

UNITED STATES DEPARTMENT OF THE INTERIOR
National Park Service

Special Use Permit

Name of Use Temporary Salt Water Barriers

Date Permit Reviewed 19_____
Reviewed 19_____
Reviewed 19_____
Expires 19_____

Long Term X

Short Term _____

Permit # I F A B I T H 5 7 0 0 0 0 3

Region Park Type No #

BIG THICKET NATIONAL PRESERVE

Name of Area

Lower Neches Valley Authority of P. O. Drawer 3464, Beaumont, TX 77704-
Name or Permittee Address 3464 Phone 409-892-4011

is hereby authorized during the period from (Time 12:00a.m. day 8 Month Feb 1996), through (Time 11:59p.m.

day 31 Month Dec 1999), to use the following described land or facilities in the above named area:

- (1) Reach of Neches River between Lakeview and Pine Island Bayou Confluence;
- (2) Reach of Pine Island Bayou between LNVA Canal siphon station and Neches River Confluence;
- (3) Administrative road access to Pine Island Bayou within the Beaumont Unit.

For the purpose(s) of: Installing temporary salt water barriers to protect local water supply. LNVA actions will be conducted in accordance with Army Corps of Engineers CWA Sect. 404 Permit #19611 (and accompanying EA/FONSI), and in accordance with the attached "Plan of Operation."

Authorizing legislation or other authority (RE- NPS-53 Appendix 1): Public Law 93-439, Section (c)

NEPA Compliance: CATEGORICALLY EXCLUDED _____ EA/FONSI X EIS _____ OTHER APPROVED PLANS _____

PERFORMANCE BOND: Required X Not Required _____ Amount \$ 50,000.00

LIABILITY INSURANCE: Required _____ Not Required X Amount \$ _____

ISSUANCE of this permit is subject to the conditions on the reverse hereof and appended pages and when appropriate

to the payment to the U.S. Dept. of the Interior, National Park Service of the sum of \$ N/A

The undersigned hereby accepts this permit subject to the terms, covenants, obligations, and reservations, expressed or implied herein.

PERMITTEE [Signature] 1/25/96
Signature Date

Authorizing Official Richard T. Shahan BIG THICKET N. PRES. 1/25/96
Signature Superintendent Date

Additional Authorizing Official _____
(If Required) Signature Title Date

PARK

LOWER NECHES VALLEY AUTHORITY

Office Location
7850 Eastex Freeway
Beaumont, Texas 77708-2815
409-892-4011

MUNICIPAL, INDUSTRIAL AND AGRICULTURAL WATER

Mailing Address
P.O. Drawer 3464
Beaumont, Texas 77704-3464
Fax 409-898-2468

January 16, 1996

National Park Service
Big Thicket National Preserve
Attn: Paul Whitefield
3785 Milam
Beaumont, Texas 77701

Dear Mr. Whitefield:

Attached please find a draft of Lower Neches Valley Authority's Plan of Operation for the installation of temporary salt water barriers in the Beaumont Unit of the Big Thicket National Preserve for your review and comment. Please notice that use of the barrier access road and adjoining boat ramp, shown in Figure 5, would improve access to the lower portion of Pine Island Bayou for both the Park Service and LNVA during periods when the temporary barrier is in place. Please contact me or Dennis Becker of my staff at 892-4011 for any additional information about this document.

Yours very truly,



A. T. Hebert, Jr.
General Manager

ATH/bb

enclosure

PLAN OF OPERATION

INSTALLATION OF TEMPORARY SALT-WATER BARRIERS
BY THE LOWER NECHES VALLEY AUTHORITY

IN THE BEAUMONT UNIT,
BIG THICKET NATIONAL PRESERVE

JANUARY, 1996

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II	Environmental Assessment - COE 404 Permit
III	LNVA Statement Concerning Temporary SWB Submitted at Public Hearing 1/21/93
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I. LEGAL COMPLIANCE

A. Compliance with National Park Service (NPS) Regulations. In accordance with Title 36, Code of Federal Regulations, §1.6(a), "... the Superintendent may issue a permit to authorize an otherwise prohibited or restricted activity... . The activity authorized shall be consistent with applicable legislation, Federal regulations and administrative policies, and based upon a determination that public health and safety, environmental or scenic values, natural and cultural resources, scientific research, implementation of management responsibilities, proper allocation and use of facilities, or the avoidance of conflict among visitor use activities will not be adversely impacted." The traditional NPS permitting instrument is a Special Use Permit (SUP), which also provides a mechanism for financial assurance from the permittee. This Plan of Operations shall serve as an attachment to a SUP issued to the Lower Neches Valley Authority (LNVA) for the installation and operation of temporary salt water barriers (SWB) within the boundaries of the Big Thicket National Preserve. Adherence to the terms of this document shall be guaranteed by the tendering by the LNVA of a performance bond commensurate with the estimated liability amount required for appropriate removal of installed salt water barriers, and mitigation of damages to BTNP natural and cultural resources incurred as a result of their installation. This permit shall expire on December 3, 1999, or shall expire at the time of expiration of any other required state or federal permit required to complete the installation.

B. Compliance with National Environmental Policy Act and other Federal Environmental Protection Regulations. Requirements for public and agency notification and involvement in the Federal decision making process have been satisfied during the Army Corps of Engineers (COE) Section 404 Permit Application process. Refer to the COE Environmental Assessment in Appendix II for summaries of public and agency notification, scoping, and comment process, and discussions of the environmental effects of the installation of SWB's within the BTNP.

C. Texas Natural Resource Conservation Commission. Appendix I contains amendments to LNVA's certificate of adjudication for both the Neches River and Pine Island Bayou. These certificates were issued by the Texas Water Commission in 1991 and authorize the diversion and use of water from Pine Island Bayou and the Neches River as well as the construction of salt water barriers on Pine Island Bayou and the Neches River.

II. BACKGROUND INFORMATION

A. LNVA Authorization/Mission

The LNVA was created by Senate Bill No. 38, and passed by the 43rd Legislature of Texas, 1933, as a conservation and reclamation district which district is created as a governmental agency, body politic and corporate, vested with all the authority as such under the Constitution and Laws of the State of Texas; and which shall have and be recognized to exercise all the powers of such governmental agency and body politic and corporate as are expressly authorized in the provisions of the Constitution, Section 59, Article 16 for districts created to conserve, store, control, preserve, utilize and distribute the storm and flood waters and the waters of rivers and streams of the state.

As such the Authority currently furnishes municipal water to all the major communities in Jefferson county except Beaumont - in excess of 200,000 people. The Authority also supplies water for the principal industries in the area, including Mobil, Star Enterprise, Chevron, and Fina refineries, Texaco Chemical Co., Mobil Chemical Co., DuPont, and others, with a combined employment of 20,000. In 1992, the LNVA canal system delivered irrigation water for a large part of the regions rice crop. The combined water requirement met by the LNVA in 1992 totaled 110 billion gallons, or an average of 301 million gallons per day.

The Authority has no power to levy taxes and does not operate for profit. Its job is to meet the water needs of its customers with water of good quality, at cost.

B. Summary of Salt Water Intrusion Problem

For a complete summary of the salt water intrusion problem please see the following attachments to the Plan of Operation.

- 1) Appendix II, page 2, section 4 a, b, c, d
- 2) Appendix III, page 3-4

C. Need for Salt-Water-Barrier Installation.

Figure 1 is a profile of the first 50 miles of the Neches River, from the mouth of the river at Sabine Lake to a point upstream of Wiess Bluff, where Beaumont has its highest intake. As the figure shows, the bed of the Neches is below sea level for about the first 45 river miles, including all of the segment where Beaumont and LNVA diversion facilities are located.

When there is ample flow, the river is fresh and of excellent quality throughout the reach used by Beaumont and the Authority. However, if flows decrease below approximately 2000 cfs, saline water from Sabine Lake begins to move upstream. Because salt water is heavier than fresh water, a wedge of salt water tends to push inland, taking over that part of the river which is below sea level. During periods of low flow, salt water can migrate upstream to water supply intakes, causing diversion pumps to be shut down eliminating the water supply for much of the Southeast Texas area.

To prevent this from happening, the LNVA must install temporary barriers on Pine Island Bayou and the Neches River. These barriers block upstream movement of salt water and keep fresh water at the intakes. Figure 2 is a graph of the rule curve used by the Fort Worth District Corps of Engineers (COE) in operating Sam Rayburn Reservoir. The lake's storage capacity is divided into zones, and the reservoir operational procedure depends on which zone the lake is in at a given time. During periods that Sam Rayburn pool elevation is within Zone 1 or Zone 2, releases of water from Sam Rayburn reservoir will be sufficient to supply local needs as well as keep salt water flushed away from diversion points. Barrier installation will begin only after the applicant receives notification from the COE Fort Worth district that the conservation pool within Sam Rayburn has remained within zone 3 for a 30 day time period. If the pool remains in zone 3 for a total of 60 days, releases of water for the prevention of salt water intrusion will be curtailed. At this time construction of salt water barriers must be completed to prevent salt water encroachment.

III. DESCRIPTION OF NATURAL RESOURCES

A. Soils

The soils of Big Thicket National Preserve are mapped in the Soil Survey for Big Thicket National Preserve, Texas, published by the Soil Conservation Service and the National Park Service in 1978. Three types of soils predominate in the project area for the Pine Island Bayou and Neches River barriers and are mapped as follows:

1. Bibb sandy loam, frequently flooded

"This deep, nearly level, frequently flooded unit occurs on bottom-lands of the smaller drainageways in the survey area and in small low wet areas in the Neches River and Pine Island Bayou bottomlands. They range from 5 to several hundred acres in size.

Typically the surface layer is a brown sandy loam in the upper 4 inches and mottled gray and grayish brown sandy loam to a depth of 12 inches. The next layer is a gray sandy loam and silt loam that is stratified.

Bibb soils are generally flooded several times each year. The soils are poorly drained. Surface runoff is very slow. The permeability is moderate. The water table is close to the surface during the winter months.

Included with the soil in mapping are small areas with a surface texture of clay loam and some small areas with a sandy overwash. Also included are small areas of Mantachie soils. These inclusions make up less than 15 percent of the soil area."

2.) Mantachie loam, frequently flooded

"This nearly level, somewhat poorly drained unit occurs as nearly level areas on floodplains next to major drainageways. These soils developed in sediments washed from loamy, acid soils. Areas are long and narrow in shape and are adjacent to the stream channel itself and will flood several times a year. Areas range from about 3 to over 200 acres in size.

Typically the surface layer is dark grayish brown loam for 5 inches, and mottled brown and grayish brown fine sandy loam to 11 inches. The subsoil consists of mottled grayish brown and gray loam to a depth of 61 inches.

Mantachie soils are somewhat poorly drained. Runoff is slow and permeability is moderate. The soils are frequently flooded and the water table is high during the winter months.

Included with this soil in mapping are small, less flooded areas of Mantachie and small areas of Bibb soils. Inclusions make up less than 20 percent of the mapping unit."

3.) Urbo silty clay, frequently flooded

"The Urbo soils consist of deep, nearly level, acid, clayey soils on broad, level flood plains of the Neches River and Pine Island Bayou. These areas are near the main stream channel and are subject to frequent flooding. They formed in thick clayey deposits recently laid down by the Neches River under hardwood timber.

Typically the surface layer is a dark grayish brown silty clay for about 5 inches. The next layer is a grayish brown silty clay to 9 inches. The next layer is a grayish brown silty clay that extends to 71 inches. The soils are grayer in the occasional channels that dissect the area.

Urbo soils are somewhat poorly drained. Permeability is very slow. Runoff is slow.

Included with Urbo soils are small areas of Mantachie, Bibb, Crevasse and Fausse soils. Inclusions make up less than 15 percent of the mapping unit.

B. Vegetation

The project areas for the Pine Island Bayou and Neches River barriers are located in the Beaumont Unit of the Big Thicket National Preserve. The mature forest vegetation adjacent to the project areas are mapped and described in Forest Vegetation of Big Thicket National Preserve, by P. A. Harcombe and P. L. Marks, in an unpublished report to the National Park Service, 1979. Information from their report is summarized as follows. With the exception of small areas around the periphery, two forest types dominate the Beaumont Unit - Floodplain Hardwood and Cypress Typelo swamp. Floodplain hardwood forest is most abundant and occurs on somewhat higher ground along the banks of both the Neches River and Pine Island Bayou. The dominant overstory species include water oak (Quercus nigra), sweetgum (Liquidam bar stayaciflua) and ironwood (Carpinus caroliniana). Other common species include Basket oak (Quercus michauxii), water tupelo (Nyssa sylvatica), water hickory (Carya aquatica), red maple (Acer rubrum), American holly (Ilex opace) and cherrybark oak (Q. falcata) var. pagodaefolia). Except for a thick curtain of understory vegetation immediately adjacent to the bank of both streams the low shrub layer is sparse. Deciduous holly (Ilex decidua) and sebastian bush (Sebastiana fruticosa) are the principal understory species. Dense growths of non-native Chinese tallow (sapium sebiferum) can also be found especially along the stream banks.

Cypress tupelo swamp occurs in the deeper back swamps, sloughs, oxbows and other depressions. Two species predominate, bald cypress (Taxodium distichum) and tupelo (Nyssa aquatica). Other woody species in the larger stands include water hickory (Carya aquatica), buttonbush (Cephalanthus occidentalis), carolina ash (Fraxinus caroliniana) and water elm (Planera aquatica) with water hickory being the most common (Mohler 1979).

C. Water Quality

See Appendix II; COE environmental assessment for the temporary salt water barrier permit application, Section 3 (d) 3 Water Quality, pages 12-14 for a overview of water quality issues in the project area.

D. Stream Channel Configuration Requirements

The preferred stream bed configuration for barrier installation would be a straight run of channel at least 500 feet in length with bluff banks on either side of the channel of four to five feet. The bluff banks are preferred to minimize by-pass around the ends of the sheetwalls and subsequent washouts during periods of minor rises in stream elevation.

E. Maps

Figure 3 shows the general location of existing LNVA facilities and future temporary salt water barrier sites. Figures 4 and 5 are maps showing more detailed proposed locations for temporary salt water barriers on the Neches River and Pine Island Bayou.

F. Boat Launches

Figures 4 and 5 note locations of boat ramps currently available to the public above and below proposed SWB sites. An additional boat ramp located on LNVA property on Pine Island Bayou at the Neches 1st pumping plant will be made available to Big Thicket personnel. LNVA also agrees to work with BTNP to increase public access to the Neches River in the area upstream of the Neches River salt water barrier if the need for additional access becomes necessary.

IV. SALT WATER BARRIER STRUCTURAL DESIGN

A. Engineering Details

See Appendix IV COE Permit #19611, pages 4 and 5, for details of structural design.

B. Central Failure Point Design Feature

The problem of bank erosion is closely related to the mode of failure of the barrier structure when there is a rise in stream elevation. It results mainly from (a) water going around the end of the barrier if the bank is lower than the upstream water level or from (b) the side piling being washed out before the middle section fails completely.

As shown in Appendix IV, figure 4, the barrier design has been modified in several ways to decrease the likelihood that either of these conditions will prevail. The penetration of the central (or overflow section) sheet piles into the stream bed will be kept at a minimum, while the penetration of the side piling will be increased. Additionally, cable tie backs will be used to strengthen the side piling but not the middle section. These cable tie backs will be attached to clusters of wooden piling driven into the river bottom upstream of the SWB. However, even with these design changes there is no guarantee that the barrier will fail as is hoped and continuing design modifications may be necessary. Any additional design modification will be approved by the COE and all affected parties as necessary, prior to incorporation in the SWB design.

C. Wingwall Design Feature

As shown in Appendix IV, Figure 4; 50 foot wingwalls have been added to the downstream portion of the structure to attempt to decrease bank erosion in the immediate area of the SWB.

V. SALT WATER BARRIER INSTALLATION

A. Notification

Barrier installation will commence only after LNVA has received notification from the COE Ft. Worth District that the conservation pool within Sam Rayburn Reservoir has remained within Zone 3 for a 30 day time period. LNVA will notify the COE Galveston District and the BTNP in writing 30 days prior to each barrier installation. At least fifteen days prior to start of construction the Commander of the Eighth Coast Guard District, Aids to Navigation and Waterways Branch will be notified that barriers to navigation will be installed in the Neches River and Pine Island Bayou. LNVA is required to publish a public warning announcement in local newspapers approximately 15 days prior to the date on which LNVA plans to install a SWB. Daily announcements will appear in local newspapers one week prior to the initiation of work. Written and photographic documentation will be provided to the COE, USCG, and BTNP within 30 days after each barrier has been removed.

B. Installation

The following is a listing of equipment and personnel necessary to install the barriers.

Floating rig (60 ton) including driving equipment, #1 hammer or equivalent, pulling A frame, clam shell bucket, 1-200 amp welder, 150 CFM compressor and small tools on a 110' X 40' spud barge.

Material Barges 26' X 90' or 30' X 110'

Tug Boat twin screw (350 HP)

Work boat

Pickup Truck

6 man work crew

The temporary salt water barriers are constructed of interlocking steel sheet piling, driven into the stream bed and banks, supported by frameworks of timber piles and bracing. The crest of the middle section of the sheet wall is usually about three feet above sea level, and the piling at either bank are left at a higher level to keep any over-flows concentrated at the center.

During dry periods, the LNVA monitors the location and movement of the salt water wedge carefully, so as to schedule the installation of the barriers as exactly as reasonably possible. The goal is to be sure the barriers are in place before salt water reaches the intake structures but to defer the start of construction until conditions make it clear that the barriers must be built.

The barrier on Pine Island Bayou is built first, because salt water reaches the bayou intake sooner. A barge or barges, as necessary, are dispatched from a contractor's yard and the equipment is moved up the Neches River from Beaumont to the Pine Island Bayou site. Every precaution possible will be taken to prevent the barges from contacting living trees along the banks of the bayou when moving and mooring this equipment. Occasionally trees which have fallen across the bayou will have to be moved to the bank to allow the barges to move freely. A typical construction schedule would be as follows:

Day 1 Tug/Barges and equipment arrive at Neches 1st pumping plant, and begin loading timbers, wood piling and sheet piling on work barges. Placement of signs on PIB advising boaters of barrier construction.

Day 2 Finish loading equipment. Move barge to PIB barrier site. Begin driving 6 sets of cluster pilings for tie backs.

Day 3-6 Finish driving tie backs. Drive wooden plumb and batter piling and set 12 X 12 wooden whalers across entire width of bayou. Install Coast Guard approved lighting on structure.

Day 7-11 Set steel sheetpiling and drive down, achieving 4' to 6' penetration of sheets into clay substrate. Bolt sheets to whaler.

Day 12-13 Cut spillway to elevation +3.5 foot and run tie back cables from dam to cluster piling. Back fill wing walls.

Day 14-15 Move barge and equipment to Four Oaks Ranch site on Neches River and load material for Neches River dam onto barges.

Day 16-31 Move to Neches River dam site and repeat above procedure for dam installation.

Day 32 Barge and equipment return to contractor yard.

The barriers are designed for simplicity and ease of construction, so that they can be built quickly once it becomes clear that there is no other alternative and be removed readily when no longer needed. They will not withstand overflows higher than approximately three feet over the spillway without washing out to some degree. When there are significant storms in the watersheds, the structures will fail. If Sam Rayburn Reservoir pool elevation remains in Zone 3, then the barriers must be repaired for continued service after flows return to normal.

However, if Sam Rayburn pool elevation returns to Zone 1 or Zone 2, then the remains of the barriers will be removed.

LNVA will place four signs at each barrier site to adequately warn boaters of an approaching barrier to navigation. Two signs will be placed on either bank approximately 500 yards upstream and downstream of the structure. These signs will conform to all United States Coast Guard (USCG) regulations relative to marking the structure with aids to navigation. LNVA will also mark and maintain each structure with USCG approved lighting for the duration of the period the barriers or remnants of the barriers are in place. Appendix V contains information provided by the USCG relative to marking the structure with aids to navigation.

C. Inspection and Maintenance

The barrier is inspected daily for integrity, operation of warning lights and signs, and vandalism. After periods of high flows and subsequent failure of the barrier or barriers, construction equipment must be re-mobilized on site to either repair the damaged section or remove and rebuild the entire structure, if the pool elevation at Sam Rayburn remains within Zone 3.

D. Removal

All salt water barrier structures and construction materials must be removed within 60 days after Sam Rayburn Reservoir returns to and remains in pool zone 1 or 2. The following is a listing of equipment necessary for barrier removal as well as an itemized summary of estimated costs associated with barrier removal.

Equipment Necessary to Remove Salt Water Barrier and Approximate
Costs Associated with Equipment

	<u>Cost per day</u>
Floating Rig 60 ton w/ tools on a 110' X 40' Spud barge	\$1,025.00
90' X 26' Material Barge	\$ 100.00
Twin Screw Tug Boat (350 HP)	\$ 333.00
Work boat	\$ 33.00
Pickup Truck	\$ 50.00
Labor*	<u>\$1,808.00</u>
Total	\$3,349.00 per day

*Labor based on a six man crew, 8 hour days at straight time rates.

Schedule for Barrier Removal

Day 1 Contractor Moves to Pine Island Bayou barrier site.

Day 2-3 Pull sheets.

Day 4 Remove timbers and wooden piling.

Day 5-6 Move to Neches 1st and off load material.

Day 7 Move to Neches River dam site.

Day 8-10 Pull Neches River barrier.

Day 11 Move to Neches 1st.

Day 12-13 Off load material.

Day 14 Contractor moved back to yard.

Total estimated cost to remove Neches River and Pine Island Bayou salt water barriers.
14 days X \$3,349.00/day = \$46,886.00

All construction materials will be off loaded and stored on LNVA property at the Neches 1st lift. Inclement weather and/or high stream flows can prevent mobilization

and safe removal of SWB structures. Requests to extend this deadline must be submitted to the Galveston COE district office within 60 days and will be reviewed on a case by case basis. Written and photographic documentation of completed barrier removal must be submitted to the COE Galveston District within 30 days of the removal of each barrier. This documentation will also be submitted to the BTNP and the USCG 8th District within 30 days of the removal of each barrier.

E. Hazardous Materials

The only hazardous material necessary to complete installation and removal of the SWB is diesel fuel to operate the pile driving hammer, crane, and tug boat. Quantities of fuel on hand should be less than 500 gallons. In case of a spill, containment boom and absorbent material will be kept on the barge at all times. Any spill cleanup contaminated materials will be disposed of in accordance with all state and federal regulations.

VI. ENVIRONMENTAL IMPACTS

A. Environmental Assessment

Appendix II contains the Environmental Assessment completed by the COE in association with LNVA's permit application. Discussions of the barriers' potential impacts to historic/cultural resources, water quality, endangered species, fish and wildlife, wetlands, scenic values, recreation, and other values can be found in this document in Section 3 (d) 1-9, pages 11-19.

B. Irreversible Impacts

During periods of high flows water sometimes forces its way under and around the ends of the barrier structure, scouring several feet of streambed and the adjacent shoreline and associated vegetation. However, it is anticipated that recent design changes (see Section IV-B of this document for details) will reduce the impact to shoreline areas and associated vegetation.

VII. MITIGATION MEASURES

A. Interim use of modified temporary salt water barrier within the boundaries of BTNP.

The LNVA shall only install temporary SWB's as an interim measure to protect water quality until a permanent or semi-permanent structure outside of BTNP boundaries is designed and funded.

B. BTNP and Public Notification

See Section V-A of this document for detailed notification procedures.

C. Installation of additional public access facilities.

LNVA agrees to cooperate with the BTNP in development of an additional public boat ramp in the area upstream of the Neches River salt water barrier site if currently available access points cannot adequately meet public demand.

D. Modified Design Features

The SWB design has been modified to incorporate central failure point and wingwall features to attempt to reduce shore erosion impacts. Fish passage structures are also under consideration for the SWBs to reduce possible impacts to fisheries during their installation. Appendix IV - COE-SWB permit contains figures 4, 5 and 6 which show these design improvements.

In the future additional modification to these features may be necessary as their functionality is tested during repeated SWB installations. Modification of the current designs may require additional COE permitting review.

E. Biological Research

LNVA has agreed to cooperate with the TPWD on several biological studies of the impact of the SWB on aquatic species. BTNP will be provided copies of all significant reports which result from this research.

F. Compensation for Loss of Wetland/Bottomland Habitat.

The NPS shall be monetarily compensated for all streambank lands lost due to erosion caused by installation of the SWBs. The value of the lost lands shall be assessed according to their real estate value as high quality bottomland hardwood habitat and public recreation lands. Appendix VI is the land Acquisition records for several tracts of land purchased by BTNP from 1980 through 1990 for inclusion in the Beaumont Unit of the preserve in the area of the proposed SWBs. LNVA and BTNP will negotiate a settlement of the value of land lost due to erosion at each barrier site based on the cost of procurement of a suitable replacement parcel for inclusion in the preserve.

To determine the exact acreage lost due to erosion caused by failure of a temporary SWB, LNVA will perform a site survey at each barrier location immediately prior to barrier installation and again immediately following each barrier removal. Once the exact location of the temporary salt water barrier site has been determined a site survey of the area will be completed. In order to minimize the environmental impact to the area adjacent to the proposed barrier while performing the site survey the following method will be used:

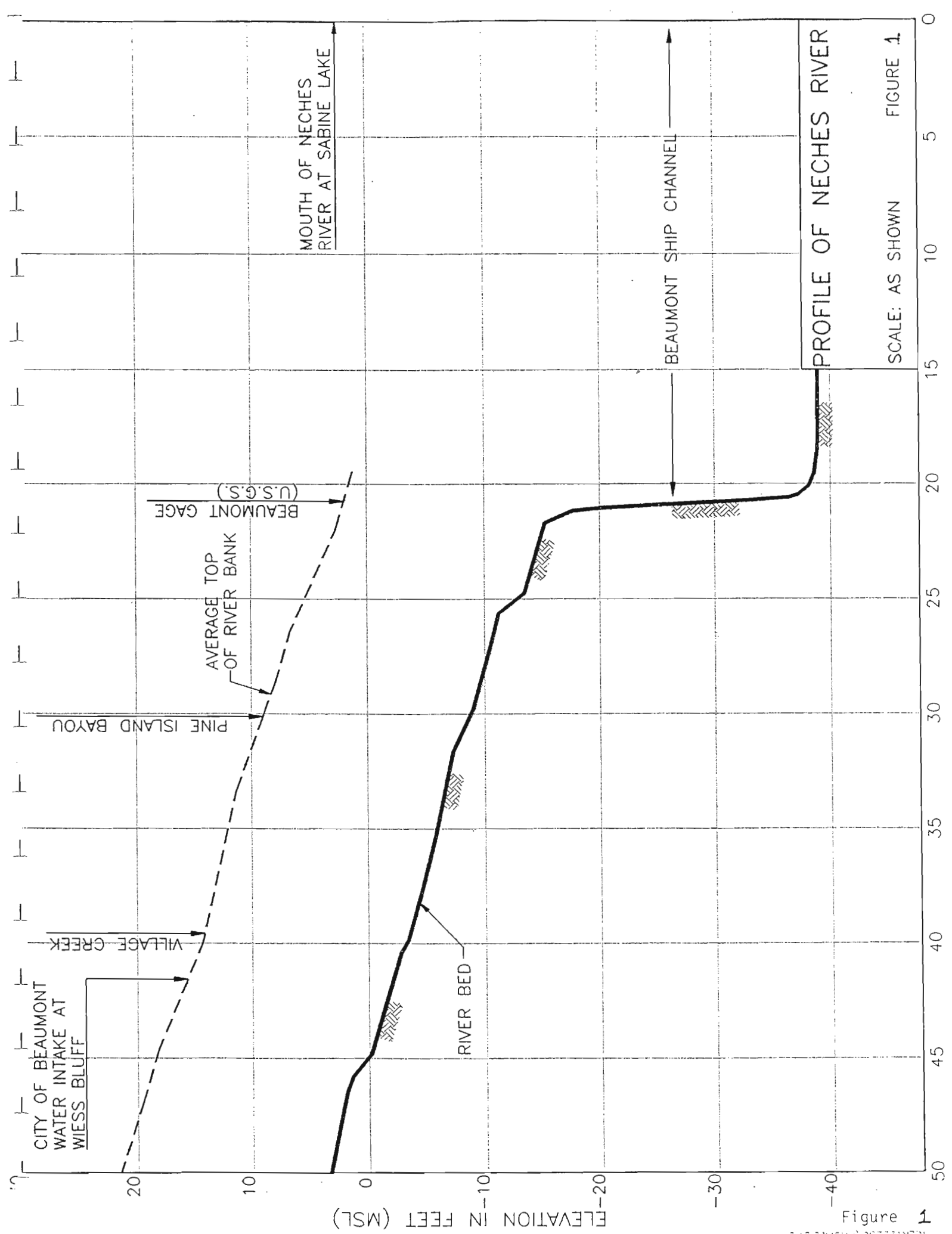
1. At a point approximately 5 feet from the edge of the bank on either side of the stream a location stake (4" X 4" wooden timber) will be set. In addition a reference stake with a line-of-site will be located approximately 150 feet perpendicular to the stream edge on the Neches River and 100 feet on Pine Island Bayou.
2. From the location stakes on either side of the stream a profile of the opposite bank will be taken. The length will vary from 300 feet upstream and downstream on the Neches River and 150 feet upstream and downstream on Pine Island Bayou.
3. In the event of a washout caused by breaching of the barrier a profile of the bank can be undertaken and the acreage lost to erosion will be calculated using the original bank profile. Figures 6 and 7 show how the bank profile surveys will be performed for the Neches River and Pine Island Bayou barrier sites.

G. Performance Bond

The LNVA shall post a performance bond guaranteeing adherence to the condition of the SUP and attached Plan of Operations. The bond shall be arranged with an acceptable surety agency to the U.S. Government, as published annually in the Federal Register. The bond amount shall be equal to the sum of: (1) the estimated amount for removal of both SWBs from their location, including removal of debris associated with failure of the structures; and, (2) the estimated value of the BTNP lands lost to erosion adjacent to the SWB installed in the Neches River in the 1989 flood.

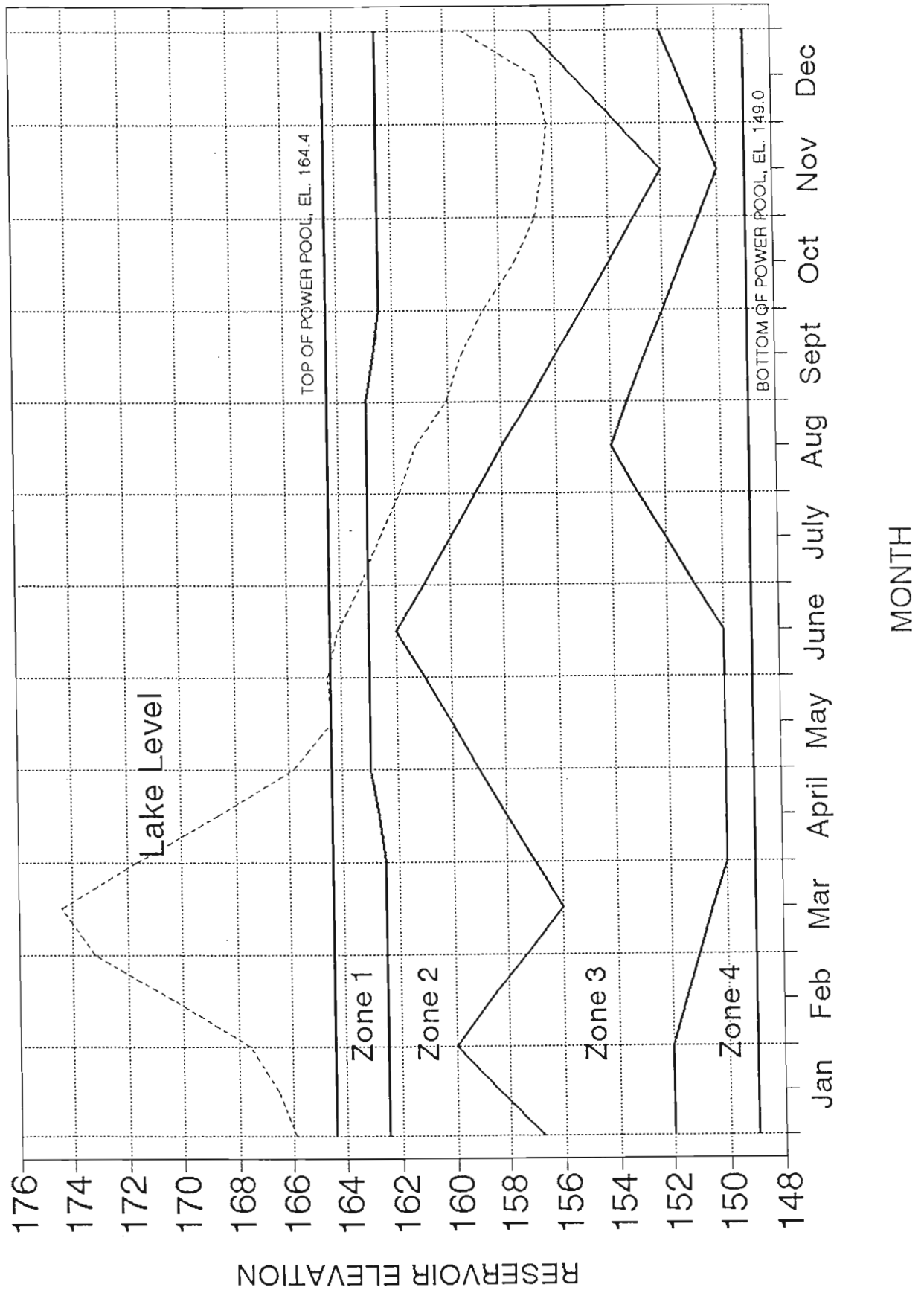
H. Liability

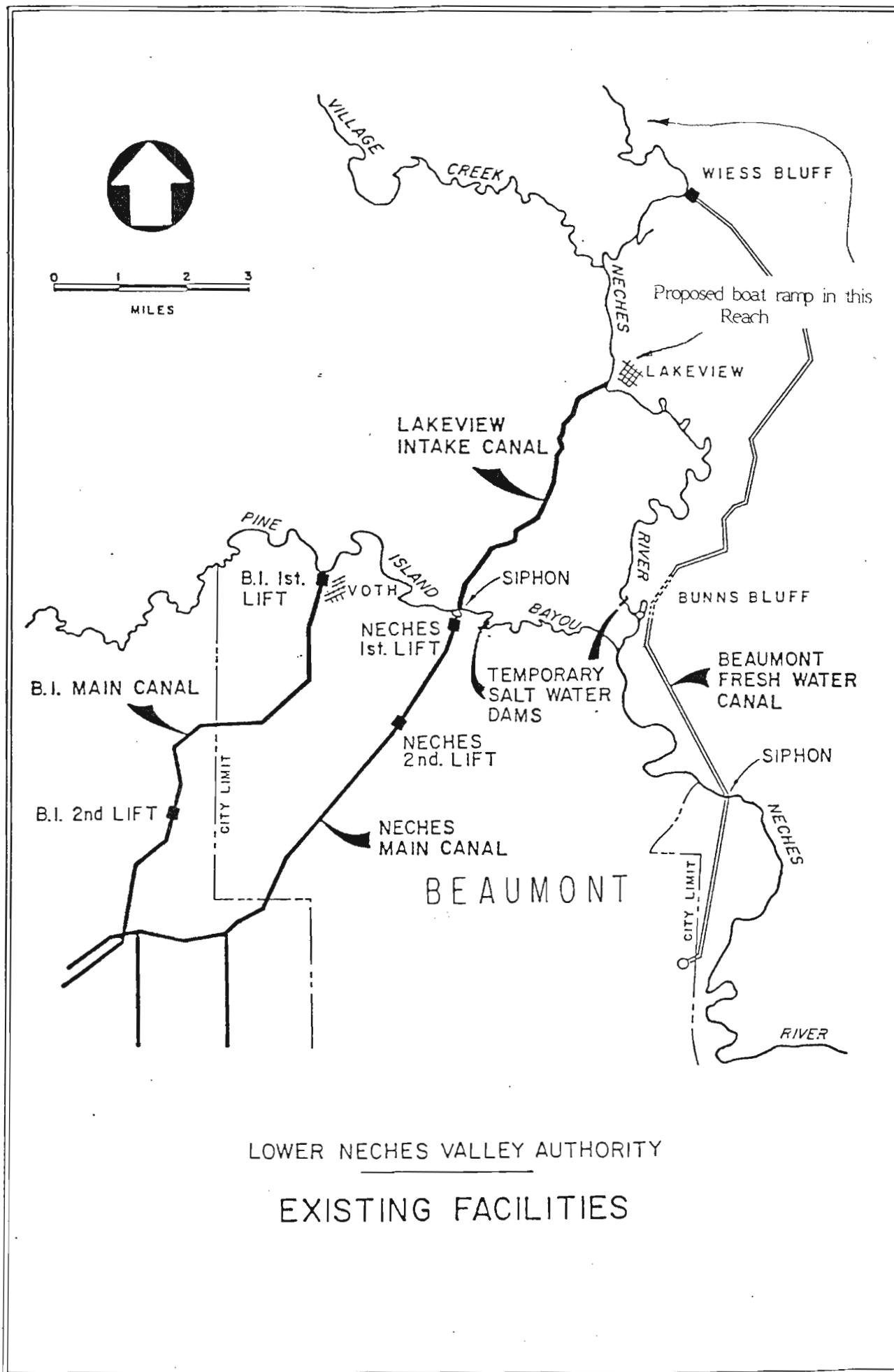
All operations shall be performed in accordance with applicable federal, state, and local laws and regulations. The LNVA and any contractors or subcontractors are responsible for any damages to human life or property, or to natural and cultural resources of Big Thicket National Preserve incurred as a direct result of the installation of temporary SWBS.



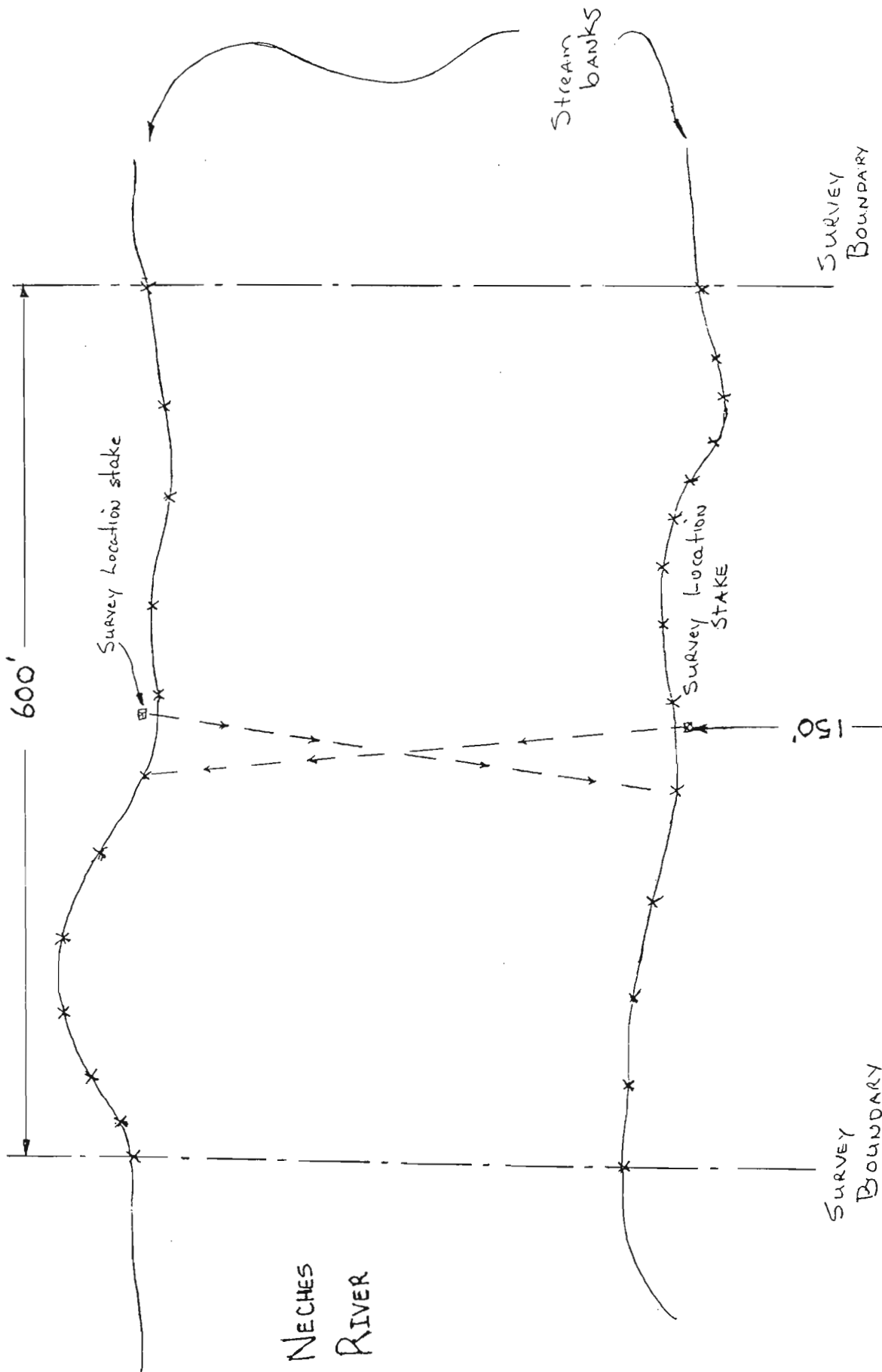
Lake Levels, Sam Rayburn Reservoir

Jan. 1, 1992 to Jan. 11, 1993





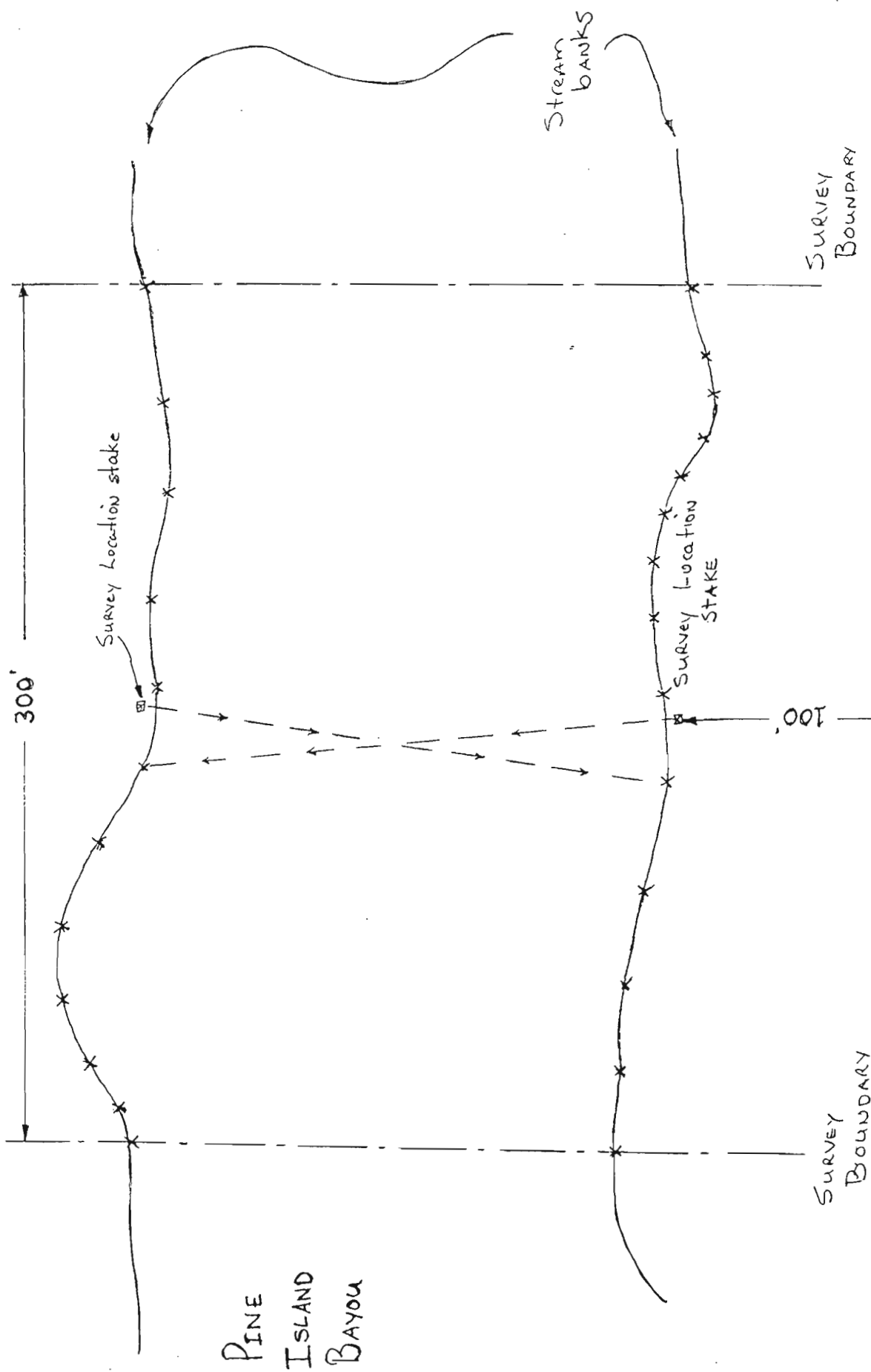
Survey reference stake
(4x4 wooden post)



NECHES RIVER BANK
STREAM BANK PROFILE
SURVEY INFORMATION

Figure 6

Survey reference stake (4x4 wooden post)



PINE ISLAND BAYOU BARN
STREAMBANK PROFILE
SURVEY INFORMATION

Figure 7

APPENDIX I

LRYA		Est.	Act.
Tommy	OK		
Robert			
Mike			
Dennis			
			✓

Orange County
VOL 797 PAGE 019

LNVA Water Certificate of
Adjudication

AMENDMENT TO
CERTIFICATE OF ADJUDICATION

TYPE: AMENDMENT

Address: PO DRAWER 3464
BEAUMONT TX 77704

Granted: June 24, 1991

Counties: Jefferson, Orange and Hardin

<i>Watercourse:</i>	<i>Neches River and Pine Island Bayou tributary of Neches River</i>	<i>Watershed:</i>	<i>Neches River Basin</i>
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WHEREAS, Certificate No. 06-4411 was issued to Lower Neches Valley Authority on August 8, 1986 and authorizes the diversion and use of water from Pine Island Bayou and the Neches River and, in accordance with a 1956 contract with the United States of America, to use water from Lake Sam Rayburn located in Jasper, Sabine, San Augustine, Angelina and Nacogdoches Counties on the Angelina River and B. A. Steinhagen Lake (Dam "B") located in Tyler and Jasper Counties on the Neches River; and

WHEREAS, Certain
an increase in the maximum
change 60,000 acre-feet
use and to reword certain

Appendix
ATTACHMENT I

June 10, 1987 and authorizes
Pine Island Bayou, to
industrial use to municipal

WHEREAS, applicant has requested an amendment to Certificate No. 06-4411, as amended, to install from time to time, two temporary saltwater barriers, i.e., one on the Neches River and one on Pine Island Bayou, tributary of the Neches River to protect freshwater intake facilities from saltwater moving upstream to authorized diversion points during periods of low flow; and

WHEREAS, the Texas Water Commission finds that jurisdiction over the application is established; and

WHEREAS, no person protested the granting of this application; and

WHEREAS, the Commission has complied with the requirements of the Texas Water Code and Rules of the Texas Water Commission in issuing this amendment; and

NOW, THEREFORE, this amendment to Certificate No. 06-4411, as amended, is issued to Lower Neches Valley Authority, subject to the following terms and conditions:

1. IMPOUNDMENTS

- C. Certificate owner is authorized to construct a saltwater barrier (No. 1) on the Neches River and may impound from time to time not to exceed 1115 acre-feet of water between elevations 0.0 feet mean sea level and 5.0 feet mean sea level. The barrier area will be adjacent to the Martin Palmer Survey, Abstract No. 19, Orange County, Texas. The barrier will be in the vicinity of Latitude 29.860° N, Longitude 94.998° W and also being N 74° W, 6205 feet from the southeast corner of the Amasa Rand Survey, Abstract No. 498, Orange County, approximately 8.5 miles north of Beaumont, Jefferson County, Texas.
- D. Certificate owner is authorized to construct a saltwater barrier (No. 2) on Pine Island Bayou, Jefferson and Hardin Counties, and may impound from time to time not to exceed 529 acre-feet of water between elevations 0.0 feet mean sea level and 3.0 feet mean sea level. The barrier area is adjacent to the Thomas Spear Survey, Abstract No. 50, Jefferson County, Texas. The barrier will be in the vicinity of an area N 35° E, 4691 feet from the northwest corner of the Harvey P. Savery Survey, Abstract No. 47, Jefferson County, approximately 6.5 miles north-northwest of Beaumont, Jefferson County, Texas.

5. SPECIAL CONDITIONS

- M. Certificate owner shall document downstream salinity conditions prior to installation of the saltwater barriers and may install the barriers when the encroaching saltwater wedge is at a point one mile downstream of the confluence of the Neches River and Pine Island Bayou.
- N. Certificate owner shall notify the Texas Water Commission and Texas Parks and Wildlife Department prior to the installation and/or after the breaching of the saltwater barriers.
- O. Certificate owner shall provide reports to the Texas Water Commission and Texas Parks and Wildlife Department for the seven-day period prior to the installation of the structures. These reports should include salinity surveys and reservoir stage and outflow conditions for Steinhagen Reservoir and Sam Rayburn Reservoir.
- P. Certificate owner shall consult with Texas Parks and Wildlife Department concerning the installation of fish passes in the saltwater barriers and will implement such installation as deemed necessary.
- Q. This amendment shall expire and become null and void on December 31, 2001 unless prior to such date certificate owner applies for an extension hereof and such application is subsequently granted for an additional term or in perpetuity. The priority date of this amendment and any extensions hereof shall be February 6, 1991.

This amendment is issued subject to all terms, conditions and provisions contained in Certificate No. 06-4411, as amended, except as specifically amended herein.

This amendment is issued subject to all superior and senior water rights in the Neches River Basin.

Certificate owner agrees to be bound by the terms, conditions and provisions contained herein and such agreement is a condition precedent to the granting of this amendment.

All other matters requested in the application which are not specifically granted by this amendment are denied.

Certificate owner shall use those practices, techniques and technologies that will reduce the loss or waste of water and improve the efficiency and use of water so that only so much water as can be beneficially used will be diverted.

This amendment is issued subject to the Rules of the Texas Water Commission and to the right of continuing supervision of State water resources exercised by the Commission.

TEXAS WATER COMMISSION

BWJ — ~~for~~
John Hall, Chairman

DATE ISSUED: AUG 09 1991

ATTEST:

Gloria A. Vasquez
Gloria A. Vasquez, Chief Clerk

FILED FOR RECORD

AUG 26 PM 2:23

MOLLY THERIOT
COUNTY CLERK
ORANGE COUNTY, TEXAS
Molly Theriot DEPUTY
STATE OF TEXAS

COUNTY OF ORANGE

I hereby certify that this instrument was filed on the date and time stamped hereon by me and was duly recorded in the Official Public Records of Real Property of Orange County, Texas, on

AUG 26 1991

A.T. Hebert Jr.
Lower Neches Valley authority
P.O. Box 3464
Beaumont, Tx. 77704
q.



Molly Theriot
COUNTY CLERK, Orange County, Texas

TEXAS WATER COMMISSION



B. J. Wynne, III, Chairman
John E. Birdwell, Commissioner
Cliff Johnson, Commissioner

Allen Beinke, Executive Director

June 13, 1991

A T HEBERT JR GENERAL MANAGER
LOWER NECHES VALLEY AUTHORITY
PO DRAWER 3464
BEAUMONT TX 77704

Re: Lower Neches Valley Authority
Application No. 06-4411B to Amend Certificate No. 06-4411
Texas Administrative Code Section 295.158(b), requiring
mailed and published notice
Neches River and Pine Island Bayou, Neches River Basin
Jefferson, Orange and Hardin Counties

Dear Mr. Hebert:

Enclosed is a copy of the amendment draft, Instream Uses Unit, Hydrology Unit, Hydraulics Unit and Applications Unit memoranda pertinent to the referenced application. If you have any comments concerning the enclosures, please contact me at 512/371-6384.

Very truly yours,

P. M. Airey, Jr.

R. M. Airey, Jr., P.E.
Applications Unit
Surface Water Section

RMA
Enclosures

cc: Arlette Capehart, Surface Water Section

LAWA			
	12/1/11		Inf. / P.T.
Agency	MA	1/1/11	
Rated		0/1/11	
MA's			
General Counsel		Jan 11	
Chief, Chief Hearings Examiner			
Director, Chief Clerk		1/1/11	

Texas Water Commission

INTEROFFICE MEMORANDUM

TO : Chief Clerk, Texas Water Commission DATE: June 11, 1991
THRU : Director, Water Rights and Uses Division
FROM : Applications Unit, Surface Water Section
SUBJECT: Lower Neches Valley Authority
Application No. 06-4411B to Amend Certificate No. 06-4411
Texas Administrative Code Section 295.158(b), requiring
mailed (11.121) and published notice
Neches River and Pine Island Bayou, Neches River Basin
Jefferson, Orange and Hardin Counties

Transmitted herewith are copies of the Hydraulics Unit, Instream Uses Unit and Hydrology Unit memoranda on the subject application. The application file, the application and the Applications Unit memorandum were transmitted to the Texas Water Commission on May 3, 1991. The Executive Director recommends that upon due consideration, the application be granted in conformity with the attached amendment draft.

Please direct any questions on this matter to Rick Airey, Applications Unit, at 371-6384.

James K. Pruett
Harry D. Pruett

Director, Water Rights and Uses Division

Date: 6/13/91

Attachments

cc: Arlette Capehart, Surface Water Section

SEP 6 1991

LNVA					
	Int.	A. I.		Int.	Act.
Barney			Lynn		
Robert			Annette		
Mike					
Dennis			Joe W.		
			File		

16899

Hardin County
VOL. 926 PAGE 191

AMENDMENT TO
CERTIFICATE OF ADJUDICATION

CERTIFICATE NO. 06-4411B

TYPE: AMENDMENT

Name: Lower Neches Valley Authority Address: PO DRAWER 3464
BEAUMONT TX 77704

Filed: February 6, 1991 Granted: June 24, 1991

Purposes: Municipal, Industrial and Irrigation Counties: Jefferson, Orange and Hardin
Neches River Basin

Watercourse: Neches River and Pine Island Bayou tributary of Neches River Watershed:

WHEREAS, Certificate No. 06-4411 was issued to Lower Neches Valley Authority on August 8, 1986 and authorizes the diversion and use of water from Pine Island Bayou and the Neches River and, in accordance with a 1956 contract with the United States of America, to use water from Lake Sam Rayburn located in Jasper, Sabine, San Augustine, Angelina and Nacogdoches Counties on the Angelina River and B. A. Steinhagen Lake (Dam "B") located in Tyler and Jasper Counties on the Neches River; and

WHEREAS, Certificate No. 06-4411A was issued on June 10, 1987 and authorizes an increase in the maximum diversion rates at two points on Pine Island Bayou, to change 60,000 acre-feet of water per annum authorized for industrial use to municipal use and to reword certain provisions of the certificate; and

WHEREAS, applicant has requested an amendment to Certificate No. 06-4411, as amended, to install from time to time, two temporary saltwater barriers, i.e., one on the Neches River and one on Pine Island Bayou, tributary of the Neches River to protect freshwater intake facilities from saltwater moving upstream to authorized diversion points during periods of low flow; and

WHEREAS, the Texas Water Commission finds that jurisdiction over the application is established; and

WHEREAS, no person protested the granting of this application; and

WHEREAS, the Commission has complied with the requirements of the Texas Water Code and Rules of the Texas Water Commission in issuing this amendment; and

NOW, THEREFORE, this amendment to Certificate No. 06-4411, as amended, is issued to Lower Neches Valley Authority, subject to the following terms and conditions:

1. IMPOUNDMENTS

- C. Certificate owner is authorized to construct a saltwater barrier (No. 1) on the Neches River and may impound from time to time not to exceed 1115 acre-feet of water between elevations 0.0 feet mean sea level and 5.0 feet mean sea level. The barrier area will be adjacent to the Martin Palmer Survey, Abstract No. 19, Orange County, Texas. The barrier will be in the vicinity of Latitude 29.860° N, Longitude 94.998° W and also being N 74° W, 6205 feet from the southeast corner of the Amasa Rand Survey, Abstract No. 498, Orange County, approximately 8.5 miles north of Beaumont, Jefferson County, Texas.*
- D. Certificate owner is authorized to construct a saltwater barrier (No. 2) on Pine Island Bayou, Jefferson and Hardin Counties, and may impound from time to time not to exceed 529 acre-feet of water between elevations 0.0 feet mean sea level and 3.0 feet mean sea level. The barrier area is adjacent to the Thomas Spear Survey, Abstract No. 50, Jefferson County, Texas. The barrier will be in the vicinity of an area N 35° E, 4691 feet from the northwest corner of the Harvey P. Savery Survey, Abstract No. 47, Jefferson County, approximately 6.5 miles north-northwest of Beaumont, Jefferson County, Texas.*

5. SPECIAL CONDITIONS

- M. Certificate owner shall document downstream salinity conditions prior to installation of the saltwater barriers and may install the barriers when the encroaching saltwater wedge is at a point one mile downstream of the confluence of the Neches River and Pine Island Bayou.*
- N. Certificate owner shall notify the Texas Water Commission and Texas Parks and Wildlife Department prior to the installation and/or after the breaching of the saltwater barriers.*
- O. Certificate owner shall provide reports to the Texas Water Commission and Texas Parks and Wildlife Department for the seven-day period prior to the installation of the structures. These reports should include salinity surveys and reservoir stage and outflow conditions for Steinhagen Reservoir and Sam Rayburn Reservoir.*
- P. Certificate owner shall consult with Texas Parks and Wildlife Department concerning the installation of fish passes in the saltwater barriers and will implement such installation as deemed necessary.*
- Q. This amendment shall expire and become null and void on December 31, 2001 unless prior to such date certificate owner applies for an extension hereof and such application is subsequently granted for an additional term or in perpetuity. The priority date of this amendment and any extensions hereof shall be February 6, 1991.*

This amendment is issued subject to all terms, conditions and provisions contained in Certificate No. 06-4411, as amended, except as specifically amended herein.

This amendment is issued subject to all superior and senior water rights in the Neches River Basin.

Certificate owner agrees to be bound by the terms, conditions and provisions contained herein and such agreement is a condition precedent to the granting of this amendment.

All other matters requested in the application which are not specifically granted by this amendment are denied.

Certificate owner shall use those practices, techniques and technologies that will reduce the loss or waste of water and improve the efficiency and use of water so that only so much water as can be beneficially used will be diverted.

This amendment is issued subject to the Rules of the Texas Water Commission and to the right of continuing supervision of State water resources exercised by the Commission.

TEXAS WATER COMMISSION

John Hall ~~for~~
John Hall, Chairman

DATE ISSUED: AUG 09 1991

ATTEST:

Gloria A. Vasquez
Gloria A. Vasquez, Chief Clerk

FILED FOR RECORD

91 AUG 26 PM 4:41

DEE HATTON
COUNTY CLERK
HARDIN COUNTY, TEXAS
BY *Sherry Cook*

STATE OF TEXAS COUNTY OF HARDIN
I hereby certify that this instrument was
filed on the date and time stamped hereon
by me and was duly recorded in the
Official Public Records of
Hardin County Texas, on

AUG 27 1991



Dee Hatton
COUNTY CLERK
HARDIN CO., TEXAS

APPENDIX II

PERMIT APPLICATION-19611

gum 3/22
Res. Mgmt. Files
MARTINEZ/3095
CESWG-CO-RN

ENVIRONMENTAL ASSESSMENT
AND
STATEMENT OF FINDINGS

1. Name and Address of Applicant.

Lower Neches Valley Authority
P.O. Drawer 3464
Beaumont, Texas 77704

2. Corps Authority. Section of 1899.

3. Project and Site Description
Authority (LNVA), is proposing barrier, in the Neches River at mile 33.5 and stream mile 35.0 near stream mile 3.0, near Beau Each structure will consist of timber piles. The sheet piling extends across the width of each respective shorelines. Each structure design failure point and two fish warning lights, flags and signs downstream of the barriers and a

Appendix
~~Attachment~~ II

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Barrier installation will commence only after the applicant receives notification from the Corps of Engineers (COE) Fort Worth District that the conservation pool within Sam Rayburn Reservoir has remained within Pool Zone 3 for a 30 day time period. If the pool remains in this zone for a total of 60 days, releases of water for the prevention of saltwater intrusion will be curtailed. The applicant will provide a written notice to mariners in the form of a public warning announcement to be published in local newspapers covering the project area approximately 15 days prior to the date on which the LNVA plans to install a saltwater barrier. Daily announcements will appear in local newspapers one week prior to the initiation of work. Copies of publishers affidavits and a notification of the commencement of work will be submitted to the COE Galveston District. All sheet piling will be removed within 60 days after Sam Rayburn Reservoir returns to and remains within Zone 2. An extension of time beyond this deadline must be requested within this time frame and will only be considered on a case by case basis. Written and photographic documentation will be submitted to the COE Galveston District immediately upon the removal of each barrier. All installation

PERMIT APPLICATION-19611

and removal activities will be closely coordinated with the COE Fort Worth and Galveston Districts as well as the Big Thicket National Preserve (BTNP). This permit will be provisional in nature. Its duration will depend on the outcome of the ongoing feasibility study that is being performed for the Federal Saltwater Barrier at Beaumont, Texas project.

If the Federal Project is still feasible, temporary saltwater barriers may be needed prior to the construction of the Federal project. If the project is not feasible, this permit will be null and void within five years of permit issuance.

4. Background Information.

a. The Saltwater Intrusion Problem. Saltwater intrusion is a documented problem that has persisted in lower reaches of the Neches River for quite some time. Activities occurring as far back as the 1800s have contributed to this problem. In 1876, a natural sand bar at Sabine Pass, between Sabine Lake (which contained freshwater) and the Gulf of Mexico, was removed by dredging. 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 River. 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 saltwater intrusion on Taylors Bayou and Hillebrandt Bayou had become serious in 1901 and 1902. Local rice growers experienced heavy losses and attributed the problem to navigation improvements. The same document commented on the fact that some saltwater had by then been noticed above Beaumont but that due to its short duration, no serious results were experienced.

The first navigation channel to Beaumont was constructed in 1914-1915. In 1914, the City of Beaumont had to move its freshwater intake 4 miles upstream to Lawsons Crossing. In 1915, the intake had to be moved another 4 miles farther upstream, to Bunns Bluff (river mile 30). From 1924 through 1929, the navigation channel on the Neches River was deepened to 30 feet. In 1926, owners of the local irrigation system 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 Weiss Bluff, at mile 41.7.

In addition to the progressive enlargement of the Sabine-Neches Waterway to the City of Beaumont, more recent factors that have contributed to the intrusion of saltwater include insufficient

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downstream flows in the river during periods of low rainfall, regulation of downstream flows via Sam Rayburn Reservoir and B.A. Steinhagen Reservoir and increased upstream withdrawals for municipal, industrial and agricultural uses.

b. Permit History. A permit was issued by the Acting Chief of Engineers and the Acting Secretary of War on 24 April 1928 and 2 May 1928, respectively, to the "Neches Canal Company" and to the City of Port Arthur, Texas, to construct a temporary dam across the Neches River at a location slightly downstream from river mile 39. The Neches Canal Company properties were later acquired by the Texas Public Service Company, who eventually sold all of its water properties in Beaumont to the LNVA. Department of the Army (DOA) Permit 117, authorizing the installation of temporary saltwater barriers, was issued to the LNVA on 8 May 1945. Primary installation sites for these barriers were at freshwater diversion points in the Neches River at Lakeview and in Pine Island Bayou near Voth, Texas.

DOA Permit 117 was amended on 12 June 1967 and 15 November 1976, respectively, to reflect revised barrier locations. The latter amendment was approved pending the construction of the Federal Saltwater Barrier at Beaumont. It was conditioned for last minute installation and immediate removal when the saltwater intrusion crisis was over. Due to rising costs, the local sponsor (LNVA) of the Federal Project could not provide necessary monetary support. Hence the Federal Project has still not been constructed.

c. History of Barrier Use. Temporary barriers were installed almost yearly from 1947 to 1982. Heavy rainfall negated the need for the barriers from 1983 to 1988. Drought conditions necessitated barrier installations in 1989. No barriers were utilized from 1990 to 1992.

d. Current Problems. Since the original permit for this work was issued, many changes in the lower Neches River valley region have occurred. Population growth has resulted in concomitant increases in water quantity and quality needs. Corresponding increases in the recreational usage of both the Neches River and Pine Island Bayou waterways have occurred. However, when installed, past temporary barriers have not provided through navigation along either waterway. Increased development in the Neches River flood plain has resulted in heavy damage during flood events. Questions have been raised concerning the contribution that temporary barriers have had to past flood events. The BTNP has also been formed within the project area since the issuance of the original permit for the

PERMIT APPLICATION-19611

temporary barriers. Past construction practices have resulted in stream bank erosion and damage to vegetation along waterways that now lie within Preserve corridors. These factors have led to the expiration of the LNVA's original permit and a new evaluation under DOA Permit Application 19611 of the proposed work, structures and construction practices.

5. Environmental Assessment.

a. Purpose and Need for the Work. The LNVA was created by an Act of the Texas Legislature in 1933. It was given authority to conserve, store, control and distribute the waters of the Neches River for municipal, industrial and agricultural purposes. It services a five county area encompassing two water districts, a population of nearly 200,000 residents within the cities of Groves; Nederland; Nome; Port Arthur and Port Neches in Jefferson County, Texas, 29 industrial customers including oil refineries and petrochemical companies, and approximately 100,000 acres of irrigable cropland. The LNVA's system is comprised of five major pumping plants and approximately 400 miles of canals and associated structures. The proposed temporary barriers will prevent saltwater contamination of this freshwater supply system.

The city of Beaumont, authorized to withdraw 56,467 acre-feet of Neches River water for municipal use, still maintains a primary gravity intake at Bunns Bluff. However, the City can activate the pumping station at Weiss Bluff when salt is detected in the water. When in place, the LNVA's temporary saltwater barriers will also protect this diversion point. Upon the rejuvenation of adequate water supplies within Sam Rayburn Reservoir, the LNVA's barriers will be removed. Water will then be released from the reservoir for the prevention of saltwater intrusion.

b. Alternatives.

(1) No Action Alternative. If no temporary barriers or other means of saltwater intrusion prevention are constructed, saltwater will eventually encroach into the LNVA's supply system. The entire system will have to be shut down. Within hours, the supply available to cities and industries will begin to disappear. Within a day or so, there will be no water in the municipal systems for public supply and every major industry in Jefferson County not having the capacity to recirculate water will have to shut down. If salt enters industrial boiler water, it could damage of equipment. Failure to supply water during the irrigation season would result in crop loss. If salt enters pump stations, the channels of the Neches River and Lakeview

PERMIT APPLICATION-19611

Canals will have to be swept clean with high releases of water from B.A. Steinhagen Reservoir. By passing large amounts of freshwater through the intake canal and the Neches First Life forebay, the lower end of Pine Island Bayou could be flushed clean. However, there would be no way to get the salt out of the segment of Pine Island Bayou between the Neches system and the B.I. system. The City of Beaumont's Weiss Bluff intake, normally protected by the LNVA's Neches River barrier, could also receive saltwater and would have to shut down. Stream segments upstream of the barrier locations would also receive saltwater and incur damage to aquatic plant and animal life.

(2) Nonstructural Alternatives.

(a) Flushing. This alternative involves an increase in water release rates from Sam Rayburn in order to effectively "flush" saltwater out of the river system into the Gulf of Mexico. With the present project dimensions of the Neches River Channel at 40-feet by 400-feet, an estimated net flow of 1,900 cubic feet per second (cfs) would be required to prevent salt-water intrusion. This flow would be required for an average of 111 days per year. A total of 418,000 acre-feet of water, in addition to water withdrawn for municipal, industrial and agricultural uses would be withdrawn from Sam Rayburn during this process. Most of the yield of the existing Sam Rayburn Reservoir is reserved for municipal, industrial and agricultural uses in the lower Neches River Basin and adjacent coastal area. Saltwater intrusion occurs during time periods when the conservation pool level within the reservoir is already low and insufficient to support any actions above and beyond water supply. 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 authorized but deferred Rockland Reservoir were built, 40 percent of its annual yield could be devoted to this purpose. However, the COE Fort Worth District is currently considering a reclassification for this project. In addition, according to the Texas Water Development Board (TWDB), Texas is rapidly becoming a water-short region. Future demands preclude consideration of such water use as a realistic long-range solution.

(b) Decrease In Pumping Rates To Equal That Of Downstream Flow. This alternative would theoretically result in no net upstream pull of water. Inflexible water demands preclude this as a feasible option.

(c) Lakeview Pump Station. This alternative involves the exclusive utilization of newly constructed additional intake gates at the LNVA's Lakeview station on the Neches River. Hence, navigation hazards experienced by people that utilize Pine Island Bayou would be alleviated. However, this alternative is not feasible. The amount of water pumped through the Lakeview station is insufficient when compared to the amount needed by the LNVA's users. The Lakeview Station has to be used in conjunction with Pine Island Bayou's pump station.

(d) Use Of Ground Water. The use of ground water in lieu of surface water for supply needs has been considered. This would alleviate the need for the saltwater barrier structures. However, the TWDB has determined that a safe annual yield of ground water from aquifers in the lower Neches River basin is about 350,000 acre-feet per year. When compared to a total annual usage of 500,000 acre-feet of water per year in this area, it is clear that ground water can only supplement the amount of total water needed.

(3) Structural Alternatives.

(a) Federal Saltwater Barrier at Beaumont. A Federal project for a permanent saltwater barrier was authorized under the Water Resources Development Act (WRDA) of 1976. It is to be constructed at river mile 23.0 in the Neches River at Beaumont, Texas. Components of the project include a sector-gated navigation bypass channel suitable for adaptation to a lock for barge navigation, 7 tainter gates, a 1,334-foot-long earthen fill and concrete auxiliary dam, and other related appurtenances. An earthen dam will also be constructed across a canal which drains the southern end of Bairds Bayou at an adjacent location immediately south of old U.S. Highway 90. The project's primary purpose is to prevent saltwater contamination of municipal, industrial and agricultural surface water supplies while maintaining free and reasonable unobstructed use of the river by existing and future navigation. It would alleviate the need for temporary saltwater barriers.

The LNVA is the "local sponsor" for this project but has to date, failed to provide its portion of needed funds. Hence, the project has never been constructed. At the time the project was initially authorized, 75 percent of the total project cost was to be covered with Federal funding and 25 percent with non-Federal (public and private) funds. However, in 1986, the WRDA was reauthorized and modified which resulted in an increase in the local sponsor's share of the construction costs on cost-sharing Federal projects. For agricultural water supply

PERMIT APPLICATION-19611

projects, 65 percent of the total cost for the project was to be paid by the Federal Government and 35 percent of the total cost (including lands, rights-of-way, easements and disposal areas) was to be paid by the local sponsors. Currently, the saltwater barrier is still an active Federal project. It will continue to be so until 1996, 10 years after it was authorized under the WRDA. Based on Fiscal Year 1991 prices, the cost of this project (which includes inflation through the construction period), is now estimated at \$60,780,000. As such, the cost to the LNVA has increased from the initial \$2,100,000 to \$18,000,000.

The LNVA has recently entered into a tentative local sponsor cost sharing agreement with the City of Port Arthur. It has also submitted a letter of support to the COE indicating their ability to provide necessary funds for this project. The WRDA of 1994 provides \$200,000 for the development of a reevaluation report. A review will determine whether the project's engineering, economic, environmental and design criteria meet current standards. If deemed feasible, this project will alleviate many of the concerns that have been voiced against past and proposed temporary saltwater barrier installations. It will provide a mechanism for navigation and fish passage through the area and minimize flooding and saltwater intrusion. The BTNP property will be protected from physical damage that would have possibly occurred as a result of temporary barrier installations. Vegetation, fish and wildlife within the preserve will also be protected from damage that may occur as water quality degrades during periods of saltwater intrusion. However, if this project is deemed still feasible and funding is provided, some type of saltwater intrusion prevention is still needed until this project is constructed.

(b) Extension of intake canals. This alternative involves the extension of intake canals to a point beyond the upper limit of saltwater intrusion (above River Mile 50 at one foot above mean sea level). However, this project would cause extensive disruption of the river's natural flood plain. Flow patterns in adjacent wetlands would be disturbed and the water quality in the lower Neches River would remain poor. Roads and other intersecting utilities would have to be relocated and approximately 230 acres of swampland in the BTNP area would have to be cleared and/or excavated. This would eliminate valuable fish and wildlife habitat and detract from the scenic quality of the area. The endangered ivory-billed woodpecker and several exotic plant species might be affected by the clearing of

woodlands. This alternative is more costly both structurally and ecologically than the proposed saltwater barrier design for Beaumont. Hence, this alternative was unacceptable.

(c) Grooved Slips. This alternative involves the construction of permanent reusable sections of sheet piling or concrete containing several vertical grooves that are anchored into the shoreline of each waterway. As barriers are installed, sheet piling that extends into the shoreline would be slipped into these grooves. Steel sheet piling wing walls would be installed along each side of the river, both upstream and downstream of the barrier for additional shoreline stabilization. Six timber mooring pilings would be permanently installed in the river on the upstream side of the barrier for anchoring support. They would functionally replace the timber piles that are regularly installed adjacent to the sheet piling and cut below the mudline when removed. These pilings would be marked with lights and safety signs and remain in place after all steel sheet piling is removed, for use during subsequent barrier installations.

This alternative limits impacts to the same section of shoreline each time a new temporary barrier is installed. However, if a barrier were to "blow out" during high river flows, the center of the river would be scoured out in such a manner that a good seal could not be achieved during subsequent barrier installations. In addition, this alternative still does not provide for navigation and it is questionable that Coast Guard regulations would permit the permanent mooring pilings to remain in place.

(d) Obermeyer Hydro Accessories, Inc. Pneumatic Crest Gate System. This alternative involves the installation of a row of 5- to 10-foot-wide steel gate panels, supported on the downstream side by an inflatable air bladder attached to a foundation structure. By controlling the pressure in the air bladder, the water elevation maintained behind the gates can be infinitely adjusted within the system control range (full inflation to full deflation) and accurately maintained at user-selected set-points. Steel gates protect the air bladder from damage by floating debris. The OHA Crest Gates are custom designed to conform to any existing or desired spillway cross-section with a minimum profile when lowered into position. This low profile allows efficient passage of flood flows without any significant increases in flood water elevation. The steel gates can also be configured for independent operation of various gate sections. This permits fish-way attraction flows from the spillway to be directed to attract fish with a minimum amount of water. Controlled water levels can also prevent sudden drowning

of waterfowl nests which often occur when flashboards are suddenly replaced. However, navigation attributes are questionable. Due to the system's low profile, the site would have to be marked with warning signs. This is a reasonable alternative for a semipermanent barrier design.

(e) Inflated Fabric. This alternative employs the use of an inflatable fabric bag installed on a concrete sill. Inflation creates a form of dam that has been used successfully in shallow water situations for various purposes, including a saltwater barrier. However, the practicality of using fabric barriers in deep water situations, such as that which exists on the Neches River, is unknown. Previous use of such dam structures on the Colorado River has resulted in shearing and tearing of fabric, especially by logs and debris that travel down the river. Vandalism was also a recurring problem and maintenance costs were high. This is not a preferable saltwater barrier alternative for use by the LNVA.

(f) Underwater Sill. An underwater sill or berm could be constructed using dredged material. The berm would extend part way across the channel and would function by directing freshwater flow into a narrow channel, sized for recreation craft. Sufficient water velocity would still have to be maintained in order to obstruct upstream saltwater intrusion. This type of berm could be quickly constructed with a small dredge and readily removed. Navigation hazard marking would be necessary since the berm would not be readily apparent to boaters.

The main problem with this alternative is that during periods of low rainfall, the conservation pool elevation in Sam Rayburn Reservoir reaches such a low level that the only water released is that amount required by the LNVA's users. It is doubtful that enough downstream flow would be produced to block saltwater intrusion. It is also doubtful that this type of structure would be workable at the wider and deeper Neches River site.

(g) Original Temporary Barrier Design. The use of temporary saltwater barriers to protect salt contamination of the LNVA's water supplies has generated much controversy in the past. Construction techniques for these barriers have changed slightly over time. The barriers are usually constructed of steel sheet piling that is driven into the sediments at the shoreline (via the use of a barge) and across the width of each water body. In narrow reaches of Pine Island Bayou, these barges have damaged shoreline habitat. The barriers have also been supported by steel cables that were tied to trees along the

river bank. Temporary saltwater barriers have remained in place as little as several days to as long as several months, depending on the time that has taken to rejuvenate the conservation pool of Sam Rayburn. This results in the blockage of waterways to fish migrations and to boaters for variable periods of time. The barriers have usually been removed by cutting the timber pilings off below the mud line. Consequently, no other barriers can be installed at that location. Barriers have "blown out", unable to withstand strong currents resulting from storm and heavy rain events. Each new barrier installation results in additional cumulative impacts to the sediment and vegetation along the riverbank. The "Neches River and Tributaries, Saltwater Barrier at Beaumont, Texas" -COE General Design Memorandum-Phase 1 (Main Report and Supplemental to Final Environmental Statement) states that although the temporary barriers are reasonably effective and economical, they do not provide an acceptable long-term solution to the problem of salinity intrusion. As such, the unmodified temporary barrier design that the LNVA has utilized in the past is not an acceptable alternative.

(h) Modified Temporary Barrier Design. Modifications in barrier design and changes in construction practices during barrier installation will alleviate some of the problems that have arisen with past usage of the temporary barriers. Flap gate, hinged gate and tainter gate modifications to the original temporary barrier design were considered but were rejected due to the length of time needed for their installation, their effect on the structural integrity of the barrier, their maintenance requirements, and/or their questionable performance within the Neches River site.

The accepted modified temporary saltwater barrier design contains a central design failure point and reinforced steel sheet piling wingwalls. These features will reduce the amount of erosion damage occurring along the river banks at barrier sites. Fish passes, incorporated as sluice gates, will aid in fish movements through the site until salt is detected near the barrier. This temporary barrier will be supported by steel cables that are wrapped around additional timber pilings driven into the river bottom further upstream, instead of around trees that border the shoreline. Coast Guard approved lights, warning signs and flags will mark the area for safety purposes. The applicant will have to work under a "Plan of Operations", developed by the BTNP, which will be designed for maximum avoid-

dance of damage to Preserve property during construction and removal activities. The applicant will also have to follow public notification procedures, as previously outlined in the "Project and Site Description".

c. Environmental Setting. The Neches River flows southeasterly over an axial distance of 210 miles and empties into Sabine Lake, 4 miles west of the mouth of the Sabine River. The river drains an area approximately 10,000 square miles in size. Major tributaries in the lower portion of the basin are Village Creek, which enters the river at river mile 40 and drains an area of 1,113 square miles and Pine Island Bayou which enters the Neches River near river mile 30 and drains an area of 657 square miles. The average annual flow at the mouth of the river is estimated at approximately 5,600,000 acre-feet per year.

The city limits of Beaumont extend along eleven miles of the west bank of the river between river miles 19 and 30. Most of 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 a landfill, a petrochemical complex, industrial outfalls and intake siphons, shipyards, marine related businesses, boating and country clubs, and public boat launching areas.

d. Environmental Impacts. The possible consequences of this proposed work were studied for environmental concerns, social well-being, and the public interest, in accordance with regulations published in 33 C.F.R. 320-330. All factors which may be relevant to the proposal must be considered. The following factors were determined to be particularly relevant to this application and were evaluated appropriately.

(1) Historic and Cultural Resources. The National Register of Historic Places has been consulted and no properties are listed in the permit area. A preliminary historic properties investigation was conducted within the permit area by a staff archeologist on 18 June 1992. Shoreline locations for the proposed barriers contained no cultural deposits determined eligible for inclusion in the National Register. However, the lower Neches River area has had a potential for yielding unrecorded remains of historic watercraft associated with former nineteenth and early twentieth century transportation commerce in the region. Therefore, the applicant was requested to conduct a standard underwater magnetometer survey of the existing channel at the proposed barrier localities. A survey conducted on 10 and 11 December 1992, identified the presence of

several magnetic anomalies. However, none of them had the characteristics of historic shipwrecks and many were clearly identified with previous salt water barrier construction projects. The Texas Historical Commission concurred with these findings on 4 February 1993 and the proposed project was cleared to proceed.

(2) Navigation. When installed, the proposed temporary saltwater barrier will totally block access through these reaches of the Neches River and Pine Island Bayou to recreational boaters, limited industrial traffic and BTNP law enforcement officials. Existing boat ramps located above and below barrier locations will have to be utilized during the time that barriers are installed. The BTNP is presently conducting "The Neches River Stream Corridor Management Study". This study will examine the degree of public recreational usage, including navigation, within this corridor of the BTNP. Using this and other information, the LNVA will work with the BTNP to identify locations for and to help construct additional public boat ramps within preserve boundaries. The Federal saltwater barrier project is proposed to be constructed below the BTNP at Beaumont. It will incorporate a navigation bypass which will alleviate most of the public access problems associated with the temporary saltwater barriers.

(3) Water Quality. Depending on the season, the LNVA's water demand can range from 800 to 2,000 cfs. A portion of the water diverted from the river by the LNVA is eventually returned through various outfalls and is often polluted. When river discharge is 1,000 to 1,500 cfs above the demand of the LNVA, these waste effluents are carried down the river and out into the Gulf of Mexico. However, during periods of reduced rainfall, most of the water discharged from Sam Rayburn Reservoir is diverted by the LNVA for use. With the lack of downstream flow, tidal waters can extend from the mouth of the river to mile 42, near Weiss Bluff. Pollutants discharged into the lower reaches of the river are often carried upriver with the ensuing salt wedge.

In his 1975 paper entitled "Water Quality and Salt Water Intrusion in the Lower Neches River", and his 1976 paper entitled "Stress and Community Structure of Macrobenthos in a Gulf Coast Riverine Estuary", Dr. Richard C. Harrel, Assistant Professor of Biology at Lamar University, compared physico-chemical conditions at sampling stations above and below a previously installed temporary saltwater barrier in the Neches River. During periods of low river flow and saltwater intrusion, values for dissolved oxygen ranged from 8.2 parts per

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million (ppm) and 7.1 ppm at the surface and bottom immediately above the barrier to 3.4 ppm and 0.0 ppm at the surface and bottom immediately below the barrier. Similarly, water above the barrier was characterized by higher pH and lower turbidity, sulfates and salinity than water below the barrier. Bottom sediments above the barrier consisted of clean, odorless coarse sand and clay, whereas bottom sediments below the barrier consisted of black silt and sand smelling of hydrogen sulfide and oil.

Aquatic benthic animal communities, usually comprised of annelids, crustaceans, insects and mollusks, are responsive to changes in their environment and are often considered as indicators of water quality. Changes in community structure can usually be correlated with fluctuations in abiotic parameters, such as those reported by Dr. Harrel, and/or the presence of pollutants. In both of his aforementioned papers, Dr. Harrel stated that the density and diversity of species collected were higher above the Neches River saltwater barrier than below it. Many "clean water species" and gill breathing forms were common only above barrier locations. Below the barrier, common estuarine species recorded during previous random collections were absent. The density of pollution tolerant taxa had also decreased. These factors indicated that organic and toxic wastes were present.

Consequently, such studies have shown that when they are installed, temporary saltwater barriers in effect, divide the Neches River into upper and lower water quality regions. Because saltwater and pollution is prevented from traveling up the river, water quality above each barrier location is enhanced. Conversely, high salinity, polluted water is concentrated throughout the lower reaches of the river and water quality is degraded.

Without the presence of some type of preventative measure, a larger portion of the Neches River would experience degraded water quality during periods of saltwater intrusion. Fish and wildlife and vegetation would be subjected to polluted water. Users of the LNVA's water supply would also have a substandard quality of water to deal with.

The "Federal Saltwater Barrier at Beaumont Project" will move the "water quality dividing line" further downstream towards Beaumont. A pollutant laden outfall will also be relocated below this barrier. Consequently, a greater portion of the

locations as far downstream as Beaumont. Although paddlefish movements between the Trinity River and San Jacinto River systems have been documented, the extent to which they migrate between the Sabine and Neches Rivers is relatively unknown.

Life history and distribution information for Texas paddlefish has been gathered largely from historical catch reports and through contact with hatcheries in other states. Hence, information regarding the extent of their utilization of waterways within the project area is lacking. During the summer, paddlefish utilize bayous, oxbow lakes, backwaters and reservoirs that are rich in zooplankton for feeding. During the winter they inhabit deeper (> 3 meters) still-water areas that provide refuge from river currents. In the spring, when water temperatures rise from 50 to 63 degrees, sexually mature paddlefish (6-12 years) congregate at the mouths of tributary streams in deep pools adjacent to spawning areas. The actual spawning run is triggered by a sudden river rise of 10 to 20 feet as well as changes in temperature and photoperiod. Spawning migrations over 240 miles long have been documented. Spawning occurs in well-oxygenated water over clean gravel substrate. This type of substrate has been located in the Village Creek tributary, above Pine Island Bayou. Eggs are released over the gravel bed and settle to the bottom where they adhere and develop. After 7 to 10 days, young paddlefish emerge which are then carried to downstream feeding areas. At least 10 days of high water flow are needed to successfully complete the reproductive cycle. If water levels return to normal stage before spawning is completed, paddlefish will move off of the gravel beds and wait for another flood. Any exposed eggs or young may then die of dehydration. If subsequent temperature or flow conditions are not satisfactory, the female reabsorbs her eggs. While temporary saltwater barriers are installed, access to upstream feeding and spawning habitat will be limited to those fish that can maneuver through the fish passages. Siltation that could result from barrier installations and removals could negatively impact water quality, planktonic food resources and paddlefish foraging abilities. Effects of increased salinities on paddlefish inhabiting the downstream portions of the Neches River and Pine Island Bayou during this time period are unknown. A few of the past barrier installations have occurred during springtime months. Rapid rises in current velocity occurring during periodic springtime rains will push water through the designed "fail point" in the center of the structure. If water velocities are adequate, a spawning run could be triggered. The break in the barrier structure would allow temporary passage of fish to the upstream side of both rivers. However, the duration of such events will be short. If

Sam Rayburn and B.A. Steinhagen Reservoirs are not adequately recharged, downstream water releases will continue to be curtailed and river levels will be lowered. The barriers will have to be repaired and any efforts by the fish at spawning would be curtailed.

In order to gain a better understanding of the effects that temporary saltwater barriers have on paddlefish inhabiting the Lower Neches River, Pine Island Bayou, and Village Creek, the TPWD and the applicant will cooperate in a joint three year study. Topics to be examined during the study may include the extent of paddlefish movement within and migration from the study area as well as the size, age structure, feeding habits, maturity and abundance of paddlefish populations within the study area. These factors will be compared to the placement and removal of the saltwater barriers and changing salinity levels. This study will also aid managers in assessing the impacts of future permit actions within the Lower Neches River area.

(5) Fish and Wildlife Values. For about 6 to 8 months each year, when net flow in the Neches River is adequate to control pollution by saltwater and municipal and industrial effluents, the lower 40 miles of the river and its adjacent flood plain furnishes a favorable environment for numerous fish, mollusca, waterfowl, aquatic mammals, aquatic reptiles and amphibians. Common freshwater and marine fish and invertebrates that have been recorded within the river in the vicinity of the project area include sheepshead minnows, bowfin gar, buffalo shad, flounder, mullet, sand seatrout, freshwater catfish, crappie, perch, river shrimp, grass shrimp, penaeid shrimp, blue crabs, freshwater mussels and rangia clams.

Bayous and swamps adjacent to the river are important 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. Seed and berry producing trees such as willow, tupelo, amyhaw, 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 bayous by furnishing additional shade, food and dense cover for wildlife. Waterfowl and wading birds such as wood duck, egret, ibis and heron nest and feed in the swamps and sloughs along the river. Timbered bottomlands and swamps provide habitat for numerous wildlife species including otter, mink, raccoon, opossum, fox, muskrat, skunk, squirrel, cottontail rabbit, swamp rabbit,

feral pig, deer, birds of prey and song birds. Open fields and clearings in the woodlands along the river provide nesting and feeding areas for quail and dove.

In addition to the paddlefish study (discussed in the previous section), the TPWD and the applicant will participate in a joint study that will assess saltwater barrier impacts on the abundance and distribution of freshwater mussels. As indicators of water quality, mussel populations are currently experiencing major declines in population levels. Texas freshwater mussels support a commercial fishery which involves the sale of shell material which is eventually used to produce cultured pearls.

While temporary saltwater barriers are installed, fish and wildlife inhabiting lower reaches of the river will be affected by poor water quality and water pollution. These effects will then be transmitted up through the food chain. Wildlife inhabiting the river and adjacent swamps above the barriers will be largely unaffected by each structure. Migratory passage of fish species through the Neches River and Pine Island Bayou will be hampered during this time period. However, each barrier will contain at least two fish passes that will be operational until saltwater is detected at each barrier location. These fish passes are experimental both in form and function. As they are utilized in the field, the applicant will be able to further refine their design and operational requirements.

The Federal saltwater barrier project will increase water quality and hence the quality of fish and wildlife habitat. It is recognized that impacts to fish and wildlife and their habitat will occur while modified temporary saltwater barriers are installed. However, the effects will not be long lasting. The use of these barriers will only be permitted on a provisional basis. Conversely, if no form of barrier is utilized, adverse effects to fish and wildlife from saltwater intrusion would be farther reaching, longer lasting and more harmful.

(6) Wetlands. Bottomland hardwood wetlands in the project area filter sediments and pollutants from the water. During flood events, they retain flood waters and decrease the potential for damage further downstream. Wetland vegetation provides food and habitat for fish and wildlife (as discussed in the previous section) as well as detritus which fuels the base of the food chain. No filling impacts to this habitat will

occur during the use of the modified temporary saltwater barrier design. Secondary impacts will include temporary turbidity during barrier installation and removal activities, as well as occasional barrier "blow outs", and reduced water quality below the barrier locations. Past construction practices that have resulted in erosion of wetland habitat are being discontinued. Shoreline stabilization will also be installed at barrier sites to prevent further loss of wetland habitat. Higher salinity and pollutant levels that occur below barrier locations will adversely affect freshwater wetland vegetation for the duration of barrier installations. However, these barriers will be installed during low water flow time periods. Water is mainly contained within the channel area. Therefore, backwater effects resulting from barrier installation may only be felt immediately upstream of the barrier; prolonged saturation of wetland habitat will be minimal. If the Federal project is constructed, a larger portion of the river's adjacent wetland habitat will be protected from saltwater intrusion.

(7) Shore Erosion and Accretion. As previously discussed, construction practices utilized during the installation of past saltwater barriers have resulted in vegetation damage and erosion of Neches River and Pine Island Bayou riverbanks, especially in those areas that lie totally within the confines of the BTNP. Water flowing downstream during rainstorm events has forced its way through and around installed barriers and loosened shoreline and river bottom sediments, eventually carrying them downstream. However, the practice of tying barriers to trees and the indiscriminate use of laydown areas for construction supplies has been discontinued. To prevent further shoreline erosion, a "central design fail point", incorporated into the proposed modified barrier design, will give way under mounting upstream water pressure and concentrate scouring actions to the center of the river channel instead of along the shoreline. Steel sheet piling wing walls will also be installed into the river bank. All activities conducted within the boundaries of the BTNP will be approved by BTNP personnel and included in a Plan of Operation.

(8) Safety. The temporary saltwater barriers are bank-to-bank installations, extending 2 to 3 feet above normal water level. Consequently, they obstruct river navigation. Federal and State law enforcement officials are limited in their ability to gain emergency access to certain parts of the river and sections of the BTNP that are accessed predominantly by boat.

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In the past, minimal signs, lights and markers have been used to advertise the barrier's presence to both officials and the general public.

Coast Guard approved warning lights and markers will be installed on each side of the modified saltwater barrier and on each associated structure. Barrier installation will commence only after the applicant has received notification from the COE Fort Worth District that the conservation pool within Sam Rayburn Reservoir has remained within Zone 3 for a 30 day time period and that after 60 days, releases of water for the prevention of saltwater intrusion will start to be minimized. The applicant will also be required to publish a public warning announcement in local newspapers approximately 15 days prior to the date on which the LNVA plans to install a saltwater barrier. Daily announcements will appear in local newspapers one week prior to the initiation of work. All sheet piling will be removed within 60 days after Sam Rayburn Reservoir returns to and remains within Pool Zone 2. The applicant will notify the COE Galveston District in writing 30 days prior to each barrier installation. Written and photographic documentation will be provided to the COE within 30 days after each barrier removal. To insure that all warning lights and signs are adequately maintained and that all sheet piling is totally removed from the project site after each barrier installation, the applicant will be required by the BTNP to tender a performance bond. These measures will insure that temporary saltwater barriers are installed only as a last resort during the time frame prior to construction of the Federal project. During this interim time period, river boaters will be provided advance notice of the presence of the barriers and their associated structures.

(9) Recreation. Temporary barriers will maintain upstream water quality and enhance the suitability of the stream and its environs for recreational activities such as fishing, boating and camping. Boat ramps will be available for recreational use both upstream and downstream of the barrier locations. However, access through the project site to downstream locations by recreational boaters will be temporarily limited. Water quality on the downstream side of the barrier will be degraded which will reduce fishing success. It will limit the amount of recreational activity that occurs in the lower reaches of the river during certain times of the year. However, such effects will only occur prior to the construction of the Federal saltwater barrier project.

(10) Water Supply and Conservation. In 1992, the LNVA supplied a total of 110 billion gallons, or an average of 301 million gallons per day of freshwater to municipal, industrial and agricultural interests within a five county area. The LNVA's most recent amendment to their Texas Natural Resource Conservation Commission (TNRCC) Water Rights and Uses permit also authorized the installation of temporary barriers to protect its previously permitted diversion points. Inherent with this authorization is the impoundment of approximately 1,115 acre-feet of water between elevations 0.0 and 5.0 feet mean sea level behind the Neches River barrier and the impoundment of approximately 529 acre-feet of water between 0.0 and 3.0 feet mean sea level behind the Pine Island Bayou saltwater barrier.

The "Water Encyclopedia" by Frits Van Der Leeden, 1990, states that raw water containing 50 parts per million (ppm) sodium content is classified as an excellent source of water for domestic water supply, requiring disinfection as its only treatment. Raw water containing 250 ppm sodium content is considered a good source of water supply requiring treatment such as filtration and disinfection. Water containing 500 ppm is considered poor, requiring special or auxiliary treatment and disinfection. The World Health Organization "Guidelines for Drinking Water" list raw water containing 200 milligrams of sodium per liter (mg/L, also equal to ppm) as having aesthetic quality. Water containing 100 ppm or less is suitable for industrial uses.

The normal salt content of the Neches River is approximately 25 ppm. Reported salinities normally within the LNVA's water supply have ranged from less than 50 mg/L to 140 mg/L of sodium. If no form of saltwater barrier is implemented during low rainfall/ river flow time periods, salinity levels within the LNVA's freshwater system could approach 10,000 ppm or greater. Industrial processing water would be damaging to equipment and drinking water would not be potable at these salt levels.

True water conservation measures have never been implemented by the LNVA. At the time that temporary barriers are installed, releases of water from Sam Rayburn Reservoir for the prevention of saltwater intrusion have been curtailed. However, user water supplies are still adequate.

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By installing temporary saltwater barriers, the LNVA will be able to protect its freshwater supply from salt contamination. Although they are not a suitable method of long term protection, the barriers will protect water supplies during the construction period for the Federal project.

(11) Flood Hazards. In accordance with Executive Order 11988, the District Engineer should avoid authorizing flood plain developments whenever practicable alternatives exist outside the flood plain. However, this proposed activity is dependent on being located in or adjacent to the aquatic environment. The "impoundment" of water that normally occurs during the period that a temporary saltwater barrier is installed consists of a net positive head of approximately 1.0 to 1.5 feet on the upstream side of the barriers during steady-state stream conditions. The water at this elevation remains within the cut banks of the stream and produces minimal overbank inundation. However, water levels have to rise 2-3 feet above sea level before overtopping the barrier.

Historical accounts of flooding within the permit area are well documented. Significant flood damages were experienced in 1963, 1975 and 1979 by homes that had been built in the wooded areas along the bayou. The flood of record in April 1979 caused \$18.5 million in damages to properties in Lumberton, Pinewood Estates, Rose Hill Acres and Sour Lake in Hardin County and Beaumont and Bevil Oaks in Jefferson County. These areas contain the majority of the residents who commented during the public notice and public hearing comment periods for the proposed project. In 1985, COE Galveston District performed an evaluation of the flood protection needs in the Pine Island Bayou watershed and the feasibility of measures for the reduction of flood damage. The study found that existing stream channels in the watershed are inadequate to carry flood flows within banks and their natural capacity is reduced by trees, brush and silt. It concluded that there is no economically feasible means of reducing existing flood damages in the Pine Island Bayou Watershed.

In regard to historical data related to flooding and the placement of temporary saltwater barriers, a previous analysis was performed in 1990 by the COE Galveston District Hydrology & Hydraulics (H&H), for a saltwater barrier location approximately 3.7 miles upstream from the mouth of Pine Island Bayou and about 4.6 miles downstream from U.S. Highway 69. The study stated that the impact of the barrier on flooding was minimized by the tendency of flood waters to flow around the channel obstruction via low and wide over-banks that occur within the vicinity of the proposed site. It also inferred that during small floods in

areas where channel banks are higher, water would be contained within the river banks causing a total blockage and greater flooding impacts. The study incorporated a barrier design that extended 250 feet across the bayou with a crest elevation of +3.5 feet. Results of the analysis indicated that during a 2-year flood and a 50-year flood, areas immediately upstream of the barrier experienced an increase in water level of just over 0.5 foot for both floods. The increase tapered off in the upstream directions with no significant increases above State Highway 105.

In order to assess the potential flooding and back water effects that the proposed temporary saltwater barriers could produce, the applicant submitted HEC-2 studies that were performed for both the proposed Pine Island Bayou and Neches River locations. These studies were examined for accurate technique by the COE Galveston District's H&H Branch. The studies indicated that during a small flood in Pine Island Bayou (1,500 cfs), a temporary saltwater barrier could produce a relative increase in upstream water level, above existing flood stage, of 0.76-foot. During a large flood (5,000 cfs), a 0.25-foot rise in water level, above existing flood stage, could occur. During a small flood in the Neches River (10,000 cfs), areas near the upstream side of the saltwater barrier could experience 0.63 to 0.89-foot rise in water level, above existing flood stage. This increase would range from 0.02 to 0.09-foot during a large flood (40,000 cfs). As confirmed by our H&H Branch, the barriers will cause some increase in flood stages but the increase will be small. Properties immediately adjacent to the upstream side of the barrier will be more vulnerable to this increase in water level. As previously stated, such effects taper off with increasing distance upstream.

To decrease the potential for back water problems, the LNVA has revised the barrier design to include a central "design fail point". The applicant states that by decreasing the amount of support that the central piles have and by varying the depth that they are driven into the sediment, the vulnerability of that section of barrier will increase. Sediment depths and water pressures required to "blow out" that portion of the barrier will depend on the type of substrate at the barrier site.

(12) Aesthetics. The proposed project is not similar to other developments and/or facilities in the immediate area of the project site. When installed, saltwater barriers adversely impact the aesthetic value of the project area. However, these effects will be temporary. When the conservation pool within

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Sam Rayburn Reservoir is adequately rejuvenated, all components of each barrier will be totally removed from the waterway. As such, adverse aesthetic impacts to the project area will be minimal.

(13) Economics. The LNVA has no power to levee taxes on its customers and does not operate for profit. Its water rates are lower than other existing Texas gulf coast water authorities. These rates vary with the type of user, the amount of water utilized, the time of year and the type of crop (if applicable). Municipal and industrial customers pay approximately 9 cents per 1,000 gallons of water, up to 1 million gallons per day. Users of more than 1 million gallons per day pay at a cheaper rate. Farmers can pay \$20 to \$40 per acre for irrigation water. Such fees produce annual water revenues for the LNVA that total approximately 4 million dollars. These revenues have in the past, covered previous installation, repair and maintenance costs for temporary barriers. Although not required on a yearly basis, installations have averaged \$100,000 per barrier, with another \$20,000 to \$50,000 per year for maintenance activities. Temporary barriers are the most economically feasible alternative for the protection of the LNVA's water supplies. However, they are not the preferred alternative for long term use.

As the local sponsor for the Federal saltwater barrier project, the LNVA's portion of the construction costs would range from 18 to 20 million dollars, with an annual debt service of 2 million dollars and approximately \$150,000 in annual operating costs. Tax-exempt revenue bonds would have to be sold by the LNVA in order to obtain the necessary construction funds. These costs would then be translated to LNVA customers in the form of a 50 percent rate increase. Municipal customers would pass along increased costs to their customers. However, when faced with increases in the costs of production, farmers would be unable to do the same and would be hardest hit by escalating water fees. The rice and crayfish industries deliver an estimated yearly economic impact of 50 million dollars to the southeast Texas region. Rice farmers invest \$400 to \$500 dollars per acre in their crop which then supports local chemical and fertilizer companies, tire and equipment companies, fuel suppliers, airplane services, trucking companies, grain handlers and numerous other local industries. The LNVA currently supplies 100 rice farms with raw water. Presently, water costs comprise approximately 10 percent of the total rice production cost incurred. For all of these reasons, the LNVA has in the past, regarded their debt obligation to the Federal project as cost prohibitive.

To assess the accuracy of this claim, the COE Galveston District's Planning Division conducted a "least cost alternative analysis". Data from the LNVA's 1992 Financial Statement, Federal project information and other economic sources was incorporated into the analysis in order to derive an estimated cost to the local sponsor for either the installation of temporary barriers or the construction of a permanent barrier over a fifty year period of analysis. Results indicated that over 50 years, the annual cost of the temporary barriers installations would be approximately \$122,000. The annual cost of the Federal project would be \$2,141,000, with total costs reaching 17.5 times that of the temporary structure.

A second analysis was conducted in order to assess the financial burden that would be incurred by rice producers if the Federal saltwater barrier was financed by the LNVA and costs were passed on to its customers. The analysis indicated that the LNVA would have to generate an additional \$2,230,217 per year in revenues in order to pay the principal, interest, and operation and maintenance costs of the Federal project. Operating revenues based solely on water sales would necessarily increase 54 percent. A uniform increase of 54 percent to all water customers with no change to consumption patterns would cause an increase in water prices to the rice producer of an additional \$25 per acre bringing the total cost of water to \$70 per acre. Cost of water would rise from 10 percent of the total variable costs of rice production to 15 percent. Based on current prices and costs, rice production costs to the producer would increase from \$14.59 per acre to \$39.59 per acre. The study concurred with the LNVA's findings that without assistance, the Federal Project would be cost prohibitive for both the LNVA and its customers.

Smaller scale semipermanent saltwater barrier designs that would incorporate navigation, flood prevention and fish pass features would be of less cost to the applicant. However, an independent engineering firm has indicated that costs for their construction would equal half of the costs of the Federal project. The LNVA has subsequently stated that meetings with its customers have produced a willingness to pursue the Federal project. The applicant has entered into a tentative cost-sharing agreement with the City of Port Arthur to help defray Federal project construction costs. The LNVA's commitment to the Federal project was confirmed in a 5 January 1994 letter to the COE Plan Formulation Branch.

As stated in previous sections, the subsequent findings of a COE Galveston District reevaluation report will determine if the existing Federal project's engineering, economic, and environmental design criteria meet current standards. If this project is feasible, it will alleviate many of the concerns that have been voiced against past and proposed temporary saltwater barrier designs. However, the modified temporary barrier design still provides a means of protecting the LNVA's water supplies from saltwater contamination while the Federal project is being evaluated and constructed.

(14) Food and Fiber Production. The lower Neches Valley region supports approximately 32,000 acres of rice and 2,000 acres of crayfish that are dependent on the timely delivery of good quality irrigation water. If water containing a salt concentration of 500 to 1,000 ppm is introduced into the LNVA's system, rice crops would not be immediately reduced. However, salt would start to accumulate in the soil. The degree of damage that would occur to a field would depend on the site impacted and the salinity of the water. One inundation of 1,000 ppm saltwater across a field could deposit 1.2 tons of salt per acre-foot of water. At 2,000 ppm, it could deposit 2.4 tons of salt per acre-foot of water. At 2,000 to 3,000 ppm, saltwater has the potential to reduce a rice yield by 10 to 25 percent. At 3,000 ppm rice crop production could be reduced by 50 percent or more. Depending on the rainfall and type of soil present, a field could lay fallow for years before it reaches maximum rice producing capacity again. These fields would generally not be available for cattle grazing and could not be incorporated into crop rotation schedules. The proposed project would prevent those impacts.

(15) Other Federal, State, or Local Requirements. All required Federal, State, and/or local authorization of certifications necessary to complete processing of this application have been obtained. No required authorizations or certifications have been denied and none are known to exist which would preclude finalization of this permit action.

(16) Other Factors Considered. The following factors were considered during the evaluation process but were determined to not be particularly relevant to this application: land use, energy needs and mineral needs.

e. Cumulative Impacts. The assessment of cumulative impacts takes into consideration the effects upon an ecosystem of past, present, and reasonable foreseeable future projects. Every application must be considered on its own merits and its

impacts on the environment must be assessed in light of historical permitting activity along with anticipated future activities in the area. Although a particular project may constitute a minor impact in itself, the cumulative effect of a large number of such projects could cause a significant impairment of water resources and interfere with the productivity and water quality of existing aquatic ecosystems.

As stated in previous sections, past temporary saltwater barrier installations, blow outs and removals have resulted in adverse cumulative impacts (in the form of erosion, vegetation damage and lowered water quality), to property within the BTNP. However, the proposed barrier design has been modified to incorporate a central design failure point and reinforced steel sheet piling wingwalls which will reduce the amount of erosion damage occurring along the river banks at barrier sites. Fish passes, incorporated as sluice gates, will aid in fish movements through the site until salt is detected near the barrier. This temporary barrier will be supported by steel cables that are wrapped around additional timber pilings driven into the river bottom further upstream, instead of around trees that border the shoreline. Coast Guard approved lights, warning signs and flags will mark the area for safety purposes. The applicant will have to work under a "Plan of Operations", developed by the BTNP, which will be designed for maximum avoidance of damage to preserve property during construction and removal activities. The applicant will also have to follow public notification procedures, as previously outlined in the "Project and Site Description".

Through water rights and use permits, the City of Beaumont and the LNVA are entitled to use approximately 16 percent of the average flow of the Neches River. Present actual use is about one half the permitted use. As municipal and industrial growth occurs in Jefferson County, the LNVA and the City of Beaumont will use larger portions of their permitted quantity of surface water. If the modified temporary saltwater barrier design is only utilized during the interim time period required for the construction of the Federal Project or the design of an alternate permanent structure, additional cumulative environmental impacts resulting from the proposed work will be minimal.

f. Findings of No Significant Impact. There have been no significant adverse environmental effects identified resulting from the proposed work. The impact of this proposed activity on aspects affecting the quality of the human environment has been evaluated and it is determined that this action does not require an Environmental Impact Statement.

6. Statement of Findings.

a. Coordination. The formal evaluation process began with publication of a public notice on 22 July 1992. Copies of the public notice were forwarded to concerned Federal, State, and local agencies, organized groups, individuals and navigation districts. These entities included the following:

U.S. Fish and Wildlife Service
Big Thicket National Preserve
National Marine Fisheries Service
Environmental Protection Agency
U.S. Coast Guard
Texas Parks and Wildlife Department
Texas Historical Commission
General Land Office
National Ocean Survey, Atlantic Marine Center
American Waterways Operators
Adjacent Property Owners

A Notice of Public Hearing was published on 18 December 1992. Copies were forwarded to the above listed entities as well as city, county, State and Federal officials and all individuals that commented on the public notice. Public Hearing information was also published in the Beaumont Enterprise, The Orange Leader, The Kountz News and The Silsbee Bee.

Comments submitted by the previously listed entities in response to the public notice, as a statement at the public hearing, by letter after the hearing, or by a combination of the above are provided below. Multiple responses received by an agency or individual were summarized into one representative response.

b. Response to the Public Notice and Public Hearing.

(1) Federal Agencies. The U.S. Fish and Wildlife Service (USFWS) stated on 31 July 1992 that it had no objection to the proposed project. By letter dated 20 August 1992, this comment was rescinded. An extension of time to prepare a joint USFWS-National Park Service (Department of the Interior) response to the proposed project was requested. A 14-day extension was granted by letter dated 31 August 1992. The Department of the Interior (DOI) response was received on the same day. Additional information was submitted at the public hearing on 21 January 1993. The DOI's concerns are stated as follows:

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In the past, the applicant has failed to coordinate temporary saltwater barrier projects with National Park Service (NPS) officials. Past conflicts have arisen regarding barrier locations and sizes as well as direct impacts to Preserve lands that have resulted from barrier storage, construction, operation and removal activities. Erosion of Preserve land has occurred during barrier washouts. Each washout results in increased siltation, oxygen depletion and a loss of shoreline vegetation. Adverse cumulative impacts have increased with each new installation as each previous location has been rendered unusable after the structure has been removed.

The USFWS and the NPS have serious environmental concerns about damages to freshwater fisheries in general and specifically to paddlefish (Polyodon spathula) populations in Pine Island Bayou. Previous modifications to existing waterways for navigation have allowed saltwater intrusion into what was once a pristine freshwater estuary and into the streams flowing into it. Over the great length of time that saltwater intrusion has occurred, habitats in this area have become unstable and a loss of biological diversity at the confluence of the Neches River and Pine Island Bayou has occurred. The NPS was concerned that saltwater moving up the river would transport industrial discharges and wastes from downstream sources.

The Service and the NPS stated that the temporary barriers are serious safety and navigational hazards which obstruct river navigation and emergency access by personnel within the Division of Ranger Activities. The Division is the primary law enforcement agency on those areas of the Neches River and Pine Island Bayou that flow through the Preserve. They are responsible for enforcing state and Federal laws, enforcing safety and public use regulations, managing recreational use, responding to accidents and organizing search and rescue operations. Their access problem is compounded by the lack of an adequate number of boat ramps on either of these streams. It makes it difficult to launch in emergency situations from sites closest to the emergency. The NPS promotes recreational use of these streams. As such, it is concerned that visitors to the Preserve will be subjected to a lower quality natural experience of the Neches River System. This system possesses many attributes similar to other waterways that are designated as Wild and Scenic Rivers.

The Service and the NPS strongly recommended that planning for the installation of temporary saltwater barriers within the boundaries of BTNP be closely coordinated with the NPS. Facilities should be designed with sensitivity to the nationally significant resources in the project area. They also recom-

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mended that mitigation measures be incorporated into project plans in order to avoid, prevent, or minimize significant impacts to Preserve resources, operation and visitor use. The Service and NPS recommended that the LNVA be responsible for liabilities incurred as a result of construction, operation and removal of the barriers and that the decision on the permit be postponed until a plan which addresses these concerns is agreed upon by the Service, the NPS and the LNVA. Stipulations from the plan could then be incorporated into the permit. The Service and the NPS stated that the installation of a temporary barrier downstream from the confluence of the Neches River and Pine Island Bayou should be among those alternatives considered. It may be possible to make use of well designed temporary barriers until such a time that a permanent structure is built. The cost of this course of action is a small price to pay for the safety and welfare of citizens, and to preserve the environment. The Service and the NPS requested that an Environmental Assessment (EA) and perhaps an Environmental Impact Statement (EIS) be completed as required by the National Environmental Policy Act (NEPA) and its procedures. 未

The USFWS notified the COE on 6 January 1993 of the DOI's opinion that the proposed project may result in substantial and unacceptable impacts to aquatic resources of national importance in accordance with the procedures outlined in Part IV of the Clean Water Act Section 404(q) Memorandum of Agreement between the Department of the Interior and the Department of the Army. The same concerns were listed as stated above. The USFWS Regional Office in Albuquerque, New Mexico, verified by letter dated 27 January 1993, that the proposed application meets the requirements for elevation under Part IV, 3(b) of the referenced Memorandum of Agreement. *

The National Marine Fisheries Service stated on 20 August 1992 that adverse effects on marine and anadromous fishery resources would be minimal. Therefore, it had no objection to the proposed project.

The Environmental Protection Agency (EPA) first stated that they had no objection to the proposed project. This statement was later rescinded by letter dated 4 January 1993. The EPA noted concerns for the applicant's lack of coordination with the NPS, the barrier's impacts to paddlefish spawning sites as well as the TPWD's restocking efforts and the potential for flooding during high river flows from barriers that maintain their structural integrity while installed. In a 10 March 1993 response to the public hearing, the EPA stated that an investigation into historical data relating to flooding and the place-

ment of previous barriers should be conducted and a water conservation plan for the users of the LNVA water distribution system should be formulated. In addition, the EPA supported the incorporation of a navigation feature and the addition of a "fail point" in the structural design of the saltwater barrier, the elimination of construction practices that involve anchoring to trees along the shoreline, continual monitoring of the cumulative impacts of such barriers and an investigation into a permanent solution to the issue of saltwater intrusion within this reach of the Neches River.

Congressional inquiries of the proposed project were received from Congressman Jack Brooks on 4 September 1992 and 5 February 1993. Congressman Brooks voiced his support for the proposed project on 21 January 1993 citing economic, agricultural, industrial and municipal needs. He also stated that the benefits of the temporary barriers far outweigh any possible negative impact. Congressional inquiries were also received from Representative Charles Wilson on 19 October 1992 and 5 January 1993, Senator Lloyd Bentsen on 5 January 1993, Senator Phil Gramm on 5 February 1993 and Senator Bob Krueger on 9 February 1993 and 19 February 1993.

(2) State Agencies. The TPWD, on 20 August 1992, requested an extension of time to provide public notice comments. A 14-day extension was granted by letter dated 31 August 1992. The TPWD responded on 4 September 1993 stating concerns for the effects that the temporary saltwater barriers might have on paddlefish populations, listed as an endangered species in the State of Texas. Historically, the fish have inhabited the Neches River Basin, Pine Island Bayou and Village Creek. These areas are considered by the TPWD as target areas for restocking paddlefish. Five of the recommended 10 years of stocking have been completed. Barrier installations occurring at south of the confluence of Village Creek with the Neches River in late February through June could adversely effect spawning migrations and activities in the southern portion of Village Creek, one of the few identified spawning sites for paddlefish. Paddlefish inhabiting any waters south of the Neches River barrier will effectively have no spawning habitat as the next nearest suitable spawning area is north of B.A. Steinhagen Reservoir, which is north of the barrier. Damage to the BTNP as previously stated by the NPS were also noted. TPWD requested that a new barrier design be formulated that can be promptly removed as water levels rise. When habitat loss does occur as a result of flooding or erosion, suitable mitigation coordinated through the manager of the BTNP, should be performed.

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The Texas State Soil and Water Conservation Board stated on 20 August 1992 that it had no comment on the proposed project.

The Texas Agricultural Experiment Station/Agricultural Research and Extension Center (Center) at Beaumont stated, on 14 January 1993, that rice is a salt tolerant crop when compared to other cultivated crops. Its salt tolerance is growth stage dependent. It can withstand about 500-600 parts per million (ppm) salt concentration during the seeding stage, 1700-1800 ppm during the reproductive stage, and 2600-2700 ppm during grain filling and maturation. This is compounded as evaporation occurs. Given a 4 inch flood, 0.35 inch per day evaporation rate, and 600 ppm irrigation inflow water, 6 dry days without irrigation would raise flood water concentration to about 900 ppm. A field irrigated one time with the 600 ppm water would have a salt concentration of 861 ppm after 6 days. It can be seen that several dry days occurring during the seedling stage, as might occur when the saltwater barrier is installed, could create conditions to significantly reduce yields. However, for the past 18 years there have been no appreciable salt accumulations in the soils at the Center. Salt damage to seedlings and on heading rice has been observed in many areas within the Texas rice belt not serviced by the LNVA. High rainfall, soil type and good management by the LNVA have been factors that have prevented salt accumulation in the soils of Jefferson County.

The agency further stated that the abnormal weather during the past two rice seasons has reduced yields, increased cost and lowered the quality of rice. This has produced a much reduced return on investment. It is predicted that 10-15 percent of the Texas rice producers may be forced out of business after the 1992 season due to severe economic times. It is further predicted that one more bad rice season could reduce the number of rice producers by another 25-30 percent. Thus any other burden on the Texas rice producers such as an excessive increase in water cost or yield loss due to lower water quality could increase the number of failed rice farmers in the LNVA service area.

A separate letter received from the Center dated 18 January 1993 stated that there are 32,000 acres of rice and 2,000 acres of crayfish delivering an estimated yearly economic impact of 50 million dollars that are dependent on the timely delivery of good quality irrigation water. The temporary barrier is an essential part of the irrigation system supplying these industries. The barriers are installed during dry periods when there is low stream flow. Such dry periods increase the need for irrigation water in rice fields and crayfish ponds, making

timely delivery of good irrigation water even more critical during those time periods. The Center voiced support for the need and importance of such a structure and requested that the present system be kept in place for the economic and environmental benefit of the citizens in southeast Texas.

Texas State Representative Mark Stiles and Texas State Senator Carl A. Parker voiced their support for the proposed project on 21 January 1993. They cited municipal, agricultural and industrial and economical needs for the barriers and disputed comments linking the temporary barriers with flooding.

(3) County Agencies. The Hardin County Water Control and Improvement District stated on 20 August 1992 and 21 January 1993 that it objected to the proposed project. Homes in the community of Pinewood have flooded in the past and there is concern that the temporary barriers could increase the risk of additional flooding. Fishing and boating activities in Pine Island Bayou would also be restricted. The District questioned the actual need for the project, requested that a combined engineering/environmental study be performed, and that alternate designs be considered prior to permit issuance.

The Hardin County Judge, Mr. Tom Mayfield, stated on 21 August 1992 that the barriers cause flooding and inherent economic hardship, negative publicity and lowered property values. He requested that the need for these structures be further examined and that a costs vs. benefits analysis be performed. Alternatives should be examined that would alleviate negative consequences to the community.

Several Hardin County Commissioners stated on 21 January 1993 that they had concerns about flooding that had occurred in their area. They suggested that studies be done to ascertain whether or not the barriers cause flooding.

The West Jefferson County Municipal Water District stated on 4 January 1993 that it supported the proposed project. The District purchases water from the LNVA, 90 percent of which is used to supply potable water to its residents and 10 percent of which is utilized by industries in the area. The District stated that water supplies in the past have been low in chloride content (less than 50 mg/L) which is essential for the health of its residential users and is a must for its industrial users. The District stated that public health and economics dictates that recreational boating and fish migration should take second place in priority.

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By letter dated 22 February 1993, the Orange County Commissioner's court voiced concerns for flooding and the associated problems that may be caused as a result of saltwater barrier installation.

A resolution from the Jefferson County Commissioners Court that voiced support for the project was submitted at the public hearing on 21 January 1993.

Jefferson County Farm Bureau stated on 21 January 1993 that the barriers were very important to the farmers in this area. Farmers not on the LNVA's system also gain benefits from the use of water discharged by others.

(4) Local Agencies and Organized Groups. The Lone Star Chapter of the Sierra Club stated on 16 August 1992 and 23 January 1993 that no reference was made in the public notice to the fact that the project is impacting the BTNP. The permit should be processed under Section 404 of the Clean Water Act due to impacts to bottomland hardwoods during barrier installation and as a structure that will effect water level and water quality within forested wetland areas. It will block the flow of water, nutrients and organic material from parts of the Preserve. The visual quality of the stream corridors will be impacted. Mitigation plans should be submitted for public review. The project will also have negative impacts on the paddlefish. No operation or maintenance requirements or possible environmental consequences have been discussed. Other reasonable alternatives should be examined, with the no action alternative as the preferred alternative. The Sierra Club stated that the proposed project is a major Federal action significantly affecting the quality of the human environment. As such, the NEPA, and the Council on Environmental Quality's implementing regulations require that an EIS be prepared. A public hearing should be set after the document has been completed so that everyone may understand the full environmental impact of the project.

The Texas Rice Improvement Association voiced its support on 18 January 1993. It stated that low cost irrigation water in good supply and of high quality is the basis of the Texas rice industry, which has been a major economic factor in the south-east Texas region for over 100 years. The proposed structures insure that the water supply is at a reasonable cost.

The Big Thicket Conservation Association, on 4 February 1993, stated the same concerns as previously identified by the DOI and the Lone Star Chapter of the Sierra Club.

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The Pine Island Bayou Area Committee voiced navigation, flooding, BTNP, and paddlefish concerns already noted thus far. In addition, it requested that alternative designs be considered or that the proposed project be issued only on a provisional basis. The Committee objected to the project on several procedural bases. It stated that the proposed project does not comply with the Americans With Disabilities Act and that it should be processed under Section 9 of the Rivers and Harbors Act for dams and dikes rather than Section 10 for work and structures in navigable waters. The committee also stated that NEPA standards were being compromised by not preparing an EIS.

American Rice Growers Cooperative, Beaumont Division, stated on 21 January 1993 that salt-free water was essential to member farmers. When in the water supply, salt not only effects crops but it ruins the land for many years until it finally leaches out. This also harms wildlife and cattle that depend on fallow land. The only reason that farmers in Jefferson and Orange Counties have been able to survive in this increasingly competitive economy and regulated industry is our advantage in low cost water that is supplied by the LNVA. Support for a salt-water barrier that incorporated a fish pass was given.

The Coastal Soil and Water Conservation District stated on 21 January 1993 that the barriers are necessary to protect freshwater supplies in Jefferson County. If the design is deficient and causes problems such as flooding, then it needs to be corrected. However, decisions must be based on scientific data and facts. The design must also be cost-effective. While industry can pass costs on to their customers, farmers cannot.

(5) General Public Concerns. The City of Bevil Oaks and the City of Rose Hill Acres responded on 5 August 1992, 11 August 1992, 21 January 1993 and 3 February 1993, respectively, with concerns about the effects that the structures have on flooding. Past flooding events have resulted in economic damage, negative publicity and lowered property values. The City of Rose Hill Acres is not opposed to the need for some type of saltwater intrusion protection. It is opposed to the proposed design. The City requested that updated alternate designs be considered. The present design blocks navigation and is a safety concern. It causes damage to the BTNP and it impacts endangered paddlefish as well as other aquatic organisms. *

The Cities of Nederland, Port Neches and Port Arthur stated on 5 January 1993, 13 January 1993, and 22 January 1993, respectively, that they need good quality water with low salt content for public health and welfare. Higher costs that the LNVA will

have to incur as a result of project modifications will translate to higher rates that the city's residents will face. This comes at a time when cities are being reviewed for compliance and regulations pertaining to disinfection, distribution and water treatment plant capacity. Customers are presently paying higher rates for other environmental considerations.

The City of Groves stated on 14 January 1993 and 21 January 1993 that a large portion of its residents work in refineries, chemical plants or other industries that need salt-free water. No reports of flooding problems in the past have been correlated to saltwater barriers. Modifications to the present design would result in a financial impact to the struggling economy in this area.

The City of Beaumont stated on 21 January 1993 that the installation of a proposed temporary saltwater barrier during extreme low river flow periods would protect the City of Beaumont's Weiss Bluff intake. Saltwater encroachment at the Weiss Bluff intake would severely affect the City's ability to furnish its citizens with an adequate freshwater supply.

Individual comments provided either to the public notice, the public hearing, or both, have been categorized into the following issues. These comments were similar to those already stated by Federal, State, County and local agencies and organized groups.

Comments Made In Opposition To The Proposed Project:

a. Navigation - 38 people submitted comments which were generally concerned with the fact that temporary barriers block access through waterways by recreational boaters and fishermen. Concerns were voiced in regard to the inaccessibility of certain parts of the BTNP to law enforcement officials, especially during emergency calls. 107 additional people signed a petition opposing the proposed project due to the blockage of a navigable stream. The petition requested that alternative barrier designs be examined.

b. Flooding - 47 people submitted comments which generally centered around the possible backwater effects that temporary barriers produce, especially during high water flows from heavy rains. In conjunction with that, concerns were voiced that barriers rarely did break through. They stated that an acceptable barrier design needed a quick-release mechanism which would give way with increasing upstream water pressure. Prolonged saturation of soils during high waters has in the past

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resulted in erosion and tree loss on private properties. Many commentors are property owners that have been flooded out and have been compensated by the Federal Emergency Management Agency for large monetary losses. Some commentors asked if any comparisons had been made between the cost of installing the barriers and the monetary losses and compensation received by individuals for their flood damage. Some commentors asked why the barrier had to be 2 to 3 feet above normal water level in order to block saltwater intrusion. Others questioned the purpose of impounding water behind the barrier to this same level, as permitted by the LNVA's TNRCC water use permit.

c. Safety - 5 people submitted comments stating that the LNVA often failed to provide advance notification pertaining to barrier installation. Adequate warning lights and signs had not been installed to alert both day and nighttime boaters as to the presence of a barrier. The Coast Guard has been contacted in the past about this matter. Questions were raised about barrier removal requirements and time frames. In the past, when barriers "blew out" during heavy rains, pieces have often remained both visible and partially buried within the waterway. These pieces have restricted flows and were a safety hazard. Commentors wondered if dangerous eddies or undercurrents would be associated with the barriers.

d. Endangered Species - 5 people submitted comments which centered around the paddlefish, Polyodon spathula. These concerns were similar to those already stated by the USFWS/NPS and the TPWD. In addition, comments were made regarding the northern bluestar, Anisonia glaberrima, a plant which has been found within the BTNP and has been a candidate for listing on the Federal Endangered Species List.

e. Fish Migrations - 6 people stated that not only would paddlefish be blocked from moving through the project areas but all other aquatic life as well.

f. Big Thicket National Preserve - 10 people voiced similar concerns as those already stated by the USFWS/NPS.

g. Decreased Water Quality - 9 people raised concerns about the decreased water quality that could occur when barriers are installed. No downstream movement of water is allowed, except for overflows during heavy rains. Pollutants moving upstream from Beaumont in the salt wedge concentrate behind the barriers. This results in salt burns to the vegetation and salt intolerant aquatic species die. Several

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commentors wanted to know what the normal salt levels were in Pine Island Bayou and what salt levels would be dangerous to crops or to drinking water.

h. Cofferdam - 4 people referenced past experiences with a construction cofferdam that was installed during the replacement of intake siphons at the applicant's Pine Island Bayou Pumping Station.

i. Other - Other miscellaneous comments included the statement that LNVA should only be issued temporary permits with strict guidelines for installation, removal and public notification. Alternate designs and locations for the barriers were suggested. Additional comments centered around water rationing programs for LNVA's customers and the general public during periods when the barriers are necessary and concerns about sewage treatment effluent that could enter waterways during flood events.

Comments Made In Support of the Proposed Project:

a. Low Cost - 11 Commentors stated that the present saltwater barrier design is the least expensive method available. Each barrier installation cost is passed on in the form of increased water rates to the LNVA's customers. The LNVA's municipal customers stated that they are already having to pay larger water bills to cover added construction to and upgrading of other water treatment facilities. These improvements are being made in response to EPA directives. Industrial customers voiced similar concerns. They do not want to incur additional costs. Agricultural users stated that they have been burdened with bad rice years and cannot pass on those costs to their customers. They do not want to incur more costs from a larger, more complicated design. Rice farmers say that much more added costs to the burdens that they face may put them out of business.

b. No Flooding - 4 Commentors disputed claims that the barriers promoted flooding and stated that no direct proof existed. They generally stated the same for the other environmental issues that have been raised.

c. Resolution Process.

(1) Applicant's Rebuttal. Public notice and public hearing comments as well as requests for additional information were forwarded to the applicant in letters dated 14 October 1992, and 23 November 1993. In response to agency and public

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comments, the U.S. Army Corps of Engineers Waterways Experiment Station (WES) in Vicksburg, Mississippi was requested by memorandum dated 28 May 1993 to provide assistance in identifying alternative saltwater intrusion prevention measures that could be used in lieu of the proposed project. Results of this analysis were forwarded to the applicant for consideration by letter dated 11 August 1993. The applicant responded by providing the requested information by letters dated 1 December and 3 December 1992, 21 January, 29 January, 3 May, 7 May, 14 June and 31 August 1993.

The applicant's response to the WES recommendations were incorporated into the list of alternative project designs identified under the "Alternatives" Section.

In response to agency and public comments, the LNVA has stated that due to mounting public concern as well as increasing costs and environmental regulation, they, as well as their customers, are now ready to commit to the financial obligations required in order to pursue the Federal Saltwater Barrier at Beaumont, Texas Project. However, the LNVA recognized that the project will take time to construct. Some form of saltwater intrusion prevention is needed during this time frame. The applicant stated that a semipermanent or small scale permanent barrier project would cost roughly half of the total cost of the Federal project. It would also take time to properly install the structures at each location. The applicant is of the opinion that it would be more financially prudent to commit its limited funds to the Federal project, and in the interim time period, include mitigative features into the temporary barrier design and proposal that would help to alleviate most of the public's concerns.

The proposed design will continue to block navigation through both the Pine Island Bayou and Neches River barrier sites. The applicant stated that this inconvenience would only occur during periods of saltwater intrusion and only until the Federal Project is constructed. The applicant stated that boat ramps exist above and below both barrier locations. In addition, the LNVA stated that it would be willing to work with the BTNP to identify and construct additional boat ramps within the Preserve in order to increase accessibility throughout the Preserve areas.

In response to agency and public concerns regarding flooding and the loss of property from erosion and scouring, the applicant submitted several HEC-2 studies that were performed for both the proposed Pine Island Bayou and Neches River locations (Refer to

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the "Flood Hazards" section in the Environmental Assessment for results). The study concluded that some backwater effects will be produced by the barriers. The applicant stated that the effects will be minimal and mainly experienced by properties immediately adjacent to the upstream side of each barrier. To decrease the potential for backwater effects, the applicant proposed the inclusion of a central "design failure point" within the barrier's design. With mounting upstream water pressures, this portion of the barrier will break through channeling high water through the center of the barrier and lessening scouring and erosion around its ends. The applicant stated that decreasing the amount of support that the central piles have and varying the depth that they are driven into the sediment will increase the vulnerability of that section of barrier. Sediment depths and water pressures required to "blow out" that portion of the barrier will depend on the type of substrate at the barrier site. The applicant further stated that because this has not been done in the past, experience in the field is needed to refine the sediment depths required in order to achieve a standardized failure point. In addition, the applicant proposed to install steel sheet piling wingwalls at the ends of the barrier on each side of the waterway. This will reinforce shoreline areas at barrier sites and lessen land and vegetation loss due to scouring such as that which has occurred in the past.

For increased safety during barrier use, the applicant stated that Coast Guard approved warning lights and signs will be installed at each barrier location. All barrier installations within BTNP boundaries will adhere to a previously approved Plan of Operations agreed upon by both the applicant and the BTNP.

In response to the paddlefish and fish migration concerns, the applicant stated that it has agreed to perform joint studies with the TPWD which will assess the impacts that the temporary barriers have on paddlefish as well as other aquatic fauna. Sluice gates will be designed and incorporated into the barrier's structure which will allow fish passage through the project area until saltwater reaches the barrier location. The applicant submitted a copy of a letter dated 20 January 1993 that had been sent to the applicant from the TPWD. The letter stated that the TPWD had met with the applicant on 5 January 1993 to discuss possible alternatives to the proposed work and to address concerns that had been voiced in response to the public notice. During the meeting, the TPWD and the applicant agreed that the need for further cooperation and data sharing was necessary to analyze the habitat needs of the paddlefish.

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In response to concerns specifically relating to the BTNP, the applicant stated that they have met with Preserve officials. They have agreed to abide by a Plan of Operations which will contain barrier installation and removal requirements, guidelines for construction techniques, notification procedures, etc... By installing the proposed barrier modifications and following procedures set forth by the Plan of Operations, damage to BTNP property resulting from barrier installations will be minimized.

In response to concerns for degraded water quality that will be experienced on the downstream sides of barriers, the applicant stated that this cannot be avoided. Conversely, if no barriers were installed, degraded water quality would be experienced throughout a greater portion of each waterway.

In response to comments regarding the previous cofferdam, the applicant stated that they and the contractor entered into a lawsuit and all construction activities at the site came to a halt. The structure was kept in place for several years. In the interim, people couldn't use the waterway for boating. The dam was placed in a section of the bayou that was constricted and near the other canals that are presently used to transport water. Hydraulic studies performed by the COE concluded that within this section of Pine Island Bayou, stream widths and bank heights were narrow and the potential for flooding was great. The COE Enforcement Section ordered prompt removal of the structure. The applicant further stated that this has sensitized many people against the idea of installing any similar type of structure across these waterways, whether it be for saltwater intrusion prevention or for construction purposes.

In response to the need for water conservation measures, the applicant stated that by the time that temporary barriers are installed, releases of water from Sam Rayburn Reservoir for the prevention of saltwater intrusion have been curtailed. However, adequate supplies for the LNVA's customers still exist. Hence, true water conservation measures for individual LNVA users have never had to be implemented and would not avert the problem.

(2) Agency Response. The applicant's revised plans and rebuttal statements were coordinated with the USFWS/NPS, the EPA and the TPWD by letters dated 13 October 1993.

Upon reviewing the applicant's modified barrier design, the applicant's agreement to adhere to a Plan of Operations and agreements with the TPWD regarding paddlefish issues, the USFWS/BTNP responded on 9 November 1993. Their letter stated

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that the NPS is pleased with the current level of cooperation that has occurred with the LNVA in regard to the proposed project. However, the COE permit should stipulate that the placement of temporary barriers is only a short-term solution to this long-term problem. The permit should also reiterate the need for a permanent solution to this problem such as the installation of a permanent saltwater intrusion barrier as Congressionally authorized. The COE permit should be limited to a short period of time pending further action on the permanent structure. To ensure consistency, the NPS suggested that both the NPS authorizing document and the COE permit run concurrently and expire at the same time.

Although its format has not yet been specified, the "letter of agreement" signed by the LNVA will include a comprehensive outline of all actions to be taken beginning with notification and continuing through removal with stated time frames for the completion of an approved "Plan of Operations". This document will be developed by the applicant and approved by the NPS. The Plan of Operations will include specific provisions for construction bonding as well as specified mitigation for damages resulting from impacts created through the placement, operation and removal of temporary barriers. A copy of the COE Environmental Assessment should be attached to the LNVA's application for an NPS authorization. If the placement of structures by the LNVA into the Neches River and Pine Island Bayou adjacent to the BTNP triggers any further actions of compliance to the NEPA, the COE should be the lead agency in the formulation of an EA or EIS. The NPS will provide assistance through exchange of information and review in this process as a cooperating agency. The NPS further stated that they appreciated the current efforts of the LNVA and the COE to inform the NPS of actions that are planned for the waterways within the boundaries of the BTNP. This communication is paramount to each agency's performance of its delegated responsibilities in the conservation and protection of natural resources within its jurisdiction.

The EPA responded in a letter dated 15 December 1993 stating that it appeared that their concerns had been addressed. Since the public hearing, it appeared that much coordination has taken place between the applicant, the COE and interested parties. The EPA stated that it was aware that the applicant has entered a cost-sharing agreement with the City of Port Arthur to help finance the local sponsor portion for the permanent saltwater barrier at Beaumont. Until this final solution to the saltwater problem can be enacted, the EPA agreed that the interim plans for the modified temporary barrier submitted for their review are satisfactory. The EPA requested that it be allowed to

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review the finalized fish pass design and study parameters as set forth by the applicant and the TPWD as well as comment on any future developments of this project.

Subsequent to meeting with the applicant and coordinating with the TPWD Hart of the Hills Research Station, the TPWD responded by letter dated 10 November 1993. Their response contained a conceptual barrier design which incorporated two fish passes as well as two detailed proposals for paddlefish and freshwater mussel studies (See "Endangered Species" and "Fish and Wildlife" Sections of Environmental Assessment for study details). The TPWD stated that recent coordination with the applicant had resulted in changes to the proposed barrier design and that final details for the fish passes and studies would be worked out during future negotiations with the applicant. The proposed studies should qualify and quantify impacts to paddlefish and associated aquatic fauna that result from the installation of temporary saltwater barriers. This agreement was confirmed with the LNVA's representative during a telephone conversation on 21 January 1994.

(3) COE's Consideration of Public/Agency Comments & Applicant's Rebuttal. Although all concerns stated during the public notice and public hearing comment periods have not been totally resolved, this Environmental Assessment/Statement of Findings adequately addresses known impacts to the environment and the general public that could result from the proposed project. Alternate saltwater barrier designs and/or saltwater intrusion prevention methods have been examined. For various reasons, most have failed to incorporate features that satisfy all of the public needs indentified during the public interest review. It is recognized that with further engineering study, an alternate design incorporating needed features could be developed. Although the Federal project has been delayed in the past, the applicant has committed to provide necessary local sponsor funds for this project. The Federal project will alleviate most of the concerns that were outlined during this public interest review process. Therefore, the applicant will be allowed to pursue it.

In the interim time frame, the applicant will be permitted to utilize temporary saltwater barriers as outlined in the conditions below. Through coordination with the COE Fort Worth District, a time table for installation and removal of these structures has been devised. The applicant will only be permitted to install each structure after receiving notification from the COE Fort Worth District that the conservation pool level has remained within Zone 3 for 30 days and that after 60

PERMIT APPLICATION-19611

days, excess water will no longer be released for the prevention of saltwater intrusion. The applicant will be required to remove all barrier structures within 60 days after the conservation pool within Sam Rayburn Reservoir has returned to and remained within Zone 2. This time frame generally indicates that the conservation pool level has stabilized and that continued installation of temporary barriers will not be required. However, if stream conditions and/or water levels within each waterway do not permit safe removal of barrier structures, the applicant must request an extension of time for the removal work. Such an approval will be reviewed on a case by case basis.

Hydraulic studies submitted by the applicant and verified for accurate technique by the Hydrology & Hydraulics Branch of the Galveston District COE, state that the temporary barriers do produce some backwater effect. However these effects are minimal. With the design failure point incorporated into the barrier's design, backwater effects during high water flows will be further minimized. All work within the boundaries of the BTNP will be governed by a Plan of Operations that has been approved by Preserve officials. This will resolve all BTNP-related project concerns that have been voiced. The applicant has incorporated fish passes into the barrier's design to facilitate fish migrations throughout the project area prior to imminent saltwater intrusion. The applicant will also participate with the TPWD in several studies that will provide much needed information regarding barriers impacts on paddlefish as well as other aquatic species. Water quality will be degraded downstream of temporary barrier locations. Such impacts will be temporary. Impacts to each waterway would be greater if no barriers were installed. Water quality within these areas will be protected once the permanent saltwater barrier is constructed.

In regard to the statement that the project does not comply with the Americans With Disabilities Act, temporary barriers will only be installed as needed during the construction period for the Federal project. When they are installed, certain reaches of the Neches River and Pine Island Bayou will be blocked to people of all ages and disabilities who desire to navigate through temporary barrier locations. However, the duration of this inaccessibility will be temporary and equally restrictive to all. The issue of access by elderly and/or disabled people to boat ramp locations within BTNP property would be addressed by NPS officials.

PERMIT APPLICATION-19611

In regard to the statement that this permit should have been processed under Section 9 of the Rivers and Harbors Act of 1899, the proposed project involves the installation of a temporary saltwater barrier for the purpose of blocking saltwater intrusion, not to function as a dam. As such, it is work and a structure affecting navigable waters which is required to be permitted. Hence, it was processed under Section 10 of the Rivers and Harbors Act, rather than Section 9.

e. Conclusion. I have reviewed and evaluated, in light of the overall public interest, the documents and factors concerning this permit application, as well as the stated views of other interested Federal and non-Federal agencies and the concerned public, relative to the proposed work in navigable waters of the United States.

Based on my review, I find that the proposed project is not contrary to the public interest and that a Department of the Army permit should be issued. The LNVA will be required to abide by the following permit conditions:

a. The LNVA will construct the temporary saltwater barrier and attendant structures as outlined in the project plans. As built drawings of site specific waterway and barrier dimensions will be submitted to the Galveston District within 30 days of each barrier installation.

b. Barrier installation will commence only after the applicant receives notification from the COE Fort Worth District (copy furnished to the Galveston District COE) stating that the conservation pool within Sam Rayburn Reservoir has remained within Zone 3 for a 30 day time period; after 60 days, releases of water for the prevention of saltwater intrusion will be curtailed.

c. The applicant will provide a written notice to mariners in the form of a public warning announcement, to be published in local newspapers covering the project area, approximately 15 days prior to the date on which the LNVA plans to install a saltwater barrier. Daily announcements will appear in local newspapers one week prior to the initiation of work. Copies of publishers affidavits and a notification of the commencement of work will be submitted to the COE Galveston District.

PERMIT APPLICATION-19611

d. For all barrier installation and removal operations occurring within the BTNP, the applicant will adhere to a Plan of Operations previously approved by Preserve officials.

e. Warning lights and markers will be installed on each barrier and each associated structure and maintained as per U.S. Coast Guard requirements.

f. All saltwater barrier structures and construction materials within each waterway and adjacent property will be removed within 60 days after Sam Rayburn Reservoir returns to and remains within Pool Zone 2. Requests to extend this deadline must be submitted to the Galveston District within this time frame and will be reviewed on a case by case basis. Written and photographic documentation will be submitted to the COE Galveston District within 30 days of the removal of each barrier.

g. The applicant will participate with the TPWD in several studies that will provide much needed information regarding barriers impacts on paddlefish as well as other aquatic species. Specific study parameters will be submitted to the COE Galveston District within one year of permit issuance.

h. The subject permit will not be valid after the completion of the Federal Saltwater Barrier at Beaumont Project. If the Federal project is not deemed feasible, this permit will only be valid for 5 years and any extension of time request may be denied should the applicant not pursue an alternate design.

16 MAR 94
(Date)


JOHN P. BASILOTTO
Colonel, EN
Commanding

CH, EVALUATION SEC DHB
CH, REGULATORY BRANCH TH 3/7/94
ASST. CH, COMPLAINTS DIV out
CH, CONSTRUCTION TH 3/7/94
DIST COUNSEL YSA 3/8/94
DEPUTY COMMANDER PO 3/12

APPENDIX III

**STATEMENT OF THE
LOWER NECHES VALLEY AUTHORITY**

**WITH REFERENCE TO
THE APPLICATION FOR A PERMIT
TO INSTALL TEMPORARY SALT WATER BARRIERS
ON THE NECHES RIVER AND PINE ISLAND BAYOU**

**SUBMITTED AT A PUBLIC HEARING
CALLED BY
THE DISTRICT ENGINEER, GALVESTON DISTRICT,
U.S. ARMY CORPS OF ENGINEERS**

LUMBERTON, TEXAS - JANUARY 21, 1993

INTRODUCTION

Salt water intrusion from the Gulf of Mexico is a problem that fresh water users in the lower Neches Basin have had to contend with since the early 1900's. As the principal distributor of fresh water for this area, the Lower Neches Valley Authority is urgently concerned with protection against encroachment by the salt water, which periodically threatens to completely stop the water supply for over 200,000 residents, one of the world's great petroleum and petrochemical processing centers and an area of over 100,000 acres of irrigable cropland.

This statement describes the basic elements of the problem and explains the critical importance of federal approval of the Authority's application to install temporary salt water barriers when they are needed.

FACTS ABOUT THE LOWER NECHES VALLEY AUTHORITY

The Lower Neches Valley Authority (generally referred to as the LNVA) is a public agency, whose main responsibility is to supply water to cities, industries and farmers in Jefferson County and parts of neighboring counties. The Authority furnishes municipal water to all the major communities in Jefferson County except Beaumont - in excess of 200,000 people. The Authority also supplies water for the principal industries in this area, including Mobil, Star Enterprise, Chevron, and Fina refineries, Texaco Chemical Co., Mobil Chemical Co., DuPont, and others, with a combined employment of more than 20,000. In 1992, the LNVA canal system delivered irrigation water for a large part of the region's rice crop. The combined water requirements met by the Lower Neches Valley Authority in 1992 totaled 110 billion gallons, or an average of 301 million gallons per day.

The Authority has no power to level taxes and does not operate for profit. Its job is to meet the water needs of its customers with water of good quality, at cost.

The source of the water supplied by the LNVA is the Neches River. Figure 1 is a map of the lower Neches region, showing the larger streams and the Authority's service area. The flow of the Neches can be plentiful, and it can be very low, depending on the weather. For that reason, the LNVA joined as local sponsor with the Corps of Engineers in development of Sam Rayburn Reservoir and Lake B. A. Steinhagen, which help to firm up the irregular natural flows and make the needed supply available on a more dependable basis. Water is released by the Corps from Lake Steinhagen in amounts necessary to meet the area's needs, and the dependability of the supply is backed up by the conservation storage in Steinhagen and Sam Rayburn.

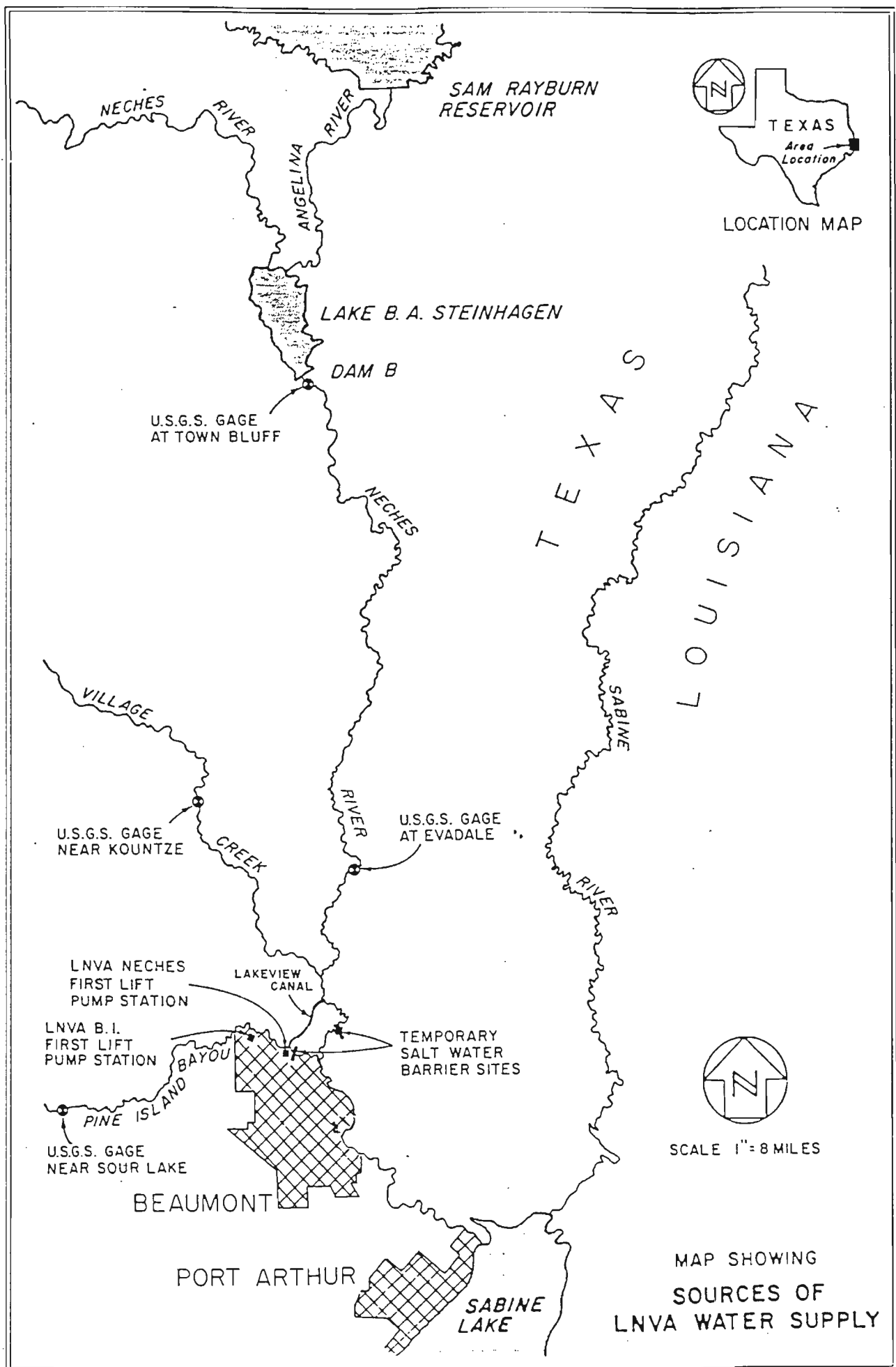


FIGURE 1

Figure 2 is a map showing the locations of the Authority's diversion pump stations and other related features. The two primary pump stations are located on Pine Island Bayou, a few miles upstream from where the bayou joins the Neches. They lift water into the LNVA's distribution system, which consists of more than 400 miles of main canals and laterals. Together, the two first lift stations can handle approximately 1.2 billion gallons per day when that much water is needed to meet the peak requirements of the users.

WHY THE SALT WATER BARRIERS ARE NEEDED

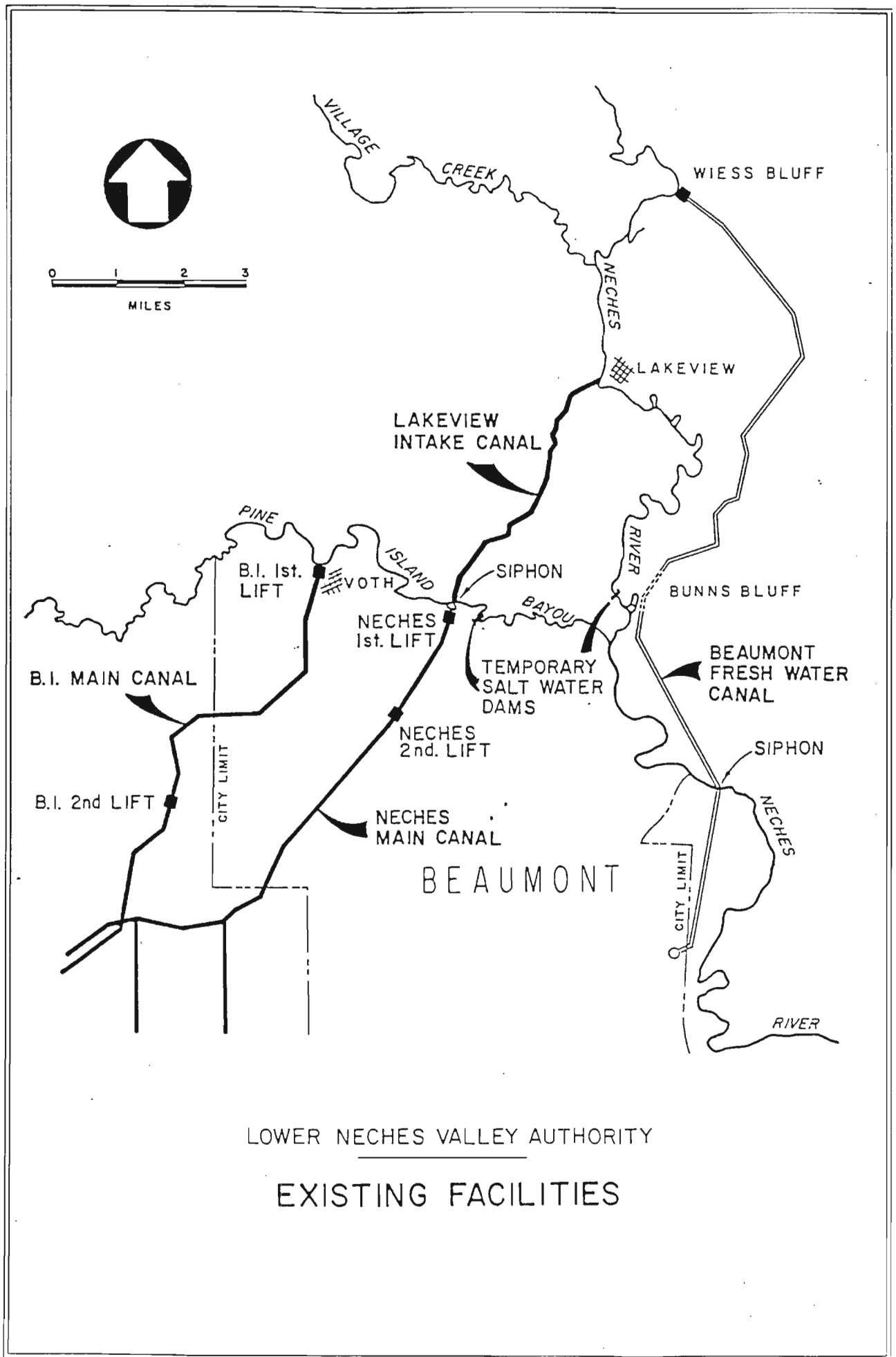
Figure 3 is a profile of the first 50 miles of the Neches River, from the mouth of the river at Sabine Lake to a point upstream of Wiess Bluff, where Beaumont has its highest intake. This information was obtained from the Corps' Definite Project Report on the Sam Rayburn Reservoir project. As the figure shows, the bed of the Neches is below sea level for about the first 45 river miles, including all of the segment where the Beaumont and LNVA diversion facilities are located.

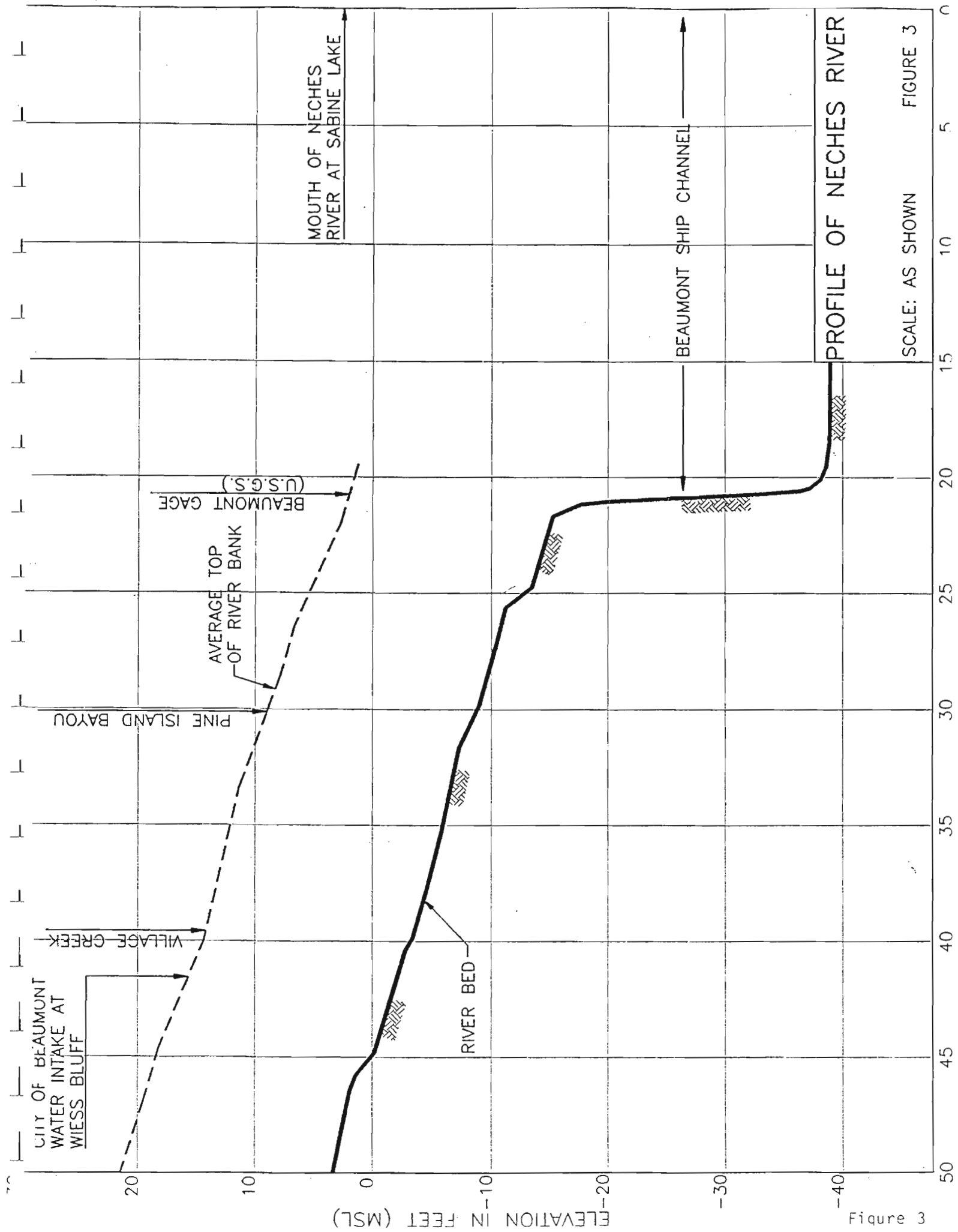
When there is ample flow, the river is fresh and of excellent quality throughout the reach used by Beaumont and the Authority. However, if the flow decreases below a certain level, salty water from Sabine Lake begins to move upstream. Because the salt water is heavier than fresh water, a wedge of salt water tends to push inland, taking over the part of the river that is below sea level. In times of low flow, the water surface in the lower Neches and its tributaries will be close to sea level, and the channels will fill with salty water.

The salt concentrations in this water are much higher than any of the cities, industries or farms can use. There is no feasible way to purify the salty water and make it suitable for beneficial purposes on the scale involved here. If the salt water wedge is ever allowed to reach the water supply intakes, the diversion pumps would have to be shut down entirely, and the water supply of the whole area would be lost.

To prevent this from happening, the LNVA must often install temporary barriers on Pine Island Bayou and the Neches River. The barriers block upstream movement of salt water and keep the water fresh at the intakes. The barriers are put in place only when absolutely necessary and are removed as soon as upstream storage reservoir levels recover and there is enough flow to keep the salt water pushed safely downstream. Some years, they are not needed at all. In other years, they are required for several months.

Because the City of Beaumont's intakes are also below sea level, the LNVA's barrier structures protect not only the Authority but Beaumont as well. When the salt water barriers are in place, they make the difference between a usable water





CONSEQUENCES OF NOT HAVING THE BARRIERS WHEN NEEDED

The result of failing to install the temporary barriers when the river flow falls below the rate that will hold the salt water away from the pump intakes would be a disaster of major proportions. The Authority would have to shut down all pumping. Within hours, the supply available to cities and industries would begin to disappear. Within a day or so, there would be no water in the municipal systems for public supply, and every major industry in Jefferson County would have to close down. The economic loss from this alone would total many millions of dollars per day. If the failure of supply occurred during the irrigation season, the entire farm crop dependent on the LNVA would be lost within a couple of weeks.

Once the salt water had found its way into the pump station intakes, it would be very hard to clean up. The channels of the Neches River and the Lakeview Canal would have to be swept clean with high releases from Lake Steinhagen. By passing large amounts of fresh water through the Lakeview canal and the Neches First Lift forebay, the lower end of Pine Island Bayou could be flushed clean, but there would be no quick way to get the salt water out of the segment of Pine Island Bayou between the Neches First Lift and the B.I. First Lift until a rainstorm brought renewed runoff into the bayou. Half of the LNVA's pumping capacity (i.e., the B.I. part of the system) might not be operable again for weeks.

Under this scenario, the City of Beaumont itself would be largely without water, even though it is not supplied by the LNVA, for its surface water intakes are also below sea level. Only the limited amount of ground water that Beaumont obtains from wells in Hardin County would still be available.

Extensive reaches of streams within the Big Thicket Natural Preserve would be changed rapidly from fresh water to salt water, probably with very adverse environmental consequences. Village Creek, which has been identified as the most suitable spawning ground for the Parks and Wildlife Department's paddlefish restocking program, would be subjected to salt water intrusion and put out of commission as a spawning area.

SUMMARY OF THE PRESENT SITUATION

Obviously, none of the parties represented at this hearing would want to accept the burden of responsibility for such a catastrophe. We believe that the primary issue here this evening is not whether the barriers should be put in if they are truly needed, but how they could best be installed and used in a way that will cause a minimum of undesirable impact.

Lake Levels, Sam Rayburn Reservoir

Jan. 1, 1992 to Jan. 11, 1993

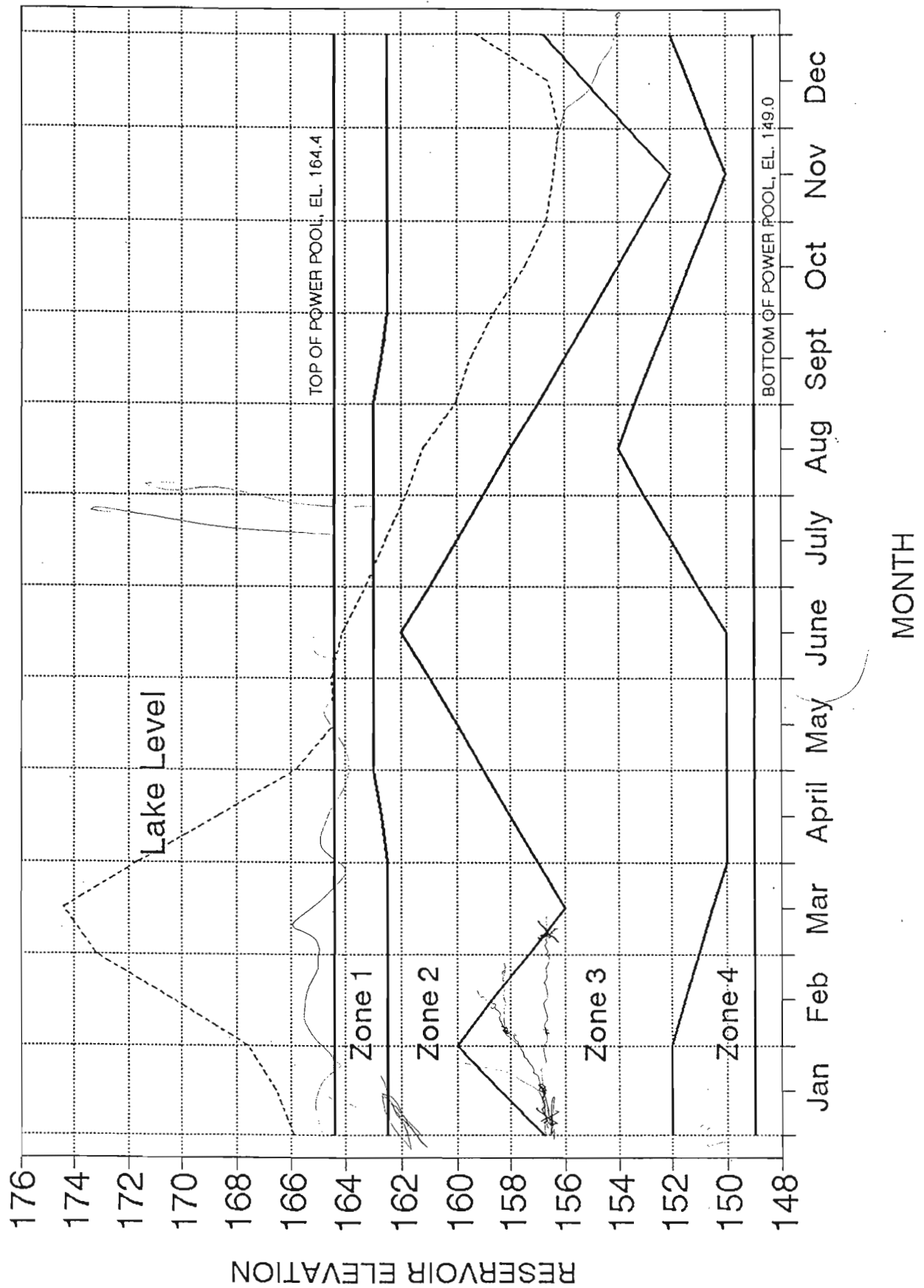


Figure 4

It is proposed that the barrier design be modified in several ways to make it less likely that either of these conditions will prevail. The penetration of the central (overflow section) piles into the stream bed will be held to a minimum, and the penetration of the side piling will be increased. Cable tiebacks will be used to strengthen the side piling, but not the middle section.

Residential Flooding

Figure 6 is a graph of the water surface profiles along Pine Island Bayou with and without the barrier in place, at approximately the maximum flow which the structure can withstand without failure. This information is the result of a computer analysis by the Authority's consultants, using the Corps of Engineers' HEC-2 backwater software. It represents the maximum backwater effect created by the barrier. The difference in water surface elevation at the Highway 69 bridge is indicated to be about 9 inches due to the barrier, and the backwater effect decreases progressively with distance upstream from that point.

Once the barrier has failed, the impact is much less. Analysis of conditions after failure showed a backwater effect of two inches at Highway 69 due to the remains of the barrier.

Thus, the backwater impact of the barrier is from zero to less than nine inches in areas west of Highway 69. For flows large enough to cause a serious threat of flooding, the barrier impact in that area is less than two inches.

The important consideration here is that the barrier will not remain standing beyond the time when the upstream water level reaches three feet above the middle section crest. The design changes listed above in regard to bank erosion are also safeguards against delayed failure and undue backwater effect.

Navigation

Some of the comments received by the Galveston District suggested that the barriers should be built with gates large enough to permit passage of boats. The temporary barriers are not strong enough to include lockage gates and the necessary operating equipment. Navigation locks are the nature of permanent structures, with heavy foundations and strong structural configurations. Such facilities are not built quickly and are feasible only if they are to stay in service for a number of years.

Pine Island Bayou Water Profile, 1500cfs Lower Neches Valley Authority

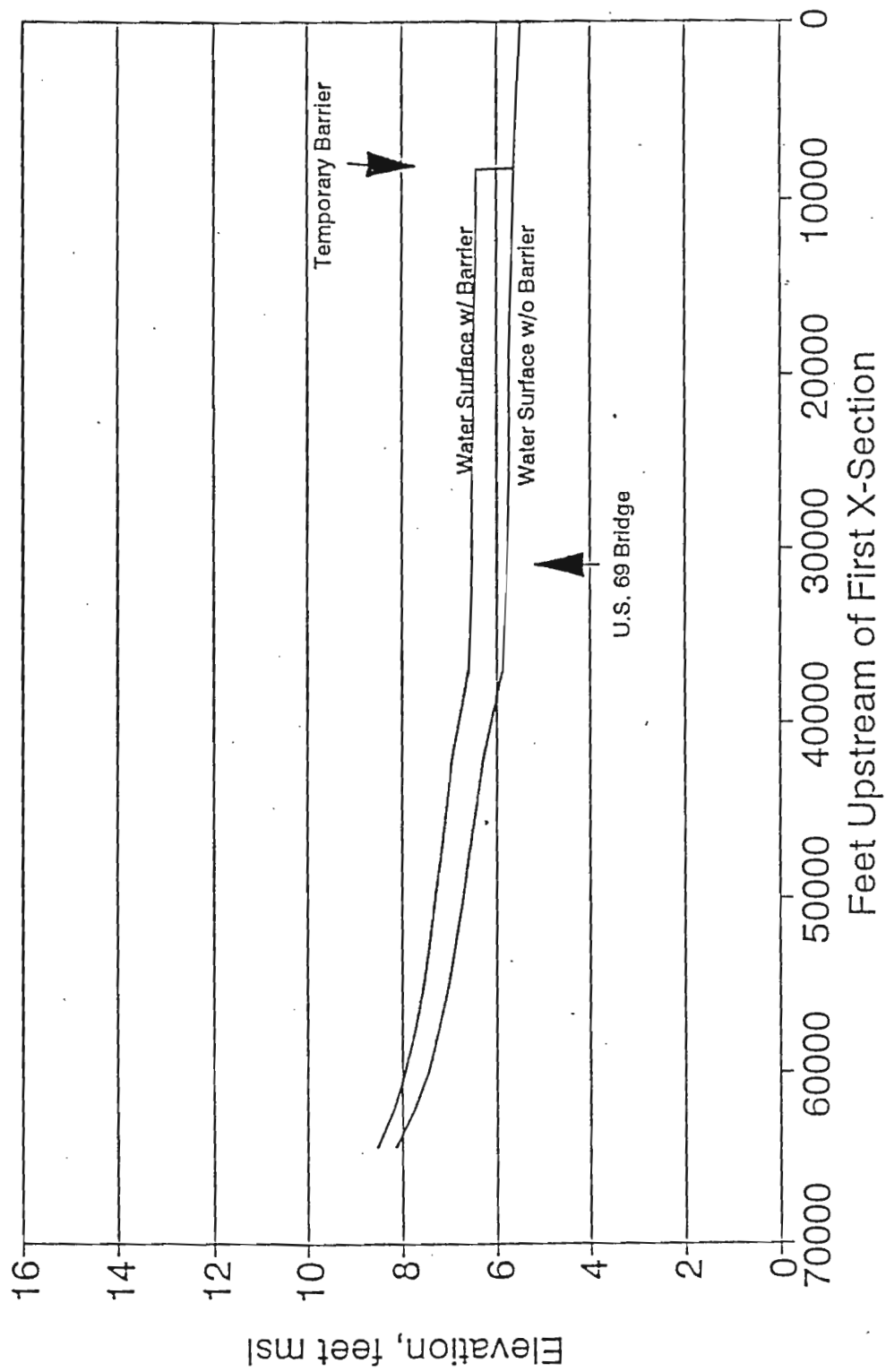


Figure 6

The best apparent answer to this issue is to make sure that there are conveniently located ramps for launching and retrieval of boats above and below the barriers. Since most of the shoreline is within the Big Thicket, any new public ramps would require approval of the National Park Service. The Authority proposes to work jointly with the Big Thicket management to determine whether suitable ramps already exist and, if not, whether satisfactory new ramps can be provided.

Signs and Lighting

The LNVA has in the past placed signs, reflectors and battery-operated caution lights on the barrier structures. The Authority proposes to review the adequacy of the signing and lighting and to upgrade them if necessary so as to meet the requirements of the U.S. Coast Guard for such situations.

REQUEST FOR A FAVORABLE DECISION

We want to express our appreciation to the Galveston District of the Corps for their highly professional attention to this matter. In particular, we appreciate the very constructive way in which the Galveston district and the Fort Worth District have coordinated their efforts, so that both of them are fully aware of the problem and are working together for positive results.

We also are grateful to the Big Thicket staff and the Texas Parks and Wildlife Department for the constructive manner in which they have responded to this difficult challenge.

This is a very serious matter, and to get a proper resolution will call for the best and most mature efforts of all of us. The LNVA wants to assure each and every one of you who are present here tonight that we will do everything reasonably possible to hold the negative impacts of the temporary barriers to a minimum.

We respectfully request that the Galveston District and others work with us and help us in reaching that goal. We also request that the Galveston District grant the LNVA's application and issue a permit, to remain in force for a period of at least five years, that will allow installation of the temporary barriers if they become truly necessary.

APPENDIX IV

DEPARTMENT C

Appendix
ATTACHMENT IV

Lower Neches
Permittee Valley Authority

Permit No. 19611

Issuing Office Galveston District

NOTE: The term "you" and its derivatives, as used in this permit, refers to the appropriate district or division of this office or the appropriate official of that office acting under the authority of this permit.

here. The term
for the permitted

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: To install a temporary saltwater barrier consisting of steel sheet piling supported by timber piles, in accordance with the attached plans in six sheets, sheet one of which is entitled "SALT WATER BARRIER."

Project Location: Neches River, between stream mile 33.5 and stream mile 35.0 and in Pine Island Bayou near stream mile 3.0, near Beaumont, in Jefferson County, Texas.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on 31 December 1999. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.
2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.
3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

Special Conditions:

1. You must construct the temporary saltwater barrier and attendant structures as outlined in the project plans. As-built drawings of site specific waterway and barrier dimensions must be submitted to the Galveston District within 30 days of each barrier installation.

2. Barrier installation will commence only after you receive notification from the Corps of Engineers (COE) Fort Worth District (copy furnished to the Galveston District (COE) stating that the conservation pool within Sam Rayburn Reservoir has remained within Zone 3 for a 30 day time period; after 60 days, releases of water for the prevention of saltwater intrusion will be curtailed.

3. You must provide a written notice to mariners in the form of a public warning announcement, to be published in local newspapers covering the project area, approximately 15 days prior to the date on which you plan to install a saltwater barrier. Daily announcements will appear in local newspapers one week prior to the initiation of work. Copies of publishers affidavits and a notification of the commencement of work must be submitted to the COE Galveston District.

4. For all barrier installation and removal operations occurring within the Big Thicket National Preserve (BTNP), you must adhere to a Plan of Operations previously approved by BTNP officials.

5. Warning lights and markers must be installed on each barrier and each associated structure and maintained as per U.S. Coast Guard requirements.

6. All saltwater barrier structures and construction materials within each waterway and adjacent property must be removed within 60 days after Sam Rayburn Reservoir returns to and remains within Pool Zone 2. Requests to extend this deadline must be submitted to the Galveston District within this time frame and will be reviewed on a case by case basis. Written and photographic documentation must be submitted to the COE Galveston District within 30 days of the removal of each barrier.

7. You must participate with the Texas Parks and Wildlife Department in several studies that will provide much needed information regarding barriers impacts on paddlefish as well as other aquatic species. Specific study parameters must be submitted to the COE Galveston District within one year of permit issuance.

Special Conditions (Cont'd):

8. This permit will not be valid after the completion of the Federal Saltwater Barrier at Beaumont Project. If the Federal project is not deemed feasible, this permit will only be valid for 5 years and any extension of time request may be denied if you do not pursue an alternate design.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

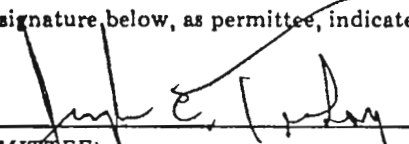
b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

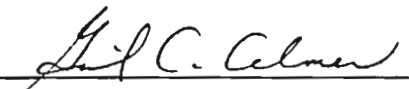
6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.


(PERMITTEE)
LOWER NECHES VALLEY AUTHORITY

3/21/94
(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.


(DISTRICT ENGINEER)
DOLAN DUNN
Chief, Special Actions Section
FOR COLONEL JOHN P. BASILOTTO

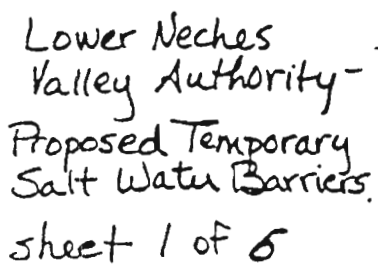
21 Mar 94
(DATE)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE)

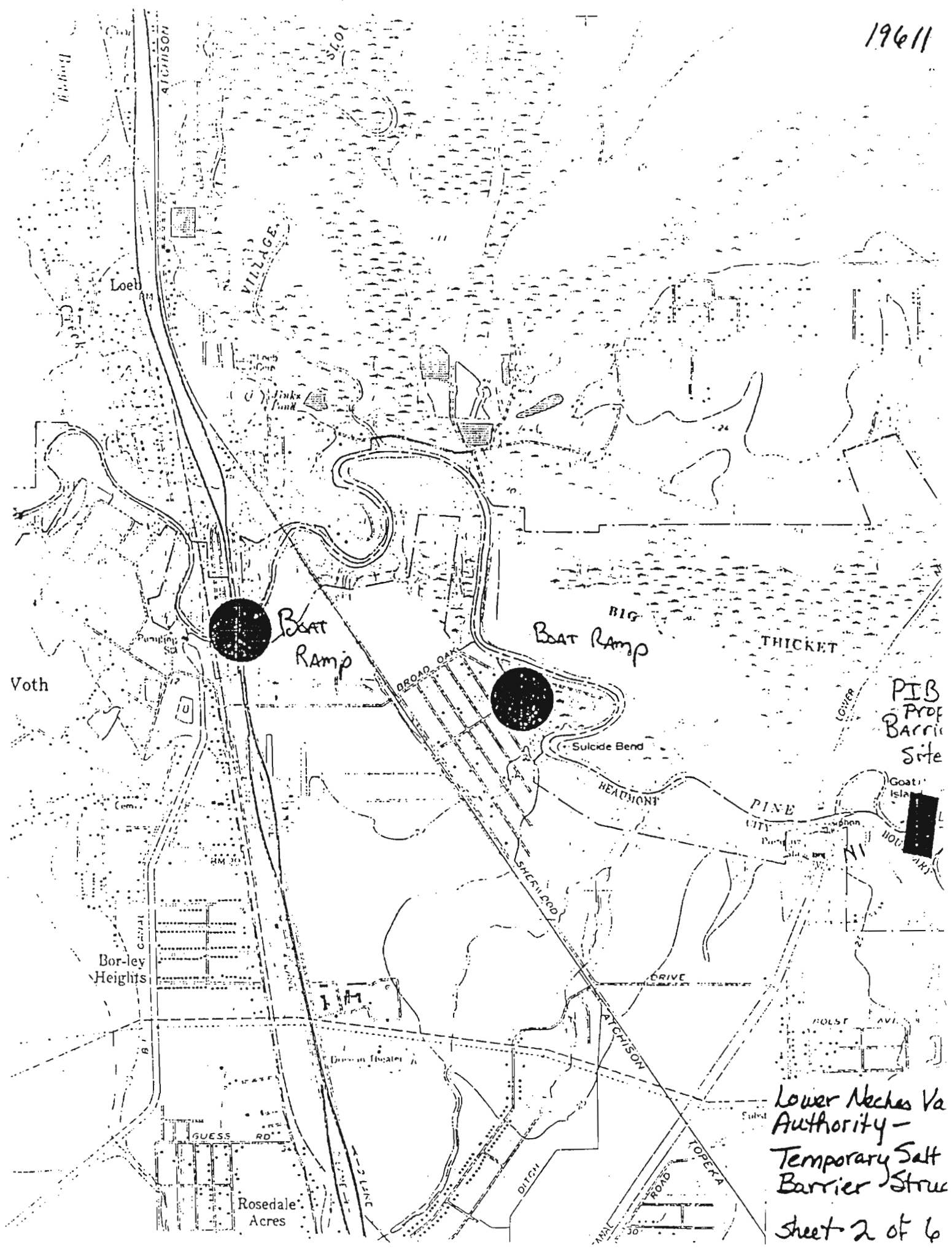
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19611



ATTACHMENT 1

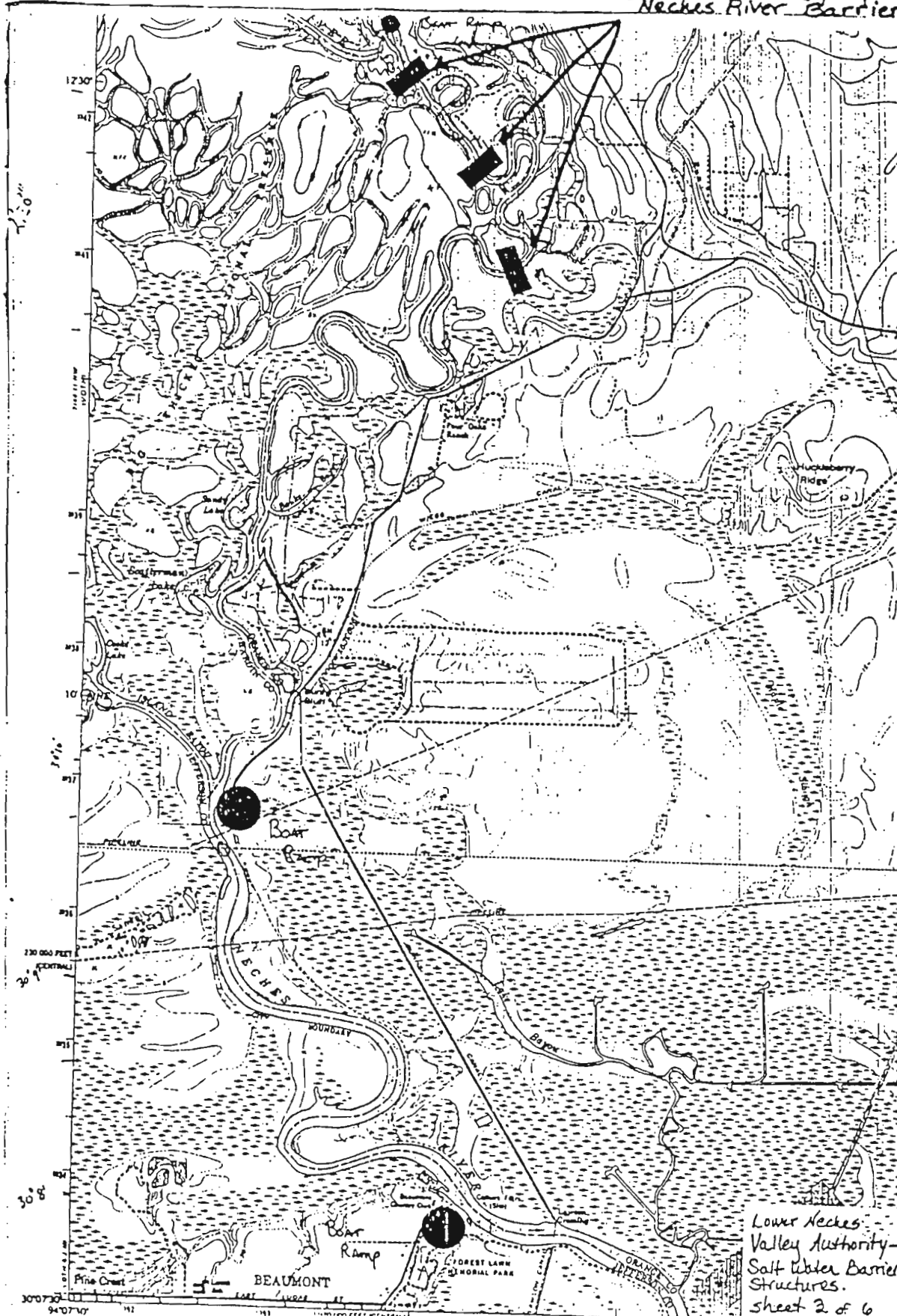
19611



Lower Neches Va
Authority -
Temporary Salt
Barrier Struc
Sheet 2 of 6

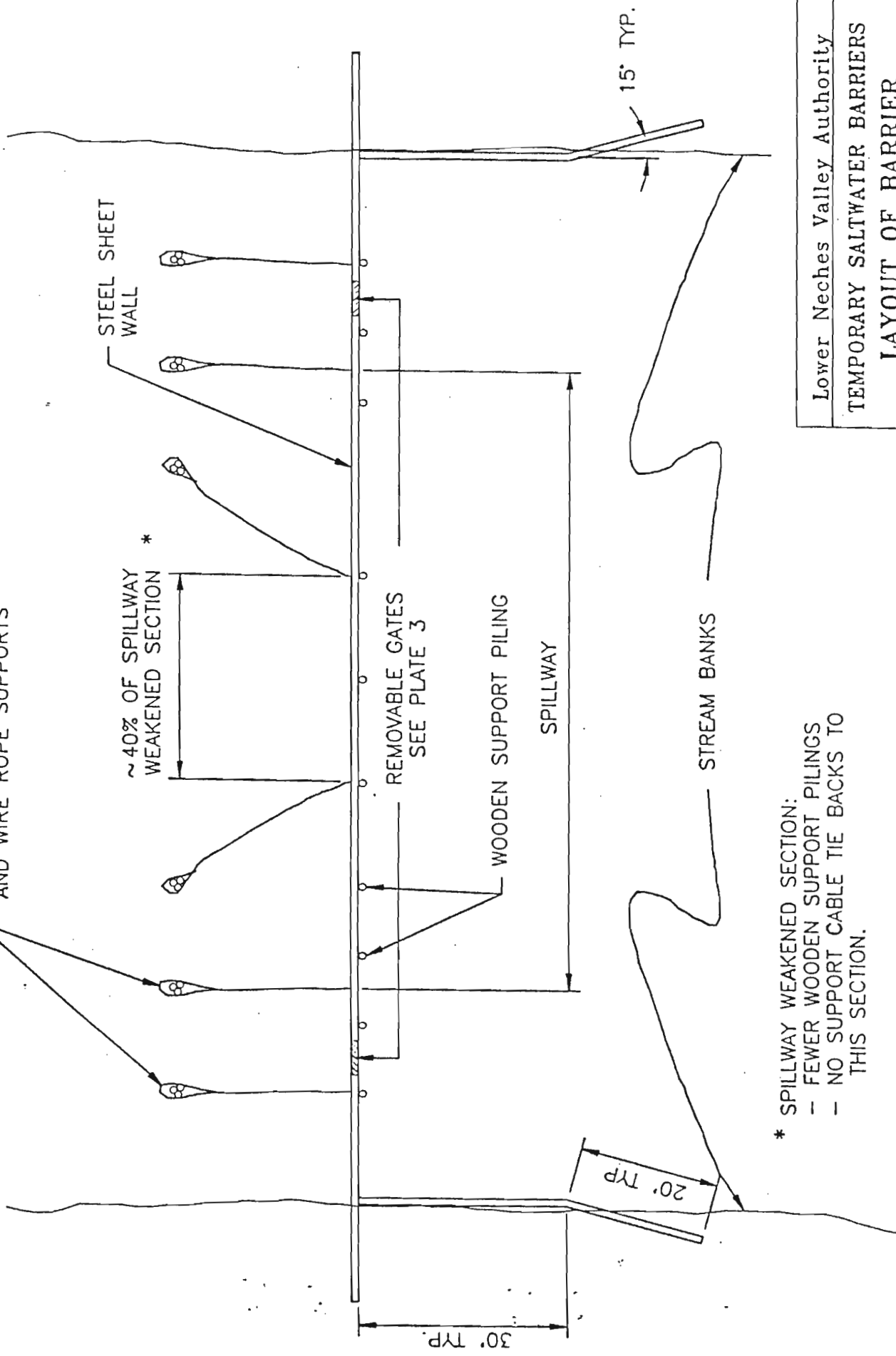
19611

Possible Sites For the proposed Neckes River Barrier



Lower Neckes
Valley Authority-
Salt Water Barrier
Structures.
sheet 2 of 6

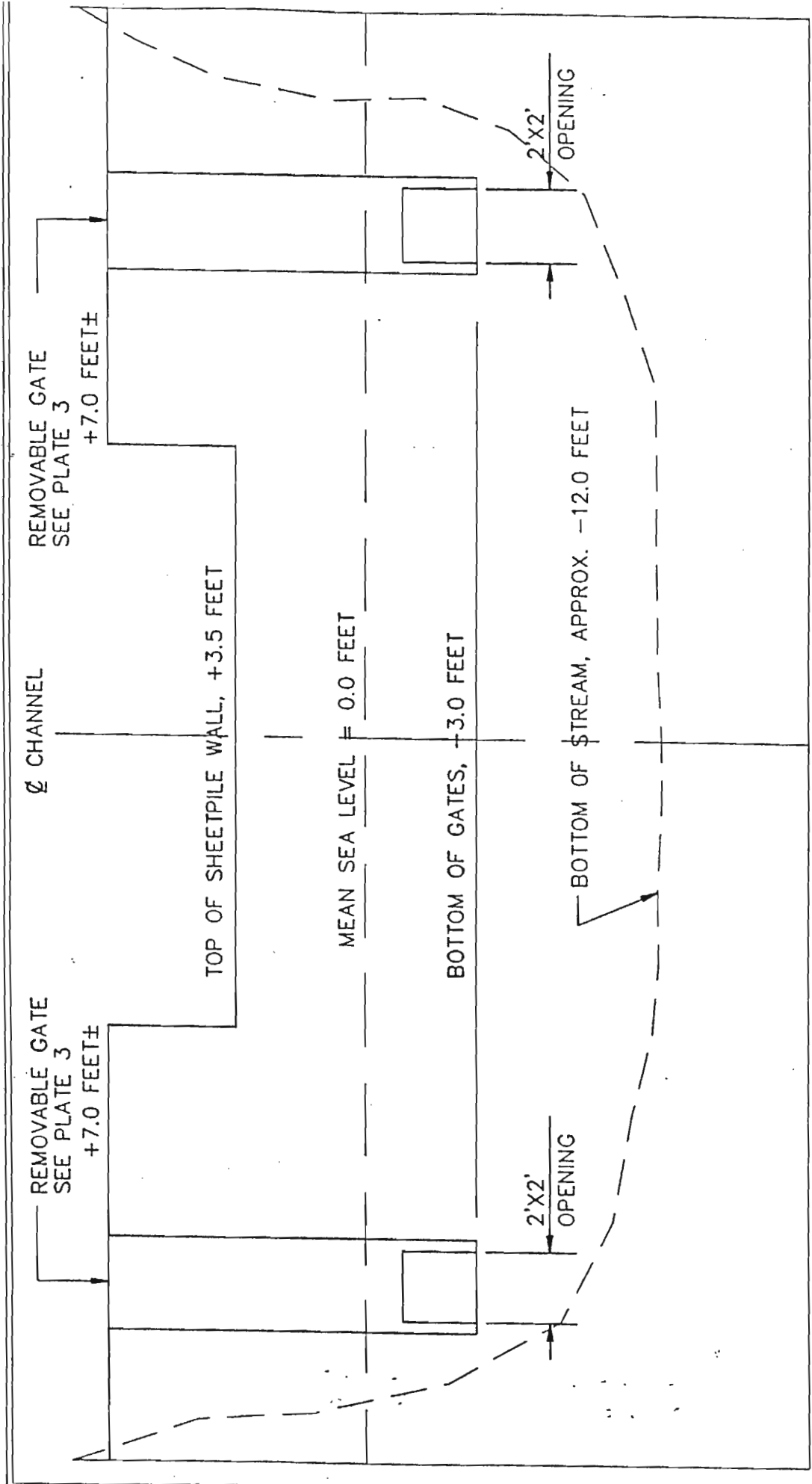
CLUSTERS OF PILINGS AND WIRE ROPE SUPPORTS



* SPILLWAY WEAKENED SECTION:
 - FEWER WOODEN SUPPORT PILINGS
 - NO SUPPORT CABLE TIE BACKS TO THIS SECTION.

Lower Neches Valley Authority
 TEMPORARY SALTWATER BARRIERS
 LAYOUT OF BARRIER

141-11
JAN 25 1994
FEB 03, 1994
1:56:00 P.M.

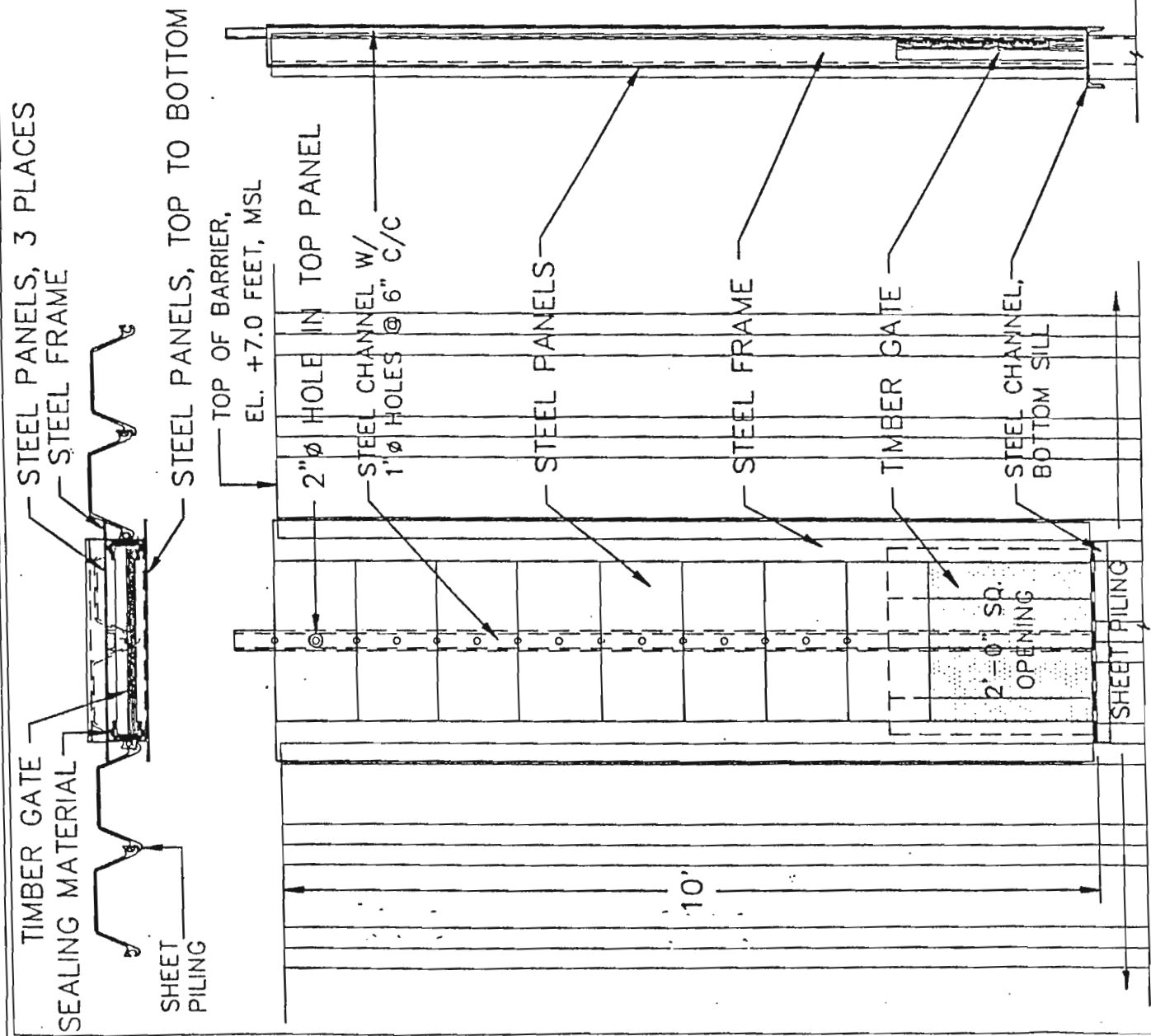


NOTE: STREAMBED NOT TO SCALE.

Lower Neches Valley Authority
TEMPORARY SALTWATER BARRIERS
PROFILE OF BARRIER
Jan. 1994
Figure 576

NOV 1994 10:33 A.M.
FEB 1994 10:33 A.M.

NOTE: DRAWING IS SCHEMATIC.
DETAILED DESIGN TO
CONFORM TO ACTUAL
BARRIER CONFIGURATION.



Lower Neches Valley Authority
TEMPORARY SALTWATER BARRIERS
REMOVABLE GATE
Jan. 1994
Figure 696

APPENDIX V

NECHES VALLEY AUTHORITY

AL, INDUSTRIAL AND AGRICULTURAL WATER

Mailing Address
P.O. Drawer 3464
Beaumont, Texas 77704-3464
Fax 409-898-2468

June 9, 1994

vigation
ct
ng

96

Dear Mr. Harrison:

As per our telephone conversation of June 1, 1994, I am forwarding information concerning Lower Neches Valley Authority's (LNVA) temporary salt water barriers (SWB). These temporary structures are occasionally placed across the stream channels of Pine Island Bayou and the Neches River and are necessary to prevent salt water from migrating upstream to LNVA water supply intakes during periods of extended drought. The barriers are removed from the streams as soon as possible after flows are sufficient to keep salt water flushed from LNVA intakes. The Corps of Engineers (COE) - Galveston District has issued a Section 404 permit No. 19611 to LNVA which authorizes installation of these structures with special provisions (See attached Permit). These special provisions include the installation of warning lights and markers maintained as per U.S. Coast Guard regulations. Following our telephone conversation and your review of LNVA's COE permit it was determined that a Private Aid to Navigation Application was not necessary because the barriers are temporary structures. In lieu of a formal application, LNVA is supplying the following information concerning marking the structures with Aids to Navigation.

A. NOTIFICATION PROCEDURES

LNVA will provide written notification to the USCG, 8th District, Aids to Navigation Branch at least 15 days prior to start of construction for each temporary SWB. LNVA will notify the USCG within 15 days if either of the structures remain in the stream for more than 180 days and will notify the USCG within 30 days after either structure is removed from the stream.

B. PROPOSED PROJECT LOCATION

The exact location of the temporary barriers are determined immediately prior to installation and will be included in the written notification discussed above. The general location of the barrier in the Neches River will be between River Mile 33.5 and River Mile 35.0 and in Pine Island Bayou will be near stream mile 3.0 near Beaumont, Texas in Jefferson County. (See Attached Permit)

C. AIDS TO NAVIGATION

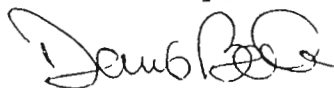
Each barrier will be marked as per 33 CFR Chapter 1 Subparts 66 and 67 as follows:

- 1.) Daymarks: Informational dayboards will be 3 ft. X 3 ft. white diamond shaped with a 2 inch orange retroreflective border. The words displayed will be "DANGER BARRICADE". The word "DANGER" will be written in 8 inch black letters; "BARRICADE" in 3 inch black letters. Two dayboards shall be installed on either stream bank approximately 500 feet upstream and 500 feet downstream of each structure, with the bottom of the dayboard approximately 7 feet up from the water's surface.
- 2.) Retroreflective Material: Each vertical wooden support piling (spaced approximately every 10 feet across the stream) and each cluster of wooden tie back piling shall be marked with a 6 inch horizontal band of retroreflective tape, white in color which will be visible for 360 degrees.
- 3.) Light Signals: Each barrier shall be marked with at least one obstruction light on each end of the structure, or with a total of at least two lights per barrier. Each light will conform to the following specifications:
 - A.) Will be white in color with a 360 degree lens.
 - B.) Will flash approximately 60 times a minute.
 - C.) Will be visible at least 1 nautical mile on 90% of the nights of the year.
 - D.) Will operate from sunrise to sunset from the start of construction until the structure is removed.
 - E.) Will be located at least 3 feet above the highest point on the structure.

Included in the notification letter will be a listing of type, model, name and address of manufacturer of the lighting apparatus LNVA would propose to use on the barriers.

If you need any additional information, please contact me at (409) 892-4011.

Sincerely,



Dennis Becker
Projects Coordinator

DRB/bb

enclosure

APPENDIX VI

LAND TRACT ACQUISITION RECORDS
LOWER NECHES VALLEY AUTHORITY SWB INSTALLATION AREA
BEAUMONT UNIT
BIG THICKET NATIONAL PRESERVE

Pine Island Bayou:

Tract #189-09; 1992.12 acres; \$1,834,025; \$921/acre; acquired from Kirby Forest Ind. 3/26/82.

Tract #190-02; 105.74 acres; \$97,349; \$921/acre; acquired from Kirby Forest Ind. 3/26/82.

Tract #190-03; 15.20 acres; \$28,500; \$1,875/acre; acquired from Sun Oil Co. 3/19/82.

Tract #190-04; 0.55 acres; \$1,050; \$1,909/acre; acquired from Sun Oil Co. 3/19/82.

Tract #190-05; 55.30 acres; \$50,911; \$921/acre; acquired from Kirby Forest Ind. 3/26/82.

Neches River:

Tract #190-01; 2654.56 acres; \$2,914,671; \$1,098/acre; acquired from Temple Inland 10/11/84.

Tract #193-04; 46.62 acres; \$94,295; \$2,023/acre; acquired from H.H.Houseman 4/6/84.

Tract #193-06; 9.17 acres; \$58,920; \$6,425/acre; acquired from H.H.Houseman 4/6/84.

Tract #195-10; 0.63 acres; \$24,000; \$38,095/acre; acquired from H.H.Houseman 4/6/84.

Tract #195-11; 0.49 acres; \$11,750; \$23,980/acre; acquired from Amos Land 2/13/80.

Tract #195-12; 0.42 acres; \$16,500; \$39,286/acre; acquired from Gene L. Barkley 5/9/90.

Tract #193-02; 25.41 acres; \$44,964; \$1,770/acre; acquired from A.P.Hart 7/20/83.

Tract #193-01; 294.09 acres; \$439,600; \$1,495; acquired from Sabine Investment Co. 2/14/84.