Texas Commission on Environmental Quality
TCEQ Industrial Wastewater Permit Application
Port of Corpus Christi Authority of Nueces County
Proposed Desalination Plant
Harbor Island

Table of Contents

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

TCEQ INDUSTRIAL WASTEWATER PERMIT APPLICATION

INDUSTRIAL ADMINISTRATIVE REPORT

Complete and submit this checklist with the application.

APPLICANT: Port of Corpus Christi Authority of Nueces County

PERMIT NUMBER: N/A

Indicate if each of the following items is included in your application.

	Y	N
Administrative Report 1.0	☒	☐
Administrative Report 1.1	☒	☐
SPIF	☒	☐
Core Data Form	☒	☐
Technical Report 1.0	☒	☐
Worksheet 1.0	☐	☒
Worksheet 2.0	☒	☐
Worksheet 3.0	☐	☒
Worksheet 3.1	☐	☒
Worksheet 3.2	☐	☒
Worksheet 3.3	☐	☒
Worksheet 4.0	☒	☐
Worksheet 4.1	☐	☒
Worksheet 5.0	☐	☒
Worksheet 6.0	☐	☒
Worksheet 7.0	☐	☒

	Y	N
Worksheet 8.0	☐	☒
Worksheet 9.0	☐	☒
Worksheet 10.0	☐	☒
Worksheet 11.0	☐	☒
Worksheet 11.1	☐	☒
Worksheet 11.2	☐	☒
Worksheet 11.3	☐	☒
Original USGS Map	☒	☐
Affected Landowners Map	☒	☐
Landowner Disk or Labels	☒	☐
Flow Diagram	☒	☐
Site Drawing	☒	☐
Original Photographs	☒	☐
Solids Management Program	☐	☒
Water Balance	☒	☐

RECEIVED

MAR 0 7 2018

WATER QUALITY DIVISION
Applications Team

Hand Delivery
Lan K. Thomas

For Commission Use Only:
Segment Number: ________ County: ________________ Expiration Date: ________________
Proposed/Current Permit Number: ________________ Region: ________________

INDUSTRIAL ADMINISTRATIVE REPORT 1.0

The following information **is required** for **all** applications—renewals, new, and amendments.

1. TYPE OF APPLICATION AND FEES (Instructions, Page 21)

Permit No.: N/A

EPA ID No.: N/A

- ☒ New TPDES permit
- ☐ Major Amendment with Renewal
- ☐ Renewal of existing permit
- ☐ Minor Amendment to permit
- ☐ New TLAP permit
- ☐ Major Amendment without Renewal
- ☐ Stormwater only discharge
- ☐ Minor modification to permit

If applying for an **amendment** or modification of a permit, please describe the request in detail.

N/A

Please indicate by a check mark the amount submitted for the application fee:

EPA Classification	New	Major Amendment (With or Without Renewal)	Renewal Only	Minor Amendment/ Minor Modification
Minor facility not subject to EPA categorical effluent guidelines (*40 CFR Parts 400-471*)	☒ $350	☐ $350	☐ $315	☐ $150
Minor facility subject to EPA categorical effluent guidelines (*40 CFR Parts 400-471*)	☐ $1,250	☐ $1,250	☐ $1,215	☐ $150
Major facility	N/A *	☐ $2,050	☐ $2,015	☐ $450

* All facilities are designated as minors until formally classified as a major by EPA.

Payment Information:

Mailed Check or Money Order Number: Click here to enter text.

Check or Money Order Amount: Click here to enter text.

Named Printed on Check or Money Order: Click here to enter text.

EPAY Voucher Number: 358549/358550

Copy of Voucher Enclosed? ☒ Yes

Attachment: 1

2. APPLICANT INFORMATION (Instructions, Pages 21-22)

a. Facility Owner

(Owner of the facility must apply for the permit.)

What is the Legal Name of the entity (applicant) applying for this permit?

Port of Corpus Christi Authority of Nueces County

(The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal documents forming the entity.)

If the applicant is currently a customer with the TCEQ, what is the Customer Number (CN)? You may search for your CN on the TCEQ website at http://www15.tceq.texas.gov/crpub/index.cfm?fuseaction=cust.CustSearch

CN: 600885248

What is the name and title of the person signing the application? The person must be an executive official meeting signatory requirements in *30 TAC § 305.44*.

First/Last Name: John P. LaRue

Title: Executive Director Credential:

b. Co-applicant Information

What is the Legal Name of the co-applicant applying for this permit?

N/A

(The legal name must be spelled exactly as filed with the TX SOS, with the County, or in the legal documents forming the entity.)

If the co-applicant is currently a customer with the TCEQ, what is the Customer Number (CN)? You may search for your CN on the TCEQ website at http://www15.tceq.texas.gov/crpub/index.cfm?fuseaction=cust.CustSearch:

CN: N/A

What is the name and title of the person signing the application? The person must be an executive official meeting signatory requirements in *30 TAC § 305.44*.

First/Last Name: N/A

Title: N/A Credential: N/A

Provide a brief description of the need for a co-permittee:

N/A

c. Core Data Form

Complete the Core Data Form for each customer and include as an attachment. If the customer type selected on the Core Data Form is **Individual**, complete **Attachment 1** of Administrative Report 1.0.

Attachment: 2

3. APPLICATION CONTACT INFORMATION (Instructions, Page 22)

If the TCEQ needs additional information regarding this application, who should be contacted?

a. First/Last Name: Sarah L. Garza   Credential: Click here to enter text.
Organization Name: Port of Corpus Christi Authority   Title: Director Environmental Planning
Mailing Address: P.O. Box 1541
City: Corpus Christi   State: Texas   ZIP Code: 78403
Phone No.: 361-885-6163   Ext.: Click here to enter text.   Fax No.: Click here to enter text.
E-mail Address: sarah@pocca.com
Check one or both: ☒ Administrative Contact ☒ Technical Contact

b. First/Last Name: David R. Hoffman   Credential: Agent
Organization Name: Amec Foster Wheeler E&I, Inc.   Title: Vice President
Mailing Address: 585 N. Dairy Ashford Road
City: Houston   State: Texas   ZIP Code: 77079
Phone No.: 713-570-1016   Ext.: N/A   Fax No.: N/A
E-mail Address: david.hoffman@amecfw.com
Check one or both: ☒ Administrative Contact ☒ Technical Contact

Attachment: N/A

4. PERMIT CONTACT INFORMATION (Instructions, Page 22)

Provide two names of individuals that can be contacted throughout the permit term.

a. First/Last Name: John P. LaRue   Credential: N/A
Organization Name: Port of Corpus Christi Authority   Title: Executive Director
Mailing Address: P.O. Box 1541
City: Corpus Christi   State: Texas   ZIP Code: 78403
Phone No.: 361-882-5633   Ext.: N/A   Fax No.: N/A
E-mail Address: john@pocca.com

b. First/Last Name: Sean Strawbridge   Credential: N/A
Organization Name: Port of Corpus Christi Authority   Title: Deputy Director and COO
Mailing Address: P.O. Box 1541
City: Corpus Christi   State: Texas   ZIP Code: 78403
Phone No.: 361-882-5633   Ext.: N/A   Fax No.: N/A
E-mail Address: sstrawbridge@pocca.com
Attachment: N/A

5. BILLING CONTACT INFORMATION(Instructions, Page 22)

The permittee is responsible for paying the annual fee. The annual fee will be assessed to permits in effect on September 1 of each year. *The TCEQ will send a bill to the address provided in this section. The permittee is responsible for terminating the permit when it is no longer needed (using form TCEQ-20029).*

First/Last Name: Sarah L. Garza
Credential: Click here to enter text.
Organization Name: Port of Corpus Christi Authority
Title: Director Environmental Planning
Mailing Address: PO Box 1541
City: Corpus Christi
State: Texas
ZIP Code: 78403
Phone No.: (361) 885-6163
Ext.: Click here to enter text.
Fax No.: (361) 881-5161
E-mail Address: sarah@pocca.com

6. DMR/MER CONTACT INFORMATION (Instructions, Pages 22-23)

Provide the name and complete mailing address of the person delegated to receive and submit Discharge Monitoring Reports (EPA 3320-1) or Monthly Effluent Reports.

First/Last Name: Sarah L. Garza
Credential: Click here to enter text.
Organization Name: Port of Corpus Christi Authority
Title: Director Environmental Planning
Mailing Address: PO Box 1541
City: Corpus Christi
State: Texas
ZIP Code: 78403
Phone No.: (361) 885-6163
Ext.: Click here to enter text.
Fax No.: (361) 881-5161
E-mail Address: sarah@pocca.com

You can submit DMR data on the TCEQ website at https://www.tceq.texas.gov/field/netdmr/netdmr.html. Establish an electronic reporting account with the permit number.

7. NOTICE INFORMATION (Instructions, Pages 23-24)

a. Individual Publishing the Notices

First/Last Name: Sarah L. Garza
Credential: Click here to enter text.
Organization Name: Port of Corpus Christi Authority
Title: Director Environmental Planning
Mailing Address: PO Box 1541
City: Corpus Christi
State: Texas
ZIP Code: 78403
Phone No.: (361) 885-6163
Ext.: Click here to enter text.
Fax No.: (361) 881-5161
E-mail Address: sarah@pocca.com

b. Method for Receiving Notice of Receipt and Intent to Obtain a Water Quality Permit Package

Indicate by a check mark the preferred method for receiving the first notice and instructions:

☒ E-mail Address:

☐ Fax No.:

☒ Regular Mail:

Mailing Address: PO Box 1541

City: Corpus Christi State: Texas ZIP Code: 78403

Phone No.: (361) 885-6163 Ext.: Click here to enter text. Fax: (361) 881-5161

c. Contact in the Notice

First/Last Name: Sarah L. Garza Credential: Click here to enter text.

Organization Name: Port of Corpus Christi Authority Title: Director Environmental Planning

Phone No.: (361) 885-6163 Ext.: Click here to enter text. E-mail: sarah@pocca.com

d. Public Place Information

If the facility or outfall is located in more than one county, a public viewing place for each county must be provided.

Public building name: La Retama Central Library

Location within the building: Reference Shelf

Physical Address of Building: 805 Comanche

City: Corpus Christi County: Nueces

Contact Name: Russell Beard

Phone No.: 361-826-7000 Ext.: Click here to enter text.

e. Bilingual Notice Requirements:

This information is required for new, major amendment, and renewal applications. It is not required for minor amendment or minor modification applications.

This section of the application is only used to determine if alternative language notices will be needed. Complete instructions on publishing the alternative language notices will be in your public notice package.

Please call the bilingual/ESL coordinator at the nearest elementary and middle schools and obtain the following information to determine whether an alternative language notices are required.

1. Is a bilingual education program required by the Texas Education Code at the elementary or middle school nearest to the facility or proposed facility?

   ☐ Yes ☒ No

   If no, publication of an alternative language notice is not required; skip to Item 8 (REGULATED ENTITY AND PERMITTED SITE INFORMATION.)

2. Are the students who attend either the elementary school or the middle school enrolled in a bilingual education program at that school?

☐ Yes ☐ No

3. Do the students at these schools attend a bilingual education program at another location?

☐ Yes ☐ No

4. Would the school be required to provide a bilingual education program but the school has waived out of this requirement under 19 TAC §89.1205(g)?

☐ Yes ☐ No

5. If the answer is yes to question 1, 2, 3, or 4, public notices in an alternative language are required. Which language is required by the bilingual program? Click here to enter text

8. REGULATED ENTITY AND PERMITTED SITE INFORMATION (Instructions Pages 24-26)

If the site of your business is part of a larger business site, a Regulated Entity Number (RN) may already be assigned for the larger site. Use the RN assigned for the larger site. Search the TCEQ's Central Registry at http://www15.tceq.texas.gov/crpub/index.cfm?fuseaction=regent.RNSearch to determine the RN or to see if the larger site may already be registered as a regulated site:

If the site is found, provide the assigned Regulated Entity Number and provide the information for the site to be authorized through this application below. The site information for this authorization may vary from the larger site information.

TCEQ issued Regulated Entity Number (RN): RN 105622112

a. State/TPDES Permit No.: Click here to enter text. Expiration Date: Click here to enter text.

EPA Identification No. (TPDES Permits only): TX Click here to enter text.

b. Name of project or site (the name known by the community where located): Harbor Island

c. Is the location address of the facility in the existing permit the same?

☒ Yes ☐ No

d. If the facility is located in Bexar, Comal, Hays, Kinney, Medina, Travis, Uvalde, or Williamson County, additional information concerning protection of the Edwards Aquifer may be required.

e. Owner of treatment facility: Port of Corpus Christi

Ownership of Facility: ☐ Public ☐ Private ☒ Both ☐ Federal

f. Owner of land where treatment facility is or will be:

First/Last Name: Port of Corpus Christi Authority

Mailing Address: PO Box 1541

City: Corpus Christi State: Texas ZIP Code: 78403

Phone No.: 361-885-6163 E-mail Address: sarah@pocca.com

If not the same as the facility owner, there must be a long-term lease agreement in effect for at least six years. In some cases, a lease may not suffice - see instructions.

Attachment: N/A

g. Owner of effluent disposal site:

First/Last Name: N/A

Mailing Address: N/A

City: N/A State: N/A ZIP Code: N/A

Phone No.: N/A E-mail Address: N/A

If not the same as the facility owner, there must be a long-term lease agreement in effect for at least six years.

Attachment: N/A

h. Owner of sewage sludge disposal site:

First/Last Name: N/A

Mailing Address: N/A

City: N/A State: N/A ZIP Code: N/A

Phone No.: N/A E-mail Address: N/A

If not the same as the facility owner, there must be a long-term lease agreement in effect for at least six years.

Attachment: N/A

(This information is required only if authorization is sought in the permit for sludge disposal on property owned or controlled by the applicant.)

9. DISCHARGE/ DISPOSAL INFORMATION (Instructions, Pages 26-28)

a. Is the facility located on or does the treated effluent cross American Indian Land?

☐ Yes ☒ No

b. Provide an original full size USGS Topographic Map with all required information. Indicate by a check mark that the following information is provided.

- ☒ Applicant's property boundary
- ☐ Effluent disposal site boundaries
- ☒ Treatment facility boundaries
- ☒ New and future construction
- ☒ Labeled point(s) of discharge and highlighted discharge route(s)
- ☒ One-mile radius and three-miles downstream information
- ☐ Sewage sludge disposal site
- ☐ All ponds

c. Is the location of the sewage sludge disposal site in the existing permit accurate?

☐ Yes ☐ No

If no, or a new permit application, please give an accurate description:

N/A

d. Are the point(s) of discharge and the discharge route(s) in the existing permit correct?

☒ Yes ☐ No

If no, or a new or amendment permit application, provide an accurate description:

This is a new permit application. The discharge route is via an HDPE pipeline to a multi-port diffuser approximately 300 ft off shore on the south side of Harbor Island in Corpus Christi Channel (Segment 2481). From this point, the discharge is tidal, and will flow either into the Gulf of Mexico via Aransas Pass or through the Corpus Christi Channel toward Corpus Christ Bay.

e. City nearest the outfall(s): Port Aransas

f. County in which the outfalls(s) is/are located: Nueces

g. Outfall Latitude: 27.503882° Longitude: -97.034908°

h. Is or will the treated wastewater discharge to a city, county, or state highway right-of-way, or a flood control district drainage ditch?

☐ Yes ☒ No

If yes, indicate by a check mark if:

☐ Authorization granted ☐ Authorization pending

For new and amendment applications, provide copies of letters that show proof of contact and the approval letter upon receipt.

Attachment: N/A

i. For all applications involving an average daily discharge of 5 MGD or more, provide the names of all counties located within 100 statute miles downstream of the point(s) of discharge.

N/A – The point of discharge is Corpus Christi Channel. No counties are located downstream of the point of discharge.

j. For TLAPs, is the location of the effluent disposal site in the existing permit accurate?

☐ Yes ☐ No

If no, or a new or amendment permit application, provide an accurate description:

N/A

k. City nearest the disposal site: N/A

l. County in which the disposal site is located: N/A

m. Disposal Site Latitude: N/A Longitude: N/A

n. For TLAPs, describe the routing of effluent from the treatment facility to the disposal site:

N/A

o. For TLAPs, please identify the nearest watercourse to the disposal site to which rainfall runoff might flow if not contained:

N/A

10. MISCELLANEOUS INFORMATION (Instructions, Pages 28-29)

a. Did any person formerly employed by the TCEQ represent your company and gert paid for service regarding this application?

☐ Yes ☒ No

List each person formerly employed by the TCEQ who represented your company and was paid for service regarding the application:

N/A

b. Do you owe any fees to the TCEQ?

☐ Yes ☒ No

If yes, provide the following information:

Account number: N/A Amount past due: N/A

c. Do you owe any penalties to the TCEQ?

☐ Yes ☒ No

If yes, please provide the following information:

Enforcement order number: N/A Amount past due: N/A

11. SIGNATURE PAGE (Instructions, Page29)

Permit Number:

Applicant:

Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under 30 Texas Administrative Code §305.44 to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signatory name (typed or printed): John P. LaRue

Signatory title: Executive Director

Signature:______________________ Date: MAR 05 2018

(Use blue ink)

Subscribed and Sworn to before me by the said John LaRue

on this 5th day of March, 2018.

My commission expires on the 29 day of July, 2018.

Notary Public

LESLYE LILIANA CAVAZOS
Notary Public, State of Texas
Comm. Expires 07-29-2018
Notary ID 129900160

[SEAL]

Nueces
County, Texas

If co-applicants are necessary, each entity must submit an original, separate signature page.

INDUSTRIAL ADMINISTRATIVE REPORT 1.1

The following information is required for new and amendment applications.

1. AFFECTED LANDOWNER INFORMATION (Instructions, Pages 30-32)

a. Indicate by a check mark that the landowners map or drawing, with scale, includes the following information, as applicable.

- ☒ The applicant's property boundaries
- ☒ The facility site boundaries within the applicant's property boundaries
- ☒ The distance the buffer zone falls into adjacent properties and the property boundaries of the landowners located within the buffer zone
- ☒ The property boundaries of all landowners surrounding the applicant's property (Note: if the application is a major amendment for a lignite mine, the map must include the property boundaries of all landowners adjacent to the new facility (ponds).)
- ☒ The point(s) of discharge and highlighted discharge route(s) clearly shown for one mile downstream
- ☒ The property boundaries of the landowners located on both sides of the discharge route for one full stream mile downstream of the point of discharge
- ☒ The property boundaries of the landowners along the watercourse for a one-half mile radius from the point of discharge if the point of discharge is into a lake, bay, estuary, or affected by tides
- ☐ The boundaries of the effluent disposal site (for example, irrigation area or subsurface drainfield site) and all evaporation/holding ponds within the applicant's property
- ☐ The property boundaries of all landowners surrounding the applicant's property boundaries where the effluent disposal site is located
- ☐ The boundaries of the sludge land application site (for land application of sewage sludge for beneficial use) and the property boundaries of landowners surrounding the applicant's property boundaries where the sewage sludge land application site is located
- ☐ The property boundaries of landowners within one-half mile in all directions from the applicant's property boundaries where the sewage sludge disposal site (for example, sludge surface disposal site or sludge monofill) is located

b. Indicate by a check mark in which format the landowners list is submitted:

☒ Readable/Writeable CD ☐ Four sets of labels

c. ☒ Indicate by a check mark that a separate list with the landowners' names and mailing addresses cross-referenced to the landowners map has been provided.

d. Provide the source of the landowners' names and mailing addresses: Nueces County Appraisal District

e. As required by *Texas Water Code § 5.115*, is any permanent school fund land affected by this application?

☐ Yes ☒ No

f. If yes, provide the location and foreseeable impacts and effects this application has on the land(s):

N/A

2. ORIGINAL PHOTOGRAPHS (Instructions, Page 32)

Provide original ground level photographs. Indicate with checkmarks that the following information is provided.

☒ At least one original photograph of the new or expanded treatment unit location

☒ At least two photographs of the existing/proposed point of discharge and as much area downstream (photo 1) and upstream (photo 2) as can be captured. If the discharge is to an open water body (e.g., lake, bay), the point of discharge should be in the right or left edge of each photograph showing the open water and with as much area on each respective side of the discharge as can be captured.

☐ At least one photograph of the existing/proposed effluent disposal site

☒ A plot plan or map showing the location and direction of each photograph

ATTACHMENT 1

Payment Voucher

TCEQ ePay Receipt

Transaction Information

Trace Number:	582EA000291959
Date:	03/06/2018 04:42 PM
Payment Method:	ACH - Authorization 0000000000
Amount:	$1,250.00
ePay Actor:	Sarah Garza

Payment Contact Information

Name:	Sarah Garza
Company:	Port Of Corpus Christi
Address:	Po Box 1541, Corpus Christi, TX 78403
Phone:	361-885-6163

Cart Items

Voucher	Fee Description	AR Number	Amount
358549	WW PERMIT - MINOR FACILITY SUBJECT TO 40 CFR 400-471 - NEW		$1,200.00
358550	30 TAC 305.53B WQ NOTIFICATION FEE		$50.00

TCEQ ePay Voucher Receipt

Transaction Information

Voucher Number:	358549
Trace Number:	582EA000291959
Date:	03/06/2018 04:42 PM
Payment Method:	ACH - Authorization 0000000000
Amount:	$1,200.00
Fee Type:	WW PERMIT - MINOR FACILITY SUBJECT TO 40 CFR 400-471 - NEW
ePay Actor:	Sarah Garza

Payment Contact Information

Name:	Sarah Garza
Company:	Port Of Corpus Christi
Address:	Po Box 1541, Corpus Christi, TX 78403
Phone:	361-885-6163

Site Information

Site Name:	HARBOR ISLAND PROPERTY - FORMER FINA TANK FARM
Site Location:	PROPERTY ADJACENT TO HIGHWAY 361 AND FERRY LANDING TO THE NORTHWEST

Customer Information

Customer Name:	PORT OF CORPUS CHRISTI OF NUECES COUNTY
Customer Address:	PO BOX 1541, CORPUS CHRISTI, TX 78403

TCEQ ePay Voucher Receipt

Transaction Information

Voucher Number:	358550
Trace Number:	582EA000291959
Date:	03/06/2018 04:42 PM
Payment Method:	ACH - Authorization 0000000000
Amount:	$50.00
Fee Type:	30 TAC 305.53B WQ NOTIFICATION FEE
ePay Actor:	Sarah Garza

Payment Contact Information

Name:	Sarah Garza
Company:	Port Of Corpus Christi
Address:	Po Box 1541, Corpus Christi, TX 78403
Phone:	361-885-6163

ATTACHMENT 2

Core Data Form

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions regarding completion of this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission (If other is checked please describe in space provided.)

☒ New Permit, Registration or Authorization (Core Data Form should be submitted with the program application.)

☐ Renewal (Core Data Form should be submitted with the renewal form) ☐ Other

2. Customer Reference Number (if issued)	Follow this link to search for CN or RN numbers in Central Registry**	3. Regulated Entity Reference Number (if issued)
CN 600885248		RN 105622112

SECTION II: Customer Information

4. General Customer Information | 5. Effective Date for Customer Information Updates (mm/dd/yyyy)

☐ New Customer ☐ Update to Customer Information ☐ Change in Regulated Entity Ownership

☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)

The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).

6. Customer Legal Name (If an individual, print last name first: e.g.: Doe, John) | If new Customer, enter previous Customer below:

7. TX SOS/CPA Filing Number	8. TX State Tax ID (11 digits)	9. Federal Tax ID (9 digits)	10. DUNS Number (if applicable)

11. Type of Customer: ☐ Corporation ☐ Individual Partnership: ☐ General ☐ Limited

Government: ☐ City ☐ County ☐ Federal ☐ State ☐ Other ☐ Sole Proprietorship ☐ Other:

12. Number of Employees

☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☐ 501 and higher

13. Independently Owned and Operated?

☐ Yes ☐ No

14. Customer Role (Proposed or Actual) - as it relates to the Regulated Entity listed on this form. Please check one of the following:

☐ Owner ☐ Operator ☐ Owner & Operator

☐ Occupational Licensee ☐ Responsible Party ☐ Voluntary Cleanup Applicant ☐ Other:

15. Mailing Address:

City		State		ZIP		ZIP + 4	

16. Country Mailing Information (if outside USA)	17. E-Mail Address (if applicable)

18. Telephone Number	19. Extension or Code	20. Fax Number (if applicable)
( ) -		( ) -

SECTION III: Regulated Entity Information

21. General Regulated Entity Information (If `New Regulated Entity" is selected below this form should be accompanied by a permit application)

☐ New Regulated Entity ☐ Update to Regulated Entity Name ☐ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated in order to meet TCEQ Agency Data Standards (removal of organizational endings such as Inc, LP, or LLC).

22. Regulated Entity Name (Enter name of the site where the regulated action is taking place.)

23. Street Address of the Regulated Entity: (No PO Boxes)							
	City		State		ZIP		ZIP + 4
24. County							

Enter Physical Location Description if no street address is provided.

25. Description to Physical Location:					
26. Nearest City			State		Nearest ZIP Code
27. Latitude (N) In Decimal:			28. Longitude (W) In Decimal:		
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds

29. Primary SIC Code (4 digits)	30. Secondary SIC Code (4 digits)	31. Primary NAICS Code (5 or 6 digits)	32. Secondary NAICS Code (5 or 6 digits)
4491			
33. What is the Primary Business of this entity? (Do not repeat the SIC or NAICS description.)			
Loading and Unloading Cargo from and to Vessels, Rail, and Trucks.			

34. Mailing Address:							
	City		State		ZIP		ZIP + 4
35. E-Mail Address:	sarah@pocca.com						

36. Telephone Number	37. Extension or Code	38. Fax Number (if applicable)
(361) 885 - 6163		(361) 881 - 5161

39. **TCEQ Programs and ID Numbers** Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☐ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
☐ Voluntary Cleanup	☒ Waste Water	☐ Wastewater Agriculture	☐ Water Rights	☐ Other:
	New Permit Application			

SECTION IV: Preparer Information

40. Name: Sarah Garza			41. Title: Director Environmental Planning
42. Telephone Number	43. Ext./Code	44. Fax Number	45. E-Mail Address
(361) 885 - 6163		(361) 881 - 5161	sarah@pocca.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

Company:	Port Of Corpus Christi Authority Of Nueces County	Job Title:	Executive Director
Name(*In Print*):	John P. LaRue	Phone:	(361) 882 - 5633
Signature:		Date:	MAR 0 5 2018

ATTACHMENT 3

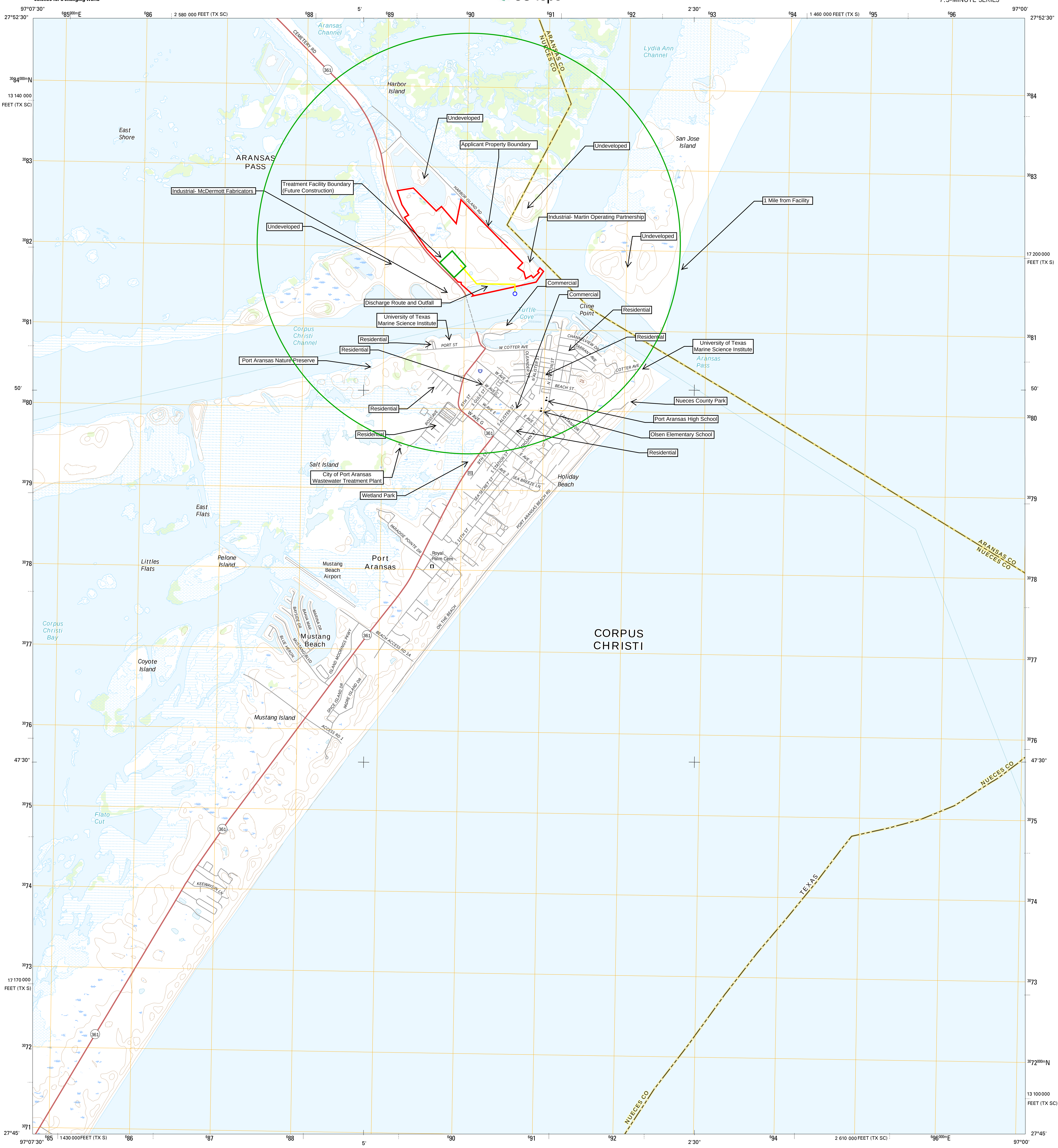
Original USGS Quadrangle Map

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

PORT ARANSAS QUADRANGLE
TEXAS
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 14R
10 000-foot ticks: Texas Coordinate System of 1983 (south and south central zones)

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery....NAIP, May 2014
Roads.... U.S. Census Bureau, 2014 - 2015
Names....GNIS, 2015
Hydrography....National Hydrography Dataset, 2014
Contours....National Elevation Dataset, 2012
Boundaries....Multiple sources; see metadata file 1972 - 2015

Wetlands....FWS National Wetlands Inventory 1977 - 2014

UTM GRID AND 2016 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
PR
Grid Zone Designation
14R

SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard, 2011.
A metadata file associated with this product is draft version 0.6.19

QUADRANGLE LOCATION

ADJOINING QUADRANGLES
1 Aransas Pass
2 Estes
3 Allyns Bight
4 Port Ingleside
5
6 Crane Islands NW
7 Crane Islands NW OE E
8

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

PORT ARANSAS, TX
2016

NSN. 7643016397778
NGA REF NO. USGSX24K36019

ATTACHMENT 4

Affected Landowners Map

Port of Corpus Christi Authority of Nueces County
Proposed Desalination Plant
Harbor Island, Port Aransas, Texas 78373

LANDOWNERS MAP

amec foster wheeler

FIGURE 1

Path: I:\Client\Port of CC\6703170030 - Desal Plant Permit Support\5.0 Figures\Figures\1 Application Figures\Technical Report\Attachment2_FacilityLayout\HI_LandownersMapv2.mxd

Port of Corpus Christi Authority of Nueces County
Proposed Desalination Plant
Harbor Island, Port Aransas, Texas 78373

LANDOWNERS MAP

amec foster wheeler

FIGURE 2

ATTACHMENT 5

Landowner Disk

Cross-Referenced Landowner List

Landowner Number	Name	Address	CITY	STATE	ZIP
1	ALVEY MERRI LEE & HUSB JO	PO Box 10	MARBLE FALLS	TX	78654
2	BARNFAIR PROP/UTOTEM INC	1370 AVE OF AMERICAS	NEW YORK	NY	10019
3	CAPPS PHYLLIS J	P. O. BOX 1728	PORT ARANSAS	TX	78373
4	CITY OF PORT ARANSAS	710 W. AVENUE A	PORT ARANSAS	TX	78373
5	DEEP SEA PROPERTIES INC	P O BOX 388	PORT ARANSAS	TX	78373
6	DURHAM JOSEPH	225 S 16th St	LA PORTE	TX	77571
7	ERF PORT ARANSAS INC	555 N CARACAHUA ST #700	CORPUS CHRISTI	TX	78401
8	GULLEYS DIVING SERVICE IN	P O BOX 521	PORT ARANSAS	TX	78373
9	HOWELL KEVIN T & WF CHRIS	1619 S 2nd St	AUSTIN	TX	78704
10	MARTIN OPERATING PARTNERS	4900 STONE RD	KILGORE	TX	75662
11	MILLER CHARLES K AND SHARON M MILLER WFE	PO BOX 5233	CORPUS CHRISTI	TX	78465
12	NORTON OWEN A	4003 BUNNY RUN	AUSTIN	TX	78746
13	PORT OF CORPUS CHRISTI	222 POWER STREET	CORPUS CHRISTI	TX	78401
14	PORT ARANSAS MARICULTURE CENTER - TEXAS A&M	1300 PORT STREET	CORPUS CHRISTI	TX	78403
15	STATE OF TEXAS	PO BOX 12608	AUSTIN	TX	78711
16	UNITED STATES OF AMERICA DEPT OF INTERIOR	1849 C STREET, N.W.	WASHINGTON	DC	20240
17	BASS BROTHERS ENTERPRISES, INC.	201 MAIN STREET, SUITE 250	FORT WORTH	TX	76102
18	TEXAS GENERAL LAND OFFICE	1700 CONGRESS AVENUE	AUSTIN	TX	78701
19	TXDOT	125 EAST 11TH STREET	AUSTIN	TX	78701
20	US COAST GRD	13411 HILLARD STREET	HOUSTON	TX	77034
21	TEAL HARBOR	200 WEST COTTER AVENUE	PORT ARANSAS	TX	78373
22	THE HARBOUR LUXURY CONDOMINIUMS	1726 HIGHWAY 361	PORT ARANSAS	TX	78373
23	CONDO.1659	116 WEST COTTER AVENUE	PORT ARANSAS	TX	78373
24	ELLIS WILLIAM R TRUST SUC	309 CAPE ARON DRIVE	CORPUS CHRISTI	TX	78412
25	FISHERMANS WHARF	P O BOX 387	PORT ARANSAS	TX	78373
26	URBAN JAMES L & MARK GROS	P O BOX 872	PORT ARANSAS	TX	78373
27	231 PORTA LLC	203 HUMBLE AVENUE	SAN ANTONIO	TX	78225
28	BRAMAN RANCHES LLC	PO BOX 400	VICTORIA	TX	77902
29	EDWARDS & RICHTER LLP	PO BOX 3185	PORT ARANSAS	TX	78373
30	MILLER CHARLES & SHARON MILLER	PO BOX 5253	CORPUS CHRISTI	TX	78465
31	C & F WEIL TRUST ETAL	500 N SHORELINE BLVD STE	CORPUS CHRISTI	TX	78401

Cross-Referenced Landowner List

32	SEUREAU GLENN	3214 INWOOD DR	HOUSTON	TX	77019
33	ABELL REALTY LMTD PARTNER	4608 CRESTWAY DR	AUSTIN	TX	78731
34	GROSSE RICHARD M ET UX	BOX 872	PORT ARANSAS	TX	78373
35	GUENTHER LIFE INSURANCE TRUST	153 TREELINE PARK STE 300	SAN ANTONIO	TX	78209
36	WATSON-PINBROOK INC	P.O. BOX 170155	ARLINGTON	TX	76003
37	MCALLISTER WALTER W III	4940 BROADWAY STE 104	SAN ANTONIO	TX	78209
38	WOODY'S INC	136 WEST COTTER AVENUE	PORT ARANSAS	TX	78373
39	PORTA CORPORATION	PO BOX 460968	SAN ANTONIO	TX	78246
40	TROUT STREET YACHT BASIN INC	P O BOX 170155	ARLINGTON	TX	76003
41	REBEL HOLDINGS LLC	311 SARATOGA BLVD	CORPUS CHRISTI	TX	78417
42	WISE GORDON E ET UX	P.O. BOX 398	PORT ARANSAS	TX	78373
43	VAUGHAN BEN F IV AND THE VAUGHAN BEN F III TRUSTEE	PO BOX 460968	SAN ANTONIO	TX	78246

Applicant's Name: Port of Corpus Christi of Nueces County
Permit Number: WQ0005253000

ALVEY MERRI LEE & HUSB JO
PO BOX 10
MARBLE FALLS, TX 78654

BARNFAIR PROP/UTOTEM INC
1370 AVE OF AMERICAS
NEW YORK, NY 10019

CAPPS PHYLLIS J
P. O. BOX 1728
PORT ARANSAS, TX 78373

CITY OF PORT ARANSAS
710 W. AVENUE A
PORT ARANSAS, TX 78373

DEEP SEA PROPERTIES INC
P O BOX 388
PORT ARANSAS, TX 78373

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LA PORTE, TX 77571

ERF PORT ARANSAS INC
555 N CARANCAHUA ST #700
CORPUS CHRISTI, TX 78401

GULLEYS DIVING SERVICE IN
P O BOX 521
PORT ARANSAS, TX 78373

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1619 S 2nd St
AUSTIN, TX 78704

MARTIN OPERATING PARTNERS
4900 STONE RD
KILGORE, TX 75662

MILLER CHARLES K AND SHARON M
MILLER WFE
PO BOX 5233
CORPUS CHRISTI, TX 78465

NORTON OWEN A
4003 BUNNY RUN
AUSTIN, TX 78746

PORT OF CORPUS CHRISTI
222 POWER STREET
CORPUS CHRISTI, TX 78401

PORT ARANSAS MARICULTURE
CENTER - TEXAS A&M
1300 PORT STREET
CORPUS CHRISTI, TX 78403

STATE OF TEXAS
PO BOX 12608
AUSTIN, TX 78711

UNITED STATES OF AMERICA DEPT
OF INTERIOR
1849 C STREET, N.W.
WASHINGTON, DC 20240

BASS BROTHERS ENTERPRISES,
INC.
201 MAIN STREET, SUITE 2500
FORT WORTH, TX 76102

TEXAS GENERAL LAND OFFICE
1700 CONGRESS AVENUE
AUSTIN, TX 78701

BASS BROTHERS ENTERPRISES,
INC.
201 MAIN STREET, SUITE 2500
FORT WORTH, TX 76102

TX GENERAL LAND OFFICE
1700 CONGRESS AVENUE
AUSTIN, TX 78701

TEXAS DEPARTMENT OF
TRANSPORTATION
125 EAST 11TH ST
AUSTIN, TX 78701

UNITED STATE COAST GUARD.
13411 HILLARD STREET
HOUSTON, TX 77034

TEAL HARBOR
200 W COTTER AVE
PORT ARANSAS, TX 78373

THE HARBOUR LUXURY
CONDOMINIUMS
1726 HIGHWAY 361
PORT ARANSAS, TX 78373

"CONDO.1659"
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VICTORIA, TX 77902

Applicant's Name: Port of Corpus Christi of Nueces County
Permit Number: WQ0005253000

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PORT ARANSAS, TX 78373

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SAN ANTONIO, TX 78246

Port of Corpus Christi Authority of Nueces County
Proposed Desalination Plant
Harbor Island, Port Aransas, Texas 78373

LANDOWNERS MAP

FIGURE 1

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0
125
250
500
Feet
N
Legend
Adjacent Landowner Parcels
Port of Corpus Christi Authority of Nueces County
Proposed Desalination Plant
Harbor Island, Port Aransas, Texas 78373
LANDOWNERS MAP
amec foster wheeler
FIGURE
2

ATTACHMENT 6

Photographic Log and Photograph Location Map

PHOTO 1:

View looking northeast towards the approximate location of the proposed Treatment Facility.

PHOTO 2:

View looking east towards the approximate location of the proposed Treatment Facility.

PHOTO 3:

View looking southeast along the approximate western boundary of the proposed Treatment Facility.

PHOTO 4:

View looking northwest along the approximate western boundary of the proposed Treatment Facility.

PHOTO 5:

View looking north towards the approximate location of the proposed Treatment Facility.

PHOTO 6:

View looking east along the approximate discharge route.

PHOTO 7:

View looking northeast at the approximate outfall location from Roberts Point Park across the Bay.

PHOTO 8:

View looking northwest at the approximate outfall location from Roberts Point Park across the Bay.

Port of Corpus Christi
Proposed Desalination Plant
Harbor Island, Port Aransas, Texas 78373

PHOTOGRAPH LOCATION MAP

amec foster wheeler

ATTACHMENT 3

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

SUPPLEMENTAL PERMIT INFORMATION FORM (SPIF)

FOR AGENCIES REVIEWING INDUSTRIAL TPDES WASTEWATER PERMIT APPLICATIONS

TCEQ USE ONLY:

Application type: ____Renewal _____Major Amendment _____Minor Amendment ______New

County: ____________________________________ Segment Number: ___________________

Admin Complete Date: ________________________

Agency Receiving SPIF:

______ Texas Historical Commission ______ U.S. Fish and Wildlife

______ Texas Parks and Wildlife Department ______ U.S. Army Corps of Engineers

This form applies to TPDES permit applications only. (Instructions, Page 33)

The SPIF must be completed as a separate document. The TCEQ will mail a copy of the SPIF to each agency as required by the TCEQ agreement with EPA. If any of the items are not completely addressed or further information is needed, you will be contacted to provide the information before the permit is issued. Each item must be completely addressed.

Do not refer to a response of any item in the permit application form. Each attachment must be provided with this form separately from the administrative report of the application. The application will not be declared administratively complete without this form being completed in its entirety including all attachments.

The following applies to all applications:

1. Permittee: Port of Corpus Christi Authority of Nueces County
2. Permit No. WQ00 N/A EPA ID No. TX N/A
3. Address of the project (location description that includes street/highway, city/vicinity, and county):

   Harbor Island, North side of Highway 361 at Ferry Landing, Nueces County

4. Provide the name, address, phone and fax number of an individual that can be contacted to answer specific questions about the property.

   First/Last Name: Sarah L. Garza Credential: N/A

   Organization Name: Port of Corpus Christi Title: Director Environmental Planning

   Mailing Address: PO Box 1541

   City: Corpus Christi State: Texas ZIP Code: 78403

   Phone: 361-885-6163 Fax: N/A E-mail Address: sarah@pocca.com

5. List the county in which the facility is located: Nueces

6. If the property is publicly owned and the owner is different than the permittee/applicant, please list the owner of the property.

N/A

7. Provide a description of the effluent discharge route. The discharge route must follow the flow of effluent from the point of discharge to the nearest major watercourse (from the point of discharge to a classified segment as defined in *30 TAC Chapter 307*). If known, please identify the classified segment number.

This is a new permit application. The discharge route is via an HDPE pipeline to a multi-port diffuser approximately 300 ft off shore on the south side of Harbor Island in Corpus Christi Channel (Segment 2481). From this point, the discharge is tidal, and will flow either into the Gulf of Mexico via Aransas Pass or through the Corpus Christi Channel toward Corpus Christ Bay.

8. Please provide a separate 7.5-minute USGS quadrangle map with the project boundaries plotted and a general location map showing the project area. Please highlight the discharge route from the point of discharge for a distance of one mile downstream. (This map is required in addition to the map in the administrative report).

9. Provide original photographs of any structures 50 years or older on the property.

10. Does your project involve any of the following? Check all that apply.

- ☒ Proposed access roads, utility lines, construction easements
- ☐ Visual effects that could damage or detract from a historic property's integrity
- ☒ Vibration effects during construction or as a result of project design
- ☐ Additional phases of development that are planned for the future
- ☐ Sealing caves, fractures, sinkholes, other karst features
- ☒ Disturbance of vegetation or wetlands

11. List proposed construction impact (surface acres to be impacted, depth of excavation, sealing of caves, or other karst features):

Construction will impact approximately 33 acres of Harbor Island in a former fuel tank storage area. The discharge pipe will enter Corpus Christi Channel on the southeast side of the island. The pipeline will feed a multiport diffuser oriented parallel to and located approximately 300 ft off the shoreline.

12. Describe existing disturbances, vegetation, and land use:

The property is the former site of a petroleum tank farm. Currently, the site is vacant and covered with intermittent natural vegetation.

THE FOLLOWING ITEMS APPLY ONLY TO APPLICATIONS FOR NEW TPDES PERMITS AND MAJOR AMENDMENTS TO TPDES PERMITS

13. List construction dates of all buildings and structures on the property:

N/A – No existing structures.

14. Provide a brief history of the property, and name of the architect/builder, if known.

The property is the location of the Former Atofina and Exxon Pipeline Tank Terminals. The tank farms have been removed many years ago and now the property is vacant with no current development. The dock structures do still remain but are in very poor condition and are slated for future removal. The Texas Treasure also used to be located at Harbor Island and only the main building still remains but is in poor condition as well.

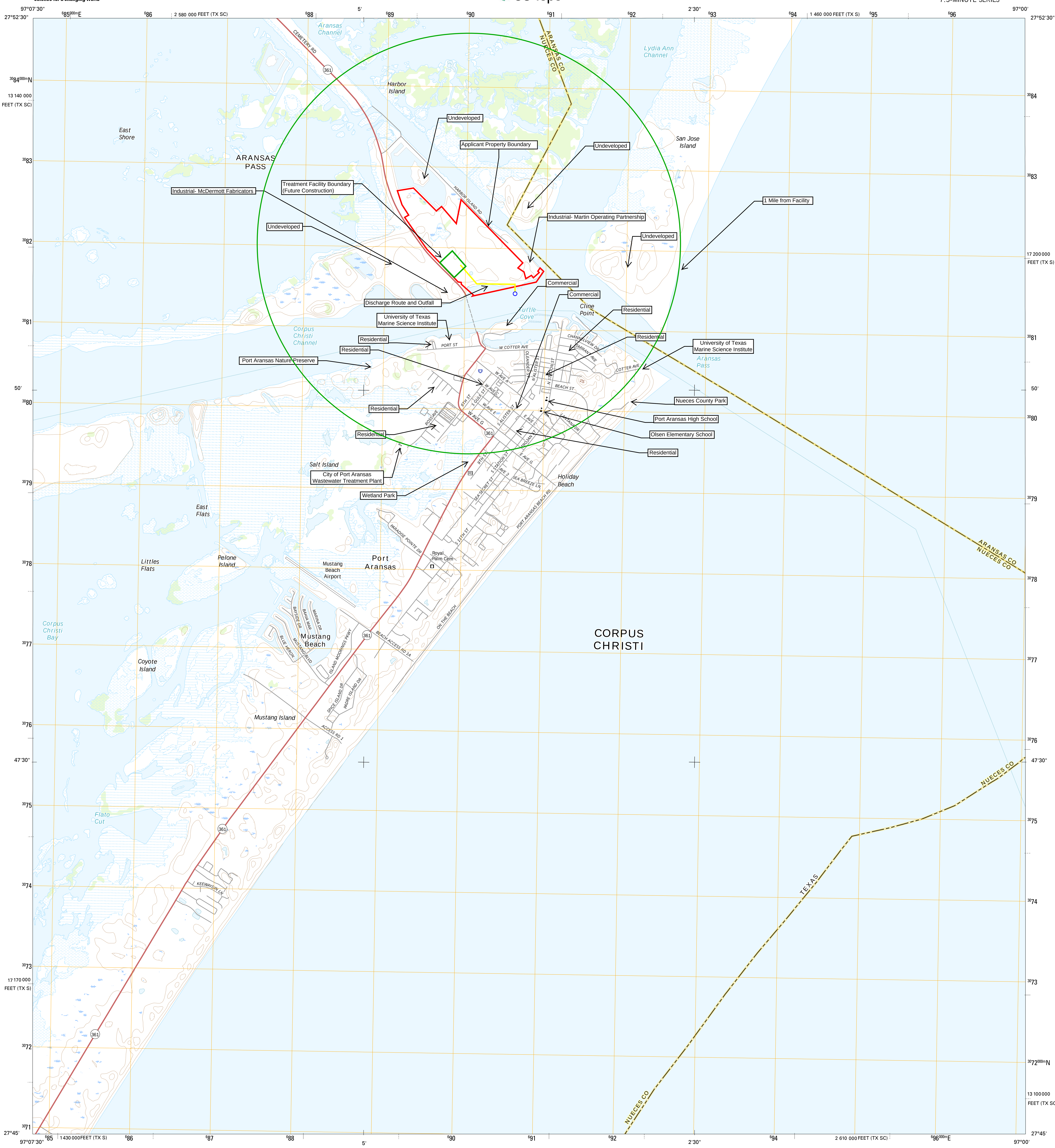
ATTACHMENT 7

SPIF - USGS Quadrangle Map

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map
US Topo

PORT ARANSAS QUADRANGLE
TEXAS
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid: Universal Transverse Mercator, Zone 14R
10 000-foot ticks: Texas Coordinate System of 1983 (south and south central zones)

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Wetlands....FWS National Wetlands Inventory 1977 - 2014

UTM GRID AND 2016 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET
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U.S. National Grid
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Grid Zone Designation
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SCALE 1:24 000

CONTOUR INTERVAL 5 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

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QUADRANGLE LOCATION

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3 Allyns Bight
4 Port Ingleside
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7 Crane Islands NW OE E
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ADJOINING QUADRANGLES

ROAD CLASSIFICATION
Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

PORT ARANSAS, TX
2016

NSN. 7643016397778
NGA REF NO. USGSX24K36019

TECHNICAL REPORT 1.0
INDUSTRIAL

This application form is for an industrial wastewater discharge authorization only. Your facility may need additional authorizations from the TCEQ Waste Permitting Division or the TCEQ Air Permitting Division.

The following information is required for all TPDES and TLAP renewal, new, and amendment applications.

1. FACILITY/SITE INFORMATION (Instructions, Pages 35-36)

a. Describe the type of activity and general nature of your business.

The Port of Corpus Christi (POCC) is developing a project to provide a sustainable supply of potable water for the Corpus Christi area that is not dependent upon rain water. The proposed system will provide up to 50 million gallon (MGD) of permeate through the process of desalination.

b. Describe the wastewater-generating processes.

See Process Design Basis and Narrative in Attachment 8.

c. Provide a list of raw materials, major intermediates, and products handled at your facility.

Materials List

Raw Materials	Intermediate Products	Final Products
Sea Water	None	Potable Use Water

d. Attach a facility map (drawn to scale) with the following information:

- Production areas, maintenance areas, materials-handling areas, and waste-disposal areas
- The location of each unit of the wastewater treatment plant including the location of wastewater collection sumps, impoundments, and outfalls (also include locations of sampling points if significantly different from outfall locations)

Attachment: 9

e. Is this a new permit application for an existing facility?

☐ Yes ☒ No

If yes, provide background discussion below.

Click here to enter text.

f. Is the treatment facility/disposal site located above the 100-year frequency flood level?

☒ Yes ☐ No

List source(s) used to determine 100-year frequency flood plain:

FEMA Flood Insurance Rate Map Panel Number 485498 0001 F dated September 30, 1992. The facility is located in Zone X, outside the 500 year flood plain.

If no, provide the elevation of the 100-year frequency flood plain and describe what protective measures are in use or planned to be used to prevent flooding of the treatment facility/disposal area.

Click here to enter text.

g. For new or amendment permit applications, will any construction operations result in a discharge of fill material into a water in the state?

☒ Yes ☐ No

If no, proceed to Item 2.

h. If yes to the above question, has the applicant applied for a U.S. Army Corps of Engineers 404 Dredge and Fill permit?

☐ Yes ☒ No

If yes, provide the permit number: TBD

If no, provide the approximate date you anticipate submitting your application to the Corps: July 2018.

2. TREATMENT SYSTEM (Instructions, Page 36)

a. List any physical, chemical, or biological treatment process that you use for the treatment of wastewater at your facility. Include a description of each treatment process, starting with initial treatment and finishing with the outfall/point of disposal.

See Process Design Basis and Narrative in Attachment 8.

b. Attach a flow schematic with a water balance showing each treatment unit and all sources of water and wastewater flow into the treatment plant and to each outfall/point of disposal.

Attachment: 8

3. IMPOUNDMENTS (Instructions, Pages 36-39)

Do you use or plan to use any wastewater lagoons, ponds, or impoundments?

☐ Yes ☒ No

If yes, complete Item 3.a for existing impoundments and Items 3.a-3.h for new or proposed impoundments. If no, proceed to Item 4.

Please note: Surface impoundments may also require additional authorizations from the TCEQ Waste Permit Division.

a. Provide the following information in the table provided:

Use Designation: Indicate the appropriate use designation for each pond: Treatment (T), Disposal (D), Containment (C), or Evaporation (E).

Associated Outfall Number: If a discharge occurs from the impoundments, designate the outfall associated with the impoundment.

Liner Type: If the impoundments are lined to comply with specifications outlined for 1) a compacted clay liner (C), 2) an in-situ clay liner (I), or 3) a synthetic/plastic/rubber liner (S), indicate the liner type with the appropriate letter designation (see instructions for further detail on liner specifications). If not, provide a reference to the attachment that provides a description of the alternate liner and any additional technical information necessary for an evaluation.

Dimensions: Provide the dimensions, freeboard, surface area, and storage capacity of the impoundments. For impoundments with irregular shapes, submit surface area (instead of length and width), the average depth, and the maximum depth below natural ground level.

Impoundment Information

Parameter	Pond #	Pond #	Pond #	Pond #
Use Designation: (T) (D) (C) or (E)				
Associated Outfall Number				
Liner Type (C) (I) or (S)				
Alt. Liner Attachment Reference				
Length (ft)				
Width (ft)				
Depth from Water Surface (ft)				
Avg Depth from Nat. Ground Level (ft)				
Max Depth from Nat. Ground Level (ft)				
Freeboard (ft)				
Surface Area (acres)				
Storage Capacity (gallons)				
Compliance with *40 CFR Chapter 257, Subpart D* is required.	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Impoundment Information

Parameter	Pond #	Pond #	Pond #	Pond #
Use Designation: (T) (D) (C) or (E)				
Associated Outfall Number				
Liner Type (C) (I) or (S)				
Alt. Liner Attachment Reference				
Length (ft)				
Width (ft)				
Depth from Water Surface (ft)				
Avg Depth from Nat. Ground Level (ft)				
Max Depth from Nat. Ground Level (ft)				
Freeboard (ft)				
Surface Area (acres)				
Storage Capacity (gallons)				
Compliance with *40 CFR Chapter 257, Subpart D* is required.	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

The following information (b - h) is required only for new or proposed impoundments.

b. Indicate if any of the following data was provided with the application:

☐ Compacted clay liner data

☐ Synthetic/plastic/rubber liner data

☐ In-situ clay liner data

Attachment: Click here to enter text.

c. Are there any leak detection systems or groundwater monitoring wells in place or planned?

☐ Yes ☐ No

If yes, attach information on the leak detection system for each pond and groundwater monitoring well data.

Attachment: Click here to enter text.

d. Is the bottom of the pond above the seasonal high water table in the shallowest waste-bearing zone?

☐ Yes ☐ No

If no, attach additional information describing the depth of the seasonal high water table in the shallowest waste-bearing zone in relation to the depth of the bottom of the new or proposed impoundment and how this may or may not impact groundwater.

Attachment: Click here to enter text.

e. Attach a USGS quadrangle map or a color copy of original quality and scale which accurately locates and identifies water supply wells and monitor wells within ½ mile radius of the impoundments

Attachment: Click here to enter text.

f. Attach copies of State Water Well Reports (driller's logs, completion data), and data on depths to groundwater for water supply wells including a description of how the depths to groundwater were obtained

Attachment: Click here to enter text.

g. For TLAP permit applications: Are new or proposed impoundment(s) and the land application disposal area are located in the same general area?

☐ Yes ☐ No

If yes, provide information for this item in Worksheet 3.0 (Item 5).

h. Attach information pertaining to the groundwater, soils, geology, etc. used to assess the potential for migration of wastes from the impoundments or the potential for contamination of groundwater or surface water.

Attachment: Click here to enter text.

4. OUTFALL/DISPOSAL METHOD INFORMATION (Instructions, Pages 39-40)

Complete the following tables to describe the location and wastewater discharge or disposal operations for each outfall for discharge operations and for each point of disposal for TLAP operations.

For TLAP permit applications: Indicate the disposal method and each individual irrigation area (I), evaporation pond (E), or subsurface drainage system (S) by providing the appropriate letter designation for the disposal method followed by a numerical designation for each disposal area in the space provided for "Outfall" designation (e.g. "E1" for evaporation pond 1, "I2" for irrigation area No. 2, etc.).

Outfall Latitude and Longitude

Outfall Number	Latitude-degrees	Latitude-minutes	Latitude-seconds	Longitude-degrees	Longitude-minutes	Longitude-seconds
001	27	50	38.82	-97	03	49.08

Outfall Location Description

Outfall Number	Location Description
001	Outfall will consist of a buried/submerged pipeline and diffuser into the Corpus Christi Channel.

Description of Sampling Points (if different from Outfall location)

Outfall Number	Description of Sampling Point
001	The sampling point will be on land following comingling of all wastewaters and prior to discharging into Corpus Christi Channel.

Outfall Flow Information – Permitted and Proposed

Outfall Number	Permitted Daily Avg Flow (MGD)	Permitted Daily Max Flow (MGD)	Proposed Daily Avg Flow (MGD)	Proposed Daily Max Flow (MGD)
001	N/A	N/A	95.6	110

Outfall Discharge – Method and Measurement

Outfall Number	Pumped Discharge? Y/N	Gravity Discharge? Y/N	Type of Flow Measurement Device Used
001	Y	N	Totalizer

Outfall Discharge – Flow Characteristics

Outfall Number	Intermittent Discharge? Y/N	Seasonal Discharge? Y/N	Continuous Discharge? Y/N	Discharge Duration (hours/ day)	Discharge Duration (days/ month)	Discharge Duration (months/ year)
001	N	N	Y	24	30.417	12

Wastestream Contributions

Outfall No.: 001

Contributing Wastestreams	Volume (MGD)	% of Total Flow
Reverse Osmosis Reject	75	78.5
Pre-Treatment System Reject	20.6	21.5

Outfall No.: N/A

Contributing Wastestreams	Volume (MGD)	% of Total Flow

Outfall No.: N/A

Contributing Wastestreams	Volume (MGD)	% of Total Flow

Additional Outfall wastestream contributions included as Attachment: N/A

5. BLOWDOWN AND ONCE-THROUGH COOLING WATER DISCHARGES (Instructions, Pages 40-41)

a. Does your facility use any cooling towers or boilers that discharge blowdown or other wastestreams to the outfall(s)?

☐ Yes ☒ No

b. Does your facility discharge once-through cooling water to the outfall(s)?

☐ Yes ☒ No

c. If yes to either Item a or b, attach the appropriate SDS with the following information for each chemical additive.

- Manufacturers Product Identification Number
- Product use (e.g., biocide, fungicide, corrosion inhibitor, etc.)
- Chemical composition including CASRN for each ingredient
- Classify product as non-persistent, persistent, or bioaccumulative
- Product or active ingredient half-life
- Frequency of product use (e.g., 2 hours/day once every two weeks)
- Product toxicity data specific to fish and aquatic invertebrate organisms
- Concentration of whole product in wastestream (if above item is for whole product)
- Concentration of active ingredient in wastestream (if above item is for active ingredient)

Please provide a summary attachment of this information in addition to the submittal of the SDS for each specific wastestream and the associated chemical additives and specify which outfalls are affected.

Attachment: Click here to enter text.

d. Cooling Towers and Boilers

Cooling Towers and Boilers

Type of Unit	Number of Units	Dly Avg Blowdown (gallons/day)	Dly Max Blowdown (gallons/day)
Cooling Towers			
Boilers			

6. STORMWATER MANAGEMENT (Instructions, Page 41)

Are there any existing or proposed outfalls which discharge stormwater runoff commingled with other wastestreams?

☐ Yes ☒ No

If no, proceed to Item 7.

If yes, briefly describe the industrial processes and activities that occur outdoors or in some manner that may result in exposure of the materials to precipitation or runoff in areas where runoff is generated.

7. DOMESTIC SEWAGE, SEWAGE SLUDGE, AND SEPTAGE MANAGEMENT AND DISPOSAL (Instructions, Pages 41-42)

a. Please check the appropriate method(s) of domestic sewage and domestic sewage sludge treatment/disposal and complete Worksheet 5.0 or Item 7.b if directed to do so.

☒ Facility is connected to a wastewater treatment plant permitted to receive domestic sewage, or the domestic sewage is transported off-site to a permitted facility for treatment, disposal, or both. COMPLETE ITEM 7.b BELOW.

☐ Domestic sewage is disposed of by an on-site septic tank and drainfield system. COMPLETE ITEM 7.b BELOW.

☐ Both domestic and industrial treatment sludge ARE commingled prior to use or disposal.

☐ Industrial wastewater and domestic sewage are treated separately, and the respective sludge IS NOT commingled prior to sludge use or disposal. COMPLETE WORKSHEET 5.0 OF THIS APPLICATION.

☐ Facility is a POTW. COMPLETE WORKSHEET 5.0 OF THIS APPLICATION.

☐ Domestic sewage is not generated on-site.

☐ Other (e.g., portable toilets): Please provide a detailed description:

Click here to enter text.

b. Provide the name and TCEQ, NPDES, or TPDES Permit No. of the waste-disposal facility which receives the domestic sewage/septage. If hauled by motorized vehicle, provide the name and TCEQ Registration No. of the hauler.

Domestic Sewage Plant/Hauler Name

Plant/Hauler Name	Permit/Registration No.
New facility. Information will be provided to the TCEQ in a supplement.	TBD

8. IMPROVEMENTS OR COMPLIANCE/ENFORCEMENT REQUIREMENTS (Instructions, Page 42)

Is the permittee currently required to meet any implementation schedule for compliance or enforcement?

☐ Yes ☒ No

If yes, provide a brief summary of the requirements and a status update.

Click here to enter text.

9. TOXICITY TESTING (Instructions, Pages 42-43)

Have any biological tests for acute or chronic toxicity been made on any of your discharges or on a receiving water in relation to your discharge within the last three years?

☐ Yes ☒ No

If yes, identify the tests and describe their purposes below. Please attach a copy of all tests performed that have not been previously sent to the TCEQ or the EPA.

Attachment: Click here to enter text.

10. OFF-SITE/THIRD PARTY WASTES (Instructions, Page 43)

Do you receive wastes from off-site sources for any or all of the following: treatment in your facility, disposal on-site via land application, or discharge via a permitted outfall?

☐ Yes ☒ No

If no, proceed to Item 11.

If yes, provide responses to Items a, b, and c below.

a. Attach the following information to the application:

- List of wastes received
- Characterization of wastes received
- Volumes of each waste received
- Information on compatibility with on-site wastes
- Identified sources of wastes received
- Name and addresses of generators
- Description of the relationship of waste source(s) with your facility's activities

Attachment: Click here to enter text.

b. Is wastewater from a TCEQ, NPDES, or TPDES permitted facility commingled with your wastewater after your final treatment and prior to discharge via your final outfall/point of disposal?

☐ Yes ☐ No

If yes, provide the name, address, and TCEQ, NPDES, or TPDES permit number of the contributing facility and a copy of any agreements or contracts relating to this activity.

Attachment: Click here to enter text.

c. Is your facility a Publicly Owned Treatment Works (POTW) that accepts process wastewater from any Significant Industrial User (SIU) and has or is required to have an approved pretreatment program under the NPDES/TPDES program?

☐ Yes ☐ No

If yes, complete Worksheet 6.0 of this application.

11. RADIOACTIVE MATERIALS (Instructions, Page 44)

a. Are radioactive materials mined, used, stored, or processed at this facility?

☐ Yes ☒ No

If yes, use the following table to provide the results of one analysis of your effluent for all radioactive materials that may be present. Provide results in picocuries per liter (pCi/L).

Radioactive Materials Mined, Used, Stored, or Processed

Radioactive Material	Concentration (pCi/L)

b. Do you have any knowledge or reason to believe that radioactive materials may be present in the discharge, including naturally occurring radioactive materials in the source waters or on the facility property?

☐ Yes ☒ No

If yes, use the following table to provide the results of one analysis of your effluent for all radioactive materials that may be present. Provide results in picocuries per liter (pCi/L). Do not include information provided in response to Item 11.a.

Radioactive Materials Present in the Discharge

Radioactive Material	Concentration (pCi/L)

12. COOLING WATER INTAKE STRUCTURES (Instructions, Pages 44-46)

a. The facility uses or proposes to use water for cooling purposes?

☐ Yes ☒ No

If yes, complete this item (12. Cooling Water Intake Structures); otherwise, stop here.

b. Cooling Water Supplier

1. Complete the following table with information regarding the Cooling Water Intake Structure(s) owner(s), operator(s), and location

Cooling Water Intake Structure(s) Owner(s), Operator(s), and Location

CWIS ID				
Owner				
Operator				
Latitude				
Longitude				

2. Cooling water is obtained from a Public Water Supplier (PWS)

☐ Yes ☐ No

If yes, provide the Public Water Supplier Registration No. for the entity providing cooling water in the space provided, and stop here.

- PWS Registration Number: Click here to enter text.

3. Cooling water is obtained from an Independent Supplier

☐ Yes ☐ No

If no, proceed to section c; otherwise, if yes provide the following:

- Independent Supplier's TPDES permit number: Click here to enter text.

  If the Independent Supplier holds a TPDES Industrial Wastewater Permit, provide the permit number in the space provided. Otherwise enter N/A and continue.

- Independent Supplier's CWIS AIF (in MGD): Click here to enter text.

  Enter the Independent Supplier's CWIS actual intake flow (AIF) in million gallons per day in the space provided, and continue.

- The facility uses or proposes to use less than 25% of the Independent Supplier's CWIS AIF for cooling purposes?

  ☐ Yes ☐ No

  If yes, stop here. If no, proceed to section c.

c. 316(b) General Criteria

Compete all questions in this section unless otherwise directed.

1. The CWIS(s) have or will have a design intake flow of 2 MGD or greater

☐ Yes ☐ No

2. At least 25% of the total water withdrawn by the CWIS is used or will be used exclusively for cooling purposes on an annual average basis

☐ Yes ☐ No

3. The facility withdraws or proposes to withdraw water for cooling purposes from surface waters that meet the definition of Waters of the United States in *40 CFR § 122.2*

☐ Yes ☐ No

If no, provide an explanation of how the waterbody does not meet the definition of Waters of the United States in *40 CFR § 122.2* in the space provided. If additional space is needed for the explanation, include the information as an attachment to the application and provide the attachment number in the space instead.

Explanation:

Click here to enter text.

If yes to all three questions in section c above, proceed to section d. If no to any of the questions in section c above the facility does not meet the minimum criteria to be subject to the full requirements of 316(b). Complete Worksheet 11.0, items 1(a), 1(b)(i-iii) and (vi), 2(b)(i), and 3(a) to allow for a determination based upon best professional judgement (BPJ).

d. Phase I vs Phase II Facilities

1. Existing facility (Phase II)

☐ Yes ☐ No

If yes, complete Worksheets 11.0 through 11.3, as applicable. Otherwise, continue.

2. New Facility – (Phase I)

☐ Yes ☐ No

If yes, continue.

3. Compliance track selection (For Phase I only; must choose one of the following)

☐ Track I - AIF greater than 2 MGD, but less than 10 MGD

If selected, include information required under *40 CFR §§ 125.86(b)(2)-(4)* as an attachment and complete Worksheet 11.0, items 2 and 3, and Worksheet 11.2.

☐ Track I - AIF greater than 10 MGD

If selected, include information required under *40 CFR § 125.86(b)* as an attachment and complete Worksheet 11.0, items 2 and 3, and Worksheet 11.2.

☐ Track II

If selected, include information required under *40 CFR § 125.86(c)* as an attachment and complete Worksheet 11.0, items 2 and 3, and Worksheet 11.2.

Attachment: Click here to enter text.

Note: Items 12, 13, and 14 are required only for existing permitted facilities.

13. MAJOR AMENDMENT REQUESTS (Instructions, Page 46)

Are you requesting a major amendment of an existing permit?

☐ Yes ☒ No

If yes, list each specific request and provide discussion on the scope of any requested permit changes. If necessary, provide supplemental information or additional data that will support the request.

Click here to enter text.

14. MINOR MODIFICATION REQUESTS (Instructions, Page 47)

Are you requesting any minor modifications to the permit? Note: see the instructions for an exclusive list of changes considered as minor modifications.

☐ Yes ☒ No

If yes, list and discuss the requested changes.

Click here to enter text.

15. MINOR AMENDMENT REQUESTS (Instructions, Page 47)

Are you requesting any minor amendments to the permit?

☐ Yes ☒ No

If yes, list and discuss the requested changes.

Click here to enter text.

WORKSHEET 1.0
EPA CATEGORICAL EFFLUENT GUIDELINES

This worksheet is required for all applications for TPDES permits for discharges of wastewaters subject to EPA categorical effluent guidelines.

1. CATEGORICAL INDUSTRIES (Instructions, Pages 50-51)

Is your facility subject to any of the 40 CFR effluent guidelines outlined on page 52 of the instructions?

☐ Yes ☒ No

If yes, provide the appropriate information in the table below.

If no, this worksheet is not required.

40 CFR Effluent Guidelines

Industry	40 CFR Part

2. PRODUCTION/PROCESS DATA (Instructions, Page 51)

a. Production Data

Provide the appropriate data for effluent guidelines with production-based effluent limitations.

Production Data

Subcategory	Actual Quantity/Day	Design Quantity/Day	Units

b. Organic Chemicals, Plastics, and Synthetic Fibers Manufacturing Data (*40 CFR Part 414*)

Provide each appropriate subpart and the percent of total production. Also provide the appropriate data for metal-bearing wastestreams as required in *40 CFR Part 414*, Appendices A and B.

Percentages of Total Production

Subcategory	Percent of Total Production	Appendix A and B - Metal	Appendix A and B – Process

c. Refineries (*40 CFR Part 419*):

Provide the applicable subcategory and a brief justification.

Click here to enter text.

3. PROCESS/NON-PROCESS WASTEWATER FLOWS (Instructions, Page 51)

Provide a breakdown of process wastewater flow(s) and non-process wastewater flow(s) as directed.

Click here to enter text.

4. NEW SOURCE DETERMINATION (Instructions, Page 51)

Provide a list of wastewater-generating processes subject to effluent guidelines and the appropriate information.

Wastewater-generating Processes Subject to Effluent Guidelines

Process	EPA Guideline: Part	EPA Guideline: Subpart	Date Process/ Construction Commenced

WORKSHEET 2.0
POLLUTANT ANALYSES REQUIREMENTS

Worksheet 2.0 is **required** for applications submitted for a TPDES permit.

Worksheet 2.0 is **not required** for applications for a permit to dispose of all wastewater by land disposal or for discharges solely of stormwater runoff.

1. LABORATORY ACCREDITATION (Instructions, Page 52)

Effective July 1, 2008, all laboratory tests performed must meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification* with the following general exemptions:

a. The laboratory is an in-house laboratory and is:

   1. periodically inspected by the TCEQ; or
   2. located in another state and is accredited or inspected by that state; or
   3. performing work for another company with a unit located in the same site; or
   4. performing pro bono work for a governmental agency or charitable organization.

b. The laboratory is accredited under federal law.

c. The data are needed for emergency-response activities, and a laboratory accredited under the Texas Laboratory Accreditation Program is not available.

d. The laboratory supplies data for which the TCEQ does not offer accreditation.

The applicant should review *30 TAC Chapter 25* for specific requirements. The following certification statement shall be signed and submitted with every application. See Instructions, Page 32, for a list of designated representatives who may sign the certification.

I,____, certify that all laboratory tests submitted with this application meet the requirements of *30 TAC Chapter 25*, Environmental Testing Laboratory Accreditation and Certification.

2. GENERAL TESTING REQUIREMENTS (Instructions, Pages 52-54)

Please read the general testing requirements in the instructions for important information about sampling, test methods, MALs, and averaging sample results.

3. SPECIFIC TESTING REQUIREMENTS (Instructions, Pages 54-66)

Table 1 and Table 2 (Instructions, Page 54)

Completion of Tables 1 and 2 is required for all external outfalls for new, renewal, and amendment applications.

Table 1 for Outfall No.: 001 – Concentrations for applicable Tables were estimated using source water data from Freese & Nichols, Variable Salinity Desalination Demonstration Project, April 26, 2016. Source water will be sampled, modeled, and updated tables will be provided to the TCEQ in a supplement.

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Sample 1 (mg/L)	Sample 2 (mg/L)	Sample 3 (mg/L)	Sample 4 (mg/L)	Average (mg/L)
BOD (5-day)					
CBOD (5-day)					
Chemical oxygen demand					
Total organic carbon					1.0
Dissolved oxygen					
Ammonia nitrogen					
Total suspended solids					30.0
Nitrate nitrogen					3.6
Total organic nitrogen					
Total phosphorus					
Oil and grease					
Total residual chlorine					
Total dissolved solids					66,000
Sulfate					4,800
Chloride					36,700
Fluoride					3.2
Total alkalinity (mg/L as CaCO3)					
Temperature (°F)					14-32
pH (standard units)					7.5

Table 2 for Outfall No.: 001

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	Average (µg/L)	MAL (µg/L)
Aluminum, total						2.5
Antimony, total						5
Arsenic, total						0.5
Barium, total					60.0	3
Beryllium, total						0.5
Cadmium, total						1
Chromium, total						3
Chromium, hexavalent						3
Chromium, trivalent						N/A
Copper, total						2
Cyanide, available						2/10
Lead, total						0.5
Mercury, total						0.005/0.0005
Nickel, total						2
Selenium, total						5
Silver, total						0.5

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	Average (µg/L)	MAL (µg/L)
Thallium, total						0.5
Zinc, total						5.0

TABLE 3 (Instructions, Page 54).

Completion of Table 3 is required for all external outfalls which discharge process wastewater.

Partial completion of Table 3 is required for all external outfalls with non-process wastewater discharges.

For discharges of stormwater runoff commingled with other wastestreams, complete Table 3 as instructed

Table 3 for Outfall No.: 001

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Samp. 1 (µg/L)*	Samp. 2 (µg/L)*	Samp. 3 (µg/L)*	Samp. 4 (µg/L)*	Avg. (µg/L)*	MAL (µg/L)*
Acrylonitrile						50
Anthracene						10
Benzene						10
Benzidine						50
Benzo(a)anthracene						5
Benzo(a)pyrene						5
Bis(2-chloroethyl)ether						10
Bis(2-ethylhexyl)phthalate						10
Bromodichloromethane [Dichlorobromomethane]						10
Bromoform						10
Carbon tetrachloride						2
Chlorobenzene						10
Chlorodibromomethane [Dibromochloromethane]						10
Chloroform						10
Chrysene						5
m-Cresol [3-Methylphenol]						10
o-Cresol [2-Methylphenol]						10
p-Cresol [4-Methylphenol]						10
1,2-Dibromoethane						10
m-Dichlorobenzene [1,3-Dichlorobenzene]						10
o-Dichlorobenzene [1,2-Dichlorobenzene]						10
p-Dichlorobenzene [1,4-Dichlorobenzene]						10
3,3'-Dichlorobenzidine						5
1,2-Dichloroethane						10
1,1-Dichloroethene [1,1-Dichloroethylene]						10

Pollutant	Samp. 1 (µg/L)*	Samp. 2 (µg/L)*	Samp. 3 (µg/L)*	Samp. 4 (µg/L)*	Avg. (µg/L)*	MAL (µg/L)*
Dichloromethane [Methylene chloride]						20
1,2-Dichloropropane						10
1,3-Dichloropropene [1,3-Dichloropropylene]						10
2,4-Dimethylphenol						10
Di-n-Butyl phthalate						10
Ethylbenzene						10
Fluoride					3200.0	500
Hexachlorobenzene						5
Hexachlorobutadiene						10
Hexachlorocyclopentadiene						10
Hexachloroethane						20
Methyl ethyl ketone						50
Nitrobenzene						10
N-Nitrosodiethylamine						20
N-Nitroso-di-n-butylamine						20
Nonylphenol						333
Pentachlorobenzene						20
Pentachlorophenol						5
Phenanthrene						10
Polychlorinated biphenyls (PCBs) (**)						0.2
Pyridine						20
1,2,4,5-Tetrachlorobenzene						20
1,1,2,2-Tetrachloroethane						10
Tetrachloroethene [Tetrachloroethylene]						10
Toluene						10
1,1,1-Trichloroethane						10
1,1,2-Trichloroethane						10
Trichloroethene [Trichloroethylene]						10
2,4,5-Trichlorophenol						50
TTHM (Total trihalomethanes)						10
Vinyl chloride						10

(*) Indicate units if different from µg/L.

(**) Total of detects for PCB-1242, PCB-1254, PCB-1221, PCB-1232, PCB-1248, PCB-1260, and PCB-1016. If all non-detects, enter the highest non-detect preceded by a "<".

TABLE 4 (Instructions, Page 55

Partial completion of Table 4 (only those pollutants which are required by the conditions specified below) is **required** for each external outfall.

Completion of Table 4 is **not required** for internal outfalls.

a. Tributyltin

Is your facility an industrial/commercial facility which directly disposes of wastewater from the types of operations listed below or a domestic facility which receives wastewater from the types of industrial/commercial operations listed below?

☐ Yes ☒ No

If yes, indicate all of the following criteria which apply and provide the appropriate testing results in the table below.

- ☐ Manufacturers and formulators of tributyltin or related compounds
- ☐ Painting of ships, boats and marine structures
- ☐ Ship and boat building and repairing
- ☐ Ship and boat cleaning, salvage, wrecking and scaling
- ☐ Operation and maintenance of marine cargo handling facilities and marinas
- ☐ Facilities engaged in wood preserving
- ☐ Any other industrial/commercial facility for which tributyltin is known to be present, or for which there is any reason to believe that tributyltin may be present in the effluent.

b. Enterococci

Does or will your facility discharge **directly** into **saltwater** receiving waters **and**:

Enterococci bacteria are expected to be present in the discharge based on facility processes?

☒ Yes ☐ No

Domestic wastewater is or will be discharged?

☐ Yes ☒ No

If yes to either question, provide the appropriate testing results in Table 4 below.

c. E. coli

Does or will your facility discharge **directly** into **freshwater** receiving waters **and**:

E. coli bacteria are expected to be present in the discharge based on facility processes?

☐ Yes ☒ No

Domestic wastewater is or will be discharged?

☐ Yes ☒ No

If yes to either question, provide the appropriate testing results in Table 4 below.

Table 4 for Outfall No.: 001

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Sample 1	Sample 2	Sample 3	Sample 4	Average	MAL
Tributyltin (µg/L)						0.010
Enterococci (cfu or MPN/100 mL)						N/A
E. coli (cfu or MPN/100 mL)						N/A

TABLE 5 (Instructions, Page 56)

Completion of Table 5 is required for all external outfalls which discharge process wastewater or other wastewaters which may contain pesticides or herbicides from a facility which manufactures or formulates pesticides or herbicides. Completion of Table 5 is not required for internal outfalls.

Does your facility manufacture or formulate pesticides or herbicides?

☐ Yes ☒ No

If yes, provide the appropriate testing results in Table 5.

Table 5 for Outfall No.: Click here to enter text.

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Sample 1 (µg/L)*	Sample 2 (µg/L)*	Sample 3 (µg/L)*	Sample 4 (µg/L)*	Average (µg/L)*	MAL (µg/L)*
Aldrin						0.01
Carbaryl						5
Chlordane						0.2
Chlorpyrifos						0.05
4,4'-DDD						0.1
4,4'-DDE						0.1
4,4'-DDT						0.02
2,4-D						0.7
Danitol [Fenpropathrin]						—
Demeton						0.20
Diazinon						0.5/0.1
Dicofol [Kelthane]						1
Dieldrin						0.02
Diuron						0.090
Endosulfan I (*alpha*)						0.01
Endosulfan II (*beta*)						0.02
Endosulfan sulfate						0.1
Endrin						0.02
Guthion [Azinphos methyl]						0.1
Heptachlor						0.01
Heptachlor epoxide						0.01
Hexachlorocyclohexane (*alpha*)						0.05
Hexachlorocyclohexane (*beta*)						0.05
Hexachlorocyclohexane (*gamma*) [Lindane]						0.05
Hexachlorophene						10
Malathion						0.1
Methoxychlor						2.0
Mirex						0.02
Parathion (ethyl)						0.1
Toxaphene						0.3
2,4,5-TP [Silvex]						0.3

* Indicate units if different from µg/L.

TABLE 6 (Instructions, Page 56)

Completion of Table 6 is required for all external outfalls but is not required for internal outfalls.

Table 6 for Outfall No.: 001

Samples are (check one): ☐ Composites ☐ Grabs

Pollutants	Believed Present	Believed Absent	Average Concentration (mg/L)	Maximum Concentration (mg/L)	No. of Samples	MAL (µg/L)*
Bromide	☒	☐				400
Color (PCU)	☐	☒				—
Nitrate-Nitrite (as N)	☒	☐				—
Sulfide (as S)	☒	☐				—
Sulfite (as SO3)	☒	☐	4,800 mg/L	5,660 mg/L	1	—
Surfactants	☐	☒				—
Boron, total	☒	☐	8.0 mg/L	9.4 mg/L	1	20
Cobalt, total	☐	☒				0.3
Iron, total	☒	☐	1.5 mg/L	2.4 mg/L	1	7
Magnesium, total	☒	☐	2,240 mg/L	2, 640 mg/L	1	20
Manganese, total	☒	☐				0.5
Molybdenum, total	☐	☒				1
Tin, total	☒	☐				5
Titanium, total	☐	☒				30

* Indicate units if different from µg/L.

TABLE 7 (Instructions, Page 56)

Indicate any of the industrial categories applicable to your facility; otherwise, check the “N/A” box below. If GC/MS testing is required, indicate with an ‘x’ in the box provided that the testing results for the appropriate parameters are provided with the application.

☒ N/A

Table 7 for Applicable Industrial Categories

Industrial Category	40 CFR Part	Volatiles Table 8	Acids Table 9	Bases/Neutrals Table 10	Pesticides Table 11
☐ Adhesives and Sealants		☐ Yes	☐ Yes	☐ Yes	No
☐ Aluminum Forming	467	☐ Yes	☐ Yes	☐ Yes	No
☐ Auto and Other Laundries		☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Battery Manufacturing	461	☐ Yes	No	☐ Yes	No
☐ Coal Mining	434	No	No	No	No
☐ Coil Coating	465	☐ Yes	☐ Yes	☐ Yes	No
☐ Copper Forming	468	☐ Yes	☐ Yes	☐ Yes	No
☐ Electric and Electronic Components	469	☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Electroplating	413	☐ Yes	☐ Yes	☐ Yes	No
☐ Explosives Manufacturing	457	No	☐ Yes	☐ Yes	No
☐ Foundries		☐ Yes	☐ Yes	☐ Yes	No
☐ Gum and Wood Chemicals - Subparts A,B,C,E	454	☐ Yes	☐ Yes	No	No
☐ Gum and Wood Chemicals - Subparts D,F	454	☐ Yes	☐ Yes	☐ Yes	No
☐ Inorganic Chemicals Manufacturing	415	☐ Yes	☐ Yes	☐ Yes	No
☐ Iron and Steel Manufacturing	420	☐ Yes	☐ Yes	☐ Yes	No
☐ Leather Tanning and Finishing	425	☐ Yes	☐ Yes	☐ Yes	No
☐ Mechanical Products Manufacturing		☐ Yes	☐ Yes	☐ Yes	No
☐ Nonferrous Metals Manufacturing	421,471	☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Ore Mining - Subpart B	440	No	☐ Yes	No	No
☐ Organic Chemicals Manufacturing	414	☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Paint and Ink Formulation	446,447	☐ Yes	☐ Yes	☐ Yes	No
☐ Pesticides	455	☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Petroleum Refining	419	☐ Yes	No	No	No
☐ Pharmaceutical Preparations	439	☐ Yes	☐ Yes	☐ Yes	No
☐ Photographic Equipment and Supplies	459	☐ Yes	☐ Yes	☐ Yes	No
☐ Plastic and Synthetic Materials Manufacturing	414	☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Plastic Processing	463	☐ Yes	No	No	No
☐ Porcelain Enameling	466	No	No	No	No
☐ Printing and Publishing		☐ Yes	☐ Yes	☐ Yes	☐ Yes
☐ Pulp and Paperboard Mills - Subpart C	430	☐ *	☐ Yes	☐ *	☐ Yes
☐ Pulp and Paperboard Mills - Subparts F, K	430	☐ *	☐ Yes	☐ *	☐ *
☐ Pulp and Paperboard Mills - Subparts A, B, D, G, H	430	☐ Yes	☐ Yes	☐ *	☐ *
☐ Pulp and Paperboard Mills - Subparts I, J, L	430	☐ Yes	☐ Yes	☐ *	☐ Yes
☐ Pulp and Paperboard Mills - Subpart E	430	☐ Yes	☐ Yes	☐ Yes	☐ *
☐ Rubber Processing	428	☐ Yes	☐ Yes	☐ Yes	No
☐ Soap and Detergent Manufacturing	417	☐ Yes	☐ Yes	☐ Yes	No
☐ Steam Electric Power Plants	423	☐ Yes	☐ Yes	No	No
☐ Textile Mills (Not Subpart C)	410	☐ Yes	☐ Yes	☐ Yes	No
☐ Timber Products Processing	429	☐ Yes	☐ Yes	☐ Yes	☐ Yes

* Test if believed present.

TABLES 8, 9, 10, and 11 (Instructions, Pages 56-57)

Completion of Tables 8, 9, 10, and 11 is **required** as specified in Table 7 for all external outfalls that contain process wastewater.

Completion of Tables 8, 9, 10, and 11 is **not required** for internal outfalls.

Completion of Tables 8, 9, 10, and 11 **may be required** for types of industry not specified in Table 7 for specific parameters that are believed to be present in the wastewater.

Table 8 for Outfall No.: N/A: Volatile Compounds

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Average (µg/L)*	Maximum (µg/L)*	No. of Samples	MAL (µg/L)
Acrolein				50
Acrylonitrile				50
Benzene				10
Bromoform				10
Carbon tetrachloride				2
Chlorobenzene				10
Chlorodibromomethane				10
Chloroethane				50
2-Chloroethylvinyl ether				10
Chloroform				10
Dichlorobromomethane [Bromodichloromethane]				10
1,1-Dichloroethane				10
1,2-Dichloroethane				10
1,1-Dichloroethylene [1,1-Dichloroethene]				10
1,2-Dichloropropane				10
1,3-Dichloropropylene [1,3-Dichloropropene]				10
Ethylbenzene				10
Methyl bromide [Bromomethane]				50
Methyl chloride [Chloromethane]				50
Methylene chloride [Dichloromethane]				20
1,1,2,2-Tetrachloroethane				10
Tetrachloroethylene [Tetrachloroethene]				10
Toluene				10
1,2-Trans-dichloroethylene [1,2-Trans-dichloroethene]				10
1,1,1-Trichloroethane				10
1,1,2-Trichloroethane				10
Trichloroethylene [Trichloroethene]				10
Vinyl chloride				10

Table 9 for Outfall No.: N/A: Acid Compounds

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Average (µg/L)*	Maximum (µg/L)*	No. of Samples	MAL (µg/L)
2-Chlorophenol				10
2,4-Dichlorophenol				10
2,4-Dimethylphenol				10
4,6-Dinitro-o-cresol				50
2,4-Dinitrophenol				50
2-Nitrophenol				20
4-Nitrophenol				50
p-Chloro-m-cresol				10
Pentachlorophenol				5
Phenol				10
2,4,6-Trichlorophenol				10

Table 10 for Outfall No.: N/A: Base/Neutral Compounds

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Average (µg/L)*	Maximum (µg/L)*	No. of Samples	MAL (µg/L)
Acenaphthene				10
Acenaphthylene				10
Anthracene				10
Benzidine				50
Benzo(a)anthracene				5
Benzo(a)pyrene				5
3,4-Benzofluoranthene [Benzo(b)fluoranthene]				10
Benzo(ghi)perylene				20
Benzo(k)fluoranthene				5
Bis(2-chloroethoxy)methane				10
Bis(2-chloroethyl)ether				10
Bis(2-chloroisopropyl)ether				10
Bis(2-ethylhexyl)phthalate				10
4-Bromophenyl phenyl ether				10
Butylbenzyl phthalate				10
2-Chloronaphthalene				10
4-Chlorophenyl phenyl ether				10
Chrysene				5
Dibenzo(a,h)anthracene				5
1,2-Dichlorobenzene [o-Dichlorobenzene]				10
1,3-Dichlorobenzene [m-Dichlorobenzene]				10
1,4-Dichlorobenzene [p-Dichlorobenzene]				10

Pollutant	Average (µg/L)*	Maximum (µg/L)*	No. of Samples	MAL (µg/L)
3,3'-Dichlorobenzidine				5
Diethyl phthalate				10
Dimethyl phthalate				10
Di-n-butyl phthalate				10
2,4-Dinitrotoluene				10
2,6-Dinitrotoluene				10
Di-n-octyl phthalate				10
1,2-Diphenylhydrazine (as Azobenzene)				20
Fluoranthene				10
Fluorene				10
Hexachlorobenzene				5
Hexachlorobutadiene				10
Hexachlorocyclopentadiene				10
Hexachloroethane				20
Indeno(1,2,3-cd)pyrene				5
Isophorone				10
Naphthalene				10
Nitrobenzene				10
N-Nitrosodimethylamine				50
N-Nitrosodi-n-propylamine				20
N-Nitrosodiphenylamine				20
Phenanthrene				10
Pyrene				10
1,2,4-Trichlorobenzene				10

Table 11 for Outfall No.: N/A: Pesticides

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Average (µg/L)*	Maximum (µg/L)*	No. of Samples	MAL (µg/L)
Aldrin				0.01
alpha-BHC [alpha-Hexachlorocyclohexane]				0.05
beta-BHC [beta-Hexachlorocyclohexane]				0.05
gamma-BHC [gamma-Hexachlorocyclohexane]				0.05
delta-BHC [delta-Hexachlorocyclohexane]				0.05
Chlordane				0.2
4,4'-DDT				0.02
4,4'-DDE				0.1
4,4'-DDD				0.1
Dieldrin				0.02
Endosulfan I (alpha)				0.01
Endosulfan II (beta)				0.02

Pollutant	Average (µg/L)*	Maximum (µg/L)*	No. of Samples	MAL (µg/L)
Endosulfan sulfate				0.1
Endrin				0.02
Endrin aldehyde				0.1
Heptachlor				0.01
Heptachlor epoxide				0.01
PCB 1242				0.2
PCB 1254				0.2
PCB 1221				0.2
PCB 1232				0.2
PCB 1248				0.2
PCB 1260				0.2
PCB 1016				0.2
Toxaphene				0.3

* Indicate units if different from µg/L

TABLE 12 (DIOXINS/FURAN COMPOUNDS)

Complete Table 12 as directed. Table 12 is not required for internal outfalls. (Instructions, Pages 57-58)

a. Are any of the following compounds manufactured or used in a process at the facility?

☐ Yes ☒ No

If yes, indicate which compound(s) are manufactured or used at the facility and provide a brief description of the conditions of its/their presence at the facility.

☐	2,4,5-trichlorophenoxy acetic acid	(2,4,5-T)	CASRN 93-76-5
☐	2-(2,4,5-trichlorophenoxy) propanoic acid	(Silvex, 2,4,5-TP)	CASRN 93-72-1
☐	2-(2,4,5-trichlorophenoxy) ethyl 2,2-dichloropropionate	(Erbon)	CASRN 136-25-4
☐	0,0-dimethyl 0-(2,4,5-trichlorophenyl) phosphorothioate	(Ronnel)	CASRN 299-84-3
☐	2,4,5-trichlorophenol	(TCP)	CASRN 95-95-4
☐	hexachlorophene	(HCP)	CASRN 70-30-4

Description:

Click here to enter text.

b. Do you know or have any reason to believe that 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) or any congeners of TCDD may be present in your effluent?

☐ Yes ☒ No

If yes, provide a brief description of the conditions for its presence.

Click here to enter text.

c. If you responded yes to either Item a or b, complete Table 12 as instructed.

Table 12 for Outfall No.: N/A

Samples are (check one): ☐ Composites ☐ Grabs

Compound	Toxicity Equivalent Factors	Wastewater Concentration (ppq)	Wastewater Toxicity Equivalents (ppq)	Sludge Concentration (ppt)	Sludge Toxicity Equivalents (ppt)	MAL (ppq)
2,3,7,8-TCDD	1					10
1,2,3,7,8-PeCDD	0.5					50
2,3,7,8-HxCDDs	0.1					50
1,2,3,4,6,7,8-HpCDD	0.01					50
2,3,7,8-TCDF	0.1					10
1,2,3,7,8-PeCDF	0.05					50
2,3,4,7,8-PeCDF	0.5					50
2,3,7,8-HxCDFs	0.1					50
2,3,4,7,8-HpCDFs	0.01					50
OCDD	0.0003					100
OCDF	0.0003					100
PCB 77	0.0001					500
PCB 81	0.0003					500
PCB 126	0.1					500
PCB 169	0.03					500
Total						

TABLE 13 (HAZARDOUS SUBSTANCES)

Complete Table 13 as directed. Not required for internal outfalls. (Instructions, Pages 58-59)

a. Are there any pollutants listed in the instructions (page 60) believed present in the discharge?

☐ Yes ☒ No

b. Are there pollutants listed in Item 1.d. on page 1 of this technical report which are believed present in the discharge and have not been analytically quantified elsewhere in this application?

☐ Yes ☒ No

If you responded yes to either Item a or b, complete Table 13 as instructed.

Table 13 for Outfall No.: N/A

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	CASRN	Average (µg/L)	Maximum (µg/L)	No. of Samples	Analytical Method

WORKSHEET 3.0
LAND APPLICATION OF EFFLUENT

This worksheet is required for all renewal, amendment, and new applications for a permit to dispose of wastewater by land application.

1. TYPE OF DISPOSAL SYSTEM (Instructions, Page 67)

Indicate the type of land disposal being proposed.

- ☐ Irrigation
- ☐ Evaporation
- ☐ Evapotranspiration beds
- ☐ Drip irrigation system
- ☐ Subsurface application
- ☐ Subsurface soils absorption
- ☐ Surface application
- ☐ Other (describe below in detail): Click here to enter text.

2. LAND APPLICATION AREA (Instructions, Page 67)

Land Application Area Information

Effluent Application (gallons/day)	Irrigation Acreage (acres)	Describe land use & indicate type(s) of crop(s)	Public Access? (Y/N)

3. ANNUAL CROPPING PLAN (Instructions, Page 67)

Attach the required cropping plan that includes each of the following:

- Cool and warm season plant species
- Crop growing season
- Harvesting method/number of harvests
- Minimum/maximum harvest height
- Crop yield goals
- Soils map
- Break down of acreage and percent of total acreage for each crop
- Nitrogen requirements per crop
- Additional fertilizer requirements
- Supplemental watering requirements
- Crop salt tolerances
- Justification for not removing existing vegetation to be irrigated

Attachment: Click here to enter text.

4. STORMWATER MANAGEMENT (Instructions, Page 68)

Is stormwater runoff a component of the effluent disposed of via land application?

☐ Yes ☐ No

If yes, provide the following information:

Stormwater Management Disposal Areas

Disposal Area	Area Contributing Runoff (acres)	Primary Soil Type	Cover Type (i.e. pasture, row crop land, concrete slab, etc.)

If no, provide a description of tailwater controls and stormwater run-on controls used for the disposal area.

Click here to enter text.

5. WELL AND MAP INFORMATION (Instructions, Page 68)

Indicate that the following information is shown and labeled on the USGS map:

- ☐ The boundaries of the land application site(s)
- ☐ On-site buildings
- ☐ Waste-disposal or treatment facilities
- ☐ All water wells within ½-mile radius of the disposal site or property boundaries
- ☐ All springs and seeps onsite and within 500 feet of the property
- ☐ All surface waters in the state onsite and within 500 feet of the property
- ☐ Effluent storage and tailwater control facilities
- ☐ Buffer zones

List and cross reference all water wells located on or within 500 feet of the disposal site or property boundaries in the following table. Attach additional pages as necessary to include all of the wells.

Well Map Information

Well ID	Well Use	Producing? Y/N	Open, cased, capped, or plugged?	Proposed Best Management Practice

Do you plan to install groundwater monitoring wells or lysimeters around the land application site?

☐ Yes ☐ No

If yes, provide the proposed location of the monitoring wells or lysimeters on a site map.

6. SOIL MAP AND SOIL INFORMATION (Instructions, Page 69)

Indicate that the following information was provided:

☐ USDA Soil Survey map that indicates the area to be used for land application with the locations identified by fields and crops

☐ Breakdown of acreage and percent of total acreage for each soil type

☐ Copies of laboratory soil analyses

7. LABORATORY ACCREDITATION CERTIFICATION (Instructions, Page 70)

Effective July 1, 2008, all laboratory tests performed must meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification* with the following general exemptions:

a. The laboratory is an in-house laboratory and is:

1. periodically inspected by the TCEQ; or
2. located in another state and is accredited or inspected by that state; or
3. performing work for another company with a unit located in the same site; or
4. performing pro bono work for a governmental agency or charitable organization.

b. The laboratory is accredited under federal law.

c. The data are needed for emergency-response activities, and a laboratory accredited under the Texas Laboratory Accreditation Program is not available.

d. The laboratory supplies data for which the TCEQ does not offer accreditation.

The applicant should review *30 TAC Chapter 25* for specific requirements. The following certification statement shall be signed and submitted with every application. See Instructions, Page 32, for a list of designated representatives who may sign the certification.

I,____, certify that all laboratory tests submitted with this application meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification*.

8. EFFLUENT MONITORING DATA (Instructions, Page 70)

Completion of Table 14 is required for all renewal and amendment applications. Provide monitoring data for the previous two years for all parameters regulated in the permit. A table with blank headers has been provided for parameters that are not listed in the first table.

Table 14 for Site No.: Click here to enter text.

Samples are (check one): ☐ Composites ☐ Grabs

Date (mo/yr)	Daily Avg Flow (gpd)	BOD5 (mg/L)	TSS (mg/L)	Nitrogen (mg/L)	Conductivity (mmhos/cm)	Total acres irrigated	Hydraulic Application rate (acre-feet/month)

Attach an explanation of all persistent excursions to permitted parameters and corrective actions taken.

Attachment: Click here to enter text.

Use this table to provide effluent analysis for parameters not listed in the table above.

Additional Parameter Effluent Analysis

Date (mo/yr)							

Attach an explanation of all persistent excursions to permitted parameters and corrective actions taken.

Attachment: Click here to enter text.

9. POLLUTANT ANALYSIS (Instructions, Page 70)

Completion of Tables 15 and 16 is required for all permit applications for the authorization of land application of effluent.

Table 15 for Site No.: Click here to enter text.

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Sample 1 (mg/L)	Sample 2 (mg/L)	Sample 3 (mg/L)	Sample 4 (mg/L)	Average (mg/L)
BOD (5-day)					
CBOD (5-day)					
Chemical oxygen demand					
Total organic carbon					
Ammonia nitrogen					
Total suspended solids					
Nitrate nitrogen					
Total organic nitrogen					
Total phosphorus					
Oil and grease					
Total residual chlorine					
Total dissolved solids					
Sulfate					
Chloride					
Fluoride					
Fecal Coliform (cfu/100 mL)					
Specific conductance (mmhos/cm)					
pH (standard units; min/max)					
Soluble sodium					
Soluble calcium					
Soluble magnesium					
SAR (unitless)					

Table 16: for Site No.: Click here to enter text.

Samples are (check one): ☐ Composites ☐ Grabs

Pollutant	Sample 1 (µg/L)	Sample 2 (µg/L)	Sample 3 (µg/L)	Sample 4 (µg/L)	Average (µg/L)	MAL (µg/L)
Aluminum, total						2.5
Antimony, total						5
Arsenic, total						0.5
Barium, total						3
Beryllium, total						0.5
Boron, total						20
Cadmium, total						1
Chromium, total						3
Chromium, hexavalent						3
Chromium, trivalent						N/A
Copper, total						2
Cyanide						2/10
Lead, total						0.5
Mercury, total						0.005/0.0005
Nickel, total						2
Selenium, total						5
Silver, total						0.5
Thallium, total						0.5
Zinc, total						5.0

WORKSHEET 3.1
SURFACE LAND APPLICATION AND EVAPORATION

This worksheet is required for all renewal, amendment, and new applications for a permit to dispose of wastewater by surface land application.

1. SURFACE SPRAY (Instructions, Page 71)

Area under irrigation (acres): Click here to enter text.

Design application rate (acre-ft/acre/yr): Click here to enter text.

Design application frequency (hours/day): Click here to enter text.

Design application frequency (days/week): Click here to enter text.

Design total nitrogen loading rate (lbs nitrogen/acre/year): Click here to enter text.

Average slope of the application area (percent): Click here to enter text.

Maximum slope of the application area (percent): Click here to enter text.

Irrigation efficiency (percent): Click here to enter text.

Effluent conductivity (mmhos/cm): Click here to enter text.

Soil conductivity (mmhos/cm): Click here to enter text.

Curve number: Click here to enter text.

Method of Application: Click here to enter text.

Attach a detailed engineering report with water balance, storage volume calculations, and nitrogen balance.

Attachment: Click here to enter text.

2. EVAPORATION PONDS (Instructions, Page 72)

Daily average effluent flow into ponds: Click here to enter text. gallons per day

Attach a separate engineering report with water balance and storage volume calculations.

Attachment: Click here to enter text.

3. EVAPOTRANSPIRATION BEDS (Instructions, Page 72)

Number of beds: Click here to enter text.

Area of bed(s) (acres): Click here to enter text.

Depth of bed(s) (feet): Click here to enter text.

Void ratio of soil in the beds: Click here to enter text.

Storage volume within the beds (include units): Click here to enter text.

Attach a certification by a licensed Texas professional engineer that the liner meets TCEQ requirements.

Attachment: Click here to enter text.

Attach a separate engineering report with water balance, storage volume calculations, and description of the liner.

Attachment: Click here to enter text.

4. OVERLAND FLOW (Instructions, Page 72)

Area used for application (acres): Click here to enter text.

Slopes for application area (percent): Click here to enter text.

Design application rate (gpm/foot of slope width): Click here to enter text.

Slope length (feet): Click here to enter text.

Design BOD5 loading rate (lbs BOD5/acre/day): Click here to enter text.

Design application frequency (hours/day): Click here to enter text.

Design application frequency (days/week): Click here to enter text.

Attach a separate engineering report with the method of application and design requirements according to *30 TAC § 217.212*.

Attachment: Click here to enter text.

5. EDWARDS AQUIFER RECHARGE AREA (Instructions, Page 72)

Is the facility subject to *30 TAC Chapter 213, Edwards Aquifer Rules*?

☐ Yes ☐ No

Attach a report that describes the surface geological units present in the proposed land application site and identify the location and extent of any significant regard areas in the land application site.

Attachment: Click here to enter text.

WORKSHEET 3.2
SUBSURFACE IRRIGATION SYSTEMS (NON-DRIP)

This worksheet is **required** for all renewal, amendment, and new applications for a permit to dispose of wastewater by subsurface land application.

This worksheet is **not required** for systems that meet the definition of a Subsurface Area Drip Dispersal System as defined in *30 TAC Chapter 222*.

☐ Indicate with an 'x' in the box that the Class V Injection Well Inventory/Authorization Form (Worksheet 9.0) for this type of disposal system has been submitted to the TCEQ UIC Permits Team as directed.

1. SUBSURFACE APPLICATION (Instructions, Page 73)

Indicate the type of subsurface land disposal system you use or are proposing to use:

☐ Conventional drainfield, beds, or trenches

☐ Low pressure dosing

☐ Other: Click here to enter text.

Provide the following information:

Application area (acres): Click here to enter text.

Area of drainfield (square feet): Click here to enter text.

Application rate (gal/square ft/day): Click here to enter text.

Depth to groundwater (feet): Click here to enter text.

Area of trench (square feet): Click here to enter text.

Dosing duration per area (hours): Click here to enter text.

Number of beds: Click here to enter text.

Dosing amount per area (inches/day): Click here to enter text.

Soil infiltration rate (inches/hour): Click here to enter text.

Storage volume (gallons): Click here to enter text.

Area of bed(s) (square feet): Click here to enter text.

Soil classification: Click here to enter text.

Attach a separate engineering report with all necessary information and a description of the schedule of dosing basin rotation.

Attachment: Click here to enter text.

2. EDWARDS AQUIFER RECHARGE AREA (Instructions, Page 73)

a. Is the subsurface system located on the Edwards Aquifer Recharge Zone, as mapped by the TCEQ?

☐ Yes ☐ No

b. Is the subsurface system located on the Edwards Aquifer Transition Zone, as mapped by the TCEQ?

☐ Yes ☐ No

If yes to **either** question, the subsurface system may be prohibited by *30 TAC § 213.8*. Please call the Industrial Permits Team to schedule a pre-application meeting.

WORKSHEET 3.3
SUBSURFACE AREA DRIP DISPERSAL SYSTEMS

This worksheet is required for all renewal, amendment, and new applications for a permit to dispose of wastewater using a subsurface area drip dispersal system.

☐ Indicate with an 'x' in the box that the Class V Injection Well Inventory/Authorization Form (Worksheet 9.0) for this type of disposal system has been submitted to the TCEQ UIC Permits Team as directed.

1. ADMINISTRATIVE INFORMATION (Instructions, Page 74)

a. Provide the legal name of all corporations or other business entities managed, owned, or otherwise closely related to the owner of the treatment facility.

Click here to enter text.

b. Is the owner of the land where the treatment facility is located the same as the owner of the treatment facility?

☐ Yes ☐ No

If no, provide the legal name of all corporations or other business entities managed, owned, or otherwise closely related to the owner of the land where the treatment facility is located.

Click here to enter text.

c. Owner of the subsurface area drip dispersal system:

Click here to enter text.

d. Is the owner of the subsurface area drip dispersal system the same as the owner of the wastewater treatment facility or the site where the wastewater treatment facility is located?

☐ Yes ☐ No

If no, identify the names of all corporations or other business entities managed, owned, or otherwise closely related to the entity identified in Item 1.c.

Click here to enter text.

e. Owner of the land where the subsurface area drip dispersal system is located:

Click here to enter text.

f. Is the owner of the land where the subsurface area drip dispersal system is located the same as owner of the wastewater treatment facility, the site where the wastewater treatment facility is located, or the owner of the subsurface area drip dispersal system?

☐ Yes ☐ No

If no, identify the name of all corporations or other business entities managed, owned, or otherwise closely related to the entity identified in item 1.e.

Click here to enter text.

2. SUBSURFACE AREA DRIP DISPERSAL SYSTEM (Instructions, Page 75)

a. Check the type of system you use or are proposing to use:

☐ Subsurface drip/trickle irrigation

☐ Surface drip irrigation

☐ Other: Click here to enter text.

b. Provide the following information:

Application area (acres): Click here to enter text.

Soil infiltration rate (inches/hour): Click here to enter text.

Average slope of the application area: Click here to enter text.

Maximum slope of the application area: Click here to enter text.

Storage volume (gallons): Click here to enter text.

Major soil series: Click here to enter text.

Depth to groundwater (feet): Click here to enter text.

Effluent conductivity (mmhos/cm): Click here to enter text.

c. Is the facility located west of the boundary shown in *30 TAC § 222.83* and using a vegetative cover of non-native grasses overseeded with cool-season grasses?

☐ Yes ☐ No

If yes, the facility may propose a hydraulic application rate not to exceed 0.1 gal/square foot/day.

d. Is the facility located east of the boundary shown in *30 TAC § 222.83* or is the facility proposing any crop other than non-native grasses?

☐ Yes ☐ No

If yes, the facility must use the formula in *30 TAC § 222.83* to calculate the maximum hydraulic application rate.

e. Do you plan to submit an alternative method to calculate the hydraulic application rate for approval by the executive director?

☐ Yes ☐ No

If yes, provide the following information:

- Hydraulic application rate (gal/square foot/day): Click here to enter text.
- Nitrogen application rate (gal/square foot/day): Click here to enter text.

f. Provide the following dosing information:

Number of doses per day: Click here to enter text.

Dosing duration per area (hours): Click here to enter text.

Rest period between doses: Click here to enter text.

Dosing amount per area (inches/day): Click here to enter text.

Number of zones: Click here to enter text.

Is the proposed system is a surface drip irrigation system proposing to use existing native vegetation as a crop?

☐ Yes ☐ No

If yes, attach the following:

- a vegetation survey by a certified arborist describing the percent canopy cover and relative percentage of major overstory and understory plant species.

  Attachment: Click here to enter text.

- a separate engineering report with all necessary information and a description of the schedule of dosing basin rotation.

  Attachment: Click here to enter text.

3. REQUIRED PLANS (Instructions, Page 76)

a. Attach a Recharge Feature Plan with all information required in *30 TAC § 222.79*.

Attachment: Click here to enter text.

b. Attach a Soil Evaluation with all information required in *30 TAC § 222.73*.

Attachment: Click here to enter text.

c. Attach a Site Preparation Plan with all information required in *30 TAC § 222.75*.

Attachment: Click here to enter text.

d. Provide soil sampling and testing with all information required in *30 TAC § 222.157*.

Attachment: Click here to enter text.

4. FLOOD AND RUN-ON PROTECTION (Instructions, Page 76)

a. Is the existing/proposed subsurface area drip dispersal system located within the 100-year frequency flood level?

☐ Yes ☐ No

Source: Click here to enter text.

If yes, describe how the site will be protected from inundation.

Click here to enter text.

b. Is the existing/proposed subsurface area drip dispersal system within a designated floodway?

☐ Yes ☐ No

☐ If yes, indicate with an 'x' in the box that either the FEMA flood map or alternate information used to make this determination is included with the application. Include the attachment number.

Attachment: Click here to enter text.

5. SUBSURFACE WATERS IN THE STATE (Instructions, Page 77)

a. Buffer Map

Attach a map showing appropriate buffers on surface waters in the state, water wells, and springs/seeps.

Attachment: Click here to enter text.

b. Buffer variance request

Do you plan to request a buffer variance from water wells or waters in the state?

☐ Yes ☐ No

If yes, then attach the additional information required in *30 TAC § 222.81(c)*.

Attachment: Click here to enter text.

6. EDWARDS AQUIFER RECHARGE AREA (Instructions, Page 77)

a. Is the subsurface area drip dispersal system located on the Edwards Aquifer Recharge Zone, as mapped by the TCEQ?

☐ Yes ☐ No

b. Is the subsurface area drip dispersal system located on the Edwards Aquifer Transition Zone, as mapped by the TCEQ?

☐ Yes ☐ No

If yes to either question, the subsurface area drip dispersal system may be prohibited by *30 TAC § 213.8*. Please call the Industrial Permits Team to schedule a pre-application meeting.

WORKSHEET 4.0
RECEIVING WATERS

This worksheet is required for all renewal, amendment, and new TPDES permit applications.

1. DOMESTIC DRINKING WATER SUPPLY (Instructions, Page 78)

Is there a surface water intake for domestic drinking water supply located within 5 (five) miles downstream from the point/proposed point of discharge?

☐ Yes ☒ No

If yes, identify owner of the drinking water supply, the distance and direction to the intake, and locate and identify the intake on the USGS map.

☐ Indicate with an 'x' in the box that the requested information is provided.

2. DISCHARGE INTO TIDALLY INFLUENCED WATERS (Instructions, Page 78)

a. Width of the receiving water at the outfall? Discharge is into an open water channel feet

b. Are there oyster reefs in the vicinity of the discharge?

☐ Yes ☒ No

If yes, indicate approximate distance and direction from outfall(s):

Click here to enter text.

c. Are there any sea grasses within the vicinity of the point of discharge?

☐ Yes ☒ No

If yes, provide the distance and direction to the grasses:

Click here to enter text.

3. CLASSIFIED SEGMENT (Instructions, Page 78)

Is the discharge directly into (or within 300 feet of) a classified segment?

☒ Yes ☐ No

If yes, stop here. It is not necessary to complete Items 4 and 5, and it is not necessary to complete Worksheet 4.1.

If no, complete Items 4 and 5.

4. DESCRIPTION OF IMMEDIATE RECEIVING WATERS (Instructions, Page 79)

Name of the immediate receiving waters: Click here to enter text.

a. Check the appropriate description of the receiving waters

- ☐ Lake or Pond

  Surface area (acres): Click here to enter text.

  Average depth of the entire water body (feet): Click here to enter text.

  Average depth of water body within a 500-foot radius of the discharge point (feet): Click here to enter text.

- ☐ Man-made Channel or Ditch
- ☐ Stream or Creek
- ☐ Freshwater Swamp or Marsh
- ☐ Tidal Stream, Bayou, or Marsh
- ☐ Open Bay
- ☐ Other: Click here to enter text.

If you checked "man-made channel or ditch" or "stream or creek" above, provide responses to items b - e below:

b. For existing discharges, check the description below that best characterizes the area upstream of the discharge.

For new discharges, check the description below that best characterizes the area downstream of the discharge.

- ☐ Intermittent (dry for at least one week during most years)
- ☐ Intermittent with Perennial Pools (enduring pools containing habitat to maintain aquatic life uses)
- ☐ Perennial (normally flowing)

Check the source(s) of the information used to characterize the area upstream (existing discharge) or downstream (new discharge):

- ☐ USGS flow records
- ☐ personal observation
- ☐ historical observation by adjacent landowner(s)
- ☐ others, specify: Click here to enter text.

c. List the names of all perennial streams that join the receiving water within three miles downstream of the discharge point:

Click here to enter text.

d. Do the receiving water characteristics change within three miles downstream of the discharge? (e.g., natural or man-made dams, ponds, reservoirs, etc.)

☐ Yes ☐ No

If yes, discuss how:

Click here to enter text.

e. Provide general observations of the water body during normal dry weather conditions:

Click here to enter text.

Date and time of observation: Click here to enter text.

Was water body influenced by stormwater runoff during observations?

☐ Yes ☐ No

5. GENERAL CHARACTERISTICS OF WATER BODY (Instructions, Page 79)

a. Is the receiving water upstream of the existing discharge or proposed discharge site influenced by (check as appropriate):

- ☐ oil field activities
- ☐ urban runoff
- ☐ agricultural runoff
- ☐ septic tanks
- ☐ upstream discharges
- ☐ others, specify: Click here to enter text.

b. Uses of water body observed or evidence of such uses (check as appropriate):

- ☐ livestock watering
- ☐ contact recreation
- ☐ navigation
- ☐ non-contact recreation
- ☐ fishing
- ☐ picnic park activities
- ☐ domestic water supply
- ☐ industrial water supply
- ☐ others, specify: Click here to enter text.
- ☐ irrigation withdrawal

c. Check the description (only one) that best describes the aesthetics of the receiving water and the surrounding area:

- ☐ Wilderness: outstanding natural beauty; usually wooded or unpastured area: water clarity exceptional
- ☐ Natural Area: trees or native vegetation common; some development evident (from fields, pastures, dwellings); water clarity discolored
- ☐ Common Setting: not offensive, developed but uncluttered; water may be colored or turbid
- ☐ Offensive: stream does not enhance aesthetics; cluttered; highly developed; dumping areas; water discolored

WORKSHEET 4.1
STREAM PHYSICAL CHARACTERISTICS

The following information is required for all new applications, all major facilities, and any applications requesting to add an outfall if the receiving waters are perennial or intermittent with perennial pools.

Date of study: Click here to enter text. Time of study: Click here to enter text.

Stream name: Click here to enter text.

Location: Click here to enter text.

Type of stream upstream of existing discharge or downstream of proposed discharges, (check one):

☐ perennial ☐ intermittent with perennial pools

Complete the transects downstream of the existing or proposed discharges.

1. DATA COLLECTION (Instructions, Pages 80-81)

No. of defined stream bends:

Well: Click here to enter text. Moderately: Click here to enter text. Poorly: Click here to enter text.

No. of riffles:

Evidence of Flow fluctuations (check one):

Minor: Click here to enter text. Moderate: Click here to enter text. Severe: Click here to enter text.

Indicate the observed stream uses and if there is evidence or flow fluctuations or channel obstructions/modifications:

Click here to enter text.

Stream Transect Data

Transect Location	Habitat Type*	Water Surface Width (ft)	Stream Depths (ft)**									

* riffle, run, glide, or pool

** channel bed to water surface

2. SUMMARIZE MEASUREMENTS (Instructions, Page 81)

Streambed slope of entire reach (from USGS map in ft. /ft.): Click here to enter text.

Approximate drainage area above the most downstream transect from USGS map or county highway map (square miles): Click here to enter text.

Length of stream evaluated (ft): Click here to enter text.

Number of lateral transects made: Click here to enter text.

Average stream width (ft): Click here to enter text.

Average stream depth (ft): Click here to enter text.

Average stream velocity (ft/sec): Click here to enter text.

Instantaneous stream flow (ft^3/sec): Click here to enter text.

Indicate flow measurement method (VERY IMPORTANT – type of meter, floating chip timed over a fixed distance, etc.): Click here to enter text.

Flow fluctuations (minor, moderate, severe): Click here to enter text.

Size of pools (large, small, moderate, none): Click here to enter text.

Maximum pool depth (ft): Click here to enter text.

Total number of stream bends: Click here to enter text.

Number well defined: Click here to enter text.

Number moderately defined: Click here to enter text.

Number poorly defined: Click here to enter text.

Total number of riffles: Click here to enter text.

WORKSHEET 5.0
SEWAGE SLUDGE MANAGEMENT AND DISPOSAL

The following information is required for all TPDES permit applications that meet the conditions as outlined in Technical Report 1.0, Item 7.

1. SEWAGE SLUDGE SOLIDS MANAGEMENT PLAN (Instructions, Page 82)

a. Is this a new permit application or an amendment permit application?

☐ Yes ☐ No

b. Does the facility discharge in the Lake Houston watershed?

☐ Yes ☐ No

If yes to either Item a or b, attach a solids management plan.

Attachment:: Click here to enter text.

2. SEWAGE SLUDGE MANAGEMENT AND DISPOSAL (Instructions, Page 83)

a. Please check the current sludge disposal method(s). More than one method can be checked.

☐ Permitted landfill

☐ Marketing and distribution by the permittee

☐ Registered land application site

☐ Composted by the permittee

☐ Surface disposal site (sludge monofill)

☐ Transported to another WWTP (written statement or contractual agreement required)

☐ Beneficial land application as authorized in the existing permit

b. Disposal site name: Click here to enter text.

TCEQ Permit/Registration Number: Click here to enter text.

County where disposal site is located: Click here to enter text.

c. Method of transportation (truck, train, pipe, other): Click here to enter text.

Hauler Registration Number: Click here to enter text.

Sludge is transported as a:

☐ liquid

☐ semi-liquid

☐ semi-solid

☐ solid

Purpose of land application (check one): ☐ reclamation ☐ soil conditioning

Provide a written statement or copy of contractual agreements confirming that the wastewater treatment plant identified above will accept and be responsible for the sludge from the plant for the life of the permit (at least 5 years).

Attachment: Click here to enter text.

d. If the existing permit contains authorization for sludge land application, composting, marketing and distribution of sludge, or sludge lagoons and authorization to renew the activity is being sought in the application, the appropriate sections of the Sewage Sludge Technical Report (form TCEQ-10056) must be provided.

3. PERMIT AUTHORIZATION FOR SEWAGE SLUDGE DISPOSAL (Instructions, Page 83)

Are you requesting new authorization to beneficially land apply sewage sludge at this site or a site under your direct control?

☐ Yes ☐ No

Are you requesting new authorization to market and distribute sewage sludge at this facility or a facility under your direct control?

☐ Yes ☐ No

Are you requesting new authorization to compost sewage sludge?

☐ Yes ☐ No

Are you requesting new authorization to surface dispose sewage sludge at this site or site under your direct control?

☐ Yes ☐ No

Are you requesting new authorization to incinerate sewage sludge at this site or site under your direct control?

☐ Yes ☐ No

If yes to any of the above items, provide the information required in the *Sewage Sludge Technical Report* (form TCEQ-10056).

Attachment: Click here to enter text.

New authorization for beneficial land application, incineration, and sludge lagoons in the TPDES permit or TLAP requires a major amendment to the permit. New authorization for composting may require a major amendment to the permit. See the instructions for an explanation whether a major amendment is required or if authorization for composting can be added through the renewal process.

WORKSHEET 6.0
INDUSTRIAL WASTE CONTRIBUTION

1. ALL POTWS (Instructions, Page 84)

a. Provide the number of each of the following types of industrial users (IUs) that discharge to your POTW and the daily average flows from each. See Definitions for Categorical IU (CIU), Significant IU (SIU) – Non-Categorical, and Other IU.

Industrial User Information

Type of Industrial User	Number of Industrial Users	Daily Average Flow (gallons per day)
CIU		
SIU - Non-categorical		
Other IU		

b. In the past three years, has your POTW experienced treatment plant interference as defined in the Definition section of the instructions?

☐ Yes ☐ No

If yes, identify the date(s), duration, nature of interference, and probable cause(s) and possible source(s) of each interference event. Include the names of the IU(s) that may have caused the interference. Submit an attachment if necessary.

Click here to enter text.

Attachment: Click here to enter text

c. In the past three years, has your POTW experienced pass through as defined in the Definitions relating to Pretreatment section of the instructions (see page 13)?

☐ Yes ☐ No

If yes, identify the date(s), duration, pollutants passing through the treatment plant, and probable cause(s) and possible source(s) of each pass through event. Include the names of the IU(s) that may have caused the pass through. Submit an attachment if necessary.

Click here to enter text.

Attachment: Click here to enter text.

d. Does your POTW have, or is it required to develop, an approved pretreatment program?

☐ Yes ☐ No

If yes, answer all questions in Item 2, but skip Item 3.

If no, skip Item 2 and answer all questions in Item 3 for each significant industrial user and categorical industrial user.

2. POTWS WITH APPROVED PROGRAMS OR THOSE REQUIRED TO DEVELOP A PROGRAM (Instructions, Pages 84-85)

a. Have there been any substantial modifications to the POTW's approved pretreatment program that have not been submitted to the Approval Authority (TCEQ) for approval according to *40 CFR § 403.18*?

☐ Yes ☐ No

If yes, identify on a separate attachment all substantial modifications that have not been submitted to the TCEQ, including the purpose of the modification.

Attachment: Click here to enter text.

b. Have there been any nonsubstantial modifications to the POTW's approved pretreatment program that have not been submitted to the Approval Authority (TCEQ)?

☐ Yes ☐ No

If yes, identify on a separate attachment all nonsubstantial modifications that have not been submitted to the TCEQ, including the purpose of the modification.

Attachment: Click here to enter text.

c. Effluent Parameters above the minimum analytical level (MAL).

List all parameters measured above the MAL in the POTW's effluent monitoring during the last three years.

Effluent Parameters Measured Above the MAL

Pollutant	Concentration	MAL	Units	Date

d. Has any SIU, CIU, or other IU caused or contributed to any other problems (excluding interference or pass through) at your POTW in the past three years?

☐ Yes ☐ No

If yes, provide a description of each episode, including date(s), duration, description of problems, and probable pollutants. Include the name(s) of the SIU(s)/CIU(s)/other IU(s) that may have caused or contributed to any of the problems.

Click here to enter text.

3. SIGNIFICANT INDUSTRIAL USER AND CATEGORICAL INDUSTRIAL USER INFORMATION (Instructions, Pages 85-86)

a. Company Name: Click here to enter text. SIC Code: Click here to enter text.

Telephone number: Click here to enter text. Fax number: Click here to enter text.

Contact name: Click here to enter text.

Physical Address: Click here to enter text. City: Click here to enter text.

State: Click here to enter text. Zip Code: Click here to enter text.

b. Describe the industrial processes or other activities that affect or contribute to the SIU(s) or CIU(s) discharge (i.e., process and non-process wastewater):

Click here to enter text.

c. Provide a description of the principal products(s) or service(s) performed:

Click here to enter text.

d. Flow rate information

Flow rate information

Effluent Type	Discharge (gallons per day)	Discharge Frequency (continuous, batch, or intermittent)
Process wastewater		
Non-process wastewater		

e. Pretreatment Standards

Is the SIU or CIU subject to technology-based local limits as defined in the application instructions?

☐ Yes ☐ No

Is the SIU subject to categorical pretreatment standards?

☐ Yes ☐ No

If the SIU is subject to categorical pretreatment standards, provide the category and subcategory or subcategories:

SIUs Subject To Categorical Pretreatment Standards

Category in 40 CFR	Subcategory in 40 CFR	Subcategory in 40 CFR	Subcategory in 40 CFR	Subcategory in 40 CFR

f. Has the SIU or CIU caused or contributed to any problem(s) (e.g., interferences, pass through, odors, corrosion, blockages) at your POTW in the past three years?

☐ Yes ☐ No

If yes, provide a description of each episode, including dates, duration, description of problems, and probable pollutants, and include the name(s) of the SIU(s)/CIU(s) that may have caused or contributed to the problem(s).

Click here to enter text.

WORKSHEET 7.0
STORMWATER RUNOFF

This worksheet is required for all TPDES permit applications requesting individual permit coverage for discharges of stormwater runoff.

1. APPLICABILITY (Instructions, Page 87)

Do discharges from any of the proposed or existing outfalls consist of stormwater runoff only or stormwater runoff and any of the listed non-stormwater discharges on page 88 of the Instructions?

☐ Yes ☐ No

If yes, proceed as directed.

If no, stop here.

2. STORMWATER OUTFALL COVERAGE (Instructions, Page 88)

Indicate which type of authorization covers or is proposed to cover discharges from each stormwater outfall.

Authorization coverage

Outfall	Authorized Under MSGP	Authorized Under Individual Permit
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐

If you have indicated that all existing or proposed stormwater outfalls are authorized under the MSGP, stop here.

If you have indicated that you are seeking authorization for any stormwater outfall under an individual permit, proceed as directed.

The following information is required for each outfall that discharges stormwater for which you are seeking individual authorization under this permit application.

3. SITE MAP (Instructions, Page 88)

Attach a site map or maps (drawn to scale) of the entire facility with the following information.

Attachment: Click here to enter text.

- the location of each stormwater outfall to be covered by the permit
- an outline of the drainage area that is within the facility's boundary and that contributes stormwater to each outfall to be covered by the permit
- connections or discharge points to municipal separate storm sewer systems
- locations of all structures (e.g. buildings, garages, storage tanks)
- structural control devices that are designed to reduce pollution in stormwater runoff
- process wastewater treatment units (including ponds)
- bag house and other air treatment units exposed to precipitation or runoff
- landfills; scrapyards; surface water bodies (including wetlands)
- vehicle and equipment maintenance areas
- physical features of the site that may influence stormwater runoff or contribute a dry weather flow
- locations where spills or leaks of reportable quality (as defined in *30 TAC § 327.4*) have occurred during the three years before this application was submitted to obtain coverage under an individual permit
- processing areas, storage areas, material loading/unloading areas, and other locations where significant materials are exposed to precipitation or runoff

☐ Indicate with an 'x' in the box that all the above information was provided on the facility site map(s).

4. FACILITY/SITE INFORMATION (Instructions, Pages 88-89)

a. Provide the area of impervious surface and the total area drained by each outfall that discharges stormwater for which you are seeking individual authorization under this permit application.

Impervious Surfaces

Outfall	Area of Impervious Surface (include units)	Total Area Drained (include units)

b. Provide the following local area rainfall information and the source of the information.

Wettest month: Click here to enter text.

Average rainfall for wettest month (total inches): Click here to enter text.

25-year, 24-hour rainfall (inches): Click here to enter text.

Source: Click here to enter text.

c. Provide an inventory, or list, of materials currently handled at the facility that may be exposed to precipitation.

Click here to enter text.

d. Provide narrative descriptions of the industrial processes and activities involving the materials in the above-listed inventory that occur outdoors or in some manner that may result in exposure of the materials to precipitation or runoff.

Click here to enter text.

e. Describe any best management practices and controls that you are using to prevent or effectively reduce pollution in stormwater discharges from the facility.

Click here to enter text.

5. POLLUTANT ANALYSIS (Instructions, Pages 89-91)

a. Complete Table 17 as directed on page 90 of the Instructions.

Table 17 Pollutant Analysis for Outfall No.: Click here to enter text.

Pollutant	Grab Sample* Maximum (mg/L)	Composite Sample** Maximum (mg/L)	Grab Sample* Average (mg/L)	Composite Sample** Average (mg/L)	Number of Storm Events Sampled	MAL (mg/L)
pH (standard units)	(max)	—	(min)	—		—
Total suspended solids						—
Chemical oxygen demand						—
Total organic carbon						—
Oil and grease						—
Arsenic, total						0.0005
Barium, total						0.003
Cadmium, total						0.001
Chromium, total						0.003
Chromium, trivalent						—
Chromium, hexavalent						0.003
Copper, total						0.002
Lead, total						0.0005
Mercury, total						0.000005
Nickel, total						0.002
Selenium, total						0.005
Silver, total						0.0005
Zinc, total						0.005

* Taken during first 30 minutes of storm event
** Flow-weighted composite sample

b. Complete Table 18 as directed on pages 90-92 of the Instructions.

Table 18 Pollutant Analysis for Outfall No.: Click here to enter text.

Pollutant	Grab Sample* Maximum (mg/L)	Composite Sample** Maximum (mg/L)	Grab Sample* Average (mg/L)	Composite Sample** Average (mg/L)	Number of Storm Events Sampled

* Taken during first 30 minutes of storm event
** Flow-weighted composite sample

6. STORM EVENT DATA (Instructions, Page 91)

Provide the following data for the storm event(s) which resulted in the maximum values for the analytical data submitted:

Date of storm event: Click here to enter text.

Duration of storm event (minutes): Click here to enter text.

Total rainfall during storm event (inches): Click here to enter text.

Number of hours between beginning of storm measured and end of previous measurable rain event (hours): Click here to enter text.

Maximum flow rate during rain event (gallons/minute): Click here to enter text.

Total stormwater flow from rain event (gallons): Click here to enter text.

Provide a description of the method of flow measurement or estimate: Click here to enter text.

WORKSHEET 8.0
AQUACULTURE

This worksheet is required for all TPDES permit applications requesting individual permit coverage for discharges of aquaculture wastewater.

1. FACILITY/SITE INFORMATION (Instructions, Pages 92-93)

a. Describe the production ponds, raceways, and fabricated tanks at the facility:

Production Pond Descriptions:

Number of Ponds	Dimensions (include units)	Area of Each Pond (include units)	Number of Ponds × Area of Ponds (include units)

Total surface area of all ponds: Click here to enter text.

Raceway Descriptions:

Number of Raceways	Dimensions (include units)

Fabricated Tank Descriptions:

Number of Tanks	Dimensions (include units)

b. Do you have a TPWD-approved emergency plan?

☐ Yes ☐ No

c. Do you have an aquatic plant transplant authorization?

☐ Yes ☐ No

If yes, please provide a copy of the authorization letter.

Attachment: Click here to enter text.

d. How many aquaculture facilities are located within a 25-mile radius of this facility? Click here to enter text.

2. SPECIES IDENTIFICATION (Instructions, Page 93)

Identify each species being raised, the source, origin, and the disease status of the stock. If applicable, identify and attach copies of current relevant authorizations or permits that authorize the species.

Stock Species Information

Species	Source of Stock	Origin of Stock	Disease Status	Authorizations

3. STOCK MANAGEMENT PLAN (Instructions, Pages 93-94)

Provide a detailed stock management plan including all information required on pages 94-95 of the Instructions. Provide an attachment if necessary (and include the attachment number).

Click here to enter text.

Attachment: Click here to enter text.

4. WATER TREATMENT AND DISCHARGE DESCRIPTION (Instructions, Page 94)

Provide a detailed description of the discharge practices and water treatment process including all information required on page 95 of the Instructions. Provide an attachment if necessary (and include the attachment number).

Click here to enter text.

Attachment: Click here to enter text.

5. SOLID WASTE MANAGEMENT (Instructions, Page 94)

Describe solid waste-disposal practices including all information required on page 95 of the Instructions. Provide an attachment if necessary (and include the attachment number).

Click here to enter text.

Attachment: Click here to enter text.

6. SITE ASSESSMENT REPORT AND SENSITIVE HABITAT REQUIREMENTS (Instructions, Pages 95-96)

Information in this section must be provided only by new and expanding commercial shrimp facilities located within the coastal zone.

Attach a detailed site assessment report including the following.

Attachment: Click here to enter text.

- Facility location
- Flushing rate
- Reefs
- Endangered or threatened species or species of concern
- Spawning
- Nesting
- Bird roosts
- Recreational use
- Nursery habitat
- Discharge characterization

WORKSHEET 9.0

CLASS V INJECTION WELL INVENTORY/AUTHORIZATION FORM

SUBMIT TO:	TEXAS COMMISSION ON ENVIRONMENTAL QUALITY	For TCEQ Use Only
TCEQ UIC Permits Team Radioactive Materials Division MC 233 PO Box 13087 Austin, Texas 78711-3087 512/239-6466	CLASS V INJECTION WELL INVENTORY/ AUTHORIZATION FORM	Reg. No. Date Received: Date Authorized:

Reg. No. 5

SECTION I GENERAL INFORMATION

Provide the information in Items 1 through 8 (Instructions, Page 98)

General Information
1. TCEQ Program Area (PST, VCP, IHW, etc.), Contact Name and Phone Number Click here to enter text.
2. Agent/Consultant, Contact Name, Address (Street, City, State, and Zip Code), and Phone Number Click here to enter text.
3. ☐ Owner ☐ Operator Owner/Operator, Contact Name, Address (Street, City, State, and Zip Code), and Phone Number Click here to enter text.
4. Facility Name, Address (Street, City, County, State, and Zip Code) or location description (if no address is available) and Facility Contact Person and Phone Number Click here to enter text.
5. Latitude and Longitude (degrees-minutes-seconds) and method of determination (GPS, TOPO, etc.) (Attach topographic quadrangle map as Attachment A) Click here to enter text.
6. Type of Well Construction (Vertical Injection, Subsurface Fluid Distribution System, Infiltration Gallery, Temporary Injection Points, etc.) and Number of Injection Wells Click here to enter text.
7. Detailed Description regarding purpose of Injection System. Attach a Site Map as Attachment B (Attach the Approved Remediation Plan [if appropriate]) Click here to enter text.
8. Water Well Driller/Installer, Address (Street, City, State, and Zip Code), Phone Number, and License Number Click here to enter text.

SECTION II PROPOSED DOWN HOLE DESIGN

Attach a diagram signed and sealed by a licensed engineer as Attachment C

Name of String	Size	Setting Depth	Sacks Cement/Grout - Slurry Volume - Top of Cement	Hole Size	Weight PVC/Steel (lbs/ft)
9. Casing					
10. Tubing					
11. Screen					

SECTION III PROPOSED TRENCH SYSTEM, SUBSURFACE FLUID DISTRIBUTION SYSTEM, OR INFILTRATION GALLERY

Attach a diagram signed and sealed by a licensed engineer as Attachment D

Proposed System Information	
12. System(s) Dimensions Click here to enter text.	13. System(s) Construction Click here to enter text.

SECTION IV SITE HYDROGEOLOGICAL AND INJECTION ZONE DATA

Provide the information in Items 14 through 31

Site Hydrogeological and Injection Zone Data
14. Name of Contaminated Aquifer Click here to enter text.
15. Receiving Formation Name of Injection Zone Click here to enter text.
16. Well/Trench Total Depth Click here to enter text.
17. Surface Elevation Click here to enter text.
18. Depth to Groundwater Click here to enter text.
19. Injection Zone Depth Click here to enter text.
20. Injection Zone vertically isolated geologically? ☐ Yes ☐ No Impervious Strata between Injection Zone and nearest Underground Source of Drinking Water Name: Click here to enter text. Thickness: Click here to enter text.

Site Hydrogeological and Injection Zone Data
21. Provide a list of contaminants and the levels (ppm) in contaminated aquifer Attach as Attachment E
22. Horizontal and Vertical extent of contamination and injection plume Attach as Attachment F
23. Formation (Injection Zone) Water Chemistry (Background levels) TDS, etc Attach as Attachment G
24. Injection Fluid Chemistry in PPM at point of injection Attach as Attachment H
25. Lowest Known Depth of Groundwater with < 10,000 PPM TDS Click here to enter text.
26. Maximum injection Rate/Volume/Pressure Click here to enter text.
27. Water wells within 1/4 mile radius (attach map as Attachment I) Click here to enter text.
28. Injection wells within 1/4 mile radius (attach map as Attachment I) Click here to enter text.
29. Monitor wells within 1/4 mile radius (attach drillers logs and map as Attachment I) Click here to enter text.
30. Sampling frequency Click here to enter text.
31. Known hazardous components in injection fluid Click here to enter text.

SECTION V SITE HISTORY

Provide the information in Items 32 through 35

Site History
32. Type of Facility Click here to enter text.
33. Contamination Dates Click here to enter text.
34. Original Contamination (VOCs, TPH, BTEX, etc.) and Concentrations Attach as Attachment J
35. Previous Remediation Attach results of any previous remediation as Attachment K

NOTE: Authorization Form should be completed in detail and authorization given by the TCEQ before construction, operation, and/or conversion can begin. Attach additional pages as necessary.

CLASS V INJECTION WELL DESIGNATIONS

5A07 Heat Pump/AC return (IW used for groundwater to heat or cool buildings)

5A19 Industrial Cooling Water Return Flow (IW used to cool industrial process equipment)

5B22 Salt Water Intrusion Barrier (IW used to inject fluids to prevent the intrusion of salt water into an aquifer)

5D02 Stormwater Drainage (IW designed for the disposal of rain water)

5D04 Industrial Stormwater Drainage Wells (IW designed for the disposal of rain water associated with industrial facilities)

5F01 Agricultural Drainage (IW that receive agricultural runoff)

5R21 Aquifer Recharge (IW used to inject fluids to recharge an aquifer)

5S23 Subsidence Control Wells (IW used to control land subsidence caused by groundwater withdrawal)

5W09 Untreated Sewage

5W10 Large Capacity Cesspools (Cesspools that are designed for 5,000 gpd or greater)

5W11 Large Capacity Septic systems (Septic systems designed for 5,000 gpd or greater)

5W12 WTTP disposal

5W20 Industrial Process Waste-disposal Wells

5W31 Septic System (Well Disposal method)

5W32 Septic System Drainfield Disposal

5X13 Mine Backfill (IW used to control subsidence, dispose of mining byproducts, or fill sections of a mine)

5X25 Experimental Wells (Pilot Test) (IW used to test new technologies or tracer dye studies)

5X26 Aquifer Remediation (IW used to clean up, treat, or prevent contamination of a USDW)

5X27 Other Wells

5X28 Motor Vehicle Waste-disposal Wells (IW used to dispose of waste from a motor vehicle site - These are currently banned)

5X29 Abandoned Drinking Water Wells (waste disposal)

WORKSHEET 10.0
QUARRIES IN THE JOHN GRAVES SCENIC RIVERWAY

This worksheet is **required** for all TPDES permit and TLAP applications for individual permits for a municipal solid waste facilities or mining facilities located within a Water Quality Protection Area in the John Graves Scenic Riverway.

Review *30 TAC §§ 311.71-311.82* thoroughly prior to completing any portion of this worksheet.

1. EXCLUSIONS (Instructions, Pages 99-100)

Is this a municipal solid waste facility?

☐ Yes ☐ No

Has this quarry been in operation since January 1, 1994 without cessation of operation for more than 30 consecutive days and under the same ownership?

☐ Yes ☐ No

Is this a coal mine?

☐ Yes ☐ No

Is this a facility mining clay and shale for use in manufacturing structural clay products?

☐ Yes ☐ No

If yes to any of the above questions, **stop here**. You are required to maintain acceptable documentation, as outlined in *30 TAC § 311.72(c)*, at the facility to demonstrate the exclusion(s).

2. LOCATION OF THE QUARRY (Instructions, Page 100)

Indicate the distance between the quarry and the nearest navigable water body.

☐ < 200 feet

☐ 200 feet – 1,500 feet

☐ 1,500 feet – 1 mile

☐ > 1 mile

Note that the construction or operation of any new quarry or expansion of any existing quarry is **prohibited** within 200 feet of any water body located within a water quality protection area in the John Graves Scenic Riverway.

3. ADDITIONAL APPLICATION REQUIREMENTS (Instructions, Pages 100-101)

Use the table below to determine which additional application requirements apply to your facility, based on distance between the quarry and the nearest waterway.

Additional Application Requirements

Application Requirement	200 feet – 1,500 feet	1,500 feet – 1 mile	> 1 mile
Restoration Plan	Yes	Yes	Yes
Financial Assurance for Restoration	Yes	Yes	Yes
Technical Demonstration	Yes	Not required	Not required
Reclamation Plan	Yes	Not required	Not required
Financial Assurance for Reclamation	Yes	Not required	Not required

a. Restoration Plan

The Restoration Plan must address each of the following items as required by *30 TAC § 311.76*:

- Certified by a licensed Texas professional engineer or a licensed Texas professional geoscientist, within the appropriate area or discipline
- Identifies receiving waters at risk of an unauthorized discharge from the quarry and includes a proposed plan of action for restoration
- Describes the process(es) used in documenting existing physical, chemical, or biological background conditions of each of the receiving waters
- Provides a schedule for updating background conditions, as appropriate
- Identifies the goals and objectives of potential restoration actions
- Provides a reasonable range of restoration alternatives and identifies the preferred restoration alternative
- Describes the process for monitoring the effectiveness of the preferred restoration action. This includes identifying performance criteria used to determine the success of the restoration or need for interim site stabilization.
- Identifies a process for public involvement in the selection of the restoration alternative
- Provides a detailed cost estimate of the maximum probable costs required to complete a restoration action based on the costs to a third party conducting the action without a financial interest or ownership in the quarry

b. Financial Assurance for Restoration

Indicate the amount of financial assurance provided and the financial assurance mechanism used.

Amount of Financial Assurance ($): Click here to enter text.

Mechanism: Click here to enter text.

c. Technical Demonstration

The Technical Demonstration must address/include each of the following items as required by *30 TAC § 311.77*:

- Certification by a licensed Texas professional engineer or a licensed Texas professional geoscientist, within the appropriate area or discipline
- A time schedule for the quarry from initiation to termination of operations, including reclamation
- A detailed description of the type of quarrying to be conducted and the processes/methods employed
- A geological description of the quarry area, including the material deposit: type, geographical extent, depth, and volume; and a description of the general area geology
- A detailed description of any other operations on-site, include raw-material processing and secondary products processing
- A topographic map representing the quarry operation and all of the following within the boundaries of the quarry
  - water bodies
  - existing and proposed roads including quarry access roads
  - existing and proposed railroads
  - the 100 year floodplain boundaries
  - structures
  - the location of all know wells including water wells, oil wells, and unplugged and abandoned wells
  - active, post, and reclaimed quarry areas
  - buffer area
  - raw material, intermediate material, final product, waste product, byproduct, or ancillary material storage and processing areas
  - chemical and fuel storage areas
  - vehicle/equipment maintenance, cleaning, and fueling areas
  - vehicle/equipment loading and unloading areas
  - baghouses and other air treatment units exposed to precipitation
  - waste-disposal areas
- Surface Water Drainage and Water Accumulation Plan (SWDAP) that
  - describes the use and monitoring of structural controls and best management practices designed to control erosion, siltation, and runoff
  - provides a topographic map, at a scale appropriate to represent the quarry operation and all of the following within the boundaries of the quarry
    - the location of each process wastewater and stormwater outfall
    - an outline of the drainage area that contributes stormwater to each outfall
    - treatment, detention, and water storage tanks and ponds
    - structural controls for managing stormwater and process wastewater
    - physical features of the site that would influence stormwater runoff or contribute a dry weather flow

- Best Available Technology Evaluation (BATE) that
  - o assesses the use of structural controls and best management practices
  - o evaluates performance criteria outlined at *30 TAC § 311.79* and *§311.80*
  - o includes structural control design and construction that is certified by a licensed Texas professional engineer. Design and construction plan/specification must be maintained on site.
- A procedure and schedule for reviewing the Technical Demonstration for consistency with quarry operations and site conditions and effectiveness in controlling erosion, siltation, and runoff.

d. Reclamation Plan

The Reclamation Plan must address/include each of the following items as required by *30 TAC § 311.78*:

- Certification by a licensed Texas professional engineer or a licensed Texas professional geoscientist, within the appropriate area or discipline
- A description of the proposed use for the disturbed area following reclamation
- A site-specific standard for reclamation appropriate to the end use that addresses the following items:
  - o removal or final stabilization of all raw material, intermediate material, final product, waste product, byproduct, and ancillary material
  - o removal of waste or closure of all waste-disposal areas
  - o removal of structures, where appropriate
  - o removal and reclamation of all temporary roads and railroads
  - o backfilling, regarding, and recontouring
  - o slope stability for remaining highwalls and detention ponds
  - o revegetation of the reclaimed area giving consideration to species diversity and the use of native species
  - o establishment of wildlife habitat
  - o establishment of drainage patterns
  - o establishments of permanent control structures, where necessary, to address erosion, siltation, and runoff from post quarrying and reclaimed areas
  - o removal of all equipment
- A description of how reclamation will be conducted and a timetable for the completion of reclamation activities

e. Financial Assurance for Reclamation

Indicate the amount of financial assurance provided and the financial assurance mechanism used.

Amount of Financial Assurance ($): Click here to enter text.

Mechanism: Click here to enter text.

WORKSHEET 11.0
COOLING WATER INTAKE INFORMATION

This worksheet is required for all new, renewal, and amendment TPDES permit applications that meet the conditions outlined in Technical Report 1.0, Item 12.

1. COOLING WATER SYSTEM DATA (Instructions, Pages 102-103)

a. Complete the following table with information regarding the cooling water system.

Cooling Water System Data

Total DIF	
Total AIF	
Intake Flow Uses (%)	
Contact cooling	
Non-contact cooling	
Process uses	
Other	

b. Provide the following information as an attachment.

Attachment: Click here to enter text.

1. A narrative description of the design and annual operation of the facility's cooling water system and its relationship to the CWIS(s).
2. A scaled map depicting the location of each CWIS, impoundment, intake pipe, and canals, pipes, or waterways used to convey cooling water to, or within, the cooling water system. Provide the latitude and longitude for each CWIS and any intake pipe(s) on the map. Indicate the position of the intake pipe within the water column.
3. A description of water reuse activities, if applicable.
4. Design and engineering calculations prepared by a qualified professional and data to support the information provided in above item a.
5. Previous year (a minimum of 12 months) of AIF data.
6. A narrative description of existing or proposed impingement and entrainment technologies or operation measures and a summary of their performance, including, but not limited to, reductions in impingement mortality and entrainment due to intake location and reductions in total water withdrawals and usage.

2. COOLING WATER INTAKE STRUCTURE(S) DATA (Instructions, Page 103)

a. Complete the following table with information regarding each cooling water intake structure (this includes primary and make-up CWIS(s)).

Cooling Water Intake Structure(s) Data

CWIS ID				
DIF				
AIF				
Intake Flow Uses (%)				
Contact cooling				
Non-contact cooling				
Process uses				
Other				
Latitude				
Longitude				

b. Provide the following information as an attachment

Attachment: Click here to enter text.

1. A narrative description of the configuration of each CWIS, annual and daily operation, including any seasonal changes, and where it is located in the water body and in the water column.
2. Engineering calculations for each CWIS.

3. SOURCE WATER PHYSICAL DATA (Instructions, Page 104)

a. Complete the following table with information regarding the CWIS(s) source waterbody (this includes primary and make-up CWIS(s)).

Source Waterbody Data

CWIS ID				
Source waterbody				
Mean annual flow				
Source				

b. Provide the following information as an attachment.

Attachment: Click here to enter text.

1. A narrative description of the source water for each CWIS, including areal dimensions, depths, salinity and temperature regimes, and other documentation that supports your determination of the water body type where each cooling water intake structure is located.
2. A narrative description of the source waterbody's hydrological and geomorphological features.
3. Scaled drawings showing the physical configuration of all source water bodies used by the facility, including the source waterbody's hydrological and geomorphological features. Note: The source waterbody's hydrological and geomorphological features may be included on the map submitted for item 1.b.ii of this worksheet.
4. A description of the methods used to conduct any physical studies to determine your intake's area of influence within the waterbody and the results of such studies.

4. OPERATIONAL STATUS (Instructions, Pages 104-105)

a. Is this application is for a power production or steam generation facility?

☐ Yes ☐ No

If yes, provide the following information as an attachment; otherwise, proceed to item b.

Attachment: Click here to enter text.

1. Describe the operating status of each individual unit, including age of each unit, capacity utilization rate (or equivalent), for the previous five years (a minimum of 60 months), and any seasonal changes in operation.
2. Describe any extended or unusual outages that significantly affect current data for flow, impingement, entrainment, or other factors.
3. Identify any operating unit with a capacity utilization rate of less than 8 percent averaged over a contiguous period of two years (a minimum of 24 months).
4. Describe any major upgrades completed within the last 15 years, including but not limited to boiler replacement, condenser replacement, turbine replacement, or changes to fuel type.

b. Process Units

1. Is this application for a facility which has process units that use cooling water other than for power production or steam generation?

   ☐ Yes ☐ No

   If yes, continue; otherwise, proceed to item c.

2. Does the facility use or intend to use reductions in flow or changes in operations to meet the requirements of *40 CFR § 125.94(c)*?

   ☐ Yes ☐ No

   If yes, provide descriptions of the following information as an attachment, otherwise proceed to item c.

   Attachment: Click here to enter text.

   - Individual production processes and product lines
   - The operating status, including age of each line and seasonal operation
   - Any extended or unusual outages that significantly affect current data for flow, impingement, entrainment, or other factors
   - Any major upgrades completed within the last 15 years and plans or schedules for decommissioning or replacement of process units or production processes and product lines.

c. Is this an application for a nuclear power production facility?

☐ Yes ☐ No

If yes, include a description of completed, approved, or scheduled upgrades and Nuclear Regulatory Commission relicensing status of each unit at the facility as an attachment; otherwise, proceed to item d.

Attachment: Click here to enter text.

d. Is this an application for a manufacturing facility?

☐ Yes ☐ No

If yes, include descriptions of current and future production schedules and any plans or schedules for any new units planned within the next five years (a minimum of 60 months) as an attachment; otherwise proceed to Worksheet 11.1.

Attachment: Click here to enter text.

WORKSHEET 11.1
IMPINGEMENT MORTALITY

This worksheet is required for all new, renewal, and amendment TPDES permit applications that meet the conditions outlined in Technical Report 1.0, Item 12. Complete one copy of this worksheet for each individual CWIS the facility uses or proposes to use.

CWIS ID: Click here to enter text.

1. IMPINGEMENT COMPLIANCE TECHNOLOGY OPTION SELECTION (Instructions, Page 106)

Indicate the method of compliance with the Impingement Mortality Standard selected by the facility with an 'x' in the appropriate box.

- ☐ Closed-cycle recirculating system(CCRS) [*40 CFR § 125.94(c)(1)*]
- ☐ 0.5 ft/s Through-Screen Design Velocity [*40 CFR § 125.94(c)(2)*] – Proceed to Worksheet 11.2
- ☐ 0.5 ft/s Through Screen Actual Velocity [*40 CFR § 125.94(c)(3)*]
- ☐ Existing offshore velocity cap [*40 CFR § 125.94(c)(4)*] – Proceed to Worksheet 11.2
- ☐ Modified traveling screens [*40 CFR § 125.94(c)(5)*]
- ☐ System of technologies [*40 CFR § 125.94(c)(6)*]
- ☐ Impingement mortality performance standard [*40 CFR § 125.94(c)(7)*]
- ☐ De minimis rate of impingement [*40 CFR § 125.94(c)(11)*]
- ☐ Low capacity utilization power-generation facilities [*40 CFR § 125.94(c)(12)*]

If you selected 0.5 ft/s Through-Screen Design Velocity [*40 CFR § 125.94(c)(2)*] or existing offshore velocity cap [*40 CFR § 125.94(c)(4)*], proceed to Worksheet 11.2. Otherwise, continue.

2. IMPINGEMENT COMPLIANCE TECHNOLOGY INFORMATION (Instructions, Pages 106-108)

Complete the following sections based on the selection made for item 1 above.

a. CCRS [*40 CFR § 125.94(c)(1)*]

☐ Indicate with an 'x' in the box if the CWS meets the definition of CCRS located at *40 CFR § 125.91(c)* and provide a response to the following questions.

1. Does the facility use or propose to use a CWIS to replenish water losses to the CWS?

   ☐ Yes ☐ No

   If no, proceed to item ii. If yes, provide the following information as an attachment and continue.

   Attachment: Click here to enter text.

   i. CWIS ID

   ii. 12 months of intake flow data for any CWIS used for make-up intake flows to replenish cooling water losses, excluding intakes for losses due to blowdown, drift, or evaporation.

   iii. A narrative description of any physical or operational measures taken to minimize make-up withdraws.

   Note: You do not need to complete a separate Worksheet 11.1 for a make-up CWIS.

2. Does the facility use or propose to use cooling towers?

☐ Yes ☐ No

If no, proceed to Worksheet 11.2. If yes, provide the following information and proceed to Worksheet 11.2.

i. Average number of COCs prior to blowdown: Click here to enter text.

Average COCs prior to blowdown

Cooling Tower ID				
COCs				

Provide COC monitoring data for each cooling tower from the previous year (a minimum of 12 months) as an attachment.

Attachment: Click here to enter text.

ii. Maximum number of COCs each cooling tower can accomplish based on design of the system.

Calculated COCs prior to blowdown

Cooling Tower ID				
COCs				

iii. Describe conditions that may limit the number of COCs prior to blowdown, if any, including but not limited to permit conditions.

Click here to enter text.

b. 0.5 ft/s Through Screen Actual Velocity [*40 CFR § 125.94(c)(3)*]

Provide daily intake flow measurement monitoring data from the previous year (a minimum of 12 months) as an attachment and proceed to Worksheet 11.2.

Attachment: Click here to enter text.

c. Modified traveling screens [*40 CFR § 125.94(c)(5)*]

Provide the following information as an attachment and proceed to Worksheet 11.2.

Attachment: Click here to enter text.

1. A description of the modified traveling screens and associated equipment.
2. A site-specific impingement technology performance optimization study that includes a narrative description of the biological data collection methods
3. Biological sampling data from the previous two years (a minimum of 24 months).

d. System of technologies [*40 CFR § 125.94(c)(6)*] or impingement mortality performance standard [*40 CFR § 125.94(c)(7)*]

Provide the following information as an attachment and proceed to Worksheet 11.2.

Attachment: Click here to enter text.

i. A description of the system of technologies used or proposed for use by the facility to achieve compliance with the impingement mortality standard.

ii. A site-specific impingement technology performance optimization study that includes a narrative description of the biological data collection methods.

iii. Biological sampling data from the previous two years (a minimum of 24 months).

e. De minimis rate of impingement [*40 CFR § 125.94(c)(11)*]

Provide the following information and proceed to Worksheet 11.2.

1. Include monitoring data from the previous year (a minimum of 12 months) of intake flow measured at a frequency of 1/day on days of operation as an attachment.

   Attachment: Click here to enter text.

2. If the rate of impingement caused by the CWIS is extremely low (at an organism or age-one equivalent count), include supplemental information to Worksheet 11.0, item 1.b.vi. to support as an attachment.

   Attachment: Click here to enter text.

f. Low capacity utilization power-generation facilities [*40 CFR § 125.94(c)(12)*]

Provide monthly utilization data from the previous 2 years (a minimum of 24 months) for each operating unit as an attachment and proceed to Worksheet 11.2.

Attachment: Click here to enter text.

WORKSHEET 11.2
SOURCE WATER BIOLOGICAL DATA

This worksheet is required for all new, renewal, and amendment TPDES permit applications that meet the conditions outlined in Technical Report 1.0, Item 12. Complete one copy of this worksheet for each source waterbody of a CWIS for which a facility has selected an Impingement Mortality Technology Option described at *40 CFR §§ 125.94(c)(1)-(7)*.

Name of source waterbody: Click here to enter text.

1. SPECIES MANAGEMENT (Instructions, Page 109)

a. The facility has obtained an incidental take permit for its cooling water intake structure(s) from the U.S. Fish and Wildlife Service or the National Marine Fisheries Service.

☐ Yes ☐ No

If yes, any information submitted in order to obtain that permit may be used to supplement the permit application information requirements of paragraph *40 CFR § 125.95(f)*. If included, provide the attachment number.

Attachment: Click here to enter text.

b. Is the facility requesting a waiver from application requirements at *40 CFR § 122.21(r)(4)* in accordance with *40 CFR § 125.95* for any CWIS(s) that withdraw from a man-made reservoir that is stocked and managed by a state or federal natural resources agency or the equivalent?

☐ Yes ☐ No

If yes, include a copy of the most recent managed fisheries report to TPWD, or equivalent, as an attachment.

Attachment: Click here to enter text.

c. There are no federally listed threatened or endangered species or critical habitat designations within the source water body.

☐ True ☐ False

2. SOURCE WATER BIOLOGICAL DATA (Instructions, Pages 109-110)

New Facilities (Phase I, Track I and II)

- Provide responses to all items in this section and stop.

Existing Facilities (Phase II)

- If the answer to 1.b. above was no, provide responses to all items in this section and proceed to Worksheet 11.3.
- If the answer to 1.b. was yes and 1.c. was true, do not complete any items in this section and proceed to Worksheet 11.3.
- If the answer to 1.b. was yes and 1.c. was false, provide a response for any item in this section that is not contained within the most recent TPWD, or equivalent, report as an attachment to the application and enter the attachment number in the space provided. Proceed to Worksheet 11.3.

Attachment: Click here to enter text.

a. A list of the data requested at *40 CFR § 122.21(r)(4)(ii)* through *(vi)* that are not available and efforts made to identify sources of the data.

b. Provide a list of species (or relevant taxa) in the vicinity of the CWIS and identify the following information regarding each species listed.

   1. all life stages and their relative abundance,
   2. identification of all species and life stages that would be most susceptible to impingement and entrainment,
   3. forage base,
   4. significance to commercial fisheries,
   5. significance to recreational fisheries,
   6. primary period of reproduction,
   7. larval recruitment, and
   8. period of peak abundance for relevant taxa.

c. Data representative of the seasonal and daily activities (e.g., feeding and water column migration) of biological organisms in the vicinity of the cooling water intake structure.

d. Identify all threatened, endangered, and other protected species that might be susceptible to impingement and entrainment at your cooling water intake structures.

e. Documentation of any public participation or consultation with federal or state agencies undertaken and provide an attachment number.

The following is required for existing facilities only. Include the following information with the above listed attachment.

f. Identify any protective measures and stabilization activities that have been implemented, and provide a description of how these measures and activities affected the baseline water condition in the vicinity of the intake.

g. A list of fragile species, as defined at *40 CFR § 125.92(m)*, at the facility. The applicant need only identify those species not already identified as fragile at *40 CFR § 125.92(m)*.

   Note: New units at an existing facility are not required to resubmit this information if the cooling water withdrawals for the operation of the new unit are from an existing intake.

WORKSHEET 11.3
COMPLIANCE WITH ENTRAINMENT MORTALITY STANDARD

This worksheet is required for all new, renewal, and amendment TPDES permit applications that meet the conditions outlined in Technical Report 1.0, Item 12. Complete one copy of this worksheet for each individual CWIS the facility uses or proposes to use.

CWIS ID: Click here to enter text.

1. APPLICABILITY (Instructions, Page 111)

Is the AIF of the CWIS identified above greater than, or equal to, 125 MGD?

☐ Yes ☐ No

- If no or the facility has selected CCRS [*40 CFR § 125.94(c)(1)*] for the impingement mortality compliance method, complete item 2 and stop here.
- If yes and the facility is seeking a waiver from application requirements in accordance with *40 CFR § 125.95* for any CWIS(s) that withdraw from a man-made reservoir that is stocked and managed by a state or federal natural resources agency or the equivalent, complete item 2 and stop.
- If yes and the facility is not seeking a waiver from application requirements in accordance with *40 CFR § 125.95*, complete item 2 and provide any required and completed studies listed in item 3. For any required studies in item 3 that are not complete, provide a detailed explanation for the delay and an anticipated schedule for completion and submittal.

2. EXISTING ENTRAINMENT PERFORMANCE STUDIES (Instructions, Page 111)

Previously conducted studies or studies obtained from other facilities addressing technology efficacy, through-facility entrainment survival, and other entrainment studies with the application.

Attachment: Click here to enter text.

3. FACILITY ENTRAINMENT PERFORMANCE STUDIES (Instructions, Pages 111-112)

a. Provide an entrainment characterization study, as described at *40 CFR § 122.21(r)(9)*, as an attachment.

Attachment: Click here to enter text.

b. Provide a comprehensive feasibility study, as described as *40 CFR § 122.21(r)(10)*, as an attachment.

Attachment: Click here to enter text.

c. Provide a benefits valuation study, as described as *40 CFR § 122.21(r)(11)*, as an attachment.

Attachment: Click here to enter text.

d. Provide a non-water quality environmental and other impacts study, as described as *40 CFR § 122.21(r)(12)*, as an attachment.

Attachment: Click here to enter text.

e. Provide a peer review analysis, as described as *40 CFR § 122.21(r)(13)*, as an attachment.

Attachment: Click here to enter text.

ATTACHMENT 8

Process Design Basis and Narrative

Process Design Basis and Narrative Port of Corpus Christi Industrial Seawater Desalination Harbor Island

December 2017

Table of Contents

Process Design Basis and Narrative
Port of Corpus Christi Industrial Seawater Desalination
Harbor Island

Introduction

The Port of Corpus Christi Authority (PCCA) is developing a project to provide a sustainable supply of potable water for the Corpus Christi area that is not dependent upon rainwater. The proposed system will provide up to 50 million gallons per day (MGD) of permeate through the process of desalination. The purpose of this project is to develop a basis of design in sufficient detail to complete the Texas Commission on Environmental Quality (TCEQ) Industrial Wastewater (TPDES) Permit Application. The proposed facility will have discharges of the following effluents:

- Reject from the membrane desalination process, which is high in Total Dissolved Solids (TDS); and
- Supernatant and filtrate from sediment and sludge dewatering.

The proposed facility will be located on Harbor Island. The plant intake will consist of seawater pumped from one of the adjacent channels. Pre-treatment will include removing sediment in the form of total suspended solids (TSS). The plant will use several clarification and filtration pretreatment processes for this purpose. The final treatment step will be membrane desalination using Reverse Osmosis. The low TDS permeate will then be treated to reduce corrosiveness, chlorinated, and distributed for potable water use. The suspended solids will be concentrated into a dried sludge for offsite disposal. The dewatering filtrate, thickener supernatant and the membrane reject are the subject of the Industrial Wastewater Permit Application.

Project Objective

The overall Project Objective is to develop a sustainable supply of potable water for the Corpus Christi area that is not dependent upon rainwater. This Process Design Basis and Narrative provides information in support of the TPDES Industrial Wastewater Permit application.

Proposed Pre-Treatment and Treatment Unit Processes

The following unit processes will be utilized in the desalination facility:

- Intake screens to remove large particulate from seawater
- Intake clarification with chemical coagulation to remove algae and suspended solids
- Strainers to remove fine debris
- Ultrafiltration to remove fine TSS
- Reverse Osmosis to remove TDS
- Calcite filters to add alkalinity to the permeate to reduce its corrosiveness
- Chlorination
- Distribution pumping

- Energy recovery
- Discharge of the membrane brine or reject under a TPDES permit
- Thickening of the clarifier underflow
- Consolidation of the ultrafiltration membrane backwash solids with thickened clarifier underflow
- Dewatering of consolidated sludge streams
- Discharge of the thickener supernatant and dewatering filtrate under a TPDES permit

Process Narrative

Seawater will be drawn into the plant from a channel adjacent to Harbor Island through coarse screens that will keep large material from entering the pre-treatment processes. The screen will reject captured solids as industrial solid waste into a dumpster. Sodium Hypochlorite (NaOCl) will be added as required to clear marine growth from the screens. The water will enter a rapid mixing unit where one or more treatment chemicals are added. It will then enter the Clarifier Center well, where flocculent is added. It will then flow into the main clarifier tank, where suspended solids will settle. The settled solids will be removed periodically as underflow to the Sludge Thickener. The clarifier effluent will flow to the Settled Water Clearwell, where NaOCl may also be added for oxidation of manganese and for partial disinfection.

From the Settled Water Clearwell, flow will pass into the strainer where solids and debris will be removed as necessary to protect the Ultrafiltration (UF) membranes. The Strainers will be backwashed to the Sludge Thickener. NaOCl may also be added to the strainers, as required. Particles exceeding a diameter greater than 0.001 μm will then be removed by passing the water under high pressure through the UF membranes. This process is semi-continuous, with some UF units in forward flow and others in Backwash or Cleaning mode. Backwash flows will be sent to the UF Reject Tank and then stored for processing in the Sludge Thickener. UF Permeate will be sent to a Clearwell where NaOCl will be added, if required.

From the Clearwell, water will be pumped through Cartridge Filters, the last unit to protect the Desalination reverse osmosis (RO) skids. The RO units will then remove particles larger than 0.1 nm. Pumps taking suction from the Clearwell will apply high pressure to force the seawater through the RO membranes, leaving the TDS behind. The process will be semi-continuous, with some RO units in forward flow and others in Reject or Cleaning mode. RO Permeate will be passed through a calcite filter to add alkalinity and reduce the corrosivity of the product water. The water will then be chlorinated and placed into one of two Permeate Storage Tanks for distribution as potable water. The RO reject will be discharged to a Brine Tank, and then pumped to Outfall 001.

Solids and sludge from the Clarifiers, Strainers, and UF Reject will be passed into a Mix Tank where Coagulant may be added, as required, to increase the diameter of the solids and then into a Sludge Thickener. A Flocculent may be added to the center well of the Thickener to enhance solids separation. The Supernatant overflow will pass over the Thickener weirs to the Outfall Storage Tank. Underflow from the thickener will be pumped into a Belt Filter press (BFP) for dewatering. Solids will be taken off site via truck. BFP Filtrate flow will flow to the Outfall Storage Tank where it will combine with the Thickener Supernatant for discharge to Outfall 001.

A Block Flow Diagram of the process is shown in **Figure 1**. The corresponding water balance is shown in **Table 1**. The water balance shows that the intake of the facility will be 150.7MGD to produce 50 MGD of Permeate. The water balance is based on the following design assumptions:

- 5% sludge removal in the clarifier;
- 3% backwash at the strainers;
- 90% permeate recovery in the UF system;
- 55% of RO feed routed through energy recovery;
- 40% permeate recovery in the RO system;
- 50% decant from the thickener; and
- 60% filtrate recovery from the filter press.

Flow Basis and Material Balance

A summary of the projected Wastewater Stream Concentration is show in **Table 2** below. The projected effluent concentrations are based on published sample data for Corpus Christi Bay and the design assumptions identified previously for the water balance. Constituent concentrations for average effluent conditions are derived by assuming 40% recovery of RO permeate, while maximum constituent concentrations are derived by assuming 50% RO permeate recovery. Note that the treatment system is designed to remove suspended solids and associated total organic carbon.

Outfall 001

Diffuser

Outfall 001 will consist of a diffuser oriented parallel to the shoreline, approximately 300 ft away. The design basis assumes a 48-inch buried HDPE discharge pipe will feed the diffuser from the on-shore pump station. The approximate diffuser location is shown in **Figure 2.** While the exact design details of the diffuser have yet to be finalized, a typical diffuser configuration is shown in **Figure 3.** The characteristics of diffuser will be defined during system design to achieve target mixing performances.

Modeling

Diffuser performance was modelled using CORMIX (version 10.0GT). A report describing the modeling program is included as **Appendix A**. Modeling results demonstrate a significant factor in achieving good mixing is locating the diffuser at sufficient water depth. Models were run at water depths of approximately 63 feet.

Significantly better effluent mixing is predicted by the model for 50% RO recovery than for 40% RO recovery for varying diffuser designs. This difference is likely due to the increased density of the effluent at higher recovery rates. Diffuser performance can change significantly across a range of flows for a particular set of design parameters. CORMIX shows that good mixing performance can be achieved when the diffuser effluent is characterized by a certain flow profile, referred to by the CORMIX model as “flow class”. As shown in the modeling report, the modeled effluent at the boundaries of the mixing zones for the various diffuser designs achieved percentages below 2.5% at the ZID, 1.5% at the aquatic life mixing zone, and 1.0% at the human health mixing zone. The diffuser will be designed to achieve these target levels of mixing performance as determined through modeling across the range of flow rates.

Natural Salinity Variation

The following discussion about the variability of salinity levels in Corpus Christi Bay is based on the U.S. Environmental Protection Agency document included in **Appendix B.**

Natural salinity levels within the Bay system vary widely and are largely controlled by sources of freshwater inflows entering into the bays and estuaries consisting of rain, groundwater, and the largest contributor, surface water from rivers and streams. The Nueces River is one of the largest contributors of freshwater into the local bays and estuaries.

Natural fluctuations in freshwater inflows into the Bay can have an immense impact on organisms within the Bay system. For example, if a long drought persists and creates a situation of very little freshwater inflow into the Bay, it may cause hypersaline (high salt) conditions that in turn affect bay shrimp catches which need a certain salinity range in order to mature in healthy numbers. On the other extreme, there may be an abundance of freshwater inflow after an extended heavy rain event that causes eutrophication (high nutrient conditions), triggers large algal blooms that deplete oxygen and light within the water column, and negatively affect fish and plants living in the Bay system.

Data obtained from the TCEQ for Buoy 16492 (located in Corpus Christi Bay) demonstrate this natural variation in ambient salinity. This data set, shown in **Figure 4** below, shows a historic salinity variation between 3.06 and 40.9 parts per thousand. Since the proposed effluent modeling demonstrates the system effluent will increase the ambient concentration less than 1% beyond the aquatic life mixing zone, this increase is considered insignificant versus the natural variation and will not lead to the degradation of local water quality.

Table 1: 50 MGD Desalination Facility Water Balance

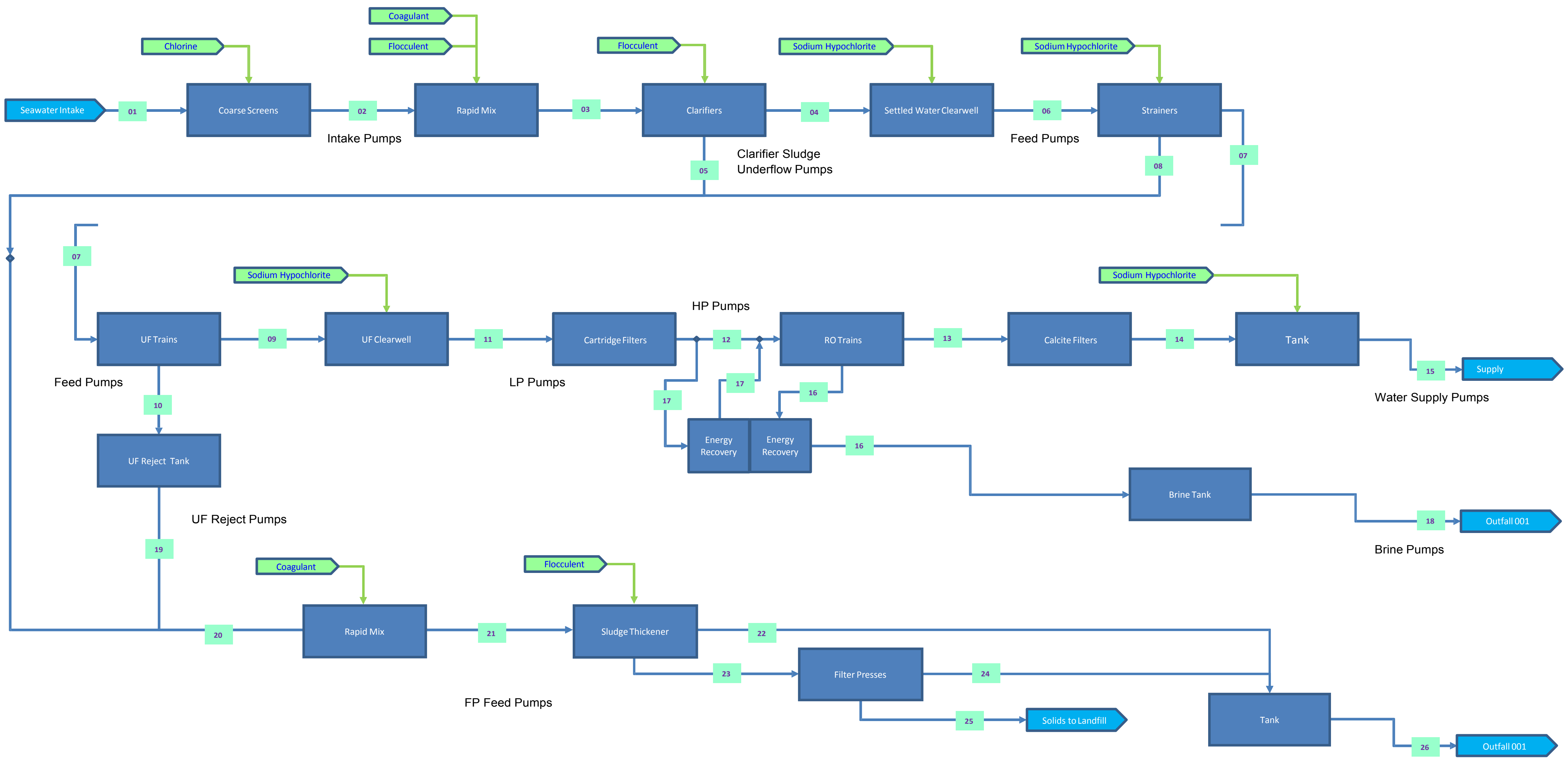
Stream #	Stream Description	Design Flow (MGD)
01	Seawater Intake	150.7
02	Screened Seawater	150.7
03	Clarifier Feed	150.7
04	Settled Seawater from Clarifier	143.2
05	Clarifier Sludge to Thickener	7.5
06	Settled Seawater to Strainers	143.2
07	UF Feed from Strainers	138.9
08	Strainer Backwash to Thickener	4.3
09	UF Permeate	125
10	UF Reject	13.9
11	UF Permeate Feed to RO	125
12	RO Feed HP Pump Flow	56.3
13	RO Permeate	50
14	RO Permeate from Calcite Filters	50
15	Water to Distribution Pumps	50
16	RO Reject Thru ERU	75
17	RO Feed Thru ERU	68.8
18	RO Reject to Disposal	75
19	Waste from UF Reject Tank	13.9
20	Combined Wastes to Rapid Mixer	25.7
21	Combined Wastes to Thickener	25.7
22	Thickener Decant to Outfall Tank	12.9
23	Thickener Slurry to Filter Presses	12.9
24	Filter Press Filtrate to Outfall Tank	7.7
25	Filter Cake Solids to Landfill	5.1
26	Outfall to Disposal	20.6

Table 2: 50 MGD Desalination Facility Design Basis Source Water and Effluent Constituent Concentrations

Parameter		Source Water Quality Design Basis[1]	Average Outfall 001 Effluent[2]	Max Outfall 001 Effluent[3]
Flow, mgd		150.7	96	125
Sodium (Na)	mg/L	11,600	18,500	21,800
Calcium (Ca)	mg/L	1,700	2,720	3,200
Magnesium (Mg)	mg/L	1,400	2,240	2,640
Potassium (K)	mg/L	368	590	690
Barium (Ba)	mg/L	0.04	0.06	0.1
Strontium (Sr)	mg/L	6.8	11.0	12.7
Iron (Fe)	mg/L	1.5	2.4	2.8
Bicarbonate (HCO3)	mg/L	145	230	270
Chloride (Cl)	mg/L	23,000	36,700	43,200
Sulfate (SO4)	mg/L	3,000	4,800	5,660
Nitrate (NO3)	mg/L	2.0	3.1	3.6
Fluoride (F)	mg/L	2.0	3.2	3.7
Silicon Dioxide (SiO2)	mg/L	5.0	8.0	9.4
Boron	mg/L	6.0	8.0	8.9
Total Dissolved Solids (TDS)	mg/L	41,252	66,000	77,460
pH	S.U.	7.5	7.5	7.5
Temperature	°C	14-32	14-32	14-32
Total Organic Carbon (TOC)	mg/L	4	1	2
Total Suspended Solids (TSS)	mg/L	30	15.0	30.0

Note:
1. The source water quality design basis data are based on sample data for Corpus Christi Bay listed in the Freese and Nichols report, "Variable Salinity Desalination Demonstration Project: Technical Memorandum No. 2, VSD Plant Siting Analysis", April 26, 2016.
2. Average constituent values based on 40% RO permeate recovery.
3. Maximum constituent values based on 50% RO permeate recovery.

Process Flow Diagram



Port of Corpus Christi
Proposed Desalination Plant
Harbor Island Site
Corpus Christi, Texas

PROCESS FLOW DIAGRAM

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FIGURE
1

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Port of Corpus Christi
Proposed Desalination Plant
Harbor Island Site
Corpus Christi, Texas

APPROXIMATE DIFFUSER LOCATION

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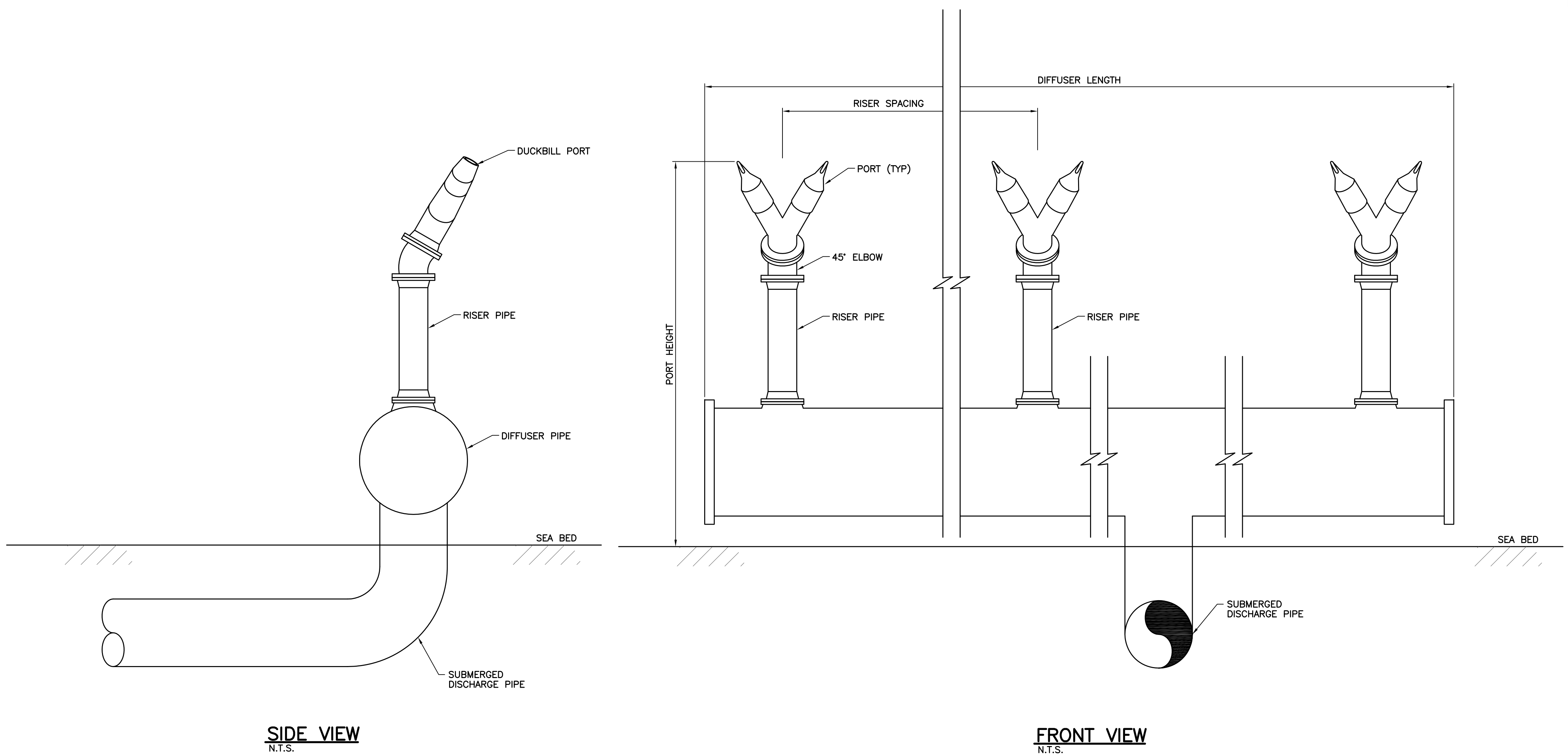
FIGURE
2



PORT OF CORPUS CHRISTI
PROPOSED DESALINATION PLANT
CORPUS CHRISTI, TEXAS

TYPICAL DIFFUSER LAYOUT

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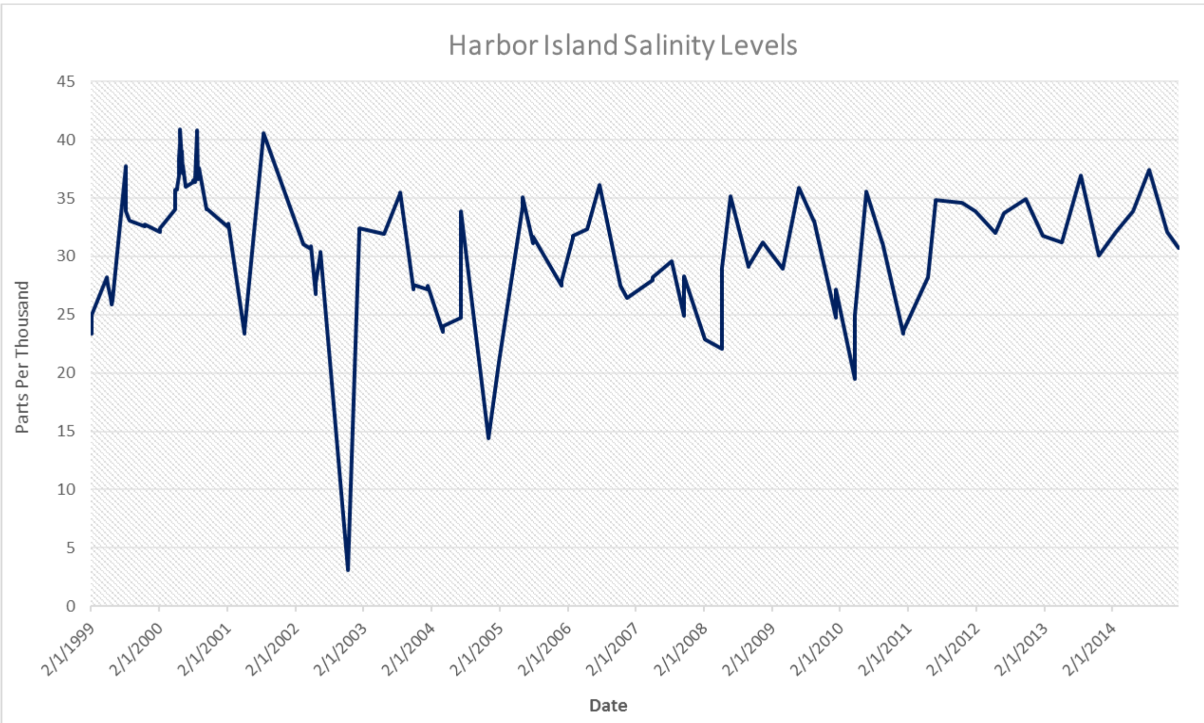
FIGURE
3

Figure 4 – Variability of Salinity Levels Over Time



Note: Data from Buoy 16492

Appendix A

Brine Discharge Mixing Analysis

Brine Discharge Mixing Analysis

Proposed Harbor Island Desalination Facility

December 2017

Table of Contents

List of Attachments

1. Introduction

The Port of Corpus Christi Authority (PCCA) proposes to construct a desalination plant at the Harbor Island site (Figure 1) near Corpus Christi, Texas. This facility is expected to produce up to 50 MGD of product water with an anticipated discharge flow of 96 MGD based on 40% recovery of permeate water during reverse osmosis (RO) processing. The desalination facility will utilize RO to produce water. The proposed diffuser from this facility will discharge into the Corpus Christi Channel.

Figure 1: Harbor Island

Because the impact of the discharge on salinity levels in Corpus Christi Bay was unknown, the Texas Commission on Environmental Quality (TCEQ) requested that the PCCA conduct an assessment of the discharge using CORMIX and present the findings in a report submitted with the TPDES permit application. CORMIX is a proprietary program widely used for mixing zone analysis. CORMIX provides estimates of the effluent concentration percentages at varying distances from a point discharge source from which any associated downstream concentration can be estimated. The comparison between various CORMIX analyses were conducted based on the effluent concentrations at the edge of the zone of initial dilution (ZID), aquatic life mixing zone (MZ), and human health mixing zone (HH MZ).

This report describes the modeling that was conducted using CORMIX, including the model inputs that were used. Results of the model runs are provided, and achievable mixing zone targets are proposed based on the CORMIX modeling output. If approved by the TCEQ, the PCCA proposes to design a diffuser for the effluent discharge that would meet the target effluent concentrations as determined through CORMIX modeling.

2. CORMIX Analysis and Required Inputs

CORMIX (version 10.0GT) software and current modeling guidelines provided by the TCEQ were used to analyze the mixing of the Harbor Island desalination plant discharge. The TCEQ modeling guidelines are included as **Attachment A**. The required and selected modeling input including the receiving water properties, effluent properties, and diffuser properties are described in this section.

2.1 Ambient Conditions

In this section, the basis and estimates for the ambient parameters are presented. The main CORMIX parameters for ambient condition include: ambient density, water velocity, bed slopes, and wind velocity. The ambient data were obtained from different sources as explained in the following sections. Although not used in the modeling study, additional ambient properties associated with Corpus Christi Bay are included in **Attachment B**.

2.1.1 Density

The TCEQ modeling guidelines require modeling to be performed at varying water densities during the summer and winter months. The water density is a function of both salinity and temperature. Specifically, the guidelines require modeling with the densities associated with the 5th and 95th percentiles of both temperature and salinity during the summer and winter months. The various densities associated with these temperature and salinity combinations can be expressed as:

$\rho\ (T_5, S_5)$, $\rho\ (T_5, S_{95})$, $\rho\ (T_{95}, S_5)$, and $\rho\ (T_{95}, S_{95})$

The equation used to calculate ambient density as a function of temperature and salinity can be found in the modeling guidelines in **Attachment A**.

Salinity and temperature data from 1999 to 2015 were obtained from Surface Water Quality Monitoring (SWQM) station 16492. The station location is shown in **Figure 2**.

Figure 2: SWQM Station 16492 Location

The calculated ambient density and effluent density for the Harbor Island site (Winter and Summer) for RO recovery rates of 50% and 40% are demonstrated in **Table 1** and **Table 2,** respectively**.** In **Table 1, t**he effluent density was calculated at twice the ambient salinity based on the design assumption that 50% recovery of permeate will be achieved at the RO unit. In **Table 2**, **t**he effluent density was calculated at 1.6 times the ambient salinity based on the design assumption that 40% recovery of permeate will be achieved at the RO unit. In both RO rates, the entire salinity would be assumed to be rejected by the RO membranes and would be discharged with the effluent through the diffuser.

Table 1: Ambient Density Values for Each Temperature and Salinity Combination in Summer and Winter at 50% RO Recovery

Condition	Summer			Winter		
	Ambient Density (kg/m^3)	Discharge Density (kg/m^3)	Δ Density (kg/m^3)	Ambient Density (kg/m^3)	Discharge Density (k/m^3)	Δ Density (kg/m^3)
ρ (T5, S5)	1013.65	1030.77	17.12	1020.67	1041.64	20.96
ρ (T_5, S_{95})	1025.51	1054.49	28.98	1027.68	1055.65	27.97
ρ (T_{95}, S_5)	1012.49	1029.45	16.96	1019.00	1039.47	20.47
ρ (T_{95}, S_{95})	1024.24	1052.94	28.70	1025.84	1053.15	27.31

Table 2: Ambient Density Values for Each Temperature and Salinity Combination in Summer and Winter at 40% RO Recovery

Condition	Summer			Winter		
	Ambient Density (kg/m^3)	Discharge Density (kg/m^3)	Δ Density (kg/m^3)	Ambient Density (kg/m^3)	Discharge Density (k/m^3)	Δ Density (kg/m^3)
ρ (T5, S5)	1013.65	1023.92	10.27	1020.67	1033.25	12.58
ρ (T_5, S_{95})	1025.51	1042.89	17.39	1027.68	1044.46	16.78
ρ (T_{95}, S_5)	1012.49	1022.67	10.18	1019.00	1031.28	12.28
ρ (T_{95}, S_{95})	1024.24	1041.46	17.22	1025.84	1042.23	16.38

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2.1.2 Water Velocity

The TCEQ modeling guidelines state that a small water velocity should be assumed for modeling discharges into bays. TCEQ personnel suggested a value of 0.05 m/s, which was used in the modeling analyses.

2.1.3 Slope

CORMIX analysis for brine discharge requires determining the near- and far-shore slopes. CORMIX specifies both the near- and far-shore bottom slope to be greater than zero. According to the CORMIX definition, the near-shore slope is steeper than the far-shore one. The point at which the near- and far-shore slope intersect is the slope break point.

For the anticipated Harbor Island facility diffuser location, the break was estimated to be at 200 feet from the shoreline (based on bathymetry maps). At the break point, the water depth is approximately 59 ft (the nearshore slope is approximately 30%). The cross -section slope reduces at this break point and the far-shore slope is 4% (between 200-400 ft from the shoreline). These slopes reflect the northern edge of the Corpus Christi Channel. The near- and far-shore slopes are shown in **Figure 3**.

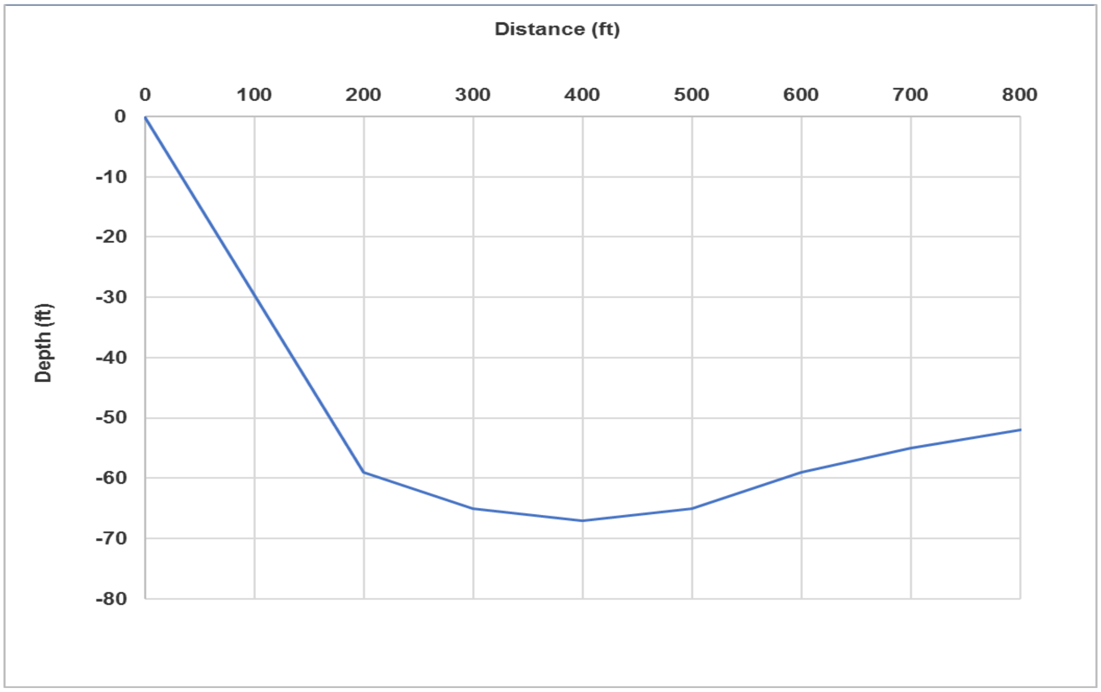


Figure 3: Cross Section Near Proposed Harbor Island Facility Diffuser

2.1.4 Summary of Ambient Conditions

The summary of ambient conditions utilized in modeling, with the ambient densities presented in **Table 1** and **Table 2,** is presented in **Table 3**.

Table 3: Harbor Island Base Scenario for Ambient Parameters

Parameter	Unit	Value	Basis
Wind Speed	m/s	2	TCEQ CORMIX Guidance
Water Velocity	m/s	0.05	TCEQ CORMIX Guidance
Manning Constant (n)	-	0.0183	Calculated based on 0.025 Darcy Constant
Near Shore Bottom Slope (%)		29.5	Bathymetry and COMRIX manual definition on slope
Distance Shoreline to Break	meter	61	Bathymetry and COMRIX manual definition on slope
Far Shore Bottom Slope (%)		4	Bathymetry and COMRIX manual definition on slope

2.2 General Design Assumptions

To design the outfall system for brine discharge, the relevant literature was reviewed to specify the important design parameters such as diffuser type, discharge velocity, diffuser diameter, and diffuser angles that result in better initial mixing. Shoreline discharge (i.e., absent a diffuser) of negatively buoyant concentrate will result in a density current that runs down the bottom slope. The dilution is very small for this discharge since the resulting density stratification inhibits vertical mixing. Therefore, submerged discharge through pipes and port(s) has been an effective method for discharging brine. The discharge could be through a single port for a small discharge or a multiport diffuser for larger discharges [1-4]. Multiport diffusers have been shown more effective in rapid salinity dilution as the waste stream discharges with high velocity which will allow more rapid initial jet mixing of the plant effluent in the ambient seawater. This rapid mixing provides enhanced initial dilution while having a limited effect on aquatic organisms as the relatively small zone of high velocity gradients occurs near the port and only lower settling velocities occur near the ocean bottom. However, entrained ambient water pulled up from under the upward discharging ports creates some limited potential for scour; therefore, the height of the ports above the sea bed should be considered. In addition, due to the presence of the Ship Channel, appropriate measures should be considered to protect the diffuser and ports.

2.2.1 Diffuser Alignment

Normally with multiport diffuser mixing, it is better if the diffuser is oriented transverse to the ambient current. Transverse co-flowing minimizes the overlapping of individual port plumes. However, for easier installation, the diffuser was assumed parallel to the shore. Therefore, the Gamma angle (diffuser line to Tidal flow) was set to zero in all cases analyzed. Vertical port angle of discharge (Theta) of 60° has been reported as the optimum discharge angle for most brine discharges. This angle was shown to provide maximum rise level of jet trajectory among other tested vertical angles [1-4]. Therefore, a 60° angle was used for brine discharge in all analyses.

The following configuration angles were selected in all of the CORMIX analyses.

- Port Angle from Horizontal (THETA) = 60 degree – The existing literature considered a THETA of 60 degrees to be the optimum angle for most brine discharge cases
- Port Angle to Tidal Flow (SIGMA) = 270 degree – This value is determined to discharge off-shore toward deeper water.
- Diffuser Line to Tidal Flow (GAMMA) = 0 degree – This value is used because the diffuser is placed in parallel to the ambient flow in order to keep the diffuser out of the ship channel.
- Port Angle to Diffuser Line (BETA) = 90 degree – Having selected that alignment (GAMMA=0), then the best port orientation in the x-y plane is perpendicular to the oscillating ambient current.

2.2.2 ZID and Mixing Zones

A mixing zone is defined as a limited area or volume within the coastal water where the impacts to marine life are deemed minimal. This negotiated area or control volume usually is restricted to an area around the outfall where the initial dilution happens. Acute marine criteria are applied at the edge of the zone of initial dilution (ZID), chronic marine criteria are applied at the edge of the aquatic life mixing zone (MZ), and chronic human health protection criteria are applied at the edge of the human heath mixing zone (HH MZ). Applicable mixing zone distances are specified in the TCEQ Procedures to Implement the Texas Surface Water Quality Standards as follows:

- The ZID is defined as a volume within a radius of 50 feet from the point where the discharge enters the receiving water.

- The MZ for this discharge is defined as a volume within a radius of 200 feet from the point where the discharge enters the receiving water.
- The HH MZ is defined as a volume within 400 feet from the point where the discharge enters the receiving water.

Based on the TCEQ modeling guidelines for multi-port diffusers, the ZID and other mixing zones are considered rectangular in shape with an equivalent area to the corresponding specified standard circular mixing zones. As the diffuser is unidirectional with all ports directed off-shore, the equivalent rectangle is shifted to the off-shore side with one side along the axis of the diffuser.

2.2.3 Other Modeling Inputs

The following effluent and diffuser model inputs were varied as described in Section 3:

- Effluent Density
- Discharge Flow
- Discharge Depth
- Diffuser Length
- Number of Ports
- Port Height
- Discharge Velocity
- Port Diameter

3. Mixing Performance Under Varying Conditions

CORMIX analysis was performed under both 40% and 50% permeate recovery at the RO unit, which impacted both effluent density and effluent flow rate. While it is possible that the proposed desalination plant will operate at 50% permeate recovery, 40% permeate recovery is more likely. Given the uncertainty in this operating condition, both conditions were modeled. In the analysis, effluent salinity was assumed to be twice the concentration of ambient for the design condition in which 50% of flow to the RO unit is recovered as permeate. Effluent was approximated as 60% more concentrated in salinity compared with ambient salinity for the 40% permeate recovery operating condition.

The work process for the CORMIX analysis, under both 40% and 50% RO recovery, included five steps. First, the diffuser location was established based on the bathymetry characteristics. Second, different diffuser designs were examined at 50% RO recovery. Third, the selected design was examined under the eight ambient conditions at 50% RO recovery to determine the critical ambient condition. Fourth, for the selected design at the critical ambient condition, the flow rate was changed at 40% RO recovery to evaluate mixing at a lower recovery rate. Fifth, multiple designs were examined at various flow rates (for the critical ambient condition) and at 40% RO recovery to identify achievable mixing performance across a range of flow rates. In analysis steps one and two, the ambient density associated with the 95th percentile temperature and 95th percentile salinity (ρ (T95, S95)) in the summer months was used for the analysis at 50% RO recovery since the critical ambient condition (ambient condition which resulted in poorest mixing) was not identified until step

3. The analysis for 40% RO recovery was thereafter performed for the identified critical ambient condition in steps four and five.

3.1 Step 1: Establish Diffuser Location

The diffuser location for the Harbor Island facility is proposed to be placed at 300 ft from the shoreline on the south side of Harbor Island and east of the Ferry (**Figure 4**). The water depth at the proposed location is approximately 63 ft. Since the change in water depth between 300-600 ft from the shoreline is insignificant, if the diffuser is placed in any location east-west or north south at this range, the results of CORMIX analysis would be expected to be similar. Thus, the study evaluated mixing performance at one location relative to the shoreline.

Figure 4: Proposed Location for Harbor Island Facility Diffuser

3.2 Step 2: Diffuser Design at 50% RO Recovery

For the selected diffuser location and a design production rate of 50 MGD (66 MGD effluent at 50% RO Recovery), different diffuser design alternatives were tested (Alternatives 1-5 in **Table 4**) using the 95% condition for temperature and salinity. In the analysis of design alternatives, the discharge depth and diffuser angles were kept constant. Design parameters that vary in different alternatives include:

- Discharge Velocity
- Port Height
- Number of Ports
- Number of Ports Per Riser
- Port Diameter
- Diffuser Length

For the Harbor Island facility, design Alternative 1 represents the initial run alternative with a discharge velocity of 11 ft/s, port height of 12.6 ft, and port diameter of 12 inches. These design parameters were varied in other design alternatives (i.e., Alternatives 2-5) to access impact on mixing performances at the ZID as shown in **Table 4**. The results of the alternatives analysis, summarized in **Table 4**, showed that increasing port height (Alternative 2) has no effect on the dilution. In Alternative 3, the number of ports was decreased, and accordingly, diffuser length was reduced compared to the initial alternative. The results showed similar effluent concentration at ZID and increase in effluent concentration at MZ compared with Alternative 1. In Alternative 4, the number of ports was decreased to six with port diameters of 18 inches (and subsequent diffuser length of 82 ft). The results showed similar effluent concentration at ZID and increase in effluent concentration at MZ compared with Alternative 1. In Alternative 5, parameter values from Alternatives 2 and 4 were combined, resulting in similar performance as Alternative 3. Based on the effluent percentage at ZID all of the configurations show similar performance. Hence, Alternative 3 was selected for further analysis in the subsequent steps. **Table 5** provides a summary of effluent percentages at the boundaries of the three mixing zones.

Table 4: Design Alternative for Harbor Island Plant Diffuser at 50% RO Recovery

Design Alternative ID	Discharge Depth (ft)	Discharge Velocity (ft/s)	Port Height (ft)	# of Port	Riser Spacing (ft)	Port Diameter (inch)	Diffuser Length (ft)	# of Ports Per Riser	Variation	Effluent at ZID (%)
1	63	11	12.6	12	16.4	12	82	2	Base	1.01
2	63	11	15.75	12	16.4	12	82	2	Port height increase	1.01
3	63	13	12.6	10	16.4	12	65.6	2	Higher discharge velocity/ Less ports/Shorter diffuser	1.01
4	63	11	12.6	6	16.4	18	98.4	2	Larger Port Diameter	1.01
5	63	13	15.75	10	16.4	12	65.6	2	Higher discharge	1.01

									velocity, higher port height	

Table 5: Effluent Percentages at Mixing Zone Boundaries for Different Design Alternatives in Harbor Island Plant Diffuser at 50% RO Recovery

Design Alternative	Effluent Percentage at ZID, MZ and HH Mixing Zones (%)		
	ZID	MZ	HH
1	1.01	0.534	0.467
2	1.01	0.536	0.467
3	1.01	0.575	0.504
4	1.01	0.541	0.472
5	1.01	0.575	0.504

3.3 Step 3: Analysis at Different Ambient Conditions

Since the most limiting combination of effluent receiving water conditions cannot be reliably predicted in advance of running the model, a range of modeling scenarios were performed in order to determine protective effluent dilution. Due to seasonal variability in the effluent density, eight standard effluent/ambient density combinations were analyzed (**Table 1**) at 66 MGD effluent flow rate for 50% RO recovery in accordance with the TCEQ modeling guidelines in **Attachment A**.

In considering the effect of stratification in these analyses, the salinity and temperature values at the top and bottom of the water column were paired. Given the available ambient data set from the TCEQ, the top depth was based on salinity data at a depth of 0.3 meters. The bottom depths were based on 12.19 meters. The average density differences between the top and bottom of the water column at these depths were calculated to be 0.01 kg/m^3 for Harbor Island. Because the differences in density are less than 0.1 kg/m^3, stratification does not need to be considered in the model in accordance with CORMIX guidance.

Table 6 shows the effluent percentages for different ambient cases for diffuser design Alternative 3 at 50% RO permeate recovery. The largest percent effluent at each of the three mixing zone boundaries was observed during summer conditions at the 95th percentile of temperature and 5th percentile of salinity, making this set of conditions the critical ambient condition.

Table 6: Effluent Percentage and Concentration at the Three Mixing Zones for Design Alternative 3 and 50% RO Permeate Recovery at Different Ambient Conditions

Ambient	Effluent at ZID (%)	Ambient Salinity (ppt)	Effluent Salinity (ppt)	ZID (ppt)	Percentage Above Ambient
Summer, (T_5, S_5)	1.440	22.90	45.8	23.56	2.88%
Summer, (T_5, S_{95})	1.00	38.76	77.52	38.84	2.00%

Summer, (T_{95}, S_5)	**1.450**	**22.90**	**45.8**	**23.56**	**2.90%**
Summer, (T_{95}, S_{95})	1.010	38.76	77.52	39.54	2.02%
Winter, (T_5, S_5)	1.260	26.70	53.4	27.37	2.52%
Winter, (T_5, S_{95})	1.030	35.63	71.25	36.36	2.06%
Winter, (T_{95}, S_5)	1.280	26.70	53.4	27.38	2.56%
Winter, (T_{95}, S_{95})	1.040	35.63	71.25	36.37	2.08%

Ambient	Effluent at MZ (%)	Ambient Salinity (ppt)	Effluent Salinity (ppt)	MZ (ppt)	Percentage Above Ambient
Summer, (T_5, S_5)	0.687	22.90	45.8	23.21	1.37%
Summer, (T_5, S_{95})	0.574	38.76	77.52	39.20	1.15%
Summer, (T_{95}, S_5)	**0.689**	**22.90**	**45.8**	**23.22**	**1.38%**
Summer, (T_{95}, S_{95})	0.575	38.76	77.52	39.21	1.15%
Winter, (T_5, S_5)	0.641	26.70	53.4	27.04	1.28%
Winter, (T_5, S_{95})	0.581	35.63	71.25	36.04	1.16%
Winter, (T_{95}, S_5)	0.646	26.70	53.4	27.04	1.29%
Winter, (T_{95}, S_{95})	0.586	35.63	71.25	36.04	1.17%

Ambient	Effluent at HH (%)	Ambient Salinity (ppt)	Effluent Salinity (ppt)	HH (ppt)	Percentage Above Ambient
Summer, (T_5, S_5)	0.599	22.9	45.8	23.17	1.20%
Summer, (T_5, S_{95})	0.503	38.76	77.52	39.15	1.01%
Summer, (T_{95}, S_5)	**0.601**	**22.9**	**45.8**	**23.18**	**1.20%**
Summer, (T_{95}, S_{95})	0.504	38.76	77.52	39.15	1.01%
Winter, (T_5, S_5)	0.561	26.7	53.4	27.00	1.12%
Winter, (T_5, S_{95})	0.509	35.625	71.25	35.99	1.02%
Winter, (T_{95}, S_5)	0.565	26.7	53.4	27.00	1.13%
Winter, (T_{95}, S_{95})	0.513	35.625	71.25	35.99	1.03%

3.4 Step 4: Test the Selected Diffuser Design under Different Discharge Flow Rates at 40% RO Recovery

In this step, the design Alternative 3 selected in Step 2 (determined based on RO recovery of 50% under critical ambient condition) was tested under a range of target product and corresponding discharge flow rates at 40% RO recovery. All the runs in this section were conducted at the critical ambient condition (Summer, (T_{95}, S_5)) with the ambient and effluent density of 1012.49 kg/m3 and 1029.45 kg/m3, respectively. These runs evaluated different plant capacities for the previously determined diffuser design alternative, now for the RO recovery of 40%. For effluent flow ranging from 38 MGD (20 MGD product water) to 96 MGD (50 MGD product water), the analysis showed that good mixing (ZID: 1.75% - 1.92%) can be achieved only for discharge flows between 38 MD (20 MGD product water) and 54 MGD (28 MGD product water) at critical ambient condition. **Figure 5** shows discharge flow vs. ZID for the specified diffuser design alternative. The variations in the ZID percentages under different discharge flow rates is significantly influenced by the “flow class” as defined by the CORMIX model. The flow classification from the CORMIX manual is demonstrated in **Attachment C.** The model results for each model run is shown in **Table 7** along with the flow class.

Table 7: Effluent Percentage and Concentration at the Three Mixing Zones for Design Alternative 3 at Different Discharge Flow Rates for 40% RO Recovery

Plant Capacity(MGD)	Discharge Flow (MGD)	Condition	Effluent at ZID (%)	Ambient Salinity (ppt)	Effluent Salinity(ppt)	ZID (ppt)	Percentage above Ambient	Flow Class
50	96	RO 40%	7.71	22.9	36.64	25.72	12.34%	MNU8
40	76	RO 40%	8.37	22.9	36.64	25.97	13.39%	MNU8
35	67	RO 40%	8.8	22.9	36.64	26.12	14.08%	MNU8
30	57	RO 40%	24.7	22.9	36.64	31.95	39.52%	MNU9
28	54	RO 40%	1.92	22.9	36.64	23.60	3.07%	MNU3
25	48	RO 40%	1.87	22.9	36.64	23.59	2.99%	MNU3
20	38	RO 40%	1.75	22.9	36.64	23.54	2.80%	MNU3

Plant Capacity	Discharge Flow (MGD)	Condition	Effluent at MZ (%)	Ambient Salinity (ppt)	Effluent Salinity(ppt)	MZ (ppt)	Percentage above Ambient	Flow Class
50 MGD	96	RO 40%	5.46	22.9	36.64	24.90	8.74%	MNU8
40 MGD	76	RO 40%	6.1	22.9	36.64	25.14	9.76%	MNU8
35 MGD	67	RO 40%	6.5	22.9	36.64	25.28	10.40%	MNU8
30 MGD	57	RO 40%	13.1	22.9	36.64	27.70	20.96%	MNU9

28 MGD	54	RO 40%	0.734	22.9	36.64	23.17	1.17%	MNU3
25 MGD	48	RO 40%	0.704	22.9	36.64	23.16	1.13%	MNU3
20 MGD	38	RO 40%	0.624	22.9	36.64	23.13	1.00%	MNU3

Plant Capacity(MGD)	Discharge Flow (MGD)	Condition	Effluent at HH (%)	Ambient Salinity (ppt)	Effluent Salinity(ppt)	HH (ppt)	Percentage above Ambient	Flow Class
50	96	RO 40%	4.44	22.9	36.64	24.53	7.10%	MNU8
40	76	RO 40%	4.99	22.9	36.64	24.73	7.98%	MNU8
35	67	RO 40%	5.34	22.9	36.64	24.86	8.54%	MNU9
30	57	RO 40%	6.59	22.9	36.64	25.31	10.54%	MNU9
28	54	RO 40%	0.633	22.9	36.64	23.13	1.01%	MNU3
25	48	RO 40%	0.606	22.9	36.64	23.12	0.97%	MNU3
20	38	RO 40%	0.535	22.9	36.64	23.10	0.86%	MNU3

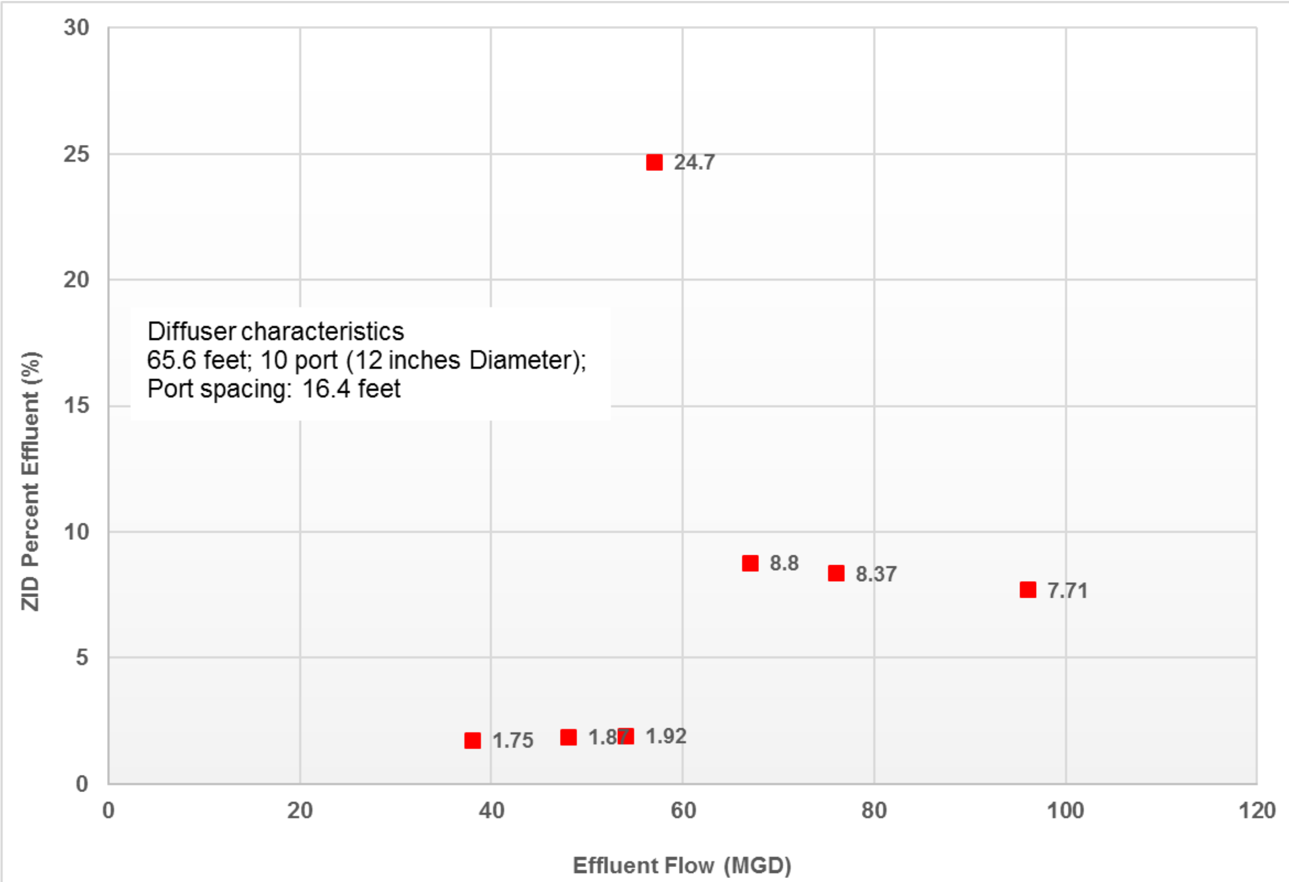


Figure 5: Discharge Flow vs. ZID Percent Effluent for the Specified Diffuser Design Alternative

3.5 Step 5: Diffuser Design Change at 40% RO Recovery Under Different Flow Rates

In this step, diffuser design features were modified to examine whether good mixing can be achieved for a plant capacity of 50 MGD (at 40% RO recovery). Different design alternatives were tested as shown in **Table 8**. This analysis showed that increasing the diffuser diameter leads to better mixing. Design alternative H6 yields a good mixing performance with ZID= 2.25%, MZ=0.94%, and HH=0.8% as shown in **Table 9.** Hence, a diffuser with the following properties would achieve the target mixing performance: **111.5 feet diffuser with 10 ports (24 inches diameters), 2 ports per riser, riser spacing 27.8 feet.**

Table 8: Design Alternatives for 50 MGD Plant at 40% RO Recovery

Design for Flow	Design	Discharge Velocity (ft/s)	Discharge Depth	Port Height (ft)	Number of Port	Port Spacing (ft)	Port Diameter (inches)	Diffuser Length (ft)	Number of Port Per Riser	Variation	Effluent at ZID (%)
50 MGD	H1	18.73	63	12.6	10	16.4	12	65.6	2	Base	8.37

50 MGD	H2	18.73	63	12.6	10	16.4	12	147.6	1	Single port per riser	6.58
50 MGD	H3	4.72	63	12.6	10	16.4	24	65.6	2	Port diameter increased	2.27
50 MGD	H4	4.72	63	12.6	10	24.6	24	98.4	2	Port diameter increased/port spacing increased to 7.5 meter	2.11
50 MGD	H5	4.72	63	12.6	10	26.248	24	104.992	2	Port diameter increased/port spacing increased to 8 meters	2.09
50 MGD	**H6**	**4.72**	**63**	**12.6**	**10**	**27.8885**	**24**	**111.554**	**2**	**Port diameter increased/port spacing increased to 8.5 meters**	**2.06**
50 MGD	H7	4.73	63	12.6	16	16.4	14	114.8	2	Port diameter increased+ number of ports increased	2.25
50 MGD	H8	4.73	63	12.6	22	16.4	16.18	164	2	Port diameter increased/port spacing increased to 8.5 meter	2.08

Table 9: Effluent Percentages and Concentrations at the Three Mixing Zones for 50 MGD Plant at Different Design Alternatives with 40% RO Recovery

Design	Plant	Discharge Flow	Condition	Effluent at ZID (%)	Ambient Salinity (ppt)	Effluent Salinity(ppt)	ZID (ppt)	Percentage above Ambient	Flow Class
H1	50 MGD	96MGD	RO 40%	8.37	22.9	36.64	25.97	13.39%	MU8
H2	50 MGD	96MGD	RO 40%	6.58	22.9	36.64	25.31	10.53%	MU9
H3	50 MGD	96MGD	RO 40%	2.27	22.9	36.64	23.73	3.63%	MU3
H4	50 MGD	96MGD	RO 40%	2.11	22.9	36.64	23.67	3.38%	MU3
H5	50 MGD	96MGD	RO 40%	2.09	22.9	36.64	23.67	3.34%	MU3
H6	**50 MGD**	**96MGD**	**RO 40%**	**2.06**	**22.9**	**36.64**	**23.65**	**3.30%**	**MU3**
H7	50 MGD	96MGD	RO 40%	2.25	22.9	36.64	23.72	3.60%	MU3
H8	50 MGD	96MGD	RO 40%	2.08	22.9	36.64	23.66	3.33%	MU3

Design	Plant	Discharge Flow	Condition	Effluent at MZ (%)	Ambient Salinity (ppt)	Effluent Salinity(ppt)	MZ(ppt)	Percentage above Ambient
H1	50 MGD	76MGD	RO 40%	6.1	22.9	36.64	25.14	9.76%
H2	50 MGD	76MGD	RO 40%	4.58	22.9	36.64	24.58	7.33%

H3	50 MGD	76MGD	RO 40%	1.14	22.9	36.64	23.32	1.82%
H4	50 MGD	76MGD	RO 40%	0.921	22.9	36.64	23.24	1.47%
H5	50 MGD	76MGD	RO 40%	0.888	22.9	36.64	23.23	1.42%
H6	**50 MGD**	**76 MGD**	**RO 40%**	**0.86**	**22.9**	**36.64**	**23.22**	**1.38%**
H7	50 MGD	76MGD	RO 40%	0.937	22.9	36.64	23.24	1.50%
H8	50 MGD	76 MGD	RO 40%	0.77	22.9	36.64	23.18	1.23%

Design	Plant	Discharge Flow	Condition	Effluent at HH (%)	Ambient Salinity (ppt)	Effluent Salinity(ppt)	HH (ppt)	Percentage above Ambient
H1	50 MGD	76 MGD	RO 40%	4.99	22.9	36.64	24.73	7.98%
H2	50 MGD	76 MGD	RO 40%	4.59	22.9	36.64	24.58	0.82%
H3	50 MGD	76 MGD	RO 40%	0.98	22.9	36.64	23.26	0.82%
H4	50 MGD	76 MGD	RO 40%	0.789	22.9	36.64	23.19	0.82%
H5	50 MGD	76 MGD	RO 40%	0.761	22.9	36.64	23.18	0.82%
H6	**50 MGD**	**76 MGD**	**RO 40%**	**0.735**	**22.9**	**36.64**	**23.17**	**1.18%**
H7	50 MGD	76 MGD	RO 40%	0.802	22.9	36.64	23.19	0.82%
H8	50 MGD	76 MGD	RO 40%	0.66	22.9	36.64	23.14	1.06%

The design alternative obtained from the previous step was tested under different discharge flow rates for RO recovery of 40%. The analysis results, shown in **Table 10**, Show that good mixing can be achieved for discharge flow rates of 67 MGD (35 MGD product water) to 96 MGD (50 MGD product water). **Figure 6** shows discharge flow vs. ZID percent effluent for the specified diffuser design alternative. The variations in the ZID percentages under different discharge flow rates is significantly influenced by the “flow class” as defined by the CORMIX model. The flow class for each model run is shown in **Table 10**.

Table 10: Effluent Percentages at the Three Mixing Zones for Design Alternative H6 at Different Flow Rate at 40% Recovery

Design	Plant	Discharge Flow (MGD)	Condition	Effluent at ZID (%)	Ambient Salinity (ppt)	Effluent Salinity(ppt)	ZID (ppt)	Percentage above Ambient	Flow Class
H6	50 MGD	96	RO 40%	2.06	22.9	36.64	23.65	3.30%	MNU3
H6	40 MGD	76	RO 40%	1.91	22.9	36.64	23.60	3.06%	MNU3
H6	35 MGD	67	RO 40%	1.82	22.9	36.64	23.57	2.91%	MNU3

H6	30 MGD	57	RO 40%	22.18	22.9	36.64	31.03	35.49%	MNU1
H6	28 MGD	54	RO 40%	22.43	22.9	36.64	31.12	35.89%	MNU1
H6	25 MGD	48	RO 40%	22.6	22.9	36.64	31.18	36.16%	MNU1
H6	20 MGD	38	RO 40%	23.5	22.9	36.64	31.51	37.60%	MNU1

Design	Plant	Discharge Flow (MGD)	Condition	Effluent at MZ (%)	Ambient Salinity (ppt)	Effluent Salinity(ppt)	MZ (ppt)	Percentage above Ambient
H6	50 MGD	96	RO 40%	0.86	22.9	36.64	23.22	1.38%
H6	40 MGD	76	RO 40%	0.753	22.9	36.64	23.18	1.20%
H6	35 MGD	67	RO 40%	0.7	22.9	36.64	23.16	1.12%
H6	30 MGD	57	RO 40%	16.48	22.9	36.64	28.94	26.37%
H6	28 MGD	54	RO 40%	16.56	22.9	36.64	28.97	26.50%
H6	25 MGD	48	RO 40%	16.63	22.9	36.64	28.99	26.61%
H6	20 MGD	38	RO 40%	17	22.9	36.64	29.13	27.20%

Design	Plant	Discharge Flow (MGD)	Condition	Effluent at HH (%)	Ambient Salinity (ppt)	Effluent Salinity(ppt)	HH (ppt)	Percentage above Ambient
H6	50 MGD	96	RO 40%	0.735	22.9	36.64	23.17	1.18%
H6	40 MGD	76	RO 40%	0.642	22.9	36.64	23.14	1.03%
H6	35 MGD	67	RO 40%	0.596	22.9	36.64	23.12	0.95%
H6	30 MGD	57	RO 40%	12.8	22.9	36.64	27.59	20.48%
H6	28 MGD	54	RO 40%	12.8	22.9	36.64	27.59	20.48%
H6	25 MGD	48	RO 40%	12.8	22.9	36.64	27.59	20.48%
H6	20 MGD	38	RO 40%	12.6	22.9	36.64	27.52	20.16%

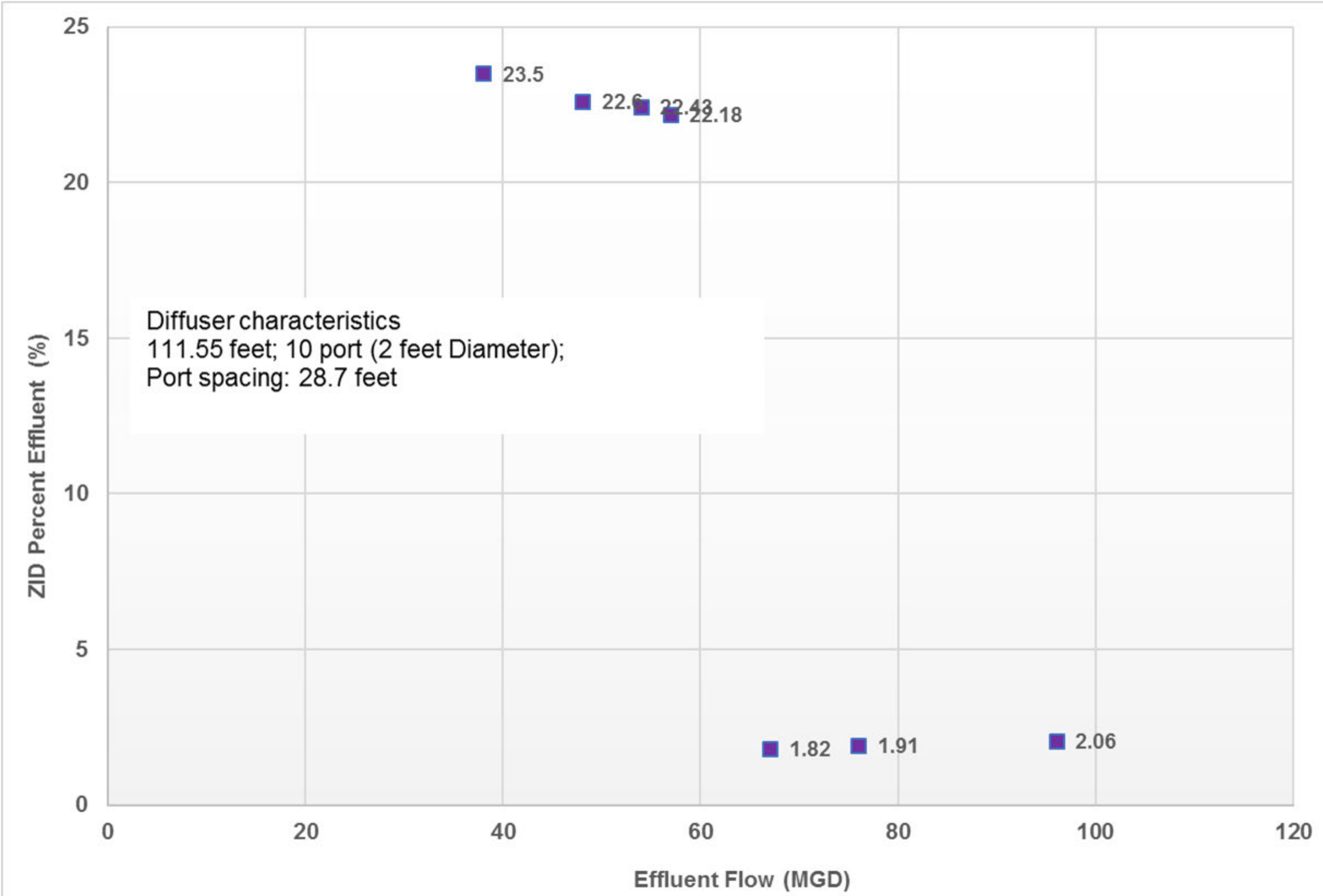


Figure 6: ZID Percent Effluent vs. Effluent Discharge Rate for the Specified Design Alternative at 40% RO Recovery

4. Summary and Conclusions

Conclusions from this modeling study include the following:

- Based on the modeling, the critical ambient condition for effluent mixing (ambient conditions which yield poorest mixing) occur at the 95th percentile of temperature and 5th percentile of salinity for the summer data.
- Significantly better effluent mixing is predicted by the model for 50% RO recovery than for 40% RO recovery for varying diffuser designs. This difference is likely due to the increased density of the effluent at higher salinity.
- At 40% RO recovery, mixing performance varied widely depending on diffuser design for effluent flows ranging from 38 MGD (20 MGD product water) to 96 MGD (50 MGD product water) at critical ambient conditions. Good mixing performance could be achieved for flows within this range (1.75% to 2.06% at the ZID, 0.7% to 0.86 at the aquatic life mixing zone, and 0.535% to 0.735 at the human health

mixing zone) but necessitated changes in the diffuser design. The performance for a given diffuser design varied significantly depending on the flow rate.

- A critical factor in achieving good mixing is the flow profile, which is referred to in the CORMIX model as “flow class”. Mixing performance changes significantly when the flow class changes.
- Across the range of flows modeled at 40% RO recovery, effluent targets of 2.5% at the ZID, 1 % at the aquatic life mixing zone, and 0.80 % at the human health mixing zone can readily be achieved with an appropriately designed diffuser.
- For a production rate of 50 MGD, yielding an estimated effluent flow rate of 96 MGD at the critical ambient condition and 40% RO recovery rate, a diffuser with the following properties would achieve the target mixing performance: 111.5 feet diffuser with 10 ports (24 inches diameter), 2 ports per riser, riser spacing 27.8 feet.
- The Port of Corpus Christi proposes to implement a diffuser which will achieve the target mixing performance at the selected design production rate and at the 40% RO recovery rate. Modeling suggests that if the RO recovery rate is increased, mixing performance for the selected design should improve.

5. References

1. Jenkins, Scott, et al. "Management of brine discharges to coastal waters recommendations of a science advisory panel." *Southern California coastal water research project. Costa Mesa, CA* (2012).
2. Bleninger, Tobias, and Gerhard H. Jirka. "Modelling and environmentally sound management of brine discharges from desalination plants." *Desalination* 221.1-3 (2008): 585-597.
3. Nash, Jonathan D., and Gerhard H. Jirka. "Buoyant surface discharges into unsteady ambient flows." *Dynamics of atmospheres and oceans* 24.1-4 (1996): 75-84.
4. Jenkins, Scott, et al. "Management of brine discharges to coastal waters recommendations of a science advisory panel." *Southern California coastal water research project. Costa Mesa, CA* (2012).

ATTACHMENT A

Mixing Analysis Using CORMIX

Mixing Analyses Using CORMIX

Introduction

Detailed site-specific mixing analyses are an alternative to using default effluent percentages for developing permit requirements. The use of effluent diffusers and/or the strategic orientation of outfall pipes can enhance mixing of wastewater effluent with receiving waters and increase critical dilutions (reduce effluent percentages) used to develop permit conditions. The model most commonly used to design diffusers and evaluate mixing near outfalls is CORMIX. This model requires a substantial amount of information on the ambient receiving water conditions, detailed discharge and diffuser configuration information, and knowledge of regulatory mixing zone shapes and sizes. This document outlines the specific information needed to construct or review a CORMIX model and provides standardized methods for developing and interpreting critical cases.

In general, mixing should be evaluated under both summer and winter temperature conditions and at different combinations of effluent and receiving water densities. This is necessary because the most limiting combination of effluent and receiving water conditions cannot be reliably predicted prior to running the model. The highest effluent percentages at the edge of the aquatic life mixing zone and the zone of initial dilution (ZID) will be used to determine water-quality-based permit limits for the protection of aquatic life. Likewise, the highest effluent percentage at the edge of the human health mixing zone will be used to determine water-quality-based permit limits for the protection of human health.

Ambient Data

Widths and Depths

For bounded receiving waters (streams, rivers, and other narrow channels), the application should include information regarding water body width and depth near the proposed discharge location. For unbounded receiving waters (lakes, bays, wide tidal rivers), the application should include information on depths in the vicinity of the discharge point (200 foot radius for lakes, 400 foot radius for bays or wide tidal rivers).

Velocity

Streams and Rivers. In flowing water bodies, use velocity calculated from the 7Q2 flow, the average width, and the average depth. If necessary, dilution estimates for human health protection can be developed using velocity calculated from harmonic mean flow. Calculate the 7Q2 and harmonic mean flows using methods outlined in the most current version of the *Procedures to Implement the Texas Surface Water Quality Standards*. Calculate the average width and depth using the data provided by the applicant.

Lakes, Bays, and Wide Tidal Rivers. In lakes or tidal water bodies, the applicant may provide velocity information. Otherwise, assume a small velocity, but large enough so that the model does not predict dilutions greater than the limiting dilution. An ambient velocity of zero may be used to obtain results in the near field only.

Wind Speed

Use a wind speed of 2 m/s unless the applicant provides site-specific information that demonstrates the wind speed should be greater.

Density

Good characterization of ambient density is an extremely important component of the mixing analysis. Therefore, an effort should be made to maximize the use of available data in order to develop meaningful statistics.

Select the appropriate SWQM station or stations and extract the following parameters:

Parameter	Code
Temperature	00010
Conductivity	00094
Salinity	00480

Generally there is more conductivity data than salinity data available. If paired salinity and conductivity data are available, develop a regression (2nd order usually fits better than linear) for salinity as a function of conductivity. Use the regression equation to calculate salinity for those conductivity measurements without a corresponding reported salinity in order to bolster the salinity data set. If paired salinity and conductivity data are not available, use the conductivity values to calculate salinity from the following equations:

S(ppt) = 0.000589 × conductivity (μmhos/cm) (for conductivities < 17,000)
S(ppt) = (0.000682 × conductivity)-1.7 (μmhos/cm) (for conductivities ≥ 17,000)

Determine the 5th and 95th percentile temperatures and salinities, and calculate the density for each combination of temperature and salinity: $\rho(T_5, S_5)$, $\rho(T_5, S_{95})$, $\rho(T_{95}, S_5)$, and $\rho(T_{95}, S_{95})$. These percentiles need to be developed for both summer (June, July, and August) and winter (December, January, and February) seasons if the effluent exhibits seasonal density variation. Use the resulting salinities along with their corresponding temperatures to calculate densities using the following equation:

$$\rho_{s,t,0} = \left[1 + \left(0.001\left(\left(28.14 - 0.0735T - 0.00469T^2\right) + \left(0.802 - 0.002T\right)\left(S - 35\right)\right)\right)\right] \times 1000$$

where:
- $\rho_{s,t,0}$ = water density (kg/m³ or g/cm³)
- T = water temperature (°C)
- S = water salinity (ppt)

For some estuarine outfall locations, density stratification can have an important influence on mixing characteristics. To determine whether stratification should be factored into the analysis, a detailed evaluation of density profile data should be performed. For each date where profile data is available, calculate the density at each point in the water column and calculate the overall density difference from surface to bottom or to a depth equal to the average depth near the outfall, whichever is less. According to CORMIX guidance, if the density changes by more than 0.1 kg/m³ from surface to bottom, stratification should be considered in the model analysis. If the density does not change this much, the water column can be considered unstratified. If the water column routinely exhibits stratification (more than 10% of the time), use the calculated surface-to-bottom density differences to determine the median density difference ($\Delta\rho_{median}$) to use later in the analysis.

Discharge Data

Diffuser Design and Orientation

The application should include drawings or schematics of the diffuser and its orientation relative to the receiving water. Distances and angles should be clearly marked. If not, contact the applicant and request this information.

Effluent Flow

Run the model using the following effluent flows as applicable:

- Existing permitted flow (renewal or amendment)
- Proposed permitted flow (new or amendment)
- Most recent two-year median monthly average flow (renewal or amendment)

Effluent Density

The application should include effluent temperature and salinity information along with calculated effluent densities (ρ_{eff}). When running the model, be sure to maintain the seasonal relationship between ambient and effluent densities; that is, do not model a winter effluent density with a summer ambient density.

Mixing Zone Definition

Single-port Diffusers

For single-port diffuser discharges to saltwater bodies or freshwater lakes, effluent percentages will need to be determined at the intersection of the plume centerline with the radial mixing zone distances given in Table 1, where:

$$D = \sqrt{X^2 + Y^2}$$

and where: *D* = distance from outfall
X = CORMIX x-coordinate of plume centerline
Y = CORMIX y-coordinate of plume centerline

For discharges to flowing freshwater streams or rivers, effluent percentages will need to be determined in the x-coordinate direction at the upstream and downstream longitudinal distances given in Table 1.

Table 1. Standard regulatory mixing zone distances for various types of water bodies.

Water Body Type		ZID (m)	MZ (m)	HH MZ (m)
Wide Tidal River, Bay, Estuary		15.24*	60.96*	121.92*
Narrow Tidal River (width < 400')	upstream	6.10	30.48	30.48
	downstream	18.29	91.44	91.44
Freshwater Lake		7.62*	30.48*	60.96*
Freshwater Stream	upstream	6.10	30.48	30.48
	downstream	18.29	91.44	91.44

* Radial distance from outfall.

Multiport Diffusers

For multiport diffuser discharges, the ZID and both mixing zones typically will be rectangular in shape and equal in area to the standard ZID and mixing zone sizes. The ZID and mixing zones may be centered on or aligned along the diffuser barrel. The position of the ZID and mixing zones relative to the diffuser will depend on two things:

1) the nature of the receiving water (tidally reversing or one-direction flow)
2) the orientation of the diffuser ports to the receiving water current.

A schematic depicting the configuration of the mixing zones relative to the multiport diffuser should be drawn to aid in the interpretation of model results.

Model Scenarios

Since the most limiting combination of effluent and receiving water conditions cannot be reliably predicted in advance of running the model, a range of modeling scenarios should be performed in order to determine protective effluent dilutions. For consistency, set the model up to predict percent effluent.

For effluents with relatively constant density year round, the following standard effluent/ambient density combination model runs should be performed for each effluent flow case:

- $\rho_{eff} / \rho(T_5, S_5)$
- $\rho_{eff} / \rho(T_5, S_{95})$
- $\rho_{eff} / \rho(T_{95}, S_5)$
- $\rho_{eff} / \rho(T_{95}, S_{95})$

For effluents with seasonal density variation, the following standard effluent/ambient density combination model runs should be performed for each effluent flow case:

Winter Conditions

- $\rho_{eff} / \rho(T_5, S_5)$
- $\rho_{eff} / \rho(T_5, S_{95})$
- $\rho_{eff} / \rho(T_{95}, S_5)$
- $\rho_{eff} / \rho(T_{95}, S_{95})$

Summer Conditions

- $\rho_{eff} / \rho(T_5, S_5)$
- $\rho_{eff} / \rho(T_5, S_{95})$
- $\rho_{eff} / \rho(T_{95}, S_5)$
- $\rho_{eff} / \rho(T_{95}, S_{95})$

If stratification was determined to be a routine characteristic of the receiving waters, further model scenarios will need to be run and evaluated. The stratification model case(s) should be developed from the most critical case(s) identified from the standard cases described previously. For each standard case that produced a critical dilution estimate (max. % effluent) for any mixing zone type (ZID, MZ, HH MZ), rerun the critical standard case(s) after adjusting the ambient density in the following manner:

$$\rho_{surface} = \rho_{standard} - (0.5 \times \Delta\rho_{median})$$
$$\rho_{bottom} = \rho_{standard} + (0.5 \times \Delta\rho_{median})$$

Choose the Stratification Type A (linear stratification) model setting for all stratification case scenarios.

ATTACHMENT B

Reported Corpus Christi Bay Ambient Properties

Reported Corpus Christi Bay Ambient Properties

Corpus Christi Bay is bordered on the North by Redfish Bay; on the south by the upper Laguna Madre; on the east by Mustang Island; and on the west by the City of Corpus Christi. The Corpus Christi Bay System has a total area of 124,796 acres with 127 miles of shoreline. The largest bay in this system is Corpus Christi Bay, which covers 95,997 acres.

The diurnal tide within Corpus Christi Bay has a typical range of approximately 3 ft along the coast, but the tidal amplitude is significantly reduced through the Aransas Pass inlet channel and lower portion of the ship canal, resulting in a typical tidal range of only approximately 1 ft in the main part of Corpus Christi Bay, including the proposed La Quinta site discharge location. There has been a seasonal component to the Corpus Christi Bay water level over the past 20 years, with the lowest average water level of approximately 0.3 ft NAVD during January and the high of approximately 1.4 ft during October.

Corpus Christi Bay is a relatively shallow bay with uniform depth (Nelson, 2012). Stratification is typically absent or small in shallow bays with mixing mechanisms. Ward and Armstrong (1997) state that there is no increase in salinity along the ship channel relative to the bay outside of the ship channel due to density currents. Salinity is variable, but the average is relatively constant over the Bay with a gradient transverse to the axis of the Bay. The salinity is typically highest near the southeast corner of the Bay near Laguna Madre. A hyper-saline gravity current originating in Oso Bay and extending into Corpus Christi Bay has been observed (Nelson, 2012). Nelson attributes the limited stratification observed within Laguna Madre and Oso Bay to be caused by winds, rather than other possible processes producing stratification. Ward and Armstrong (1997) state that the average weak stratification is relatively uniform and typically less than 0.5 parts per thousand (ppt) per meter (ppt/m) nearly everywhere and less than 0.3 ppt/m across half of the Corpus Christi Bay system. [1]

General circulation is described by the Texas Parks and Wildlife Department's Sea Center web page as being counter clockwise along the shoreline with a prevailing wind from the southeast being a primary factor for the circulation.

References:

1. http://www.cbbep.org/publications/virtuallibrary/CCBNEP-23.pdfTCEQ. 2017, updated daily. Surface Water Quality Monitoring Information System, May 22, 1969 – May 11, 2017. Compiled by Data Management & Analysis Team. Austin, Texas USA. Data Request ID 322

ATTACHMENT C

Flow Classes Definition by COMRIX

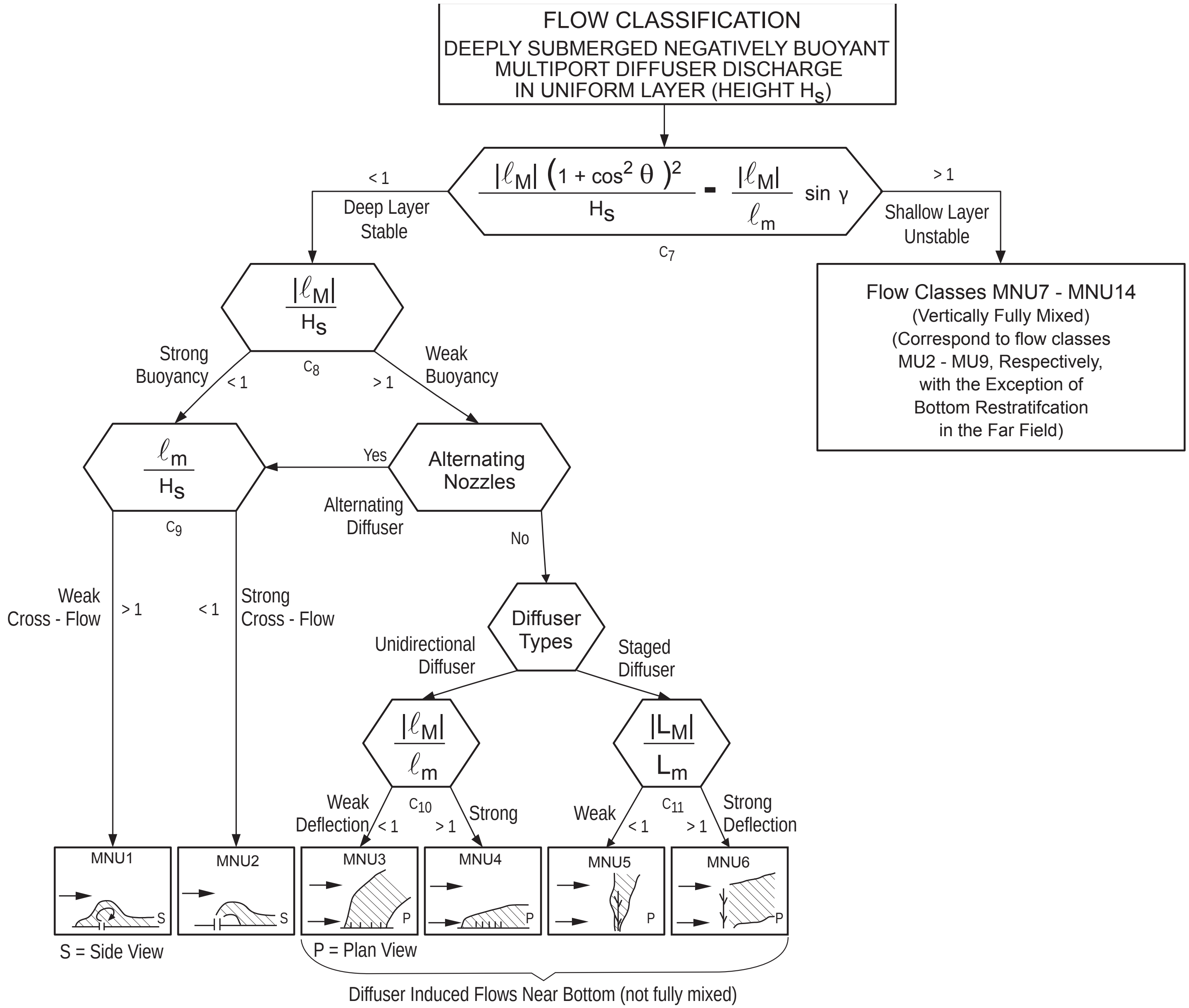


Figure A.7.a *CORMIX2 Classification: Behavior of negatively buoyant multiport diffuser discharges in unifor ambient layer flow (Flow classes MNU*

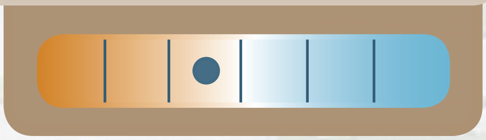
APPENDIX B

EPA Salinity Variation Q&A

FOCUS QUESTION 6:

Are freshwater inflows adequate to maintain a healthy bay system?

What was measured: Freshwater inflows and Corpus Christi Bay system salinity levels

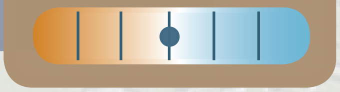


Answer: Maybe, because the freshwater inflows have been altered and managed. Studies are underway to determine the health of the bays and estuaries based on inflows and salinity.

INDICATOR #18: Quantity and timing of freshwater inflows.

Condition/Trend: Good/Stable

Good

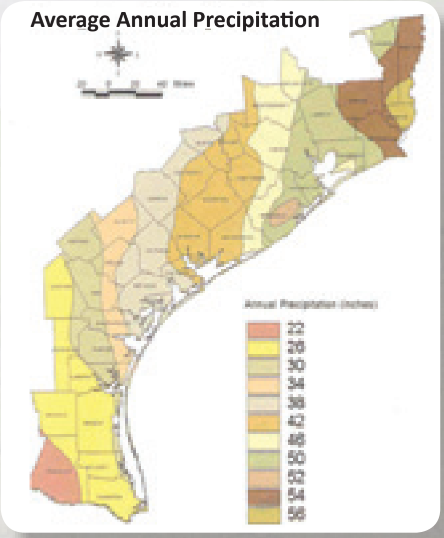


I. BACKGROUND

The flow of freshwater into a bay system from its watershed (drainage areas to a particular body of water) helps to ensure that necessary salinity, nutrient, and sediment loading are adequate in order to maintain productivity of economically and ecologically important species. Sources of freshwater inflows entering into the bays and estuaries consist of rain, groundwater, and the largest contributor, surface water from rivers and streams. The characteristic natural community living in and around the Texas Coastal Bend bay system is largely defined by the volume, timing, location, and quality of freshwater inflows.

Nueces River Watershed

The Nueces River is one of the largest contributors of freshwater into our local bays and estuaries. Because of the altered freshwater inflows into Nueces Bay due to the Choke Canyon and Lake Corpus Christi Reservoirs, it is necessary to regulate inflows with "pass through" requirements that allow a certain amount of freshwater flow into the Nueces River each month.



The City of Corpus Christi is responsible for distributing water to all necessary users and consumers, as well as ensuring all target pass through requirements to the Nueces Estuary are met. The Nueces River Authority (NRA), a governmental organization created in 1935, works closely with the City of Corpus Christi to preserve, protect, and develop surface water resources including flood control, irrigation, navigation, water supply, wastewater treatment, and water quality control within the Nueces River Basin.

II. CONCERNS

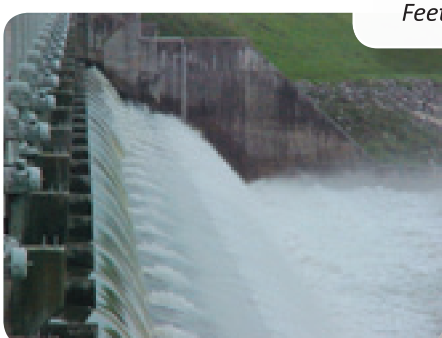
Natural fluctuations in freshwater inflows into the bay can have an immense impact on organisms within the bay system. For example, if a long drought persists and creates a situation of very little freshwater inflow into the bay, it may cause hypersaline (high salt) conditions that in turn affect bay shrimp catches which need a certain salinity range in order to mature in healthy numbers. On the other extreme, there may be an abundance of freshwater inflow after an extended heavy rain event that causes eutrophication (high nutrient conditions), triggers large algal blooms that deplete oxygen and light within the water column, and negatively effects fish and plants living in the bays.

III. LOCAL FRESHWATER INFLOW LEVELS

When looking at the distribution of freshwater inflow into the Coastal Bend bays, there is a definite trend of less rain from north to south. While scientific work continues to determine the amount and location of monthly inflows needed, recommendations were made in 1991 that developed the current target levels of annual freshwater inflows to the bay system. Since the "pass through targets" attempt to mimic the natural freshwater inflow cycle into the Corpus Christi Bay system, there is a greater chance of maintaining a healthy estuary for fish and wildlife, as well as its human inhabitants.

Pass Through Targets (AcFt)				
Month	**Capacity<=70%**	**40%<= Capacity<=70%**	**30%<= Capacity<=40%**	**Capacity<=30%**
January	2,500	2,500	1,200	0
February	2,500	2,500	1,200	0
March	3,500	3,500	1,200	0
April	3,500	3,500	1,200	0
May	25,500	23,500	1,200	0
June	25,500	23,000	1,200	0
July	6,500	4,500	1,200	0
August	6,500	5,000	1,200	0
September	28,500	11,500	1,200	0
October	20,000	9,000	1,200	0
November	9,000	4,000	1,200	0
December	4,500	4,500	1,200	0

Choke Canyon/Lake Corpus Christi Reservoirs pass through targets measured in Acre Feet for the Nueces River which the City of Corpus Christi is required to follow:



Wesley Seale Dam

Freshwater Inflow
- Quantity
- Timing
- Quality

→

Estuarine Conditions
- Salinity
- Sediment
- Dissolved Material
- Particulate Material

→

Estuarine Resources
- Species Composition, Abundance, Distribution
- Primary and Secondary Production

Freshwater Inflow cause and effect diagram.

IV. REFERENCES

- Asquith, W. H., Mosier, J.G., and P.W. Bush. 1997. Status, Trends, and Changes in Freshwater Inflows to Bays Systems in the Corpus Christi Bay National Estuary Program Study Area. Corpus Christi Bay National Estuary Program. 48 pp.
- City of Corpus Christi. 2007. Frequently Asked Questions About Water Related Issues In Corpus Christi. http://www.cctexas.com/?fuseaction=main.view&page=2841
- Nueces River Authority. 2007. Basin highlights report. Report prepared in cooperation with the Texas Commission on Environmental Quality Clean Rivers Program. Corpus Christi, 82 pp.

INDICATOR #19: Bay salinity levels (within desired target ranges).

Condition/Trend: Good/Stable

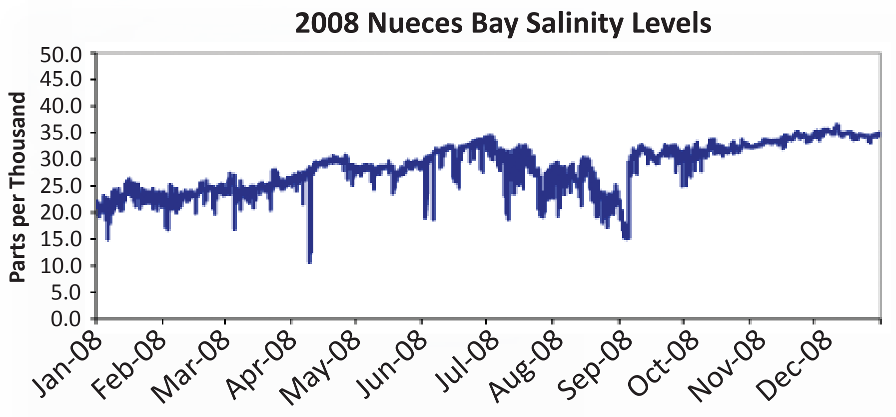
Improvement Needed

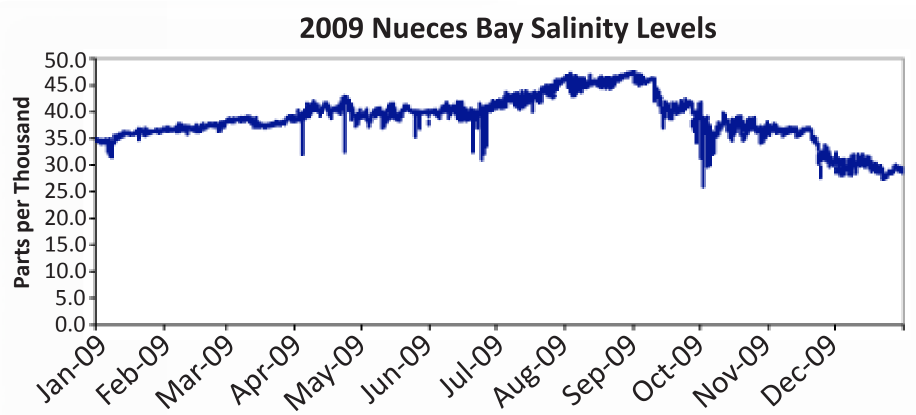
I. BACKGROUND

Salinity is a measure of how much sea salt is contained in a unit of water. The Gulf of Mexico coastal seawater is relatively constant at about 35 parts sea salt per thousand parts water by weight. Salinity of freshwater is near zero. Therefore, most of the salinity variations in the estuary are responses to river inflow, evaporation and mixing by winds and ocean tides.

The ability of resource agencies to manage fish, wildlife and freshwater supplies to the Corpus Christi Bay estuary requires an integrated knowledge of the relations between the organisms and their environment. The salinity of the water, and particularly its seasonality patterns, affect which aquatic species can survive. In short, salinity is a fundamental property of the estuary that determines its biological characteristics.

The Texas Water Development Board has been recording salinity levels since 1987 for the various bays around the Coastal Bend. The Conrad Blucher Institute's Division of Nearshore Research at Texas A&M University-Corpus Christi maintains salinity monitoring stations within the Corpus Christi Bay system and posts a salinity relief check page that is updated daily. The site can be accessed at http://lighthouse.tamucc.edu/Salinity/HomePage.





II. CONCERNS

Management of the freshwater supply is complicated in part because Lake Corpus Christi's freshwater supply serves two major purposes: human consumption and salinity control. When freshwater runoff from the Nueces Watershed is scarce, as in dry years, a proportionally greater amount of available freshwater from the estuary is needed for human use as well as for salinity control.

In order to relieve some salinity stress from within the estuary, salinity pass through targets were developed, based on historical salinity levels, in attempts to mimic natural salinity levels within the bay system. In simple terms, if salinity is too high, freshwater is released to lower salinity levels. When salinity is too low, the City of Corpus Christi gets a Salinity Relief Credit which allows for less freshwater pass through entering into the bay system, allowing salinity levels a chance to increase back to normal levels.

III. LOCAL LEVELS

Salinity gradients along the Texas Coastal Bend bays from the upper to lower regions are a normal feature. Salinity measured within each bay system such as the San Antonio Bay may be as low as zero parts per thousand (ppt), while values as high as 70 ppt may occur in Baffin Bay and the Upper Laguna Madre.

The Corpus Christi Bay system, which receives runoff from urban areas in addition to Nueces River inflow, experiences lower average salinities than the southern region of the Coastal Bend area with an average salinity in 2008 of around 28 ppt compared to an average salinity of 39 ppt in 2009 for Nueces Bay. Optimum salinity ranges vary for the Corpus Christi Bay system depending on proximity to the river and season, but in general, salinities can be between 1 to 30 ppt. By keeping salinities within this target range, fish, wildlife, and plants will be less stressed and more productive.

Salinity Relief Credit Chart

Months	Salinity Lower Bounds	Salinity Upper Bounds	Reduction for Average Salinity		
			5 psu below SUB	10 psu below SUB	15 psu below SUB
January	5	30	25%	50%	75%
February	5	30	25%	50%	75%
March	5	30	25%	50%	75%
April	5	30	25%	50%	75%
May	1	20	0%	25%	75%
June	1	20	0%	25%	75%
July	2	25	25%	50%	75%
August	2	25	25%	50%	75%
September	5	20	0%	25%	75%
October	5	30	0%	25%	75%
November	5	30	25%	50%	75%
December	5	30	25%	50%	75%

The City of Corpus Christi receives 500 acre feet per month return flow credit for all return flows into Nueces Bay and possibly one of the following: up to half of the monthly target from flows exceeding the freshwater inflow requirement of the previous month or the salinity relief credit when the salinity in Nueces Bay is low.

Measuring salinity using a refractometer.

IV. REFERENCES

- City of Corpus Christi. 2007. Frequently Asked Questions About Water Related Issues In Corpus Christi. http://www.cctexas.com/?fuseaction=main.view&page=2841
- Conrad Blucher Institute – Division of Nearshore Research. 2010. Nueces Bay Salinity. http://lighthouse.tamucc.edu/Salinity/HomePage

ATTACHMENT 9

Facility Map

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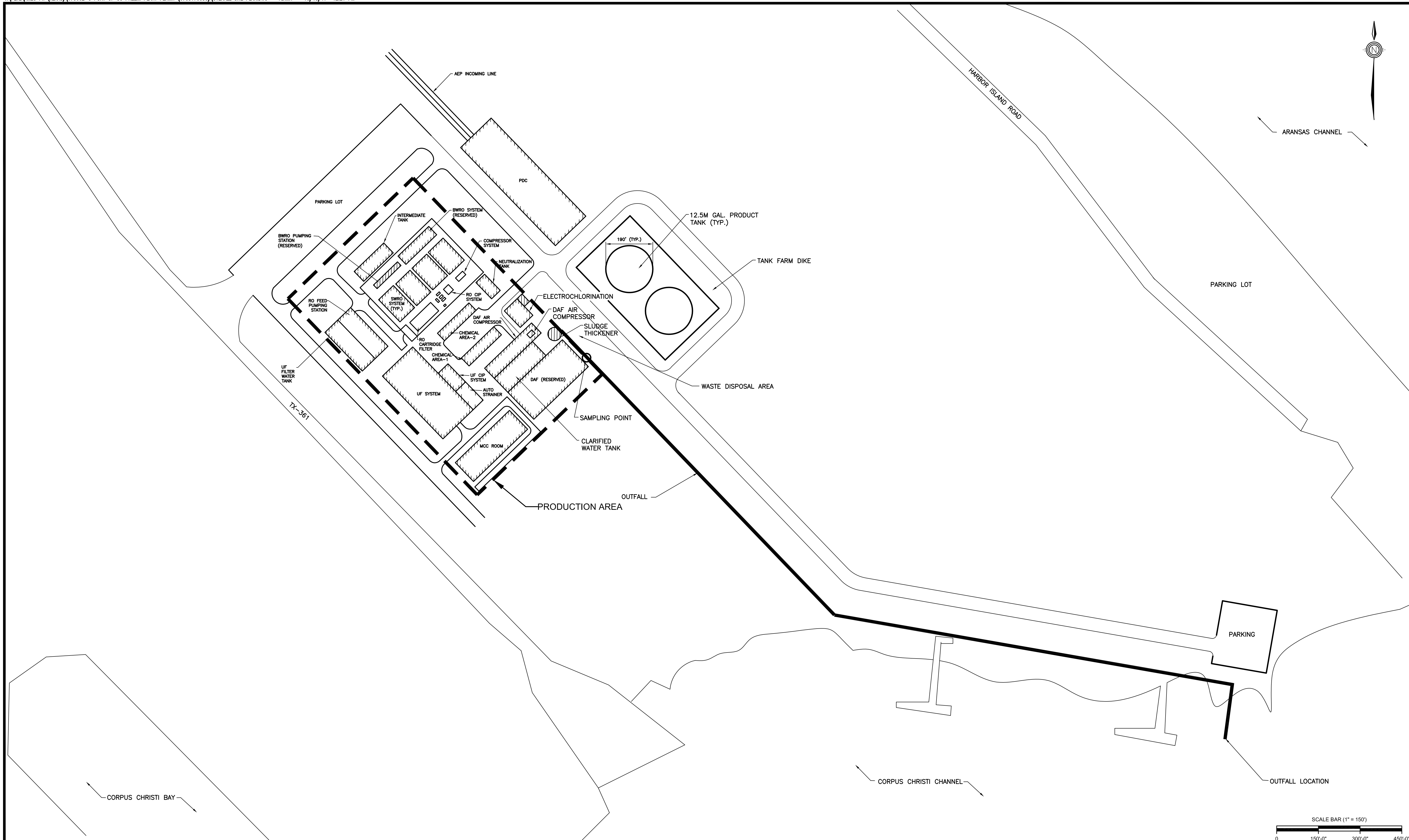

NOTES:

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amec foster wheeler

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APPROVED		DATE		VPE NO.	
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AMEC NO.				VERSION	

PORT OF CORPUS CHRISTI
PROPOSED DESALINATION PLANT
HARBOR ISLAND, PORT ARANSAS
TEXAS 78373

FACILITY MAP

DRAWING NO. ATTACHMENT 9

REV.