hunting or trapping are not anticipated. The one area of possible loss is in wildlife-oriented recreation associated with the Beaumont Unit of the Big Thicket, and this loss would occur only with a barrier at upstream sites Nos. 5 or 6.

Much of the boat traffic to the Beaumont Unit of the Big Thicket Area for wildlife-oriented recreation originates from the boat-launching ramp located at river mile 26.5 on the Neches River in the city of Beaumont. Constructing a saltwater barrier and lock at either site No. 5 or 6 would impede boat travel and lengthen travel time to and from the Big Thicket Area. The consequent shortening of trip time remaining for on-the-ground recreation in the Big Thicket would reduce the interest in this type of activity.

To prevent this reduction, a boat-launching ramp should be constructed immediately upstream from the saltwater barrier should either site No. 5 or 6 be selected. This facility would provide means for rapid upstream boat transportation and would fully mitigate project-induced losses in use of the Big Thicket Area.

It is recommended that:

1. A boat-launching ramp be constructed on project land immediately upstream from the barrier should either site No. 5 or 6 be developed.

### CONCLUSIONS

Construction of a saltwater barrier would create a permanent freshwater fishery above the damsite. An annual increase in freshwater sport fishing ranging from 1,600 to 6,100 man-days and from \$1,600 to \$6,100 in value, according to the plan selected, would accrue from the project. Freshwater commercial fishing would increase by 400 pounds annually valued at \$200 for any of the six barrier plans.

With respect to wildlife, the project would cause no significant change in the amount of hunting or trapping. Wildlife-oriented recreation would be reduced by 500 man-days annually should either site No. 5 or 6 be selected. Construction of a boat-launching ramp, as advocated in Recommendation No. 1, would fully mitigate these project-caused losses.

This report is based on data received prior to June 25, 1971. Any modification in the project planning should be brought to the attention of the Bureau of Sport Fisheries and Wildlife so that the effects of the project may be reappraised if necessary.

Sincerely yours,

*William J. White*  
Acting Regional Director

Enclosure

Copies (10)

Distribution:

- (5) Executive Director, Texas Parks and Wild, Dept., Austin, Tex.
- (2) Regional Director, Nat'l Mar. Fish. Serv., St. Petersburg, Fla.
- (2) Laboratory Director, Biol. Lab., NMFS, Galveston, Tex.
- (2) Regional Director, Bureau of Outdoor Recr., Denver, Colo.
- (2) Regional Administrator, EPA - Reg. VI, Dallas, Tex.
- (1) Field Representative, USDI, SW Reg., Albuquerque, N. Mex.
- (2) Field Supervisor, BSW, Div. of River Basin Studies, Fort Worth, Tex.

TEXAS  
PARKS AND WILDLIFE DEPARTMENT

COMMISSIONERS

JACK R. STONE  
CHAIRMAN, WELLS

HARRY JERSIG  
SAN ANTONIO

PEARCE JOHNSON  
AUSTIN



JAMES U. CROSS  
EXECUTIVE DIRECTOR

JOHN H. REAGAN BUILDING  
AUSTIN, TEXAS 78701

COMMISSIONERS

BOB BURLESON  
TEMPLE

JOE K. FULTON  
LUBBOCK

MAX L. THOMAS  
DALLAS

March 7, 1972

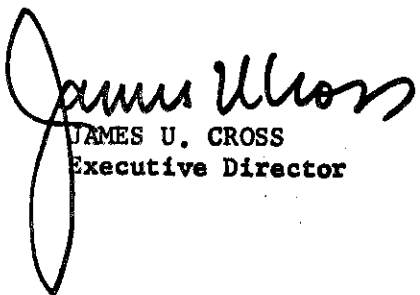
Mr. William M. White  
Department of the Interior  
Fish and Wildlife Service  
Bureau of Sport Fisheries and Wildlife  
P. O. Box 1306  
Albuquerque, New Mexico 87103

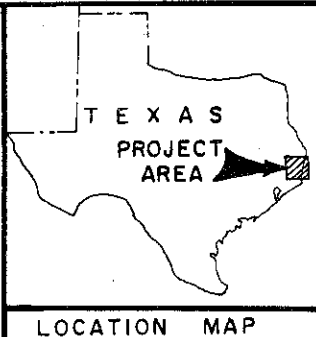
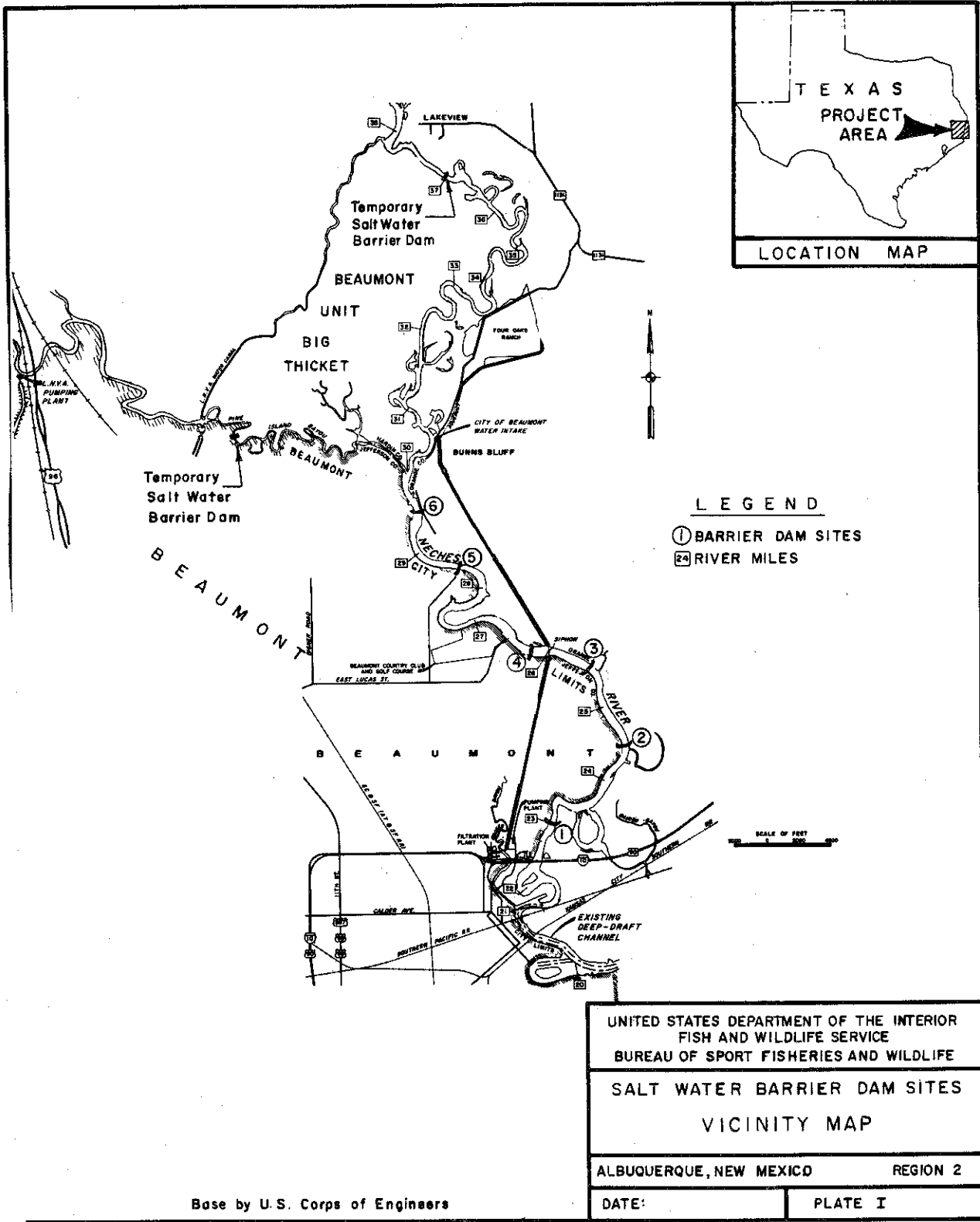
Dear Mr. White:

We have reviewed and concur with the field draft report concerning the Corps of Engineers proposed Saltwater Barrier Dam on the Neches River at Beaumont, Texas, as presented.

We appreciate having had the opportunity to comment on this draft report.

Sincerely,

  
JAMES U. CROSS  
Executive Director



**LEGEND**  
 ① BARRIER DAM SITES  
 24 RIVER MILES

SCALE OF FEET  
 0 1000 2000

UNITED STATES DEPARTMENT OF THE INTERIOR  
 FISH AND WILDLIFE SERVICE  
 BUREAU OF SPORT FISHERIES AND WILDLIFE

SALT WATER BARRIER DAM SITES  
 VICINITY MAP

ALBUQUERQUE, NEW MEXICO REGION 2

DATE: PLATE I

Base by U.S. Corps of Engineers



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE

POST OFFICE BOX 1306  
ALBUQUERQUE, NEW MEXICO 87103  
July 24, 1972

District Engineer  
Corps of Engineers, U. S. Army  
Post Office Box 1229  
Galveston, Texas 77550

Dear Sir:

This letter constitutes the Bureau of Sport Fisheries and Wildlife revised report on the fish and wildlife resources to be affected by the proposed Saltwater Barrier on the Neches River at Beaumont, Texas. It relates to the proposed barrier at Site No. 1 (river mile 23.0) and supersedes the Bureau report of April 26, 1972, which pertained to the six alternative sites previously studied. The project, an element of the authorized basinwide survey for the Neches River and Tributaries, Texas, is designed to protect freshwater supplies in Pine Island Bayou and the Neches River from contamination by salt water moving upstream during periods of low flow.

This report, which is intended to accompany your interim report on the project, has been prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Texas Parks and Wildlife Department cooperated in the fish and wildlife investigations and has concurred with the views expressed herein as indicated by the enclosed copy of a letter dated June 29, 1972, signed by Executive Director, James U. Cross. The National Marine Fisheries Service also has expressed concurrence in this report by the enclosed copy of a letter dated July 7, 1972, signed by Acting Regional Director, Harold B. Allen.

The Neches River Basin lies between the Sabine River Basin to the east and the Trinity River Basin to the west. The lowermost 21.5 miles of the Neches River above its mouth at Sabine Lake have been straightened and deepened to form a portion of the Sabine-Neches Waterway. The watershed above the mouth of the river encompasses about 10,000 square miles.

The project lies in the Gulf Coast Prairie ecological region. The river in this area meanders through a low-lying forested floodplain which varies from 1 to 4 miles in width. The swamp-type forest is dominated by water-loving hardwoods.



Within the project area, the river varies in width between 300 and 400 feet and has an average depth of about 20 feet. Streamflows are variable and the water is usually a muddy brown except during low-flow periods when it turns almost black due to the backwash of downstream industrial pollutants.

At the Evadale Gaging Station (river mile 55), a 50-year period of record reveals that the average flow of the river at that point has been about 6,100 second-feet (4,419,000 acre-feet per year) with a minimum flow of 63 second-feet in 1956 and a maximum flow of 92,100 second-feet in 1944.

Flat Creek, Palestine, Jacksonville, Tyler, Mud Creek, Striker Creek, Kurth, Sam Rayburn, and B. S. Steinhagen Reservoirs comprise the existing upstream impoundments. Major upstream water diversions below B. A. Steinhagen, the lowermost reservoir, include those operated by the Lower Neches Valley Authority, the city of Beaumont, and Eastex Incorporated. Temporary saltwater barriers of steel sheet piling are located at about river mile 3.8 on Pine Island Bayou and at river mile 37.0 on the Neches River.

The human population within 50 miles of the project area, in the State of Texas, which includes the Beaumont and Port Arthur metropolitan areas, in 1970 was about 450,000. By 2020 the population is expected to be about 820,000 within the same radius.

The proposed plan of development would consist of a dam in the natural river channel at river mile 23.0 and a navigation gate located adjacent to the dam in a parallel navigation channel. The dam, to be constructed of concrete and steel, would have 7 tainter-type gates, each measuring 40 feet wide and 24.5 feet high, spanning the width of the channel. The sill of the dam would be at elevation -20.0 feet mean sea level (MSL). With the gates fully lowered onto the sill, the upper lip of the gates would be at +4.5 feet MSL.

The navigation gate would lie in a land-cut channel adjacent to the dam. The gate would consist of two sector gates providing a clear opening of 56 feet with a depth of -16 feet mean low tide (MLT) over the sill. The approach channel to the gate would afford a 100-foot width at the 12-foot depth and would measure 76 feet in width at its bottom depth of -16 feet MLT.

An auxiliary dam with two 10- by 2-foot flapgates and three 10- by 8-foot slidegates would be constructed across the canal which

drains the southern end of Bairds Bayou at a location south of old Highway No. 90.

The barrier and navigational gates would be operational during periods of low streamflow when saltwater and industrial pollution would encroach to these structures. Such periods normally occur during the summer and fall and may vary in duration from 4 to 6 months of any given year. During such times, the tainter gates would be closed and the navigational gate would be operational. During the period of operation, a one-foot head would be maintained upstream of the barrier. This head would be controlled by regulating the releases from upstream reservoirs. Any excess head would be further regulated by the partial raising of one or more tainter gates. During floods the barrier gates, the navigation gate, and the slide gates in the auxiliary dam would be opened and the flapgates in the auxiliary dam would be operational. Flood-flow elevations would slightly exceed plus one-foot MSL several times each year.

Once in operation, it is anticipated that maintenance of a one-foot head would be controlled effectively by upstream reservoir releases and that essentially no natural streamflow would be released at the barrier site to the downstream channel. Thus, the downstream flow would be dependent upon return flows originating below the damsite, upon runoff from the associated downstream area, and upon freshwater discharges from operation of the navigation gate.

During the remainder of the year when the river flow would be sufficient to hold the saltwater wedge below the barrier site, the barrier gates would be fully raised and the navigation gate opened to allow normal flow of the river and unrestricted river boat traffic.

The project period of analysis is 50 years, 1980 to 2030.

## FISH

### Without the Project

The area of influence for fish would include about 17.8 miles of streams and 350 acres of oxbows and sloughs. Stream reaches included extend from the temporary saltwater barriers on the Neches River and on Pine Island Bayou downstream to the proposed barrier.

Historically, the project streams, oxbows, and sloughs provided a good quality freshwater fishery. The tidal reach of these waters also provided a good quality saltwater fishery. In recent years, however, industrial discharges have progressively lowered the quality of fish habitat in the lower 25 miles of the Neches River. Furthermore, diversions of fresh water from the lower reaches of the Neches River and Pine Island Bayou for municipal, industrial, and irrigation purposes have helped lower the water quality in this same reach to the extent that aquatic life has virtually disappeared.

Above the lower 25-mile reach of the Neches River, the quantity and quality of fresh water are adequate for 6 to 8 months of the year. In low-flow periods, however, temporary saltwater barriers are installed in the Neches River and in Pine Island Bayou. During such times, all streamflows originating above the barriers are diverted into canals for distribution to various water users. The only freshwater inflows to the lower reach of the Neches River come from runoff and from poor quality return flows originating downstream from the barriers. As a result, salt water backs upstream to the barriers carrying heavy concentrations of industrial pollution which degrade the quality of the fish habitat.

Common fish species in the project streams and other waters include blue catfish, smallmouth buffalo, freshwater drum, river carpsucker, gizzard shad, spotted gar, longnose gar, sand seatrout, croaker, menhaden, striped mullet, bay anchovy, and various minnows. Important crustaceans and mollusks occurring in these waters include brown shrimp, white shrimp, grass shrimp, blue crabs, and brackish-water clams.

At present, freshwater sport fishing above river mile 25 is of moderate intensity. Freshwater commercial fishing in these waters is slight. Below river mile 25, freshwater and saltwater sport and commercial fishing are insignificant. In the future, increased water demands and consequent decrease in streamflow are expected to increase the period of temporary barrier use to 6 to 8 months a year. Freshwater flows downstream from the temporary barrier sites would be reduced accordingly. Under these conditions sport and commercial fishing would continue to decline.

During the period of analysis, freshwater sport fishing would amount to 4,600 man-days annually in project streams, oxbows, and sloughs. Freshwater commercial fishing in these waters would amount to 800 pounds annually.

## With the Project

Construction of a saltwater barrier would result in year-round improvement in freshwater fish habitat between the proposed barrier and the upstream sites of the temporary saltwater barriers by preventing upstream encroachment of heavily polluted salt water. Further improvement in water quality within this reach could be obtained by relocating a wood-pulp mill effluent outfall downstream from the proposed barrier before the barrier is constructed.

Freshwater sport fishing would amount to 10,000 man-days annually in the area of influence. Freshwater commercial fishing in these waters would amount to about 1,200 pounds annually.

## Wildlife

### Without the Project

The area of influence for wildlife would consist of streams, other water areas, and low-lying floodplains characterized by tupelo gum-cypress swamps, between the sites of the temporary saltwater barriers and the proposed saltwater barrier. The project would have no effect on wildlife habitat downstream from the proposed saltwater barrier.

Much of the timber in the area is in various stages of second growth and logging is not now being practiced. Human activities center around a few summer cabins, two boat clubs, and a country club. There is one public boat-launching ramp at about river mile 26.5. A portion of the proposed Beaumont Unit of the Big Thicket Area lies to the north of Pine Island Bayou and to the west of the Neches River and is bordered on the west and north by the Lower Neches Valley Authority water diversion canal.

Important wildlife in the project area includes the white-tailed deer, fox and gray squirrels, swamp rabbit, red and gray foxes, raccoon, and waterfowl. Principal species of waterfowl are the wood duck and mallard. Other wildlife in the area includes bobwhite, mourning dove, cottontail, opossum, skunk, beaver, river otter, nutria, mink, bobcat, coyote, and various song and wading birds. Rare or endangered species listed in the Bureau of Sport Fisheries and Wildlife Publication No. 34, "Rare and Endangered Fish and Wildlife in the United States", are the American alligator, southern bald eagle, ivory-billed woodpecker, northern red-cockaded

woodpecker, and red wolf. The presence of the ivory-billed woodpecker is considered questionable by many.

The amount of hunting is moderate to slight due to poor accessibility. The species hunted are primarily squirrels, rabbits, deer, raccoon, fox, and waterfowl. Trapping in the area is slight. Wildlife-oriented recreation, including bird watching, wildlife photography, and wildlife-directed educational activities, is a major pastime.

During the period of analysis, big-game hunting would amount to 200 man-days annually, while upland-game hunting would be about 500 man-days annually. Hunting for waterfowl would amount to 300 man-days annually, and hunting for other remaining forms of wildlife would be about 300 man-days also. Wildlife-oriented recreation would amount to 1,000 man-days annually.

#### With the Project

Construction of a saltwater barrier would result in year-round freshwater conditions in the wooded swamp upstream from the site. Brackish water and pollution from the lower reach of the Neches River would be prevented from encroaching into these environs.

The one-foot head impounded by a saltwater barrier would, for the most part, be contained in the stream channels, oxbows, and sloughs. Only for short periods of less than 24 hours would water levels exceed the design pool level. Such occurrences would be so infrequent as to have insignificant effects on wildlife habitat.

Hunting of big game, upland game, other wildlife, and waterfowl, and the trapping of fur animals would not change significantly over without-the-project conditions.

#### DISCUSSION

A saltwater-barrier dam as proposed would enhance freshwater sport and commercial fishing in the area of project influence by improving water quality. On the other hand, wildlife habitat would not be materially affected so that project-induced changes in hunting or trapping are not anticipated.

## CONCLUSIONS

Construction of a saltwater barrier would create a permanent freshwater fishery above the damsite. An annual increase in freshwater sport fishing in the amount of 5,400 man-days and valued at \$5,400 would accrue from the project. The freshwater commercial fishing harvest would increase by 400 pounds annually, valued at \$200.

With respect to wildlife, the project would cause no significant change in the amount of hunting or trapping.

The following material is included for use in the preparation of an environmental statement on the Saltwater Barrier Dam Project as required by Section 102(2)(C) of the National Environmental Policy Act of 1969, approved January 1, 1970 (83 Stat. 852). Effects on fish and wildlife habitat and resultant changes in human use with project construction and operation are discussed.

(i) The environmental impact of the proposed action. The project would convert a sizable portion of Pine Island Bayou and the Neches River and their associated low-lying floodplains, oxbows, and sloughs into a year-round freshwater environment. It would prevent pollution-laden, brackish water in the Neches River from contaminating the streams, oxbows, and sloughs upstream from the barrier during periods of low flow in the Neches River.

About 40 acres would be completely cleared of trees and vegetation in the construction of the barrier and gate. Selective clearing would be performed on an additional 16 acres of land severed by construction of the navigation channel.

(ii) Any adverse environmental effects which cannot be avoided should the proposal be implemented. Small acreages of marshland and bottomland habitat would be destroyed by the construction of the dam, diversion channel, navigation gate, and access road. These losses would have no significant effect on the amount of hunting or trapping.

(iii) Alternatives to the proposed action. An alternative to the proposed action would be to construct a barrier at other locations upstream from the proposed site. However, pollution-laden waters would encroach to any barrier site selected.

(iv) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. The project would prevent fish and wildlife losses caused by a deteriorating environment and restore some of the former productivity of the area. An increase in hunting is not anticipated but sport fishing is expected to increase by 5,400 man-days annually. Freshwater commercial fishing also would be improved.

(v) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. Small acreages of wildlife habitat would be lost forever; however, other wildlife habitat would be protected from further degradation by preventing pollution infiltration to these areas.

This report is based on data received prior to March 24, 1972. Any modification in the project planning should be brought to the attention of the Bureau of Sport Fisheries and Wildlife so that the effects of the project may be reappraised.

Sincerely yours,

*William M. White*

Acting Regional Director

Enclosures 2

Copies (10)

Distribution:

- (5) Executive Director, Texas Parks and Wild. Dept., Austin, Tex.
- (2) Regional Director, Nat'l Mar. Fish. Serv., St. Petersburg, Fla.
- (2) Laboratory Director, Biol. Lab., NMFS, Galveston, Tex.
- (2) Regional Director, Bureau of Outdoor Recr., Denver, Colo.
- (2) Regional Administrator, EPA - Reg. VI, Dallas, Tex.
- (1) Field Representative, USDI, SW Reg., Albuquerque, N. Mex.
- (2) Field Supervisor, BSWF, Div. of River Basin Studies, Fort Worth, Tex.





# PARKS AND WILDLIFE DEPARTMENT

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June 29, 1972

Mr. W. O. Nelson, Jr.  
Regional Director  
U. S. Department of Interior  
Bureau of Sport Fisheries and Wildlife  
Post Office Box 1306  
Albuquerque, New Mexico 87103

Dear Mr. Nelson:

We have examined and concur with the review draft report concerning the Corps of Engineers plans for a proposed Saltwater Barrier Dam on the Neches River at Beaumont, Texas, and find it to be well presented.

We appreciate having had the opportunity to review this draft report.

Sincerely,

A handwritten signature in cursive script that reads "James U. Cross".

JAMES U. CROSS  
Executive Director

cc: Mr. John Degani

# LOWER NECHES VALLEY AUTHORITY

MUNICIPAL, INDUSTRIAL AND AGRICULTURAL WATER

7850 NORTH ELEVENTH STREET - P. O. BOX 3007

BEAUMONT, TEXAS

November 28, 1972

Colonel Nolan C. Rhodes  
District Engineer  
Department of the Army  
Galveston District,  
Corps of Engineers  
Post Office Box 1229  
Galveston, Texas 77550

Re: Salt Water Barrier in  
Neches River at Beaumont,  
Texas

Dear Colonel Rhodes:

This acknowledges receipt of your letter of November 13, 1972 re: requirements of local cooperation (a), (b), (c), (d), (e), (f) and (g) and the other provisions thereof.

This letter is to reaffirm Lower Neches Valley Authority's intent to fulfill the proposed requirement of local cooperation as set forth in your above referred to letter.

Yours truly,

  
\_\_\_\_\_  
W. F. Weed, President  
Lower Neches Valley Authority



## EXECUTIVE DEPARTMENT

DIVISION OF PLANNING COORDINATION

DOLPH BRISCOE  
GOVERNOR

BOX 12428, CAPITOL STATION  
AUSTIN, TEXAS 78711  
PHONE 512 475-2427

February 21, 1973

Lt. Col. Martin W. Teague, C.E.  
Acting District Engineer  
Department of the Army  
Galveston District,  
Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Dear Colonel Teague:

The Office of the Governor, Division of Planning Coordination (the State Planning and Development Clearinghouse), and interested or affected Texas State agencies have reviewed the Interim Review of Reports and the draft environmental impact statement on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas.

The following comments are offered:

1. The Texas Water Quality Board recommends that the Corps' report include an evaluation of downstream water quality problems that might result from construction of the salt water barrier. An assessment of the effects of confining wastewater discharges in lower reaches of the river during low flow periods should be made to particularly reflect dissolved oxygen, temperature and salinity changes. In addition, the relocation of the Eastex, Inc., effluent outfall line downstream from the barrier will require an amendment to their existing waste control order by formal Board action.
2. The Bureau of Economic Geology has completed recent surface mapping in the area, and has defined a photographic linear extending along the north end of the proposed salt barrier, approximately paralleling the proposed city road. Many of these kinds of linears are coincident with active faults in the Houston area, and although there is no indication that this particular linear represents an active surface fault, some field observation might be worthwhile.
3. The Texas Water Rights Commission recommends that recognition be given to the fact that the proposed project has water rights impacts of sufficient importance to require formal examination by the Commission. The local sponsor should submit an application for permit either to reaffirm that existing permits are not affected or to formalize justifiable changes in the existing permits, if applicable. The Commission further commented that:

1. While the proposed project is, in fact, an action by the Federal government to remedy adverse effects of exercising the Federal right of navigational servitude in the Lower Neches River, the proposed remedial project imposes on the local, non-Federal sponsor the full responsibility to acquire in accordance with State laws and regulations, and if necessary to establish and justify, any and all water rights needed for the desired utilization of the fresh water storage space created by the salt water barrier dam on the Neches River.
2. The submission of the permit application from the local sponsor will enable the Texas Water Rights Commission to make proper statutory and legal reviews of proposed beneficial use of the fresh water impoundment which would be created by the proposed barrier facility. It may be necessary for the Commission to examine carefully the use of impounded fresh water for proposed multiple beneficial purposes versus the single limited purpose of using the impounded fresh water mainly to delay or regulate stream flow in aid of navigation, and to limit the extent of tidal contaminated salt water intrusion in the Neches River and Estuary during unforeseen periods of low stream flow and high fresh water withdrawals.
3. Special recognition should be given to the Interim Review of Reports and in the Environmental Statement to the provisions of the Federal Water Pollution Control Act Amendment of 1961, regarding the inclusion of water quality storage in Federal reservoirs. The referenced barrier dam brings to the fore certain aspects of the problems concerning fresh water inflows to bays and estuaries; water releases for quality control; and, release to control salt water intrusion. Specifically, assurance should be given that storage and water releases shall not be regarded as a substitute for adequate municipal and industrial wastewater treatment or other methods of controlling waste at the source. There is a difference between fresh water releases to control salinity in bays and estuaries, and fresh water releases merely to reduce municipal and industrial waste concentrations. In this regard, the referenced documents would be enhanced if further informative details were given concerning water quality management planning being done by Federal or non-Federal agencies in the Lower Neches River and Estuary downstream from the site of the proposed project.
4. The Texas Parks and Wildlife Department and the Water Development Board both recommend the barrier at Site 1 rather than the other locations.

We appreciate the opportunity to review the Interim Review of Reports and the draft environmental impact statement on the Neches River Project. Copies of the comments of the State agencies are enclosed.

Sincerely,



Ed Grisham  
Director

EG:jab

Enclosures

- cc: Mr. Hugh C. Yantis, Jr., TWQB
- Dr. W. L. Fisher, BEG
- Mr. Louis L. McDaniels, TWRC
- Mr. Clayton Garrison, TP&WD
- Mr. Harry P. Burleigh, TWDB

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# TEXAS WATER QUALITY BOARD



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JIM C. LANGDON  
J. E. PEAVY, MD  
HUGH C. YANTIS, JR.  
EXECUTIVE DIRECTOR  
PH. 475-2651  
A.C. 512

314 WEST 11TH STREET 78701  
P.O. BOX 13246 CAPITOL STATION 78711  
AUSTIN, TEXAS

February 5, 1973

RE: Interim Review of Reports on  
Neches River and Tributaries,  
Texas, Covering Salt Water  
Barrier at Beaumont, Texas -  
Environmental Statement

Mr. Ed Grisham, Director  
Division of Planning Coordination  
Office of the Governor  
P. O. Box 12428, Cap. Sta.  
Austin, Texas 78711

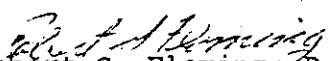
Attention: Mr. Tony Breard

Dear Mr. Grisham:

In response to your request for our comments on the above-referenced Environmental Statement, the staff of the Texas Water Quality Board concurs with the cited upstream benefits. However, we feel that the probable adverse downstream water quality effects have not been presented by the Corps of Engineers. Accordingly, we would recommend that a discussion of the downstream water quality effects be included as a part of the Environmental Statement.

If we can be of further assistance, please contact us.

Very truly yours,

  
Robert G. Fleming, P.E., Director  
Central Operations

JML:ww

RECEIVED

FEB 7 1973

Div. of Plan. Coord.

GORDON FULCHER  
CHAIRMAN  
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# TEXAS WATER QUALITY BOARD



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J. E. PEAVY, MD  
HUGH C. YANTIS, JR.  
EXECUTIVE DIRECTOR  
PH. 475-2651  
A.C. 512

314 WEST 11TH STREET 78701  
P.O. BOX 13246 CAPITOL STATION 78711  
AUSTIN, TEXAS

February 5, 1973

RE: Draft Review of the Corps of  
Engineers Interim Report for  
Neches River Covering Salt Water  
Barrier at Beaumont, Texas

Mr. Ed Grisham, Director  
Division of Planning Coordination  
Office of the Governor  
P. O. Box 12428, Cap. Sta.  
Austin, Texas 78711

RECEIVED

FEB 7 1973

Attention: Mr. Tony Breard

Div. of Plan. Coord.


Dear Mr. Grisham:

In response to your request of the review of the above-referenced project, the staff of the Texas Water Quality Board feels that the Corps' report should include an evaluation of downstream water quality problems that might result from construction of the salt water barrier. An assessment of the effects of confining wastewater discharges in lower reaches of the river during low flow periods (usually about 4 months each year) should be made to particularly reflect dissolved oxygen, temperature and salinity changes. In addition, the relocation of the Eastex, Inc., effluent outfall line, downstream from the barrier, will require an amendment to their existing waste control order by formal Board action.

The benefits from this proposed project are undoubtedly justified and necessary. However, the previously cited comments on downstream quality problems should be evaluated as a part of the report.

If there are any questions in regard to this review, or if we can be of further assistance, please contact us.

Very truly yours,

  
Robert G. Fleming, P.E., Director  
Central Operations

JML:ww



THE UNIVERSITY OF TEXAS AT AUSTIN  
BUREAU OF ECONOMIC GEOLOGY  
AUSTIN, TEXAS 78712

University Station, Box X  
Phone 512--471-1534

January 18, 1973

Mr. Ed Grisham, Director  
Governor's Office  
Division of Planning Coordination  
Box 12428, Capitol Station  
Austin, Texas 78711

Dear Ed:

I write in response to your memoranda of 4 January requesting review of "Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas." Our staff has completed review and has no substantial negative response. In recent surface mapping we have completed in this area, we have defined a photographic linear extending along the north end of the proposed salt barrier, approximately paralleling the proposed city road. Many of these kinds of linears are coincident with active faults in the Houston area, and although we have no indication that this particular linear represents an active surface fault, some field observation might be worthwhile. We can provide the Corps with a map showing the location of the linear if they desire.

Best regards.

Sincerely,

A handwritten signature in cursive script that reads "W. L. Fisher".

W. L. Fisher  
Director

WLF:sc



# TEXAS WATER RIGHTS COMMISSION

SAM HOUSTON STATE OFFICE BUILDING

## COMMISSIONERS

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EXECUTIVE DIRECTOR

475-2452

AUDREY STRANDTMAN

SECRETARY

475-4514

February 7, 1973

Mr. Ed Grisham, Director  
Governor's Division of Planning  
Coordination  
Sam Houston State Office Bldg.  
Austin, Texas 78711

Re: US Corps of Engineers  
Documents: "Interim  
Review of Reports on  
Neches River and Tribu-  
taries, Texas, Covering  
Salt Water Barrier at  
Beaumont, Texas." (20  
December 1972) and Pre-  
liminary Draft Environ-  
mental Statement (20  
December 1972).

Dear Ed:

In response to your request by Memorandum of January 4, 1973, a copy of our staff Memorandum of Review on the referenced documents is attached for your information and use.

Our staff finds that the salt water barrier project, described in the referenced Interim Review of Reports, is conceptually sound, and that the Draft Environmental Statement appears to be in compliance with the policies and guidelines contained in Sections 101 and 102(2)(C) of the National Environmental Policy Act of 1969. However, the staff review suggests that proper recognition be given in the Interim Review of Reports to the fact that the proposed project has water rights impacts of sufficient importance to require

formal examination by the Texas Water Rights Commission. The local sponsor should submit an application for permit either to reaffirm that existing permits are not affected, or to formalize justifiable changes in the existing permits, if applicable. Specifically, the staff finds that:

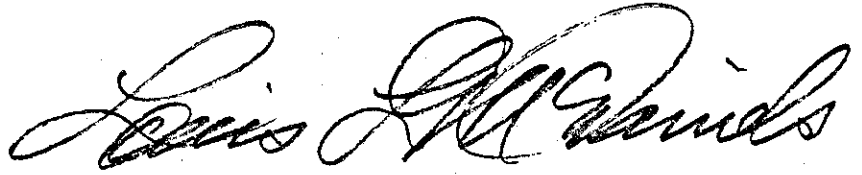
1. While the proposed project is, in fact, an action by the Federal government to remedy adverse effects of exercising the Federal right of navigational servitude in the Lower Neches River, the proposed remedial project imposes on the local, non-Federal sponsor the full responsibility to acquire in accordance with State laws and regulations, and if necessary to establish and justify, any and all water rights needed for the desired utilization of the fresh water storage space created by the salt water barrier dam on the Neches River.
2. The submission of the permit application from the local sponsor will enable the Texas Water Rights Commission to make proper statutory and legal reviews of proposed beneficial use of the fresh water impoundment which would be created by the proposed barrier facility. It may be necessary for the Commission to examine carefully the use of impounded fresh water for proposed multiple beneficial purposes versus the single limited purpose of using the impounded fresh water mainly to delay or regulate stream flow in aid of navigation, and to limit the extent of tidal contaminated salt water intrusion in the Neches River and Estuary during unforeseen periods of low stream flow and high fresh water withdrawals.

3. Special recognition should be given in the Interim Review of Reports and in the Environmental Statement to the provisions of the Federal Water Pollution Control Act Amendment of 1961, regarding the inclusion of water quality storage in Federal reservoirs. The referenced barrier dam brings to the fore certain aspects of the problems concerning fresh water inflows to bays and estuaries; water releases for quality control; and, release to control salt water intrusion. Specifically, assurance should be given that storage and water releases shall not be regarded as a substitute for adequate municipal and industrial wastewater treatment or other methods of controlling waste at the source. There is a difference between fresh water releases to control salinity in bays and estuaries, and fresh water releases merely to reduce municipal and industrial waste concentrations. In this regard, the staff believes that the referenced documents would be enhanced if further informative details were given concerning water quality management planning being done by Federal or non-Federal agencies in the Lower Neches River and Estuary downstream from the site of the proposed project.

Finally, attention is invited to the special proviso contained in subparagraph 1.2 of the attached Memorandum. The staff review comments should not be misconstrued as the final or formal position of the Texas Water Rights Commission on the final project report and details. Nor should the comments be presupposed to constitute any constraints on the Commission regarding water rights actions that may be presented to the Commission for resolution.

This staff review is presented with the view toward enhancing and expediting the development and construction of the proposed project.

Sincerely,

A handwritten signature in cursive script, reading "Louis L. McDaniels". The signature is written in black ink and is positioned above the typed name and title.

Louis L. McDaniels  
Executive Director

Attachment  
As stated.

To: The Executive Director  
Texas Water Rights Commission

February 6, 1973

MEMORANDUM OF REVIEW  
OF

US ARMY ENGINEER DISTRICT, GALVESTON, CORPS OF ENGINEERS,  
GALVESTON, TEXAS, DOCUMENTS: "INTERIM REVIEW OF  
REPORTS ON NECHES RIVER AND TRIBUTARIES, TEXAS,  
COVERING SALT WATER BARRIER AT BEAUMONT,  
TEXAS." (20 DECEMBER 1972) AND PRE-  
LIMINARY DRAFT ENVIRONMENTAL  
STATEMENT (20 DECEMBER 1972).

By: Dr. Alfred J. D'Arezzo, Environmental Sciences Analyst,  
Texas Water Rights Commission.

1. INTRODUCTION

1.1 Correspondence.

By Memoranda of January 4, 1973, the Director, Governor's Division of Planning Coordination, transmitted the subject documents, for review and comments by February 5, 1973, to the Executive Director, Texas Water Rights Commission. (The Memoranda was received on January 15, 1973.)

1.2 Scope and Limitations of the Review.

The comments in this review should not be misconstrued as a substitute for the eventual review by the Commission staff of the comprehensive project report and plans, after they are developed by the US Army Corps of Engineers. The staff comments in this review should not be presupposed as constraining in any way the future position of the Commissioners of the Texas Water Rights Commission insofar as the details of the final project plans or of the water rights impacts thereof, are concerned.

### 1.3 Essential Background Data.

- a. Purposes: The purposes of the subject Corps of Engineers study and review are to develop a plan that will permanently control salinity intrusion in the Neches River at Beaumont, Texas; provide for free and reasonably unobstructed use of the river by existing and prospective recreational and commercial navigation; be compatible with any future plan for extension of a barge channel above Beaumont; and preserve the natural environment of the river and its flood plain; and to determine the nature and extent of Federal interest in the plan.
- b. Problem: Annually the fresh water supplies of the City of Beaumont and the Lower Neches Valley Authority drawn from the Neches River are threatened by salt water intruding up the river during periods of low river flow and high water withdrawals. At present, to avoid damages, the Lower Neches Valley Authority constructs temporary salt water barriers in the Neches River and in Pine Island Bayou. Although effective and economical, these temporary barriers interfere with navigational use of the waters and are not an acceptable long term solution to the problem of salinity intrusion.
- c. Present Water Rights Situation:

(1) Lower Neches Valley Authority:

"The Lower Neches Valley Authority provides surface water from Pine Island Bayou and the Neches River to irrigate approximately 48,000 acres of rice; to the cities of Port Arthur, Port Acres, Port Neches, Nederland and Groves; to several small water districts; to five oil refineries; and to ten petro-chemical plants. The LNVA installed pumping capacity is 860,000 gallons per minute

(1,916 cubic feet per second or 1,238 million gallons per day), and the experienced daily peak rate of pumping has approached the installed capacity. It is estimated that the average daily demand during a peak week would be approximately 90 percent of the installed capacity, or about 1,700 cubic feet per second. Under permits from the Texas Water Rights Commission, the LNVA is entitled to 22,000 acre-feet per year of Pine Island Bayou water for municipal use at 30 cubic feet per second; 33,516 acre-feet per year of Pine Island Bayou and Neches River water for municipal use at 45 cubic feet per second; and 820,000 acre-feet per year of Angelina River and Neches River water for municipal, industrial and agricultural use at 2,000 cubic feet per second. The latter permit covers water from B. A. Steinhagen Lake and Sam Rayburn Reservoir. The estimated actual water use by the LNVA in 1971 was 156.2 billion gallons or 479,144 acre-feet."<sup>1/</sup>(Emphasis supplied.)

(2) City of Beaumont:

"The City of Beaumont obtains surface water from the Neches River and ground water from Hardin County. The city's peak pumping of record was on 23 December 1963, when approximately 27.6 million gallons per day (42.7 cubic feet per second) of surface water was used. Under permits from the Texas Water Rights Commission, the city is entitled to 56,467 acre-feet per year of Neches River water for municipal use at 78 cubic feet per second. The estimated actual water use by the city in 1970 was approximately 16,500 acre-feet."<sup>1/</sup>(Emphasis supplied.)

---

<sup>1/</sup> "Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas," Appendixes, Appendix 1, page C-1.

d. Findings by District Engineer:

- (1) The study finds that the cause of the salinity intrusion problem is the progressive improvement of the stream for navigation over a period of many years by the Federal Government between Beaumont and the Gulf of Mexico, culminating in the recent completion of improvement of the Sabine-Neches Waterway generally to a depth of 40 feet; that measures to mitigate the problem are a Federal responsibility in furtherance of navigation improvements previously undertaken, subject to the usual requirements of local cooperation attached to navigation projects; that the basis for this finding was implied in the Congressional authorization for the most recent navigation improvements (House Document No. 553, 87th Congress, 2nd Session, pages 15 and 32).
- (2) The study discloses that a gated barrier, including provisions for the passage of navigation, would be technically and environmentally feasible and economically justified. It finds that the most economical plan would provide such a structure at mile 26.3 on the Neches River (site 4) at an estimated first cost, exclusive of preauthorization studies, of \$11,206,000 including Federal and non-Federal first costs of \$11,174,000 and \$32,000, respectively, estimated annual maintenance, operation and major replacement costs to the United States of \$194,800, and estimated annual non-Federal costs of \$300 for spoil areas, levees and spillways.



- (3) The study also finds, however, that substantial environmental enhancement would accrue from a functionally equivalent but more costly structure located farther downstream at mile 23.0 (site 1), and enhancement resulting from the incidental effect of the structure in barring the upstream movement of water degraded by municipal and industrial pollutants, and that the local interests are desirous of realizing this additional benefit and are willing to pay the difference in cost to obtain it. The difference in estimated first costs of the two plans is \$647,000, including an increase of \$14,000 in the non-Federal cost of usual items of local cooperation, and a cash contribution of \$633,000. The plan preferred by local interests is selected based on their willingness to pay for their preference. The selected plan provides for a gated main barrier, navigation gate, bypass channel, auxiliary dam and appurtenances at site 1, mile 23.0 on the Neches River. The estimated first cost of the proposed improvements, exclusive of preauthorization studies is \$11,853,000. The total annual cost of operation, maintenance and major replacement is estimated to be \$197,100, including \$196,800 Federal and \$300 non-Federal.
- (4) The Galveston District Engineer recommends that, subject to the usual conditions of non-Federal cooperation for navigation projects and cash contributions toward the first cost of construction and the increased annual costs of operation, maintenance, and major replacement, the proposed plan of improvement for a salt water barrier at site 1 in the Neches River at Beaumont, Texas, be adopted, at a presently estimated first cost to the United States of \$11,174,000 and an

estimated net annual maintenance, operation, and major replacement cost to the United States of \$194,800. Non-Federal first costs are estimated at \$679,000, including a cash contribution presently estimated to be \$633,000, and non-Federal annual costs for disposal areas, levees and spillways are estimated at \$300, plus an advance contribution of \$34,000 to increased Federal operation, maintenance, and major replacement. The District Engineer recommends further that, if at the time of construction the required non-Federal cash contribution should for any reason be not forthcoming, the plan of improvement shall revert to that most economical to the United States.

## 2. COMMENTS

### 2.1 Need to Recognize the Requirement for Obtaining Necessary Water Rights Permit.

The staff believes that both the interim report and the environmental impact statement should include an adequate discussion of the water rights impacts of the proposed project. The proposed fresh water impoundment, the proposed operation of the navigation gate and dam facility, and the subsequent uses of the water constitute significant changes in the present water rights permits of the Lower Neches Valley Authority (LNVA) and the City of Beaumont. The staff believes that the changes resulting from the proposed project have sufficient impacts to necessitate the submission of a formal application for permit by the local sponsor, LNVA, to the Texas Water Rights Commission.

The Corps of Engineers' report emphasizes that the proposed barrier project, intended to limit the tidal intrusion of polluted salt water in the Neches River and Estuary, would fulfill a

" . . . Federal responsibility for mitigation of salinity intrusion related to Federal navigation improvements . . . ." <sup>1/</sup> (Emphasis supplied.)

The rationale of the Federal interest and obligation in the proposed remedial project is expressed as follows in the report:

"The historical acceptance by local interests of responsibilities for prevention of salinity intrusion represents a "no choice" situation involving a compelling need for deep-water navigation for economic development of the area and a compelling need for fresh water to satisfy municipal, industrial, and agricultural uses. Continued deferral of Federal responsibility for mitigation measures in connection with Federal navigation improvements will merely prolong an inequitable situation. A salt water barrier might well have been included in the most recent navigation project rather than being recognized in the authorizing document as subject for later study. In any case, this report recognizes the Federal interest as an overdue responsibility in extension of its responsibility for navigation improvements and proposed that the mitigation measures be provided entirely at Federal expense, except for items of local cooperation which are typically required in navigation projects—land, rights-of-way, relocations,

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<sup>1/</sup> "Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas." Main Report, page 36.

spoil disposal areas, spoil retention works, and an agreement to hold and save the United States harmless from damages incidental to construction of the project.

"A further exception is an additional cost represented by the local interests' preference as to site related to the obtainment of environmental benefits." 1/ (Emphasis supplied.)

The fact that the proposed project is emphatically presented in the report as an action by the Federal government to fulfill reasonable and expected requirements generated by navigational projects, does not relieve local interests from the task of fulfilling permit obligations. Specifically, the staff believes that the local interests should take the responsibility of acquiring, in accordance with State laws and regulations, all water rights needed for the intended utilization of the fresh water storage space created by the salt water barrier. The authorized sponsor should utilize the water storage space in a manner consistent with Federal and State laws.

Application for new or revised water rights permits should be submitted to the Texas Water Rights Commission in order that unique water rights issues involving State water, arising from the proposed project, can be given appropriate statutory and legal review. For example, it is conceivable that

- a. It may be necessary to distinguish carefully between impoundment of fresh water for consumptive use and for nonconsumptive use. This issue may arise because the proposed dam presents the opportunity of impounding water for multiple uses including use of the

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1/ Id., pages 36-37.

water merely to delay or regulate the flow of fresh water to repel tidal salt water inflows during low flow conditions.

- b. Special scrutiny of the project finally adopted may be necessary to ensure that the project location and operational procedures are best adapted to the comprehensive plan for the Neches River Basin, and that the proposed water uses represent the most beneficial public uses, considering the related, contemporaneous conditions of: irrigation, drainage, forestry, swamp land reclamation, clarification of streams, regulation of flow, control of floods, prevention of soil erosion and waste, storage, and conservation of water for domestic, municipal, industrial, and agricultural uses.
- c. With increasingly-higher effluent discharge standards and the expected, increased use of water-use recycling (especially during low flow periods), special care will be necessary to ascertain the appropriate release of the fresh water for bays and estuaries, to ensure protection of these areas from severe ecological stress. The staff believes that it will become increasingly more important for the State to uphold the principle that it makes little difference how, in the first instance, the water in a stream becomes running water, for if it were raised from wells, or brought out of reservoirs, the moment the individual thus producing it should allow it to flow in a natural stream, and mingling with its waters -- the water becomes State water and subject to permitted use.

## 2.2 Use of Water for Quality Control.

Since the Federal Water Pollution Control Act Amendment (FWPCAA) of 1961, provides a source of authority for the inclusion of water quality storage in Federal reservoirs, it is believed that the applicable provision should be cited in the subject report or in environmental statement, and some affirmation given that fresh water releases from Federal impoundments are not used as pollution diluent or as a substitute for proper wastewater treatment in the Lower Neches River and Estuary. The applicable provision of the FWPCAA of 1961, reads as follows:

"In the survey or planning of any reservoir by the Corps of Engineers, Bureau of Reclamation, or other Federal agency, consideration shall be given to inclusion of storage for regulation of streamflow for the purpose of water quality control, except that any such storage and water releases shall not be provided as a substitute for adequate treatment or other methods of controlling waste at the source." <sup>1/</sup> (Emphasis supplied.)

Thus, a more emphatic differentiation would be made between the prevention of tidal salt water intrusion, and the prevention of municipal and industrial effluent intrusion. This distinction is already recognized in the subject report, as follows:

"It is considered that the effect on water pollution will be beneficial in the reach of the Neches River and Pine Island Bayou between the project site and the temporary

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<sup>1/</sup> Act of July 20, 1961, PL 87-88, Sec. 2(b)(1), 75 Stat. 204.

barriers that are constructed by the Lower Neches Valley Authority. In this reach, the project will prevent salt water intrusion of municipal and industrial wastes discharged into the Neches River below Beaumont until such wastes are purified at their sources or are no longer discharged into the river." 1/ (Emphasis supplied.)

Elsewhere in the report, the following general forecast is made:

"It has been found that the project will be generally beneficial by protecting the surface water supplies of the municipalities, industries and farm lands served by the water delivery systems of the Lower Neches Valley Authority and the City of Beaumont from contamination by salt water and pollution moving upstream during periods of low river flow and high fresh water withdrawals."2/ (Emphasis supplied.)

The water quality conditions below the project remain a problem and no solution is offered. In this regard, the report states:

". . .the river below the proposed barrier will continue to become polluted in times of low flow but this shall be neither aggravated nor diminished by the proposed project." 3/

It would enhance the project report if some mention were made of plans being developed by the LNVA, or others for the water quality management in the important estuarine reach of the Neches River downstream of the proposed project.

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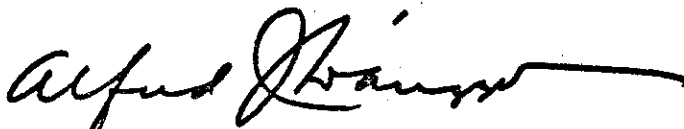
1/ "Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas," Main Report, page 48.

2/ Id., page 48.

3/ Id., page 49.

3. CONCLUSIONS

- 3.1 The project is conceptually sound.
- 3.2 The Draft Environmental Statement appears to be in compliance with the guidelines and policies contained in Sections 101, and 102(2)(C), of the National Environmental Policy Act of 1969.
- 3.3 The interim report would be enhanced by inclusion of a discussion on certain vital water rights impacts. Specifically, there is a need to recognize the requirement for the local sponsor to obtain necessary water rights permits from the Texas Water Rights Commission; a need for discussion of the use of water for quality control; and, a need to discuss regional water quality management as an integral part of the corrective actions to problems resulting from dedication of the estuarine reaches of the Lower Neches River to navigational servitude.



Alfred J. D'Arezzo

AJD:11



# PARKS AND WILDLIFE DEPARTMENT

## COMMISSIONERS

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CLAYTON T. GARRISON  
EXECUTIVE DIRECTOR

JOHN H. REAGAN BUILDING  
AUSTIN, TEXAS 78701

## COMMISSIONERS

PEARCE JOHNSON  
AUSTIN

BOB BURLESON  
TEMPLE

JOE K. FULTON  
LUBBOCK

January 23, 1973

Mr. Ed Grisham  
Director, Executive Department  
Division of Planning Coordination  
Box 12428, Capitol Station  
Austin, Texas 78711

Dear Mr. Grisham:

Reference is made to your memorandum of 4 January and the attached Preliminary Draft Environmental Statement for the Neches River Saltwater Barrier.

Our Department has reviewed this report and agrees with the enclosed findings. We would hope to press the Corps of Engineers for a barrier at Site 1 rather than the other locations.

We appreciate having had the opportunity of commenting on this report.

Sincerely,

A handwritten signature in cursive script, appearing to read "Clayton T. Garrison".

CLAYTON T. GARRISON  
Executive Director

CTG:EM:wj

# TEXAS WATER DEVELOPMENT BOARD

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PETERSBURG  
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P.O. BOX 13067  
CAPITOL STATION  
AUSTIN, TEXAS 78711

HARRY P. BURLEIGH  
EXECUTIVE DIRECTOR

AREA CODE 512  
475-2201

301 WEST 2ND STREET

February 5, 1973

IN REPLY REFER TO:

TWDBP-0

Mr. Ed Grisham, Director  
Division of Planning Coordination  
Office of the Governor  
Post Office Box 12428  
Capitol Station  
Austin, Texas 78711

RECEIVED

FEB 6 1973

Div. of Plan. Coord.

Dear Mr. Grisham:

Your memorandum of January 4, 1973 requested our review of the Corps of Engineers "Interim Review of Reports of Neches River and Tributaries Covering Salt Water Barrier at Beaumont, Texas" and the accompanying "Preliminary Draft Environmental Statement" pertaining to the salt water barrier. We are pleased to offer the following comments on these reports.

The systems for diversion of water from the Neches River for municipal and industrial supplies constitute two of the oldest continuous water systems in Texas, having been initiated at present points of diversion prior to 1913. Tidewater from the Gulf of Mexico, under low-flow conditions of the Neches River, reaches river mile 42, near Wiess Bluff. The City of Beaumont normally withdraws water from the Neches River at a gravity canal intake at Bunn's Bluff (mile 30), and has a pump station located at Wiess Bluff (mile 41.7). The Lower Neches Valley Authority (LNVA) withdraws water from the Neches River through a canal at Lakeview (mile 32). The canal leads to a siphon and pump station on Pine Island Bayou (mile 3.2). The LNVA also withdraws water from Pine Island Bayou at a pump station located at Voth (mile 6). Thus, the entire municipal, industrial and agricultural water supply for a large industrial complex, for the cities of Beaumont, Port Arthur and other urban areas with a total population of approximately 175,000 persons, and irrigation water for thousands of acres of rice, are all derived from a segment of the Neches River now subject to tidewater effects.

Over the years it has been necessary to protect the fresh-water diversions from salt-water intrusion by means of temporary dams and cut-off walls which separate fresh water and salt water. Large volumes of treated industrial waste and

municipal drainage enter the Neches River in its lower reaches. The presence of such wastes, together with the brackish water, frequently result in a septic mix that ebbs and flows with the tides during periods of low flow in the Neches River. This condition creates a constant threat to fresh-water supplies and has also adversely affected aquatic life in the river segment.

The proposed project will provide a permanent barrier dam at mile 23.0, which is a short distance above the Interstate Highway 10 crossing on the Neches River within the City of Beaumont, and is approximately 16.7 miles downstream from the temporary salt water barriers which have been in use heretofore. This 16.7 miles of the Neches River will be thus restored to fresh-water status. The dam will be provided with flood gates which will normally provide a fresh-water pool, and at the same time protect against salt-water intrusion from normal tides. This is not a hurricane protection project, and tides induced by tropical storms will top the dam. Such unusual conditions will require subsequent flushing through the flood gates.

In addition to the salt water barrier dam, equipped with flood gates, the proposed project will include a by-pass navigation channel at the east bank of the river which will be controlled by a navigation gate as an integral part of the dam. By this means it will be possible for small commercial and pleasure craft to continue use of the navigable portion of the Neches River.

Specific comments on the five principal areas of environmental impact follow:

1. The environmental impact of the proposed action.

In the opinion of Water Development Board staff, benefits to be derived from the proposed action will far outweigh any adverse effects. As has been indicated above, the lower Neches River supplies substantial quantities of municipal, industrial and irrigation water. The proposed project will protect the existing diversion points against all but the most unusual hurricane conditions, when salt water and industrial wastes will threaten the fresh-water supply. Additionally, 16.7 miles of the river channel will be permanently open for fresh-water recreation and navigation by small craft will be possible on a continuous basis.

Construction of the salt water barrier and navigation channel will, inevitably, require use and alteration of some land features. Approximately 600 acres of land will be drained by Brakes Bayou on the west side of the Lawson Canal. As a trade-off, however, approximately 16.7 miles of the Neches River and Pine Island Bayou between the new salt water barrier and the presently-used temporary barrier locations will be improved for swimming, boating, hunting, and fresh-water fishing.

Some of the material excavated from the navigation channel will be placed in leveed spoil areas (14 acres) adjacent to the project. Approximately 41 acres of land

will be completely cleared of trees and vegetation, and 16 acres of land severed by the project will be selectively cleared. These 57 acres of land will be temporarily lost as wildlife habitat, but can be expected to return to such use as vegetation restores itself.

Since the proposed permanent barrier is a substitute for temporary barriers now in use, it will not substantially alter the current regimen of fresh-water inflows into the estuary and Sabine Lake. At the same time, the barrier will block salt water from the fresh-water fisheries grounds, thus enhancing fresh-water fisheries production.

The Corps of Engineers recommends an archeological survey of the proposed work area and subsequent salvage, if necessary, prior to initiation of construction.

Estimates provided by the U. S. Fish and Wildlife Service show that sport fishing in the area as a result of the project will be increased by between 4,200 and 6,100 man-days per year, and that the commercial fish catch will improve by about 1,200 pounds per year.

2. Adverse environmental effects which cannot be avoided should the project be implemented.

Approximately 57 acres of project land will be temporarily lost or altered as wildlife habitat. Upstream migration of marine life will be impeded during conditions of low flow of the river. (However, the poor quality water existing between the estuary and the salt water barrier could also be considered as a deterrent to such migration, so that the practical effect of the barrier may be negligible.)

3. Alternatives to the proposed action.

Several alternatives to the construction of a permanent salt water barrier were considered. Among these alternatives were: no action; continuation with temporary barriers; moving the points of diversion farther upstream; shifting to groundwater; desalinization; and alternate locations and alternate methods of constructing a salt water barrier. Most of the alternatives to the concept of a salt water barrier were rejected either because of construction or operational costs. Ground-water supplies in the region are inadequate. Six of the sites selected for possible construction of the salt water barrier were found to be less economically favorable or less efficient than the one selected, which is designated as Site 1. This site is the second most costly, but affords environmental enhancement to a larger area of the river basin than any of the other sites.

4. Relationship between local short-term uses of man's environment and the maintenance and enhancement of local long-term productivity.

Long-term and short-term benefits to man's environment include improvements in the reliability of a water supply for municipal, industrial and agricultural uses, thereby promoting the economic well-being of the population of the area. Many miles of the stream will be restored to a fresh-water, pollution-free condition which enhances environmental, aesthetic, and recreational values. Navigation of the river on a year-round basis, and fresh-water fishing, are added benefits.

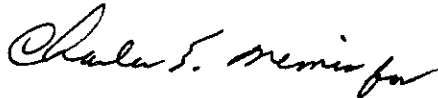
5. Irreversible and irretrievable commitments of resources involved in the proposed action.

Loss of existing trees and vegetation on 41 acres of project area, plus part of the trees and vegetation on an additional 16 acres, will be irreversible. Loss of, or alteration of, wildlife habitat on the same 57 acres could probably also be considered as irretrievable. Capital, labor, and materials associated with construction of this facility would be irretrievable.

Many years of planning have gone into this project. The economy of the area--potentially great--has remained unstable because of the uncertainty of its water supply. For 6 or 8 months each year, during low-flow periods, there is uncertainty of a dependable supply of water. This has been particularly true for irrigation water, as the rice crops cannot tolerate highly saline water over extended periods of time. The proposed salt water barrier and navigation facility is within the financial capabilities of the area. We strongly recommend construction of this Corps of Engineers facility, as proposed, and believe that the draft environmental impact statement sufficiently complies with the provisions of NEPA.

The opportunity to furnish these comments is appreciated.

Sincerely,



Harry P. Burleigh



## EXECUTIVE DEPARTMENT

DIVISION OF PLANNING COORDINATION

BOX 12428, CAPITOL STATION

AUSTIN, TEXAS 78711

PHONE 512 475-2427

DOLPH BRISCOE

GOVERNOR

May 15, 1973

Nolan C. Rhodes  
Colonel, C.E., U.S.A.  
District Engineer  
Galveston District  
Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Dear Colonel Rhodes:

On February 21, we submitted a letter with comments from Texas State agencies on the draft environmental impact statement for Neches River and Tributaries, Texas, covering Salt Water Barrier at Beaumont, Texas.

On April 6, you requested our assistance in securing comments of the Texas State Historical Survey Committee (TSHSC) concerning any information they might have regarding historical and archeological resources in the proposed project area. We asked the TSHSC to review the draft environmental statement and enclose their response to that request. The Committee spent a substantial amount of time in conducting a thorough review of this draft environmental statement and consequently their comments should be considered in their entirety. Please place this material with our original letter and enclosures.

Thank you for your cooperation in this matter.

Sincerely,

A handwritten signature in black ink, appearing to read "Walter G. Tibbitts III".

Walter G. Tibbitts III  
Acting Director

WGT:jab

Enclosure

cc: Mr. Truett Latimer, TSHSC



Texas State Historical Survey Committee  
Box 12276, Capitol Station, Austin, Texas 78711  
Truett Latimer  
Executive Director

May 7, 1973

RECEIVED

MAY 8 1973

Div. of Plan. Coord.

Mr. Walter Tibbitts  
Acting Director  
Division of Planning Coordination  
Governor's Office  
Box 12428, Capitol Station  
Austin, Texas 78711

Re: Preliminary Draft Environmental Statement and Interim Review of Reports on Neches River and Tributaries, Texas, covering Salt Water Barrier at Beaumont, Texas

Dear Mr. Tibbitts:

In response to your request of April 10 for review and comment on the Salt Water Barrier at Beaumont, Texas, the above-referenced documents have been examined and are found to be deficient in dealing with cultural (archeological, historical, and architectural) resources. Both Orange and Jefferson Counties contain archeological sites of high significance, and one Orange County site, on Baird's Bayou, lies near the project area. For all purposes, the cultural resources of the project area are unknown; the statement in the draft impact statement (p. 11) concerning the State and local significance of the cultural resources is obviously incorrect.

For the above reasons, we recommend that the following procedures be conducted in the area of the project prior to further consideration or construction:

1. As the resource is unknown, an intensive archeological survey of the total project area must be conducted to locate, record, identify and appraise the significance of the resource to be affected. This examination should provide, and result in, definition of research problems, cost, and strategy for further study leading to the mitigation of adverse effects on the resource.
2. Scientific recovery of information contained in cultural resources can mitigate the adverse affect of an action on the resource. An acceptable mitigation program should recover a reliable sample of all significant cultural and related ecological resources which will be affected through the use of a systematically prepared and explicitly stated research design under the direction of a competent professional archeologist. Measures other than recovery of the resource may be considered and may include protection of the resource through management measures, stabilization or no project action; all must be assessed from the perspective of preserving resources for future generations.

Thank you for the opportunity to comment on this report and draft environmental impact statement. If we can be of further assistance, please advise.

Sincerely,

Truett Latimer  
Executive Director

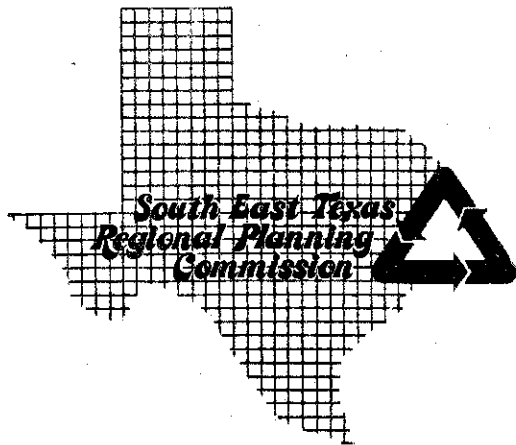
By

A handwritten signature in black ink that reads "Alton K. Briggs". The signature is written in a cursive style with a large initial 'A'.

Alton K. Briggs  
Survey Archeologist

AKB:bjw





February 23, 1973

**PRESIDENT**

Don Cash  
Councilman  
City of Beaumont

**1st VICE PRESIDENT**

Paul E. Hale  
Mayor  
City of Orange

**2nd VICE PRESIDENT**

Carl "Cropo" LeBlanc  
Councilman  
City of Nederland

**3rd VICE PRESIDENT**

Raymond Gould  
Commissioner  
Orange County

**4th VICE PRESIDENT**

Preston Wood  
Mayor  
City of Bridge City

**SECRETARY-TREASURER**

Leroy Mahaney  
Councilman  
City of Groves

**LEGAL COUNSEL**

George Wikoff  
City Attorney  
City of Port Arthur

---

**EXECUTIVE DIRECTOR**

Don Kelly  
950 E. Florida, Beaumont  
Lamar University Campus  
Telephone: (713) 833-2648

**P. O. Box 10074**

Lamar University Station  
Beaumont, Texas 77710

Martin W. Teague  
Lieutenant Colonel, CE  
Acting District Engineer  
Department of the Army  
Galveston District  
Corps of Engineers  
P.O. Box 1229  
Galveston, Texas 77550

Dear Colonel Teague:

The U.S. Department of the Army Corps of Engineers' Interim Review of Reports on the Neches River and Tributaries, Texas (covering the Saltwater Barrier at Beaumont) has been reviewed by the South East Texas Regional Planning Commission's Project Review Committee on February 13, 1973, and the South East Texas Regional Planning Commission's Executive Committee on February 21, 1973.

The comments of the South East Texas Regional Planning Commission's Executive Committee are as follows:

"It is the opinion of the SETRPC Executive Committee that the proposed project will have a favorable environmental impact. However, several points of detail should be noted:

The 'temporary' steel sheet-pile barriers, currently being used, are really not temporary, as they often are left in place for six (6) to nine (9) months. Thus, the term semi-permanent barriers would be more proper. The semi-permanent barriers now in use do not allow

free navigational use of the river. These semi-permanent barriers, at their present location, do not prevent saltwater intrusion into approximately 16.7 miles of the Neches River and Pine Island Bayou, which, in their natural state, were fresh water.

One consideration will be that the proposed permanent barrier at mile 23 will necessitate the loss of approximately 57 acres of potential wildlife habitat. It should be pointed out that a large part of this 57 acres is now being reclaimed by the City of Beaumont as a sanitary landfill.

It appears that the proposed saltwater barrier will:

- (1) Return approximately 16.7 miles of the Neches River and Pine Island Bayou to their natural fresh water state;
- (2) Afford ready access to the new recreation areas which will be formed through a series of navigation locks, an access road, and a service bridge; and
- (3) Protect the surface water supplies of a large number of the municipalities and industries in Jefferson County from contamination by saltwater and pollution during periods of low river flow and high fresh water withdrawals."

If I may answer any questions concerning this matter, please do not hesitate to call on me.

Cordially,

*Don Kelly*

Don Kelly  
Executive Director

DK:dm

cc: Mr. Bob Curry, Jefferson County Environmental Control  
Department  
Mr. W. F. Weed, President, Lower Neches Valley  
Authority, Beaumont

# LOWER NECHES VALLEY AUTHORITY

MUNICIPAL, INDUSTRIAL AND AGRICULTURAL WATER

7850 NORTH ELEVENTH STREET - P. O. BOX 3007

BEAUMONT, TEXAS

77704

April 9, 1973

Colonel Nolan C. Rhodes  
District Engineer  
Galveston District  
U.S. Army, Corps of Engineers  
P.O.Box 1229  
Galveston, Texas 77550

RE: Corps of Engineers Report on  
Salt Water Barrier, Neches River,  
Texas.

Dear Sir:

Lower Neches Valley Authority acknowledges receipt of your Department's Interim Review of Reports Neches River and Tributaries Texas, Salt Water Barrier at Beaumont, Texas, Volumes 1 and 2, and your covering letter dated December 28, 1972.

The Authority has examined this Review of Reports and approves the findings, conclusions and recommendations contained therein for the construction of the Salt Water Barrier at Site 1.

If there is any further assistance you may need in connection with this Project, please call on us.

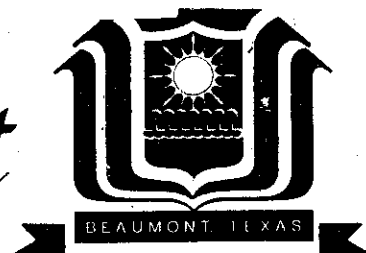
Yours very truly,

LOWER NECHES VALLEY AUTHORITY

By W. F. Wood  
President

# City of Beaumont

P. O. BOX 3827 77704



January 29, 1973

Mayor  
**KEN RITTER**  
Councilmen:  
**DON S. CASH**  
**GEORGE A. DISHMAN, JR.**  
**CALVIN WILLIAMS**  
**J. LEROY EVANS**  
City Manager  
**CHARLES V. HILL**

Nolan C. Rhodes  
Colonel, CE  
District Engineer  
Corps of Engineers, U. S. Army  
P. O. Box 1229  
Galveston, Texas 77550

Re: Salt Water Barrier, Neches River at Beaumont, Texas

Dear Sir:

The City of Beaumont has tentatively agreed with the Lower Neches Valley Authority, sponsoring agent, that they will cooperate in this project.

Any other location of this project than that at mile 23.0 on the Neches River substantially decreases the benefits to the City of Beaumont. It is estimated that the site selected for the project would project benefits equal to the anticipated participation by the City of Beaumont.

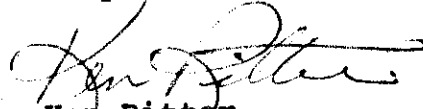
The City of Beaumont does have a plan for the development of the property west of the river. The plan includes park areas, water front facilities, as well as developing two oxbow lakes into wildlife refuges. It is anticipated that several boat ramps will be installed throughout the area. This area is the last river front that is available to be developed for public use within our city.

We believe that with the installation of this project at mile 23.0 the thousands of acres adjacent to the river will restore itself into a semblance of its original natural beauty. With this restoration, all forms of wildlife will return, and within the near future a tremendous impact on the conservation of our natural resources will be realized.

It is also felt that this project will substantially reduce the threat of salt water encroachment into the City of Beaumont's fresh water supply.

The City of Beaumont endorses this project and feels that the project will greatly enhance the fresh water environment upstream from the project.

Very truly yours,

A handwritten signature in cursive script, appearing to read "Ken Ritter", written in dark ink.

Ken Ritter  
Mayor, City of Beaumont

WJB;d

CLEAN AIR & WATER, INC.

P. O. BOX 1069  
BEAUMONT, TEXAS 77704

February 24, 1973

Re: Preliminary draft, Environmental  
Statement - Neches River

Col. Martin W. Teague,  
Acting District Engineer,  
Galveston District, U. S. Corps of Engineers,  
P. O. Box 1229,  
Galveston, Texas 77550

Dear Sir:

This will acknowledge with appreciation receipt of your letter of December 29, 1972, inclosing preliminary draft, environmental impact statement, on proposed "salt water" barrier in the Neches River.

To begin with, we wish to make it clear that this association has never been in favor of barriers of any type being constructed in our rivers. We have reluctantly given some favorable consideration to the proposed barrier requested by the Lower Neches Valley Authority.

With reference to temporary steel sheet-piling barriers which LNVA has installed in the past, we have hardly considered them temporary, due to the great length of time they are left in place. We have been very much opposed to this type barrier, since it completely blocks navigation during the time the sheet piling are in place. This is another reason we have given consideration to the installation of a permanent barrier with suitable navigation locks.

This report in several instances refers to the fact that "local interests" must provide a cash contribution if the barrier is to be constructed at Mile 23.0 of the Neches River. On Page 4 of the preliminary draft the report reads:

"In the event the local interests do not make the required cash contribution for the project at Mile 23.0, it is proposed that the project be built at Mile 26.3, which would not require a cash contribution."

If the U. S. Corps of Engineers can ask for Congressional approval of funds for the location of this barrier at Mile 26.3, it would seem reasonable that they could also ask for the funds for construction at Mile 23.0, even though slightly higher, without calling on "local interests" for a cash contribution to the U. S. Corps of Engineers project.

It is further noted that throughout the impact statement reference is continually made to locating the barrier and locks at other points than Mile 23.0 of the Neches River, in each instance pointing out the economy of

CLEAN AIR & WATER, INC.

P. O. BOX 1069  
BEAUMONT, TEXAS 77704

#2 - Col. Martin W. Teague, U. S. Corps of Engineers - 2/24/73.

locating the project at any point other than Mile 23.0 of the Neches River.

Our association has considered this report very carefully and we tentatively approve the location of the barrier and navigation locks at Mile 23.0 of the Neches River at Beaumont. We would be unalterably opposed to the location of the barrier at any point on the Neches River above Mile 23.0. We would consider its location farther down stream.

We very much appreciate the opportunity of reviewing the preliminary impact report.

Respectfully yours,

CLEAN AIR AND WATER, INC.

By: *Everett Brashear*  
President

WEB/e

cc. Hon. John Tower, U. S. Senator,  
Washington, D. C.  
Hon. Jack B. Brooks, U. S. Representative,  
Washington, D. C.  
Lower Neches Valley Authority,  
Beaumont, Texas  
Hon. Lloyd Bentsen, U. S. Senator,  
Washington, D. C.

# NECHES BOAT CLUB

BOX 727

BEAUMONT, TEXAS



February 26, 1973

U. S. Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Gentlemen:

The Board of Directors and Membership of the Neches Boat Club have given consideration to the present environmental statement about the Salt Water Barrier across the Neches River. We are alarmed over the possibility of relocation to site four which would destroy the area occupied by the Neches Boat Club, and would result in extreme pollution of our beach area and picnic grounds and would forever destroy any possibility of a municipal park on the west bank of the Neches River.

Our group strongly favors site number one, which was previously proposed and strongly recommended by almost everybody who attended the hearing.

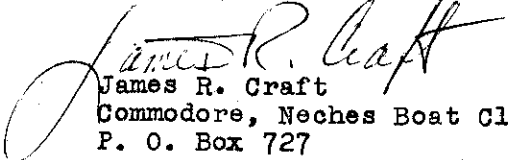
If site number one is not to be used, we feel that there should not be a salt water barrier.

We respectfully direct attention to the fact that Ten Mile Bayou and Lake Bayou, prior to the influx of pollution by the paper mill and local industries, constituted prime recreational areas for the local population. Site number four would destroy these.

Site number one would reserve them as recreational areas.

We strongly favor site number one.

Yours very truly,

  
James R. Craft  
Commodore, Neches Boat Club  
P. O. Box 727  
Beaumont, Texas 77704

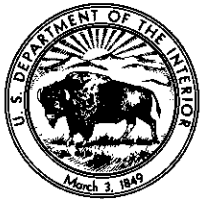
MEMBERS OF:

L.S.B.R.A.

A.P.B.A.

N.O.A.





United States Department of the Interior  
BUREAU OF RECLAMATION

IN REPLY  
REFER TO:

AUSTIN DEVELOPMENT OFFICE  
P.O. BOX 1946  
AUSTIN, TEXAS 78767  
January 11, 1973

Colonel Nolan C. Rhodes  
District Engineer  
Corps of Engineers  
Galveston District  
Post Office Box 1229  
Galveston, Texas 77550

Dear Colonel Rhodes:

We have considered your report entitled Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas requested by letter dated 28 December 1972. We have no comment to make on the report.

Sincerely

  
Norman G. Flaigg  
Area Planning Officer



United States Department of the Interior  
BUREAU OF RECLAMATION

REGIONAL OFFICE - REGION 5  
HERRING PLAZA BOX H-4377  
AMARILLO, TEXAS 79101

IN REPLY  
REFER TO: 730

123.14-

JAN 24 1973

Col. Nolan C. Rhodes  
District Engineer  
Corps of Engineers  
Post Office Box 1229  
Galveston, Texas 77550

Your Ref. SWGED-B

Dear Colonel Rhodes:

Please refer to your letter of December 28, 1972, enclosing for field-level review a copy of your report entitled Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas. The report has been reviewed by this office and our Austin Development Office. We have no comments to make on the report.

Sincerely,

*J. A. Bradley*  
J. A. Bradley  
Regional Director



# United States Department of the Interior

NATIONAL PARK SERVICE  
Southwest Region  
P.O. Box 728  
Santa Fe, New Mexico 87501

IN REPLY REFER TO:  
L7423

FEB 6 1973

Colonel Nolan C. Rhodes, CE  
District Engineer, Galveston District  
Corps of Engineers  
Post Office Box 1229  
Galveston, Texas 77550

Dear Colonel Rhodes:

We have reviewed your Interim Review of Reports on Neches River and Tributaries, Texas, covering Salt Water Barrier at Beaumont, Texas in two volumes.

We would like to note that the reports make no mention of archeological and historical resources or the effect of this project on such materials. As planning progresses on this project, particularly at the "Environmental Impact Statement" stage, full consideration must be given to archeological and historical values. We will be available to assist in setting up these research studies.

We note that mention is made of the Big Thicket proposal. At present, several proposals have been made including one segment in or near Beaumont City limits. It doesn't appear that your proposal for a Salt Water Barrier would affect any of the Big Thicket proposals adversely.

Thank you for the opportunity to review these reports.

Sincerely yours,

Frank Mentzer  
Assistant Director, Cooperative Activities



DEPARTMENT OF TRANSPORTATION  
UNITED STATES COAST GUARD

ADDRESS REPLY TO:  
COMMANDER (mep)  
EIGHTH COAST GUARD DISTRICT  
CUSTOMHOUSE  
NEW ORLEANS, LA. 70130  
5900

FEB 7 1973

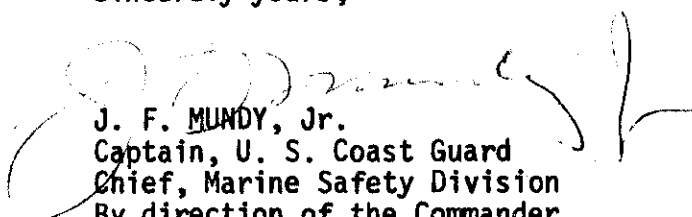
Colonel Nolan C. Rhodes  
District Engineer  
Galveston District  
Department of the Army  
U. S. Corps of Engineers  
P. O. Box 1229  
Galveston, Texas.

RE: SWGED-B, Neches River and  
Tributaries, Texas

Dear Colonel Rhodes:

The Commander, Eighth Coast Guard District does not have any objections to the referenced draft environmental statement.

Sincerely yours,

  
J. F. MUNDY, Jr.  
Captain, U. S. Coast Guard  
Chief, Marine Safety Division  
By direction of the Commander  
Eighth Coast Guard District

**UNITED STATES DEPARTMENT OF AGRICULTURE**  
**SOIL CONSERVATION SERVICE**

---

P. O. Box 648  
Temple, Texas 76501

February 9, 1973

Colonel Nolan C. Rhodes  
District Engineer  
Corps of Engineers, Galveston District  
P. O. Box 1229  
Galveston, Texas 77550

Dear Colonel Rhodes:

We have completed our review of the Interim Review Reports on Neches River and Tributaries, Texas, covering Salt Water Barrier at Beaumont, Texas.

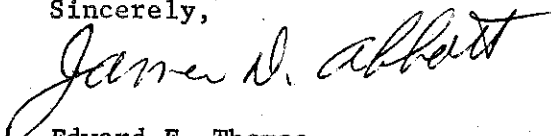
The proposed salt water barrier will have no adverse effects on proposed projects of the Soil Conservation Service. In fact, they may complement each other.

We would like to point out that we have applications for Federal assistance under PL 83-566 on three watersheds above this proposed dam. Field examinations have shown all to be feasible for project development. These watersheds are:

1. Western Portion of Pine Island Bayou Watershed, Liberty and Hardin Counties above Sour Lake exclusive of Jackson Creek.
2. Eastern Portion of Pine Island Bayou Watershed, Polk and Hardin Counties to the Neches River including Jackson Creek.
3. Lower Neches River Watershed, Orange and Jasper Counties, covering that area entering the Neches River from the east between Evadale, Jasper County to a point just east of Bridge City, Orange County.

We appreciate the opportunity to review and comment on the reports.

Sincerely,



for Edward E. Thomas  
State Conservationist

cc: Kenneth E. Grant, SCS, Washington, D. C.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI  
1600 PATTERSON, SUITE 1100  
DALLAS, TEXAS 75201

February 13, 1973

Colonel Nolan C. Rhodes  
District Engineer  
U.S. Army Corps of Engineers  
Galveston District  
P. O. Box 1229  
Galveston, Texas 77550

Re: 06-3-80-NM &  
06-3-IIIF-12

Dear Colonel Rhodes:

We have reviewed your agency's report, "Interim Review of Reports on the Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas," and the Preliminary Draft Environmental Impact Statement on the project.

The proposed action will provide a tainter-gated dam at mile 23.0 on the Neches River, approximately one-half mile upstream from the Interstate Highway 10 bridge at Beaumont, Texas; a sector-gated navigation by-pass channel; and an auxiliary dam in a small canal that drains Bairds Bayou.

We have the following comments on the report and the impact statement:

1. In the discussion of the existing environment, reference is made to the City of Beaumont's sanitary landfill on the west bank of the river upstream from mile 22.6. We suggest that a discussion of the leachate from this fill be included in the report and the statement. Should the area for the sanitary landfill extend beyond mile 23.0, the leachate could reach the river above the proposed salt water barrier. Usually leachate from sanitary fills contains pollutants. If these pollutants reach the river, one of the purposes of the project - an unpolluted reach of water above the salt water barrier - would be defeated. The City of Beaumont should be consulted and their plans for the sanitary landfill and any provisions for abating possible pollution by leachates should be included in the report.

2. Reference is made in several sections of the report and the statement to "local interest." The "local interest" should be identified in the first part of the report and statement and possibly be substituted for "local interest" throughout the report.

3. We do not understand why the salt water wedge is "a Federal responsibility related to navigation improvements previously installed." An examination of the profile of the river shows the bed of the river does not reach mean sea level until mile 44. This strongly indicates that the salt wedge was there before navigation and will reach its furthest point upriver during periods of low flows and withdrawal of large quantities of water

4. It is not clear from the discussion on the alternative for flushing the salt water from the channel how the 1900 cfs that would be required to keep the salt water wedge below the fresh water intake at Brinns Bluff was computed.

5. We suggest that a combination of surface water and ground water to supply municipal, industrial and agricultural demands be considered as an alternative to the salt water barrier.

6. The statement that the proposed barrier will have little effect on fresh water flows to the estuary should be discussed in detail. The barrier will be closed 4 to 6 months each year. If the time period for this length of closure is continuous, there could be an adverse effect on the ecosystems of the estuary.

We have the following additional comments on the Preliminary Draft Environmental Impact Statement:

1. A map should be furnished that shows the service area and the 16 acres of land on the point isolated or severed by the salt water barrier and their relationship to the project. All spoil areas should also be shown on the map.

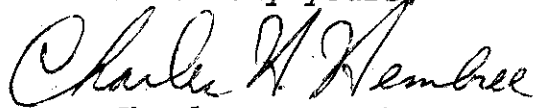
2. All dredged material should be placed behind dikes or levees with control weirs so the sediment returning to the river will be reduced.

3. The total cost of the project should be given with a brief discussion of how the benefit-to-cost ratio of 1.86 was computed.

4. We suggest that the cost of each alternative be included in the discussion of the alternatives to the project.

We appreciate the opportunity to review and comment on your report and preliminary draft statement. We will appreciate receiving five copies of the Draft Environmental Impact Statement for formal review.

Sincerely yours,

A handwritten signature in cursive script that reads "Charles H. Hembree".

Charles H. Hembree  
Chief

Federal Assistance Branch





# United States Department of the Interior

## BUREAU OF MINES

BUILDING 20, DENVER FEDERAL CENTER  
DENVER, COLORADO 80225

Office of  
Chief

Intermountain Field Operation Center

February 14, 1973

Air Mail

Your reference:  
SWGED-B

Col. Nolan C. Rhodes  
District Engineer, Galveston District  
U. S. Army Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Dear Colonel Rhodes:

We have reviewed the "Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas," as requested in your letter of December 28, 1972.

The report, dated December 20, 1972, and prepared by U. S. Army Engineer District at Galveston, Texas, summarizes studies, findings, and recommended action to control salt water intrusion up the Neches River during periods of low river flow. Proposed construction consists of a gated main barrier, navigation gate, bypass channel, auxiliary dam, and appurtenances at a 57-acre site one-half mile upstream from the Interstate Highway 10 bridge across the Neches River at Beaumont.

Our primary interest in the project is possible involvement of mineral resources and mineral-production facilities, and our office review indicates that the proposed improvements would have no adverse effect thereon. Mineral resources and related facilities that exist in the Beaumont area are summarized in the report (p. 4). Although we have no objection to the project as described, any subsequent environmental impact statement might well include such language as the following:

The project is not expected to affect adversely any mineral resources nor will it appreciably hamper future exploitation of such resources.

Our field-level comments are informal and are provided as a service; they do not constitute a formal project review by the Bureau of Mines.

Sincerely yours,

O. M. Bishop, Chief  
Intermountain Field Operation Center



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL WEATHER SERVICE Southern Region  
819 Taylor Street, Room 10E09  
Fort Worth, Texas 76102

February 14, 1973

WFS2x1

Colonel Nolan C. Rhodes  
District Engineer  
Galveston District, Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Dear Colonel Rhodes:

Reference is made to your letter SWGED-B, 28 December 1972, and included report, Serial No. 77.

We appreciate the opportunity to examine the Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas.

It appears that a thorough treatment of the problem and various alternatives has been provided with due consideration of the environmental and ecological factors.

From the standpoint of the National Weather Service Hydrologic Field Program and the attendant responsibility of providing a river forecast and flood warning service, there is no indication that the proposed project would have any adverse effect.

Sincerely,

*J. P. McCallister*  
J. P. McCallister  
Regional Hydrologist

*for*



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
POST OFFICE BOX 1306  
ALBUQUERQUE, NEW MEXICO 87103

March 20, 1973

District Engineer  
Corps of Engineers, U. S. Army  
P. O. Box 1229  
Galveston, Texas 77550

Dear Sir:

As requested in your letter of December 28, 1972, we have reviewed the Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas, and except for noting a possible typographical error on page C-28, line 8, of Appendix 1, which reads "60 to 8 months," we have no further comments to make.

We regret that we did not comply with your request for comments by February 15.

Sincerely yours,

Acting Regional Director

cc:

Field Supervisor, BSFW, Div. of River Basin Studies, Fort Worth, Texas



**U.S. DEPARTMENT OF COMMERCE**  
**National Oceanic and Atmospheric Administration**  
NATIONAL MARINE FISHERIES SERVICE  
144 First Avenue South  
St. Petersburg, Florida 33701

April 4, 1973

Colonel Nolan C. Rhodes  
District Engineer, Galveston District  
Department of the Army, Corps of Engineers  
Post Office Box 1229  
Galveston, Texas 77550

Dear Colonel Rhodes:

This is in reply to your letter of March 28, 1973, inquiring about National Marine Fisheries Service's comments requested by you on December 28, 1972, relative to the Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas.

Generally, our views on the proposed project are reflected in the revised report submitted by the Bureau of Sport Fisheries and Wildlife on July 24, 1972, to which our letter of concurrence was attached. Our views concerning the presentation of alternative designs to the project are presented in the comments concerning your draft Environmental Impact Statement for this project which was forwarded to you from the Office of the Assistant Secretary of Commerce on February 15, 1973.

According to information furnished us, the barrier would be located far enough upstream to preclude any significant loss of normally estuarine habitat while some increase in potential commercial fresh water fish harvests could be expected. The project could, however, have an indirect adverse effect on the productivity of the Sabine estuary system if it enables a much greater reduction of fresh water inflows to the estuary.

Section 42 of Appendix 1 (page C28) should apparently read "for about 6 to 8 months...etc." instead of "60 to 8..." Also, unless it comes from mining or industry, "salt water" penetration in the upper reaches of an estuarine system, though sporadic in occurrence, is not considered "pollution."

Thank you for the opportunity to comment on the project.

Sincerely yours,

Jack W. Gehring  
Regional Director

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE  
SA, S&PF, Atlanta, Georgia 30309

1940

April 4, 1973

┌ Nolan C. Rhodes, Colonel  
District Engineer  
Department of the Army  
Galveston District- Corps of Engineers  
P.O. Box 1229  
└ Galveston, Texas 77550



Attached is a copy of our reply referred to in your letter of March 28, 1973. This covered the Preliminary Draft Environmental Statement and the Interim Review of Reports on Neches River and Tributaries, Texas, covering Salt Water Barrier at Beaumont, Texas.

Thank you again for the opportunity of reviewing this statement.

*Frederick W. Honing*  
FREDERICK W. HONING  
Area Environmental Coordinator

Enclosure

FILE COPY - EPI  
ENVIRONMENT QUALITY

1940

February 22, 1973

Martin W. Toague, Lt. Colonel  
Acting District Engineer  
Galveston District - Corps of Engineers  
Galveston, Texas 77550

The Preliminary Draft Environmental Statement, "Neches River and Tributaries, Texas Saltwater Barrier on Neches River at Beaumont, Texas", has been reviewed by our office.

We feel the statement adequately describes the situation and predicts probable changes.

Thank you for the opportunity of reviewing this statement.

**AMEL E. LANDGRAF**

AMEL E. LANDGRAF  
Area Environmental Coordinator

/db

11 copies to WO



IN REPLY REFER TO:

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF OUTDOOR RECREATION

South Central Regional Office

First National Bank Building East - 5301 Central Avenue, N.E., Room 915  
Albuquerque, New Mexico 87108

APR 26 1973

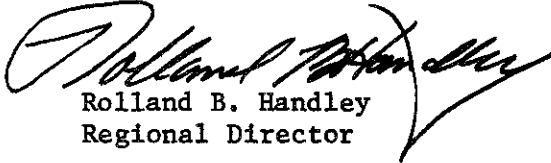
Col. Nolan C. Rhodes  
U. S. Army Corps of Engineers  
Galveston District  
P. O. Box 1229  
Galveston, Texas 77550

Dear Colonel Rhodes:

We have reviewed the plan for construction of the Salt Water Barrier at Beaumont, Texas, as requested in your December 28, 1972, letter.

The plan recognizes the potential recreation benefits of a fresh water lake and provides for the use of spoil material for development of future recreation sites. We recommend the project be implemented as described in the report.

Sincerely yours,

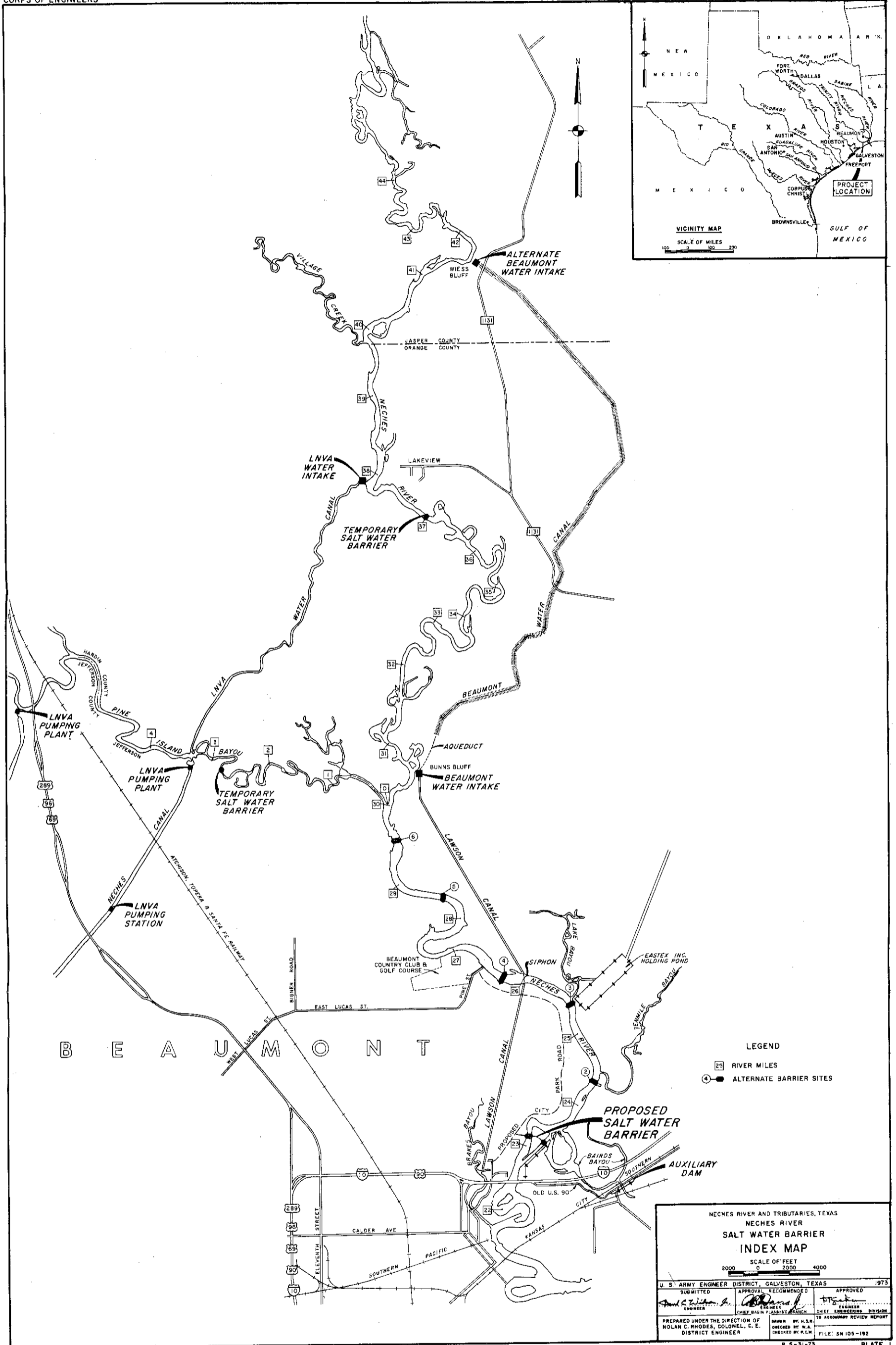
  
Rolland B. Handley  
Regional Director





CORPS OF ENGINEERS

U.S. ARMY





FINAL ENVIRONMENTAL STATEMENT

SUMMARY

NECHES RIVER AND TRIBUTARIES, TEXAS  
SALTWATER BARRIER ON NECHES RIVER  
AT BEAUMONT, TEXAS

- ( ) Revised Draft Environmental Statement  
(X) Final Environmental Statement

Responsible Office: U.S. Army Engineer District, Galveston  
Don S. McCoy, Colonel, CE  
District Engineer  
P.O. Box 1229  
Galveston, Texas 77550  
Telephone: 713-763-1211 EXT 301

1. Name of Action: ( ) Administrative (X) Legislative
  
2. Description of Project: It is proposed to construct a permanent barrier across the Neches River at the city of Beaumont in Jefferson County, Texas, to prevent intrusion of salt water to upstream freshwater supply intakes. The saltwater intrusion problem is attributed to progressive enlargement of the navigation channel of the Sabine-Neches Waterway and to large withdrawals of surface water for municipal, industrial, and agricultural uses. The permanent barrier will eliminate the present practice of erecting temporary barriers which impede free navigational use of the river. The proposed barrier will consist of a gated dam in the river, a gated navigation bypass channel, an auxiliary dam in a small tributary bayou, an access road and service bridge, and other related works. The recommended site for the proposed barrier is at river mile 23.
  
3. a. Environmental Impacts: The proposed project will benefit man's environment by protecting the surface water supplies of the municipalities and industries served by the water delivery systems of the Lower Neches Valley Authority and the City of Beaumont from contamination by salt water and pollution moving upstream during periods of low river flow and high freshwater withdrawals. With the exception of about 600 acres drained by Brakes Bayou, all swamp areas upstream from the project will be restored to freshwater conditions, and approximately 16.7 miles of the Neches River and Pine Island Bayou would be

improved for recreational swimming, boating, hunting, and freshwater fishing.

b. Adverse Environmental Impacts: Approximately 57 acres of land will be devoted to project purposes and lost as wildlife habitat. All trees and vegetation will be removed from approximately 41 acres of the project site, and selective cutting and clearing will be performed on approximately 16 acres. The barrier when closed will impede upstream migration of estuarine animals; however in view of the distance and many miles of river with poor water conditions, separating the project area from the Sabine estuary, the practical effect is considered negligible.

4. Alternatives: Continue present practice of constructing temporary saltwater barriers; flushing with freshwater releases from upstream impoundments; relocation of freshwater intakes upstream beyond the influence of tide water; utilization of ground water to supply area demands; desalinization; and alternative site locations for proposed barrier.

5. a. Comments Received (District Review): Comments on a draft of this statement were received from the following:

State Conservationist, Soil Conservation Service, USDA  
Southeast Region, Forest Service, USDA  
Deputy Ass't Sec'y for Environmental Affairs, USDC  
Region VI, DHEW  
Bureau of Sport Fisheries and Wildlife, USDI  
National Park Service, USDI  
Bureau of Mines, USDI  
Water Resources Division, Geological Survey, USDI  
Geologic Division, Geological Survey, USDI  
Bureau of Outdoor Recreation, USDI  
Eighth Coast Guard District  
Region VI, EPA  
Division of Planning Coordination, State of Texas  
Texas Parks and Wildlife Department  
Texas Water Development Board  
Texas Water Quality Board  
Texas Water Rights Commission



NECHES RIVER AND TRIBUTARIES TEXAS  
SALTWATER BARRIER ON NECHES RIVER  
AT BEAUMONT, TEXAS

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3.	Water quality data for the Neches River Basin at Pine Island Bayou near Sour Lake, Texas, October 1973 to September 1974

### APPENDIX A

#### Agency Reports

### APPENDIX B

#### Letters Received by the District Engineer on the Draft Environmental Statement

### APPENDIX C

#### News Release and Recipients of Draft Statements as a Result of Announcement

### APPENDIX D

#### Letters Received by the Chief of Engineers and the District Engineer on the Revised Draft Environmental Statement

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APPENDIX E

"Water Quality and Salt Water Intrusion in the  
Lower Neches River" by Richard C. Harrel

PLATES

Plate  
No.

1. Index Map
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3. Selected Plan
4. Miscellaneous Details
5. Auxiliary Dam, Navigation Gate and Service Area



## ENVIRONMENTAL STATEMENT

### NECHES RIVER AND TRIBUTARIES, TEXAS SALTWATER BARRIER ON NECHES RIVER AT BEAUMONT, TEXAS

1. PROJECT DESCRIPTION. The proposed saltwater barrier will be located on the Neches River, Jefferson County, at the city of Beaumont, Texas. Saltwater intrusion upstream in the Neches River during periods of low river flow and high water demand has made it necessary for the Lower Neches Valley Authority periodically to construct temporary steel sheet-pile saltwater barriers to protect the freshwater supply in the Neches River. These barriers effectively and economically control the problem, but block the waterway and interfere with the free use and enjoyment by the public of the naturally navigable waters. The primary purpose of the project is to prevent salt water from intruding up the river during periods of low flow and high water use and contaminating the supplies of the Lower Neches Valley Authority and the City of Beaumont.

A study of the problem indicates that a Federal project for construction of a permanent saltwater barrier could be economically justified, subject to the provision of specified items of local cooperation and subject to specific authorization by the Congress. The project described herein is the subject of a survey report now being prepared for submission to the Congress.

Federal interest in control of the saltwater intrusion stems from the fact that, although salinity intrusion could have been somewhat of a problem at Bunns Bluff under natural conditions, progressive enlargement of navigation channels of the Sabine-Neches Waterway is the major cause of the problem. The intrusion problem is related to the significant reductions of freshwater flows to the estuary during spring and summer seasons resulting from upstream reservoir control and withdrawal of water for various uses.

The plan found to be most suitable to meet the problem will provide a tainter-gated dam at mile 23.0 on the Neches River,

approximately one-half mile upstream from the Interstate Highway 10 bridge at Beaumont, Texas; a sector-gated navigation by-pass channel; an auxiliary dam in a small canal that drains an adjacent bayou; and other related works.

An access road on an earth fill will extend from a proposed city park road on the west side of the river to the dam and gate. A service bridge with a 12-foot roadway will be provided across the dam to permit access to the service area and navigation gate. The access road will have a crown elevation of 14 feet above mean sea level and will consist of two 11-foot lanes with 8-foot shoulders constructed on a 10-inch base course. The travel lanes will receive a double bituminous surface treatment, and the shoulders will receive a single bituminous surface treatment. The earth fill will have side slopes of one vertical on four horizontal. Approximately 4 acres of land will be required as right-of-way for the access road.

The dam will be a concrete structure with seven 40-by 24.5-foot tainter gates. The tainter gates will have a top elevation in the closed position of 4.5 feet above mean sea level and a bottom elevation in the raised position of 16 feet above mean sea level. The sill elevation will be 20 feet below mean sea level. A normal pool elevation of one foot above mean sea level will be maintained upstream from the dam during the period of the year when salinity intrusion is a problem (an average of 111 days a year during the 43-year period 1928 through 1970). Approximately one-half acre of land will be required as right-of-way for the dam.

The navigation gate will consist of two sector gates with a radius of approximately 35 feet to provide a clear opening 56 feet wide. The top elevation of the sector gates will be 4.5 feet above mean sea level, and the sill elevation will be 16 feet below mean sea level. The gate walls will have a top elevation of 10 feet above mean sea level. Timber guide-walls and timber fenders will extend upstream and downstream from the gate. A service area will be located adjacent to the west side of the navigation gate and will consist of an office; garage and storage building, approximately 30 feet by 50 feet in size; a paved parking area; a control house for operation of the gate; and a boat landing. Approximately 13.5 acres of land will be required as right-of-way for the gate, service area, and auxiliary dam.

The proposed navigation gate is sized and sited for expansibility to a 56- by 400-foot navigation lock at some future date, if warranted by increased barge traffic and specifically authorized by Congress. Such a lock will accommodate a tow consisting of two 35- by 195-foot barges and a towboat in a single lockage, and will have an estimated capacity of over 11,000,000 tons of cargo per year. The 35- by 195-foot barge is the standard barge and predominates on the Ohio-Mississippi Rivers system. Some of the other barge sizes used are: 26 feet by 175 feet, 50 feet by 240 feet, and 50 feet by 290 feet. <sup>1/</sup> It is assumed that a barge fleet on the Neches River would be similar in makeup.

The 16 acres of severed land between the dam and the by-pass channel will be acquired by the Government. Selective cutting and clearing will be performed to remove undesirable trees and underbrush and to give the more desirable trees and shrubs adequate growing space. Although no facilities are planned, the area will be retained as a natural park to enhance the appearance of the project. Enough ground cover will be retained to encourage small animals and birds to return to the area after completion of construction.

The navigation by-pass channel will have a total length of approximately 2,500 feet. It will have a depth of 16 feet, a bottom width of 76 feet, and side slopes of one vertical on three horizontal. Approximately 14 acres of land will be required as right-of-way for the channel. Approximately 250,000 cubic yards of material will be excavated during the construction of the by-pass channel. Some of this material will be used in the construction of the levee; some will be used as fill material in the service area; and the remainder will be placed on shore in 14 acres of leveed disposal area, most probably on part of the land west of the river used by the City of Beaumont for sanitary landfill.

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<sup>1/</sup> Davis, John P., "Tonnage Capacity of Locks," Journal of the Waterways and Harbors Division, Proceedings of the American Society of Civil Engineers, vol. 95, No. WW2, May 1969, pp. 205-206

An earthen levee will be constructed from the east end of the navigation gate southwestward along the east side of the navigation by-pass channel to high ground north of Interstate Highway 10. The levee will have a top elevation of 12 feet above mean sea level, a crown width of 10 feet, and side slopes of one vertical on four horizontal. Approximately 9 acres of land will be required as right-of-way for the levee.

An earth fill and concrete auxiliary dam, 1,334 feet long, will be constructed across the canal which drains the southern end of Bairds Bayou at an adjacent location immediately south of old U.S. Highway 90. The concrete section of the dam will have a top elevation of 13 feet above mean sea level and will contain three 10- by 8-foot slide gates and two 10- by 2-foot flap gates. The earth fill section will have a top elevation of 14 feet above mean sea level, a crown width of 12 feet, and side slopes of one vertical on four horizontal. An access road and service bridge will be provided for inspection, maintenance, and operation of the auxiliary dam. The auxiliary dam is required to block salinity intrusion via a canal that drains the southern end of Bairds Bayou. When flows are adequate to prevent saltwater or pollution intrusion, the slidegates in the auxiliary dam will be left open.

No specific recreation facilities are included in the project plan; however, the City of Beaumont has a long-range plan for development of the area west of the river and east of the Lawson Canal for use as a city park. The proposed barrier will enhance the recreational value of this proposed future park. Based on October 1974 price data, the total average annual benefits are estimated at \$2,736,900 and the total estimated annual costs are estimated at \$1,193,500 resulting in a benefit-to-cost ratio for the proposed project of 2.3.

2. ENVIRONMENTAL SETTING WITHOUT THE PROJECT. The Neches River Basin, lying in east Texas, has an overall length of about 210 miles and a maximum width of about 70 miles. The basin lies within 20 counties and encompasses an area of about 10,000 square miles. The Neches River, with a total length of 416 miles and a total fall of 530 feet, rises near Canton in Van Zandt County and empties into Sabine Lake and the Sabine-Neches Waterway near Port Arthur. The river flows discharge through Sabine Pass to the Gulf of Mexico. The largest tributary, the Angelina River, with a total length of 205 miles and a total fall of 415 feet, rises in Rusk County and joins the Neches River near mile 126 in the upper reaches of the B. A. Steinhagen Lake. The major tributaries below the Angelina River are Village Creek with a drainage area of 1,113 square miles, which enters the Neches River near mile 40, and Pine Island Bayou with a drainage area of 657 square miles, which enters the Neches River near mile 30. The average flow at the mouth of the Neches River is estimated at approximately 5,600,000 acre-feet per year. Tidal effects extend from the mouth to river mile 42 near Wiess Bluff. The city limits of Beaumont extend along eleven miles of the west bank of the river between miles 19 and 30. The flood plain in this reach has a maximum width of about 4 miles with a surface elevation of 5 feet or less. It is largely swampy land dominated by trees and dense underbrush. Existing developments in the flood plain include the Bethlehem Steel Corp. shipyard on the west bank (miles 21-22), Beaumont Boat Club on the west bank, G & W Marine, Inc., on the east bank (just above IH 10, Mile 22.5), the City of Beaumont's sanitary landfill on the west bank (extending upstream from mile 22.6 between Lawson Canal and Neches River), the Eastex, Inc. effluent outfall on the east bank (mile 25.3), the Neches Boat Club on the west bank (mile 25.9), the City of Beaumont's siphon under the river at Lawson Crossing (mile 26), and the public boat launching area and Beaumont Country Club on the west bank (mile 26.5).

Significant geological strata in the lower Neches River basin were deposited during the Holocene and Pleistocene

Epochs of the Quaternary Period, and during the preceding Pliocene and Miocene Epochs of the Tertiary period. The oldest geologic unit that outcrops in Jefferson County is the Beaumont Clay of Pleistocene age, which is at least 30,000 years old. This formation is a series of yellow, gray, blue, brown, and black clays with black sands. The thickness of the formation is not known, but may be less than 100 feet. The Deweyville, or alluvial terrace deposits, which are between 13,000 and 30,000 years old, are intermediate between the Beaumont Clay and the modern flood plain deposits of the Neches River. They are probably of late Pleistocene and Holocene origin. The deposits, which are at least 30 feet thick, range from silty clay to very fine sand in some places, and from very fine sand to coarse sand in others. The youngest sediments are the flood plain and other deposits of Holocene age, which are clay, silt, sand, and organic matter less than 5,000 years old, since the sea level rose to its present level perhaps 5,000 years ago.

The U.S. Geological Survey and the Texas Water Development Board have subdivided the Neches River basin into two ground water regions. The primary aquifer in the lower 3,000 square miles of the basin, is the Gulf Coast Aquifer, consisting of the Catahoula, Oakville, Lagarto, Goliad, Willis, Lissie, and Beaumont Formations. The Oakville, Lagarto, and Goliad Formations are also known as the Fleming Formation. The upper portion of the Lissie Formation is also known as the Montgomery Formation and the lower portion of the Lissie Formation is also known as the Bentley Formation.

The Evangeline and Chicot Aquifers, subdivisions of the Gulf Coast Aquifer, furnish ground water for municipal and industrial use in Jefferson County. The Evangeline Aquifer includes the Fleming Formation. The Chicot Aquifer includes the Willis, Bentley, Montgomery, and Beaumont Formations as well as the overlying Deweyville deposits and Holocene alluvium. The total estimated use of ground water in Jefferson County in 1965 was approximately 14.6 million gallons per day or 16,400 acre-feet annually. Of this total, 4.6 mgd was produced from wells in Jefferson County for industrial, municipal, and agricultural use;

6 mgd was imported by the City of Beaumont from a well field in the Evangeline aquifer in Hardin County; and 4 mgd was imported by two industries in Beaumont and Port Arthur from the Chicot Aquifer in Orange County. The City of Beaumont plans to expand its usage of ground water to 20 mgd or 22,400 acre-feet annually by 1980. A representative of the U.S. Geological Survey indicated that total ground water usage in 1971 probably was approximately the same as that reported for 1965.

Withdrawals of ground water, oil, and gas have resulted in subsidence of the land surface in most of the upper Gulf Coast region of Texas. The land surface subsided more than 0.5 feet in western Chambers County between 1918 and 1954. The subsidence for most of the rest of Chambers and Jefferson Counties was less than 0.25 foot. A small area in eastern Jefferson County had subsided more than 0.25 feet and an area in the vicinity of the Spindletop Dome subsided more than one foot. Subsidence in Orange County since 1918 has been generally less than 0.5 feet. Recent studies indicate that ground water levels in Orange County could be lowered an additional 75 feet before significant subsidence would occur. 2/ A releveling program by the National Geodetic Survey indicates that between 1959 and 1973 seven bench marks in the Beaumont area subsided an average of about 0.5 feet.

The two major users or suppliers of fresh surface water in the lower basin are the City of Beaumont and the Lower Neches Valley Authority. The City of Beaumont normally withdraws water from the Neches River at a gravity intake at Bunns Bluff (mile 30). During periods of the year when salt water intrudes up the river to Bunns Bluff, the city withdraws water from the Neches River at a pump station at Wiess Bluff (mile 41.7).

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2/ Gabrysch, R. K. and Gene D. McAdoo, Development of Ground-water Resources in Orange County Areas, Texas and Louisiana, 1963-71, Texas Water Development Board, Report 156, August 1973, p. 9.

The Lower Neches Valley Authority withdraws water from the Neches River through a canal at Lakeview (mile 38) which leads to a siphon and a pump station at mile 3.2 on Pine Island Bayou. The LNVA also withdraws water from Pine Island Bayou at a pump station at Voth (mile 6).

To prevent saltwater intrusion to the pump intakes, the Lower Neches Valley Authority has found it necessary to install temporary sheet-pile barriers in the Neches River below Lakeview and in Pine Island Bayou below Voth almost every year and to leave these barriers in place for 4 to 6 months. During the period 1953 through 1971, a barrier was placed across the Neches River every year except 1961, 1968, and 1969, and across Pine Island Bayou every year except 1953 and 1968. During the 4 to 6 months out of the year when the temporary barriers are in place, navigation by recreational and commercial vessels is completely blocked.

Under permits from the Texas Water Rights Commission, the Lower Neches Valley Authority is entitled to use 875,516 acre-feet of surface water per year. In 1971 the LNVA used about 55 percent of the permitted quantity. Under permits from the Texas Water Rights Commission, the City of Beaumont is entitled to use 56,467 acre-feet of surface water per year. In 1971 the city used about 29 percent of the permitted quantity. As municipal and industrial growth occurs in Jefferson County, the LNVA and the city will use larger and larger portions of their permitted quantity of surface water. By about 1990-2000, it is possible that the LNVA will be seeking additional sources of surface water.

Effluent from the paper mill owned by Eastex, Inc., at Evadale, Texas, is discharged into the Neches River at mile 25.3, downstream from the sites of the temporary saltwater barriers. Dr. Roy W. Hann, Jr. reported that this effluent had a flow rate of 55 cubic feet per second and a 5-day biochemical oxygen demand of 73 milligrams per liter. 3/

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3/ Hann, Roy W., Jr., Neches Estuary Study, prepared for Texas Water Quality Board by Civil Engineering Systems, Inc., n.d. (1969), p. 38.



In a statement submitted at the public meeting in Beaumont on 9 December 1970, Dr. Richard C. Harrel, Assistant Professor of Biology, Lamar University, stated that "With no flow below the saltwater barriers, salt water from the Gulf surges upriver carrying with it a mixture of organic and toxic wastes from industries in the lower reaches of the river. Tidal action flushes the wastes back and forth causing it to become more and more concentrated. Thus the lower 36 miles of the river and 3 miles of Pine Island Bayou becomes a large waste holding lake. The water turns black, oxygen depletion occurs, and all but the most resistant species of organisms are killed."

Dr. Harrel's statement is based on personal observation and extensive studies of specific conductance, temperature, alkalinity, pH, turbidity, dissolved oxygen, sulfate concentration, and benthic organisms at eleven sampling stations along the Neches River.

A copy of Dr. Harrel's paper, "Water Quality and Salt Water Intrusion in the Lower Neches River" is attached to this statement as Appendix "E". His paper compares physicochemical conditions above and below the temporary saltwater barrier in the Neches River. Water quality was shown to be significantly better above the barrier during periods of saltwater intrusion. Values for dissolved oxygen ranged from 8.2 ppm and 7.1 ppm at the surface and bottom immediately above the barrier to 3.4 and 0.0 ppm at the surface and bottom immediately below the barrier. Similarly, water below the barrier was characterized by higher carbonate alkalinity, lower pH, higher turbidity, higher sulfates, and higher salinity than water above the barrier. Bottom material above the barrier consists of clean, odorless sand and clay, whereas bottom material below the barrier consisted of black silt and sand smelling of hydrogen sulfide and oil. Additional data on water quality in the Neches River at Evadale, in Village Creek near Kountze, and in Pine Island Bayou near Sour Lake, extracted from "Water Resources Data for Texas-Part 2 Water Quality Records, 1974," U.S. Department of the Interior, Geological Survey, are contained in Tables 1 through 3. Water quality data span the water year October 1973 through September 1975.

The Neches River below Interstate Highway 10 is polluted to such an extent, as reported by Dr. Roy W. Hann, Jr., <sup>4/</sup> that a minimum flow of about 5,375 cubic feet per second would be required at the present level of waste loadings on the Neches River to maintain a dissolved oxygen level of 3 milligrams per liter. The required flow of 5,375 cubic feet per second is more than twice the yield of both existing Sam Rayburn Reservoir and proposed Rockland Reservoir and is about 70 percent of the total average flow of the entire river.

For about 6 to 8 months each year, when net flow in the river is adequate to control pollution by salt water and municipal and industrial effluents, the portion of the Neches River and its adjacent flood plain within the project area furnishes a favorable environment for numerous fish, mollusca, waterfowl, aquatic mammals, aquatic reptiles, and amphibians. Some of the common freshwater and marine fish and shellfish that have been recorded in the vicinity of the project area are the sheepshead minnow, bowfin, gar, buffalo, shad, flounder, mullet, sand seatrout, freshwater catfish, crappie, perch, river shrimp, grass shrimp, penaeid shrimp, blue crab, and rangia clam. Under natural conditions prior to the construction of the ship channel to Beaumont and industrial development in the area, the river provided a good year round freshwater environment. However, under present conditions, for about 4 to 6 months each year the reach of the river in the project area is brackish water environment frequently contaminated with industrial wastes. Poor water quality conditions in the river generally occur from June through September, upsetting the natural balance of the river resulting in kills of fish and invertebrates and algal blooms.

The bayous and swamps adjacent to the river are spawning and nursery areas for fish, shellfish, and other organisms that form an important part of the food web of many fish and wildlife species. The swamp and land vegetation is

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<sup>4/</sup> Hann, Roy W., Jr., Neches Estuary Study, op. cit, p. 49.

especially important as a source of food and cover. The seed and berry producing trees such as willow, tupelo, mayhaw, cypress, dogwood, oaks, sweet gum, pines, and sycamore are of particular value as food and shelter for numerous species. Thick undergrowths of palmetto, vines, and shrubs also enhance the habitat conditions along the river and adjacent bayous by furnishing additional shade, food, and dense cover for wildlife. Rare and exotic plant species known to occur along the river include water elm, black hickory, greenfly orchid, and water clover.

The timbered bottomlands and swamps provide habitat for numerous wildlife species including otter, mink, raccoon, opossum, fox, muskrat, skunk, squirrel, cottontail rabbit, swamp rabbit, wild pig, deer, birds of prey, and songbirds. The open fields and clearings in the woodlands along the river provide nesting and feeding areas for quail and dove. Waterfowl and wading birds such as wood duck, mallard, egret, ibis, and heron nest and feed in the swamps and sloughs along the river. Many rare and endangered wildlife species require the swamp and timberland as habitat. Among these are the American alligator, American bald eagle, ivory-billed woodpecker, northern red-cockaded woodpecker, and the red wolf.

A search of the National Register of Historic Places revealed no registered historic sites in the project area that would be affected by the project. The State Historical Survey Committee advised that both Orange and Jefferson Counties contain archeological sites of high significance, and one Orange County site is situated on Bairds Bayou downstream from the proposed saltwater barrier location. It further advised that the historical, archeological and architectural resources of the project area are, for all purposes, unknown. The Acting Director, Texas Archeological Survey advised that four archeological sites in the general area were located and recorded by G. R. Arnold in 1940. These sites (designated as 41JF1, 41JF2, 41JF3, and 41HN3) were situated on or near the banks of the Neches River and at the time of discovery were eroding badly. Present condition of the sites is not known.

The existing dredged navigation channel in the Neches River, which is part of the Sabine-Neches Waterway project, terminates downstream from Interstate Highway 10. There is some existing commercial and recreational navigation above the head of the Federal project channel. One firm in Beaumont presently dredges sand from the Neches River and transports the sand to Beaumont in 30- by 120-foot barges with a loaded draft of 5-1/2 feet. Approximately 90 round trips were made annually in 1970 and 1971. The firm operates under the authority of a permit from 500 feet above Interstate Highway 10 to 1-1/2 miles above the mouth of Village Creek. When the temporary salt-water barrier is in place below Lakeview, the sand dredging is restricted to the reach of the river below that point. There is no other regular commercial use of the river at present. In addition to the commercial traffic, there are approximately 500 recreational craft of various kinds that use the Neches River. These recreational crafts are berthed or launched at the Beaumont Boat Club (mile 22.5), Neches Boat Club (mile 25.9), and at the public boat launching area and Beaumont Country Club (mile 26.5).

It is expected that recreational boating will increase, as it has in the past few years, at a somewhat faster rate than the increase in population. No significant increase in the local sand dredging operation in the Neches River is anticipated at this time. The Corps of Engineers' navigation field traffic survey in 1964, updated to 1968 conditions, indicated potential barge commerce of 202,000 tons for the reach of the Neches River between Beaumont and Evadale and 196,000 tons for the reach of the river between Evadale and Diboll. No significant potential commerce was located above Diboll.

The U.S. Fish and Wildlife Service estimates that sport fishing without a project will amount to between 3,000 and 4,600 man-days per year, depending on the site, as shown in the following table, and that the commercial fish catch at any of the six sites will amount to 800 pounds per year: 5/

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5/ Attachment, p. A-6

<u>Site</u>	<u>Sport fishing without project (man-days)</u>
1	4,600
2	4,400
3	4,200
4	3,900
5	3,300
6	3,000

The U.S. Fish and Wildlife Service also estimates the following man-days of hunting and wildlife-oriented recreation will occur without a project: 6/

<u>Item</u>	<u>Man-days without project</u>
Big-game hunting	200
Upland-game hunting	500
Waterfowl hunting	300
Other wildlife hunting	300
Wildlife-oriented recreation	1,000

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6/ Attachment, p. A-8

3. ENVIRONMENTAL IMPACT OF THE PROPOSED ACTION. The proposed project will benefit man's environment by serving as a pollution barrier until municipal and industrial effluents are purified at the source or eliminated and by serving as a permanent saltwater barrier. The barrier normally will protect the surface water supplies of the municipalities and industries served by the water delivery systems of the Lower Neches Valley Authority and the City of Beaumont from contamination by salt water moving up the Neches River during periods of low flow and high water use. The barrier is not designed to serve as a hurricane-flood barrier and will be overtopped by tides generated by hurricanes or lesser tropical disturbances. The gates would be opened after the storm tide has subsided, and the salt water which had flowed upstream over the dam will be flushed downstream. The barrier will restore freshwater conditions to all the swamp area above Interstate Highway 10 except the 600 acres drained by Brakes Bayou on the west side of the Lawson Canal.

Approximately 16.7 miles of the Neches River and Pine Island Bayou between the proposed permanent barrier location and the presently used temporary barrier locations will be improved for recreational uses such as swimming, boating, hunting, and freshwater fishing, as will the canals and bayous leading into the swamp.

Some of the excavated material from the by-pass channel will be used in the construction of the levee and the remainder will be used as fill in the service area and placed in leveed dredged material disposal areas (14 acres) on shore adjacent to the project. Although the exact location of these disposal areas has not yet been determined, it is proposed that the surplus excavated material be deposited on the west side of the river between the Lawson Canal and the river on land presently used by the City of Beaumont for a sanitary landfill but proposed for eventual use as a city park. The City of Beaumont has several test wells in the sanitary landfill and continuously monitors conditions by taking water samples from the test wells and from the river adjacent to the landfill. So far there has been no water quality problem. If a problem should develop in the future, as the sanitary landfill

is extended northward, the city proposes to increase the width of the earthen barrier between the landfill and the river sufficiently to prevent leaching into the river.

Approximately 41 acres will be entirely cleared of existing trees and vegetation, and selective cutting and clearing will be performed on approximately 16 acres of severed land. The 57 acres of land initially will be lost as wildlife habitat, but some small animals and birds are expected to return to the severed land after completion of construction and vegetation has begun to regrow.

During the period of the year when the gates are closed, the one-foot normal pool elevation upstream from the dam will cause slightly higher water surface elevations along the river for several miles upstream and in the sloughs and bayous which lead away from the river in the same reach; but no significant environmental effects are expected as a result of this seasonal increase in water elevation. No significant increase in the ground water table adjacent to the river is expected as a result of this seasonal increase in water surface elevation. Backwater studies made by the Galveston District Corps of Engineers indicate that during flood flows the proposed project will increase water surface elevations upstream from the project site only slightly.

At the present time when the temporary barriers are in place on Pine Island Bayou and the Neches River, there is no flow past the barriers during periods of low natural stream flow, and water released from B. A. Steinhagen Lake does not reach the estuary unless the temporary barrier is overtopped or breached by a sudden rise on the river. It is estimated that when the permanent saltwater barrier is in place, the gates in the barrier will be closed for an average period of 111 days each year to bar upstream movement of salt water. When the gates in the barrier are closed, about 100 acre-feet of fresh water will be released to the estuary each time the navigation gate is opened for vessel passage. It is estimated that a minimum of about 10,000 acre-feet of water will be released each year through the navigation gate.

The release of the relatively small quantity of water through the navigation gate during periods when there

otherwise would be no flow in the Neches River will have a negligible effect on salinities and pollution in the river below the barrier and in Sabine Lake. Thus, the proposed barrier will have little effect on freshwater flows to the estuary (Sabine Lake) and no apparent adverse effect on the estuarine environment. No adverse effect on the authorized Big Thicket National Preserve, 7/ which is to be located along and north of Pine Island Bayou and along and west of the Neches River, is foreseen. The polluted water below the permanent barrier will be confined to a shorter reach of the river than is presently the case with the temporary barriers, but this should have only a negligible effect on dissolved oxygen, temperature, and salinity below the barrier.

No registered historic places will be affected by the project; however, the Texas Historical Survey Committee advised that the probability of finding archeological sites in the project area is high. Therefore, an archeological survey of the construction area will be undertaken during preconstruction planning. Such a survey will identify and appraise the significance of the resources and result in definition of mitigation measures if necessary. The Department of the Interior advised that the proposed action will not adversely affect any proposed or existing unit of the National Park System, including the nearby Big Thicket National Preserve, and no site eligible for registration as a National Historic, Natural, or Environmental Education Landmark will be affected.

The anticipated effects of the proposed project on the existing sand dredging operation are that dredging can be done to the upper limits of the permit area throughout the year and that dredging in the vicinity of the permanent

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7/ PL 93-439, Approved 11 October 1974



saltwater barrier will be restricted. Any dredging beyond that already authorized by permit will require additional permits from the Corps of Engineers, consideration of which will include solicitation of the views of all interested parties.

The proposed project would cause no apparent adverse effects on public facilities and services, and, except to the extent that it affords insurance to the continuity of the municipal, industrial, and agricultural water supplies that are being adequately supplied by existing facilities, would have negligible impact on the economy of the Beaumont-Port Arthur industrial complex and the agricultural economy in Jefferson County.

In itself the proposed project is not expected to stimulate industrial development along the river which could contribute to increased air and water quality problems. The reach of the Neches River above the proposed site is used by pleasure craft and at times for motor boat races. The noise of the racing boats is intense, but it is considered that the distance to the nearest inhabitants would be sufficient to avoid adverse reaction. It is to be expected that this type of traffic will increase materially in the future along with possible increases in commercial barge traffic. Attendant increases in noise levels, however, should not create excessive adverse effects, and air and water quality should not be significantly degraded by these activities.

The proposed project will not be constructed until Eastex, Inc. relocates its effluent discharge point to a new location downstream from Interstate Highway 10. The Corps of Engineers will cooperate with the Environmental Protection Agency and the Texas Water Quality Board to regulate any proposed new waste discharges into the Neches River and tributaries upstream from the barrier site.

The U.S. Fish and Wildlife Service estimates that sport fishing with a project would amount to between 7,500 and 10,000 man-days per year, or an increase of between 4,200 and 6,100 man-days per year, depending on the site as shown in the following table, and that the commercial fish catch at any of the six sites would amount to 1,200

pounds per year, or an increase of 400 pounds per year with an estimated annual benefit of \$200. 8/

Sport Fishing with Project

<u>Site</u>	<u>Total (man-days)</u>	<u>Gain (man-days)</u>	<u>Estimated Annual Benefits</u>
1	10,000	5,400	\$5,400
2	10,000	5,600	5,600
3	10,000	5,800	5,800
4	10,000	6,100	6,100
5	7,500	4,200	4,200
6	7,500	4,500	4,500

The U.S. Fish and Wildlife Service also estimates that there would be no significant change in man-days of hunting and other wildlife-oriented recreation with a project at sites 1, 2, 3, or 4, but that a project at sites 5 or 6 would result in a loss of 500 man-days of wildlife-oriented recreation unless a boat-launching ramp were constructed immediately upstream from the barrier. 9/ The project is not expected to effect adversely any mineral resources nor will it hamper future exploitation of such resources.

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8/ Attachment, p. A-6, as modified on p. A-16

9/ Attachment, p. A-8

4. ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED SHOULD THE PROJECT BE IMPLEMENTED. The 57 acres of land on which the project is to be constructed initially will be lost as wildlife habitat. All of the existing trees and vegetation will be removed from approximately 41 acres of the project site, and selective cutting and clearing will be performed on approximately 16 acres of the project site. The project will impede upstream migration of estuarine marine animals during periods of low flow and high water use when the barrier is closed. However, in view of the distance and many miles of river with poor water conditions separating the project area from the estuary, the practical effect will be negligible.

5. ALTERNATIVES TO THE PROPOSED ACTION. The alternative solutions considered were continuation of the present practice of installing temporary barriers each year; flushing the saltwater wedge downstream with fresh water; extension of the freshwater intake canals above the limit of the water; use of ground water; desalinization; as well as several alternate locations and alternate methods of constructing a permanent barrier.

The most economical solution to the problem of salinity intrusion would be the 'no-action' alternative, which is for the Lower Neches Valley Authority to continue the present practice of constructing temporary saltwater barriers across the Neches River and Pine Island Bayou. However, there are three reasons for discontinuing the practice of using temporary barriers. The first is to eliminate periodic and prolonged interference with public use and enjoyment of the naturally navigable waterway. The second reason is that the temporary sheet-pile barriers, being fixed, cause higher backwater effects upstream on Pine Island Bayou and the Neches River than permanent gated structures would cause. The third reason is to relieve local interests of the responsibility for annually providing mitigation measures related to navigation improvements previously installed by the Federal government.

The portion of the Neches River within the project area would remain a low quality estuarine habitat even with a "no action" alternative and pollution abatement because of the river's instability as indicated by river discharge data and salinity conditions. Saline water intrudes upstream into the project area during periods of low flow about six months out of an average year but is pushed downstream during the fall and winter floods. Freshwater and marine organisms living in the river periodically experience stress during these changing water conditions. For this reason, the diversity and abundance of resident aquatic animals may be expected to be relatively low and unstable. With continued saltwater contamination and the pollution that would inevitably result from normal recreational water use in the area, the river water would continue to support only a limited

resident population of aquatic animals even if present sources of municipal and industrial pollution are eliminated. However, removing or reducing the present level of pollution may eliminate a barrier to some species of freshwater and estuarine animals that presently do not visit the area.

If the project is not undertaken, the Lower Neches Valley Authority would have to continue the use of temporary barriers in the Neches River and Pine Island Bayou during low flow periods to protect the surface water supplies for municipal, agricultural, and industrial use. The freshwater swamps adjacent to the river below the temporary barriers would continue to be affected by saltwater contamination and freshwater fishing would not be greatly improved as under the proposed plan. This "no action" alternative would eliminate clearing of trees and vegetation related to construction for project purposes.

One alternative to construction of a permanent saltwater barrier would be to flush the salt water below Bunns Bluff with fresh water released from existing or additional upstream lakes and reservoirs. Such an alternative would provide a portion of the freshwater inflow to the estuary necessary for the growth of marine fishes and crustaceans which support a large commercial industry as well as sport fishing activities. Utilizing Keulegan's formula, it is estimated that a net flow of 1,900 cubic feet per second in addition to water withdrawn for municipal, industrial, and agricultural uses would be required to prevent saltwater intrusion caused by the 40- by 400-foot ship channel to Beaumont. This flow would be required for an average of approximately 111 days per year, and the amount of water required would be about 418,000 acre-feet per year. The yield of existing Sam Rayburn Reservoir is reserved for municipal, industrial, and agricultural uses in the lower Neches River Basin and adjacent coastal area. If the flushing proposal were feasible, it would be necessary to use the yield from another reservoir such as the proposed Rockland Reservoir. If the proposed Rockland Reservoir were to be the source of flushing water, approximately 40 percent of the yield of that reservoir would be required.

The addition of 1,900 cubic feet per second would be expected to have only a minor effect on the present salinity regime of Sabine Lake because of the low salinities that normally prevail but would assure a continuous low level nutrient input to the estuary. Sediments and waste effluents that would be associated with the stream flow would also be continuously flushed into Sabine Lake, and would have a negative effect on the lake's ecology. The benefits of the small increase in freshwater flow to the marine fishes and crustaceans in the estuary are questionable, if they could be detected at all. In view of the projected statewide increase in demand for water for municipal, industrial, and agricultural uses and the lack of water to meet the future demand throughout the state, the flushing alternative is not a realistic long-range alternative to the construction of a saltwater barrier.

A technically feasible alternative to construction of a saltwater barrier below the mouth of Pine Island Bayou would be to extend the freshwater intake canals above the influence of tide water. Investigation of this alternative shows that it would be more costly than the proposed barrier and would not improve the environment in the Neches River above Beaumont.

The construction of about 8 miles of new canals would require clearing and excavation of about 230 acres of swampland in the Big Thicket area, eliminating valuable wildlife habitat and detracting from the scenic quality of the area. The endangered ivory-billed woodpecker and several exotic plant species might be affected by clearing of the woodlands.

Consideration was given to the possibility of utilizing groundwater to supply the area demands. Available information on groundwater supplies in the local aquifers indicates a sufficiency of water to meet the present municipal and industrial demands but inadequate supply to provide the large

volumes of water to meet the agricultural demand. <sup>10/</sup>  
Desalinization was considered but rejected as a possible alternate source of fresh surface water for municipal, industrial, and agricultural uses. Even if the cost of desalinization approached its target of 25 cents per 1,000 gallons, it would be too expensive for agricultural use and would be more expensive than groundwater for municipal and industrial uses.

A total of seven sites along the Neches River were considered as alternate locations for a permanent saltwater barrier. Initial consideration was given to a site at mile 22.5, immediately downstream from the Interstate Highway 10 bridge. Examination of this site indicated that it would not be possible to construct the barrier and navigation gate there without a major alteration of the bridge, which is not economically feasible. The other six sites considered, arranged in order of increasing firstcost, are as follows: site 4 (mile 26.3), site 6 (mile 29.7), site 2 (mile 24.3), site 3 (mile 25.4), site 1 (mile 23.0), and site 5 (mile 28.3).

Site 4, the alternate project site, which is located about halfway between Lawson Crossing and the Beaumont Country Club, would be the most economical site. Site 4 is located upstream from the Beaumont Boat Club, the Neches Boat Club, and the Eastex, Inc. effluent outfall. A project at site 4 would require an access road 1,800 feet long, a navigation

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<sup>10/</sup> Wesselman, J. B. and Saul Aronow, Ground Water Resources of Chambers and Jefferson Counties, Texas, Texas Water Development Board, Report 133, August 1971, pp. 7, 8, 11, 18, 33, and 34; A Summary of the Preliminary Plan for Proposed Water Resources Development in the Neches River Basin, Texas Water Development Board, June 1966, pp. 26-27; and The Texas Water Plan, Texas Water Development Board, November 1968, p. IV-18.

by-pass channel 2,500 feet long, and removal of 57 acres of trees. A project at site 4 would restore freshwater conditions to 13.4 miles of the Neches River and would protect all but 7,700 acres of the swamp area above Interstate Highway 10 from polluted saltwater intrusion.

The estimated cost of a project at site 6 is only slightly greater than at site 4. Site 6 at mile 29.7 would require 1,200 feet of navigation by-pass channel, the removal of about 35 acres of trees, and would require an access road 7,700 feet long. Site 6 has significant environmental disadvantages. A project at site 6 would improve freshwater conditions in only 10 miles of river channel, and backwater effects would extend into the lower reaches of the proposed Big Thicket National Park, with possible adverse effects on flora along the banks of the river and bayou. Site 6 also is located upstream from all three existing boat clubs - The Beaumont Boat Club, Neches Boat Club, and Beaumont Country Club.

Site 2 at mile 24.3 would require a navigation by-pass channel 4,300 feet long and an access road 6,700 feet long. A project at site 2 would require the removal of about 94 acres of trees, and improve freshwater conditions in 15.4 miles of river channel. Site 2 is located downstream from the Beaumont Country Club and the Neches Boat Club but above the Beaumont Boat Club.

Site 3 at mile 25.4 would require a 3,300 foot navigation by-pass channel, and an access road 7,100 feet long. A project at site 3 would improve 14.3 miles of river and would require about 60 acres of trees to be removed. Site 3 is located downstream from the Beaumont Country Club and the Neches Boat Club.

A project at site 1 would be the second most costly alternative because of the auxiliary dam required to block salinity intrusion via a canal that drains the southern end of Bairds Bayou in the adjacent river bottoms. A barrier at site 1 would afford environmental enhancement to 16.7 miles of river channel and all but 600 acres of river bottom. Site 1 is located downstream of the Neches Boat Club and the Beaumont Country Club.



Site 5 at mile 28.3 would require a 4,500 foot navigation by-pass channel and a 7,300 foot long access road. A project at site 5 would improve 11.4 miles of the river, and would require the removal of about 159 acres of trees. Site 5 also is located upstream from all three existing boat clubs.

From the standpoint of Federal responsibility to prevent saltwater intrusion, preserve the public right of navigation, and preserve the natural environment, all with the least costly expenditure of funds, it is considered that a project at site 4 would be the most feasible project.

The local interests, however, have expressed a desire for the project at site 1 and recognize that the additional environmental improvement at this site stemming from the mitigation of a polluted condition of local origin is a local responsibility to be undertaken at local expense if it is desired by local interests. The local interests have formally stated a willingness to pay for this environmental enhancement. Selection of site 1 is dependent on the local assumption of the excess cost, presently estimated at \$761,000, involved in construction at the site of their preference. The feasibility of a barrier at site 1 is conditioned further on the relocation of the Eastex, Inc. industrial waste effluent to a location downstream of site 1. This action is being undertaken by the owner independently of construction of any barrier to prevent saltwater intrusion and will be done as a non-project cost.

An evaluation of the economics from the standpoint of national efficiency of the several alternatives for providing fresh water for municipal, industrial, and agricultural use in Jefferson County shows that a saltwater barrier in the Neches River above Beaumont would be the most economical alternative and that a project at site 4 would afford the largest net return on the required investment. Further, it is found that substantial environmental benefits will be realized from a more costly but functionally equivalent project located 3.3 miles farther downstream at site 1.

Local interests are willing to pay the additional costs necessary to realize these improvements. Insofar as can be determined, the adverse environmental effects would be about the same for a project at any site. The adverse effects from removal of the land area occupied by project features from its natural condition are not subject to monetary evaluation, nor are the beneficial effects from restoration of original freshwater conditions to the reach of the river above the project site. It is the apparent conclusion of all persons who have expressed their views, that the beneficial effects exceed the adverse effects. It is concluded that a saltwater barrier project at site 1 would serve man's total needs best.

6. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LOCAL LONG-TERM PRODUCTIVITY. The project will be of both long- and short-term benefit to man's environment and long-term productivity by improving the reliability of water supply which is vital to the municipal, industrial, and agricultural economy of the area, thereby promoting the economic well-being of the population of the area. It will restore many miles of natural river to a freshwater, pollution free condition, enhancing the suitability of the stream and its environs for fish and wildlife and enhancing man's enjoyment of the aesthetics and recreational opportunities offered by the stream. It will restore the stream to its naturally navigable capacity on a year-round basis, eliminating impediments to man's free use and enjoyment for recreational boating and related pursuits, including access by boat to the Big Thicket area upstream. Freshwater sport and commercial fishing will be improved.

Land use in the project area is presently devoted to industry, agriculture, and recreation. No significant changes in these land uses are expected to be induced by this project, other than to enhance recreational use of adjoining undeveloped lands benefitting from improved water quality in the stream. However, the proposed project will afford insurance to the continuity of the municipal, industrial, and agricultural water supplies that are being adequately provided by existing facilities. To this extent the project will influence regional growth.

By permits from the Texas Water Rights Commission, the City of Beaumont and the Lower Neches Valley Authority (LNVA) are entitled to use about 16.6 percent of the average flow of the Neches River. Present actual use is about half the permitted use. Return flows from this use generally flow into Taylors Bayou and empty into the lower end of Sabine Lake. As municipal and industrial growth occurs in Jefferson County, the Lower Neches Valley Authority and the City of Beaumont will use larger and larger portions of their permitted quantity of surface water. The estimated effect on the estuary of these future increases in municipal and industrial water demands will be to decrease the volume of flow into the estuary during periods of high flow. During future periods of

low flow and high water use, it is estimated that the net effect on the estuary will be approximately the same as at present. Future increases in salinity intrusion will increase the average period during the year when the gates in the barrier have to remain closed; however, this will be offset by the fact that fresh water will be released to the estuary each time the navigation gate is opened for the passage of recreational and commercial vessels.

If the saltwater barrier were used to divert all or nearly all the flows of the river from the estuary, long range adverse effects on Sabine Lake and its associated biota could be expected. However reduction in river flow below that now occurring could come about only if permitted withdrawals are increased.

7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES INVOLVED IN THE PROPOSED ACTION. The irreversible and irretrievable commitments of resources will be the loss of the existing trees and vegetation on 41 acres of the project site, part of the trees and vegetation on 16 acres, the loss of 57 acres as wildlife habitat, and the capital, labor, and material resources associated with construction of the project.

## 8. COORDINATION WITH OTHERS.

a. Public Participation. Three public meetings have been held on this project. The first on 14 November 1961 for initiation of the study, the second on 9 December 1970 to consider a number of alternate solutions and specifically to discuss views on the environmental conditions in the area, and the third on 24 March 1972 to discuss the proposed plan. The environmental aspects of the proposed plan were thoroughly discussed. News releases were issued concerning the public meetings, and an environmental assessment was included with the public notice announcing the third public meeting. A news release was issued on 3 January 1973 generally describing the project and advising the public that copies of a preliminary draft of this statement were available on request. A copy of the news release and a list of recipients of the statement as a result of this announcement are included in Appendix C.

b. Government Agencies. The regional Director, Bureau of Sport Fisheries and Wildlife, in letters dated 26 April 1972 and 24 July 1972, advised that a project at site 1 will increase annual freshwater sport fishing by 5,400 man-days and that annual freshwater commercial catch will increase by 400 pounds. The total annual fish and wildlife benefits for a barrier at site 1 are estimated at \$5,600. Similarly, the Fish and Wildlife Service estimates that a project at alternate site 4 would have benefits of \$6,300. The Fish and Wildlife Service estimates that a project at either site would not significantly affect wildlife. The Bureau of Sport Fisheries reports on the project are included as Appendix A to this statement.

Copies of the preliminary draft of this statement were sent to the following governmental agencies for review and comments on 29 December 1972. All comments received are summarized and, where appropriate, responded to below. Copies of the agencies replies are attached to the statement as Appendix B.

(1) STATE CONSERVATIONIST, TEXAS, SOIL CONSERVATION SERVICE, DEPARTMENT OF AGRICULTURE. (Attachment B-1)

Comment: "We have completed our review of the preliminary draft environmental statement on a proposed saltwater barrier in the Neches River at Beaumont, Texas.

Information contained herein appears to adequately cover the environmental impact of the proposed project."

(2) SOUTHEASTERN AREA, FOREST SERVICE, DEPARTMENT OF AGRICULTURE. (Attachment B-2)

Comment: "The Preliminary Draft Environmental Statement, 'Neches River and Tributaries, Texas Saltwater Barrier on Neches River at Beaumont, Texas,' has been reviewed by our office.

We feel the statement adequately describes the situation and predicts probable changes."

(3) DEPUTY ASSISTANT SECRETARY FOR ENVIRONMENTAL AFFAIRS, DEPARTMENT OF COMMERCE. (Attachment B-3 through B-5)

Comment: "It is stated that the salt water intrusion up the river is a problem related to navigational improvements previously installed. The Statement should also note that the intrusion is also related to the significant reductions of fresh water flows to the estuary during certain seasons."

Response: The statement has been revised to reflect this comment. (Page 1)

Comment: "Under Alternative to the Proposed Action, only the negative impacts expected from the alternative of flushing are discussed. The benefits to the marine fishes and crustaceans reared in the

Sabine Estuary should also be discussed, including the value of fresh water inflows as both a source of nutrients and a reducer of salinity in the estuary, as noted in Copeland (1966) and Copeland, Odum and Cooper (1972). Although the flows today may be more than sufficient in some parts of the year, the draft statement indicates a future 'lack of water to meet the future demand through the state.'

Response: The statement has been revised to reflect this comment. (Page 21)

Comment: "Since a major objection to the alternative of flushing indicated in the draft statement would be the need for 'a net flow of 1,900 cubic feet per second,' another alternative of constructing a sill just below the water surface with sufficient flushing to provide for a continuous downstream flow should be discussed. This alternative would not require as great a flow of water. It would, however, provide a long-term assurance of some fresh water inflows to the estuary."

Response: Do not concur. A submerged fixed weir is not considered to be a feasible alternative since it would obstruct navigation and would cause higher water surface elevations upstream especially during flood flows. Furthermore, a submerged weir would not prevent intrusion of polluted water over the weir whenever the withdrawals equal or exceed the river flow.

Comment: "It should be noted that an alternative requiring at least some continuous flushing would help insure that the Neches River contributes the future minimum estimates of needed flows to the estuary. A further observation should be made that the marine fishes and crustaceans reared in the estuaries support a large seafood industry, as well as marine sport fishing."

Response: The statement has been revised to discuss continuous downstream water releases and its effect on Sabine Lake (pages 21 and 22. Although not discussed in this



statement, it is acknowledged that Sabine Lake supports a significant sport and commercial fishery.

Comment: "With regard to the Relationship between Local Short-Term use of Man's Environment and the Maintenance and Enhancement of Local Long-Term Productivity, a discussion of possible long-term effects on estuarine productivity should be included. A downstream structure that can completely block the river could conceivably be used to divert all or nearly all of the flows from the river. According to the draft statement, the average number of days of closure for the past four decades was 111 days per year. The average annual number of days of closure predicted for future decades should also be included. That some of these actions may occur without the federal project, though worthy of note, does not lessen the need under the National Environmental Policy Act for delineating the expected impacts of the federal project."

Response: The statement has been revised to recognize this comment. (Page 27)

(4) REGION VI, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. (Attachment B-6)

Comment: "Environmental health program responsibilities and standards of the Department of Health, Education, and Welfare include those vested with the United States Public Health Service and the Facilities Engineering and Construction Agency. The U.S. Public Health Service has those programs of the Federal Food and Drug Administration, which include the National Institute of Occupational Safety and Health and the Bureau of Community Environmental Management (housing, injury control, recreational health and insect and rodent control).

Accordingly, our review of the Draft Environmental Statement for the project discerns no adverse health effects that might be of significance where our program responsibilities and standards pertain, provided that appropriate guides are followed in concert with State, County, and local environmental health laws and regulations.

We therefore, have no objection to the authorization of this project insofar as our interests and responsibilities are concerned."

(5) REGION 2, BUREAU OF SPORT FISHERIES AND WILDLIFE, DEPARTMENT OF THE INTERIOR. (Attachment B-7)

Comment: "The discussion of alternatives to the proposed action, starting on page 13, includes flushing by freshwater from upstream reservoirs. No mention is made, however, of the extent of this practice under existing conditions and whether this practice would be continued after project construction. Operational procedures for B. A. Steinhagen Lake (Dam B Reservoir) now include provisions for the release of 140 second-feet during periods of saltwater intrusion. We believe that the environmental statement should give consideration to these flushing releases as an existing influence on the environment and also discuss the impacts which may occur should these releases be eliminated or modified. "

Response: The statement has been expanded to discuss the effect of constructing the saltwater barrier on freshwater flows to the estuary. The statement shows that the proposed barrier will effect little change in the flows of the Neches River as they occur under existing conditions. The Definite Project report dated 1957 on the upstream reservoirs tentatively allocated 140 cfs to be released from B. A. Steinhagen Lake for salinity and pollution control in the lower Neches River and the regulation schedules dated May 1971 for operation of the reservoirs state that it is desirable to maintain a continuous flow of fresh water in the lower river to dilute and flush out sewage and industrial wastes and to prevent salt water from encroaching upstream. Such releases are entirely inadequate to prevent intrusion of pollution upstream, however, the proposed saltwater barrier will not bar such releases from the lower river. (Pages 15, 21, and 27)

(6) SOUTHWEST REGION, NATIONAL PARK SERVICE,  
DEPARTMENT OF THE INTERIOR. (Attachment B-8)

Comment: "The draft statement should contain evidence of contact with the Texas Historic Preservation Officer and include his comments concerning the effect of the undertaking upon historical and archeological resources."

Response: Comments of the Texas Historical Survey Committee are included in Appendix B.

Comment: "As the preliminary draft statement points out: 'Adequate data to assess the impact of the project on the archeological resources are not available at this time' (p. 11). Therefore, the treatment of archeological resources is inadequate. Archeological sites and materials are non-renewable resources and any adverse impact constitutes an irreversible and irretrievable commitment of such resources. It is not sufficient to state that 'no sites of local or State significance will be affected by the project.' (p. 11.) A qualified professional archeologist must survey the entire area of the proposed project. The draft statement should cite the resulting report and both the survey and report should be available for review. If archeological materials are found within the scope of the project, the draft statement must include an evaluation of the significance of the resources and also contain cost estimates and steps to be taken to mitigate any adverse effects on the archeological resources."

Response: The statement has been revised to expand the discussion of cultural resources. (Pages 16 and 17)

(7) INTERMOUNTAIN FIELD OPERATION CENTER, BUREAU  
OF MINES, DEPARTMENT OF THE INTERIOR. (Attachment B-9)

Comment: "Our primary interest in the project is possible involvement of mineral resources and mineral-production facilities, and our office review indicates

that the proposed improvements would have no adverse effect thereon. Although we have no objection to the project as described, any subsequent environmental impact statement might well include such language as the following:

The project is not expected to affect adversely any mineral resources nor will it appreciably hamper future exploitation of such resources."

Response: Suggested language has been added to the statement. (Page 18)

(8) TEXAS DISTRICT, WATER RESOURCES DIVISION, GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR. (Attachment B-10)

Comment: "The Water Resources Division of the U.S. Geological Survey, Texas District, has no comments to make on the preliminary Draft Environmental Statement for the construction of a permanent barrier across the Neches River, Jefferson County, Texas."

This agency by letter dated 29 January 1973 (B-11) forwarded a copy of the comments of the Office of Environmental Quality, Geological Survey summarized below.

(9) OFFICE OF ENVIRONMENTAL GEOLOGY, GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR. (Attachment B-12)

Comment: "No data on the geology of the area of the proposed barrier project are provided in the draft environmental statement. However, environmental problems that may result from geologic conditions should be recognizable from pre-construction investigations and should be within the range of standard engineering practice."

Response: Information on the geology of the project area has been added to the statement. (Pages 5, 6, and 7)

(10) SOUTH CENTRAL REGIONAL OFFICE, BUREAU OF OUTDOOR RECREATION, DEPARTMENT OF THE INTERIOR. (Attachment B-13)

Comment: "We have found the statement to be adequate and have no substantive comments to offer."

(11) EIGHTH COAST GUARD DISTRICT, DEPARTMENT OF TRANSPORTATION. (Attachment B-14)

Comment: "The Commander, Eighth Coast Guard District does not have any objections to the referenced draft environmental statement."

(12) REGION VI, ENVIRONMENTAL PROTECTION AGENCY.  
(Attachments B-15 through B-17)

Comment: "In the discussion of the existing environment, reference is made to the City of Beaumont's sanitary landfill on the west bank of the river upstream from mile 22.6. We suggest that a discussion of the leachate from this fill be included in the report and the statement. Should the area for the sanitary landfill extend beyond mile 23.0, the leachate could reach the river above the proposed salt water barrier. Usually leachate from sanitary fills contains pollutants. If these pollutants reach the river, one of the purposes of the project - an unpolluted reach of water above the salt water barrier - would be defeated. The City of Beaumont should be consulted and their plans for the sanitary landfill and any provisions for abating possible pollution by leachates should be included in the report."

Response: The statement has been revised to include a discussion of the leachate from the landfill. (Pages 14 and 15)

Comment: "Reference is made in several sections of the report and the statement to 'local interest.' The 'local interest' should be identified in the first part of the report and statement and possibly be substituted for 'local interest' throughout the report."

Response: The words "local interests" are commonly used in Corps of Engineers reports to refer both to concerned local citizens and groups and to the local agency which assumes responsibility for the non-Federal share of the

project. In this instance the local financial sponsor is the Lower Neches Valley Authority.

Comment: "We do not understand why the salt water wedge is 'a Federal responsibility related to navigation improvements previously installed.' An examination of the profile of the river shows the bed of the river does not reach mean sea level until mile 44. This strongly indicates that the salt wedge was there before navigation and will reach its furthest point upriver during periods of low flows and withdrawal of large quantities of water."

Response: The statement has been revised to indicate the possibility of saltwater intrusion under natural conditions prior to dredging of the navigation channels.  
(Page 1)

Comment: "It is not clear from the discussion on the alternative for flushing the salt water from the channel how the 1900 cfs that would be required to keep the salt water wedge below the fresh water intake at Bunns Bluff was computed."

Response: The statement has been revised to indicate that the required flow was estimated using Keulegan's formula.  
(Page 21)

Comment: "We suggest that a combination of surface water and ground water to supply municipal, industrial and agricultural demands be considered as an alternative to the salt water barrier."

Response: Do not concur. Consideration of this proposed alternative shows that while the available ground water supply in the lower Neches River basin of 350,000 acre-feet per year is adequate to meet the present municipal and industrial water demands, it is much less than would be required for future municipal and industrial uses. If surface water were to be reserved for irrigation use, it would still be necessary to construct a saltwater barrier to protect the water supply from contamination by saltwater

during periods of low net flow in the river. The irrigation water demand is much larger and more concentrated than the municipal and industrial water demands and the peak rate of withdrawal of surface water for irrigation use alone would be almost as great as the present peak rate of withdrawal for municipal, industrial, and irrigation uses.

Comment: "The statement that the proposed barrier will have little effect on fresh water flows to the estuary should be discussed in detail. The barrier will be closed 4 to 6 months each year. If the time period for this length of closure is continuous, there could be an adverse effect on the ecosystems of the estuary."

Response: The statement has been revised to include a discussion of the effects of fresh water flows on the ecosystems of the estuary. (Pages 15 and 16)

Comment: "A map should be furnished that shows the service area and the 16 acres of land on the point isolated or severed by the salt water barrier and their relationship to the project. All spoil areas should also be shown on the map."

Response: As shown on Plate 3, land situated between the proposed navigation by-pass channel and the river will be the only severed land. Since the disposal areas have not as yet been delineated, the general description of their locations provided in the statement is considered adequate.

Comment: "All dredged material should be placed behind dikes or levees with control weirs so the sediment returning to the river will be reduced."

Response: Concur. The statement indicates the use of leveed disposal areas. (Page 3)

Comment: "The total cost of the project should be given with a brief discussion of how the benefit-to-cost ratio of 1.86 was computed."

Response: The statement has been revised as suggested and an updated B/C ratio presented (Page 4)

Comment: "We suggest that the cost of each alternative be included in the discussion of the alternatives to the project."

Response: Do not concur in that adequate information has been presented for evaluating and comparing project alternatives and their relative costs.

(13) DIVISION OF PLANNING COORDINATION, STATE OF TEXAS. (Attachment B-18 through B-21). This agency summarized comments of various state agencies and furnished copies of their comments. Comment of the various state agencies are summarized below.

(a) TEXAS PARKS AND WILDLIFE DEPARTMENT.  
(Attachment B-22)

Comment: "Our Department has reviewed this report and agrees with the enclosed findings. We would hope to press the Corps of Engineers for a barrier at Site 1 rather than the other locations."

(b) TEXAS WATER DEVELOPMENT BOARD. (Attachment B-23 through B-26)

Comment: "In the opinion of the Water Development Board staff, benefits to be derived from the project far outweigh any adverse effects. \*\*\*\*\*We strongly recommend construction of this Corps of Engineers facility, as proposed, and believe that the draft environmental impact statement sufficiently complies with the provisions of NEPA."

(c) TEXAS WATER QUALITY BOARD. (Attachment B-27)

Comment: "\*\*\*\*\*the staff of the Texas Water Quality Board concurs with the cited upstream benefits. However, we feel that the probable adverse downstream water quality effects have not been presented by the Corps of Engineers. Accordingly, we would recommend that a discussion of the downstream water quality effects be included as a part of the Environmental Statement."



Response: The statement has been revised to discuss downstream water quality. (Pages 15 and 16)

(d) TEXAS WATER RIGHTS COMMISSION. (Attachment B-28 through B-43)

Comment: "Our staff finds \*\*\*\*\* that the Draft Environmental Statement appears to be in compliance with the policies and guidelines contained in Sections 101 and 102 (2) (C) of the National Environmental Policy Act of 1969."

Comment: "Special recognition should be given \*\*\*\*\*in the Environmental Statement to the provisions of the Federal Water Pollution Control Act Amendment of 1961, regarding the inclusion of water quality storage in Federal reservoirs."

Response: Do not concur. The only water storage is that which is necessary to create a one foot head upstream from the barrier to prevent seepage of salt water through the barrier. No provision is made for release of water for quality control.

(e) TEXAS STATE HISTORICAL SURVEY COMMITTEE. (Attachments B-44 and B-45).

Comment: "\*\*\*\*\*the above-referenced documents have been examined and are found to be deficit in dealing with cultural (archeological, historical, and architectural) resources. Both Orange and Jefferson Counties contain archeological sites of high significance, and one Orange County site, on Baird's Bayou, lies near the project area. For all purposes, the cultural resources of the project area are unknown; the statement in the draft impact statement (p. 11) concerning the State and local significance of the cultural resources is obviously incorrect."

Response: The statement has been revised to include information furnished by the Texas State Historical Survey Committee. (Pages 11 and 16)

Comment: "Recommended survey, to determine significance of cultural resources."

Response: Recommended survey will be conducted during preconstruction planning stage of the project.

(f) BUREAU OF ECONOMIC GEOLOGY, THE UNIVERSITY OF TEXAS AT AUSTIN. (Attachment B-46).

Comment: 'Our staff has completed review and has no substantial negative response. In recent surface mapping we have completed in this area, we have defined a photographic linear extending along the north end of the proposed salt barrier, approximately paralleling the proposed city road. Many of these kinds of linears are coincident with active faults in the Houston area, and although we have no indication that this particular linear represents an active surface fault, some field observation might be worthwhile. We can provide the Corps with a map showing the location of the linear if they desire.'

Response: A map of the photographic linear has been obtained from the Bureau of Economic Geology. When funds are made available for detailed preconstruction planning, surface and subsurface investigations will be made to determine whether a fault exists and, if so, whether modification of the project will be necessary.

(14) SOUTHEAST TEXAS REGIONAL PLANNING COMMISSION. (Attachments B-47 and B-48)

Comment: "It is the opinion of the SETRPC Executive Committee that the proposed project will have a favorable environmental impact."

(15) LOWER NECHES VALLEY AUTHORITY. (Attachment B-49)

Comment: "The Authority has examined this statement and approves the findings and conclusions contained therein pertaining to the construction of the Salt Water Barrier at Site 1."

(16) ENVIRONMENTAL CONTROL DEPARTMENT, JEFFERSON COUNTY. (Attachments B-50 and B-51)

Comment: "After having reviewed the literature of the proposed project, attending the public hearings, and considering the alternatives, we concur with the preliminary draft environmental impact statement."

(17) CITY OF BEAUMONT. (Attachments B-52 and B-53)

Comment: "We believe that with the installation of this project at mile 23.0 the thousands of acres adjacent to the river will restore itself into a semblance of its original natural beauty. With this restoration, all forms of wildlife will return, and within the near future a tremendous impact on the conservation of our natural resources will be realized.

It is also felt that this project will substantially reduce the threat of salt water encroachment into the City of Beaumont's fresh water supply.

The City of Beaumont endorses this project and feels that the project will greatly enhance the fresh water environment upstream from the project."

c. Citizen Groups.

(1) CLEAN AIR AND WATER INCORPORATED. (Attachments B-54 and B-55)

Comment: "Our association has considered this report very carefully and we tentatively approve the location of the barrier and navigation locks at Mile 23.0 of the Neches River at Beaumont. We would be unalterably opposed to the location of the barrier at any point on the Neches River above Mile 23.0. We would consider its location farther down stream."

Response: The report recommends construction of a project at site 1, that preferred by local interests, subject to a cash contribution by local interests of the difference in cost between that site and the most economical site, site 4. The local interests have reaffirmed their intention to contribute the excess cost for the project at site 1.

(2) NECHES BOAT CLUB. (Attachment B-56).

Comment: "Our group strongly favors site number one, which was previously proposed and strongly recommended by almost every body who attended the hearing.

If site number one is not to be used, we feel that there should not be a salt water barrier."

Response: See response to comment from Clean Air and Water, Incorporated.

(3) Comments of the following citizen's organizations were requested: however no comments were received.

Sierra Club  
National Wildlife Federation  
National Audubon Society  
Texas Committee for Natural Resources, Texas Wildlife  
Nature Conservancy  
League of Women Voters

d. Coordination of the Revised Draft Environmental Statement. The preliminary draft environmental statement was revised to reflect comments received during field level review. A revised draft environmental statement was furnished the Department of Interior; Department of Transportation; Department of Health, Education, and Welfare; Department of Agriculture; Department of Commerce; the Environmental Protection Agency; and the State of Texas for review and was filed with the Council on Environmental Quality on 18 November 1974. With exception of the Department of Commerce, each of the above cited recipients of the revised draft statement either replied with comments or indicated they had no comments to offer. Comments on the revised draft statement were also received from the Southwest Regional Representative of the National Audubon Society. All comments received are summarized and responded to below, and copies of the replies are attached to this statement as Appendix "D" (Attachments D-1 through D-37).

(1) DEPARTMENT OF THE INTERIOR. (Attachments D-1 and D-2)

Comment: "We have some doubts about the benefits to be derived from this proposed project in view of the economically attractive and effective temporary saltwater barriers now being used. The reports should provide a sound analysis of technical, engineering and economic features that clearly demonstrate that the proposed project is superior to the existing one."

Response: The essential elements of an acceptable plan are that it should permanently control salinity intrusion in the river; provide for free and reasonably unobstructed use of the river by existing and prospective recreational and commercial navigation; be compatible with any future plan for extension of a barge channel above Beaumont; and preserve or enhance the natural environment of the river and its flood plain. Although the temporary barriers are effective and economical, they obstruct existing navigation when in place and are incompatible with the potential for extending navigation. Therefore, the temporary barriers are unacceptable as a permanent solution.

Comment: "The review reports and the draft environmental statement do not evaluate the possibility that continuing subsidence along the Gulf Coast may nullify project benefits within a relatively brief period. Continuing development in this area necessitates greater groundwater withdrawals, that will accelerate land subsidence and tend to reduce the 1-foot differential at the proposed structure, thereby reducing or negating the usefulness of the proposed project. Additional information pertaining to the adequacy of the 1-foot differential is desired."

Response: As discussed in the statement, most of the land surface of Jefferson County subsided less than 0.25 feet between 1918 and 1954. Recently the National Geodetic Survey furnished information on the 1973 releveing. Between 1959 and 1973 seven bench marks in the Beaumont area subsided an average of about 0.5 feet. At this rate of subsidence, about 100 years will elapse before the 3.5-foot freeboard at the barrier reduces to zero. Installation of the proposed saltwater barrier.

will insure the reliability of the existing surface water supplies and retard the development of additional ground water withdrawals. We have no evidence to indicate that other demands will produce either a significant future increase in withdrawals of groundwater in Jefferson and Orange Counties or a significant increase in the rate of subsidence. It is believed that a one-foot differential is adequate to minimize upstream penetration of salt water through the navigation gate when it is opened for navigation.

Comment: "The revised draft environmental statement adequately addresses the concerns of outdoor recreation and fish and wildlife resources."

Comment: "The proposed action will not adversely affect any proposed or existing unit of the National Park System, including the nearby Big Thicket National Preserve. No site eligible for registration as a National Historic, Natural or Environmental Education Landmark will be affected."

Response: This information has been incorporated into the final statement. (Page 17)

Comment: "We also agree that the proposed project should not significantly affect mineral resource development (environmental statement, page 18)."

Comment: "Results of the archeological survey mentioned on page 15, paragraph 1 of the environmental statement should be included in the final statement. If the survey locates sites that will be disturbed by the project, the final statement should also include actions that will be taken to mitigate the impact on non-renewable archeological resources."

Response: The archeological reconnaissance will be conducted as part of post authorization planning studies. Should this reconnaissance reveal that significant cultural resources would be adversely affected by construction of the proposed project, appropriate measures

to mitigate damage to the resources will be coordinated with the State Historic Preservation Officer, the National Park Service, and the Advisory Council on Historic Places.

Comment: "If operational procedures proposed by the Corps of Engineers, on pages 12 and 13 of the environmental statement are strictly adhered to freshwater return flows to the Sabine Lake Estuary should not be significantly reduced below historically recorded values. In addition, approximately 17 miles of the Neches River and Pine Island Bayou will be improved in water quality as a result of the project.

Response: Concur.

(2) DEPARTMENT OF TRANSPORTATION. (Attachment D-3)

Comment: "The concerned operating administrations and staff of the Department of Transportation have reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

(3) DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE. (Attachments D-4 and D-5)

Comment: ". . . . our review of the Draft Environmental Statement for the project discerns no adverse health effects that might be of significance where our program responsibilities and standards pertain, provided that appropriate guides are followed in concert with State, County, and local environmental health laws and regulations. We therefore have no objection to the authorization of this project insofar as our interests and responsibilities are concerned."

Comment: "Review of draft of this plan revealed no areas of concern in regard to compliance with Section 102(2)(c) of Public Law 91-190. This revised impact statement is still in compliance with these criteria and no changes are recommended."

(4) DEPARTMENT OF AGRICULTURE. (Attachment D-6)

Comment: "The Draft Environmental Statement meets the requirements of the National Environmental Policy Act of 1969."

(5) ENVIRONMENTAL PROTECTION AGENCY, REGION VI.  
(Attachments D-7 through D-10)

Comment: "The statement indicates that the Lower Neches River Authority 'periodically' constructs temporary salt water barriers to protect the fresh water supply. The frequency with which these barriers have been constructed in the past should be described. For example, are the temporary barriers needed every year? This information would further aid in better understanding the need for the project."

Response: Frequency and duration of installation of the temporary barriers are discussed in the final statement on page 8.

Comment: "An earth fill and concrete auxiliary dam are proposed to be constructed across the canal which drains the southern end of Baird's Bayou. However, no discussion as to the need for such a structure is given in the statement. This aspect of the project, including the associated environmental impacts, should be discussed in the Final Environmental Impact Statement."

Response: The final statement has been revised to express the need for the auxiliary dam (Page 4). Although not specifically identified, the environmental effects of construction of the auxiliary are discussed in Section 3, Environmental Impact of the Proposed Action.

Comments: "The statement indicates that should the local interests not make the required cash contributions for a project at river mile 23.0, the project is proposed to be built at river mile 26.3. Further discussion should be included as to possible impacts associated with a barrier at this location. For example, will an earth fill auxiliary structure still be required for Baird's



Bayou, and if so, what will its function be? Also, if navigation lock and canal is needed for alternate sites, these areas should be clearly illustrated on an appropriate map."

Response: The proposed alternate barrier site at river mile 26.3 has been omitted from the recommended plan, and appropriate revisions have been made in the final statement. Although navigation gates and canals would be required at each of the sites considered, inclusion of detailed site layout maps for the alternate sites is not considered necessary.

Comment: "We would also suggest that consideration be given to the preparation of a revised or supplemental Environmental Impact Statement for the proposed project should the barrier be placed at an alternate location. For example, at river mile 26.3, spoil from the construction of a navigation lock and channel will have to be disposed of in alternate sites. A revised statement would help to ensure that an adequate assessment has been made of the possible environmental impacts associated with construction of the project at the alternate site in question."

Response: See above response regarding alternate barrier site at river mile 26.3. Should the proposed project be authorized and should substantive revisions to the project be necessary during post authorization planning, a supplemental or revised environmental statement will be prepared.

Comment: "The statement contains no data as to the existing quality of water in the Neches River. This information is necessary in order that an adequate assessment of the possible impacts to water quality can be made. The water quality data should include levels of dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, existing nutrient concentrations, salinities, and concentrations of toxic pollutants (heavy metals, pesticides). If data is available, an effort should be made to compare the water quality both above and below the temporary barriers. These comparisons could help

in substantiating statements as to the seasonally dependent decrease in the quality of water in the lower reaches of the proposed project area."

Response: The statement has been revised to provide additional discussion of water quality (Page 9), and available data have been included in the final statement. (Appendix E and Tables 1 through 3).

Comment: "Another alternative to the navigation lock and canal which should be discussed is the incorporation of a navigation lock into the salt water barrier. The salt water intrusion problem would be mitigated and still allow barge traffic to continue on the river. It appears that building the proposed by-pass channel, which could be expanded to accommodate larger barges, could actually induce an increase in barge traffic with accompanying pollutants."

Response: Basic considerations in designing the gates for the main barrier in the Neches River were that they have sufficient cross sectional area to pass large flows at stream bed elevation to facilitate the periodic flushing of accumulated sediment and that the cross-sectional area be sufficient to pass river flows at no greater velocity than corresponding velocities in the natural river channel in the vicinity of the structure. Incorporation of the navigation lock into the main barrier would decrease the cross sectional area available for gated structures and would thus increase water surface elevations and water velocities during periods of flood flow. The navigation channel and navigation gate are designed to accommodate existing recreational and commercial navigation, and their construction in itself is not expected to induce increases in barge traffic over and above that which would normally occur.

Comment: "Possible adverse secondary impacts which could be induced by the project should also be discussed in the statement. For example, increased barge traffic and a more reliable water supply could induce an increase in industrialization in the area accompanied by increased noise, air, solid waste, and water pollution. Increased demands and dependence on the water supply

provided by the Neches River may require that the salt water barrier be closed for a longer time period during the year. This could represent a potential impact to downstream estuarine areas bringing about a decline in productivity. Such an impact would be of a long-term nature and may represent an essentially irretrievable commitment of resources. Such possible long-term impacts need to be discussed in the statement."

Response: The statement has been amended to discuss the long-term effect of the proposed project on the long-term growth and development in Jefferson County and possible secondary environmental effects. (Pages 17 and 27)

Comment: "These comments classify your Draft Environmental Impact Statement as LO-2. Specifically, we have no objection to the proposed project. However, additional information on the existing water quality of the Neches River and the possible long-term secondary impacts which the project may have on downstream estuarine areas is needed in the final statement."

Response: Available water quality data have been included in the statement, and the discussion of the effects of the proposed project on downstream estuarine areas has been expanded.

(6) GOVERNOR OF TEXAS. (Attachment D-11 through D-16)

Comment: ". . . . , in response to your request for comments on the project environmental statement, the State reaffirms its comments submitted in letters of February 21, 1973 and May 15, 1973, to the Galveston District Engineer, relative to the Preliminary Draft Environmental Impact Statement. The Revised Draft Environmental of August 1974 which you forwarded by letter of November 18, 1974, properly incorporates the views of the appropriate State of Texas agencies. The statement appears to conform adequately to the provisions of Section 102(2)(C), Public Law 91-190. I suggest that a copy of this letter be included in the Final Environmental Impact Statement."

Response: The Governor's letter is included as Attachments D-11 and D-12. Included with the letter is an order of the Texas Water Rights Commission with a statement by the City of Beaumont and the Lower Neches Valley Authority presented at the Commission's public hearing on 5 February 1975. The order and the appended statement are included as Attachments D-13 through D-35.

(7) SOUTHWEST REGIONAL REPRESENTATIVE, NATIONAL AUDUBON SOCIETY. (Attachments D-36 and D-37)

Comment: ". . . . , the National Audubon Society would like to echo the concerns expressed in letters to the Corps of Engineers by Sidney R. Galler, Deputy Assistant Secretary of Commerce, dated January 15, 1973 and reproduced in the draft environmental statement. In addition, we concur with the concerns reflected in the correspondence dated February 13, 1973 from Charles H. Hembur, Chief of the Federal Assistance Branch, Region IV, of the U.S. Environmental Protection Agency in Dallas. This correspondence is also reproduced in the draft environmental statement. We feel that both of these agencies make very valid points of concern, especially in regard to the protection of the estuarian areas."

Comment: "The draft environmental statement was referred to our nearest chapter, which in this case was the Sabine Audubon Society headquartered in Beaumont, Texas. The impact statement was subsequently reviewed by the chapter's conservation committee chairman, John Frink, who offers the following comments which the National Audubon Society endorses. The comments are as follows:"

Comment: "Although there appears to be some uncertainty as to which of the works of man is responsible for the saline intrusion on the Neches River above the city of Beaumont, the contention that this intrusion is detrimental to the riverine ecology of the Neches is not disputed. Further, the draft environmental statement as revised August, 1974, is essentially correct in its assessment of the impact of the proposed salt water barrier upon the Neches basin environment."

Comment: "If the proposed barrier is to be constructed, it must be located as far to the south as possible; the benefits afforded by the barrier decrease geometrically as the site is moved upriver, and any location north of site 1 (mile 23.0) is unacceptable. Regardless of site, however, the relocation of the Eastex, Inc. effluent outfall to a location downstream of the barrier is a necessary condition for successful effect of the barrier."

Response: The southernmost feasible site for the barrier is the recommended location for the facility. As stated in Section 3 of the statement, the proposed project will not be constructed until Eastex, Inc. relocates its effluent discharge point to a new location downstream from the barrier.

## TABLES

Table 1

NECHES RIVER BASIN

0804100D NECHES RIVER AT EVADALE, TEX.

LOCATION.--Lat 30°21'22", long 94°05'36", Jasper County, at gaging station at bridge on U.S. Highway 96 at Evadale, 0.8 mile (1.3 km) upstream from Mill Creek, and 16 miles (26 km) upstream from Village Creek.

DRAINAGE AREA.--7,951 mi<sup>2</sup> (20,593 km<sup>2</sup>).

PERIOD OF RECORD.--Chemical analyses: October 1947 to September 1974.  
 Chemical and biochemical analyses: January 1968 to September 1974.  
 Pesticide analyses: January 1968 to September 1974.  
 Water temperatures: October 1947 to September 1974.

EXTREMES.--October 1973 to September 1974:

Specific conductance: Maximum daily, 171 micromhos Apr. 6; minimum daily, 67 micromhos Jan. 29.  
 Water temperatures: Maximum, 29.0°C on many days during summer months; minimum, 8.0°C Dec. 21, 22, Jan. 4, 5.

Period of record:

Specific conductance: Maximum daily, 422 micromhos Jan. 25, 1957; minimum daily, 23 micromhos Sept. 19, 1963.  
 Water temperatures: Maximum, 34.0°C June 29, 1953; minimum, 3.0°C Jan. 30, 31, 1948, Jan. 31, 1949, Jan. 24, 1963.

REMARKS.--for information on diversions and return flows, see REMARKS paragraph in Part 1 of this report.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	TIME	INSTAN- TANEOUS DIS- CHARGE (CF/S)	DIS- SOLVED SILICA (SI02) (MG/L)	DIS- SOLVED CAL- CIUM (CA) (MG/L)	DIS- SOLVED MAG- NE- SIUM (MG) (MG/L)	DIS- SOLVED SODIUM SODIUM (NA) (MG/L)	DIS- SOLVED SODIUM PLUS POTAS- SIUM (K) (MG/L)	DIS- SOLVED PO- TAS- SIUM (K) (MG/L)	BICAR- BONATE (HCO3) (MG/L)	CAR- BONATE (CO3) (MG/L)	DIS- SOLVED SULFATE (SO4) (MG/L)	DIS- SOLVED CHLO- RIDE (CL) (MG/L)
OCT.												
11...	0930	5500	9.4	9.0	3.4	14	--	3.1	33	0	14	19
26...	1030	8760	11	6.8	2.2	--	8.3	--	17	0	14	11
NOV.												
13...	1400	15800	12	5.3	1.6	7.2	--	2.9	15	0	7.6	10
DEC.												
19...	0925	17000	9.4	7.5	3.0	--	13	--	26	0	14	16
20...	0900	17800	9.0	7.0	2.7	13	--	3.3	24	0	14	17
JAN.												
27...	0830	23600	7.1	4.6	1.1	6.8	--	1.8	13	0	7.5	6.7
FEB.												
06...	0830	24000	7.8	4.9	1.1	5.9	--	2.0	14	0	9.9	7.8
21...	1040	21500	6.7	6.5	3.4	--	10	--	21	0	12	16
MAR.												
14...	0830	21600	6.7	6.8	2.8	13	--	2.8	28	0	15	18
21...	1545	18900	7.5	8.5	2.6	--	14	--	26	0	15	18
APR.												
26...	0845	8050	9.2	8.3	2.9	14	--	2.6	21	0	19	21
MAY												
24...	1100	4840	8.2	8.1	2.8	14	--	3.0	26	0	17	20
JUNE												
14...	0830	4000	9.2	8.2	3.1	14	--	2.9	24	0	15	20
JULY												
11...	1045	4000	9.2	8.3	3.1	13	--	2.9	25	0	18	17
AUG.												
06...	1910	3400	8.8	7.5	3.3	13	--	2.7	28	0	14	17
SEP.												
09...	1315	2950	9.5	8.8	3.0	15	--	2.8	29	0	14	18
25...	1610	6800	11	7.5	2.8	13	--	2.7	19	0	18	16

DATE	DIS- SOLVED FLUO- RIDE (F) (MG/L)	TOTAL NITRATE (N) (MG/L)	TOTAL NITRITE (N) (MG/L)	AMMONIA NITRO- GEN (N) (MG/L)	ORGANIC NITRO- GEN (N) (MG/L)	TOTAL KJEL- DAHL NITRO- GEN (N) (MG/L)	TOTAL PHOS- PHORUS (P) (MG/L)	DIS- SOLVED SOLIDS (SUM OF CONSTITU- ENTS) (MG/L)	TOTAL NON- FILT- RABLE RESIDUE (MG/L)	VOL. NON- FILT- RABLE RESIDUE (MG/L)	HARD- NESS (CA+MG) (MG/L)
OCT.											
11...	.1	--	--	--	--	--	--	88	--	--	36
26...	.0	.07	.02	.10	.44	--	.08	62	65	13	26
NOV.											
13...	--	--	--	--	--	--	--	54	--	--	20
DEC.											
19...	.0	.20	.00	.07	.20	--	.03	77	32	1	31
20...	--	--	--	--	--	--	--	78	--	--	29
JAN.											
27...	--	--	--	--	--	--	--	42	--	--	16
FEB.											
06...	--	--	--	--	--	--	--	46	--	--	17
21...	.0	.09	.01	.07	.21	--	.03	65	36	15	30
MAR.											
14...	--	--	--	--	--	--	--	79	--	--	29
21...	.0	.12	.01	.01	.49	--	.07	79	56	4	32
APR.											
26...	--	.08	.01	.06	.59	.65	.08	88	104	34	33
MAY											
24...	--	.11	.00	.06	1.0	1.1	.04	86	110	39	32
JUNE											
14...	--	.11	.00	.06	.78	.84	.07	84	114	14	33
JULY											
11...	--	.00	.00	.08	.60	.68	.11	84	57	24	34
AUG.											
06...	--	.01	.00	.02	.67	.69	.04	80	38	1	32
SEP.											
09...	--	--	--	--	--	--	--	85	--	--	34
25...	--	.03	.01	.03	.65	.68	.03	80	37	27	30

Table 1 (Continued)

NECHES RIVER BASIN

08041000 NECHES RIVER AT EVADALE, TEX.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	NON-CARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROHMS)	PH (UNITS)	TEMPERATURE (DEG C)	COLOR (PLAT-INUM-COBALT UNITS)	TURBIDITY (JTU)	DIS-SOLVED OXYGEN (MG/L)	PERCENT SATURATION	BIO-CHEMICAL OXYGEN DEMAND (MG/L)	TOTAL ORGANIC CARBON (C) (MG/L)
OCT. 11...	9	1.0	150	7.1	--	--	--	--	--	--	--
26...	12	.7	104	6.3	18.5	160	35	8.1	86	1.1	20
NOV. 13...	8	.7	86	7.1	18.0	--	--	--	--	--	--
DEC. 19...	10	1.0	144	6.4	14.0	100	25	9.4	90	.7	12
20...	9	1.1	129	6.7	10.0	--	--	--	--	--	--
JAN. 27...	5	.7	67	6.5	15.0	--	--	--	--	--	--
FEB. 06...	5	.6	76	6.5	16.0	--	--	--	--	--	--
21...	13	.8	141	6.4	15.5	60	150	10.3	102	1.2	8.0
MAR. 14...	6	1.1	140	6.5	--	--	--	--	--	--	--
21...	11	--	143	6.9	18.0	65	35	7.5	79	1.3	10
APR. 26...	16	1.1	147	6.3	20.0	100	50	8.0	87	1.1	12
MAY 24...	10	1.1	163	7.2	27.0	50	40	7.4	91	1.7	7.5
JUNE 14...	14	1.1	155	6.4	27.0	80	50	7.2	89	1.3	8.2
JULY 11...	13	1.0	153	6.4	29.0	60	30	--	--	.6	8.7
AUG. 06...	9	1.0	146	6.6	27.5	30	20	7.0	88	.9	6.6
SEP. 09...	11	1.1	147	--	26.0	--	--	--	--	--	--
25...	15	1.0	144	6.5	24.5	100	30	7.0	83	.8	--

DATE	TIME	DIS-SOLVED ALUMINUM (AL) (UG/L)	DIS-SOLVED ARSENIC (AS) (UG/L)	DIS-SOLVED BORON (B) (UG/L)	DIS-SOLVED CADMIUM (CD) (UG/L)	DIS-SOLVED CHROMIUM (CR) (UG/L)	DIS-SOLVED COBALT (CO) (UG/L)	DIS-SOLVED COPPER (CU) (UG/L)
OCT. 26...	1030	200	1	--	0	0	0	2
FEB. 21...	1040	210	2	--	0	0	0	6
APR. 26...	0845	30	0	50	1	10	0	9
AUG. 06...	1910	0	0	40	0	0	0	2

DATE	DIS-SOLVED IRON (FE) (UG/L)	DIS-SOLVED LEAD (PB) (UG/L)	DIS-SOLVED LITHIUM (LI) (UG/L)	DIS-SOLVED MANGANESE (MN) (UG/L)	DIS-SOLVED MERCURY (HG) (UG/L)	DIS-SOLVED NICKEL (NI) (UG/L)	DIS-SOLVED STRONTIUM (SR) (UG/L)	DIS-SOLVED ZINC (ZN) (UG/L)
OCT. 26...	640	0	0	170	4.2	0	70	0
FEB. 21...	220	3	0	60	.0	4	70	70
APR. 26...	320	--	0	60	.1	2	150	40
AUG. 06...	70	2	0	0	.0	0	100	0



Table 1 (Continued)

NECHES RIVER BASIN

08041000 NECHES RIVER AT EVADALE, TEX.--Continued

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	TEMPERATURE (DEG C)	ALDRIN (UG/L)	ALDRIN IN BOTTOM DE-POSITS (UG/KG)	DDD (UG/L)	DDD IN BOTTOM DE-POSITS (UG/KG)	DDE (UG/L)	DDE IN BOTTOM DE-POSITS (UG/KG)	DDT (UG/L)	DDT IN BOTTOM DE-POSITS (UG/KG)
OCT. 26...	1030	8600	18.5	.00	.0	.00	.0	.00	.0	.00	.0
FEB. 21...	1040	21500	15.5	.00	.0	.00	.0	.00	.0	.00	.0
APR. 26...	0845	9000	20.0	.00	.0	.00	.0	.00	.0	.00	.0
MAY 24...	1100	4840	27.0	.00	--	.00	--	.00	--	.00	--
AUG. 06...	1910	3300	27.5	.00	.0	.00	.0	.00	.0	.00	.0

DATE	DI-ELDRIN (UG/L)	DI-ELDRIN IN BOTTOM DE-POSITS (UG/KG)	ENDRIN (UG/L)	ENRIN IN BOTTOM DE-POSITS (UG/KG)	HEPTA-CHLOR (UG/L)	HEPTA-CHLOR IN BOTTOM DE-POSITS (UG/KG)	HEPTA-CHLOR EPOXIDE (UG/L)	HEPTA-CHLOR EPOXIDE IN BOTTOM DE-POSITS (UG/KG)	LINDANE (UG/L)	LINDANE IN BOTTOM DE-POSITS (UG/KG)	CHLOR-DANE (UG/L)
OCT. 26...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.0
FEB. 21...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.0
APR. 26...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.0
MAY 24...	.00	--	.00	--	.00	--	.00	--	.00	--	.0
AUG. 06...	.00	.0	.00	.0	.00	.0	.00	.0	.00	.0	.0

DATE	CHLOR-DANE IN BOTTOM DE-POSITS (UG/KG)	PCB (UG/L)	PCB IN BOTTOM DE-POSITS (UG/KG)	DI-AZINON (UG/L)	MALATHION (UG/L)	METHYL PARATHION (UG/L)	PARATHION (UG/L)	2,4-D (UG/L)	SILVER (UG/L)	2,4,5-T (UG/L)
OCT. 26...	0	.0	0	.00	.00	.00	.00	.00	.00	.00
FEB. 21...	0	.0	0	.00	.00	.00	.00	.00	.01	.00
APR. 26...	0	.0	0	.00	.00	.00	.00	--	.77	--
MAY 24...	--	.0	--	.00	.00	.00	--	.01	.07	.00
AUG. 06...	0	.0	0	.00	.00	.00	.00	.00	.00	.00

MONTHLY AND ANNUAL MEANS AND LOADS FOR WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

MONTH	DISCHARGE (CFS-DAYS)	SPECIFIC CONDUCTANCE (MICRO-MHOS)	DIS-SOLVED SULFUR (MG/L)	DIS-SOLVED SOLIDS (TONS)	DIS-SOLVED CHLORIDE (MG/L)	DIS-SOLVED CHLORIDE (TONS)	DIS-SOLVED SULFATE (MG/L)	DIS-SOLVED SULFATE (TONS)	HARDNESS (CA+MG) (MG/L)
OCT. 1973.....	250020	124	71	47900	14	9450	14	9450	27
NOV. 1973.....	353470	111	65	62100	12	11500	12	11500	25
DEC. 1973.....	472560	122	70	89300	14	17900	13	16600	27
JAN. 1974.....	672900	107	63	114000	12	21400	12	21800	24
FEB. 1974.....	607000	109	64	105000	12	19700	12	19700	24
MAR. 1974.....	559300	142	80	121000	17	25700	15	22700	31
APR. 1974.....	210880	142	80	47300	17	10000	15	8860	31
MAY 1974.....	165970	154	86	38500	19	8510	16	7170	33
JUNE 1974.....	130920	153	85	30000	19	6720	16	5660	33
JULY 1974.....	119270	149	83	26700	18	5800	16	5150	32
AUG. 1974.....	106790	145	81	23400	18	5190	15	4320	31
SEPT 1974.....	136940	146	82	30300	18	6660	16	5920	32
TOTAL .....	3794520	**	**	735000	**	149000	**	134000	**
WTD. AVG. ....	10395	125	72	**	15	**	14	**	28

Table 1 (Continued)

## NECHES RIVER BASIN

08041000 NECHES RIVER AT EVADALE, TEX.--Continued

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C) ; WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974  
(ONCE-DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	148	109	156	101	72	144	157	149	158	151	144	142
2	150	120	158	107	74	144	160	150	157	153	145	144
3	152	107	158	110	75	145	160	152	155	152	146	145
4	154	111	153	115	75	147	158	152	155	152	145	146
5	152	108	140	121	75	147	159	150	154	154	147	148
6	151	92	131	127	75	146	171	152	155	153	145	153
7	153	97	126	131	78	144	163	151	160	155	145	154
8	151	91	125	130	80	143	162	148	158	154	146	153
9	151	89	116	132	86	141	160	151	157	155	146	152
10	150	89	110	134	95	142	159	154	155	153	147	149
11	150	83	103	133	103	141	162	153	155	151	146	151
12	152	82	105	130	108	141	167	152	153	151	146	139
13	140	79	110	130	114	140	169	152	151	150	145	143
14	129	81	115	131	121	140	109	153	156	152	144	145
15	127	85	117	134	126	140	98	155	153	150	143	145
16	131	92	121	136	132	139	108	156	150	147	144	147
17	111	100	124	137	131	139	98	156	147	147	145	149
18	99	117	128	140	135	140	100	159	146	145	145	151
19	98	130	131	127	132	140	107	159	147	145	145	151
20	100	136	130	125	134	140	121	159	149	146	145	149
21	106	138	129	98	134	139	132	156	150	147	144	147
22	105	143	132	84	132	141	135	156	147	143	144	146
23	121	144	133	83	134	141	137	157	146	145	145	146
24	109	147	127	79	134	142	143	161	150	146	146	145
25	105	147	123	77	137	139	143	160	150	145	147	144
26	102	148	119	70	139	144	152	159	151	149	145	143
27	105	144	117	68	139	137	154	157	156	146	145	143
28	100	146	113	66	111	136	154	154	161	145	144	143
29	101	154	106	67	---	141	154	154	157	143	142	143
30	104	155	96	71	---	141	153	155	156	144	141	143
31	105	---	98	70	---	146	---	157	---	145	142	---
MONTH	126	115	124	109	110	142	144	154	153	149	145	147

TEMPERATURE (DEG. C) OF WATER ; WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974  
(ONCE-DAILY)

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	26.0	18.0	19.0	10.5	15.5	---	21.0	23.0	27.0	26.0	28.0	28.0
2	26.0	18.5	20.0	9.5	15.5	---	19.0	23.0	27.0	27.0	28.0	27.0
3	26.5	18.5	18.0	9.5	15.0	16.5	20.0	23.0	27.0	27.0	27.0	27.0
4	26.5	21.0	16.0	8.0	14.0	---	20.0	24.0	27.0	28.0	28.0	25.0
5	26.0	20.5	15.5	8.0	14.0	---	19.0	---	28.0	28.0	28.0	24.0
6	26.0	20.0	14.0	9.5	16.0	---	18.5	23.0	28.0	28.0	27.0	24.0
7	25.5	19.0	12.0	9.5	15.5	---	20.0	23.0	27.0	28.0	27.0	24.0
8	26.0	20.0	10.0	9.5	12.0	---	19.0	23.0	---	28.0	27.0	24.0
9	26.0	20.5	10.0	13.5	11.0	---	19.0	24.0	28.0	---	28.0	24.0
10	26.0	---	10.0	15.5	10.0	---	18.0	23.0	27.0	28.0	---	25.0
11	---	18.5	10.0	14.5	10.5	---	19.0	23.0	27.0	27.0	28.0	24.0
12	25.5	16.0	9.0	10.0	11.5	---	20.0	24.0	27.0	27.0	28.0	---
13	25.5	16.5	13.5	12.0	12.0	---	20.0	25.0	---	---	28.0	25.0
14	24.5	18.5	13.0	13.0	13.0	---	21.0	25.0	27.0	27.0	28.0	25.0
15	24.0	19.5	---	13.0	17.0	---	19.0	26.0	---	28.0	28.0	25.0
16	24.0	18.5	10.0	13.0	15.5	---	19.0	26.0	27.0	---	28.0	26.0
17	21.0	16.5	10.0	15.5	17.0	15.0	18.0	26.0	27.0	27.0	29.0	26.0
18	20.0	18.0	11.0	16.5	13.0	---	19.0	27.0	28.0	27.0	29.0	26.0
19	---	19.0	12.0	16.5	14.0	---	---	---	28.0	28.0	---	26.0
20	---	20.5	9.5	20.5	14.0	---	20.0	27.0	28.0	27.0	29.0	26.0
21	20.0	---	8.0	15.0	14.5	---	21.0	---	28.0	29.0	29.0	26.0
22	20.5	18.5	8.0	15.5	14.5	---	22.0	26.0	---	29.0	29.0	---
23	20.5	18.5	10.5	15.0	16.5	---	21.0	26.0	29.0	29.0	29.0	23.0
24	20.0	18.5	10.0	14.0	15.5	---	21.0	26.0	29.0	29.0	29.0	23.0
25	20.5	---	11.0	13.0	---	---	---	26.0	28.0	29.0	29.0	24.0
26	20.5	21.5	10.5	13.5	---	---	21.0	26.0	---	29.0	28.0	24.0
27	---	21.5	10.0	15.0	---	---	22.0	---	24.0	29.0	28.0	24.0
28	20.5	19.0	10.0	15.0	---	---	21.0	26.0	25.0	29.0	---	24.0
29	18.5	17.0	---	15.0	---	---	22.0	26.0	26.0	29.0	28.0	26.0
30	18.5	16.5	10.5	14.0	---	---	23.0	26.0	26.0	28.0	27.0	22.0
31	18.5	---	14.0	10.0	---	20.0	---	27.0	---	29.0	27.0	---
MONTH	23.0	19.0	12.0	13.0	14.0	---	20.0	25.0	27.0	28.0	28.0	25.0

TABLE 2

MECHES RIVER BASIN

08041500 VILLAGE CREEK NEAR KOUNTZE, TEX.

LOCATION.--Lat 30°23'52", long 94°15'48", Hardin County, at gaging station at bridge on Farm Road 418, 1.6 miles (2.6 km) upstream from Gulf, Colorado, and Santa Fe Railway Co. bridge, and 3.4 miles (5.5 km) northeast of Kountze.

DRAINAGE AREA.--860 mi² (2,227 km²).

PERIOD OF RECORD.--Chemical analyses: November 1967 to September 1974.

Water temperatures: November 1967 to September 1970.

REMARKS.--For information on diversions and return flows, see REMARKS paragraph in Part 1 of this report.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	TIME	INSTANTANEOUS DISCHARGE (CFS)	DIS-SOLVED SILICA (SiO <sub>2</sub> ) (MG/L)	DIS-SOLVED CALCIUM (CA) (MG/L)	DIS-SOLVED MAGNESIUM (MG)	DIS-SOLVED SODIUM (NA) (MG/L)	DIS-SOLVED SODIUM PLUS POTASSIUM (MG/L)	DIS-SOLVED POTASSIUM (K) (MG/L)	BICARBONATE (HCO <sub>3</sub> ) (MG/L)	CARBONATE (CO <sub>3</sub> ) (MG/L)
OCT. 10...	1430	462	12	4.2	1.3	--	6.9	--	2	0
NOV. 15...	1200	815	13	5.0	1.3	--	9.1	--	11	0
DEC. 20...	1700	1400	8.6	3.2	.8	9.2	--	1.1	6	0
FEB. 08...	1130	1590	12	3.6	1.0	8.7	--	.8	8	0
MAR. 20...	1330	600	12	4.5	1.1	7.8	--	1.1	10	0
MAY 02...	1430	500	12	4.0	1.3	9.5	--	.9	10	0
JUNE 12...	1430	401	13	4.2	1.1	8.3	--	.9	10	0
JULY 24...	1320	130	13	4.5	.5	7.8	--	1.0	14	0

DATE	DIS-SOLVED SULFATE (SO <sub>4</sub> ) (MG/L)	DIS-SOLVED CHLORIDE (CL) (MG/L)	DIS-SOLVED FLUORIDE (F) (MG/L)	DIS-SOLVED SILIOLS (SUM OF CONSTITUENTS) (MG/L)	HARDNESS (CA+MG) (MG/L)	NON-CARBONATE HARDNESS (MG/L)	SODIUM ADSORPTION RATIO	SPECIFIC CONDUCTANCE (MICROMHOS)	PH (UNITS)	TEMPERATURE (DEG C)
OCT. 10...	2.4	19	.0	47	16	14	.8	93	5.0	24.0
NOV. 15...	3.2	18	.0	55	18	9	.9	94	5.8	17.5
DEC. 20...	3.9	19	--	49	11	6	1.2	88	5.9	10.0
FEB. 08...	3.2	16	--	49	13	7	1.0	87	6.2	12.5
MAR. 20...	3.2	16	--	51	16	8	.9	85	5.9	21.5
MAY 02...	2.9	18	--	54	15	7	1.1	89	6.1	22.5
JUNE 12...	3.0	15	--	50	15	7	.9	86	6.1	27.5
JULY 24...	2.9	15	--	52	13	2	.9	87	6.4	27.5

TABLE 3

NECHES RIVER BASIN

08041700 PINE ISLAND BAYOU NEAR SOUR LAKE, TEX.

LOCATION.--Lat 30°06'21", long 94°20'04", Hardin County, at gaging station at bridge on county road and 5.1 miles (8.2 km) southeast of Sour Lake.

DRAINAGE AREA.--336 mi<sup>2</sup> (870 km<sup>2</sup>).

PERIOD OF RECORD.--Chemical analyses: February 1968 to September 1974.  
Water temperatures: February 1968 to September 1974.

EXTREMES.--October 1973 to September 1974:  
Specific conductance: Maximum, 887 micromhos Mar. 13; minimum daily, 47 micromhos Jan. 21-24.  
Water temperatures: Maximum, 34.0°C Aug. 22.

Period of record:  
Specific conductance: Maximum daily, 11,600 micromhos Mar. 23, 1968; minimum daily, 40 micromhos Apr. 19, 1973.  
Water temperatures: Maximum, 37.0°C Sept. 15, 1972; minimum, 2.0°C Jan. 11, 1973.

WATER QUALITY DATA, WATER YEAR OCTOBER 1973 TO SEPTEMBER 1974

DATE	TIME	INSTANTANEOUS DIS-CHARGE (CFS)	DIS-SOLVED SILICA (SI0 <sub>2</sub> ) (MG/L)	DIS-SOLVED CALCIUM (CA) (MG/L)	DIS-SOLVED MAGNE-SIUM (MG) (MG/L)	DIS-SOLVED SODIUM (NA) (MG/L)	DIS-SOLVED SODIUM PLUS POTAS-SIUM (MG/L)	DIS-SOLVED PO-TAS-SIUM (K) (MG/L)	BICAR-BONATE (HCO <sub>3</sub> ) (MG/L)	CAR-BONATE (CO <sub>3</sub> ) (MG/L)
OCT. 18...	1600	4360	6.1	5.0	1.1	5.6	--	2.7	14	0
NOV. 12...	1630	1610	4.9	5.2	.9	7.0	--	2.4	18	0
DEC. 17...	1600	73	5.5	15	2.8	31	--	3.0	33	0
JAN. 31...	1830	2420	3.7	6.4	1.1	6.4	--	1.1	20	0
FEB. 22...	1430	140	4.7	21	4.2	--	58	--	38	0
MAR. 21...	0930	40	6.2	20	2.9	49	--	2.6	46	0
APR. 21...	1530	658	4.2	8.9	1.4	17	--	2.3	20	0
MAY 03...	1630	113	6.3	16	2.4	37	--	2.2	30	0
JUNE 11...	1615	67	5.8	14	2.2	26	--	1.6	30	0
JULY 23...	1000	66	7.6	16	2.9	22	--	1.7	52	0
AUG. 07...	1700	117	8.0	15	3.5	24	--	3.0	50	0
SEP. 05...	1660	82	9.5	19	3.2	56	--	3.0	44	0

DATE	DIS-SOLVED SULFATE (SO <sub>4</sub> ) (MG/L)	DIS-SOLVED CHLORIDE (CL) (MG/L)	DIS-SOLVED FLUORIDE (F) (MG/L)	DIS-SOLVED SOLIDS (SUM OF CONSTITUENTS) (MG/L)	HARDNESS (CA+MG) (MG/L)	NON-CAR-BONATE HARDNESS (MG/L)	SODIUM SULFATE RATIO	SPECIFIC CONDUCTANCE (MICRO-MHOS)	PH (UNITS)	TEMPERATURE (DEG C)
OCT. 18...	0	9.0	.1	37	17	6	.6	63	6.2	21.0
NOV. 12...	4.1	6.7	--	42	17	2	.7	71	6.6	17.0
DEC. 17...	5.5	59	--	138	49	22	1.9	268	6.8	11.0
JAN. 31...	5.1	10	--	46	21	4	.8	75	6.4	16.0
FEB. 22...	5.2	110	.1	224	70	38	3.0	441	6.7	--
MAR. 21...	12	65	--	200	62	24	2.7	400	6.4	18.5
APR. 21...	9.2	32	--	85	28	12	1.4	163	6.2	21.0
MAY 03...	18	63	--	160	50	25	2.3	316	6.6	27.0
JUNE 11...	12	46	--	126	44	19	1.8	260	6.7	32.0
JULY 23...	13	31	--	120	52	9	1.3	235	6.5	27.5
AUG. 07...	13	33	--	124	52	11	1.5	247	6.5	28.0
SEP. 05...	13	94	--	221	61	25	3.2	451	7.2	26.0

APPENDIX "A"  
AGENCY REPORTS

Page

A-1 Bureau of Sport Fisheries and Wildlife ltr dtd 26 Apr 72  
A-12 Bureau of Sport Fisheries and Wildlife ltr dtd 24 Jul 72



IN REPLY REFER TO:

RB

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE

POST OFFICE BOX 1306  
ALBUQUERQUE, NEW MEXICO 87103

April 26, 1972

District Engineer  
Corps of Engineers, U. S. Army  
Post Office Box 1229  
Galveston, Texas 77550

Dear Sir:

This letter constitutes the Bureau of Sport Fisheries and Wildlife report on the fish and wildlife resources to be affected by each of six alternative plans under study for the proposed Saltwater Barrier Dam on the Neches River at Beaumont, Texas. The project is an element of the authorized basinwide survey for the Neches River and Tributaries, Texas. The purpose of the project is to protect freshwater supplies in Pine Island Bayou and the Neches River from contamination by salt water moving upstream during periods of low flow.

This report, which is intended to accompany your interim report on the project, has been prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Texas Parks and Wildlife Department cooperated in the fish and wildlife investigations and has concurred with the views expressed herein as indicated by the enclosed copy of a letter dated March 7, 1972, signed by Executive Director, James U. Cross.

The Neches River Basin lies between the Sabine River Basin to the east and the Trinity River Basin to the west. The lowermost 21.5 miles of the Neches River above its mouth at Sabine Lake have been straightened and deepened to form a portion of the Sabine-Neches Waterway. The watershed above the mouth of the river encompasses about 10,000 square miles.

The project area lies principally in the Gulf Coast Prairie ecological region although the upper two sites lie within the East Texas Timber Country region. The river in this area meanders through a low-lying forested floodplain which varies from 1 to 4 miles in width. The swamp-type forest is dominated by water-loving hardwoods.

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Within the project area, the river varies in width between 300 and 400 feet and has an average depth of about 20 feet. Stream flows are variable and the water is usually a muddy brown except during low-flow periods when it turns almost black due to the backwash of downstream industrial pollutants.

At the Evadale Gaging Station (river mile 55), a 50-year period of record reveals that the average flow of the river at that point has been about 6,100 second-feet (4,419,000 acre-feet per year) with a minimum flow of 63 second-feet in 1956 and a maximum flow of 92,100 second-feet in 1944.

Flat Creek, Palestine, Jacksonville, Tyler, Mud Creek, Striker Creek, Kurth, Sam Rayburn, and B. A. Steinhagen Reservoirs comprise the existing upstream impoundments. Major upstream water diversions below the lowermost reservoir, B. A. Steinhagen, include those operated by the Lower Neches Valley Authority, the city of Beaumont, and Eastex, Incorporated. Temporary saltwater barriers of steel sheet piling are located at about river mile 3.8 on Pine Island Bayou and at river mile 37.0 on the Neches River.

The human population within 50 miles of the project area, in the State of Texas, which includes the Beaumont and Port Arthur metropolitan areas, in 1970 was about 450,000. By 2020 the population is expected to be about 820,000 within the same radius.

The six project sites being considered as alternates are located at river-mile sites 23.0, 24.5, 25.5, 26.2, 28.5, and 29.5 on the Neches River. One site of the six will be selected for eventual development. Location of the six sites is depicted on Plate I.

The basic design of the barrier structure for any plan would consist of a dam in the natural river channel and a navigation lock located adjacent to the dam in a parallel navigation channel. The barrier, to be constructed of concrete and steel, would have 7 tainter-type gates, each measuring 40 feet wide and 23 feet high, spanning the width of the channel. The sill of the dam would be at elevation -20.0 feet mean sea level (MSL). With the gates fully lowered onto the sill, the upper lip of the gate would be at +3.0 feet MSL.

The navigation lock would involve a land-cut channel adjacent to the barrier. Both lock and channel would be designed to accommodate existing and proposed recreational and commercial traffic. The approach channel would measure 125 feet in width at its bottom

depth of -14 feet mean low tide (MLT). Two pairs of sector-gate locks with open door widths of 56 feet and a lock sill depth of -16 feet MLT would be required. The intermediate chamber, 400 feet in length, would be of earthen construction with riprapped sides.

The barrier dam and navigation lock would be operational only during periods of low stream flow when saltwater would intrude to the barrier site. Such periods normally occur during the summer and fall and may vary in duration from 4 to 6 months of any given year. During such times, the tainter gates would be lowered into position and the locks would be closed and operational. The lowered gates and closed locks would stop upstream saltwater intrusion while lock operation would permit continuance of boat traffic.

During the period of operation, a one-foot head would be maintained upstream of the barrier. This head would be controlled by regulating the releases from upstream reservoirs. Any excess head would be further regulated by the partial raising of one or more tainter gates. All flood flows originating below the upstream reservoirs, and occurring during the normal period of barrier operation, would be released at the barrier dam at such a rate that a constant pool elevation of +1 foot MSL would be maintained above the dam.

Once in operation, it is anticipated that maintenance of a one-foot head would be controlled effectively by upstream reservoir releases and that essentially no natural stream flow would be released at the barrier site to the downstream channel. Thus, the downstream flow would be dependent upon return flows originating below the damsite, upon runoff from the associated downstream area, and upon freshwater discharges from operation of the locks.

During the remainder of the year when the river flow would be sufficient to hold the saltwater wedge below the barrier site, the gates would be fully raised and the lock gates opened to allow normal flow of the river and unrestricted river boat traffic.

The project period of analysis is 50 years, 1980 to 2030.



## FISH

### Without the Project

The areas of influence for fish would vary from 11.8 to 17.8 miles of streams and 100 to 350 acres of oxbows and sloughs, dependent upon the barrier site selected. Stream reaches included extend from the temporary saltwater barriers on the Neches River and on Pine Island Bayou downstream to the proposed project barriers on the Neches River. For site No. 1, about 17.8 miles of streams and 350 acres of oxbows and sloughs would be involved. For sites Nos. 2 through 6, 16.3 miles and 240 acres, 15.3 miles and 200 acres, 14.6 miles and 100 acres, 12.3 miles and 100 acres, and 11.8 miles and 100 acres of streams and oxbows and sloughs, respectively, would be involved. The project would have no effect on the fishery resources downstream from the proposed saltwater barriers.

Historically, the project streams, oxbows, and sloughs provided a good quality freshwater fishery. The tidal reach of these waters also provided a good quality saltwater fishery. In recent years, however, industrial discharges have progressively lowered the quality of fish habitat in the lower 25 miles of the Neches River. Furthermore, diversions of fresh water from the lower reaches of the Neches River and Pine Island Bayou for municipal, industrial, and irrigation purposes have helped lower the water quality in this same reach to the extent that aquatic life has virtually disappeared.

Above the lower 25-mile reach of the Neches River, the quantity and quality of fresh water is adequate for 6 to 8 months of the year. In low-flow periods, however, temporary saltwater barriers are installed in the Neches River and in Pine Island Bayou. During such times, all stream flows originating above the barriers are diverted into canals for distribution to various water users. The only freshwater inflows to the lower reach of the Neches River come from runoff and from poor quality return flows originating downstream from the barriers. As a result, salt water backs upstream to the barriers carrying heavy concentrations of industrial pollution which degrade the quality of the fish habitat.

Common fish species in the project streams and other waters include blue catfish, smallmouth buffalo, freshwater drum, river carpsucker, gizzard shad, spotted gar, longnose gar, sand seatrout, croaker, menhaden, striped mullet, bay anchovy, and various minnows. Important crustaceans and mollusks occurring in these waters include

brown shrimp, white shrimp, grass shrimp, blue crabs, and brackish water clams.

At present, freshwater sport fishing above river mile 25 is of moderate intensity. Freshwater commercial fishing in these waters is slight. Below river mile 25, freshwater and saltwater sport and commercial fishing are insignificant. In the future, increased water demands and consequent decrease in stream flow are expected to increase the period of temporary barrier use to 6 to 8 months a year. Freshwater flows downstream from the temporary barrier sites would be reduced accordingly. Under these conditions sport and commercial fishing would continue to decline.

During the period of analysis, freshwater sport fishing would range from 4,600 to 3,000 man-days annually depending upon the barrier site involved and the associated area of influence. Freshwater commercial fishing in these waters would amount to 800 pounds annually with any of the plans.

#### With the Project

Construction of a saltwater barrier at any one of the proposed six sites would result in year-round improvement in freshwater fish habitat between the barrier site and the upstream sites of the temporary saltwater barriers by preventing upstream encroachment of heavily polluted salt water. The amount of improved freshwater fish habitat would depend on the location of the barrier plan selected. However, fish habitat in those waters above sites Nos. 3 to 6 would be of better quality than that in the environs above sites Nos. 1 or 2 because of wood pulp mill discharge into the Neches River above these latter sites. During low-flow periods, which normally coincide with high water temperatures, oxidation of fibrous materials in the discharge may lower the oxygen content in these waters, thereby reducing the quality of habitat.

Freshwater sport fishing would range from 6,200 to 10,000 man-days annually in the areas of influence depending upon the site selected. Freshwater commercial fishing in these waters would amount to about 1,200 pounds of fish annually for any one of the six saltwater barrier locations.

An annual summary of freshwater sport and commercial fishing in project waters, without and with the project, is presented in Table 1.

Table 1. Annual Summary of Man-days of Freshwater Sport Fishing and Pounds of Commercial Fishing

Sites	Without Project	With Project	Gain or Loss
<u>Sport Fishing (Man-Days)</u>			
1	4,600	6,200	1,600
2	4,400	6,200	1,800
3	4,200	10,000	5,800
4	3,900	10,000	6,100
5	3,300	7,500	4,200
6	3,000	7,500	4,500
<u>Commercial Fishing (Pounds)</u>			
1 - 6	800	1,200	400

### Wildlife

#### Without the Project

The area of influence for wildlife would consist of streams, other water areas, and low-lying floodplains characterized by tupelo gum-cypress swamps, between the sites of the temporary saltwater barriers and the proposed saltwater barriers. The project would have no effect on wildlife habitat downstream from the proposed saltwater barriers.

Much of the timber in the area is in various stages of second growth and logging is not now being practiced. Human activities center around a few summer cabins, two boat clubs, and a country club. There is one public boat-launching ramp at about river mile 26.5, between barrier sites Nos. 4 and 5. A portion of the proposed Beaumont Unit of the Big Thicket Area lies in the project's area of influence. This tract lies to the north of Pine Island Bayou and to the west of the Neches River and is bordered on the west and north by the Lower Neches Valley Authority water diversion canal.

Important wildlife in the project area includes the white-tailed deer, fox and gray squirrels, swamp rabbit, red and gray foxes, raccoon, and waterfowl. Principal species of waterfowl are the

wood duck and mallard. Other wildlife in the area includes bobwhite, mourning dove, cottontail, opossum, skunk, beaver, river otter, nutria, mink, bobcat, coyote, and various song and wading birds. Rare or endangered species listed in the Bureau of Sport Fisheries and Wildlife Publication No. 34, "Rare and Endangered Fish and Wildlife in the United States", are the American alligator, southern bald eagle, ivory-billed woodpecker, northern red-cockaded woodpecker, and red wolf. The presence of the ivory-billed woodpecker is considered questionable by many.

The amount of hunting is moderate to slight due to poor accessibility. The species hunted are primarily squirrels, rabbits, deer, raccoon, fox, and waterfowl. Trapping in the area is slight. Wildlife-oriented recreation, including bird watching, wildlife photography, and wildlife-directed educational activities, is a major pastime.

During the period of analysis, big-game hunting would amount to 200 man-days annually, while upland-game hunting would be about 500 man-days annually. Hunting for waterfowl would amount to 300 man-days annually, and hunting for other remaining forms of wildlife would be about 300 man-days also. Wildlife-oriented recreation would amount to 1,000 man-days annually.

#### With the Project

Construction of a saltwater barrier would result in year-round freshwater conditions in the wooded swamp upstream from the site. Brackish water and pollution from the lower reach of the Neches River would be prevented from encroaching into these environs.

The one-foot head impounded by a saltwater barrier would, for the most part, be contained in the stream channels, oxbows, and sloughs. Only for short periods of less than 24 hours would water levels exceed the design pool level. Such occurrences would be so infrequent as to have insignificant effects on wildlife habitat.

Hunting of big game, upland game, other wildlife, and waterfowl and the trapping of fur animals would not change significantly over without-the-project conditions. The amount of wildlife-oriented recreation in the Big Thicket Area would be reduced by the construction of a barrier at either site No. 5 or 6. Longer periods of time required to travel to the Big Thicket Area by boat through the lock would deter visits to this area. For the project area as a whole wildlife-oriented recreation would be reduced to about 500 man-days annually.

Table 2 presents a summary of hunting and wildlife-oriented recreation without and with the project.

Table 2. Annual Summary of Man-days of Hunting and Other Wildlife-oriented Recreation

Item	Without Project	With Project	Gain or Loss
Big-game hunting	200	200	
Upland-game hunting	500	500	
Waterfowl hunting	300	300	
Other wildlife hunting	300	300	
Wildlife-oriented recreation	1,000	500	-500

#### DISCUSSION

A saltwater barrier dam as proposed would enhance the sport and commercial freshwater fishing in the area of project influence by improving water quality. On the other hand, wildlife habitat would not be materially affected so that project-induced changes in hunting or trapping are not anticipated. The one area of possible loss is in wildlife-oriented recreation associated with the Beaumont Unit of the Big Thicket, and this loss would occur only with a barrier at upstream sites Nos. 5 or 6.

Much of the boat traffic to the Beaumont Unit of the Big Thicket Area for wildlife-oriented recreation originates from the boat-launching ramp located at river mile 26.5 on the Neches River in the city of Beaumont. Constructing a saltwater barrier and lock at either site No. 5 or 6 would impede boat travel and lengthen travel time to and from the Big Thicket Area. The consequent shortening of trip time remaining for on-the-ground recreation in the Big Thicket would reduce the interest in this type of activity.

To prevent this reduction, a boat-launching ramp should be constructed immediately upstream from the saltwater barrier should either site No. 5 or 6 be selected. This facility would provide means for rapid upstream boat transportation and would fully mitigate project-induced losses in use of the Big Thicket Area.

It is recommended that:

1. A boat-launching ramp be constructed on project land immediately upstream from the barrier should either site No. 5 or 6 be developed.

#### CONCLUSIONS

Construction of a saltwater barrier would create a permanent freshwater fishery above the damsite. An annual increase in freshwater sport fishing ranging from 1,600 to 6,100 man-days and from \$1,600 to \$6,100 in value, according to the plan selected, would accrue from the project. Freshwater commercial fishing would increase by 400 pounds annually valued at \$200 for any of the six barrier plans.

With respect to wildlife, the project would cause no significant change in the amount of hunting or trapping. Wildlife-oriented recreation would be reduced by 500 man-days annually should either site No. 5 or 6 be selected. Construction of a boat-launching ramp, as advocated in Recommendation No. 1, would fully mitigate these project-caused losses.

This report is based on data received prior to June 25, 1971. Any modification in the project planning should be brought to the attention of the Bureau of Sport Fisheries and Wildlife so that the effects of the project may be reappraised if necessary.

Sincerely yours,

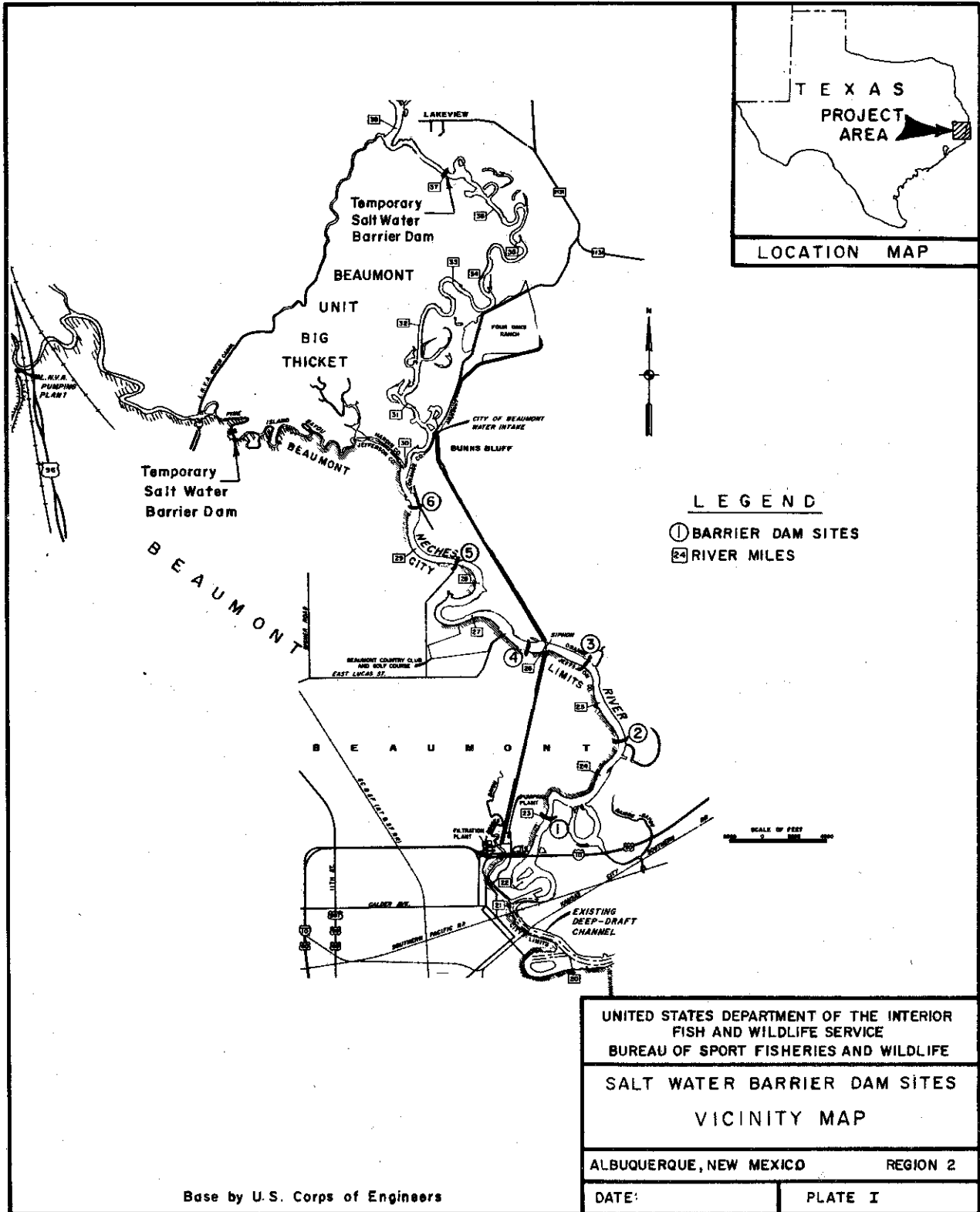
*William J. White*  
Acting Regional Director

Enclosure

Copies (10)

Distribution:

- (5) Executive Director, Texas Parks and Wild. Dept., Austin, Tex.
- (2) Regional Director, Nat'l Mar. Fish. Serv., St. Petersburg, Fla.
- (2) Laboratory Director, Biol. Lab., NMFS, Galveston, Tex.
- (2) Regional Director, Bureau of Outdoor Recr., Denver, Colo.
- (2) Regional Administrator, EPA - Reg. VI, Dallas, Tex.
- (1) Field Representative, USDI, SW Reg., Albuquerque, N. Mex.
- (2) Field Supervisor, BSFW, Div. of River Basin Studies, Fort Worth, Tex.



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JOHN H. REAGAN BUILDING  
AUSTIN, TEXAS 78701

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March 7, 1972

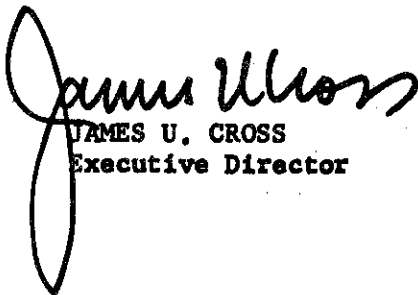
Mr. William M. White  
Department of the Interior  
Fish and Wildlife Service  
Bureau of Sport Fisheries and Wildlife  
P. O. Box 1306  
Albuquerque, New Mexico 87103

Dear Mr. White:

We have reviewed and concur with the field draft report concerning the Corps of Engineers proposed Saltwater Barrier Dam on the Neches River at Beaumont, Texas, as presented.

We appreciate having had the opportunity to comment on this draft report.

Sincerely,

  
JAMES U. CROSS  
Executive Director

A-11





UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
POST OFFICE BOX 1306  
ALBUQUERQUE, NEW MEXICO 87103  
July 24, 1972

District Engineer  
Corps of Engineers, U. S. Army  
Post Office Box 1229  
Galveston, Texas 77550

Dear Sir:

This letter constitutes the Bureau of Sport Fisheries and Wildlife revised report on the fish and wildlife resources to be affected by the proposed Saltwater Barrier on the Neches River at Beaumont, Texas. It relates to the proposed barrier at Site No. 1 (river mile 23.0) and supersedes the Bureau report of April 26, 1972, which pertained to the six alternative sites previously studied. The project, an element of the authorized basinwide survey for the Neches River and Tributaries, Texas, is designed to protect freshwater supplies in Pine Island Bayou and the Neches River from contamination by salt water moving upstream during periods of low flow.

This report, which is intended to accompany your interim report on the project, has been prepared under the authority of and in accordance with the provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). The Texas Parks and Wildlife Department cooperated in the fish and wildlife investigations and has concurred with the views expressed herein as indicated by the enclosed copy of a letter dated June 29, 1972, signed by Executive Director, James U. Cross. The National Marine Fisheries Service also has expressed concurrence in this report by the enclosed copy of a letter dated July 7, 1972, signed by Acting Regional Director, Harold B. Allen.

The Neches River Basin lies between the Sabine River Basin to the east and the Trinity River Basin to the west. The lowermost 21.5 miles of the Neches River above its mouth at Sabine Lake have been straightened and deepened to form a portion of the Sabine-Neches Waterway. The watershed above the mouth of the river encompasses about 10,000 square miles.

The project lies in the Gulf Coast Prairie ecological region. The river in this area meanders through a low-lying forested floodplain which varies from 1 to 4 miles in width. The swamp-type forest is dominated by water-loving hardwoods.

A-12

Within the project area, the river varies in width between 300 and 400 feet and has an average depth of about 20 feet. Streamflows are variable and the water is usually a muddy brown except during low-flow periods when it turns almost black due to the backwash of downstream industrial pollutants.

At the Evadale Gaging Station (river mile 55), a 50-year period of record reveals that the average flow of the river at that point has been about 6,100 second-feet (4,419,000 acre-feet per year) with a minimum flow of 63 second-feet in 1956 and a maximum flow of 92,100 second-feet in 1944.

Flat Creek, Palestine, Jacksonville, Tyler, Mud Creek, Striker Creek, Kurth, Sam Rayburn, and B. S. Steinhagen Reservoirs comprise the existing upstream impoundments. Major upstream water diversions below B. A. Steinhagen, the lowermost reservoir, include those operated by the Lower Neches Valley Authority, the city of Beaumont, and Eastex Incorporated. Temporary saltwater barriers of steel sheet piling are located at about river mile 3.8 on Pine Island Bayou and at river mile 37.0 on the Neches River.

The human population within 50 miles of the project area, in the State of Texas, which includes the Beaumont and Port Arthur metropolitan areas, in 1970 was about 450,000. By 2020 the population is expected to be about 820,000 within the same radius.

The proposed plan of development would consist of a dam in the natural river channel at river mile 23.0 and a navigation gate located adjacent to the dam in a parallel navigation channel. The dam, to be constructed of concrete and steel, would have 7 tainter-type gates, each measuring 40 feet wide and 24.5 feet high, spanning the width of the channel. The sill of the dam would be at elevation -20.0 feet mean sea level (MSL). With the gates fully lowered onto the sill, the upper lip of the gates would be at +4.5 feet MSL.

The navigation gate would lie in a land-cut channel adjacent to the dam. The gate would consist of two sector gates providing a clear opening of 56 feet with a depth of -16 feet mean low tide (MLT) over the sill. The approach channel to the gate would afford a 100-foot width at the 12-foot depth and would measure 76 feet in width at its bottom depth of -16 feet MLT.

An auxiliary dam with two 10- by 2-foot flapgates and three 10- by 8-foot slidegates would be constructed across the canal which

drains the southern end of Bairds Bayou at a location south of old Highway No. 90.

The barrier and navigational gates would be operational during periods of low streamflow when saltwater and industrial pollution would encroach to these structures. Such periods normally occur during the summer and fall and may vary in duration from 4 to 6 months of any given year. During such times, the tainter gates would be closed and the navigational gate would be operational. During the period of operation, a one-foot head would be maintained upstream of the barrier. This head would be controlled by regulating the releases from upstream reservoirs. Any excess head would be further regulated by the partial raising of one or more tainter gates. During floods the barrier gates, the navigation gate, and the slide gates in the auxiliary dam would be opened and the flapgates in the auxiliary dam would be operational. Flood-flow elevations would slightly exceed plus one-foot MSL several times each year.

Once in operation, it is anticipated that maintenance of a one-foot head would be controlled effectively by upstream reservoir releases and that essentially no natural streamflow would be released at the barrier site to the downstream channel. Thus, the downstream flow would be dependent upon return flows originating below the damsite, upon runoff from the associated downstream area, and upon freshwater discharges from operation of the navigation gate.

During the remainder of the year when the river flow would be sufficient to hold the saltwater wedge below the barrier site, the barrier gates would be fully raised and the navigation gate opened to allow normal flow of the river and unrestricted river boat traffic.

The project period of analysis is 50 years, 1980 to 2030.

## FISH

### Without the Project

The area of influence for fish would include about 17.8 miles of streams and 350 acres of oxbows and sloughs. Stream reaches included extend from the temporary saltwater barriers on the Neches River and on Pine Island Bayou downstream to the proposed barrier.

Historically, the project streams, oxbows, and sloughs provided a good quality freshwater fishery. The tidal reach of these waters also provided a good quality saltwater fishery. In recent years, however, industrial discharges have progressively lowered the quality of fish habitat in the lower 25 miles of the Neches River. Furthermore, diversions of fresh water from the lower reaches of the Neches River and Pine Island Bayou for municipal, industrial, and irrigation purposes have helped lower the water quality in this same reach to the extent that aquatic life has virtually disappeared.

Above the lower 25-mile reach of the Neches River, the quantity and quality of fresh water are adequate for 6 to 8 months of the year. In low-flow periods, however, temporary saltwater barriers are installed in the Neches River and in Pine Island Bayou. During such times, all streamflows originating above the barriers are diverted into canals for distribution to various water users. The only freshwater inflows to the lower reach of the Neches River come from runoff and from poor quality return flows originating downstream from the barriers. As a result, salt water backs up-stream to the barriers carrying heavy concentrations of industrial pollution which degrade the quality of the fish habitat.

Common fish species in the project streams and other waters include blue catfish, smallmouth buffalo, freshwater drum, river carpsucker, gizzard shad, spotted gar, longnose gar, sand seatrout, croaker, menhaden, striped mullet, bay anchovy, and various minnows. Important crustaceans and mollusks occurring in these waters include brown shrimp, white shrimp, grass shrimp, blue crabs, and brackish-water clams.

At present, freshwater sport fishing above river mile 25 is of moderate intensity. Freshwater commercial fishing in these waters is slight. Below river mile 25, freshwater and saltwater sport and commercial fishing are insignificant. In the future, increased water demands and consequent decrease in streamflow are expected to increase the period of temporary barrier use to 6 to 8 months a year. Freshwater flows downstream from the temporary barrier sites would be reduced accordingly. Under these conditions sport and commercial fishing would continue to decline.

During the period of analysis, freshwater sport fishing would amount to 4,600 man-days annually in project streams, oxbows, and sloughs. Freshwater commercial fishing in these waters would amount to 800 pounds annually.

## With the Project

Construction of a saltwater barrier would result in year-round improvement in freshwater fish habitat between the proposed barrier and the upstream sites of the temporary saltwater barriers by preventing upstream encroachment of heavily polluted salt water. Further improvement in water quality within this reach could be obtained by relocating a wood-pulp mill effluent outfall downstream from the proposed barrier before the barrier is constructed.

Freshwater sport fishing would amount to 10,000 man-days annually in the area of influence. Freshwater commercial fishing in these waters would amount to about 1,200 pounds annually.

## Wildlife

### Without the Project

The area of influence for wildlife would consist of streams, other water areas, and low-lying floodplains characterized by tupelo gum-cypress swamps, between the sites of the temporary saltwater barriers and the proposed saltwater barrier. The project would have no effect on wildlife habitat downstream from the proposed saltwater barrier.

Much of the timber in the area is in various stages of second growth and logging is not now being practiced. Human activities center around a few summer cabins, two boat clubs, and a country club. There is one public boat-launching ramp at about river mile 26.5. A portion of the proposed Beaumont Unit of the Big Thicket Area lies to the north of Pine Island Bayou and to the west of the Neches River and is bordered on the west and north by the Lower Neches Valley Authority water diversion canal.

Important wildlife in the project area includes the white-tailed deer, fox and gray squirrels, swamp rabbit, red and gray foxes, raccoon, and waterfowl. Principal species of waterfowl are the wood duck and mallard. Other wildlife in the area includes bobwhite, mourning dove, cottontail, opossum, skunk, beaver, river otter, nutria, mink, bobcat, coyote, and various song and wading birds. Rare or endangered species listed in the Bureau of Sport Fisheries and Wildlife Publication No. 34, "Rare and Endangered Fish and Wildlife in the United States", are the American alligator, southern bald eagle, ivory-billed woodpecker, northern red-cockaded

woodpecker, and red wolf. The presence of the ivory-billed woodpecker is considered questionable by many.

The amount of hunting is moderate to slight due to poor accessibility. The species hunted are primarily squirrels, rabbits, deer, raccoon, fox, and waterfowl. Trapping in the area is slight. Wildlife-oriented recreation, including bird watching, wildlife photography, and wildlife-directed educational activities, is a major pastime.

During the period of analysis, big-game hunting would amount to 200 man-days annually, while upland-game hunting would be about 500 man-days annually. Hunting for waterfowl would amount to 300 man-days annually, and hunting for other remaining forms of wildlife would be about 300 man-days also. Wildlife-oriented recreation would amount to 1,000 man-days annually.

#### With the Project

Construction of a saltwater barrier would result in year-round freshwater conditions in the wooded swamp upstream from the site. Brackish water and pollution from the lower reach of the Neches River would be prevented from encroaching into these environs.

The one-foot head impounded by a saltwater barrier would, for the most part, be contained in the stream channels, oxbows, and sloughs. Only for short periods of less than 24 hours would water levels exceed the design pool level. Such occurrences would be so infrequent as to have insignificant effects on wildlife habitat.

Hunting of big game, upland game, other wildlife, and waterfowl, and the trapping of fur animals would not change significantly over without-the-project conditions.

#### DISCUSSION

A saltwater-barrier dam as proposed would enhance freshwater sport and commercial fishing in the area of project influence by improving water quality. On the other hand, wildlife habitat would not be materially affected so that project-induced changes in hunting or trapping are not anticipated.

## CONCLUSIONS

Construction of a saltwater barrier would create a permanent freshwater fishery above the damsite. An annual increase in freshwater sport fishing in the amount of 5,400 man-days and valued at \$5,400 would accrue from the project. The freshwater commercial fishing harvest would increase by 400 pounds annually, valued at \$200.

With respect to wildlife, the project would cause no significant change in the amount of hunting or trapping.

The following material is included for use in the preparation of an environmental statement on the Saltwater Barrier Dam Project as required by Section 102(2)(C) of the National Environmental Policy Act of 1969, approved January 1, 1970 (83 Stat. 852). Effects on fish and wildlife habitat and resultant changes in human use with project construction and operation are discussed.

(i) The environmental impact of the proposed action. The project would convert a sizable portion of Pine Island Bayou and the Neches River and their associated low-lying floodplains, oxbows, and sloughs into a year-round freshwater environment. It would prevent pollution-laden, brackish water in the Neches River from contaminating the streams, oxbows, and sloughs upstream from the barrier during periods of low flow in the Neches River.

About 40 acres would be completely cleared of trees and vegetation in the construction of the barrier and gate. Selective clearing would be performed on an additional 16 acres of land severed by construction of the navigation channel.

(ii) Any adverse environmental effects which cannot be avoided should the proposal be implemented. Small acreages of marshland and bottomland habitat would be destroyed by the construction of the dam, diversion channel, navigation gate, and access road. These losses would have no significant effect on the amount of hunting or trapping.

(iii) Alternatives to the proposed action. An alternative to the proposed action would be to construct a barrier at other locations upstream from the proposed site. However, pollution-laden waters would encroach to any barrier site selected.

(iv) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. The project would prevent fish and wildlife losses caused by a deteriorating environment and restore some of the former productivity of the area. An increase in hunting is not anticipated but sport fishing is expected to increase by 5,400 man-days annually. Freshwater commercial fishing also would be improved.

(v) Any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. Small acreages of wildlife habitat would be lost forever; however, other wildlife habitat would be protected from further degradation by preventing pollution infiltration to these areas.

This report is based on data received prior to March 24, 1972. Any modification in the project planning should be brought to the attention of the Bureau of Sport Fisheries and Wildlife so that the effects of the project may be reappraised.

Sincerely yours,

*William M. White*

Acting Regional Director

Enclosures 2

Copies (10)

Distribution:

- (5) Executive Director, Texas Parks and Wild. Dept., Austin, Tex.
- (2) Regional Director, Nat'l Mar. Fish. Serv., St. Petersburg, Fla.
- (2) Laboratory Director, Biol. Lab., NMFS, Galveston, Tex.
- (2) Regional Director, Bureau of Outdoor Recr., Denver, Colo.
- (2) Regional Administrator, EPA - Reg. VI, Dallas, Tex.
- (1) Field Representative, USDI, SW Reg., Albuquerque, N. Mex.
- (2) Field Supervisor, BSW, Div. of River Basin Studies, Fort Worth, Tex.



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EXECUTIVE DIRECTOR

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AUSTIN, TEXAS 78701

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LUBBOCK

June 29, 1972

Mr. W. O. Nelson, Jr.  
Regional Director  
U. S. Department of Interior  
Bureau of Sport Fisheries and Wildlife  
Post Office Box 1306  
Albuquerque, New Mexico 87103

Dear Mr. Nelson:

We have examined and concur with the review draft report concerning the Corps of Engineers plans for a proposed Saltwater Barrier Dam on the Neches River at Beaumont, Texas, and find it to be well presented.

We appreciate having had the opportunity to review this draft report.

Sincerely,

A large, stylized handwritten signature of James U. Cross in black ink.

JAMES U. CROSS  
Executive Director

cc: Mr. John Degani



**APPENDIX "B"**

**LETTERS RECEIVED BY THE  
DISTRICT ENGINEER ON THE  
DRAFT ENVIRONMENTAL STATEMENT**

Page

- B-1 Soil Conservation Service, USDA ltr dtd 9 Feb 73
- B-2 Forest Service, USDA ltr dtd 22 Feb 73
- B-3 Deputy Assistant Secretary for Environmental Affairs,  
USDC ltr dtd 15 Feb 73
- B-6 Region VI, DHEW ltr dtd 26 Jan 73
- B-7 Bureau of Sport Fisheries and Wildlife, USDI ltr dtd  
6 Feb 73
- B-8 National Park Service, USDI ltr dtd 9 Feb 73
- B-9 Bureau of Mines, USDI ltr dtd 14 Feb 73
- B-10 Water Resources Division, Geological Survey, USDI  
ltr dtd 26 Jan 73
- B-11 Water Resources Division, Geological Survey, USDI ltr  
dtd 29 Jan 73
- B-12 Office of Environmental Geology, Geological Survey, USDI  
ltr dtd 19 Jan 73
- B-13 Bureau of Outdoor Recreation, USDI ltr dtd 15 Feb 73
- B-14 Eighth Coast Guard District, USDOT ltr dtd 6 Feb 73
- B-15 Region VI, Environmental Protection Agency ltr dtd 13 Feb 73
- B-18 Division of Planning Coordination, State of Texas  
ltr dtd 21 Feb 73
- B-21 Division of Planning Coordination, State of Texas  
ltr dtd 15 May 1973
- B-22 Texas Parks and Wildlife Department ltr dtd 23 Jan 73
- B-23 Texas Water Development Board ltr dtd 5 Feb 73
- B-27 Texas Water Quality Board ltr dtd 5 Feb 73
- B-28 Texas Water Rights Commission ltr dtd 7 Feb 73
- B-44 Texas State Historical Survey Committee ltr dtd 7 May 73
- B-46 Bureau of Economic Geology, The University of Texas  
at Austin ltr dtd 18 Jan 73
- B-47 South East Texas Regional Planning Commission ltr dtd  
23 Feb 73
- B-49 Lower Neches Valley Authority ltr dtd 9 Apr 73
- B-50 Environmental Control Department, Jefferson County,  
Texas ltr dtd 15 Jan 73
- B-52 City of Beaumont, Texas ltr dtd 29 Jan 73
- B-54 Clean Air and Water, Inc. ltr dtd 24 Feb 73
- B-56 Neches Boat Club ltr dtd 26 Feb 73

**UNITED STATES DEPARTMENT OF AGRICULTURE**  
**SOIL CONSERVATION SERVICE**

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P. O. Box 648  
Temple, Texas 76501

February 9, 1973

Colonel Nolan C. Rhodes  
District Engineer  
Corps of Engineers, Galveston District  
P. O. Box 1229  
Galveston, Texas 77550

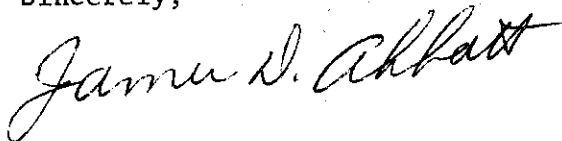
Dear Colonel Rhodes:

We have completed our review of the preliminary draft environmental statement on a proposed saltwater barrier in the Neches River at Beaumont, Texas.

Information contained herein appears to adequately cover the environmental impact of the proposed project.

We appreciate the opportunity to review the statement and make appropriate comments.

Sincerely,



for Edward E. Thomas  
State Conservationist

cc: Kenneth E. Grant, SCS, Washington, D. C.

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

Southeastern Area, State and Private Forestry  
Atlanta, Georgia 30309

1940

February 22, 1973

Martin W. Teague, Lt. Colonel  
Acting District Engineer  
Galveston District - Corps of Engineers  
Galveston, Texas 77550



The Preliminary Draft Environmental Statement, "Neches River and Tributaries, Texas Saltwater Barrier on Neches River at Beaumont, Texas", has been reviewed by our office.

We feel the statement adequately describes the situation and predicts probable changes.

Thank you for the opportunity of reviewing this statement.

*Amel E. Landgraf*  
for AMEL E. LANDGRAF  
Area Environmental Coordinator



**THE ASSISTANT SECRETARY OF COMMERCE**  
Washington, D.C. 20230

February 15, 1973

Lt. Colonel Martin W. Teague  
Acting District Engineer  
Department of the Army  
P. O. Box 1229  
Galveston, Texas 77550

Dear Colonel Teague:

The draft environmental impact statement for Neches River at Beaumont, Texas which accompanied your letter of December 29, 1972, has been received by the Department of Commerce for review and comment.

The Department of Commerce has reviewed the draft environmental statement and has the following comments to offer for your consideration.

In the section Environmental Impact of the Proposed Action, it is stated that the salt water intrusion up the river is a problem related to navigational improvements previously installed. The Statement should also note that the intrusion is also related to the significant reductions of fresh water flows to the estuary during certain seasons.

Under Alternatives to the Proposed Action, only the negative impacts expected from the alternative of flushing are discussed. The benefits to the marine fishes and crustaceans reared in the Sabine Estuary should also be discussed, including the value of fresh water inflows as both a source of nutrients and a reducer of salinity in the estuary, as noted in Copeland (1966) and Copeland, Odum and Cooper (1972). Although the flows today may be more than sufficient in some parts of the year, the draft Statement indicates a future "lack of water to meet the future demand through the state."

B-3

Since a major objection to the alternative of flushing indicated in the draft statement would be the need for "a net flow of 1,900 cubic feet per second," another alternative of constructing a sill just below the water surface with sufficient flushing to provide for a continuous downstream flow should be discussed. This alternative would not require as great a flow of water. It would, however, provide a long-term assurance of some fresh water inflows to the estuary. The report on Comprehensive Basin Study, Sabine River and Tributaries, Texas and Louisiana, December 1967 noted that "To preserve the estuarine fisheries in Sabine Lake and the estuarine-dependent fisheries of the associated Gulf of Mexico, total freshwater discharge from the Sabine and Neches Rivers should never be less than 1.1 million acre-feet annually, of which the Sabine River should contribute at least 600,000 acre-feet annually. This is a preliminary estimate and may need revising as additional knowledge of requirements of fish and wildlife resources associated with the estuary is made available." This statement clearly implies that the Neches River should contribute at least 500,000 acre-feet annually. It should be noted that an alternative requiring at least some continuous flushing would help insure that the Neches River contributes to this flow and to the future minimum estimates of needed flows to the estuary. A further observation should be made that the marine fishes and crustaceans reared in the estuaries support a large seafood industry, as well as marine sport fishing.

With regard to the Relationship between Local Short-Term use of Man's Environment and the Maintenance and Enhancement of Local Long-Term Productivity, a discussion of possible long-term effects on estuarine productivity should be included. A downstream structure that can completely block the river could conceivably be used to divert all or nearly all of the flows from the river. According to the draft statement, the average number of days of closure for the past four decades was 111 days per year. The average annual number of days of closure predicted for future decades should also be included. That some of these actions may occur without the federal project, though worthy of note, does not lessen the need under the National Environmental Policy Act for delineating the expected impacts of the federal project.

#### Literature Cited

Copeland, B.J. 1966. Effects of decreased river flow on estuarine ecology. Jour. Water Pollution Control Federation, pp. 1831-1839



Copeland, B.J., Howard T. Odum and David C. Cooper. 1972. Water quantity for preservation of estuarine ecology, pp. 107-126. In Conflicts in water resources planning, E.F. Gloyna and W. S. Butcher (ed.), Water Resources Symposium No. 5, Center for Research in Water Resources, University of Texas at Austin.

We hope these comments will be of assistance to you in the preparation of the final statement.

Sincerely,

A handwritten signature in cursive script that reads "Sidney R. Galler".

Sidney R. Galler  
Deputy Assistant Secretary  
for Environmental Affairs



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

REGIONAL OFFICE

1114 COMMERCE STREET

DALLAS, TEXAS 75202

January 26, 1973

OFFICE OF  
THE REGIONAL DIRECTOR

Our Reference: EI #173-195

Re: Neches River and Tributaries,  
Texas Saltwater Barrier on  
Neches River at Beaumont, TX

Martin W. Teague  
Lieutenant Colonel, CE  
Acting District Engineer  
Department of the Army  
Galveston District, Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Dear Mr. Teague:

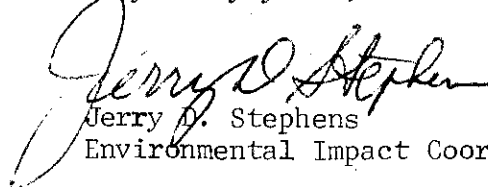
Pursuant to your request, we have reviewed the Environmental Impact Statement for the above project proposal in accordance with Section 102(2)(C) of P. L. 91-190, and the Council on Environmental Quality Guidelines of April 23, 1971.

Environmental health program responsibilities and standards of the Department of Health, Education, and Welfare include those vested with the United States Public Health Service and the Facilities Engineering and Construction Agency. The U. S. Public Health Service has those programs of the Federal Food and Drug Administration, which include the National Institute of Occupational Safety and Health and the Bureau of Community Environmental Management (housing, injury control, recreational health and insect and rodent control).

Accordingly, our review of the Draft Environmental Statement for the project discerns no adverse health effects that might be of significance where our program responsibilities and standards pertain, provided that appropriate guides are followed in concert with State, County, and local environmental health laws and regulations.

We therefore, have no objection to the authorization of this project insofar as our interests and responsibilities are concerned.

Very truly yours,

  
Jerry D. Stephens  
Environmental Impact Coordinator

B-6



IN REPLY REFER TO: RB

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
FISH AND WILDLIFE SERVICE  
BUREAU OF SPORT FISHERIES AND WILDLIFE  
POST OFFICE BOX 1306  
ALBUQUERQUE, NEW MEXICO 87103

February 6, 1973

District Engineer  
Corps of Engineers, U. S. Army  
P. O. Box 1229  
Galveston, Texas 77550

Dear Sir:

The preliminary draft of the environmental statement on the Saltwater Barrier on the Neches River at Beaumont, Texas, dated December 20, 1972, for the most part adequately presents the impact of the project on fish and wildlife.

The discussion of alternatives to the proposed action, starting on page 13, includes flushing by freshwater from upstream reservoirs. No mention is made, however, of the extent of this practice under existing conditions and whether this practice would be continued after project construction. Operational procedures for B. A. Steinhagen Lake (Dam B Reservoir) now include provision for the release of 140 second-feet during periods of saltwater intrusion. We believe that the environmental statement should give consideration to these flushing releases as an existing influence on the environment and also discuss the impacts which may occur should these releases be eliminated or modified.

In comparison with the total need for freshwater below the saltwater barrier site, the contribution of 140 second-feet is relatively minor. Nevertheless, its loss could only aggravate the adverse conditions which prevail in the lower river and estuary.

The above comments are provided as input to the preliminary draft statement and do not represent the review comments of the Bureau of Sport Fisheries and Wildlife or of the Department of the Interior on the draft environmental statement.

Sincerely yours,

Acting Regional Director

cc:  
Field Supervisor, BSWF, Div. of River Basin Studies, Fort Worth, Texas

B-7



# United States Department of the Interior

NATIONAL PARK SERVICE

Southwest Region

P.O. Box 728

Santa Fe, New Mexico 87501

**FEB - 9 1973**

IN REPLY REFER TO:

L7619

(ER-73/23)

District Engineer, Galveston District  
Corps of Engineers  
Post Office Box 1229  
Galveston, Texas 77550

Dear Sir:

The following comments relate to the preliminary draft environmental statement for the construction of a permanent barrier across the Neches River, Jefferson County, Texas. Our comments are intended as input to the preparation of a draft environmental statement and do not necessarily reflect the views of the Department of the Interior.

The draft statement should contain evidence of contact with the Texas Historic Preservation Officer and include his comments concerning the effect of the undertaking upon historical and archeological resources.

As the preliminary draft statement points out: "Adequate data to assess the impact of the project on the archeological resources are not available at this time" (p. 11). Therefore, the treatment of archeological resources is inadequate. Archeological sites and materials are non-renewable resources and any adverse impact constitutes an irreversible and irretrievable commitment of such resources. It is not sufficient to state that "no sites of local or State significance will be affected by the project." (p. 11.) A qualified professional archeologist must survey the entire area of the proposed project. The draft statement should cite the resulting report and both the survey and report should be available for review. If archeological materials are found within the scope of the project, the draft statement must include an evaluation of the significance of the resources and also contain cost estimates and steps to be taken to mitigate any adverse effects on the archeological resources.

Sincerely yours,

Director Southwest Region

B-8



United States Department of the Interior

BUREAU OF MINES

BUILDING 20, DENVER FEDERAL CENTER  
DENVER, COLORADO 80225

Office of  
Chief

Intermountain Field Operation Center

February 14, 1973

Air Mail

Your reference:  
SWGED-B

Col. Nolan C. Rhodes  
District Engineer, Galveston District  
U. S. Army Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Dear Colonel Rhodes:

We have reviewed the "Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas," as requested in your letter of December 28, 1972.

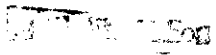
The report, dated December 20, 1972, and prepared by U. S. Army Engineer District at Galveston, Texas, summarizes studies, findings, and recommended action to control salt water intrusion up the Neches River during periods of low river flow. Proposed construction consists of a gated main barrier, navigation gate, bypass channel, auxiliary dam, and appertenances at a 57-acre site one-half mile upstream from the Interstate Highway 10 bridge across the Neches River at Beaumont.

Our primary interest in the project is possible involvement of mineral resources and mineral-production facilities, and our office review indicates that the proposed improvements would have no adverse effect thereon. Mineral resources and related facilities that exist in the Beaumont area are summarized in the report (p. 4). Although we have no objection to the project as described, any subsequent environmental impact statement might well include such language as the following:

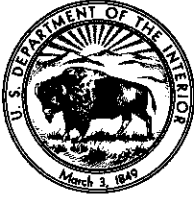
The project is not expected to affect adversely any mineral resources nor will it appreciably hamper future exploitation of such resources.

Our field-level comments are informal and are provided as a service; they do not constitute a formal project review by the Bureau of Mines.

Sincerely yours,

  
O. M. Bishop, Chief  
Intermountain Field Operation Center

B-9



# United States Department of the Interior

## GEOLOGICAL SURVEY

### WATER RESOURCES DIVISION

FEDERAL BUILDING

300 EAST 8TH STREET

AUSTIN, TEXAS 78701

January 26, 1973

District Engineer  
Galveston District  
Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Dear Sir:

The Water Resources Division of the U.S. Geological Survey, Texas District, has no comments to make on the Preliminary Draft Environmental Statement for the construction of a permanent barrier across the Neches River, Jefferson County, Texas (ER-73/23).

Sincerely yours

I. D. Yost  
District Chief

cc: Regional Hydrologist, WRD, CR, Lakewood, Colorado  
G. H. Davis, WRD, Washington, D. C. Code: 4000 0000

IDY:lk

B-10



# United States Department of the Interior

GEOLOGICAL SURVEY

WATER RESOURCES DIVISION

FEDERAL BUILDING

300 EAST 8TH STREET

AUSTIN, TEXAS 78701

January 29, 1973

District Engineer  
Galveston District  
Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Dear Sir:

Enclosed herewith are the statements of the U.S. Geological Survey, Geologic Division, on the review of draft environmental statement for the construction of a permanent barrier across the Neches River, Jefferson County, Texas (ER-73/23).

Sincerely yours.

I. D. Yost  
District Chief

cc: Regional Hydrologist, WRD, CR, Lakewood, Colorado  
G. H. Davis, WRD, Washington, D. C. Code: 4000 0000

IDY:lk

B-11



# United States Department of the Interior

GEOLOGICAL SURVEY  
WASHINGTON, D.C. 20242

January 19, 1973

## Memorandum

To: Special Assistant for Environmental Analysis,  
Office of the Director

From: Deputy Chief for Engineering Geology,  
Office of Environmental Geology

Subject: Review of draft environmental statement for the construction  
of a permanent barrier across the Neches River, Jefferson  
County, Texas (ER 73-23)

It is proposed to construct a permanent barrier across the river to prevent intrusion of salt water to upstream freshwater supply intakes. The project consists of a gated dam in the river, a gated navigation by-pass channel, an auxiliary dam in a small tributary bayou, an access road and service bridge, levee, and other related works. About 57 acres will be required for the project.

No data on the geology of the area of the proposed barrier project are provided in the draft environmental statement. However, environmental problems that may result from geologic conditions should be recognizable from pre-construction investigations and should be within the range of standard engineering practice.

*Elmer H. Baltz*  
for  
Elmer H. Baltz





United States Department of the Interior  
BUREAU OF OUTDOOR RECREATION

SOUTH CENTRAL REGIONAL OFFICE  
FIRST NATIONAL BANK BUILDING EAST  
5301 CENTRAL AVENUE, N.E., SUITE 1015  
ALBUQUERQUE, NEW MEXICO 87108

IN REPLY  
REFER TO:

FEB 15 1973

Col. Nolan C. Rhodes  
District Engineer  
Galveston District  
Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Dear Colonel Rhodes:

As requested in Bruce Blanchard's memo of January 5, 1973, a review has been made of the draft environmental statement for the construction of a permanent barrier across the Neches River, Jefferson County, Texas (ER-73/23). We have found the statement to be adequate and have no substantive comments to offer.

Sincerely yours,

Acting for Rolland B. Handley  
Regional Director

B-13



DEPARTMENT OF TRANSPORTATION  
UNITED STATES COAST GUARD

ADDRESS REPLY TO:  
COMMANDER (mep)  
EIGHTH COAST GUARD DISTRICT  
CUSTOMHOUSE  
NEW ORLEANS, LA. 70130

5900

FEB 6 1973

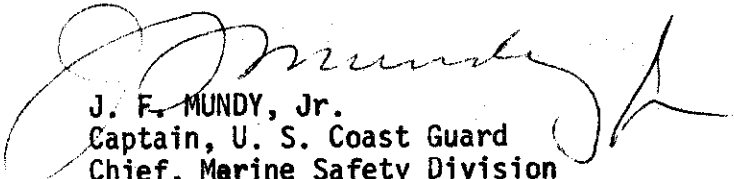
. Lt. Colonel Martin W. Teague  
Acting District Engineer  
Galveston District  
Department of the Army  
U. S. Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

RE: SWGED-PV dtd 29 Dec 1972  
Neches River and Tributaries, Texas  
Saltwater Barrier on Neches River  
at Beaumont, Texas

Dear Sir:

The Commander, Eighth Coast Guard District does not have any objections to the referenced draft environmental statement.

Sincerely yours,

  
J. F. MUNDY, Jr.  
Captain, U. S. Coast Guard  
Chief, Marine Safety Division  
By direction of the Commander  
Eighth Coast Guard District

B-14



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI  
1600 PATTERSON, SUITE 1100  
DALLAS, TEXAS 75201

February 13, 1973

Colonel Nolan C. Rhodes  
District Engineer  
U.S. Army Corps of Engineers  
Galveston District  
P. O. Box 1229  
Galveston, Texas 77550

Re: 06-3-80-NM &  
06-3-IIIF-12

Dear Colonel Rhodes:

We have reviewed your agency's report, "Interim Review of Reports on the Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas," and the Preliminary Draft Environmental Impact Statement on the project.

The proposed action will provide a tainter-gated dam at mile 23.0 on the Neches River, approximately one-half mile upstream from the Interstate Highway 10 bridge at Beaumont, Texas; a sector-gated navigation by-pass channel; and an auxiliary dam in a small canal that drains Bairds Bayou.

We have the following comments on the report and the impact statement:

1. In the discussion of the existing environment, reference is made to the City of Beaumont's sanitary landfill on the west bank of the river upstream from mile 22.6. We suggest that a discussion of the leachate from this fill be included in the report and the statement. Should the area for the sanitary landfill extend beyond mile 23.0, the leachate could reach the river above the proposed salt water barrier. Usually leachate from sanitary fills contains pollutants. If these pollutants reach the river, one of the purposes of the project - an unpolluted reach of water above the salt water barrier - would be defeated. The City of Beaumont should be consulted and their plans for the sanitary landfill and any provisions for abating possible pollution by leachates should be included in the report.

B-15

2. Reference is made in several sections of the report and the statement to "local interest." The "local interest" should be identified in the first part of the report and statement and possibly be substituted for "local interest" throughout the report.

3. We do not understand why the salt water wedge is "a Federal responsibility related to navigation improvements previously installed." An examination of the profile of the river shows the bed of the river does not reach mean sea level until mile 44. This strongly indicates that the salt wedge was there before navigation and will reach its furthest point upriver during periods of low flows and withdrawal of large quantities of water

4. It is not clear from the discussion on the alternative for flushing the salt water from the channel how the 1900 cfs that would be required to keep the salt water wedge below the fresh water intake at Brinns Bluff was computed.

5. We suggest that a combination of surface water and ground water to supply municipal, industrial and agricultural demands be considered as an alternative to the salt water barrier.

6. The statement that the proposed barrier will have little effect on fresh water flows to the estuary should be discussed in detail. The barrier will be closed 4 to 6 months each year. If the time period for this length of closure is continuous, there could be an adverse effect on the ecosystems of the estuary.

We have the following additional comments on the Preliminary Draft Environmental Impact Statement:

1. A map should be furnished that shows the service area and the 16 acres of land on the point isolated or severed by the salt water barrier and their relationship to the project. All spoil areas should also be shown on the map.

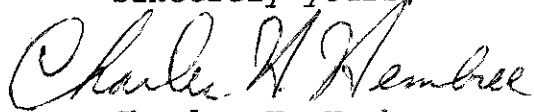
2. All dredged material should be placed behind dikes or levees with control weirs so the sediment returning to the river will be reduced.

3. The total cost of the project should be given with a brief discussion of how the benefit-to-cost ratio of 1.86 was computed.

4. We suggest that the cost of each alternative be included in the discussion of the alternatives to the project.

We appreciate the opportunity to review and comment on your report and preliminary draft statement. We will appreciate receiving five copies of the Draft Environmental Impact Statement for formal review.

Sincerely yours,



Charles H. Hembree  
Chief

Federal Assistance Branch



## EXECUTIVE DEPARTMENT

### DIVISION OF PLANNING COORDINATION

PH BRISCOE  
GOVERNOR

BOX 12428, CAPITOL STATION

AUSTIN, TEXAS 78711

PHONE 512 475-2427

February 21, 1973

Lt. Col. Martin W. Teague, C.E.  
Acting District Engineer  
Department of the Army  
Galveston District,  
Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Dear Colonel Teague:

The Office of the Governor, Division of Planning Coordination (the State Planning and Development Clearinghouse), and interested or affected Texas State agencies have reviewed the Interim Review of Reports and the draft environmental impact statement on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas.

The following comments are offered:

1. The Texas Water Quality Board recommends that the Corps' report include an evaluation of downstream water quality problems that might result from construction of the salt water barrier. An assessment of the effects of confining wastewater discharges in lower reaches of the river during low flow periods should be made to particularly reflect dissolved oxygen, temperature and salinity changes. In addition, the relocation of the Eastex, Inc., effluent outfall line downstream from the barrier will require an amendment to their existing waste control order by formal Board action.

2. The Bureau of Economic Geology has completed recent surface mapping in the area, and has defined a photographic linear extending along the north end of the proposed salt barrier, approximately paralleling the proposed city road. Many of these kinds of linears are coincident with active faults in the Houston area, and although there is no indication that this particular linear represents an active surface fault, some field observation might be worthwhile.

3. The Texas Water Rights Commission recommends that recognition be given to the fact that the proposed project has water rights impacts of sufficient importance to require formal examination by the Commission. The local sponsor should submit an application for permit either to reaffirm that existing permits are not affected or to formalize justifiable changes in the existing permits, if applicable. The Commission further commented that:

1. While the proposed project is, in fact, an action by the Federal government to remedy adverse effects of exercising the Federal right of navigational servitude in the Lower Neches River, the proposed remedial project imposes on the local, non-Federal sponsor the full responsibility to acquire in accordance with State laws and regulations, and if necessary to establish and justify, any and all water rights needed for the desired utilization of the fresh water storage space created by the salt water barrier dam on the Neches River.
2. The submission of the permit application from the local sponsor will enable the Texas Water Rights Commission to make proper statutory and legal reviews of proposed beneficial use of the fresh water impoundment which would be created by the proposed barrier facility. It may be necessary for the Commission to examine carefully the use of impounded fresh water for proposed multiple beneficial purposes versus the single limited purpose of using the impounded fresh water mainly to delay or regulate stream flow in aid of navigation, and to limit the extent of tidal contaminated salt water intrusion in the Neches River and Estuary during unforeseen periods of low stream flow and high fresh water withdrawals.
3. Special recognition should be given to the Interim Review of Reports and in the Environmental Statement to the provisions of the Federal Water Pollution Control Act Amendment of 1961, regarding the inclusion of water quality storage in Federal reservoirs. The referenced barrier dam brings to the fore certain aspects of the problems concerning fresh water inflows to bays and estuaries; water releases for quality control; and, release to control salt water intrusion. Specifically, assurance should be given that storage and water releases shall not be regarded as a substitute for adequate municipal and industrial wastewater treatment or other methods of controlling waste at the source. There is a difference between fresh water releases to control salinity in bays and estuaries, and fresh water releases merely to reduce municipal and industrial waste concentrations. In this regard, the referenced documents would be enhanced if further informative details were given concerning water quality management planning being done by Federal or non-Federal agencies in the Lower Neches River and Estuary downstream from the site of the proposed project.
4. The Texas Parks and Wildlife Department and the Water Development Board both recommend the barrier at Site 1 rather than the other locations.

We appreciate the opportunity to review the Interim Review of Reports and the draft environmental impact statement on the Neches River Project. Copies of the comments of the State agencies are enclosed.

Sincerely,



Ed Grisham  
Director

EG:jab

Enclosures

cc: Mr. Hugh C. Yantis, Jr., TWQB

Dr. W. L. Fisher, BEG

Mr. Louis L. McDaniels, TWRC

Mr. Clayton Garrison, TP&WD

Mr. Harry P. Burleigh, TWDB





## EXECUTIVE DEPARTMENT

DIVISION OF PLANNING COORDINATION

DOLPH BRISCOE

GOVERNOR

BOX 12428, CAPITOL STATION

AUSTIN, TEXAS 78711

PHONE 512 475-2427

May 15, 1973

Nolan C. Rhodes  
Colonel, C.E., U.S.A.  
District Engineer  
Galveston District  
Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Dear Colonel Rhodes:

On February 21, we submitted a letter with comments from Texas State agencies on the draft environmental impact statement for Neches River and Tributaries, Texas, covering Salt Water Barrier at Beaumont, Texas.

On April 6, you requested our assistance in securing comments of the Texas State Historical Survey Committee (TSHSC) concerning any information they might have regarding historical and archeological resources in the proposed project area. We asked the TSHSC to review the draft environmental statement and enclose their response to that request. The Committee spent a substantial amount of time in conducting a thorough review of this draft environmental statement and consequently their comments should be considered in their entirety. Please place this material with our original letter and enclosures.

Thank you for your cooperation in this matter.

Sincerely,

A handwritten signature in cursive script, reading "Walter G. Tibbitts III".

Walter G. Tibbitts III  
Acting Director

WGT:jab

Enclosure

cc: Mr. Truett Latimer, TSHSC

B-21

MISSIONERS

R. STONE  
AIRMAN, WELLS

L. THOMAS  
VICE-CHAIRMAN, DALLAS

F. JERSIG  
SAN ANTONIO



CLAYTON T. GARRISON  
EXECUTIVE DIRECTOR

JOHN H. REAGAN BUILDING  
AUSTIN, TEXAS 78701

COMMISSIONERS

PEARCE JOHNSON  
AUSTIN

BOB BURLESON  
TEMPLE

JOE K. FULTON  
LUBBOCK

January 23, 1973

Mr. Ed Grisham  
Director, Executive Department  
Division of Planning Coordination  
Box 12428, Capitol Station  
Austin, Texas 78711

Dear Mr. Grisham:

Reference is made to your memorandum of 4 January and the attached Preliminary Draft Environmental Statement for the Neches River Saltwater Barrier.

Our Department has reviewed this report and agrees with the enclosed findings. We would hope to press the Corps of Engineers for a barrier at Site 1 rather than the other locations.

We appreciate having had the opportunity of commenting on this report.

Sincerely,

A handwritten signature in cursive script, appearing to read "Clayton T. Garrison".

CLAYTON T. GARRISON  
Executive Director

CIG:EM:wj

B-22

# TEXAS WATER DEVELOPMENT BOARD

## MEMBERS

JOHN H. MCCOY, CHAIRMAN  
NEW BOSTON  
MARVIN SHURBET, VICE CHAIRMAN  
PETERSBURG  
ROBERT B. GILMORE  
DALLAS  
W. E. TINSLEY  
AUSTIN  
MILTON T. POTTS  
LIVINGSTON  
CARL ILLIG  
HOUSTON



P.O. BOX 13087  
CAPITOL STATION  
AUSTIN, TEXAS 78711

HARRY P. BURLEIGH  
EXECUTIVE DIRECTOR

AREA CODE 512  
475-2201  
301 WEST 2ND STREET

February 5, 1973

IN REPLY REFER TO:  
TWDBP-0

Mr. Ed Grisham, Director  
Division of Planning Coordination  
Office of the Governor  
Post Office Box 12428  
Capitol Station  
Austin, Texas 78711

RECEIVED

FEB 6 1973

Div. of Plan. Coord.

Dear Mr. Grisham:

Your memorandum of January 4, 1973 requested our review of the Corps of Engineers "Interim Review of Reports of Neches River and Tributaries Covering Salt Water Barrier at Beaumont, Texas" and the accompanying "Preliminary Draft Environmental Statement" pertaining to the salt water barrier. We are pleased to offer the following comments on these reports.

The systems for diversion of water from the Neches River for municipal and industrial supplies constitute two of the oldest continuous water systems in Texas, having been initiated at present points of diversion prior to 1913. Tidewater from the Gulf of Mexico, under low-flow conditions of the Neches River, reaches river mile 42, near Wiess Bluff. The City of Beaumont normally withdraws water from the Neches River at a gravity canal intake at Bunn's Bluff (mile 30), and has a pump station located at Wiess Bluff (mile 41.7). The Lower Neches Valley Authority (LNVA) withdraws water from the Neches River through a canal at Lakeview (mile 32). The canal leads to a siphon and pump station on Pine Island Bayou (mile 3.2). The LNVA also withdraws water from Pine Island Bayou at a pump station located at Voth (mile 6). Thus, the entire municipal, industrial and agricultural water supply for a large industrial complex, for the cities of Beaumont, Port Arthur and other urban areas with a total population of approximately 175,000 persons, and irrigation water for thousands of acres of rice, are all derived from a segment of the Neches River now subject to tidewater effects.

Over the years it has been necessary to protect the fresh-water diversions from salt-water intrusion by means of temporary dams and cut-off walls which separate fresh water and salt water. Large volumes of treated industrial waste and

B-23

municipal drainage enter the Neches River in its lower reaches. The presence of such wastes, together with the brackish water, frequently result in a septic mix that ebbs and flows with the tides during periods of low flow in the Neches River. This condition creates a constant threat to fresh-water supplies and has also adversely affected aquatic life in the river segment.

The proposed project will provide a permanent barrier dam at mile 23.0, which is a short distance above the Interstate Highway 10 crossing on the Neches River within the City of Beaumont, and is approximately 16.7 miles downstream from the temporary salt water barriers which have been in use heretofore. This 16.7 miles of the Neches River will be thus restored to fresh-water status. The dam will be provided with flood gates which will normally provide a fresh-water pool, and at the same time protect against salt-water intrusion from normal tides. This is not a hurricane protection project, and tides induced by tropical storms will top the dam. Such unusual conditions will require subsequent flushing through the flood gates.

In addition to the salt water barrier dam, equipped with flood gates, the proposed project will include a by-pass navigation channel at the east bank of the river which will be controlled by a navigation gate as an integral part of the dam. By this means it will be possible for small commercial and pleasure craft to continue use of the navigable portion of the Neches River.

Specific comments on the five principal areas of environmental impact follow:

1. The environmental impact of the proposed action.

In the opinion of Water Development Board staff, benefits to be derived from the proposed action will far outweigh any adverse effects. As has been indicated above, the lower Neches River supplies substantial quantities of municipal, industrial and irrigation water. The proposed project will protect the existing diversion points against all but the most unusual hurricane conditions, when salt water and industrial wastes will threaten the fresh-water supply. Additionally, 16.7 miles of the river channel will be permanently open for fresh-water recreation and navigation by small craft will be possible on a continuous basis.

Construction of the salt water barrier and navigation channel will, inevitably, require use and alteration of some land features. Approximately 600 acres of land will be drained by Brakes Bayou on the west side of the Lawson Canal. As a trade-off, however, approximately 16.7 miles of the Neches River and Pine Island Bayou between the new salt water barrier and the presently-used temporary barrier locations will be improved for swimming, boating, hunting, and fresh-water fishing.

Some of the material excavated from the navigation channel will be placed in leveed spoil areas (14 acres) adjacent to the project. Approximately 41 acres of land

will be completely cleared of trees and vegetation, and 16 acres of land severed by the project will be selectively cleared. These 57 acres of land will be temporarily lost as wildlife habitat, but can be expected to return to such use as vegetation restores itself.

Since the proposed permanent barrier is a substitute for temporary barriers now in use, it will not substantially alter the current regimen of fresh-water inflows into the estuary and Sabine Lake. At the same time, the barrier will block salt water from the fresh-water fisheries grounds, thus enhancing fresh-water fisheries production.

The Corps of Engineers recommends an archeological survey of the proposed work area and subsequent salvage, if necessary, prior to initiation of construction.

Estimates provided by the U. S. Fish and Wildlife Service show that sport fishing in the area as a result of the project will be increased by between 4,200 and 6,100 man-days per year, and that the commercial fish catch will improve by about 1,200 pounds per year.

2. Adverse environmental effects which cannot be avoided should the project be implemented.

Approximately 57 acres of project land will be temporarily lost or altered as wildlife habitat. Upstream migration of marine life will be impeded during conditions of low flow of the river. (However, the poor quality water existing between the estuary and the salt water barrier could also be considered as a deterrent to such migration, so that the practical effect of the barrier may be negligible.)

3. Alternatives to the proposed action.

Several alternatives to the construction of a permanent salt water barrier were considered. Among these alternatives were: no action; continuation with temporary barriers; moving the points of diversion farther upstream; shifting to groundwater; desalinization; and alternate locations and alternate methods of constructing a salt water barrier. Most of the alternatives to the concept of a salt water barrier were rejected either because of construction or operational costs. Groundwater supplies in the region are inadequate. Six of the sites selected for possible construction of the salt water barrier were found to be less economically favorable or less efficient than the one selected, which is designated as Site 1. This site is the second most costly, but affords environmental enhancement to a larger area of the river basin than any of the other sites.

4. Relationship between local short-term uses of man's environment and the maintenance and enhancement of local long-term productivity.

Long-term and short-term benefits to man's environment include improvements in the reliability of a water supply for municipal, industrial and agricultural uses, thereby promoting the economic well-being of the population of the area. Many miles of the stream will be restored to a fresh-water, pollution-free condition which enhances environmental, aesthetic, and recreational values. Navigation of the river on a year-round basis, and fresh-water fishing, are added benefits.

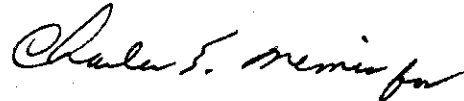
5. Irreversible and irretrievable commitments of resources involved in the proposed action.

Loss of existing trees and vegetation on 41 acres of project area, plus part of the trees and vegetation on an additional 16 acres, will be irreversible. Loss of, or alteration of, wildlife habitat on the same 57 acres could probably also be considered as irretrievable. Capital, labor, and materials associated with construction of this facility would be irretrievable.

Many years of planning have gone into this project. The economy of the area--potentially great--has remained unstable because of the uncertainty of its water supply. For 6 or 8 months each year, during low-flow periods, there is uncertainty of a dependable supply of water. This has been particularly true for irrigation water, as the rice crops cannot tolerate highly saline water over extended periods of time. The proposed salt water barrier and navigation facility is within the financial capabilities of the area. We strongly recommend construction of this Corps of Engineers facility, as proposed, and believe that the draft environmental impact statement sufficiently complies with the provisions of NEPA.

The opportunity to furnish these comments is appreciated.

Sincerely,



Harry P. Burleigh

GORDON FULCHER  
CHAIRMAN  
LESTER CLARK  
VICE-CHAIRMAN  
J. DOUG TOOLE  
HAI P. BURLEIGH

# TEXAS WATER QUALITY BOARD



WALTER T. CARLSON  
JIM C. LANGDON  
J. E. PEAVY, MD  
HUGH C. YANTIS, JR.  
EXECUTIVE DIRECTOR  
PH. 475-2651  
A.C. 512

314 WEST 11TH STREET 78701  
P.O. BOX 13246 CAPITOL STATION 78711  
AUSTIN, TEXAS

February 5, 1973

RE: Interim Review of Reports on  
Neches River and Tributaries,  
Texas, Covering Salt Water  
Barrier at Beaumont, Texas -  
Environmental Statement

Mr. Ed Grisham, Director  
Division of Planning Coordination  
Office of the Governor  
P. O. Box 12428, Cap. Sta.  
Austin, Texas 78711

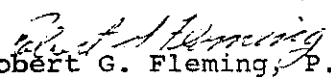
Attention: Mr. Tony Breard

Dear Mr. Grisham:

In response to your request for our comments on the above-referenced Environmental Statement, the staff of the Texas Water Quality Board concurs with the cited upstream benefits. However, we feel that the probable adverse downstream water quality effects have not been presented by the Corps of Engineers. Accordingly, we would recommend that a discussion of the downstream water quality effects be included as a part of the Environmental Statement.

If we can be of further assistance, please contact us.

Very truly yours,

  
Robert G. Fleming, P.E., Director  
Central Operations

JML:ww

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SAM HOUSTON STATE OFFICE BUILDING

COMMISSIONERS

WYTHA F. DENT, CHAIRMAN  
475-2451

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475-2453

MORSEY B. HARDEMAN  
475-4325

LOUIS L. MCDANIELS

EXECUTIVE DIRECTOR

475-2452

AUDREY STRANDTMAN

SECRETARY

475-4514

February 7, 1973

Mr. Ed Grisham, Director  
Governor's Division of Planning  
Coordination  
Sam Houston State Office Bldg.  
Austin, Texas 78711

Re: US Corps of Engineers  
Documents: "Interim  
Review of Reports on  
Neches River and Tribu-  
taries, Texas, Covering  
Salt Water Barrier at  
Beaumont, Texas." (20  
December 1972) and Pre-  
liminary Draft Environ-  
mental Statement (20  
December 1972).

Dear Ed:

In response to your request by Memorandum of January 4, 1973, a copy of our staff Memorandum of Review on the referenced documents is attached for your information and use.

Our staff finds that the salt water barrier project, described in the referenced Interim Review of Reports, is conceptually sound, and that the Draft Environmental Statement appears to be in compliance with the policies and guidelines contained in Sections 101 and 102(2)(C) of the National Environmental Policy Act of 1969. However, the staff review suggests that proper recognition be given in the Interim Review of Reports to the fact that the proposed project has water rights impacts of sufficient importance to require



formal examination by the Texas Water Rights Commission. The local sponsor should submit an application for permit either to reaffirm that existing permits are not affected, or to formalize justifiable changes in the existing permits, if applicable. Specifically, the staff finds that:

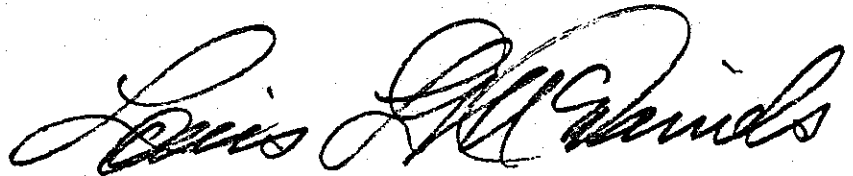
1. While the proposed project is, in fact, an action by the Federal government to remedy adverse effects of exercising the Federal right of navigational servitude in the Lower Neches River, the proposed remedial project imposes on the local, non-Federal sponsor the full responsibility to acquire in accordance with State laws and regulations, and if necessary to establish and justify, any and all water rights needed for the desired utilization of the fresh water storage space created by the salt water barrier dam on the Neches River.
2. The submission of the permit application from the local sponsor will enable the Texas Water Rights Commission to make proper statutory and legal reviews of proposed beneficial use of the fresh water impoundment which would be created by the proposed barrier facility. It may be necessary for the Commission to examine carefully the use of impounded fresh water for proposed multiple beneficial purposes versus the single limited purpose of using the impounded fresh water mainly to delay or regulate stream flow in aid of navigation, and to limit the extent of tidal contaminated salt water intrusion in the Neches River and Estuary during unforeseen periods of low stream flow and high fresh water withdrawals.

3. Special recognition should be given in the Interim Review of Reports and in the Environmental Statement to the provisions of the Federal Water Pollution Control Act Amendment of 1961, regarding the inclusion of water quality storage in Federal reservoirs. The referenced barrier dam brings to the fore certain aspects of the problems concerning fresh water inflows to bays and estuaries; water releases for quality control; and, release to control salt water intrusion. Specifically, assurance should be given that storage and water releases shall not be regarded as a substitute for adequate municipal and industrial wastewater treatment or other methods of controlling waste at the source. There is a difference between fresh water releases to control salinity in bays and estuaries, and fresh water releases merely to reduce municipal and industrial waste concentrations. In this regard, the staff believes that the referenced documents would be enhanced if further informative details were given concerning water quality management planning being done by Federal or non-Federal agencies in the Lower Neches River and Estuary downstream from the site of the proposed project.

Finally, attention is invited to the special proviso contained in subparagraph 1.2 of the attached Memorandum. The staff review comments should not be misconstrued as the final or formal position of the Texas Water Rights Commission on the final project report and details. Nor should the comments be presupposed to constitute any constraints on the Commission regarding water rights actions that may be presented to the Commission for resolution.

This staff review is presented with the view toward enhancing and expediting the development and construction of the proposed project.

Sincerely,

A handwritten signature in cursive script, reading "Louis L. McDaniels". The signature is written in black ink and is positioned above the typed name and title.

Louis L. McDaniels  
Executive Director

Attachment  
As stated.

To: The Executive Director  
Texas Water Rights Commission

February 6, 1973

MEMORANDUM OF REVIEW  
OF  
US ARMY ENGINEER DISTRICT, GALVESTON, CORPS OF ENGINEERS,  
GALVESTON, TEXAS, DOCUMENTS: "INTERJM REVIEW OF  
REPORTS ON NECHES RIVER AND TRIBUTARIES, TEXAS,  
COVERING SALT WATER BARRIER AT BEAUMONT,  
TEXAS." (20 DECEMBER 1972) AND PRE-  
LIMINARY DRAFT ENVIRONMENTAL  
STATEMENT (20 DECEMBER 1972).

By: Dr. Alfred J. D'Arezzo, Environmental Sciences Analyst,  
Texas Water Rights Commission.

1. INTRODUCTION

1.1 Correspondence.

By Memoranda of January 4, 1973, the Director, Governor's Division of Planning Coordination, transmitted the subject documents, for review and comments by February 5, 1973, to the Executive Director, Texas Water Rights Commission. (The Memoranda was received on January 15, 1973.)

1.2 Scope and Limitations of the Review.

The comments in this review should not be misconstrued as a substitute for the eventual review by the Commission staff of the comprehensive project report and plans, after they are developed by the US Army Corps of Engineers. The staff comments in this review should not be presupposed as constraining in any way the future position of the Commissioners of the Texas Water Rights Commission insofar as the details of the final project plans or of the water rights impacts thereof, are concerned.

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### 1.3 Essential Background Data.

- a. Purposes: The purposes of the subject Corps of Engineers study and review are to develop a plan that will permanently control salinity intrusion in the Neches River at Beaumont, Texas; provide for free and reasonably unobstructed use of the river by existing and prospective recreational and commercial navigation; be compatible with any future plan for extension of a barge channel above Beaumont; and preserve the natural environment of the river and its flood plain; and to determine the nature and extent of Federal interest in the plan.
- b. Problem: Annually the fresh water supplies of the City of Beaumont and the Lower Neches Valley Authority drawn from the Neches River are threatened by salt water intruding up the river during periods of low river flow and high water withdrawals. At present, to avoid damages, the Lower Neches Valley Authority constructs temporary salt water barriers in the Neches River and in Pine Island Bayou. Although effective and economical, these temporary barriers interfere with navigational use of the waters and are not an acceptable long term solution to the problem of salinity intrusion.
- c. Present Water Rights Situation:
- (1) Lower Neches Valley Authority:

"The Lower Neches Valley Authority provides surface water from Pine Island Bayou and the Neches River to irrigate approximately 48,000 acres of rice; to the cities of Port Arthur, Port Acres, Port Neches, Nederland and Groves; to several small water districts; to five oil refineries; and to ten petro-chemical plants. The LNVA installed pumping capacity is 860,000 gallons per minute

(1,916 cubic feet per second or 1,238 million gallons per day), and the experienced daily peak rate of pumping has approached the installed capacity. It is estimated that the average daily demand during a peak week would be approximately 90 percent of the installed capacity, or about 1,700 cubic feet per second. Under permits from the Texas Water Rights Commission, the LNVA is entitled to 22,000 acre-feet per year of Pine Island Bayou water for municipal use at 30 cubic feet per second; 33,516 acre-feet per year of Pine Island Bayou and Neches River water for municipal use at 45 cubic feet per second; and 820,000 acre-feet per year of Angelina River and Neches River water for municipal, industrial and agricultural use at 2,000 cubic feet per second. The latter permit covers water from B. A. Steinhagen Lake and Sam Rayburn Reservoir. The estimated actual water use by the LNVA in 1971 was 156.2 billion gallons or 479,144 acre-feet." 1/(Emphasis supplied.)

(2) City of Beaumont:

"The City of Beaumont obtains surface water from the Neches River and ground water from Hardin County. The city's peak pumping of record was on 23 December 1963, when approximately 27.6 million gallons per day (42.7 cubic feet per second) of surface water was used. Under permits from the Texas Water Rights Commission, the city is entitled to 56,467 acre-feet per year of Neches River water for municipal use at 78 cubic feet per second. The estimated actual water use by the city in 1970 was approximately 16,500 acre-feet." 1/(Emphasis supplied.)

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1 "Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas," Appendixes, Appendix 1, page C-1.

d. Findings by District Engineer:

- (1) The study finds that the cause of the salinity intrusion problem is the progressive improvement of the stream for navigation over a period of many years by the Federal Government between Beaumont and the Gulf of Mexico, culminating in the recent completion of improvement of the Sabine-Neches Waterway generally to a depth of 40 feet; that measures to mitigate the problem are a Federal responsibility in furtherance of navigation improvements previously undertaken, subject to the usual requirements of local cooperation attached to navigation projects; that the basis for this finding was implied in the Congressional authorization for the most recent navigation improvements (House Document No. 553, 87th Congress, 2nd Session, pages 15 and 32).
  
- (2) The study discloses that a gated barrier, including provisions for the passage of navigation, would be technically and environmentally feasible and economically justified. It finds that the most economical plan would provide such a structure at mile 26.3 on the Neches River (site 4) at an estimated first cost, exclusive of preauthorization studies, of \$11,206,000 including Federal and non-Federal first costs of \$11,174,000 and \$32,000, respectively, estimated annual maintenance, operation and major replacement costs to the United States of \$194,800, and estimated annual non-Federal costs of \$300 for spoil areas, levees and spillways.

(3) The study also finds, however, that substantial environmental enhancement would accrue from a functionally equivalent but more costly structure located farther downstream at mile 23.0 (site 1), and enhancement resulting from the incidental effect of the structure in barring the upstream movement of water degraded by municipal and industrial pollutants, and that the local interests are desirous of realizing this additional benefit and are willing to pay the difference in cost to obtain it. The difference in estimated first costs of the two plans is \$647,000, including an increase of \$14,000 in the non-Federal cost of usual items of local cooperation, and a cash contribution of \$633,000. The plan preferred by local interests is selected based on their willingness to pay for their preference. The selected plan provides for a gated main barrier, navigation gate, bypass channel, auxiliary dam and appurtenances at site 1, mile 23.0 on the Neches River. The estimated first cost of the proposed improvements, exclusive of preauthorization studies is \$11,853,000. The total annual cost of operation, maintenance and major replacement is estimated to be \$197,100, including \$196,800 Federal and \$300 non-Federal.

(4) The Galveston District Engineer recommends that, subject to the usual conditions of non-Federal cooperation for navigation projects and cash contributions toward the first cost of construction and the increased annual costs of operation, maintenance, and major replacement, the proposed plan of improvement for a salt water barrier at site 1 in the Neches River at Beaumont, Texas, be adopted, at a presently estimated first cost to the United States of \$11,174,000 and an



estimated net annual maintenance, operation, and major replacement cost to the United States of \$194,800. Non-Federal first costs are estimated at \$679,000, including a cash contribution presently estimated to be \$633,000, and non-Federal annual costs for disposal areas, levees and spillways are estimated at \$300, plus an advance contribution of \$34,000 to increased Federal operation, maintenance, and major replacement. The District Engineer recommends further that, if at the time of construction the required non-Federal cash contribution should for any reason be not forthcoming, the plan of improvement shall revert to that most economical to the United States.

## 2. COMMENTS

### 2.1 Need to Recognize the Requirement for Obtaining Necessary Water Rights Permit.

The staff believes that both the interim report and the environmental impact statement should include an adequate discussion of the water rights impacts of the proposed project. The proposed fresh water impoundment, the proposed operation of the navigation gate and dam facility, and the subsequent uses of the water constitute significant changes in the present water rights permits of the Lower Neches Valley Authority (LNVA) and the City of Beaumont. The staff believes that the changes resulting from the proposed project have sufficient impacts to necessitate the submission of a formal application for permit by the local sponsor, LNVA, to the Texas Water Rights Commission.

The Corps of Engineers' report emphasizes that the proposed barrier project, intended to limit the tidal intrusion of polluted salt water in the Neches River and Estuary, would fulfill a

". . . Federal responsibility for mitigation of salinity intrusion related to Federal navigation improvements . . ." <sup>1/</sup> (Emphasis supplied.)

The rationale of the Federal interest and obligation in the proposed remedial project is expressed as follows in the report:

"The historical acceptance by local interests of responsibilities for prevention of salinity intrusion represents a "no choice" situation involving a compelling need for deep-water navigation for economic development of the area and a compelling need for fresh water to satisfy municipal, industrial, and agricultural uses. Continued deferral of Federal responsibility for mitigation measures in connection with Federal navigation improvements will merely prolong an inequitable situation. A salt water barrier might well have been included in the most recent navigation project rather than being recognized in the authorizing document as subject for later study. In any case, this report recognizes the Federal interest as an overdue responsibility in extension of its responsibility for navigation improvements and proposed that the mitigation measures be provided entirely at Federal expense, except for items of local cooperation which are typically required in navigation projects—land, rights-of-way, relocations,

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<sup>1/</sup> "Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas." Main Report, page 36.

spoil disposal areas, spoil retention works, and an agreement to hold and save the United States harmless from damages incidental to construction of the project.

"A further exception is an additional cost represented by the local interests' preference as to site related to the obtainment of environmental benefits." 1/ (Emphasis supplied.)

The fact that the proposed project is emphatically presented in the report as an action by the Federal government to fulfill reasonable and expected requirements generated by navigational projects, does not relieve local interests from the task of fulfilling permit obligations. Specifically, the staff believes that the local interests should take the responsibility of acquiring, in accordance with State laws and regulations, all water rights needed for the intended utilization of the fresh water storage space created by the salt water barrier. The authorized sponsor should utilize the water storage space in a manner consistent with Federal and State laws.

Application for new or revised water rights permits should be submitted to the Texas Water Rights Commission in order that unique water rights issues involving State water, arising from the proposed project, can be given appropriate statutory and legal review. For example, it is conceivable that

- a. It may be necessary to distinguish carefully between impoundment of fresh water for consumptive use and for nonconsumptive use. This issue may arise because the proposed dam presents the opportunity of impounding water for multiple uses including use of the

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1/ Id., pages 36-37.

water merely to delay or regulate the flow of fresh water to repel tidal salt water inflows during low flow conditions.

- b. Special scrutiny of the project finally adopted may be necessary to ensure that the project location and operational procedures are best adapted to the comprehensive plan for the Neches River Basin, and that the proposed water uses represent the most beneficial public uses, considering the related, contemporaneous conditions of: irrigation, drainage, forestry, swamp land reclamation, clarification of streams, regulation of flow, control of floods, prevention of soil erosion and waste, storage, and conservation of water for domestic, municipal, industrial, and agricultural uses.
- c. With increasingly-higher effluent discharge standards and the expected, increased use of water-use recycling (especially during low flow periods), special care will be necessary to ascertain the appropriate release of the fresh water for bays and estuaries, to ensure protection of these areas from severe ecological stress. The staff believes that it will become increasingly more important for the State to uphold the principle that it makes little difference how, in the first instance, the water in a stream becomes running water, for if it were raised from wells, or brought out of reservoirs, the moment the individual thus producing it should allow it to flow in a natural stream, and mingling with its waters -- the water becomes State water and subject to permitted use.

## 2.2 Use of Water for Quality Control.

Since the Federal Water Pollution Control Act Amendment (FWPCAA) of 1961, provides a source of authority for the inclusion of water quality storage in Federal reservoirs, it is believed that the applicable provision should be cited in the subject report or in environmental statement, and some affirmation given that fresh water releases from Federal impoundments are not used as pollution diluent or as a substitute for proper wastewater treatment in the Lower Neches River and Estuary. The applicable provision of the FWPCAA of 1961, reads as follows:

"In the survey or planning of any reservoir by the Corps of Engineers, Bureau of Reclamation, or other Federal agency, consideration shall be given to inclusion of storage for regulation of streamflow for the purpose of water quality control, except that any such storage and water releases shall not be provided as a substitute for adequate treatment or other methods of controlling waste at the source." 1/ (Emphasis supplied.)

Thus, a more emphatic differentiation would be made between the prevention of tidal salt water intrusion, and the prevention of municipal and industrial effluent intrusion. This distinction is already recognized in the subject report, as follows:

"It is considered that the effect on water pollution will be beneficial in the reach of the Neches River and Pine Island Bayou between the project site and the temporary

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1/ Act of July 20, 1961, PL 87-88, Sec. 2(b) (1), 75 Stat. 204.

barriers that are constructed by the Lower Neches Valley Authority. In this reach, the project will prevent salt water intrusion of municipal and industrial wastes discharged into the Neches River below Beaumont until such wastes are purified at their sources or are no longer discharged into the river." 1/ (Emphasis supplied.)

Elsewhere in the report, the following general forecast is made:

"It has been found that the project will be generally beneficial by protecting the surface water supplies of the municipalities, industries and farm lands served by the water delivery systems of the Lower Neches Valley Authority and the City of Beaumont from contamination by salt water and pollution moving upstream during periods of low river flow and high fresh water withdrawals."2/ (Emphasis supplied.)

The water quality conditions below the project remain a problem and no solution is offered. In this regard, the report states:

". . .the river below the proposed barrier will continue to become polluted in times of low flow but this shall be neither aggravated nor diminished by the proposed project." 3/

It would enhance the project report if some mention were made of plans being developed by the LNVA, or others for the water quality management in the important estuarine reach of the Neches River downstream of the proposed project.

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1/ "Interim Review of Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas," Main Report, page 48.

2/ Id., page 48.

3/ Id., page 49.

3. CONCLUSIONS

- 3.1 The project is conceptually sound.
- 3.2 The Draft Environmental Statement appears to be in compliance with the guidelines and policies contained in Sections 101, and 102(2)(C), of the National Environmental Policy Act of 1969.
- 3.3 The interim report would be enhanced by inclusion of a discussion on certain vital water rights impacts. Specifically, there is a need to recognize the requirement for the local sponsor to obtain necessary water rights permits from the Texas Water Rights Commission; a need for discussion of the use of water for quality control; and, a need to discuss regional water quality management as an integral part of the corrective actions to problems resulting from dedication of the estuarine reaches of the Lower Neches River to navigational servitude.



Alfred J. D'Arezzo

AJD:11



**Texas State Historical Survey Committee**

Box 12276, Capitol Station, Austin, Texas 78711

Truett Latimer

Executive Director

May 7, 1973

RECEIVED

MAY 8 1973

Div. of Plan. Coord.

Mr. Walter Tibbitts  
Acting Director  
Division of Planning Coordination  
Governor's Office  
Box 12428, Capitol Station  
Austin, Texas 78711

Re: Preliminary Draft Environmental Statement and Interim Review of Reports on Neches River and Tributaries, Texas, covering Salt Water Barrier at Beaumont, Texas

Dear Mr. Tibbitts:

In response to your request of April 10 for review and comment on the Salt Water Barrier at Beaumont, Texas, the above-referenced documents have been examined and are found to be deficient in dealing with cultural (archeological, historical, and architectural) resources. Both Orange and Jefferson Counties contain archeological sites of high significance, and one Orange County site, on Baird's Bayou, lies near the project area. For all purposes, the cultural resources of the project area are unknown; the statement in the draft impact statement (p. 11) concerning the State and local significance of the cultural resources is obviously incorrect.

For the above reasons, we recommend that the following procedures be conducted in the area of the project prior to further consideration or construction:

1. As the resource is unknown, an intensive archeological survey of the total project area must be conducted to locate, record, identify and appraise the significance of the resource to be affected. This examination should provide, and result in, definition of research problems, cost, and strategy for further study leading to the mitigation of adverse effects on the resource.
2. Scientific recovery of information contained in cultural resources can mitigate the adverse effect of an action on the resource. An acceptable mitigation program should recover a reliable sample of all significant cultural and related ecological resources which will be affected through the use of a systematically prepared and explicitly stated research design under the direction of a competent professional archeologist. Measures other than recovery of the resource may be considered and may include protection of the resource through management measures, stabilization or no project action; all must be assessed from the perspective of preserving resources for future generations.

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Thank you for the opportunity to comment on this report and draft environmental impact statement. If we can be of further assistance, please advise.

Sincerely,

Truett Latimer  
Executive Director

By



Alton K. Briggs  
Survey Archeologist

AKB:bjw



THE UNIVERSITY OF TEXAS AT AUSTIN  
BUREAU OF ECONOMIC GEOLOGY  
AUSTIN, TEXAS 78712

University Station, Box X  
Phone 512-471-1534

January 18, 1973

Mr. Ed Grisham, Director  
Governor's Office  
Division of Planning Coordination  
Box 12428, Capitol Station  
Austin, Texas 78711

Dear Ed:

I write in response to your memoranda of 4 January requesting review of "Reports on Neches River and Tributaries, Texas, Covering Salt Water Barrier at Beaumont, Texas." Our staff has completed review and has no substantial negative response. In recent surface mapping we have completed in this area, we have defined a photographic linear extending along the north end of the proposed salt barrier, approximately paralleling the proposed city road. Many of these kinds of linears are coincident with active faults in the Houston area, and although we have no indication that this particular linear represents an active surface fault, some field observation might be worthwhile. We can provide the Corps with a map showing the location of the linear if they desire.

Best regards.

Sincerely,

A handwritten signature in cursive script that reads "W. L. Fisher".

W. L. Fisher  
Director

WLF:sc

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February 23, 1973

**PRESIDENT**

Don Cash  
Councilman  
City of Beaumont

**1st VICE PRESIDENT**

Paul E. Hale  
Mayor  
City of Orange

**2nd VICE PRESIDENT**

Carl "Crope" LeBlanc  
Councilman  
City of Nederland

**3rd VICE PRESIDENT**

Raymond Gould  
Commissioner  
Orange County

**4th VICE PRESIDENT**

Preston Wood  
Mayor  
City of Bridge City

**SECRETARY-TREASURER**

Leroy Mahaney  
Councilman  
City of Groves

**LEGAL COUNSEL**

George Wikoff  
City Attorney  
City of Port Arthur

---

**EXECUTIVE DIRECTOR**

Don Kelly  
950 E. Florida, Beaumont  
Lamar University Campus  
Telephone: (713) 833-2648

**P. O. Box 10074**

Lamar University Station  
Beaumont, Texas 77710

Martin W. Teague  
Lieutenant Colonel, CE  
Acting District Engineer  
Department of the Army  
Galveston District  
Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Dear Colonel Teague:

The U.S. Department of the Army Corps of Engineers' Interim Review of Reports on the Neches River and Tributaries, Texas (covering the Saltwater Barrier at Beaumont) has been reviewed by the South East Texas Regional Planning Commission's Project Review Committee on February 13, 1973, and the South East Texas Regional Planning Commission's Executive Committee on February 21, 1973.

The comments of the South East Texas Regional Planning Commission's Executive Committee are as follows:

"It is the opinion of the SETRPC Executive Committee that the proposed project will have a favorable environmental impact. However, several points of detail should be noted:

The 'temporary' steel sheet-pile barriers, currently being used, are really not temporary, as they often are left in place for six (6) to nine (9) months. Thus, the term semi-permanent barriers would be more proper. The semi-permanent barriers now in use do not allow

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free navigational use of the river. These semi-permanent barriers, at their present location, do not prevent saltwater intrusion into approximately 16.7 miles of the Neches River and Pine Island Bayou, which, in their natural state, were fresh water.

One consideration will be that the proposed permanent barrier at mile 23 will necessitate the loss of approximately 57 acres of potential wildlife habitat. It should be pointed out that a large part of this 57 acres is now being re-claimed by the City of Beaumont as a sanitary landfill.

It appears that the proposed saltwater barrier will:

- (1) Return approximately 16.7 miles of the Neches River and Pine Island Bayou to their natural fresh water state;
- (2) Afford ready access to the new recreation areas which will be formed through a series of navigation locks, an access road, and a service bridge; and
- (3) Protect the surface water supplies of a large number of the municipalities and industries in Jefferson County from contamination by saltwater and pollution during periods of low river flow and high fresh water withdrawals."

If I may answer any questions concerning this matter, please do not hesitate to call on me.

Cordially,

  
Don Kelly  
Executive Director

DK:dm

cc: Mr. Bob Curry, Jefferson County Environmental Control  
Department  
Mr. W. F. Weed, President, Lower Neches Valley  
Authority, Beaumont

# LOWER NECHES VALLEY AUTHORITY

MUNICIPAL, INDUSTRIAL AND AGRICULTURAL WATER  
7850 NORTH ELEVENTH STREET .. P. O. BOX 3007  
**BEAUMONT, TEXAS**  
77704

April 9, 1973

Colonel Nolan C. Rhodes  
District Engineer  
Galveston District  
U.S. Army, Corps of Engineers  
P.O.Box 1229  
Galveston, Texas 77550

RE: Corps of Engineers Environmental  
Impact Statement on Salt Water  
Barrier, Neches River, Texas

Dear Sir:

Lower Neches Valley Authority acknowledges receipt of your Department's Preliminary Draft Environmental Impact Statement Neches River and Tributaries, Texas Salt Water Barrier at Beaumont, Texas and your cover letter dated December 29, 1972.

The Authority has examined this Statement and approves the findings and conclusions contained therein pertaining to the construction of the Salt Water Barrier at Site 1.

If there is any further assistance you may need in connection with this Project, please call on us.

Yours very truly,

LOWER NECHES VALLEY AUTHORITY

By W. F. Wood  
President

B-49



# JEFFERSON COUNTY

## ENVIRONMENTAL CONTROL

E.C. McREE, M.D.  
COUNTY HEALTH OFFICER

PAUL N. FORTNEY, M.D.  
COUNTY HEALTH OFFICER

1149 PEARL  
BEAUMONT, TEXAS 77701

January 15, 1973

ROBERT C. CURRY  
DIRECTOR

VICTOR E. BATEMAN  
ENVIRONMENTAL HEALTH SPECIALIST

JOHN N. WIEDENHOFF  
ENVIRONMENTAL TECHNICIAN

Martin W. Teague  
Lieutenant Colonel, CE  
Acting District Engineer  
Department of the Army  
Galveston District, Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

RE: Comments and evaluations on preliminary draft concerning saltwater barrier.

Dear Lt. Col. Teague:

In answer to your letter of December 29, 1972, to Judge Chester C. Young, we offer the following comments and evaluations of the preliminary draft environmental impact statement on a proposed saltwater barrier in the Neches River at Beaumont, Texas.

The "temporary" steel sheet-pile barrier, currently being used, are really not temporary as they often are left in place for six (6) to nine (9) months. Thus, the term semi-permanent barrier would be more proper. The semi-permanent barriers, now in use, do not allow free navigational use of the river. These semi-permanent barriers, at their present location do not prevent saltwater intrusion into approximately 16.7 miles of the Neches River and Pine Island Bayou, which in their natural state were fresh water.

The only major objection to the proposed permanent barrier at mile 23 will be the loss of approximately 57 acres as a wildlife habitat. However, it should be pointed out that a large part of this 57 acres is not presently a wildlife habitat, it is land reclaimed by the City of Beaumont as a sanitary landfill.

It appears that the proposed saltwater barrier will:

1. return approximately 16.7 miles of the Neches River and Pine Island Bayou to their natural fresh water state;
2. afford ready access, to the new recreation areas which will be formed through a series of navigation locks, an access road, and a service bridge; and

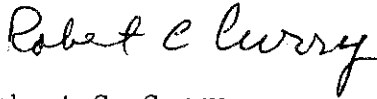
B-50

3. protect the surface water supplies of a large number of the municipalities and industries in Jefferson County from contamination by saltwater and pollution during periods of low river flow and high fresh water withdrawals.

After having reviewed the literature of the proposed project, attending the public hearings, and considering the alternatives, we concur with the preliminary draft environmental impact statement.

We appreciate having had the opportunity to review this draft report.

Sincerely,



Robert C. Curry  
Director, Environmental Control Department  
Jefferson County

RCC:sh

# City of Beaumont

P. O. BOX 3827 77704



January 29, 1973

Mayor  
**KEN RITTER**  
Councilmen:  
**DON S. CASH**  
**GEORGE A. DISHMAN, JR.**  
**CALVIN WILLIAMS**  
**J. LEROY EVANS**  
City Manager  
**CHARLES V. HILL**

Nolan C. Rhodes  
Colonel, CE  
District Engineer  
Corps of Engineers, U. S. Army  
P. O. Box 1229  
Galveston, Texas 77550

Re: Salt Water Barrier, Neches River at Beaumont, Texas

Dear Sir:

The City of Beaumont has tentatively agreed with the Lower Neches Valley Authority, sponsoring agent, that they will cooperate in this project.

Any other location of this project than that at mile 23.0 on the Neches River substantially decreases the benefits to the City of Beaumont. It is estimated that the site selected for the project would project benefits equal to the anticipated participation by the City of Beaumont.

The City of Beaumont does have a plan for the development of the property west of the river. The plan includes park areas, water front facilities, as well as developing two oxbow lakes into wildlife refuges. It is anticipated that several boat ramps will be installed throughout the area. This area is the last river front that is available to be developed for public use within our city.

We believe that with the installation of this project at mile 23.0 the thousands of acres adjacent to the river will restore itself into a semblance of its original natural beauty. With this restoration, all forms of wildlife will return, and within the near future a tremendous impact on the conservation of our natural resources will be realized.

It is also felt that this project will substantially reduce the threat of salt water encroachment into the City of Beaumont's fresh water supply.

B-52



The City of Beaumont endorses this project and feels that the project will greatly enhance the fresh water environment upstream from the project.

Very truly yours,



Ken Ritter  
Mayor, City of Beaumont

WJB;d

CLEAN AIR & WATER, INC.

P. O. BOX 1069  
BEAUMONT, TEXAS 77704

February 24, 1973

Re: Preliminary draft, Environmental  
Statement - Neches River

Col. Martin W. Teague,  
Acting District Engineer,  
Galveston District, U. S. Corps of Engineers,  
P. O. Box 1229,  
Galveston, Texas 77550

Dear Sir:

This will acknowledge with appreciation receipt of your letter of December 29, 1972, inclosing preliminary draft, environmental impact statement, on proposed "salt water" barrier in the Neches River.

To begin with, we wish to make it clear that this association has never been in favor of barriers of any type being constructed in our rivers. We have reluctantly given some favorable consideration to the proposed barrier requested by the Lower Neches Valley Authority.

With reference to temporary steel sheet-piling barriers which LNVA has installed in the past, we have hardly considered them temporary, due to the great length of time they are left in place. We have been very much opposed to this type barrier, since it completely blocks navigation during the time the sheet piling are in place. This is another reason we have given consideration to the installation of a permanent barrier with suitable navigation locks.

This report in several instances refers to the fact that "local interests" must provide a cash contribution if the barrier is to be constructed at Mile 23.0 of the Neches River. On Page 4 of the preliminary draft the report reads:

"In the event the local interests do not make the required cash contribution for the project at Mile 23.0, it is proposed that the project be built at Mile 26.3, which would not require a cash contribution."

If the U. S. Corps of Engineers can ask for Congressional approval of funds for the location of this barrier at Mile 26.3, it would seem reasonable that they could also ask for the funds for construction at Mile 23.0, even though slightly higher, without calling on "local interests" for a cash contribution to the U. S. Corps of Engineers project.

It is further noted that throughout the impact statement reference is continually made to locating the barrier and locks at other points than Mile 23.0 of the Neches River, in each instance pointing out the economy of

CLEAN AIR & WATER, INC.

P. O. BOX 1069  
BEAUMONT, TEXAS 77704

#2 - Col. Martin W. Teague, U. S. Corps of Engineers - 2/24/73.

locating the project at any point other than Mile 23.0 of the Neches River.

Our association has considered this report very carefully and we tentatively approve the location of the barrier and navigation locks at Mile 23.0 of the Neches River at Beaumont. We would be unalterably opposed to the location of the barrier at any point on the Neches River above Mile 23.0. We would consider its location farther down stream.

We very much appreciate the opportunity of reviewing the preliminary impact report.

Respectfully yours,

CLEAN AIR AND WATER, INC.

By: *Everett Brashear*  
President

WEB/e

cc. Hon. John Tower, U. S. Senator,  
Washington, D. C.  
Hon. Jack B. Brooks, U. S. Representative,  
Washington, D. C.  
Lower Neches Valley Authority,  
Beaumont, Texas  
Hon. Lloyd Bentsen, U. S. Senator,  
Washington, D. C.

# NECHES BOAT CLUB

P. O. BOX 727

BEAUMONT, TEXAS



February 26, 1973

U. S. Corps of Engineers  
P. O. Box 1229  
Galveston, Texas 77550

Gentlemen:

The Board of Directors and Membership of the Neches Boat Club have given consideration to the present environmental statement about the Salt Water Barrier across the Neches River. We are alarmed over the possibility of relocation to site four which would destroy the area occupied by the Neches Boat Club, and would result in extreme pollution of our beach area and picnic grounds and would forever destroy any possibility of a municipal park on the west bank of the Neches River.

Our group strongly favors site number one, which was previously proposed and strongly recommended by almost everybody who attended the hearing.

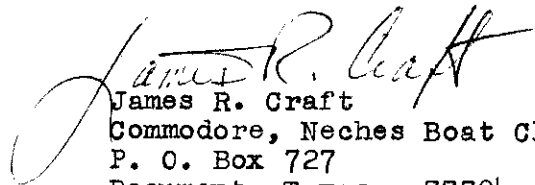
If site number one is not to be used, we feel that there should not be a salt water barrier.

We respectfully direct attention to the fact that Ten Mile Bayou and Lake Bayou, prior to the influx of pollution by the paper mill and local industries, constituted prime recreational areas for the local population. Site number four would destroy these.

Site number one would reserve them as recreational areas.

We strongly favor site number one.

Yours very truly,

  
James R. Craft  
Commodore, Neches Boat Club  
P. O. Box 727  
Beaumont, Texas 77704

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**APPENDIX C**

**NEWS RELEASE AND RECIPIENTS  
OF DRAFT STATEMENT AS A RESULT  
OF ANNOUNCEMENT**

U. S. ARMY ENGINEER DISTRICT, GALVESTON  
CORPS OF ENGINEERS



JUNE 16, 1775

**NEWS RELEASE**

PUBLIC AFFAIRS OFFICE  
606-A Santa Fe Building  
Galveston, Texas 77550  
Ph: 713/763-1211, Ext: 305



HURRICANE-FLOOD  
PROTECTION



NAVIGATION



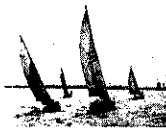
FLOOD CONTROL



BASIN PLANNING



THE ENVIRONMENT



RECREATION

Environmental Statement Prepared

1/Jan. 3, 1973

By Engineers on Saltwater Barrier

GALVESTON, Texas -- A preliminary draft environmental statement on the proposed saltwater barrier across the Neches River in Beaumont has been completed by the Army Engineers' Galveston District.

Colonel Nolan C. Rhodes, Galveston District Engineer, said the proposed barrier across the Neches River would prevent intrusion of saltwater to upstream freshwater supply intakes. The barrier would replace the present practice of erecting temporary barriers which impede free navigation use of the river, the colonel said.

The proposed structure will consist of a gated dam on the river, a gated navigation by-pass channel, an auxiliary dam in a small tributary bayou, an access road, service bridge and related works.

Recommended site for the proposed barrier is about 1/2 mile north of Interstate Highway 10, near Bairds Lake. An alternate location would be about three miles upstream.

The environmental statement said the proposed project will benefit the environment by protecting surface water supplies of the municipalities and industries served by the Lower Neches Valley Authority and the City of Beaumont.

With exception of about 600 acres drained by Brakes Bayou, all swamp areas upstream from the project will be restored to freshwater conditions and about 17 miles of the Neches River and Pine Island Bayou will be improved for recreational swimming, boating, hunting and freshwater fishing.

The statement is being reviewed by federal, state and local agencies, in addition to private citizens, and conservation and environmental groups as required by the National Environmental Policy Act of 1969, and the guidelines of the Council on Environmental Quality.

Single copies of the statement may be obtained on written request to the District Engineer, U. S. Army Engineer District, P. O. Box 1229, Galveston, Texas 77550.

Dist: 1-5, 8, 13

RECIPIENTS OF DRAFT STATEMENT  
AS A RESULT OF NEWS RELEASE

Mr. Lawrence P. Gwin, Attorney at Law: Bay City, Texas  
Mr. W. E. Emigh, Eastex, Inc.; Silsbee, Texas  
Ms. Marion Fontenot, H. H. Houseman Real Estate; Vidor, Texas  
Dr. Richard C. Harrel, Lamar University; Beaumont, Texas  
CPT Stephen Shepard, U.S. Army, University of Missouri,  
Rolla, Mo.  
Mr. John Kury; Beaumont, Texas  
Mr. Herbert Free; Silsbee, Texas  
Mobil Oil Corporation; Beaumont, Texas  
Charles P. Smith, Associates, Inc., Engineers and Surveyors;  
Orange, Texas  
Restlawn Memorial Park of Vidor Inc.; Vidor, Texas  
Mr. E. A. Huebner, Vidor, Texas



APPENDIX "D"

LETTERS RECEIVED BY THE CHIEF OF  
ENGINEERS AND THE DISTRICT ENGINEER  
ON THE REVISED DRAFT ENVIRONMENTAL  
STATEMENT



# United States Department of the Interior

OFFICE OF THE SECRETARY  
WASHINGTON, D.C. 20240

In Reply Refer To:  
PEP ER-74/1457

March 18, 1975

Dear General Gribble:

Thank you for your letter of November 18, 1974, requesting our views and comments on the revised draft environmental statement and interim review of reports, for the Saltwater Barrier on Neches River at Beaumont, Texas. Comments on both documents are presented below.

## General Comments

We have some doubts about the benefits to be derived from this proposed project in view of the economically attractive and effective temporary saltwater barriers now being used. The reports should provide a sound analysis of technical, engineering and economic features that clearly demonstrate that the proposed project is superior to the existing one.

The review reports and the draft environmental statement do not evaluate the possibility that continuing subsidence along the Gulf Coast may nullify project benefits within a relatively brief period. Continuing development in this area necessitates greater groundwater withdrawals, that will accelerate land subsidence and tend to reduce the 1-foot differential at the proposed structure, thereby reducing or negating the usefulness of the proposed project. Additional information pertaining to the adequacy of the 1-foot differential is desired.

The revised draft environmental statement adequately addresses the concerns of outdoor recreation and fish and wildlife resources.

## Interim Review Reports

We concur with the Corps of Engineers statements of mineral commodities produced in Jefferson County, Texas, as set forth in the Main Report (page 4) and in Appendix 1 (page B-1). We also agree that the proposed project should not significantly affect mineral resource development (environmental

D-1

statement, page 16). However, the section titled "Natural Resources" (Appendix 1, page B-6) should contain maps and explain in more detail the cited mineral resources in the project area.

The report indicates that saltwater intrusion has plagued this portion of the Neches River since the nineteenth century, before the installation of any navigation improvements. The problem of saltwater intrusion appears to be the result of inadequate flows in the Neches River which, in turn, is directly attributable to upstream impoundment of water for conservation and recreation and to excessive withdrawals of water for irrigation and municipal use. Aggravation of the problem by continuing development should be discussed.

The proposed action will not adversely affect any proposed or existing unit of the National Park System, including the nearby Big Thicket National Preserve. No site eligible for registration as a National Historic, Natural or Environmental Education Landmark will be affected.

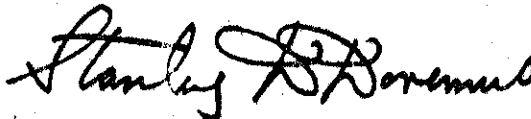
#### Revised Draft Environmental Statement

Results of the archeological survey mentioned on page 15, paragraph 1 of the environmental statement should be included in the final statement. If the survey locates sites that will be disturbed by the project, the final statement should also include actions that will be taken to mitigate the impact on non-renewable archeological resources.

If operational procedures proposed by the Corps of Engineers, on pages 12 and 13 of the environmental statement are strictly adhered to freshwater return flows to the Sabine Lake Estuary should not be significantly reduced below historically recorded values. In addition, approximately 17 miles of the Neches River and Pine Island Bayou will be improved in water quality as a result of the project.

We hope these comments will be of assistance to you in preparing your final documents.

Sincerely yours,



Secretary of the Interior



**DEPARTMENT OF TRANSPORTATION  
UNITED STATES COAST GUARD**

MAILING ADDRESS:  
U. S. COAST GUARD (G-WS/73)  
400 SEVENTH STREET SW.  
WASHINGTON, D. C. 20590  
PHONE: (202) 426-2262

20 Feb 1975

• Lieutenant General W. C. Gribble, Jr.  
Chief of Engineers  
Department of the Army  
Washington, D. C. 20314

Dear General Gribble:

This is in response to your letter of 18 November 1974 addressed to Secretary Claude S. Brinegar concerning a proposed report on Neches River and Tributaries, Salt Water Barrier, Beaumont, Jefferson County, Texas.

The concerned operating administrations and staff of the Department of Transportation have reviewed the material submitted. We have no comments to offer nor do we have any objection to this project.

The opportunity to review this proposed report is appreciated.

Sincerely,

W. E. CALDWELL  
Captain, U.S. Coast Guard  
Deputy Chief, Office of Marine  
Environment and Systems  
By direction of the Commandant

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

REGIONAL OFFICE  
1114 COMMERCE STREET  
DALLAS, TEXAS 75202

OFFICE OF  
THE REGIONAL DIRECTOR

Our Reference: EI# 1274-453

13 December 1974

Lt. Gen. W. C. Gribble, Jr.  
Chief of Engineers  
Department of the Army  
Washington, D.C. 20314

Dear Gen. Gribble:

RE: Revised: Neches River & Tributaries,  
Salt Water Barrier, Beaumont, Texas

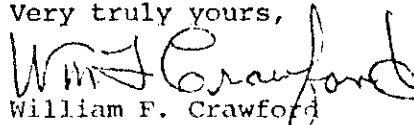
Pursuant to your request, we have reviewed the Environmental Impact Statement for the above project proposal in accordance with Section 102(2) (C) of P. L. 91-190, and the Council on Environmental Quality Guidelines of April 23, 1971.

Environmental health program responsibilities and standards of the Department of Health, Education, and Welfare include those vested with the United States Public Health Service and the Facilities Engineering and Construction Agency. The U. S. Public Health Service has those programs of the Federal Food and Drug Administration, which include the National Institute of Occupational Safety and Health and the Bureau of Community Environmental Management (housing, injury control, recreational health and insect and rodent control).

Accordingly, our review of the Draft Environmental Statement for the project discerns no adverse health effects that might be of significance where our program responsibilities and standards pertain, provided that appropriate guides are followed in concert with State, County, and local environmental health laws and regulations.

We therefore have no objection to the authorization of this project insofar as our interests and responsibilities are concerned.

Very truly yours,



William F. Crawford  
Environmental Impact Coordinator

cc: Phyllis Hayes, OEA/Wash  
Warren Muir, Council on Environmental Quality

D-4

DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

Reaction Review and Comments on Environmental Impact Statement for Project Proposal:

Draft Environmental Impact Statement Reviewed With Objections

Draft Environmental Impact Statement Reviewed With No Objections

XX

Date: 12-13-74 EI# 1274-453

Agency/Bureau: DHEW/PHS

Project Proposal: Neches River and Tributaries, Texas  
Saltwater Barrier on Neches River at Beaumont, Texas

Comments: Review of draft of this plan revealed no areas of concern in regard to compliance with Section 102(2)(c) of Public Law 91-190. This revised impact statement is still in compliance with these criteria and no changes are recommended.



DEPARTMENT OF AGRICULTURE  
OFFICE OF THE SECRETARY  
WASHINGTON, D. C. 20250

March 7, 1975

Lt. General William C. Gribble, Jr.  
Chief of Engineers  
Office of the Chief of Engineers  
Department of the Army

Dear General Gribble:

This is in response to your letter of November 18, 1974, transmitting for our review and comments your proposed report, together with pertinent papers, and the draft environmental statement for Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas.

The Main Report on page 38 states "The costs of a salt water barrier and navigation gate at site 4 are attributable to mitigation of damages that result from dredging of the Federal navigation project." Thus, the \$11,853,000 cost would appear to be additional costs for the navigation project and should be justified by navigation benefits rather than benefits from prevention of salinity damages to the rice crop. The use of benefits from prevention of salinity damages to the rice crop appears to be further questionable since the report states on page 32 that potential damages at present are effectively prevented by existing fixed salt water barriers and, therefore, must be assessed on a hypothetical basis rather than established fact. If the proposed project is truly mitigation, you may wish to consider supplementing the existing federal navigation project.

The Draft Environmental Statement meets the requirements of the National Environmental Policy Act of 1969.

Sincerely,

A handwritten signature in black ink, appearing to read "Robert W. Long".

**Robert W. Long**  
Assistant Secretary for Conservation,  
Research and Education

D-6



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VI  
1600 PATTERSON  
DALLAS, TEXAS 75201

January 27, 1975

Colonel Marvin W. Rees  
Executive Director of Civil Works  
Department of the Army  
Office of the Chief of Engineers  
Washington, D. C. 20314

Dear Colonel Rees:

We have reviewed the Revised Draft Environmental Impact Statement for "Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas." The proposal calls for the construction of a permanent salt water barrier across the Neches River at Beaumont, Texas. The proposed barrier will consist of a gated dam in the river, a gated navigation by-pass channel, an auxiliary dam in a small tributary bayou, an access and service bridge, and other related works.

The statement covers most of the possible environmental impacts of the proposed project; however, we offer the following comments for your consideration in preparing the Final Environmental Impact Statement:

1. The statement indicates that the Lower Neches River Authority "periodically" constructs temporary salt water barriers to protect the fresh water supply. The frequency with which these barriers have been constructed in the past should be described. For example, are the temporary barriers needed every year? This information would further aid in better understanding the need for the project.
2. An earth fill and concrete auxiliary dam are proposed to be constructed across the canal which drains the southern end of Baird's Bayou. However, no discussion as to the need for such a structure is given in the statement. This aspect of the project, including the associated environmental impacts, should be discussed in the Final Environmental Impact Statement.
3. The statement indicates that should the local interests not make the required cash contributions for a project at river mile 23.0, the project is proposed to be built at river mile 26.3. Further discussion should be included as to possible impacts associated with a barrier at



this location. For example, will an earth fill auxiliary structure still be required for Baird's Bayou, and if so, what will its function be? Also, if navigation lock and canal is needed for alternate sites, these areas should be clearly illustrated on an appropriate map.

We would also suggest that consideration be given to the preparation of a revised or supplemental Environmental Impact Statement for the proposed project should the barrier be placed at an alternate location. For example, at river mile 26.3, spoil from the construction of a navigation lock and channel will have to be disposed of in alternate sites. A revised statement would help to ensure that an adequate assessment has been made of the possible environmental impacts associated with construction of the project at the alternate site in question.

4. The statement contains no data as to the existing quality of water in the Neches River. This information is necessary in order that an adequate assessment of the possible impacts to water quality can be made. The water quality data should include levels of dissolved oxygen, biochemical oxygen demand, chemical oxygen demand, existing nutrient concentrations, salinities, and concentrations of toxic pollutants (heavy metals, pesticides). If data is available, an effort should be made to compare the water quality both above and below the temporary barriers. These comparisons could help in substantiating statements as to the seasonally dependent decrease in the quality of water in the lower reaches of the proposed project area.

5. Another alternative to the navigation lock and canal which should be discussed is the incorporation of a navigation lock into the salt water barrier. The salt water intrusion problem would be mitigated and still allow barge traffic to continue on the river. It appears that building the proposed by-pass channel, which could be expanded to accommodate larger barges, could actually induce an increase in barge traffic with accompanying pollutants.

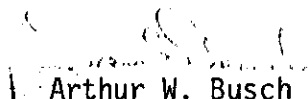
6. Possible adverse secondary impacts which could be induced by the project should also be discussed in the statement. For example, increased barge traffic and a more reliable water supply could induce an increase in industrialization in the area accompanied by increased noise, air, solid waste, and water pollution. Increased demands and dependence on the water supply provided by the Neches River may require that the salt water barrier be closed for a longer time period during the year. This could represent a potential impact to downstream estuarine areas bringing about a decline in productivity. Such an impact would be of a long-term nature and may represent an essentially irretrievable commitment of resources. Such possible long-term impacts need to be discussed in the statement.

These comments classify your Draft Environmental Impact Statement as LO-2. Specifically, we have no objection to the proposed project. However, additional information on the existing water quality of the Neches River and the possible long-term secondary impacts which the project may have on downstream estuarine areas is needed in the final statement. The classification and the date of our comments will be published in the Federal Register in accordance with our responsibility to inform the public of our views on proposed Federal actions, under Section 309 of the Clean Air Act.

Definitions of the categories are provided on the attachment. Our procedure is to categorize our comments on both the environmental consequences of the proposed action and on the adequacy of the impact statement at the draft stage, whenever possible.

We appreciate the opportunity to review the Draft Environmental Impact Statement and would be happy to discuss our comments with you. Please send us two copies of the Final Environmental Impact Statement at the same time it is sent to the Council on Environmental Quality.

Sincerely yours,

  
Arthur W. Busch  
Regional Administrator

Enclosure

## ENVIRONMENTAL IMPACT OF THE ACTION

### LO - Lack of Objections

EPA has no objections to the proposed action as described in the draft impact statement; or suggests only minor changes in the proposed action.

### ER - Environmental Reservations

EPA has reservations concerning the environmental effects of certain aspects of the proposed action. EPA believes that further study of suggested alternatives or modifications is required and has asked the originating Federal agency to re-assess these aspects.

### EU - Environmentally Unsatisfactory

EPA believes that the proposed action is unsatisfactory because of its potentially harmful effect on the environment. Furthermore, the Agency believes that the potential safeguards which might be utilized may not adequately protect the environment from hazards arising from this action. The Agency recommends that alternatives to the action be analyzed further (including the possibility of no action at all).

## ADEQUACY OF THE IMPACT STATEMENT

### Category 1 - Adequate

The draft impact statement adequately sets forth the environmental impact of the proposed project or action as well as alternatives reasonably available to the project or action.

### Category 2 - Insufficient Information

EPA believes the draft impact statement does not contain sufficient information to assess fully the environmental impact of the proposed project or action. However, from the information submitted, the Agency is able to make a preliminary determination of the impact on the environment. EPA has requested that the originator provide the information that was not included in the draft statement.

### Category 3 - Inadequate

EPA believes that the draft impact statement does not adequately assess the environmental impact of the proposed project or action, or that the statement inadequately analyzes reasonably available alternatives. The Agency has requested more information and analysis concerning the potential environmental hazards and has asked that substantial revision be made to the impact statement. If a draft statement is assigned a Category 3, no rating will be made of the project or action, since a basis does not generally exist on which to make such a determination.



OFFICE OF THE GOVERNOR  
STATE CAPITOL  
AUSTIN, TEXAS 78711

PH BRISCOE  
GOVERNOR

March 15, 1975

W. C. Gribble, Jr.  
Lieutenant General, USA  
Chief of Engineers  
Department of the Army  
Office of the Chief of Engineers  
Washington, D. C. 20314

Dear General Gribble:

Under the provisions of Section 6.073(b), Texas Water Code, I directed that the Texas Water Rights Commission evaluate the report, "Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas," and related papers which you transmitted by letter of November 18, 1974, pursuant to Public Laws 78-534, 85-624, and 91-190.

The Texas Water Rights Commission recommends adoption of the Corps of Engineers conclusions and recommendations urging, however, that careful reconsideration be given to the data and analysis submitted by local sponsors regarding the Calcasieu River, Louisiana, project precedent, the historical cause-effect relationship between extensive navigation improvements and salt water intrusion in the Neches River, and a more equitable cost-sharing determination. Attached is a copy of the Commission Order of February 25, 1975.

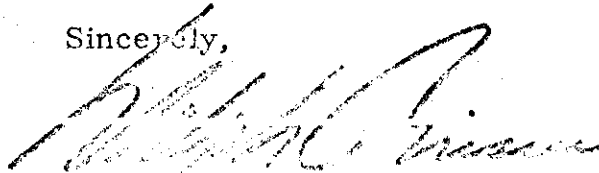
Pursuant to the said Commission Order, I concur in your endorsement of the project scope proposed by the Galveston District and Southwestern Division Engineers, and the Chairman of the Board of Engineers for Rivers and Harbors. And, I urge that before you finalize your recommendations to the Secretary of the Army and to the Congress, you consider without delay the special report presented by the local sponsors, the City of Beaumont and the Lower Neches Valley Authority. Their report has been appended to, and is part of the attached Commission's Order.

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Finally, in response to your request for comments on the project environmental statement, the State reaffirms its comments submitted in letters of February 21, 1973 and May 15, 1973, to the Galveston District Engineer, relative to the Preliminary Draft Environmental Impact Statement. The Revised Draft Environmental Statement of August 1974 which you forwarded by letter of November 18, 1974, properly incorporates the views of the appropriate State of Texas agencies. The Statement appears to conform adequately to the provisions of Section 102(2)(C), Public Law 91-190. I suggest that a copy of this letter be included in the Final Environmental Impact Statement.

I will appreciate your sending to me a copy of the report transmittal letter from the Secretary of the Army to the Congress, as indicated in your letter of November 18, 1974.

Sincerely,



Dolph Briscoe  
Governor of Texas

DB:ll

Attachment  
As stated.

# TEXAS WATER RIGHTS COMMISSION



AN ORDER of the Texas Water Rights  
Commission Making Recommendations  
Concerning the Feasibility of the United  
States Army, Corps of Engineers  
Proposed Project Report, "Neches  
River and Tributaries, Salt Water  
Barrier at Beaumont, Texas."

On February 5, and 24, 1975, came on to be considered before the Texas Water Rights Commission pursuant to Section 6.073, Texas Water Code, jurisdiction having been established, the project report of the United States Army Engineer District, Corps of Engineers, Galveston, Texas, entitled "Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas," dated May 31, 1973; and modifications thereto, of July 9, 1974 and November 18, 1974, by the Chief of Engineers and the Chairman, Board of Engineers for Rivers and Harbors, respectively.

After evaluating the captioned report and the evidence submitted at the public hearings, the Commission finds that:

1. The proposed salt water barrier project meets the feasibility criteria set forth in Section 6.073(e), Texas Water Code.
2. There is a vital need for the project and the public interest would be served favorably thereby.
3. The preponderance of evidence and data supports the conclusions reached in the basic report of the Galveston District Engineer that salt water intrusion on the Neches River is attributable to the long succession of Federal navigation improvements.

4. The Chief of Engineers and the Chairman, Board of Engineers for Rivers and Harbors, should reconsider following the precedent cited in the Galveston District Engineer's report regarding the Corps of Engineers salt water barrier project in the Calcasieu River at Lake Charles, Louisiana, where the Corps of Engineers determined, pursuant to Public Law 87-874 (October 23, 1962), that salt water intrusion damage was caused by navigation improvements and, therefore, damage mitigation costs were borne entirely by the Federal Government.

5. The local sponsors, the City of Beaumont and the Lower Neches Valley Authority, have submitted extremely strong evidence in rebuttal to the determinations made by the Chief of Engineers and the Chairman, Board of Engineers for Rivers and Harbors. The local sponsors show that even if it is decided as a matter of new policy by the Federal Government, that salt water intrusion on the Neches River at Beaumont is not due entirely to successive navigation improvements and that mitigation of the salt water intrusion at Beaumont is not a wholly Federal responsibility, a proper analysis of the problem indicates that the maximum local cost responsibility is about 3.9 percent rather than 25 percent of the project cost as proposed by the Chief of Engineers and the Chairman, Board of Engineers for Rivers and Harbors.

6. The proposed project possesses significant environmental enhancement features.

7. The detailed analysis of the foregoing major findings presented by the local sponsors at the public hearing of


February 5, 1975, warrants careful consideration by the Corps of Engineers prior to finalizing its recommendations to the Secretary of the Army and to Congress. Therefore, the Commission hereby appends and makes the local sponsors' analysis report a formal part of this Order.


NOW, THEREFORE, BE IT ORDERED BY THE TEXAS WATER RIGHTS COMMISSION that the Commission does recommend to the Governor of the State of Texas that the proposed project of the United States Army, Corps of Engineers, described in their report, "Neches River and Tributaries, Salt Water Barrier at Beaumont, Texas," be considered feasible and that its design and construction be pursued with diligence.

And, the Commission does urge that special reconsideration be given by the Chief of Engineers and the Chairman, Board of Engineers for Rivers and Harbors to their findings, in the light of the precedent established in the Calcasieu River, Louisiana, salt water barrier project, and in the light of the rationale, analysis, and justification submitted by the local sponsors regarding the historical cause-effect relationship between navigation improvements and salt water intrusion, and the equitable sharing of costs between the Federal Government and local sponsors.

Executed and entered of record, this the 25th day of February, 1975.

TEXAS WATER RIGHTS COMMISSION

  
\_\_\_\_\_  
Joe D. Carter, Chairman

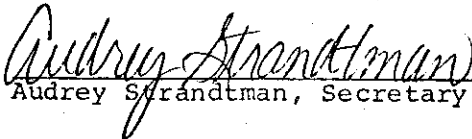
  
\_\_\_\_\_



STATE OF TEXAS       X  
                          X  
COUNTY OF TRAVIS    X

I, Audrey Strandtman, Secretary of the Texas Water Rights Commission, do hereby certify that the foregoing and attached is a true and correct copy of an order of said Commission, the original of which is filed in the permanent records of said Commission.

Given under my hand and the seal of the Texas Water Rights Commission, this the 27th day of February, A.D. 1975.

  
\_\_\_\_\_  
Audrey Strandtman, Secretary

STATEMENT OF THE CITY OF BEAUMONT  
AND THE LOWER NECHES VALLEY AUTHORITY

CONCERNING THE PROPOSED REPORT  
OF THE CHIEF OF ENGINEERS, DEPARTMENT OF THE ARMY, ENTITLED  
"NECHES RIVER AND TRIBUTARIES, SALT WATER BARRIER  
AT BEAUMONT, TEXAS"

PRESENTED TO THE  
TEXAS WATER RIGHTS COMMISSION

FEBRUARY 5, 1975

## INTRODUCTION

Fresh water supply from the Neches River is vital to the municipalities, industries, and rice irrigation farming of the Beaumont and Jefferson County area. Over the years, as Sabine Lake and the channel of the river have been progressively modified to accommodate navigation by sea-going vessels, the problem of salt water intrusion from the Gulf of Mexico has become more and more severe. A permanent salt water barrier is urgently needed to maintain fresh water conditions in the reaches of the river above Beaumont and protect the area's fresh water resource.

The proposed report by the Chief of Engineers in relation to the Neches salt water barrier consists basically of three parts:

- (1) A detailed study which the Galveston District of the Corps completed in 1973. This study outlines the history and facts of the matter and recommends construction of a permanent barrier. It concludes that resolution of the problem should be a Federal responsibility and that the United States should pay the full construction cost of a barrier at the most economical site (Site No. 4), with local interests paying any incremental cost attributable to moving the structure to an alternative site (Site No. 1) which is more desirable for environmental reasons.
- (2) A letter of comment to the Chief of Engineers from the Board of Engineers for Rivers and Harbors, dated 9 July, 1974. This letter concurs generally in the findings of the Galveston District, except that it proposes a different view regarding

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local sharing of the project costs. Based on a separate study, which had been requested by the Board of Engineers for Rivers and Harbors and prepared by the Waterways Experiment Station at Vicksburg (Miscellaneous Paper H-74-9, Neches River Saltwater Barrier, by Carl J. Huval, final report published August 1974), the Board recommended that 25% of the construction cost of the barrier at the most economical site should also be allocated to the local interests.

- (3) A proposed letter from the Chief of Engineers to the Secretary of the Army, concurring with the comments of the Board of Engineers for Rivers and Harbors and submitting the report for transmission to Congress on that basis.

#### SUMMARY

In summary, the views of the City of Beaumont and the Lower Neches Valley Authority are as follows:

- a. There is a clear need for the permanent salt water barrier.  
The barrier is feasible and should be constructed as proposed.
- c. As concluded in the study by the Galveston District, responsibility for the problem should be attributed to Federal navigation improvements.
- d. The cause-and-effect relationship between the navigation improvements and salt water intrusion on the Neches River has long been recognized and has been acknowledged repeatedly in past documents of the Corps of Engineers and the United States Congress.

- e. The precedent of a similar project on the Calcasieu River at Lake Charles, Louisiana, where the full cost of resolving a comparable problem was borne by the Federal government, should also be followed in this instance.
- f. Even if it were ultimately concluded, at the Federal level, that mitigation of the salt intrusion problem at Beaumont is not a wholly Federal responsibility, proper analysis of the problem would indicate the maximum local responsibility to be on the order of 3.9%, rather than 25% as now proposed.

#### NEED FOR THE PERMANENT BARRIER

The study by the Galveston District clearly outlines the seriousness of the salt water intrusion problem. Temporary barriers of steel sheet piling are now required nearly every year during the season of lowest river flow, which also coincides with the months of heaviest demand for fresh water diversions. A flow in the river of 1,900 cubic feet per second or more is estimated to be required to keep salt water away from the fresh water intakes. During the last seven years of published records, the natural flow of the river, without upstream regulation and without fresh water diversions, would have been less than that amount approximately 42% of the time, or an average of five months out of the year. Unless the salt contamination is prevented, adequate water supply cannot be provided for the Jefferson County area. A permanent barrier structure, with provision for regular passage of boating traffic, is the logical solution to the problem.

## FEASIBILITY

Construction of a salt water barrier on the Neches River below the mouth of Pine Island Bayou was recommended by the Lower Neches Valley Authority in its master plan for the Neches River Basin, which was published in 1960. The investigation by the Galveston District of the Corps of Engineers has confirmed the technical feasibility of the project, which offers a practical solution to a long-standing problem and also will provide concurrent environmental benefits. Appendix F of the Galveston District report determines that the project is economically feasible, with a favorable 1.86 ratio of annual benefits to annual costs.

## RELATIONSHIP TO NAVIGATION IMPROVEMENTS

The syllabus on the first page of the detailed report by the Galveston District states the matter very concisely, in the following words:

"The study finds that the cause of the salinity intrusion problem is the progressive improvement of the stream for navigation over a period of many years by the Federal Government, between Beaumont and the Gulf of Mexico, culminating in the recent completion of improvement of the Sabine-Neches Waterway generally to a depth of 40 feet; that measures to mitigate the problem are a Federal responsibility in furtherance of navigation improvements previously undertaken, subject to the usual requirements of local cooperation attached to navigation projects; that the basis for this finding was implied in the Congressional authorization for the most recent navigation improvements (House Document No. 553, 87th Congress, 2nd Session, pages 15 and 32)."

## CAUSE AND EFFECT

That the salt encroachment problem is basically related to enlargement of the river channel for navigation is not a new concept, but is a fact that has been recognized for more than sixty years.

Executive Document No. 84, 43rd Congress, 1st Session, 1874, entitled Examination of Rivers and Harbors, discussed possible construction of wooden jetties in Sabine Lake at the mouth of the Neches River and (on Page 62) referred to the water as fresh: "The water being fresh, such a jetty would remain for years."

In 1876, the natural bar at Sabine Pass, between Sabine Lake and the Gulf, was removed by dredging, and in 1883 the first jetty was constructed at Sabine Pass to keep the bar from reforming. In 1879-1880, a 5-foot channel was cut through the natural bar at the mouth of the Neches River. During the 1880's, a 5-foot navigation channel was dredged and maintained from Sabine Pass to the mouth of the Neches. This was subsequently deepened to 6 feet in 1896.

House Document No. 634, 58th Congress, 2nd Session, published in 1902 and entitled Sabine Lake and Sabine and Neches Rivers, Texas, noted that salt water intrusion on Taylors Bayou and Hillebrandt Bayou had become serious in 1901 and 1902 and that local rice growers attributed the problem to the navigation improvements. The same document also commented (Page 8) on the fact that some salt water had by then been noticed above Beaumont but that

"No serious results, however, have been experienced from this source on the Neches, owing to the short duration of the salt-water period, but on Taylors and Hildebrandts bayous the loss to the rice producers from salt water has been heavy."

Commenting on the Taylors Bayou situation, the U.S. Department of Agriculture, in its Bulletin No. 113, 1902, Irrigation of Rice in the United States, observed as follows:

"In view of the statement of the rice growers along Taylors Bayou, that prior to the year 1901 they had always had sufficient water for the irrigation of their crops, it is quite natural to conclude that the Port Arthur Canal is wholly responsible for the condition which prevailed this year."

House Document No. 836, 61st Congress, 2nd Session, in 1910, discussed the proposed dredging of a navigation channel from the mouth of the Neches River to Beaumont. It stated (on Page 13) that:

"The rice growers claim, and apparently with good reason, that the deeper channels will cause salt water to reach their pumping plants much sooner than it otherwise would."

That document also discussed the concept of a lock or guard gates to keep the salt water from coming upstream and concluded (Page 21) that "a deep channel should not be dredged without providing some means whereby the rice-growing industry can be protected from the dangers of salt water. . . ."

The first navigation channel to Beaumont was 25 feet deep and was constructed in 1914-1915. In 1914, the City of Beaumont had to move its fresh water intake 4 miles upstream, to Lawsons Crossing, and then in 1915 another 4 miles farther upstream, to Bunns Bluff (river mile 30).

A guard lock was built in the Sabine-Neches Canal, below the mouth of the Neches River, in 1916, but it was bypassed as an obstruction to navigation under authority of the River and Harbor Act of March 3, 1925.

From 1924 through 1929, the navigation channel on the Neches River was deepened to 30 feet. In 1926, owners of the irrigation system that is now operated by the Lower Neches Valley Authority built an intake canal from Pine Island Bayou to Lakeview, at mile 38 on the Neches River. In 1927, the City of Beaumont carried its intake upstream to Wiess Bluff, at mile 41.7.



Between 1937 and 1943, the Neches River channel to Beaumont was again deepened, to 34 feet. Beginning in 1944, it began to be necessary in some years for the Lower Neches Valley Authority to install temporary sheet pile barriers across either the Neches River or Pine Island Bayou or both, to keep the water fresh at the entrance of the Lakeview Canal, and at the L.N.V.A. pumping plant at Voth.

These barriers were needed about one year out of two, on the average, until 1947, when the channel was enlarged to a depth of 36 feet. Since then, temporary barriers have been needed during the dry season almost every year. The channel depth is now 40 feet, and further enlargement to 45 feet is currently being considered.

#### PRECEDENT

The Galveston District report (Page 37) notes the similarity of the Neches River situation to a previous project at Lake Charles, Louisiana:

"In a similar case involving a salt water barrier on the Calcasieu River, Louisiana, the Congress stated in the River and Harbor Act approved 23 October 1962 (Public Law 87-874) that "measures for mitigation of damages from navigation improvements will be a Federal responsibility and enhancement effects will be shared on the basis of a 50 per centum Federal and 50 per centum non-Federal." It ultimately was determined that no enhancement effects were involved, and the Calcasieu River salt water barrier was constructed with no apportionment of costs to local interest."

The Calcasieu problem was fundamentally the same as that on the Neches. Construction of the deep-draft navigation channel had led to salt water intrusion to the extent that a river flow of some 8,000 cfs was required to keep the river fresh at Lake Charles. The river was the source of water for irrigation of an estimated 132,000 acres of rice,

some 78% of which were affected by the salt water encroachment. After careful review of the question of relative obligations for Federal and local participation in the cost of corrective measures, it was concluded that the entire construction cost of the salt water barrier was a Federal responsibility.

#### RELATIVE SIGNIFICANCE OF DIVERSIONS AND NAVIGATION IMPROVEMENTS

If, after due deliberation, the Chief of Engineers and the Federal Congress determine that the conclusions of the Galveston District investigation and the precedent of the Calcasieu Salt Water Barrier should not be followed, and that there should be required some degree of local participation in the initial cost of the Neches barrier project, then presumably the system of evaluation developed by the Waterways Experiment Station in the Huval report would be used. Thus, although that study was not included among the materials incorporated in the subject report, it is potentially of considerable importance to the matter.

The basic reasoning of the Huval study is easily described. It is based on comparisons of natural river flows versus the actual net flows remaining after diversions, and also on the fact that a flow of at least 1,900 cfs is now required to keep the salt water pushed downstream whereas a much lower "pre-project" flow (estimated by Huval to be 400 cfs) was needed to accomplish the same thing before construction of navigation works. Using published records of historical measurements at stream gaging stations, Huval derived estimates of the natural flows of the river and of the net flows remaining after diversions during the period from 1945 through 1973. He then reasoned essentially as follows:

- a. The degree to which salt water intrusion has worsened since pre-project conditions could be estimated by comparing (a) the average number of months per year that the actual net flows have been less than 1,900 cfs versus (b) the average number of months per year that the natural flows would have been less than the pre-project flow (400 cfs in his calculations).
- b. Although navigation improvements were apparently a major cause of the problem, part of the difficulty might also be attributed to water supply diversions.
- c. The portion of the problem due to diversions could be estimated based on the difference between (a) the average number of months per year that the actual net flows have been less than the pre-project flow requirement and (b) the average number of months per year that the natural flows would have been less than that amount if there had been no diversions.
- d. The portion attributable to navigation improvements might also be based on the difference between (a) the average number of months per year that the natural flows would have been less than 1,900 cfs and (b) the average number of months per year that such flows would have been less than the pre-project flow. And the portion not assigned to navigation on this basis could then be assumed to be due to diversions.
- e. Since the two approaches described in "c" and "d" above overlap and do not give identical answers, the final evaluation should be based on averaging the two sets of results.

Although the basic rationale of the Huval study is not unreasonable, there were several secondary assumptions employed in his detailed calculations which lead to results that over-estimate the effect of water supply diversions in comparison to the navigation works. Because the Huval report is the basis of the conclusions and recommendations of the Board of Engineers for Rivers and Harbors in regard to cost allocations, it is believed that the following points should be considered:

- a. The assumed pre-project condition should be based on the original state of the river and of Sabine Lake, before any effect of navigation improvements. The Huval report assumes that conditions as of the years 1900-1910 represented the situation prior to the effect of navigation work. However, navigation improvements affecting the salinity of Sabine Lake, and therefore of the lower reaches of the Neches as well, began substantially before 1900. It is apparent that earlier actions, such as removal of the natural bar at Sabine Pass in 1876 and dredging of a navigation channel around and through Sabine Lake in the 1890's would materially influence the ease of access allowed to water from the Gulf. It is clear that conditions as of 1900-1910 are not appropriate for pre-project conditions.

The City of Beaumont was able to operate its fresh water intake on the Neches at a location just downstream from the proposed salt water barrier site until 1914. Records of the Evadale gaging station show that, during the years when Beaumont was still pumping at the original location, river flows of little more than 200 cfs prevailed for over a month in the fall of 1904.

Records were not kept at Evadale from January 1907 through March 1921, but records from the Rockland gage, which has been operating continuously since 1903, show that flows there averaged only 12 cfs for a month or more in the fall of 1910, which is equivalent to an estimated flow at Beaumont of less than 40 cfs.

In effect, the evidence indicates that salt water intrusion at Beaumont under true pre-project conditions was probably non-existent. The Galveston District report states unequivocally that "Prior to 1900 there was no salinity problem in the Neches River." It is apparent that 400 cfs is too high to use for the pre-project condition in the analysis.

Before navigation channels were cut through Sabine Pass, Sabine Lake, the bar at the mouth of the Neches, and the bed of the river itself, it is probable that the river could have fallen to zero flow for a substantial period without causing salt water to reach Beaumont. Based on actual observed stream flows at the Rockland gage in 1910, it appears that the Beaumont water works was able to function while the river flow at Beaumont averaged less than 40 cfs for a month or longer.

- b. In computing both the natural flows and the actual net flows, the contribution of the full drainage area of the Neches Basin should be included. The calculations in the ~~Muval~~ study do not count any runoff from below the Evadale and Kountze gaging stations and thus omit the flow from nearly 1,000 square miles of contributing watershed.

- c. The flows derived to show the extent of salt water intrusion in a state of nature should reflect conditions as they would be without the benefit of upstream flow regulation. In recent years, a substantial part of the flow passing the Evadale gage in summer months of low flow has consisted not of natural flows, but of regulated releases from Steinhagen Reservoir and Sam Rayburn Reservoir, which have been constructed by the Corps of Engineers and in which the Lower Neches Valley Authority has participated as local sponsor. The L.N.V.A. is contributing \$15 million to pay for the water supply benefits of those projects. Particularly in times of low flow, the Evadale gaging station does not show a state-of-nature condition but the result of regulation by the upstream projects. In computing the natural flows, the methods should be such as to eliminate the effects of Sam Rayburn and Steinhagen. The Huval analysis did not make allowance for this and thus treated the upstream releases as natural runoff in times of low flow.
- d. The records utilized in the analysis to establish actual net flows after diversions should reflect conditions as they are at the present time, so that the effect attributed to water supply operations is based on the net result of diversions at present levels plus supplemental upstream releases obtained through L.N.V.A. participation at Sam Rayburn and Steinhagen Reservoirs. The Huval analysis uses records extending back as far as 1945. Conditions on the river have changed continually during much of that period. In particular, the actual net flows in the summer months now that there is major regulating

storage at Sam Rayburn Reservoir are not comparable to those in years before the Sam Rayburn project was built. It is not believed possible to get meaningful answers regarding present-day actual net flows from records taken prior to the present levels of diversion pumpage and upstream flow regulation. The fairest and soundest basis for evaluation would be to use the records beginning with Water Year 1967 (the first year after Sam Rayburn Reservoir filled to above the minimum power pool level) and extending through the latest published records, Water Year 1973. During that period, the diversion pumpage went up and down somewhat from year to year but experienced relatively little over-all change. These records represent 84 months of essentially stable conditions, comparable to the present situation, and they are a much more suitable basis for the analysis than are the older records.

The factors listed above can significantly affect the results of the calculations. As used in the Huval study, they lead to under-estimation of the available flow and over-estimation of the impact of the water supply pumpages. They result in counting releases from upstream storage as part of the natural flow and counting the diversion of such releases as contributing to salt water intrusion.

If the basic philosophy developed in the Huval study is to be used to apportion costs between the Federal government and the local sponsors, the L.N.V.A. and the City of Beaumont suggest that the detailed analysis should be re-evaluated, with attention given to the foregoing points. Attachment "A" presents calculations comparable to those of the Huval

study, using the same fundamental line of reasoning but with the computations handled so as to allow for those considerations. Answers were derived for assumed pre-project flow requirements of zero and 40 cfs, as shown in the following table. For purposes of comparison, the results for a pre-project flow of 400 cfs are also shown.

<u>Pre-Project Flow Required</u>	<u>Present-Day Flow Required</u>	<u>Relative Contribution</u>	
		<u>Diversions</u>	<u>Navigation</u>
zero cfs	1,900 cfs	3.9%	96.1%
40 cfs	1,900 cfs	3.9%	96.1%
400 cfs	1,900 cfs	11.7%	90.3%

Also in relation to this point, it must be recognized that the effect attributable to navigation now is almost certainly less than it will be in the future. In 1961, when the Lower Neches Valley Authority presented its views on this subject at a public hearing called by the District Engineer of the Galveston District, the navigation channel was 36 feet deep, and the flow required to prevent salt water encroachment was 1,500 cfs. Subsequent deepening of the channel to 40 feet has raised the required flow rate to 1,900 cfs. Further enlargement, which is now under consideration, will raise the necessary flow to a still higher amount. Thus, analysis based on 1,900 cfs as the "after-project" condition is not a final result, but only a relative guideline, indicating the current state of the problem.

#### CONCLUSIONS

In conclusion, it is the position of the City of Beaumont and the Lower Neches Valley Authority that the proposed salt water barrier on the Neches River at Beaumont is a much-needed project and has been for

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many years, but that proper allocation of construction costs should recognize full Federal responsibility to mitigate damages caused by Federal navigation works. There is ample precedent for this approach, and it is believed to be the correct one to follow in this instance.

In the alternative, if the established precedents are to be abandoned and part of the basic construction cost is to be allocated to local interests, it is requested that the analysis leading to the apportionment of costs be re-evaluated. It is the belief of the City of Beaumont and the Lower Neches Valley Authority that correct application of the basic rationale developed by the Waterways Experiment Station would indicate the local share to be 3.9%, rather than the 25% presently under consideration.

Analysis of Neches River Flows to Estimate the Relative Significance of Navigation Improvements and Water Supply Diversions in Relation to Salt Water Intrusion: Water Years 1967-1971

(Using the Basic Approach Proposed in Waterways Experiment Station Miscellaneous Paper H-74-9)

1. Derivation of Natural Flows:

- a. Runoff above Dam B was derived from gaged flows at the Rockland, Lufkin and Chireno gaging stations, multiplied by the ratio of total contributing drainage area above Dam B to that above the gaging stations.
- b. Runoff below Dam B was derived from gaged flows at the Kountze and Sour Lake gaging stations, multiplied by the ratio of total contributing drainage area below Dam B to that above the gaging stations.

2. Derivation of Actual Flows:

- a. The actual gross flow available was derived from measured flows at the Evadale gaging station; plus observed flows at the Kountze and Sour Lake gaging stations multiplied by the ratio of the total contributing area below the Evadale gage to that above the Kountze and Sour Lake gages.
- b. The actual net flows were derived by subtracting the diversions of the L.N.V.A. and the City of Beaumont from the actual gross flows.

3. Flows Required to Keep Salt Water Away:

- a. Before any navigation improvements ("pre-project"), records indicate that a flow of 40 cfs or less could be tolerated in any given month.
- b. At the present time, it takes a flow of 1,900 cfs to keep the salt water away.

4. Difference Between Natural and Actual Flows:

- a. The natural flows would have been less than 40 cfs during no months, and less than 1,900 cfs during 35 months out of the seven years.
- b. The actual net flows were less than 40 cfs during no months, and less than 1,900 cfs during 38 months out of the seven years.

5. Results:

- a. Total worsening of salt water intrusion is the difference between zero months with natural flow, pre-project, versus 38 months with actual net flows and the present-day flow requirement, or an over-all increase of 38 months.
- b. If there had been no navigation improvements, there would have been no change in the number of months of intrusion problems, and from this viewpoint the effect due to diversions is zero.
- c. If there had been no diversions and no change in flow conditions, the increased intrusion due to the navigation improvements would have been 35 months out of the total of 38 months, and from this viewpoint the remaining 3 months might be attributed to the diversions.
- d. Averaging the results of the two alternative viewpoints (b and c), the estimated contributions of diversions and navigation works are:

$$\text{Attributable to diversions: } \frac{(0+3)/2}{38} \times 100 = 3.9\%$$

$$\text{Attributable to navigation: } \frac{(38+35)/2}{38} \times 100 = 96.1\%$$

- e. Results for a pre-project flow requirement of zero are the same as for a pre-project flow requirement of 40 cfs.

## 6. Summary of Flows

On the following page is a tabulation of the derived natural flows, actual gross flows (i.e., before diversions) and actual net flows for the Neches River just below the mouth of Pine Island Bayou for the period since Sam Rayburn Reservoir became effective. Although the actual net flows are generally less than the natural flows, there are many times, especially during the dry summer months, when the releases from upstream storage add more water to the river than the diversions take away. On the average, there is more flow left in the river now, during the months of June through October, even after the diversion pumpage, than there would have been with no diversions if the upstream reservoirs had not been constructed. Thus, the cooperative participation of the L.N.V.A., in joining with the Corps of Engineers to help provide the regulating storage, has served to substantially compensate for the water supply diversions during many months of the most critical low flow conditions. These data emphasize the importance of giving correct treatment to the effects of upstream regulation releases when applying the basic method suggested by the Waterways Experiment Station.

SUMMARY OF NATURAL AND ACTUAL FLOWS  
OF THE NECHES RIVER BELOW THE MOUTH OF PINE ISLAND BAYOU  
WATER YEARS 1967-1973

-c's-

	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>
<u>W.Y. 1967</u>												
Natural Flow	1,163	1,046	1,459	2,050	2,357	1,986	4,543	2,810	2,951	748	254	253
Actual Gross Flow	2,347	1,890	2,041	2,447	2,908	2,151	4,312	2,736	2,552	1,269	1,146	977
Actual Net Flow	2,037	1,647	1,795	2,207	1,756	1,692	3,354	1,824	1,232	224	247	308
<u>W.Y. 1968</u>												
Natural Flow	141	235	870	6,891	3,813	6,688	23,103	15,818	14,958	9,155	1,563	3,332
Actual Gross Flow	587	506	826	3,813	3,913	4,454	14,430	14,637	15,958	10,736	4,438	2,258
Actual Net Flow	186	227	616	3,593	2,796	4,160	13,668	13,539	14,915	9,329	3,280	1,698
<u>W.Y. 1969</u>												
Natural Flow	1,691	2,699	13,240	6,651	13,317	28,516	26,047	32,458	4,561	1,010	372	403
Actual Gross Flow	3,373	4,366	9,803	8,238	12,118	18,190	23,197	30,818	14,863	2,963	2,562	1,902
Actual Net Flow	2,963	4,059	9,570	6,008	11,816	17,900	22,408	29,856	13,346	1,672	1,528	1,072
<u>W.Y. 1970</u>												
Natural Flow	340	1,352	3,358	4,435	4,031	9,139	6,768	6,253	1,757	476	306	522
Actual Gross Flow	1,343	1,085	2,257	3,380	2,918	5,544	6,426	6,816	2,752	1,485	945	1,271
Actual Net Flow	869	722	1,599	3,111	2,539	5,148	5,630	5,806	1,551	188	100	727
<u>W.Y. 1971</u>												
Natural Flow	2,761	2,723	1,537	1,522	1,457	2,090	1,162	2,669	466	295	789	424
Actual Gross Flow	2,800	2,559	1,409	1,515	1,419	1,972	1,826	1,901	1,568	1,387	840	597
Actual Net Flow	2,466	2,252	1,090	1,213	1,126	1,251	727	787	158	119	309	91
<u>W.Y. 1972</u>												
Natural Flow	834	780	9,199	7,962	6,012	5,390	3,240	8,372	914	1,139	448	487
Actual Gross Flow	918	720	8,948	6,775	5,238	5,191	4,113	9,080	3,232	2,605	2,133	1,910
Actual Net Flow	482	372	8,881	6,479	4,917	4,488	3,076	7,958	1,951	1,668	1,518	1,310
<u>W.Y. 1973</u>												
Natural Flow	945	5,987	7,573	15,602	14,624	17,326	29,764	17,241	25,974	7,790	4,295	9,139
Actual Gross Flow	1,690	4,023	6,174	11,501	17,204	17,220	30,339	22,928	22,679	15,221	6,166	10,741
Actual Net Flow	1,306	3,630	5,898	11,240	16,935	16,902	29,817	21,781	21,333	13,594	5,190	10,316

Notes: Natural flow is amount that would be experienced without upstream regulation or diversions. Actual gross flow is historical flow, including effect of upstream regulation but before diversions. Actual net flow is actual gross flow minus water supply diversions.

OUTHWESTERN REGIONAL OFFICE

John R. Franson, Representative

Louisiana  
New Mexico  
Texas  
Mexico



## NATIONAL AUDUBON SOCIETY

2507 ROGGE LANE, AUSTIN, TEXAS 78723 -- PHONE (512) 928-2047

January 23, 1975

Lt. Colonel Martin W. Teague  
Deputy District Engineer  
Corps of Engineers  
P.O. Box 1229  
Galveston, Texas 77550

RE: DRAFT ENVIRONMENTAL STATEMENT ON NECHES RIVER AND TRIBUTARIES,  
TEXAS - SALTWATER BARRIER ON NECHES RIVER AT BEAUMONT, TEXAS

Dear Colonel Teague:

This is a delayed reply from the National Audubon Society in regard to the draft environmental statement on the Neches River and Tributaries Saltwater Barrier. We apologize for our delay in expressing our concerns. However, this office has been closed for some time and we are now just getting to some of these assessments. I hope, however, that our comments will be taken into consideration in the final environmental draft of this project and by the agencies that a copy of this letter is going to.

First of all, the National Audubon Society would like to echo the concerns expressed in letters to the Corps of Engineers by Sidney R. Galler, Deputy Assistant Secretary of Commerce, dated January 15, 1973 and reproduced in the draft environmental statement. In addition, we concur with the concerns reflected in the correspondence dated February 13, 1973 from Charles H. Hembur, Chief of the Federal Assistance Branch, Region IV, of the U.S. Environmental Protection Agency in Dallas. This correspondence is also reproduced in the draft environmental statement. We feel that both of these agencies make very valid points of concern, especially in regard to the protection of the estuarian areas.

The draft environmental statement was referred to our nearest chapter, which in this case was the Sabine Audubon Society headquartered in Beaumont, Texas. The impact statement was subsequently reviewed by the chapter's conservation committee chairman, John Frink, who offers the following comments which the National Audubon Society endorses. The comments are as follows:

D-36

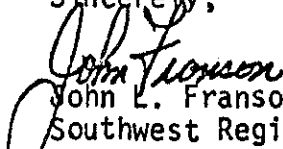
"Although there appears to be some uncertainty as to which of the works of man is responsible for the saline intrusion on the Neches River above the city of Beaumont, the contention that this intrusion is detrimental to the riverine ecology of the Neches is not disputed. Further, the draft environmental statement as revised August, 1974, is essentially correct in its assessment of the impact of the proposed salt water barrier upon the Neches basin environment."

"If the proposed barrier is to be constructed, it must be located as far to the south as possible; the benefits afforded by the barrier decrease geometrically as the site is moved upriver, and any location north of site 1 (mile 23.0) is unacceptable. Regardless of site, however, the relocation of the Eastex, Inc. effluent outfall to a location downstream of the barrier is a necessary condition for successful effect of the barrier."

We appreciate an opportunity to comment on the draft environmental statement and we request that the final draft of the statement be forwarded to the Sabine Audubon Society's conservation committee chairman, Mr. John Frink, when it is available. His address is 527 Hydrangea Street, Orange, Texas 77630.

We appreciate an opportunity to express our views on this project's draft statement.

Sincerely,

  
John L. Franson

Southwest Regional Representative

cc: Environmental Protection Agency  
Council on Environmental Quality  
Fish and Wildlife Service, U.S. Department of the Interior  
U.S. Geological Survey  
National Marine Fisheries Service, NOAA, St. Petersburg, Fla.  
Texas Parks and Wildlife Department  
Texas General Land Office  
Texas Water Development Board  
National Audubon Society  
Sabine Audubon Society

APPENDIX "E"

WATER QUALITY AND SALT WATER INTRUSION  
IN THE LOWER NECHES RIVER 1/

by

RICHARD C. HARREL

Department of Biology  
Lamar University  
Beaumont, Texas 77710

1/ This research was funded by a Lamar University Research Grant, and subsequently published in The Texas Journal of Science, Vol XXVI, Nos. 1-2, February 1975, pp. 107-117

WATER QUALITY AND SALT WATER INTRUSION IN THE LOWER  
NECHES RIVER<sup>1</sup>

by RICHARD C. HARREL

Department of Biology  
Lamar University  
Beaumont, Texas 77710

ABSTRACT

The effects of salt water intrusion, carrying with it toxic and organic waste effluents from the heavily industrialized lower reaches of the river are discussed. Salt water intrusion occurs for as much as six months of the year. During this period the water of the lower 58 km (36 mi) of the river, and 5 km (3 mi) of Pine Island Bayou becomes deoxygenated, and most of the organisms are killed by being trapped below temporary salt water barrier dams constructed to protect the fresh-water intake of the Lower Neches River Valley Authority.

INTRODUCTION

The Neches River drains an area of approximately 25,900 km<sup>2</sup> (10,000 mi<sup>2</sup>). The river flows southeasterly over an axial distance of 338 km (210 mi), and empties into Sabine Lake, an inlet of the Gulf of Mexico (Texas Water Development Board, 1966). This report deal with the lower 64 km (40 mi) of the river which are subject to salt water intrusion from the Gulf

<sup>1</sup> This research was funded by a Lamar University Research Grant.



during periods of low river discharge and high water demand (Figure 1).

The Neches River is vital to the economy of the area, both for navigation and as a water supply. The lower 35 km (21.5 mi) of the river have been dredged to a minimum depth of 12 m (40 ft) forming the Neches ship channel leading to the Port of Beaumont. The water of the lower Neches River is used to supply: (1) a large industrial complex consisting primarily of petrochemical refining and manufacturing, and production of lumber products, (2) municipal water for over 350,000 people, and (3) irrigation for as much as 24,281 hectares (60,000 acres) of rice land.

Much of this water is distributed by the Lower Neches River Valley Authority (LNVA). The water is pumped from two stations located on Pine Island Bayou at km 6 and 11 above the confluents of the Neches River (Figure 1). The water demand of the LNVA ranges from 20 to 50 cubic meters per second (800 to 2000 cfs), depending on the season. Much of this water is returned to the river below km 32. However, by this time many types of polluttional effluents have been added. Unless "over-loaded" with waste, a river can purify itself by biodegrading, settling, and dilution of harmful materials. During the year 1963 the waste discharge into the lower Neches River exceeded the rivers capacity for self-purification (Freese, Nichols, and Endress, 1967). Since that time water quality has steadily deteriorated.

When river discharge is 28 to 42 cubic meters per second (1000 to 1,500 cfs) above the demand of the LNVA the waste effluents are carried downriver, and eventually into the Gulf of Mexico. When river discharge is less than this, usually during summer and fall months, most of the water is required by the LNVA for distribution. At this time, the LNVA installs temporary salt water barrier dams across the river at km 58 (mi 36), and Pine Island Bayou at km 5 (mi 3) (Figure 1). This diverts the entire flow of the river above the barrier into the LNVA Lakeview Canal, and protects the freshwater intakes from salt water. Now, with nothing to hold it back, salt water from the Gulf and waste effluents from from the lower river move up to the salt water barrier dams. Tidal action flushes the salt- waste water back and forth causing it to become more and more concentrated. The lower 58 km of the river, and 5 km of Pine Island Bayou become a large effluent holding lake. The water below the barriers becomes deoxygenated, and most organisms are killed by being trapped below the salt water barrier dams.

The above conditions have existed for a part of every year since 1951, except 1968 when an unusually large amount of precipitation occurred during the period of high water demand. In 1969 only the Pine Island barrier was installed.

## LOCATION OF COLLECTING STATIONS

Physico-chemical data were collected monthly or semi-monthly from 11 stations along a 32 km (20 mi) stretch of the river (km 64 to km 32) from June, 1967 through May, 1968 (Figure 1). Stations 1, 2, and 3 were located approximately 1 km above, in, and below the confluents of Village Creek. Stations 4, 5, and 6 were located approximately 1 km above, in, and below the confluents of Pine Island Bayou. Stations 7, 8, and 9 were located approximately 1 km above, in, and below the confluents of Lake Bayou. Station 10 was located 1 km above the Interstate 10 and the deep water navigation channel. Station 11 was located adjacent to Bethlehem Shipyard in the deep water channel.

Waste effluents entered the river in the study area at the following locations: (1) Kraft papermill effluent just below the confluents of Lake Bayou and the river between stations 7 and 9, (2) mixed effluents including phenols, cresote, and sewage from a cresote plant between stations 10 and 11, and (3) mixed effluent and sewage from Bethlehem Shipyard at station 11.

Average depth at collecting stations ranged from 12 m at station 11, to 3 m at stations 2 and 8. Bottom deposits consisted of coarse sand, clay, and silt at stations 1, 2, and 3. Sand, clay, silt, and black sludge were present at all stations located below the Neches

River salt water barrier dam.

Benthic macroinvertebrates were collected 40 m above and below the Neches River barrier during September, 1967.

#### METHODS

Measurements of specific conductance, temperature, alkalinity, pH, turbidity, dissolved oxygen, and sulfates were determined according to standard methods (Amer. Public Health Assoc., 1965). Mean monthly discharge was estimated from records of the U.S. Department of the Interior Geological Survey by summing the average discharge from the Neches River at Evadale and Village Creek near Kountze (U.S. Department of the Interior Geological Survey, 1967 and 1968).

Benthic macroinvertebrates were collected with an Ekman dredge and preserved with 10% formalin. Ten dredge samples were taken at equally spaced intervals across the river above and below the barrier. In the laboratory, samples were washed into a No. 50 U.S. standard soil seive, the organisms removed, and preserved in 80% ethanol.

Diversity per individual ( $\bar{d}$ ) was determined by Patten's (1962) equation:

$$\bar{d} = \sum_{i=1}^m \frac{n_i}{N} \log_2 \frac{n_i}{N}$$

where (N) is the total number of organisms, ( $n_i$ ) is the number of individuals per species, and (m) is the number of species per unit area.

#### RESULTS

## RESULTS

Mean monthly discharge ranged from 13.7 m<sup>3</sup>/sec. in November to 347 m<sup>3</sup>/sec in May (Figure 2). Salt water intrusion occurred during the last part of June when discharge dropped below 50 m<sup>3</sup>/sec. At this time temporary salt water barriers were constructed at km 58 on the river, and at km 5 on Pine Island Bayou. Salt water intrusion, and concentration of waste effluents below the salt water barriers continued until the end of December, 1967, when river discharge increased to 95 m<sup>3</sup>/sec.

During the July survey the specific conductance at stations 1 and 3, located above the salt water barrier, was 189  $\mu$ mhos/cm at the surface and 192  $\mu$ mhos/cm at the bottom. Below the barrier conductivity increased steadily to 11,880  $\mu$ mhos/cm at the surface and 32,000  $\mu$ mhos/cc at the bottom at station 11, located in the deep water navigation channel (Figure 3).

Specific conductance at station 3 above the barrier was low and similar on surface and bottom throughout the year, except during September (Figure 4). The wider variation during September was due to a strong south wind which caused a slight leakage of salt water over the barrier.

Below the barrier, at station 4, surface and bottom conductance was quite different from July through December the period of salt water intrusion (Figure 5). During the rest of the year surface and bottom values were similar.

The effects of salt water intrusion on seasonal distribution of dissolved oxygen at station 3, located above the barrier, and station 4, located below the barrier, are illustrated on Figure 6. At station 3 dissolved oxygen was similar on surface and bottom throughout the year. The observed seasonal variation was attributed wholly to variations in solubility with temperature change. Dissolved oxygen was always lower at station 4 below the barrier. In addition, no measurable oxygen was found in the bottom waters from July through December, the period of salt water intrusion.

Downriver variations in dissolved oxygen during July and January are shown on Figure 7. During July surface oxygen decreased constantly to no measurable oxygen below station 9. No measurable oxygen was found in bottom waters below the salt water barrier during July. During the January collection oxygen concentration was high and similar for surface and bottom water, except at station 11, located in the deep water navigation channel.

Sulfates were measured at all stations during December, 1967, and January and May, 1968. Sulfate concentrations were less than 30 ppm on surface and bottom at stations above the barrier. Sulfate concentrations

at station 4, below the barrier during December, were 130 ppm at the surface and 1850 ppm for bottom waters. Maximum concentration of 1990 ppm was found from bottom water at station 11 in the deep water navigation channel. During the January and May collections following high river discharge the maximum sulfate concentration was below 100 ppm.

On September 8, 1967, physico-chemical data and benthic macroinvertebrates were collected at stations located 40 meters above and below the salt water barrier on the river (Figure 1).

The effects of salt water intrusion on water quality were evident from physico-chemical data (Table 1) and benthic macroinvertebrates (Table 2). Dissolved oxygen and pH decreased below the barrier, while alkalinity, turbidity, and specific conductance increased. Above the barrier the bottom substrate consisted of clean fine and coarse sand. Below the barrier the bottom sand was covered with several centimeters of black silt which had an odor of hydrogen sulfide and oil.

A total of 1575 individuals per  $M^2$  distributed among 35 species were found above the barrier. Diversity per individual ( $\bar{d}$ ) was 3.30.

Below the barrier only 555 individuals per  $M^2$  were collected and these were distributed among only five species. Diversity per individual was 0.55. The lower  $\bar{d}$  below the barrier indicates less random distribution of individuals into species, thus less stable community

structure. Wilhm and Dorris (1968) stated that  $\bar{d}$  values above three indicate clean water, and values below three are common in polluted waters.

Many clean water species e.g. Hexagenia limbata, Potamanthus sp., Brachycerus prudens, and other gill breathing forms were common above the barrier. All species collected below the barrier have been reported by various investigators in polluted waters. The decrease in numbers of sludge worms, Limnodrilus sp. and Aulodrilus sp., and the absence of common estuarian species such as Laonereis culveri, Palaemonetes sp., Corophium lucustria, and Congeria leucopheata that were found during earlier random collections, indicates that toxic waste were present. The brackish water clam, Rangia cuneata seemed to thrive in the polluted water. Their distribution ranged from station 9, upriver to the Pine Island Bayou and Neches River salt water barrier dams. Densities over  $500/m^2$  were found in shallow water about 200 m above station 7.

During July, August, and October collections Callinectes sapidus were observed on shore at various sites below Pine Island Bayou. Despite numerous attempts to chase them they would not return to the water. Small numbers of dead fishes, Pomoxis sp., Lepisosteus sp., Dorosoma sp., Aplodinotus sp., and Mugil cephalus, were observed during July, August, and October. Thousands of dead fishes were reported to be found by the Texas Parks and Wildlife



personnel at the ends of small bayous below the barriers during August and September.

Currently the U. S. Army Corps of Engineers are considering construction of a permanent salt water barrier on the Neches River. The proposed barrier would be located somewhere between the confluents of Pine Island Bayou (km 48, mi 30) and the Interstate 10 Highway bridge (km 37, mi 23). This would protect from 16 km (10 mi) to 27 km (17 mi) of the river from being subjected to toxic and organic wastes and salt water nearly every year. However, before the final decision is reached, more studies should be made to make sure that the design and construction of the permanent barrier would not be detrimental to the river and the ecology of the area.

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TABLE 1: PHYSICO-CHEMICAL CONDITIONS 30 METERS ABOVE AND BELOW THE SALT-WATER BARRIER, NECHES RIVER, SEPTEMBER 8, 1967

	Above Barrier		Below Barrier	
	Surface	Bottom	Surface	Bottom
Temperature, C.	28.0	28.0	28.5	28.0
Oxygen, ppm	8.2	7.1	3.4	0.0
% Saturation	105.0	89.1	45.0	0.0
Alkalinity, HCO <sub>3</sub> <sup>-</sup> , ppm	42.0	45.0	65.0	116.0
pH	7.9	7.5	7.1	6.9
Turbidity, ppm	24.0	26.0	36.0	70.0
Specific Conductance, Micromhos/cm	186.0	196.0	6,300.0	17,600.0
Depth, M		4.0		3.3
Bottom material	clean sand and clay		black silt and sand	
Odor	none		hydrogen sulfide and oil	

TABLE 2: COMMUNITY STRUCTURE OF BENTHIC MACROINVERTEBRATES ABOVE AND BELOW SALT WATER BARRIER, NECHES RIVER, SEPTEMBER 8, 1967

	Above Barrier		Below Barrier	
	No. Spp.	No. Individ.	No. Spp.	No. Individ.
Diptera	18	85	2	109
Oligochaeta	6	162	3	20
Hirudinea	1	1	-	---
Crustacea	2	3	-	---
Ephemeroptera	4	101	-	---
Odonata	1	1	-	---
Coleoptera	1	4	-	---
Pelecypoda	1	8	-	---
Gastropoda	1	1	-	---
Total Species	35		5	
Individuals/M <sup>2</sup>	1575		555	
Species Diversity ( $\bar{d}$ )	3.30		0.55	

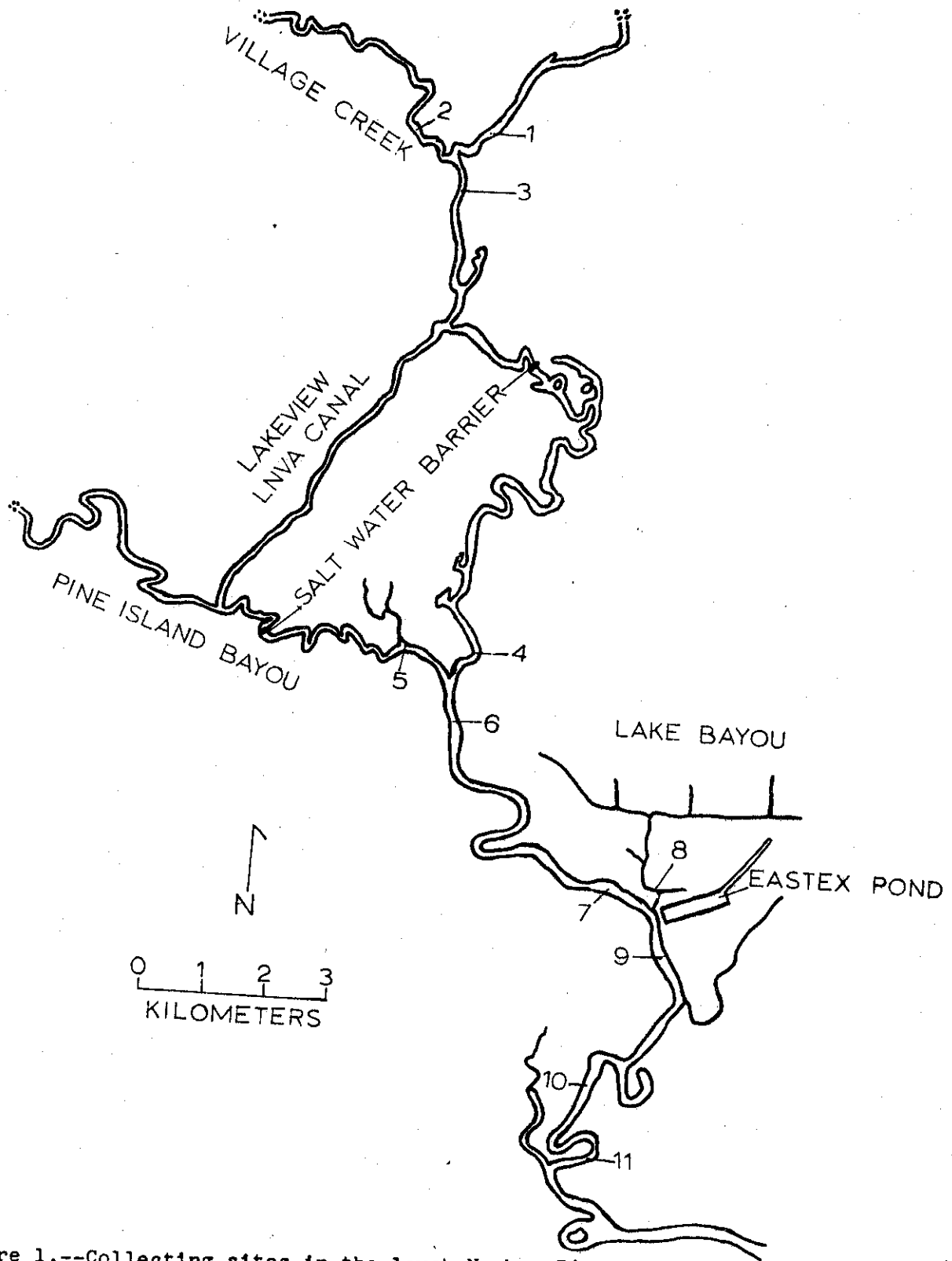


Figure 1.--Collecting sites in the lower Neches River.

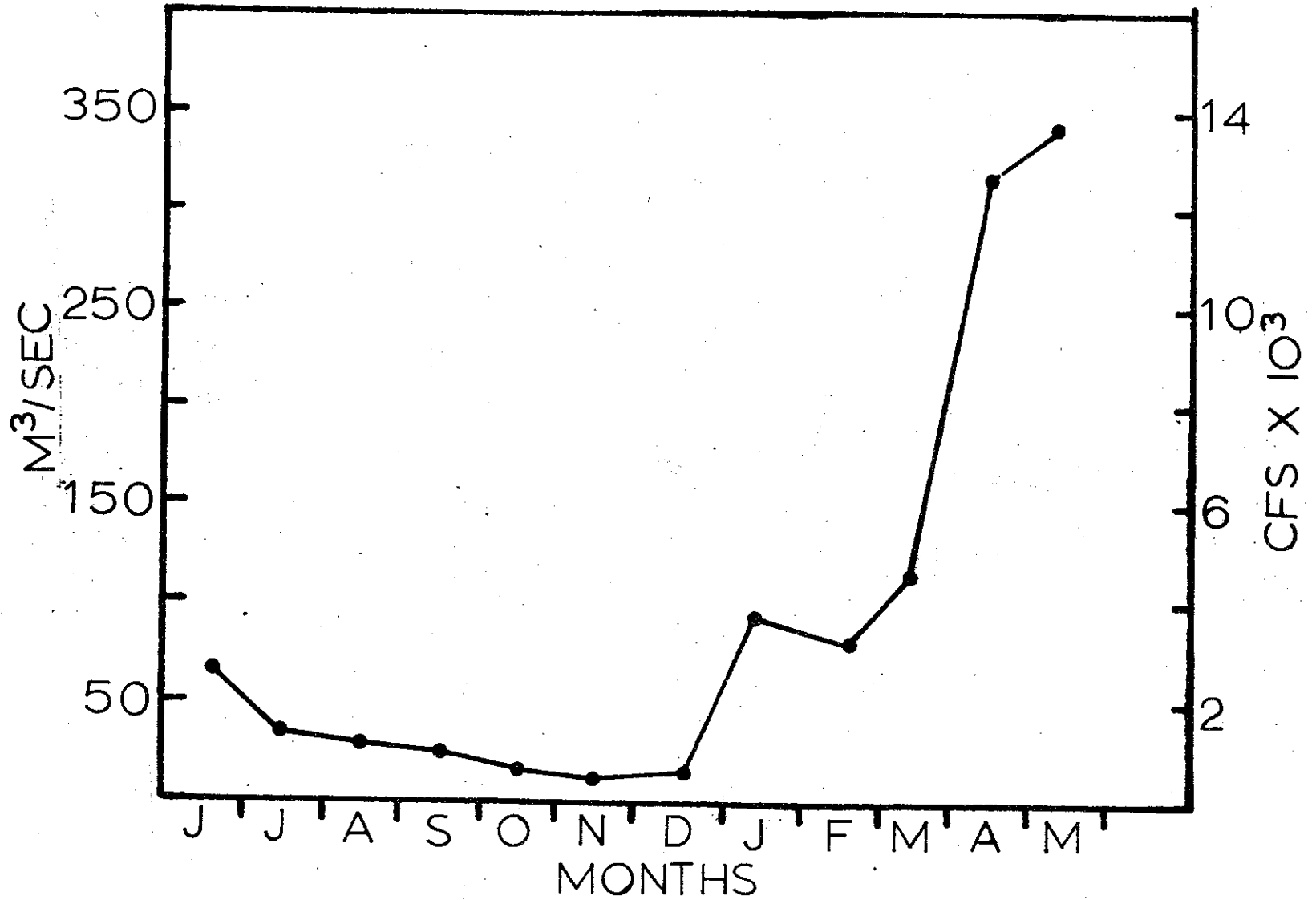
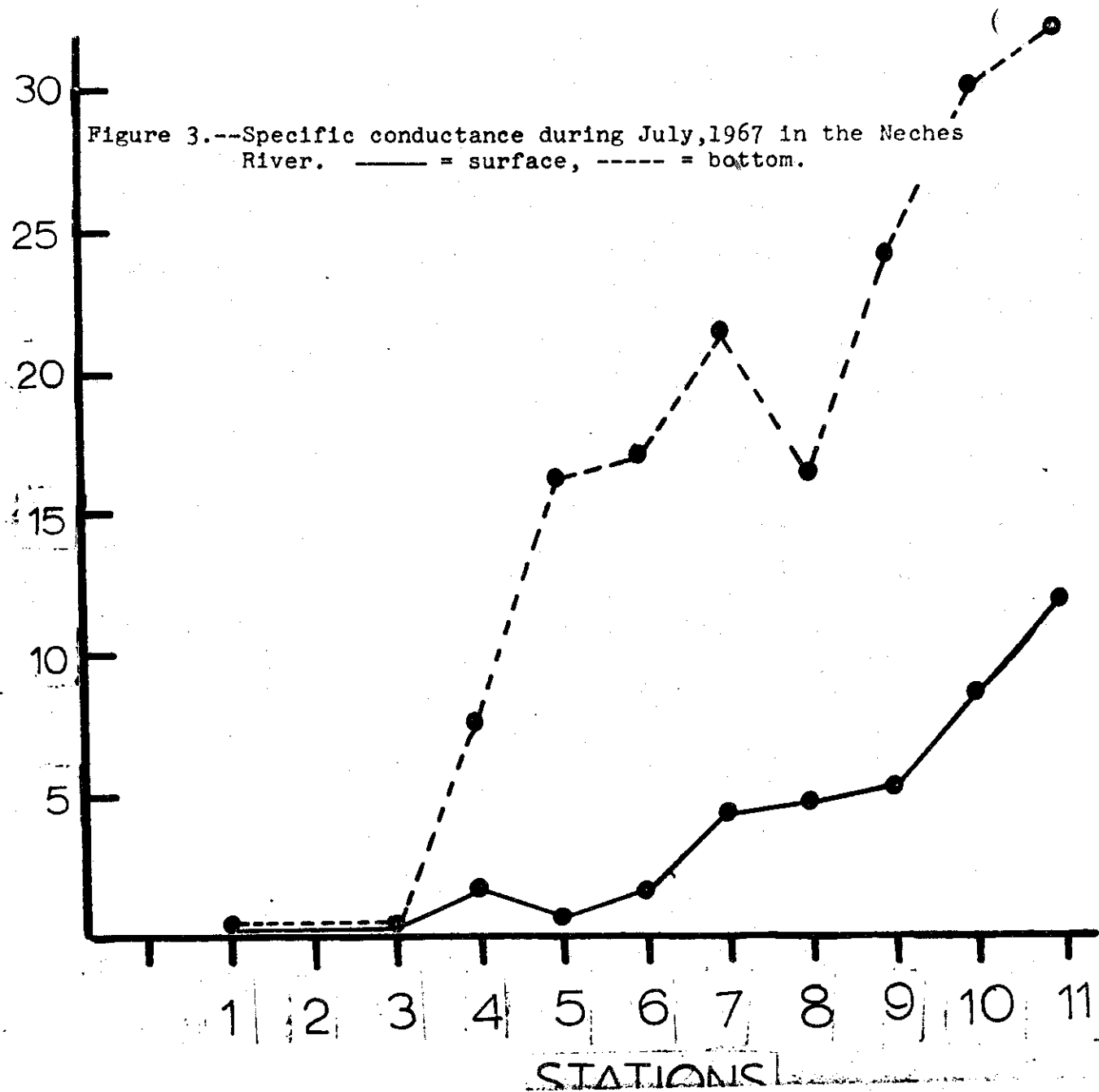


Figure 2.--Mean monthly discharge in lower Neches River.

CONDUCTANCE

 $\mu\text{MHOS}/\text{CM} \times 10^3$ 

CONDUCTANCE

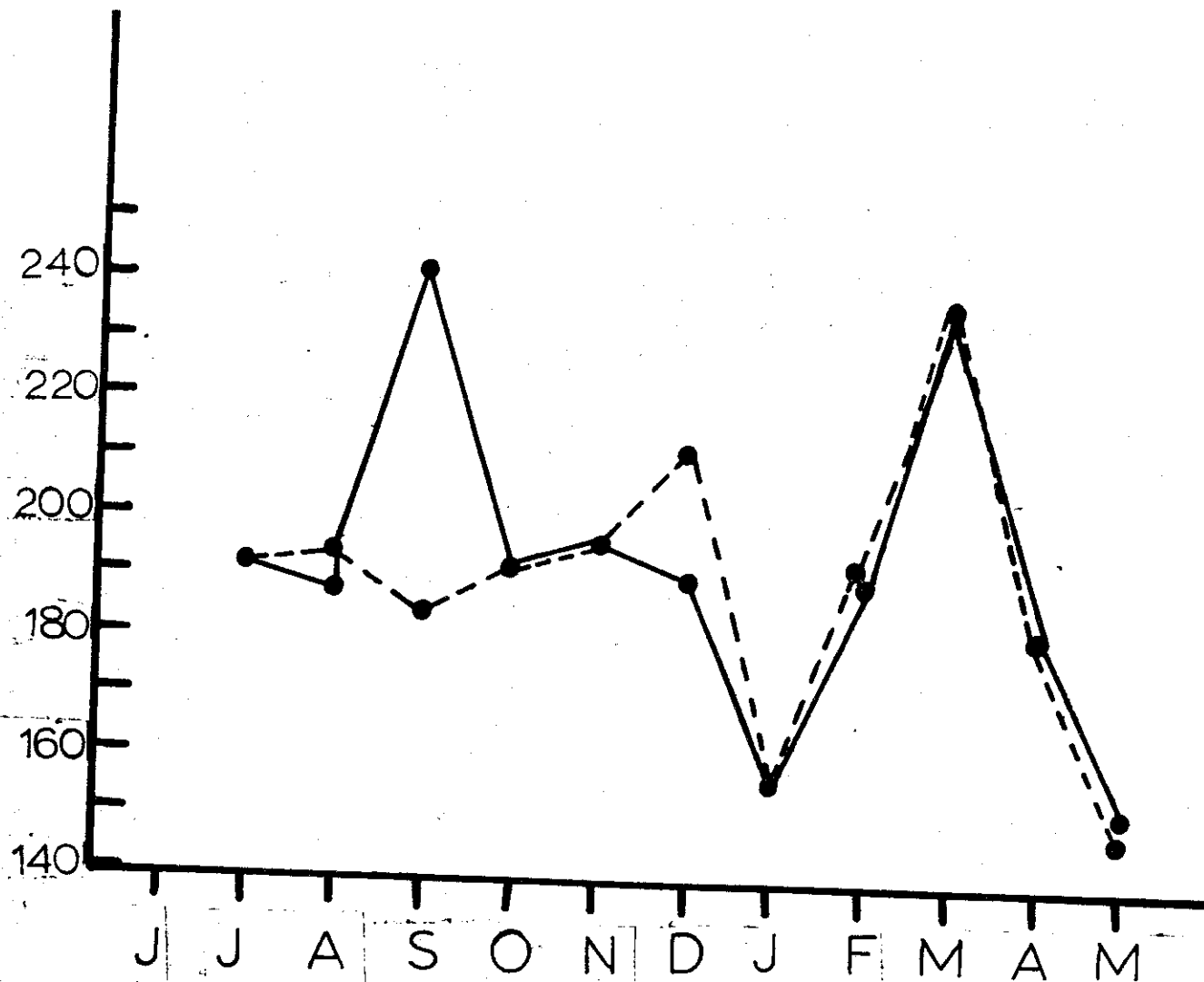
 $\mu\text{MHOS}/\text{CM}$ 

Figure 4.--Specific conductance at station 3 from June 1967 to May 1968. — = surface, ---- = bottom.



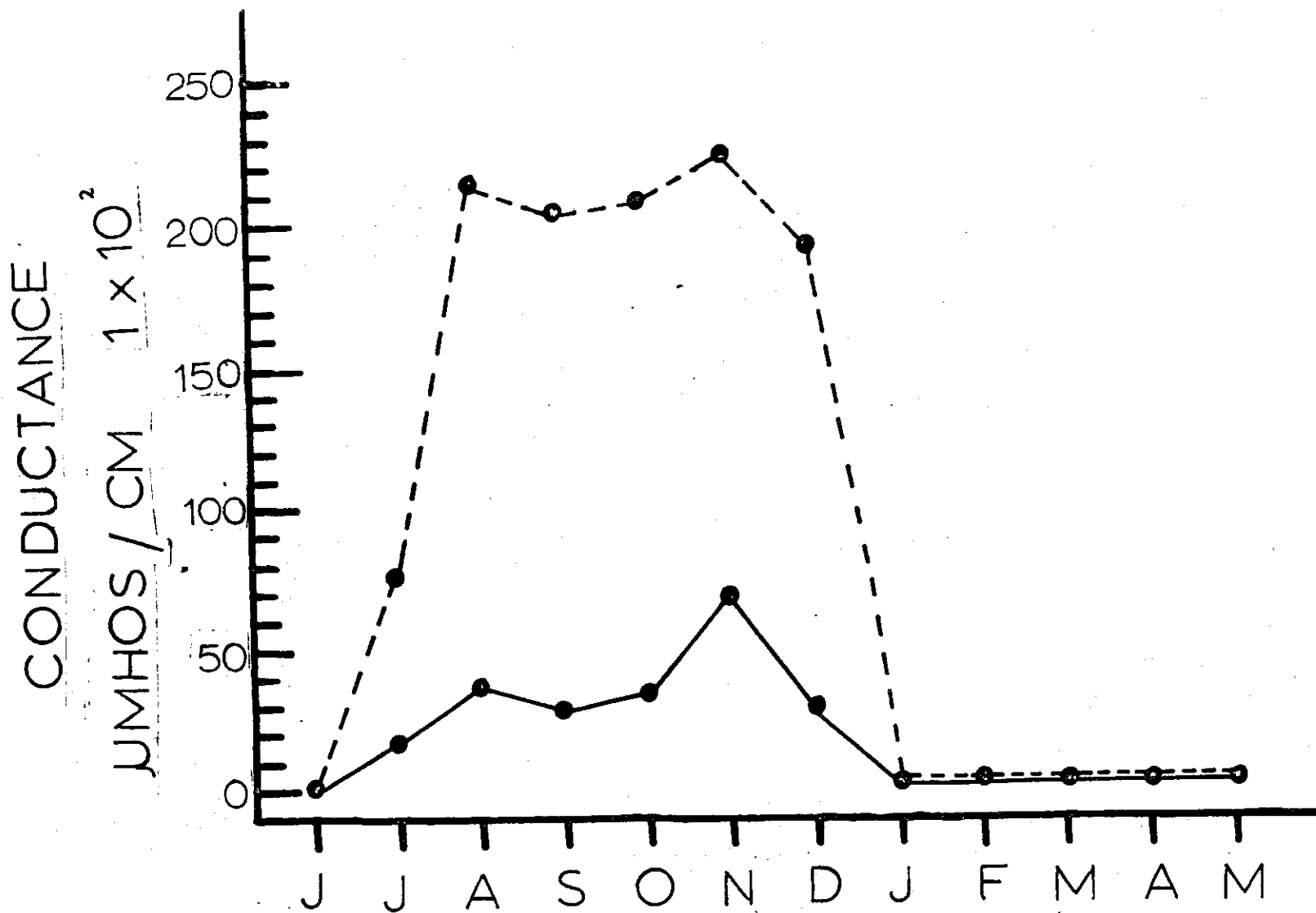


Figure 5.--Specific conductance at station 4 from June 1967 to May 1968. \_\_\_\_\_ = surface, ----- = bottom.

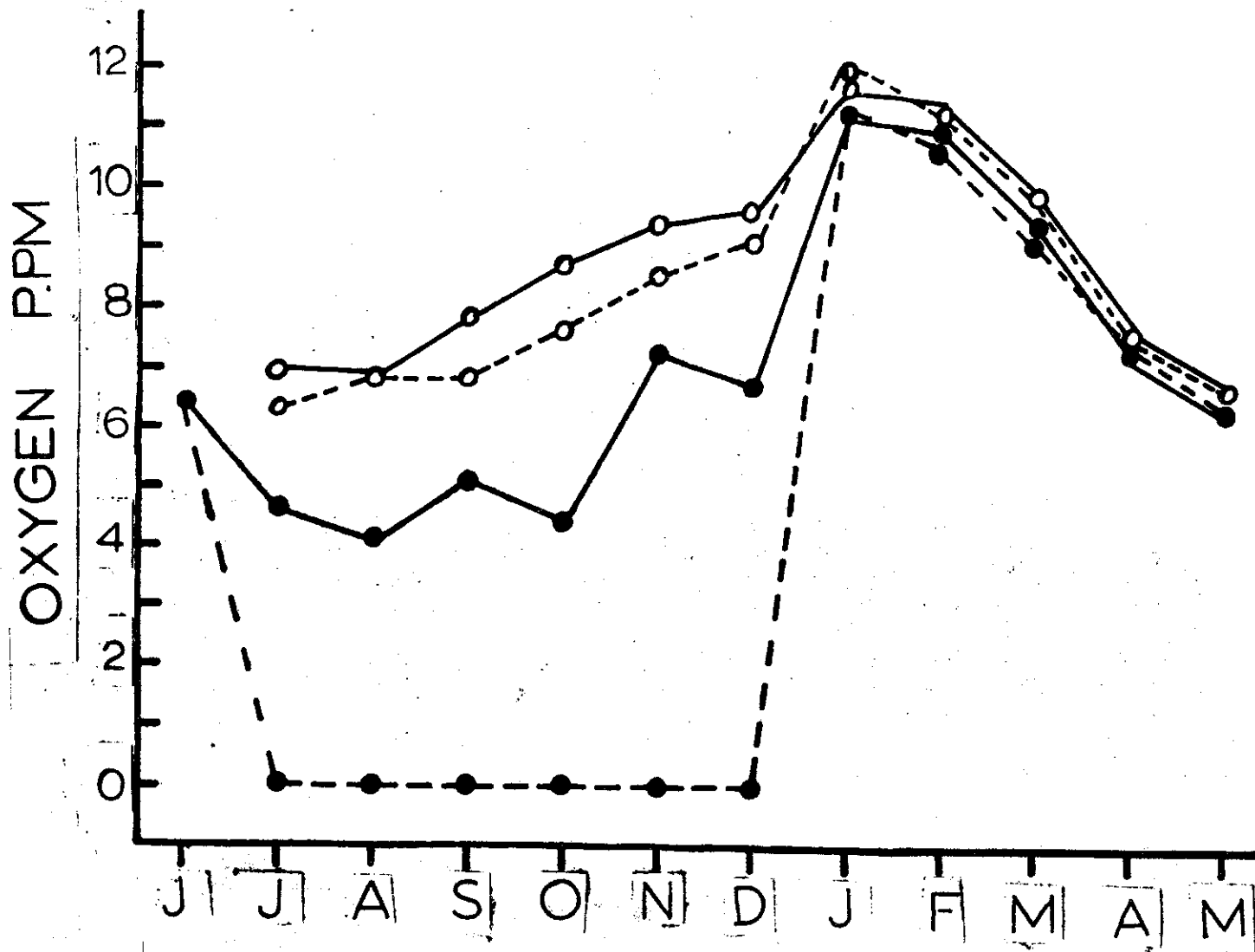
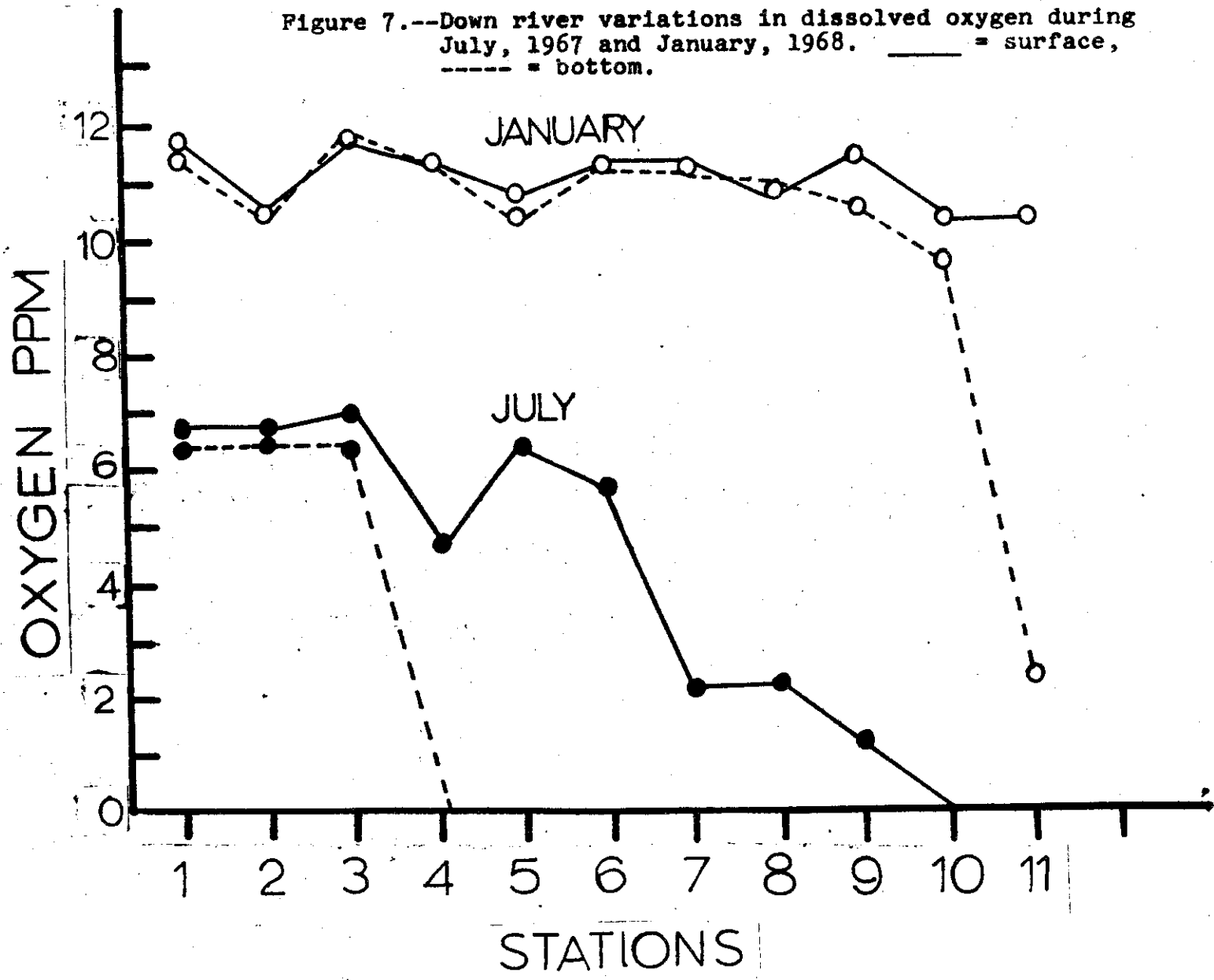


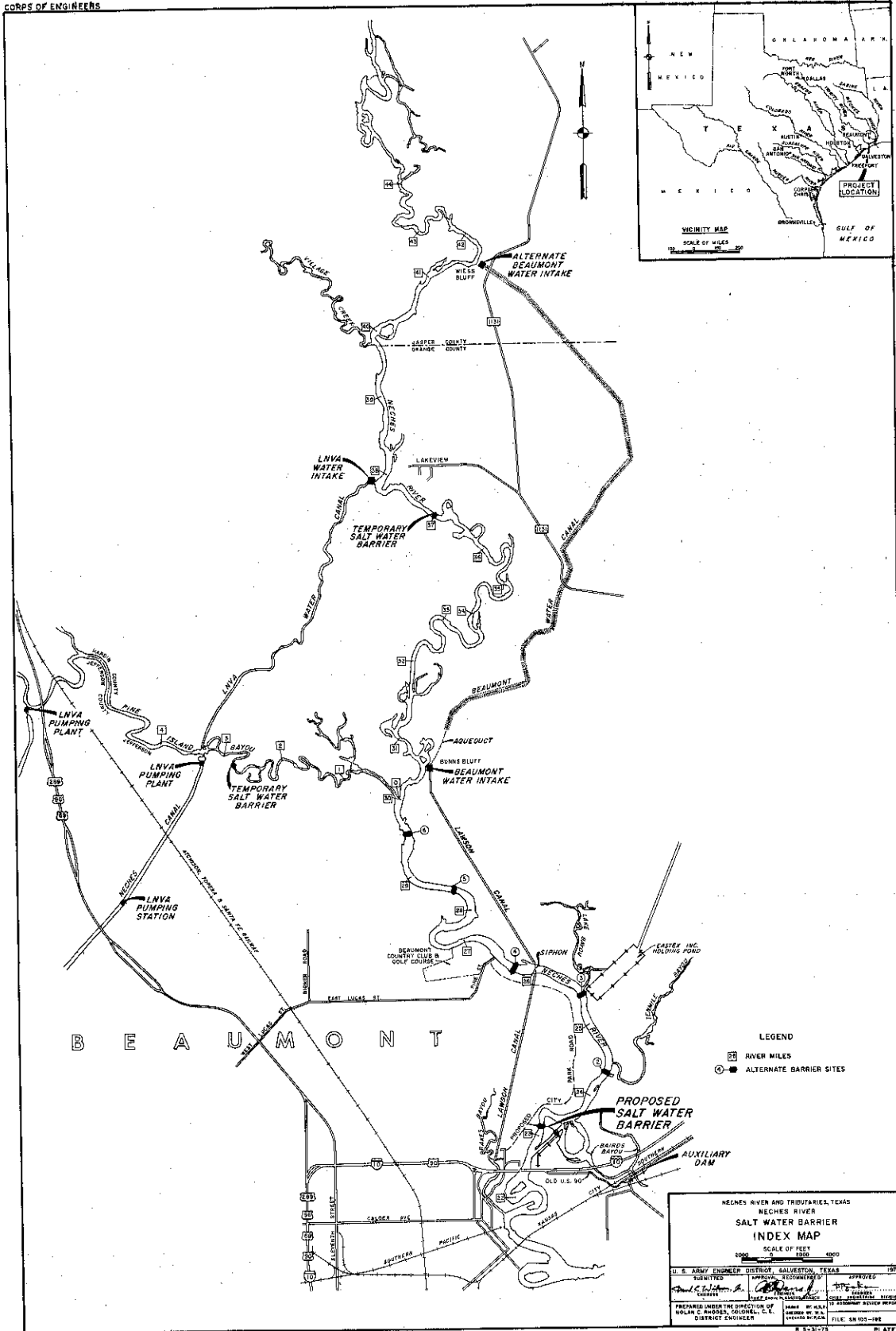
Figure 6.--Seasonal distribution of dissolved oxygen at stations 3 (O) and 4 (O). \_\_\_\_\_ = surface, ----- = bottom.

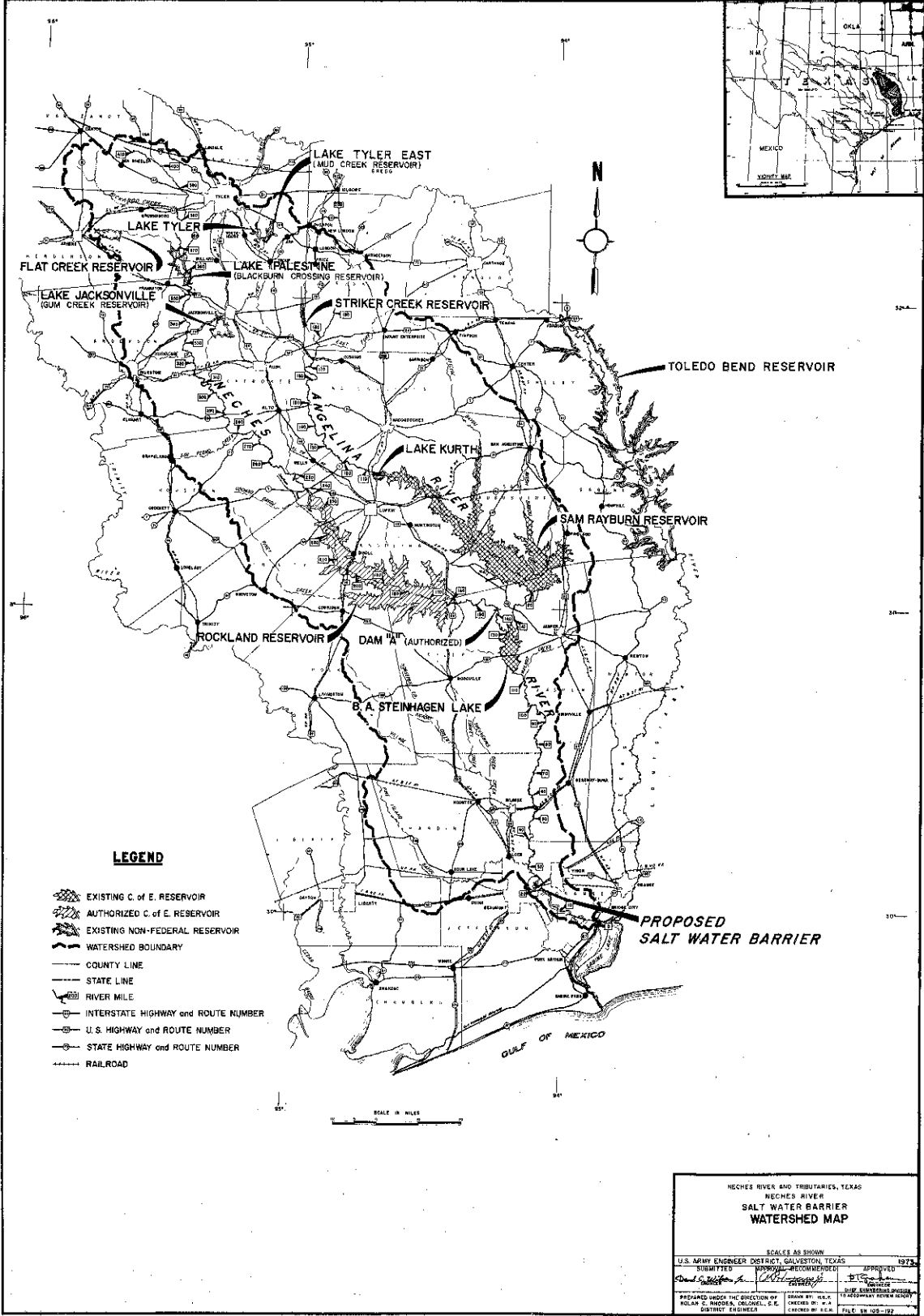
Figure 7.--Down river variations in dissolved oxygen during July, 1967 and January, 1968. \_\_\_\_\_ = surface, ----- = bottom.

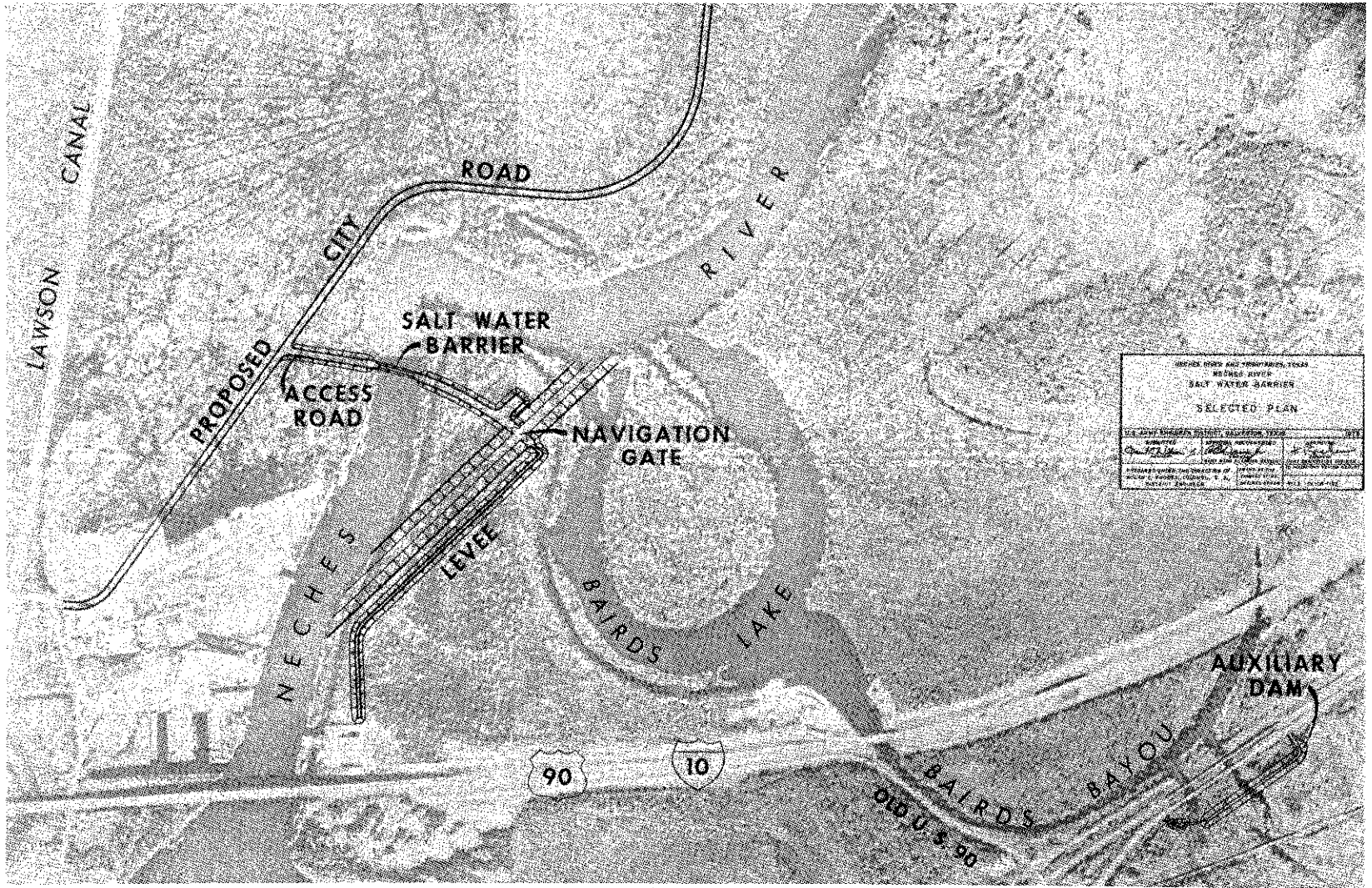


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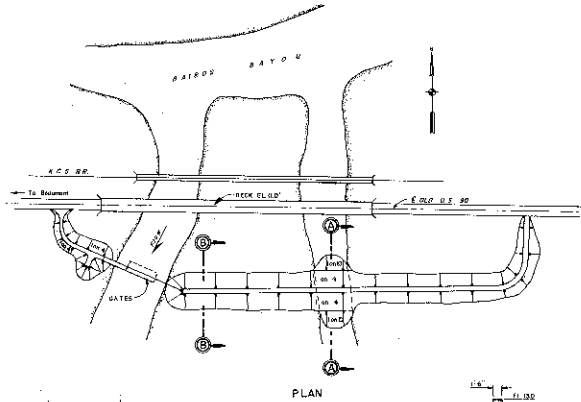
**PLATES**



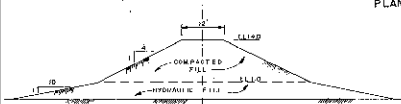




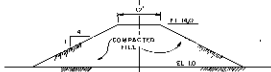
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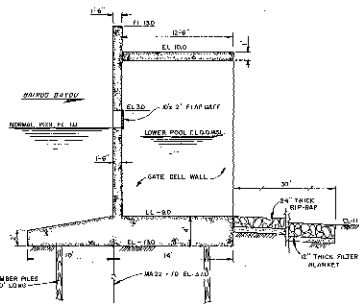
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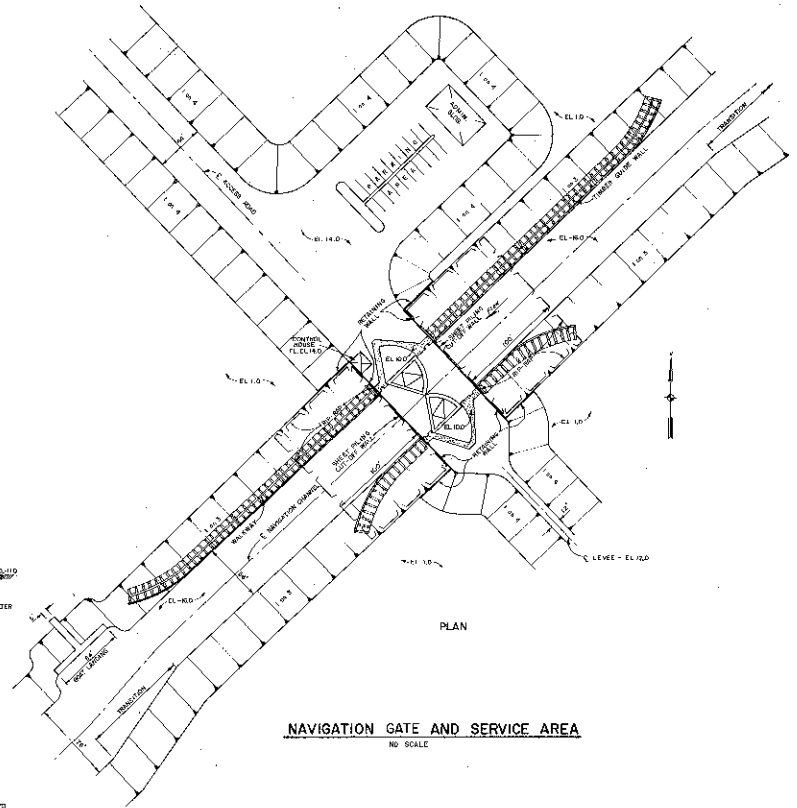
SECTION "A-A"



SECTION "B-B"  
AUXILIARY DAM  
NO SCALE

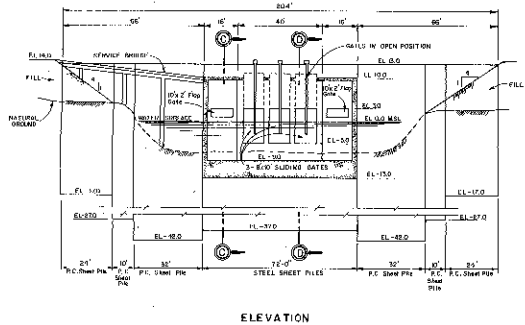


SECTION "C-C"



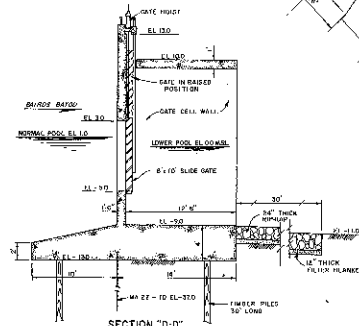
PLAN

NAVIGATION GATE AND SERVICE AREA  
NO SCALE



ELEVATION

GATED STRUCTURE  
NO SCALE



SECTION "D-D"

NECHES RIVER AND TRIBUTARIES, TEXAS  
NECHES RIVER  
SALT WATER BARRIER  
AUXILIARY DAM, NAVIGATION GATE  
AND SERVICE AREA

U. S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS	1975
DESIGNED BY: [Signature]	CHECKED BY: [Signature]
PREPARED UNDER THE DIRECTION OF NOLAN C. HINDLEY, COLONEL, C.E. DISTRICT ENGINEER	DESIGNED BY: [Signature] CHECKED BY: [Signature] DISTRICT ENGINEER

R 5-34-75 PLATE 8





NECHES RIVER AND TRIBUTARIES, TEXAS  
SALTWATER BARRIER AT BEAUMONT, TEXAS

SUMMARY OF ECONOMIC DATA

EXTRACTED FROM U.S. ARMY CORPS OF ENGINEERS INTERIM REPORT, NECHES RIVER AND TRIBUTARIES, TEXAS - SALTWATER BARRIER AT BEAUMONT, TEXAS. BASED ON 1974 PRICE DATA. COMPLETE DOCUMENT IS AVAILABLE AT U.S. ARMY ENGINEER DISTRICT, GALVESTON, TEXAS.

1. <u>Total Project Cost</u>	\$13,939,000
2. <u>Average Annual Benefits:</u>	
a. Salinity Control	2,676,000
b. Environmental Enhancement	54,900
c. Fish and Wildlife	6,000
Total Average Annual Benefits	2,736,900
3. Average Annual Charges	1,193,500
4. Benefits-to-Cost Ratio	2.3 <u>1/</u>

1/ Non-quantifiable environmental benefits and costs have not been reflected in benefits-to-cost determination.

STATEMENT OF FINDINGS

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STATEMENT OF FINDINGS

NECHES RIVER AND TRIBUTARIES, TEXAS  
SALTWATER BARRIER ON NECHES RIVER  
AT BEAUMONT, TEXAS

U.S. ARMY ENGINEER DISTRICT, GALVESTON  
CORPS OF ENGINEERS  
GALVESTON, TEXAS 77550  
SEPTEMBER 1975

STATEMENT OF FINDINGS  
TO ACCOMPANY  
FINAL ENVIRONMENTAL STATEMENT

NECHES RIVER AND TRIBUTARIES, TEXAS  
SALTWATER BARRIER ON NECHES RIVER  
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1. Authority and Purpose. This Statement of Findings concerns an interim review of reports on the basin study of the Neches River and Tributaries, Texas. The interim report is in partial response to the following Congressional authorizations; (a) Act to provide for preliminary examination of the Sabine and Neches Rivers, approved 15 May 1936; (b) Section 6 of the Flood Control Act, approved 22 June 1936 (c) Section 6 of the River and Harbor Act, approved 2 March 1945; (d) House Committee on Flood Control Resolution, adopted 20 March 1945; and (e) House Committee on Rivers and Harbors Resolution, adopted 24 May 1946.

1.01 Almost every year the surface water supplies of the municipalities, industries, and rice farmers in Jefferson County, Texas, are threatened by salt water intruding upstream in the Neches River and Pine Island Bayou, a principal tributary. The Lower Neches Valley Authority (LNVA), an agency of the State of Texas, presently controls the upstream penetration of the salt water by constructing temporary barriers. Although effective and economical, these temporary barriers are objectionable as a long-term solution because they interfere with existing recreational and commercial navigation. The objective of the interim study was to find a permanent solution to the problem of salinity intrusion, which will not unreasonably obstruct navigation, will preserve the environment, and be compatible with long-term development.

1.02 The recommended plan of improvement provides for a gated saltwater barrier with seven 40- by 24.5-foot tainter gates at site 1 located at Neches River mile 23.0, one-half mile upstream from the Interstate Highway 10 bridge at Beaumont, Texas; a navigation structure consisting of two sector gates providing a clear opening 56 feet wide and 16 feet deep over the sill; a navigation bypass channel 2,500 feet long, 16 feet deep, and 76 feet wide; an access road on the west side of the river; an

earthen levee 2,500 feet long extending from the east end of the navigation gate southwestward along the east side of the navigation by-pass channel to high ground north of Interstate Highway 10; and an auxiliary dam with three 10- by 8-foot slide gates and two 10- by 2-foot flapgates across a canal which drains the southern end of Bairds Bayou at a location immediately south of old U.S. Highway 90.

2. Sources of Information. In addition to study results, the following documents were the principal sources of information used to develop the proposed plan of action. Copies of all of these documents are available for public inspection in the office of the District Engineer, U.S. Army Engineer District, Galveston, 400 Barracuda Avenue, Galveston, Texas:

a. Sabine-Neches Waterway (Saltwater Guard Lock) Texas. House Committee on Rivers and Harbors Document 12, 68th Congress, Second Session, Washington, U.S. Government Printing Office, 1924. This document contains the report on a detailed salinity survey of the Sabine Lake area conducted by the Corps of Engineers between February 1921 and December 1923.

b. The Report of the U.S. Study Commission-Texas. U.S. Study Commission on the Neches, Trinity, Brazos, Colorado, Guadalupe, San Antonio, Nueces, and San Jacinto River Basins and Intervening Areas, March 1962. This report proposed the construction of a saltwater barrier on the Neches River below the mouth of Pine Island Bayou, creating a water supply reservoir with a total storage capacity of 37,200 acre-feet.

c. Record of Public Hearing Held by Lieutenant Colonel James S. Maxwell in Beaumont, Texas, 14 November 1961. The record includes a comprehensive brief by the LNVA covering the history of salinity intrusion in the Neches River and requesting the construction of a gated saltwater barrier on the Neches River 2,300 feet downstream from the mouth of Pine Island Bayou. The structure would have gate openings equal in total area to that of the natural river channel between sea level and bank level, a navigation gate or lock to accommodate barges, and a normal pool elevation upstream from the barrier of 5 feet

above mean sea level. The record also contains a statement by the late Mr. Armand Yramategui of the Texas Chapter, Nature Conservancy, concerning the environmental value of an area in the Thomas Spears League in the Big Thicket, near the junction of Pine Island Bayou and the Neches River. This area subsequently was included in the Beaumont Unit of the Big Thicket National Preserve authorized by Public Law 93-439, approved 11 October 1974.

d. Record of Public Meeting Held by Lieutenant Colonel Nolan C. Rhodes in Beaumont, Texas, 9 December 1970. This record includes the requests by various concerned citizens and groups that the proposed saltwater barrier be located as close to Interstate Highway 10 as possible. The record contains a statement by Dr. Richard C. Harrel, Assistant Professor of Biology, Lamar University, on environmental conditions in the Neches River, and a copy of his paper, "Water Quality and Salt Water Intrusion in the Lower Neches River." A copy of this paper was included in the interim review of reports and the paper subsequently was printed in the Texas Journal of Science, Vol. XXVI, Nos. 1-2, February 1975, pp. 107-117. The record also contains questions raised by Mr. Robert C. Curry of the Jefferson County Environmental Control Department, by Dr. E. A. Eads, Professor of Chemistry and Director of Environmental Studies, Lamar University, and by Mrs. Cleve Bachman, Jr. of the Texas Committee on Natural Resources.

e. Record of Public Meeting Held by Colonel Nolan C. Rhodes in Beaumont, Texas, 24 March 1972. This record contains the initial environmental assessment and answers to the questions raised at the public meeting on 9 December 1970. The record also contains the request by the city of Beaumont that the top elevation of the gates in the saltwater barrier in the closed position be raised from 3.0 to 4.5 feet above mean sea level. The statement by the Pennzoil Pipeline Company that they have an existing 18-inch high pressure gas pipeline north of the Kansas City Southern Railway track, where the Corps of Engineers then proposed to construct the auxiliary dam, is also in the record.

f. Final Environmental Statement, Neches River and Tributaries, Texas, Saltwater Barrier on Neches River

at Beaumont, Texas - Office of the Chief of Engineers,  
Department of the Army, Washington, D.C. 20314, September  
1975.

3. Evaluation and Tradeoff Analysis. In developing a plan to solve the problem of salinity intrusion, the most significant factors included development of preliminary plans, consideration of alternatives, and analysis of environmental, economic, and social impacts.

3.01 Preliminary Plans Developed. Initially two preliminary plans were developed for a saltwater barrier at river mile 28.3 on the Neches River (Site 5) with normal pool elevations upstream of one and four feet, respectively, above mean sea level, and three preliminary plans were developed for a combination water supply reservoir and saltwater barrier at river mile 29.7 on the Neches River (Site 6) with normal pool elevations of 7, 12, and 18 feet, respectively, above mean sea level. Because of a lack of local sponsorship, plans for a reservoir at mile 29.7 were removed from further consideration. Subsequently, it was determined that it would not be possible to maintain a normal water surface elevation of 4 feet above mean sea level upstream from the barrier and remain within the average banks of the Neches River.

3.02 Alternatives Considered. Alternatives which have been considered are continuation of the present practice of installing temporary saltwater barriers each year, flushing the saltwater wedge downstream with fresh water, extension of the fresh water intake canals, increased use of ground water as a substitute for surface water from the river, and construction of a permanent barrier in the river channel.

a. Temporary saltwater barriers. The "no action" alternative would mean continuation of the present practice of installing temporary saltwater barriers in Pine Island Bayou and the Neches River each year. This is the most economical alternative, but I have found it unacceptable as a permanent solution to the problem of salinity intrusion, because the temporary barriers interfere with public use and enjoyment of the naturally navigable waterway;

because the temporary barriers cause higher backwater effects upstream on Pine Island Bayou and the Neches River than permanent gated structures would cause; and because local interests should be relieved of the responsibility for annually providing mitigation measures related to navigation improvements previously installed by the Federal government.

b. Flushing. Flushing the salt water below Bunns Bluff with fresh water would require about 418,000 acre-feet of water per year. I have rejected this alternative because it would represent uneconomical use of a valuable natural resource which should be conserved for more beneficial uses.

c. Extension of intake canals. I have rejected the alternative of extending the water intake canals above the limit of saltwater intrusion, because it would be more costly than a barrier and would entail detrimental environmental effects related to the extensive construction involved.

d. Use of ground water. I have found that ground water supplies are not adequate to supply the existing municipal, industrial and agricultural water demands, and that use of ground water in lieu of surface water is not an adequate alternative.

e. Site selection. Of seven possible sites on the Neches River considered for a permanent gated barrier, I find that a site at mile 26.3 (Site 4) would be the most economical in terms of first cost of construction. I find also, however, that locating the barrier at a site farther downstream at mile 23.0 (Site 1) will offer, at additional cost, substantial environmental advantages which are attractive to local interests and for which they are willing to pay the additional cost. The barrier, incidental to its primary function, will bar the upstream movement of waters polluted by municipal and industrial wastes and will restore a dependable fresh water environment in the upstream waters and adjacent swamps and marshes. The downstream site, which local interests prefer and which I have selected based on their preference and



willingness to pay the excess cost, will restore fresh water conditions to 3.3 miles more of river and to 7,100 acres more of swampland than would the most economical project at Site 4.

f. Barrier design. For purposes of this report, I have selected a barrier design incorporating seven tainter gates and providing a navigation opening, consisting of two sector gates, and suitable for possible future adaptation to a lock. I recognize that more detailed consideration of design concepts may later develop more economical designs, particularly with respect to alternatives to the tainter gates, and I recommend that such consideration be given in preconstruction planning.

3.03 Impacts and Effects. The proposed project will require an estimated 57 acres of right-of-way and 14 acres of leveed disposal areas. About 41 acres of the right-of-way will be entirely cleared of existing trees and vegetation, and selective cutting and clearing will be performed on 16 acres of severed land. The 57 acres of land will be lost as wildlife habitat; however, enough ground cover will be retained to encourage small animals and birds to return to the severed land area after completion of construction. I do not foresee any other significant adverse environmental effects.

3.04 Conversely, the project will provide substantial environmental benefits by restoring a dependable fresh water condition of high water quality upstream of the barrier, providing for a permanent and reliable source of fresh water supply essential to the economic well being of the inhabitants of the area; improving the aesthetic quality of the stream and its environs for the enjoyment of man; restoring the navigability of the natural stream for recreational and commercial use; and restoring the habitat for fish and wildlife to a consistently beneficial and productive condition. I find that the environmental benefits to be realized from the project outweigh any adverse environmental effects.

3.05 The possible consequences of the alternatives have been studied according to environmental, social well-being, and economic effects, including regional and national development and engineering feasibility. Other factors bearing on my review include compatibility with

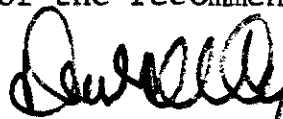
plans for water resources development in the Neches River basin and the remainder of the state.

3.06 In evaluation, the following points were considered pertinent:

- a. Environmental considerations
- b. Social well-being considerations
- c. Engineering considerations
- d. Economic considerations
- e. Other public interest considerations

4. Conclusions. I have reviewed and evaluated, in light of the overall public interests, the documents concerning the proposed action, as well as the stated views of other interested agencies and the concerned public, relative to the various practicable alternatives in developing a plan that will permanently control salinity intrusion in the Neches River, provide for free and reasonably unobstructed use of the river by existing and prospective recreational and commercial navigation, be compatible with any future plan for extension of a barge channel above Beaumont, and preserve or enhance the natural environment of the river and its flood plain.

4.01 I find that the proposed action, as developed above, is based on thorough analysis and evaluation of various practicable alternative courses of action for achieving the stated objectives, that wherever adverse effects are found to be involved they cannot be avoided by following reasonable alternative courses of action which would achieve the specified purposes, that where the proposed action has an adverse effect this effect is either ameliorated or substantially outweighed by other considerations of national policy, that the recommended action is consonant with national policy, statutes, and administrative directives, and that, on balance, the total public interest would be served best by the implementation of the recommendation.



DON S. McCOY  
Colonel, CE  
District Engineer

DATE 24 Sept 75

I concur in the preceding Statement of Findings for the Saltwater Barrier Project on Neches River at Beaumont, Texas.

*Joseph A. Shewski*  
JOSEPH A. SHEWSKI  
Colonel, CE  
Acting Division Engineer

Date 8 October 1975

I concur in the preceding Statement of Findings.

29 March 1976  
DATE

Ernest Graves  
ERNEST GRAVES  
Major General, USA  
Director of Civil Works

