

# TCEQ Interoffice Memorandum

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**To:** Industrial Permits Team  
Wastewater Permitting Section

**From:** Peter Schaefer, Standards Implementation Team Leader  
Water Quality Assessment Section  
Water Quality Division

**Date:** August 19, 2021

**Subject:** Port of Corpus Christi Authority of Nueces County; Permit No. WQ0005253000  
New; Application Received: March 7, 2018

**This memorandum supersedes the one written August 20, 2018.**

**A pH screen was performed to determine if a pH limit of 6 would meet the segment criterion of 6.5. Results of the screening indicate segment criteria will be met at the edge of the aquatic life mixing zone. The upper pH limit is set at the segment criterion of 9.0.**

The discharge route for the above referenced permit is directly to Corpus Christi Bay in Segment 2481 of the Bays and Estuaries. The designated uses and dissolved oxygen criterion as stated in Appendix A of the Texas Surface Water Quality Standards (30 Texas Administrative Code §307.10) for Segment 2481 are primary contact recreation, exceptional aquatic life use, oyster waters, and 5.0 mg/L dissolved oxygen.

In accordance with 30 Texas Administrative Code §307.5 and the TCEQ implementation procedures (June 2010) for the Texas Surface Water Quality Standards, an antidegradation review of the receiving waters was performed. A Tier 1 antidegradation review has preliminarily determined that existing water quality uses will not be impaired by this permit action. Numerical and narrative criteria to protect existing uses will be maintained. A Tier 2 review has preliminarily determined that no significant degradation of water quality is expected in Corpus Christi Bay which has been identified as having exceptional aquatic life use. Existing uses will be maintained and protected. The preliminary determination can be reexamined and may be modified if new information is received.

A watershed of high priority has been identified in Segment 2481 in Nueces County. The piping plover, *Charadrius melodus* Ord, a threatened aquatic dependent species, is found in the watershed of Segment 2481; **however, the facility is not a petroleum facility and its discharge is not expected to have an effect on the piping plover.** This determination is based on the United States Fish and Wildlife Service's (USFWS) biological opinion on the State of Texas authorization of the Texas Pollutant Discharge Elimination System (TPDES; September 14, 1998, October 21, 1998 update). To make this determination for TPDES permits, TCEQ and EPA only considered aquatic or aquatic dependent species occurring in watersheds of critical concern or high priority as listed in Appendix A of the USFWS biological opinion. The

determination is subject to reevaluation due to subsequent updates or amendments to the biological opinion. The permit does not require EPA review with respect to the presence of endangered or threatened species

## Permit Review for Classified Waters by Standards Team

\_\_\_ Amendment or \_\_\_ **X** New

**(permit was remanded by Commissioners for a new review to include updated information provided by applicant. This is that review of remanded application with new information supplied by applicant)**

Name: Port of Corpus Christi Authority

Number: 05253-000

County: Nueces

Region: 14

Basin: Bays and Estuaries

Date Application Received: March 7, 2018

1. Segment in Which Discharge is Located: 2481- Corpus Christi Bay
2. Designated Uses and Pertinent Criteria: PCR, E/O, DO = 5.0 mg/L
3. Additional Comments: Applicant seeking permit to discharge up to 95.6 MGD of brine from desalination facility. Effluent may contain sodium hypochlorite and flocculants for pretreatment and treatment and if chlorine is used for disinfection, then effluent will be dechlorinated prior to discharge.  
Draft permit to have 24-hour acute and 7-day chronic WET testing requirements

Segment 2481 has been designated as Oyster Waters. 307.7(b)(3)(B) applies. Because the effluent is brine from ambient waters, it is not expected to be a source of bacteria or toxic substances. The outfall is located within the buffer zone as defined in 307.7(b)(3)(B). If subsequent effluent analyses indicate toxic substances to be present in the effluent, appropriate limits will be incorporated to ensure that concentrations of toxic materials do not cause species of shellfish to exceed acceptable guidelines for the protection of public health.

A pH screen was performed to determine if a pH limit of 6 would meet the segment criterion of 6.5. Results of the screening indicate segment criteria will be met at the edge of the aquatic life mixing zone. The upper pH limit is set at the segment criterion of 9.0 and a screening is not necessary at this upper pH limit.

**305b: Concern:** none per 2020 Integrated Report.

**303-d: Impairment:** 2020 303-d list indicates 2481CB03, CB04, CB06 (Cole Park, Ropes Park, and Poenisch Park) impaired for bacteria. These parks are 20 miles from the proposed outfall location.

4. Applicable Toxic Criteria: acute, chronic, sustainable fish tissue apply.
5. Antidegradation Review: This discharge is subject to Tier I and Tier II antidegradation reviews.

Tier I - Existing uses and water quality sufficient to protect those existing uses must be maintained. The existing uses are Exceptional ALU, Oyster Waters, Primary Contact Recreation and others as defined in 307.7. This discharge is taking ambient seawater and removing salts and other constituents from seawater using reverse osmosis purification process. The discharge consists primarily of concentrated seawater. Of interest for this discharge is the salinity of the effluent and any potential effects on aquatic life and the salinity gradient in the receiving waters. The Texas Surface Water Quality Standards (TSWQS) do not have numeric criteria for salinity. However, narrative criteria found in TSWQS 307.4 do apply. TSWQS 307.4(g)(3) states that

salinity gradients in estuaries must be maintained to support attainable estuarine-dependent aquatic life uses. TSWQS 307.6(e)(2)(B) states that effluent of discharges to waters in the state must not be acutely toxic to sensitive species of aquatic life, as demonstrated by effluent toxicity tests. The applicant performed Whole Effluent Toxicity tests under several different scenarios to determine how sensitive invertebrate and vertebrate species may be affected by this proposed discharge. The applicant also performed salinity modeling to determine potential effects to the salinity gradient of the receiving waters. The results are as follows:

WET – 24 hour acute, 48 hour acute, and 7 day chronic tests- These tests were performed using various salinities up to 45 ppt. All species tested (*Cyprinodon variegatus*, *Menidia beryllina* and *Mysidopsis bahia*) passed survival and growth tests at all dilutions tested. Cormix modeling performed by the applicant determined that the worse-case scenario of conditions would result in a salinity of 45 ppt in the ZID (23.1 m from outfall) at 19.8 seconds after exiting the outfall. Critical conditions determined an effluent percentage of 8.9% at the edge of the mixing zone.

Static 2-minute acute test at 35, 45, 50, and 55 ppt. All tests met EPA test acceptance criteria. Within 90 days of commencement of discharging, the applicant will be required to submit effluent data. This data will be run through TexTox calculations by the permit writer to ensure compliance with TSWQS. Based on the technical review of the submitted analytical results, an amendment may be initiated by TCEQ staff to include additional effluent limitations, monitoring requirements or both. In addition to the WET tests already performed under simulated effluent salinities, the draft permit will have 24-hour acute and 7-day chronic testing to monitor for possible effects to aquatic life.

Tier II- No activities subject to regulatory action that would cause degradation of waters that exceed fishable/swimmable quality are allowed unless it can be shown to the commission's satisfaction that the lowering of water quality is necessary for important economic or social development. Degradation is defined as a lowering of water quality by more than a de minimis extent, but not to the extent that an existing use is impaired. Water quality sufficient to protect existing uses must be maintained. Fishable/swimmable waters are defined as waters that have quality sufficient to support propagation of indigenous fish, shellfish, terrestrial life, and recreation in and on the water.

Nutrients- nutrient limits are not required for this permit because there is not a significant source of nutrients expected in the effluent.

Critical conditions have been calculated for this proposed discharge with an expected effluent percentage of 8.9% at the edge of the mixing zone.

Dissolved oxygen modeling- compliance with dissolved oxygen criteria is addressed by the dissolved oxygen modeler.

Toxic criteria- the permit writer will screen the application using the effluent percentages provided in the Critical Conditions memo to determine compliance with TSWQS, and will include permit limits or monitoring as necessary based on TexTox screening calculations. Within 90 days of commencement of discharging, the applicant will be required to submit effluent data. This data will be run through TexTox calculations by the permit writer to ensure compliance with TSWQS. Based on the technical review of the submitted analytical results, an amendment may be initiated by TCEQ staff to include additional effluent limitations, monitoring requirements or both.

WET testing (24 hr. acute and 7-day chronic) will be required to further monitor for potential impacts to aquatic life from the discharge.

The Procedures to Implement the Texas Surface Water Quality Standards (IPs) (2010) state that degradation is not likely to occur if less than 10% of the assimilative capacity of the receiving waters are used. While the IPs provide calculations for determining consumption of assimilative capacity, these calculations require the use of numeric criteria. There are no numeric criteria for dissolved salts applicable to the receiving

waters. Dr. Furnans (UT) calculated the total mass of salt that the proposed discharge would release into the CCSC under the draft permit and compared it with the total mass of salt that flow into and out of the CCSC under normal ambient conditions at the proposed diffuser location. The results indicate that at the most extreme conditions, the mass of total salt would increase by less than 1% at the diffuser location. Thus indicating that the discharge of brine as proposed would not constitute degradation of the receiving waters with respect to salts.

**Salinity of effluent** – Cormix modeling performed by the applicant determined that the worse-case scenario of conditions would result in a salinity of 45 ppt in the ZID (23.1 m from outfall) at 19.8 seconds after exiting the outfall. Critical conditions determined an effluent percentage of 8.9% at the edge of the mixing zone.

**Near field effects-**

Zone of passage – 307.8(b)(6) states that “Mixing zones must not preclude passage of free swimming aquatic organisms...” Effluent plume modeling was performed by the applicant under a range of ambient velocities. This modeling determined that the cross-sectional area of the plume at a 1.2 m/s tidal flow in the near field region is 152 m from the diffuser ports and has a cross-sectional area of 234.4 m<sup>2</sup>. The cross-sectional area of the ship channel at this location is 5574 m<sup>2</sup> which leaves a 95.6% area for zone of passage in which there would be no measurable increase in salinity above ambient.

Under slack tide conditions, effluent plume modeling indicates a zone of passage of 92.6% of the cross-sectional area.

**Far field effects-** SUNTANS modeling performed by Dr. Furnans (UT).

-determined that vertical mixing would be sufficient to prevent the formation of a high salinity layer on the bottom of the ship channel.

-bottom salinity values increase between 0 and 1 ppt where the outfall is located and do not accumulate in the CCSC and bay system.

6. Endangered species: Piping plover, but applies to petroleum facilities only.

Signature: Peter Schaefer

Date: August 19, 2021

Entered into Database: Yes.

ERC Review date: