TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

April 12, 2022

Laurie Gharis, Chief Clerk
Texas Commission on Environmental Quality
Office of the Chief Clerk (MC-105)
P.O. Box 13087
Austin, Texas 78711-3087

RE: **PORT OF CORPUS CHRISTI AUTHORITY OF NUECES COUNTY**
SOAH DOCKET NO. 582-20-1895
TCEQ DOCKET NO. 2019-1156-IWD

Dear Ms. Gharis:

Enclosed for filing is the Office of Public Interest Counsel's Closing Argument in the above-entitled matter.

Sincerely,

Sheldon P. Wayne, Attorney
Assistant Public Interest Counsel

Jennifer A. Jamison, Attorney
Assistant Public Interest Counsel

cc: Mailing List

SOAH DOCKET NO. 582-20-1895
TCEQ DOCKET NO. 2019-1156-IWD

APPLICATION OF PORT OF CORPUS CHRISTI AUTHORITY OF NUECES COUNTY FOR TPDES PERMIT NO. WQ0005253000	**§**	**BEFORE THE STATE OFFICE OF ADMINISTRATIVE HEARINGS**

OFFICE OF PUBLIC INTEREST COUNSEL'S CLOSING ARGUMENT

TO THE HONORABLE ADMINISTRATIVE LAW JUDGES:

The Office of Public Interest Counsel (OPIC) at the Texas Commission on Environmental Quality (TCEQ) files this closing argument and would respectfully show the following:

I. INTRODUCTION

A. Background of Facility

The Port of Corpus Christi Authority (the Port or Applicant) has applied to TCEQ for a new Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0005253000 to authorize the discharge of water treatment wastes at a daily average flow not to exceed 95.6 million gallons per day (MGD). The Applicant proposes to operate the Harbor Island Property – Former FINA Tank Farm, which is a seawater desalination facility (the Facility).

According to the application, seawater will be drawn into the Facility from an intake located in the Gulf of Mexico through coarse screens that will keep large material from entering the pretreatment processes. The screens will reject captured solids as industrials solid waste, which will be sent off-site for disposal.

All domestic wastewater generated must be disposed of in an approved manner, such as routing to an approved on-site septic tank and drainfield system or to an authorized third party

for treatment and disposal. The Facility will be located adjacent to State Highway 361 just northeast of the Ferry Landing, Nueces County, Texas 78336.

If the draft permit is issued, the treated effluent will be discharged via pipe directly into Corpus Christi Bay (the Bay) in Segment No. 2481 of the Bays and Estuaries. The designated uses for Segment No. 2481 are primary contact recreation, exceptional aquatic life use, and oyster waters. The effluent limits in the draft permit are intended to maintain and protect the existing instream uses. All determinations are preliminary and subject to additional review and revisions.

B. Procedural Background

The TCEQ received the application on March 7, 2018 and declared it administratively complete on June 26, 2018. The Notice of Receipt and Intent to Obtain a Water Quality Permit (NORI) was published in English on July 25, 2018, in the *Aransas Pass Progress/Ingleside Index* and the *Corpus Christi Caller Times*, and in the *Port Aransas South Jetty* on July 26, 2018. The TCEQ Executive Director's (ED) staff completed technical review of the application and prepared a draft permit. The Notice of Application and Preliminary Decision (NAPD) was published in English on November 21, 2018 in the *Aransas Pass Progress* and the *Ingleside Index*, and in the *Port Aransas South Jetty* and the *Corpus Christi Caller Times* on November 22, 2018.

A public meeting was held on April 8, 2019 at the Port Aransas Civic Center in Port Aransas, Texas. The public comment period ended on April 8, 2019. The Chief Clerk mailed the ED's Decision and Response to Public Comment on July 12, 2019 and the deadline for filing requests for a contested case hearing and requests for reconsideration was August 12, 2019. The TCEQ received numerous timely comments, hearing requests, and two timely requests for

reconsideration. On November 6, 2019, the Commission considered the hearing requests and requests for reconsideration and the matter was then referred to the State Office of Administrative Hearings (SOAH) to conduct a contested case hearing. The hearing on the merits was conducted via Zoom on November 4-6 and 9-10, 2020. On May 19, 2021, the TCEQ considered the Application at an Agenda Meeting. After consideration, TCEQ remanded the matter to SOAH to: (1) apply the appropriate legal standard for non-numeric criteria found in 30 Texas Administrative Code § 307.6(e)(1) for evaluating the impacts to aquatic organisms that move through a zone of initial dilution; and (2) take additional evidence on the following issues:

> A) Whether the proposed discharge will adversely impact: the marine environment, aquatic life, and wildlife, including birds and endangered or threatened species, spawning eggs, or larval migration;
>
> C) Whether the proposed discharge will adversely impact recreational activities, commercial fishing, or fisheries in Corpus Christi Bay and the ship channel;
>
> D) Whether the Application, and representations contained therein, are complete and accurate;
>
> G) Whether the modeling complies with applicable regulations to ensure the Draft Permit is protective of water quality, including utilizing accurate inputs;
>
> H) Whether the Executive Director's antidegradation review was accurate; and
>
> I) Whether the Draft Permit includes all appropriate and necessary requirements.

The preliminary hearing was held on January 22, 2022 by Zoom videoconference. The following parties appeared through counsel: Port of Corpus Christi Authority of Nueces County (Port Authority), Executive Director of the Texas Commission on Environmental Quality (TCEQ), Office of Public Interest Counsel, Audubon Texas, Port Aransas Conservancy, James King, Tammy King, Sam Steves, and Edward Steves. In addition, non-party Cathy Fulton appeared for the aligned pro se intervenors Stacy Bartlett, Jo Ellen Krueger, Sarah Searight, and Lisa Turcotte.

The hearing on the merits was conducted via Zoom on March 14, 2022 through March 25, 2022. For the reasons stated herein, the record supports findings and conclusions that the draft permit does not meet applicable requirements regarding the issues referred to hearing, and thus OPIC recommends that the permit be denied.

II. DISCUSSION

1. Whether there will be significant lethality to aquatic organisms that move through the Zone of Initial Dilution.

A key issue on remand is application of the appropriate legal standard for non-numeric criteria found in 30 Texas Administrative Code § 307.6(e)(1) for evaluating impacts to aquatic organisms that move through the Zone of Initial Dilution (ZID).[1] The relevant standard prescribes that while acute total toxicity levels may be exceeded within a ZID, there must be "no significant lethality" to aquatic organisms that move through a ZID.[2] Accordingly, the definition of "significant lethality" is crucial to analyzing whether or not the Port has carried its burden with respect to Issue no. 1. Because the Texas Surface Water Quality Standards do not expressly define "significant lethality," parties have deferred to the plain language of the term, as well as expert interpretations of its meaning in the context of this permit. OPIC analyzed each party's position on the appropriate definition of "significant lethality," as well as evidence supporting whether mortality would occur to organisms moving through the ZID, and to what degree. Ultimately, OPIC finds that the greater weight of the evidence shows that the Port has failed to carry its burden with respect to Issue no. 1.

i. <u>Definitions of Significant Lethality</u>

Protestants' Definition[3]

[1] Exhibit AR-R 2 (Admin Record – Remand Tab G) at ¶I.1.
[2] 30 Tex. Admin. Code § 307.6(e)(1).
[3] OPIC is using the term "Protestants" to collectively refer to all parties who oppose the permit.

Protestants' definition of significant lethality hinges on the idea that significant lethality represents an impact that has an important effect on the sustainability of a population of organisms.[4] Protestant expert, Dr. Gregory Stunz, testified that significant lethality in the relevant context is mortality that is either instantaneous or delayed, that would affect some type of population dynamic in the recruited population.[5] Similarly, Protestant expert Scott Holt testified that significant lethality in this context refers to mortality that is "important or consequential."[6] Finally, Dr. Kristin Nielsen testified that significant lethality is a "statistically significant" relationship between a specific parameter and an outcome.[7] Dr. Nielsen further elaborated that, in this case, significant lethality refers to findings that are both mathematically different from the control group, and biologically significant.[8]

Executive Director's Definition

ED expert Peter Shaefer explains that the permit contains 24-hour acute, 48-hour acute, and 7-day chronic whole effluent toxicity testing (WET) requirements.[9] Mr. Shaefer relies on a definition of significant lethality in the context of WET testing, concluding that for a 24-hour acute test, anything less than 50% lethality at 100% effluent would not constitute significant lethality.[10] Further, Mr. Shaefer testified that in terms of a 48-hour acute test, significant lethality is defined in the draft permit as a statistically significant difference between survival of the test organism in a specified effluent dilution compared to the survival of the test organism in the control.[11] ED expert Michael Pfeil concurs with this approach, stating that "For 24-hour acute

[4] *See, e.g.*, Hearing on Merits Remand Transcript (HOM) p. 1072, ln. 14-17; HOM, p. 1319, ln. 8-10.
[5] HOM, p. 1072, ln. 14-22.
[6] HOM, p. 1319, ln. 9-10.
[7] HOM, p. 2112, ln. 23-25.
[8] HOM, p. 1801, ln. 7-14.
[9] ED-PS-1, Pre-filed Testimony of Peter Schaefer, p. 10, ln. 30-33.
[10] ED-PS-1 p. 10, ln. 30-33; p. 11 ln. 1-4.
[11] ED-PS-1 p. 11, ln. 1-4.

lethality, the test organisms are exposed to 100% effluent for 24 hours, after which the number of living organisms is counted. A Lethal Concentration (LC50) greater than 100% is considered meeting the standard. That is, if more than 50% of the test organisms survive, the test is considered passing."[12] Despite this position, Mr. Shaefer also offers testimony that appears to support Protestants' sentiment regarding significant lethality. He states, "What needs to be considered is how the number of larvae killed compares to the overall number of larvae and whether that would have significant impacts to the aquatic community."[13] By contrast, ED witness Shannon Gibson states that there must be "no lethality to aquatic organisms that move through a ZID."[14]

Port's Definition

The Port's experts did not come to a consensus on a definition of significant lethality but did seemingly agree that no significant lethality would occur within the ZID. When asked to clarify his understanding of the term "significant lethality" as used in his pre-filed testimony, Port expert Randy Palachek stated, "Let's say greater than a 20 percent or so effect."[15] Palachek further testified that he believed there would be no lethality to organisms passing through the ZID.[16] When asked to clarify the meaning of the term "no lethality," Palachek stated, "… I would say not zero but not 20 percent either, so I would say because of the extremely short exposure time of seconds and minutes, I would expect no lethality being no toxicity."[17] Port expert, Dr. Lance Fontenot, does not expressly define significant lethality, but states that the discharge will result in no adverse impact to aquatic life, including early life stages.[18] Similarly,

[12] ED-MP-1, Pre-filed Testimony of Michael Pfeil, p. 12, ln. 15-20.
[13] ED-PS-1 p. 21, ln. 5-9.
[14] ED-SG-1, Pre-filed Testimony of Shannon Gibson, p. 19, ln. 1-2.
[15] HOM, p. 863, ln. 23 – p. 864 ln. 1.
[16] HOM, p. 865, ln. 1-5.
[17] HOM, p. 865, ln. 10-16.
[18] AP-LF-1-R, Pre-filed Rebuttal Testimony of Lance Fontenot, p.10, ln. 1-2.

Port expert Lial Tischler does not offer a definition of significant lethality, but states that there will be no significant lethality to aquatic organisms passing through the ZID. [19]

OPIC's Position

Upon consideration of all parties' definitions of significant lethality in the context of this permit, OPIC finds that Protestants' definition is the most reasonable, and most protective of aquatic life. A broad interpretation of significant lethality that encompasses effects to recruited populations ensures that impacts to the entire population are considered, rather basing the definition on enumerating the deaths of single organisms. Further, OPIC finds that the ED's reliance on a definition relevant to WET testing procedures is inappropriate for application in the real world, as allowing up to 49% lethality of organisms moving through the ZID cannot ensure adequate protection of aquatic organisms. Finally, OPIC finds no basis to support the Port's contention that significant lethality occurs when there is "greater than 20 percent effect" as described by Mr. Palachek. The Port carries the burden to show that significant lethality will not occur with respect to organisms who move within ZID, and failure to contemplate effects to populations of organisms cannot adequately meet this threshold. Accordingly, OPIC's analysis of significant lethality centers on whether there are important or consequential effects, either instantaneous or delayed, that would affect a population dynamic in the recruited population.

ii. <u>Evidence of Significant Lethality within the ZID</u>

Using a definition of significant lethality as mortality having a consequential effect on the recruited population, Protestants assert that not only has the Port failed to carry its burden to show that no significant lethality would occur within the ZID, but also, that Protestants have provided ample evidence demonstrating significant lethality will affect some populations of

[19] AP-LT-1-R p. 49, ln. 24-26.

organisms that move through the ZID. OPIC notes that all parties presented a vast amount of evidence pertaining to Issue No. 1, but for the sake of clarity, OPIC will focus on two sub-issues it found to be particularly compelling: a) duration of exposure vs. abruptness of salinity change and; b) selection of test species.

a. Abrupt changes of salinity within the ZID

All of Protestants' experts who offered definitions regarding significant lethality relied on Dr. Nielsen's studies to some degree.[20] Of relevance to Issue No. 1 are Dr. Nielsen's LT50 studies, which demonstrated lethality at every timepoint evaluated, including the first timepoint (4 minutes for round 1 and 10 min for round 2).[21] Dr. Nielsen concludes that significant effects on the survival of larval red drum drifting through the ZID will begin sometime between 0 and 4 minutes, with 50% mortality between 47.7 and 55.4 minutes.[22]

The Port's predominant rebuttal to Nielsen's findings is that duration of exposure within the ZID is extremely short. For example, Mr. Palachek states in response to Protestants' experts that the exposure within the ZID and mixing zone will be on the order of minutes, not 24-hours or longer, and the levels predicted by the modeling show that concentrations at 50m will be less than 44 ppt, and larvae will pass through very quickly.[23] Mr. Palachek provides the example of an organism floating at an average velocity of 0.5 m/sec, stating that it would traverse 56 meters in less than 2 minutes.[24] Mr. Palachek further argues that failure to consider duration of exposure delegitimizes Dr. Stunz's reliance on Dr. Nielsen's findings, stating:

> "Repeatedly, Dr. Stunz does not consider the exposure duration of the ZID concentration. As noted many times in my statements, the exposure will only last for a few minutes and one of PAC's experts, Dr. Nielsen, has determined a 24-hour LC-50 of over 50 ppt. I do not understand how Dr. Stunz can claim seconds of

[20] PAC 46R, Pre-filed Testimony of Scott Holt, p. 4 ln. 20; PAC 52-R, Pre-filed Testimony of Greg Stunz, ln. 20.
[21] PAC 48R, Pre-filed Testimony of Kristin Nielsen, p. 14 ln. 5-9.
[22] PAC 48R, p. 14, ln. 5-9.
[23] PAC 48R, p. 14, ln. 5-9.
[24] AP-RP-1-R, Pre-filed Testimony of Randy Palachek, p. 12.

> exposure will result in widespread effects to population levels within a range that has been shown to not cause effects even for a 24-hour period."[25]

Protestants' response to the Port's duration argument rests on the claim that harm to organisms moving through the ZID results from the *abruptness* of the change in salinity, rather than simply the duration of the passage. Dr. Stunz explains the effects of abrupt salinity changes using a gunshot analogy:

> "…short-term exposure to stressors such as salinity may be comparable to a "gunshot wound" from which a victim dies hours or days (or even weeks) after the fact. Or may not even die, but effectively be removed from populations or greatly impaired. Exposure to high salinity may kill immediately; or it may not. An organism may die later or suffer an impairment preventing it from contributing to the population either through direct mortality or functional impairments causing eventual death."[26]

Dr. Stunz further testified that even small changes in salinity of just a few parts per thousand over ambient can constitute an abrupt change.[27] This is supported by both the GLO and TPWD studies, which both recommend no more than 2 ppt or 5% change in overall salinity.[28] Port expert Randy Palachek countered that his definition of "abrupt" consists of very short, sharp increases in salinity greater than 10-15 ppt, but offered no study or citation to support this estimate.[29] By contrast, Dr. Stunz offered citations to papers (e.g., Estudillo paper, Thomas paper) showing, for example, lethality at 2 ppt increase in salinity to grey snapper, a species relatively closely related to red drum.[30] Further testimony from Dr. Stunz clarified that abrupt salinity changes on either end of an organism's range of tolerance can be problematic, meaning abrupt increase or decrease in salinity can cause adverse effects to organisms passing through the

[25] AP-RP-1-R, p. 14, ln. 28-31; p. 15, ln. 1-4.
[26] PAC-52R, p. 10, ln. 12-17.
[27] HOM, p. 1069, ln. 2-25.
[28] HOM, p. 482, ln. 22-25.
[29] HOM, p. 876, ln. 3-7.
[30] HOM, p. 1115, ln. 21-25.

ZID, thus causing effects on an overall population.[31]

When asked whether there will be an increase over ambient in salinity that is encountered in the ZID, Port expert Randy Palachek acknowledged that, yes, salinity over ambient would increase.[32] Mr. Palachek further agreed that a potential increase of 4.11 ppt within the ZID is "probably accurate."[33] Given the evidence showing an increase in salinity over ambient will occur, combined with evidence demonstrating an abrupt increase in salinity can have a consequential effect on populations of salinity-sensitive species such as red drum whose larvae will float through the ZID, OPIC cannot find that the Port has met its burden to show that there will be no significant lethality to organisms that traverse the ZID.

b. Selection of test species

Dr. Nielsen's studies are distinct from testing provided by the Port for several reasons, but OPIC finds one of the most significant divergences to be the selection of test species. Dr. Nielsen chose to test red drum larvae, which all parties agree is a species found within the relevant channel, and a species whose larvae will encounter the ZID. The Port elected to test on inland silverside and mysid shrimp, which it notes are both EPA-approved species for WET testing.[34] Ultimately, OPIC finds that weight of the evidence demonstrates that the Port's testing does not provide adequate assurance that significant lethality will not occur to organisms within the ZID.

Protestants, through their experts, offer ample evidence demonstrating that testing on red drum larvae offers credible and useful information for the purposes of evaluating the potential for significant lethality and adverse impacts because of the proposed discharge. Dr. Nielsen

[31] HOM, p. 1207.
[32] HOM, p. 877, ln. 14-18.
[33] HOM, p. 877-878.
[34] HOM, p. 736, ln. 12-15.

refers to early life stage red drum as the "gold standard of study organisms" when evaluating potential damage to local estuarine ecosystems from human-caused environmental change in the Gulf of Mexico.[35] She states that since red drum drift through the Ship Channel during this incredibly sensitive stage, they are expected to be an important driver of risk.[36] Moreover, due to their long lifespan, the impacts to red drum of below average survival and recruitment can persist for multiple decades.[37] In addition, Dr. Nielsen points out that unlike mysid shrimp and inland silverside, red drum larvae are an estuarine-dependent species that spawn in nearshore waters, and thus red drum larvae experience gradual changes in salinity across a relatively narrow range during their earliest developmental stages.[38] This gradual change in early stages results in low salinity tolerance in the days following hatch.[39] By contrast, both inland silverside and mysid shrimp have remarkably high ability to cope with extreme salinity fluctuations from day one of development.[40] Inland silverside lay eggs that stick to the seagrass, and evidence shows that they are ubiquitous across the bay or estuary, meaning they are not estuarine dependent like the red drum.[41] Further, due to their known resilience, both mysid shrimp and inland silverside are easy to grow in a lab setting.[42] Red drum, on the other hand, are more difficult to test on specifically because of their known sensitivities at early life stages.[43] As such, OPIC finds that testing on a salinity-sensitive species such as early-stage red drum larvae provides crucial information with respect to whether organisms who traverse the ZID will experience significant lethality.

The Port relies on the fact that Dr. Nielsen's lab is unaccredited to support its claim that

[35] PAC 48R, p. 16, ln. 1-3.
[36] PAC 48R, p. 16, ln. 12-16.
[37] PAC 48R, p. 17, ln. 14-15.
[38] PAC 48R, p. 20, ln. 5-12.
[39] PAC 48R, p. 20, ln. 6-9.
[40] PAC 48R, p. 19, ln. 10-13.
[41] HOM, p. 1199, ln. 1-20.
[42] HOM, p. 1199, ln. 15-20.
[43] HOM, p. 1199, ln. 1-20.

Dr. Nielsen's studies should not be considered, and that the testing provided by the Port is sufficient to demonstrate no significant lethality within the ZID. 30 Tex. Admin. Code § 25.1 provides that the Commission may accept environmental testing laboratory data and analyses for use in Commission decisions regarding permits only if the data and analyses are prepared by an environmental testing laboratory accredited by the Commission. "Environmental testing laboratory" is defined as a scientific laboratory that performs analyses to determine the chemical, molecular, or pathogenic components of environmental media for regulatory compliance.[44] Protestants contend, and OPIC agrees, that Dr. Nielsen's lab is not an environmental testing laboratory and is thus not subject to accreditation requirements set forth in 30 Tex. Admin. Code, Chapter 25. Dr. Nielsen's tests did not seek to determine what the salinity was, rather, Dr. Nielsen's tests sought to determine the effects of salinity on her test subjects. Port expert, Dr. Kirk Dean's testimony disputes this contention, and instead argues that determining the effects of an environmental media is the same as determining the component of the media.[45] OPIC concludes that the Port's interpretation of 30 Tex. Admin. Code § 25.2(6) runs afoul of the plain language of the rule which clearly seeks to regulate laboratories analyzing components of environmental media rather than toxicity on selected organisms.

Further, ample evidence in the record supports the notion that Dr. Nielsen's studies are reliable and provide useful information for the evaluation of this permit. Dr. Nielsen's laboratory is an academic laboratory, not a commercial laboratory, so her findings are substantiated by the peer review process.[46] Her testimony revealed that her lab has sufficient quality assurance plans and standard operating procedures to ensure reliable results, her prior work has been published in

[44] 30 Tex. Admin. Code § 25.2(6).
[45] HOM, p. 686, ln. 12-19.
[46] HOM, p. 2077, ln. 16-20.

Q1 journals, and her studies relevant to this matter were sent to a non-conflicted EPA statistician for review and analysis.[47] Further, Peter Shaefer, a witness for the Executive Director, testified that the ED relied on Dr. Nielsen's studies when conducting its antidegradation review, which further bolsters the claim that the Nielsen studies are useful and dependable, and able to be considered by TCEQ.

Upon evaluation of the evidence, OPIC finds the Port has failed to meet its burden to show that significant lethality will not occur to organisms that move through the ZID. Not only has the Port failed to offer a usable definition of significant lethality, but it has also failed to adequately address concerns surrounding abrupt changes in salinity, and deficiencies surrounding its selected test species. Conversely, OPIC finds that testing on early-stage red drum larvae provides valuable information regarding the potential for significant lethality to organisms who move through the ZID. OPIC agrees with Protestants that the known salinity tolerance and resilience of inland silverside and mysid shrimp render these species inappropriate subjects for tests in this particular permitting matter. OPIC further concludes that the reliability of the testing performed in Dr. Nielsen's lab is safeguarded by sufficient quality assurance measures, and that her laboratory is not subject to 30 Tex. Admin. Code, Chapter 25 because it is not an "environmental testing laboratory" as defined by statute.

A. Whether the proposed discharge will adversely impact the marine environment, aquatic life, and wildlife, including birds and endangered or threatened species, spawning eggs, or larval migration.

OPIC first notes that, having found that significant lethality will occur to organisms who traverse the ZID, OPIC has also determined that there will be adverse impact to aquatic life. Still, OPIC has focused on two additional topics of importance with respect to adverse impacts. Upon

[47] HOM, p. 645, ln. 1-23.

review of evidence, OPIC has determined that the Port has not met its burden to show that the discharge will not result in adverse impacts to aquatic life, wildlife, spawning eggs, or larval migration because it has not sufficiently addressed concerns regarding multiple stressors and latent mortality, and harm to benthic organisms.

i. Multiple Stressors and latent mortality

Protestants' expert Dr. Greg Stunz asserts that a major shortcoming of WET testing in this context is its failure to consider the multitude of challenges an organism faces in the wild, in addition to an abrupt change in salinity.[48] Explaining the effects of multiple stressors, Dr. Stunz states that in an otherwise perfect environment, increases in salinity alone might have little or no effect. However, when you couple an increase in salinity with one, or multiple, ecological stressors (predatory avoidance, procuring food, competitors, low dissolved oxygen) the animals often die.[49] Dr. Stunz emphasizes that WET testing's failure to consider mortality in an ecological context has been a major vocal criticism in the field for many years.[50] Thus, says Dr. Stunz, increases in salinity could be the proverbial "straw that broke the larvae's back" when combined with a multitude of other biological stressors.[51] This concern is echoed by other Protestant experts, such as Dr. Nielsen, who testified using an example about the fragility of larvae who become weak from dehydration caused by increased salinity, and thus more susceptible to death from things like mechanical stressors or predators.[52] Similarly, multiple stressors can contribute to latent mortality, or the notion that an organism may not die directly after exposure, but subsequently experience an effect of exposure that results in eventual death.

[48] PAC-52R, p. 10-11.
[49] PAC-52R, p. 10-11.
[50] PAC-52R, p. 21, ln. 5-6.
[51] PAC-52R, p. 21, ln. 9-11.
[52] HOM, p. 2168, ln. 9-25.

For example, Dr. Stunz testified to growth rates of fish in the context of latent mortality, stating:

> So marine fish and marine organisms have phenomenal growth rates because they want to get out of those predation windows. So anything that might affect growth or the ability to procure food could be an effect of latent mortality. We see that a lot in poor nursery quality habitats, you have stunted growth and high mortality.[53]

ED witness Peter Shafer's testimony contradicts Protestants' position as it states that WET testing requirements as prescribed by the draft permit address concerns about multiple stressors and sublethal effects.[54] That said, OPIC can find no provision in the draft permit that contemplates a multiple stressor scenario as described by Protestants' witnesses. For instance, WET testing, as required in the draft permit, does not measure potential adverse effects of salinity stressed organisms being more susceptible to predation. Further, Mr. Shaefer's testimony states that the ED did not consider whether an organism will be subjected to mechanical forces, such as the jet stream from a diffuser, when conducting its antidegradation review because such forces would not have an impact on the aquatic organism population.[55] Port expert, Mr. Palachek, similarly discounted mechanical turbulence concerns in his rebuttal testimony.[56] When posed the question: "Dr. Stunz refers to multi-stressors that could play a role in causing impacts to the early life stages. Do you agree with this statement?" Mr. Palachek responded in relevant part, "No, I do not agree with the idea that the diffuser being used at the Harbor Island facility and the 8.2 m/sec would cause any harm to larval species…" Mr. Palachek's testimony mischaracterizes Dr. Stunz's concern, as his response suggests that he is not worried about diffuser turbulence in a vacuum. Dr. Stunz's apprehension about multiple stressors is a concern about simultaneous stresses, such as an organism's ability to withstand increased turbulence

[53] HOM, p. 1196, ln. 3-9.
[54] ED-PS-1, p. 19, ln. 21-25.
[55] ED-PS-1, p. 19, ln. 13-19.
[56] AP-RP-1-R, p. 20, ln. 11-29.

while already being salinity stressed.

OPIC shares Protestants' concern regarding the potential adverse impacts to aquatic organisms resulting from multiple stressors and latent mortality. The fact that WET testing cannot account for potential impacts resulting from multiple stressors suggests that information gathered from such testing should be a conservative estimate of potential harms resulting from the discharge. Further, the Port's failure to adequately consider multiple stressors, such as effects on growth, or combined factors such as diffuser turbulence alongside increased salinity when determining whether there will be adverse impacts to organisms in the Channel leads OPIC to conclude that the Port has not carried its burden with respect to Issue A.

ii. Adverse Impact to Benthic Organisms

Issue A asks us to consider potential adverse impacts to a vast array of organisms who reside in, traverse through, or rely on the Corpus Christi Ship Channel. Included for consideration are benthic organisms, or organisms who live along the channel floor. Port expert, Dr. Lance Fontenot, testified that he is not worried about adverse effects to benthic organisms because the Corpus Christi Ship Channel is dredged, meaning it already represents a less than suitable habitat for these organisms, resulting in what he refers to a "disturbed benthic community."[57] Dr. Fontenot further testified that even benthic organisms who do reside within the Channel will not be adversely affected by higher salinity because effluent will be rapidly dispersed along the lower water column of the channel.[58] Also, Dr. Fontenot reports that the estimated salinity concentrations fall within the reported salinity tolerance of several benthic community species, including polychaetes that live within the bottom sediments.[59]

[57] AP-LF-1-R, p. 77, ln. 5-11.
[58] AP-LF-1-R p. 29, ln. 17-22.
[59] AP-LF-1-R p. 29, ln. 17-22.

Protestants' expert, Dr. Stunz, countered the notion that the Channel represents a "disturbed benthic community" when he testified about the feeding habits of birds in the area. Dr. Stunz states:

> Whooping cranes are obviously feeding on blue crabs and other things, but the other ones are feeding on other benthic infauna, and the reason they're in those tidal flats and those big areas is because of the -- the marine life that's living in the sediment, therefore, if they're feeding in those areas, by definition, it's functioning at some level in the ecosystem.[60]

Protestant witness, Dr. Scott Socolofsky, also offered compelling testimony with respect to adverse effects to benthic organisms resulting from an accumulation of concentrated brine.[61] Dr. Socolofsky referenced the 90-foot hole near the proposed discharge, and stated that the continuously running diffuser was akin to a constantly running bathtub.[62] Essentially, the brine is never fully removed because the continuous flow of the diffuser replaces any brine overflowing the edges of the hole.[63] Protestants' expert, Dr. Larry Mckinney also raised concerns about benthic organisms who dwell in the hole, stating, "the eddy-derived depression near the outfall is likely to concentrate brine, increase the areas where there is little to no dissolved oxygen, and prove fatal to any organisms trapped there.[64] CORMIX modeling shows that a diluted plume will hit the floor of the channel.[65] Protestants' witness, Dr. Andrew Esbaugh, echoed concerns about benthic organisms stating that fluctuations in oxygen levels, when considered alongside a non-mixing plume, could result in a hypoxic if not anoxic zone for benthic organisms and plants who encounter the diluted plume.[66]

OPIC concurs with Protestants regarding concerns for adverse impacts to benthic

[60] HOM, p. 1256, ln. 1-16.
[61] HOM, p. 1659 ln. 8-24.
[62] HOM, p. 1659, ln. 8-24.
[63] HOM, p. 1659, ln. 8-24.
[64] PAC-47R p. 12, ln. 3-7.
[65] HOM, p. 404, ln. 19-24.
[66] HOM, p. 1997-98.

organisms. Because the Port has failed to alleviate such concerns, it has not met its burden to show that there will be no adverse impacts to aquatic organisms as prescribed by Issue A.

C. Whether the proposed discharge will adversely impact recreational activities, commercial fishing, or fisheries in Corpus Christi Bay and ship channel.

No party disputes the recreational and economic importance of the Corpus Christi Bay and the Channel. Similarly, parties agree that red drum is a flagship species in the area, beloved by local residents and tourists alike. Likewise, areas surrounding the Channel are favored by birdwatchers, as estuaries and shorelines are frequented by a variety of avian inhabitants, including the endangered Whooping Crane and Piping Plover.[67] Given the robust commercial and recreational significance of the region, it stands to reason that any adverse impacts to aquatic or avian inhabitants would negatively impact those activities. Because OPIC finds that aquatic species such as red drum, blue crab, and benthic organisms will be adversely affected by the proposed discharge, OPIC concludes that recreational activities dependent upon healthy populations of such species will also be negatively impacted. As such, OPIC finds that the Port has failed to meet its burden with respect to Issue C.

Fishing

Protestant expert, Dr. Andrew Esbaugh, testified that red drum is a "hallmark" of the Port Aransas area.[68] Dr. Esbaugh continued, stating, "You drive into Port Aransas or even in North Padre, people have red drum on their cars and mailboxes. People buy houses to come down here and go fishing…".[69] The economic and recreational importance of red drum was echoed by other Protestant experts, such as Dr. Larry McKinney, who testified about the unique habitat that makes up the Redfish Bay State Scientific Area, and its central significance to recreational

[67] HOM, p. 1252, ln. 19-24.
[68] HOM, p. 1986, ln. 23.
[69] HOM, p. 1986, ln. 20-25; 1987, ln. 1-2.

fishing and sportfishing economies in the Coastal Bend.[70] Port expert, Randy Palachek, asserted that the proposed discharge would not affect red drum larvae because 95% of all the larvae and organisms that pass through the Channel will not see any increase salinity from the proposed discharge (i.e., will not be exposed at all).[71] This safe route free of plume exposure has been has been dubbed the "zone of passage" by Port experts.[72] Mr. Palachek further testified regarding the fecundity of red drum, or the idea that each fish has the ability to produce roughly 1.5 million eggs several times per year.[73] Dr. McKinney, for Protestants, counters the notion that millions of larvae will avoid the plume altogether by reiterating that red drum larvae are planktonic, meaning they drift or float with the current rather than swim.[74] According to Dr. McKinney, this means that millions of larvae will be unable to avoid the saline plume, despite the fact that it does not take up the entirety of the Aransas Inlet.[75] Further, testimony revealed that Texas Parks and Wildlife has been re-stocking red drum and other species along the Texas coast for decades.[76] When asked why TPWD would engage in stocking millions of red drum at the cost of millions per year if the species was so prolific in nature, Mr. Palachek stated, "Because they're very desired as a fish species, and they can get overfished for the populations that can be provided by nature."[77] Given the fact that the Port has failed to show that planktonic red drum larvae will safely avoid the saline plume, coupled with the notion that this species is already in need of assistance from Texas Parks and Wildlife to sustain its population, OPIC finds that the Port has not met its burden to show that fishing will not be impacted by the proposed discharge.

[70] PAC-47R p. 15, ln. 5-19.
[71] AP-RP-R, Pre-filed Rebuttal Testimony of Randy Palachek, p. 50, ln. 18-31.
[72] AP-RP-R p. 50.
[73] HOM, p. 924, ln. 22-25.
[74] PAC-47R p. 16, ln. 7-17.
[75] PAC-47R p. 16.
[76] HOM, p. 924, ln. 3-16.
[77] HOM, p. 925, ln. 14-16.

Bird Watching

Outside of fishing, expert testimony revealed a rich avian community enjoyed by birdwatchers in the areas surrounding the Corpus Christi Ship Channel. Dr. McKinney described himself as an amateur bird watcher who makes regular trips to areas near the Channel to enjoy the endangered Whooping Cranes who feed there.[78] Similarly, testimony revealed that the endangered Piping Plover, a shoreline bird, inhabits the area.[79] As previously discussed, birds in the area are known to feed on benthic organisms who inhabit the mud along the bottom of the water line, as well as blue crabs found in the region.[80] Many Protestant experts expressed concerns about "cascading effects" that would impact local birds if their food source was depleted.[81] Protestants' expert, Scott Holt, stated, "If there is a substantial adverse effect on something in the water column, there are many things in this region that are all interconnected and, you know, you can easily imagine that cascading to nonaquatic organisms as well."[82] Because OPIC has already established that benthic organisms and certain fishes will be adversely impacted by the proposed discharge, OPIC also finds it is reasonable to conclude that the discharge will result in a cascading effect that negatively impacts birds in the area.

Upon review of the evidence, OPIC concurs with Protestants' concerns regarding impacts to commercial and recreational fishing of red drum, a flagship species in the area, as well as negative impacts to recreational birdwatchers who visit the region to enjoy fragile species such as Whooping Cranes and Piping Plovers. Accordingly, OPIC finds that the Port has not met its burden with respect to Issue C.

[78] HOM, p. 1437, ln. 12-20.
[79] HOM, p. 1460, ln. 15-16.
[80] HOM, p. 1256, ln. 1-16.
[81] HOM, p. 1417, ln. 1-9.
[82] HOM, p. 1417, ln. 1-9.

D. Whether the Application, and representations contained therein, are complete and accurate.

The application appears to contain numerous inaccuracies which may have ultimately affected the underlying credibility of the draft permit as discussed below. For that reason, OPIC concludes that the Port has failed to carry its burden with respect to presenting a complete and accurate application.

Preliminarily, OPIC notes he ED's testimony clarifying that it is the Applicant's responsibility to submit correct information in its application and to promptly notify TCEQ of any incorrect information the application contains.[83] Despite this requirement, the Protestants demonstrated that the Port's application contains incomplete or inaccurate information that has not been corrected by the Port.

Location of the Discharge

The Port admitted that it has not determined that exact location of the discharge at this time, stating that "the diffuser design memorandum does not specify an exact latitude or longitude for the diffuser barrel and ports as these will be determined for the final design."[84] However, the ED has stated that the Applicant is required to provide the latitude and longitude coordinates of the discharge location with a specificity of six decimal points.[85]

It is clear that the Applicant's description of the discharge location as provided in its application cannot be relied on to ascertain the precise location of the discharge. While the exact consequence of this deficiency cannot be known until the Port precisely identifies the discharge location, it may have consequential effects on the Cormix modeling results that the ED and the Port have relied on to demonstrate that the discharge will not cause adverse impacts. Further, and

[83] HOM, p. 2219, ln. 17-19; p. 2221, ln 9-14.
[84] APP-LT-1-R, Pre-filed Rebuttal Testimony of Lial Tischler, p. 2, ln. 4-5.
[85] HOM, p. 2226, ln. 2-18.

perhaps more importantly, in light of the complex bathymetry of the Corpus Christi Ship Channel, movement of the discharge location could affect how the effluent actually interacts with the Channel once any discharge commences. Additionally, Port witness Dr. Fontenot testified during cross examination that if the diffuser were to be moved 60 meters, he would want a chance to rethink his ultimate opinions regarding environmental impacts that may result from the discharge.[86] After considering the above, OPIC takes the position that because the latitude and longitude of the discharge location are required to be identified in the application, the application is deficient without this information.

Facility Classification as Major or Minor

TCEQ classified the Facility as a minor facility and consequently did not send the application and draft permit to the Environmental Protection Agency (EPA) for review. However, the EPA has lodged an interim objection to the draft permit and has taken the position that the Facility should be classified as a major facility.[87] The EPA has explained that if TCEQ were to issue this permit without responding to the EPA's interim objection, then the permit will not be a validly issued NPDES (National Pollutant Discharge Elimination System) permit.[88]

Shannon Gibson for the ED explained that to determine if a particular facility is major or minor, TCEQ completes the EPA's major/minor rating worksheet.[89] TCEQ then transmits its recommendation to the EPA for review and approval following permit issuance.[90] She further testified that she completed a major/minor worksheet for the Port's original application, but did not complete a new worksheet for the amended draft permit.[91] The results of the major/minor

[86] HOM, p. 447, ln. 18-25; AP-LF-1R, Pre-filed Testimony of Lance Fontenot, p. 7, ln. 1-2.
[87] HOM, p. 2245, ln. 6-11.
[88] HOM, p. 2234, ln. 11-21.
[89] HOM, p. 2245, ln. 23-25.
[90] HOM, p. 2246, ln. 18-20.
[91] HOM, p. 2233, ln. 4-11.

worksheet indicated that the facility qualifies as a minor facility.[92] However, the EPA did not find that TCEQ's response to its interim objection was sufficient and has taken the position that TCEQ's determination of the Facility's status as minor is incorrect because the Facility will discharge process wastewater.[93] Until this conflict has been resolved, there is too great a risk in issuing a permit that may not be viewed as valid by the EPA.

Chemicals Used in the Desalination Process

The Port proposes use of several chemicals in its desalination process. Examples of these chemicals include flocculants, coagulants, and chlorine. However, these chemicals have not been specifically identified in the Port's application.[94] Instead, the process design basis provides general descriptions of some, but not all, of the chemicals that will be used by the Port.[95] As an example, an antiscalant compound is expected to be used, but is not included in the process flow diagram that was submitted as part of the Port's application.[96]

While Alex Wesner testified for the Port that he expects the majority of the coagulants and flocculants to be removed from the residual process design flow, he was unable to more precisely quantify what he meant by majority.[97] Mr. Wesner testified that "some constituents cross the RO membrane and integrate with the product water."[98] However, the remaining chemicals are then concentrated in the effluent discharge as determined by the concentration factor applicable to the discharge.[99] Mr. Wesner also agreed that any antiscalant added during the process would be discharged as part of the effluent.[100]

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[92] HOM, p. 2252, ln. 4-6.
[93] HOM, p. 2233, ln. 21-23; HOM, p. 2252, ln. 4-6.
[94] HOM, p. 191, ln. 5-8.
[95] APP-AW-1-R, Pre-filed Testimony of Alex Wesner, p. 4, ln. 25-28; p. 5, ln. 4-7.
[96] APP-AW-1-R, p. 5, ln. 4-5.
[97]APP-AW-1-R, p. 5, ln. 14-16; HOM, p. 175, ln. 10-19.
[98] APP-AW-1-R, p. 8, ln. 4-5.
[99] APP-AW-1-R, p. 8, ln. 5-11.
[100] HOM, p. 174, ln. 10-17.

To ensure that the chemicals do not cause adverse impacts to the Channel or the organisms found within it, Mr. Wesner opines that the chemicals will be pre-approved by TCEQ.[101] However, Mr. Wesner also admitted that he is not an expert in the TCEQ application process.[102] Mr. Wesner further agreed that a desalination facility in California (the Carlsbad Facility) identified the chemicals it intended to use in its application.[103] Finally, Mr. Wesner seems to rely on the fact that, in his view, the Facility will be operated in accordance with best engineering practices, which in his view equate to common sense practices, to ensure the added chemicals are protective. He stated that these best practices will be determined by whichever engineer designs the Facility.[104]

OPIC is unable to find that the Port has demonstrated the chemicals it intends to use in its operations have been adequately identified in a way that allows TCEQ to review their use and determine they will be not cause adverse impacts. Thus, OPIC recommends that the Port be required to provide this information to TCEQ as part of the application process and before a draft permit is issued, if issued at all.

G. Whether the modeling complies with applicable regulations to ensure the Draft Permit is protective of water quality, including utilizing accurate inputs.

At the outset, OPIC recognizes that there are many disagreements between the Protestants and other parties in this matter regarding the sufficiency and accuracy of the modeling conducted in connection with this permit application. As discussed below, after examination of the record regarding the most contested modeling issues, OPIC finds that while

[101] APP-AW-1-R, p. 12, ln. 28-30.
[102] HOM, p. 178, ln. 1-3.
[103] HOM, p. 187, ln. 20 – p. 188, ln. 6.
[104] HOM, p. 191, ln. 18 – p. 192, ln. 6.

the Port has successfully rebutted a few of Protestants' contentions, it ultimately has not carried its burden with respect to Issue G.

Bathymetry of the Corpus Christi Ship Channel

All parties agree that the Channel has numerous complex bathymetric features, including a large depression at the site of the discharge location. The parties' disagreement is centered on the effect of those features on the modeling of the discharge's interaction with the Channel, and ultimately, the dilution of the discharge. For the Port, Dr. Craig Jones testified that while Cormix cannot simulate bathymetric variations, these variations do not have a big effect on the way the discharge performs.[105] However, Protestants' witness Tim Osting opined that bathymetric features, including underwater humps associated with a nearby cove that extend into the Channel, will decrease mixing, but cannot be simulated by Cormix.[106] Mr. Osting does not believe that TCEQ's Cormix modeling properly took these features into account.[107] Additionally, Dr. Socolofsky testified that there is a sign near the diffuser and nearby cove to notify people of the danger of submerged structures at that location.[108]

Because Cormix is unable to simulate these conditions, these bathymetric features do not appear to have been considered by the Port or TCEQ when evaluating the Cormix modeling results. OPIC finds that while Cormix does provide useful information, these features should have been considered in some independent fashion to ensure that the modeling does not under-predict the mixing of the effluent with the ambient water. This is especially important given that

[105] HOM, p. 304, ln. 12-21; p. 305, ln. 1-5.
[106] HOM, p. 1650, ln. 15 – p. 1651, ln. 3.
[107] HOM, p. 1651, ln. 8-13.
[108] HOM, p. 1667, ln. 19-23.

the draft permit does not require testing of the waterbody at the ZID boundary to verify that the Port complies with the effluent percentage limit of the draft permit.[109]

Existence of an Eddy

Closely related to the complex bathymetry of the Channel, is the possible existence of an eddy, which similarly cannot be modeled using the Cormix software, and could conceivably affect the actual mixing of the effluent with the ambient water in a way that Cormix is incapable of predicting.

For the ED, Katie Cunningham testified that Cormix cannot simulate the presence of an eddy.[110] For the Port, Dr. Craig Jones agreed that Cormix cannot simulate an eddy.[111] However, Dr. Jones also testified that he saw no evidence of the existence of a large, persistent eddy that would alter Cormix modeling.[112]

Mr. Kirk Dean gathered current velocity data for the Port. To do so, he employed ADCP devices (one of which was boat mounted) and performed 66 different runs of the Channel, called transects. At the northern end of transect 1, which is the transect that was closest to the proposed diffuser location, there are a number of currents which flow in different directions, with velocity vectors that appear to point in almost opposite directions from the bulk of the transect.[113] Mr. Dean explains that these vectors may be related to the boat's movement as it slowed down and turned around.[114] He states that the data gathered near the end of a transect is unreliable.[115] However, the ADCP device did not report that this data was unreliable.[116] Finally, Mr. Dean

[109] HOM, p. 2230, ln. 14-18.
[110] HOM, p. 2324, ln. 9-10.
[111] HOM, p. 280, ln. 21 – p. 281, ln. 2.
[112] HOM, p. 319, ln. 21-25; p. 320, ln. 1-4.
[113] *See* Ex. PAC-44R BA-6.
[114] HOM, p. 630, ln. 18 – p. 631, ln. 5.
[115] HOM, p. 633, ln. 2-6.
[116] HOM, p. 635, ln. 4-14.

stated that he wished he had continued the transect farther north, which would have resulted in more accurate data near the diffuser.[117]

Mr. Dean also opined that if an eddy were to exist, it would have been captured in the ADCP data. He recognized, however, that if an eddy did not lie on one of the transects, it could have been missed by his data collection effort.[118] Dr. Jordan Furnans for the Port offered a similar opinion, observing that the ADCP data does not show evidence of an eddy, however, he also testified that if an eddy were to occur in between the transects (which are approximately 200 feet apart), or if it were to occur on an intermittent basis, there is a chance it would not be captured in the ADCP data.[119] Mr. Palachek testified for the Port that he had not used the scientific method to determine what caused the large depression near the diffuser, and thus could not rule out the theory that it was created by an eddy.[120]

On the Protestants' side, Dr. Barney Austin testified that the ADCP data and 1956 aerial photograph included as one of his exhibits evidence an eddy.[121] Dr. Austin did concede that he is not in possession of any other photographs which show an eddy.[122] However, he also stated that when he worked for the Texas Water Development Board, it was common knowledge that an eddy exists near the proposed discharge location.[123]

Regarding the ADCP data, Dr. Austin disagreed with Mr. Dean that the circular movement shown in the data resulted from the boat slowing down and turning.[124] Dr. Austin further stated that, the circular movement was seen throughout the entire water column and this

[117] HOM, p. 705, ln. 14 – p. 706, ln. 1.
[118] HOM, p. 709, ln. 4 – p. 710, ln. 9.
[119] HOM, p. 808, ln. 23 – p. 809 ln. 1; HOM, p. 810, ln. 6-18.
[120] HOM, p. 848, ln. 10-12.
[121] HOM, p. 1523, ln. 12-23, p. 1537, ln. 16-18; Ex. PAC-44R BA-11.
[122] HOM, p. 1524, ln. 17-20.
[123] HOM, p. 1526, ln. 6-12.
[124] HOM, p. 1541, ln. 4-16.

is consistent with his expectation that an eddy would cause movement in the entire water column.[125] Dr. Austin did agree with the Port's experts that an eddy located between the transects could be missed by ADCP collection effort.[126] He ultimately concluded that a smaller, intermittent eddy forms under certain flow conditions.[127]

Finally, OPIC notes that all ADCP data was collected over a four-day period, and therefore, necessarily results in more of a snapshot of the conditions in the Channel instead of a true reflection of its conditions at all times of the year.[128]

OPIC is concerned that an intermittent eddy of some size is likely to occur near the proposed location of the discharge, and if it does in fact exist, is likely to affect mixing of the effluent in a way that Cormix is not capable of simulating. The Port's own ADCP data appears to be reliable and to support the existence of an eddy, at least under some flow conditions. Given this concern, the presence of an eddy cannot be ruled out, and its likely existence calls into question the accuracy and reliability of the Cormix modeling results.

Distance of the Discharge to the Shore

All parties agree that the distance from the discharge location to the shore (also referred to as a "bank"), termed the distance to shore, is a required input in the Cormix modeling software.[129] The Cormix model essentially visualizes a waterbody as a rectangular prism, within which the discharge mixes with ambient water, and then mixing results are extrapolated from that model. The bank effectively creates a vertical wall wherever it is placed.[130] Here, the Channel's bank at the location of the proposed discharge has a slope of approximately 23-

[125] HOM, p. 1542, ln. 11-17, p. 1543, ln. 4-5.
[126] HOM, p. 1550, ln. 17-24.
[127] HOM, p. 1553, ln. 3-7.
[128] HOM, p. 704, ln. 4-25.
[129] HOM, p. 1660, ln. 24 – p. 1661, ln. 3; p. 2295, ln 8-20; p. 237, ln. 4-14.
[130] HOM, p. 204, ln. 3-11.

degrees, there is a large depression near the discharge site, and other bathymetric features exist in the area.[131] Because Cormix is unable to simulate these precise conditions, some amount of schematization of the model is required.[132] The crux of the disagreement among the parties centers on how the term "distance to shore" should be interpreted and what its value should be in the Cormix model.

For the Protestants, Dr. Socolofosky performed several modeling runs using varying distances to the shore, including distances of 0, 3, 5, 15, and 30 meters. The Port and TCEQ used a distance to shore of 229 feet (approximately 70 meters) in their modeling.[133] The Port has taken the position that placing the wall three meters away does not conform to reality and denies Cormix a lot of ambient water volume for mixing of the effluent.[134] However, the Port also concedes that the bank's 23-degree slope does reduce the volume of water available for mixing when compared to open water.[135]

Dr. Socolofsky responded to the Port's criticisms by explaining that when doing his modeling runs, he was performing a sensitivity analysis, and that one must look at the range of results of his analysis, instead of considering a single result in isolation.[136] He stated that Cormix is incapable of accurately simulating the bathymetry of the channel, due in part to the cove near the discharge site.[137] Dr. Socolofosky further testified that Cormix does not recommend putting a wall where the shore meets the top of the water because that would over-estimate the amount of water available for mixing. Therefore, he opined that the ED and the Port's placement of the

[131] HOM, p. 309, ln. 7-10; p. 1681, ln. 1-6.
[132] HOM, p. 2295, ln. 3-12.
[133] HOM, p. 2299, ln. 2-5; APP-LT-1-R Rebuttal, p. 10, ln. 11-17.
[134] HOM, p. 312, ln. 2-7; p. 314, ln. 12-20; HOM, p. 879, ln. 9-21.
[135] HOM, p. 879, ln. 9-21
[136] HOM, p. 1661, ln. 23 – p. 1662, ln. 5.
[137] HOM, p. 1664, ln. 2 – p. 1665, ln. 7.

bank at 200 ft was not reasonable.[138] He also noted that Cormix recommends performing sensitivity runs.[139]

For the ED, Katie Cunningham testified that she used 229 feet as the distance to shore value, which places a wall where the surface water meets the shore.[140] She stated that, with respect to Dr. Socolofsky's modeling, placing a wall zero meters from the diffuser doesn't match reality.[141] However, she also acknowledged that placing a wall 229 feet from the diffuser likewise doesn't match reality.[142] Additionally, Ms. Cunningham agreed that Cormix has a range of error of fifty percent.[143]

Finally, the Cormix user's manual contains a graphic labeled Figure 4.4 which shows that the proper placement for the nearest bank, and thus the proper distance to shore value, is where the bank and diffuser intersect, which according to the graphic may be underwater, and not where the bank meets the surface water level.[144] This demonstrates that the 229-foot distance used by the Port and the ED does not conform to the guidelines contained in the user's manual. Additionally, even if one accepts the ED and the Port's interpretation that the surface water distance to the bank is the correct value to use, Dr. Jones for the Port agreed that the mean lower water line is 160 feet from the diffuser, which is substantially less than the 229 used by the Port and the ED, and at the very least, would be a more reasonable choice.[145]

While OPIC lacks the technical expertise to interpret Dr. Socolofsky's sensitivity runs and attempt to predict the likely level of salinity at specific points in the Channel, it is clear that

[138] HOM, p. 1773, ln 25 – p. 1774, ln. 5; HOM, p. 1662, ln. 19-23.
[139] HOM, p. 1776, ln. 22 – p. 1777, ln. 4.
[140] HOM, p. 2299, ln. 2-5.
[141] HOM, p. 2327, ln. 13-21.
[142] HOM, p. 2327, ln. 22 – p. 2327, ln. 4.
[143] HOM, p. 2304, ln. 15-21.
[144] Ex. ED-5 Remand, bates p. 0072 (internal pagination p. 44).
[145] HOM, p. 358, ln. 8-24.

the greater weight of the evidence demonstrates that the Port and the ED's 229 foot distance to shore value was not an accurate selection and it is not consistent with the Cormix manual's instructions. The distance to shore value may affect the modeling results and TCEQ must have the opportunity to critically evaluate the modeling results using accurate inputs, even if this requires consideration of a range of results as advocated for by the Protestants. Finally, given the Channel's challenging bathymetry and Cormix's fifty-percent range of error, it is crucial to utilize the most conservative model available to demonstrate that adverse impacts are not likely to occur.

Other Concerns Regarding Cormix

OPIC notes that the ED and the Port chose not to perform a Cormix modeling run using the brine option. For the ED, Ms. Cunningham agrees that the Cormix user's manual recommends running the brine option to get information relevant to the far-field.[146] Here, the far-field begins in the human health mixing zone and the aquatic life mixing zone, so its analysis is especially relevant to this proceeding.[147] OPIC has been unable to locate a cogent reason in the record for not performing a modeling run using the brine option, and thus recommends that the effect of the discharge be evaluated through additional modeling using the brine option.

Another concern raised by Protestants is that according to some of the latitude and longitude coordinates, the diffuser appears to be located underground.[148] However, Dr. Tischler for the Port explained that while the diffuser may sit on the Channel floor, it will feature ports on risers, which are located 4-6 feet above the diffuser.[149] Dr. Tischler further explained that the diffuser will be installed so as to make the ports discharge the effluent at a depth of 64 feet

[146] HOM, p. 2335, ln. 25 – p. 2336, ln. 6.
[147] HOM, p. 2336, ln. 10-15.
[148] HOM, p. 1566, ln. 24 – p. 1567, ln. 8.
[149] APP-LT-1-R, p. 2, ln. 29-31.

(below mean low tide), which has been accurately identified in his June 2021 memorandum.[150] OPIC finds that the Port has adequately addressed this concern as raised by the Protestants.

Suntans Modeling

The Port performed modeling using the Suntans program to explore whether the discharge would result in an increase in salinity throughout the entire Channel. This modeling used grid cells, which each are much larger than the areas associated with the discharge mixing zones, and transferred the salt mass to a new grid cell after it caused a salinity increase in the previous grid cell of one part per thousand.[151]

The Protestants have argued that Suntans should have been run at a higher grid resolution, however, Dr. Furnans testified that he was unsure whether this would provide any new useful information.[152] Additionally, Dr. Larry McKinney for the Protestants stated that the 2010 year used for its dataset was a wet year, and thus it was not representative of the amount of salt accumulation that could occur during a dry year.[153] However, Dr. Furnans explained that Suntans utilized 2010, a wet year, and 2011, a dry year, as its dataset.[154]

After considering the evidence, OPIC concludes that Suntans likely provides useful information regarding the total increase in salinity in the Channel, and demonstrates a likelihood that salt will not accumulate in the Channel. While Suntans could have been run at a higher resolution and could have included more years in its dataset, it appears to OPIC that the information it did provide is useful and there was no contention that it is inaccurate.

H. Whether the Executive Director's antidegradation review was accurate.

[150] APP-LT-1-R, p. 1, ln. 24 – p. 2, ln 2, ln 11-12, 22-24.
[151] APP-JF-1-R, Pre-filed Testimony of Jordan Furnans, p. 7, ln 30-31, p. 8, ln 3-9.
[152] HOM, p. 806, ln. 15-24.
[153] HOM, p. 1496, ln. 12-17.
[154] APP-JF-1-R, p. 5, ln. 6-8.

The ED performed an antidegradation review to ensure that the waterbody is not degraded and that attainable uses are maintained. Mr. Peter Schaefer performed the anti-degradation review for the ED, and while his analysis appears to have met baseline requirements, substantial questions remain regarding the accuracy of the review. For the reasons explained below, OPIC is unable to conclude that the Port has carried its burden of proving that the antidegradation review was accurate.

In performing his review, Mr. Shaefer employed a weight of the evidence approach to reach his conclusion that no degradation would occur.[155] He did this primarily because there are no specific numerical criteria for salinity, which complicates the antidegradation review process. Further confounding the review process is the fact that TCEQ has no real guidance on using a weight of the evidence approach.[156] Mr. Schaefer therefore, in his best judgment, based his review on the results of WET testing and the Suntans and Cormix modeling.[157] He also considered the ED's critical conditions memorandum, which utilized results from the Cormix modeling.[158] Mr. Schaefer, testified that if the Cormix results were shown to be inaccurate, he would want to re-evaluate his opinion regarding antidegradation.[159] He further stated that if the outfall location changed, and this had a consequential effect on Cormix, he would want to re-evaluate his determination that no degradation would occur.[160]

Mr. Schaefer testified that in performing his review, he concluded that red drum have an optimal salinity level between 20 and 35 parts per thousand, but did not know the specific salinity level required to support attainable dependent aquatic life uses.[161] Also, Mr. Schaefer

[155] HOM, p. 2358, ln. 16-24.
[156] HOM, p. 2359, ln. 13-20.
[157] HOM, p. 2385, ln. 3-4.
[158] HOM, p. 2385 ln. 23 – p. 2386, ln. 6.
[159] HOM, p. 2378, ln. 25 – p. 2379, ln. 3.
[160] HOM, p. 2383, ln. 3-14.
[161] HOM, p. 2368, ln. 19-25; p. 2368, ln. 10-15.

was unable to provide a specific definition of "de minimis" that he used in his review.[162] However, the applicable regulations require that the receiving waterbody not be degraded beyond a de minimis amount, except under certain circumstances, which are not relevant here. OPIC notes that the Port chose not to perform its own independent antidegradation analysis.[163] Finally, Mr. Schaefer stated that the antidegradation analysis can be revisited if new information is received.[164] However, if it is revisited after the permit is issued, the Port would be allowed to continue discharging effluent during that time.[165]

Given the specific issues identified with Cormix in the preceding section, which call into question the results of the model utilized by the Port and the ED, and the other identified deficiencies of the antidegradation review, the greater weight of the evidence does not support a conclusion that the ED's anti-degradation review is accurate. Therefore, OPIC finds that the Port has failed to carry its burden with respect to Issue H.

I. Whether the Draft Permit includes all appropriate and necessary requirements.

As discussed thus far, OPIC recommends denial of the permit. However, in the event a permit is issued, it would be more protective and better serve the public interest if the permit included the items discussed below.

Salinity Limit

The Protestants contend that if the permit is issued, it should include a salinity limit above which the Facility could not operate. For the ED, Ms. Gibson testified that there is no permit limit specifically for salinity.[166] Instead, the permit simply contains a percentage effluent

[162] HOM, p. 2384, ln. 9-11.
[163] HOM, p. 835, ln. 5-9.
[164] HOM, p. 2379, ln. 5-11.
[165] HOM, p. 2379, ln. 21-24.
[166] HOM, p. 2229, ln. 14-15.

limit at the zone of initial dilution. Also, for the ED, Mr. Schaefer testified that a salinity limit would make the permit more protective.[167] Finally, for the Port, Mr. Palachek testified that he would not want salinity to exceed 45 ppt in the Channel during spawning season. After consideration of the above, OPIC finds that the permit would be more protective if it contained an overall salinity limit.

Effluent Percentage Limits at the HHMZ and ALMZ

The Protestants demonstrated that the percentage of the effluent remaining at the Human Health Mixing Zone (HHMZ) and the Aquatic Life Mixing Zone (ALMZ) has increased from the original permit to the post-remand amended permit.[168] Protestant expert Mr. Bruce Wiland testified that there should be effluent limits at the HHMZ and ALMZ.[169] For the ED, Ms. Gibson confirmed that another TCEQ permit contains limits for all three mixing zones (the ZID, HHMZ, and ALMZ).[170] Additionally, Ms. Cunningham stated that TCEQ has recently begun to include limits for at boundaries of the HHMZ and ALMZ, and she would not oppose the addition of limits to the Port's permit.[171] Finally, Ms. Cunningham said that these limits would be just as enforceable as the currently included limit at the ZID boundary.[172]

If this permit is issued, OPIC also supports the addition of effluent percentage limits at the HHMZ and ALMZ's boundaries. There appears to be no defensible reason to not include these limits in the permit and they would provide additional, and importantly, enforceable levels of assurance that the discharge will not cause adverse impacts.

[167] HOM, p. 2381, ln. 12-16.
[168] *See* Ex. Kings-Steves-22R.
[169] HOM, p. 1629, ln. 18-24.
[170] HOM, p. 2219, ln. 12-15.
[171] HOM, p. 2319, ln. 12-24; p. 2286, ln. 12-19.
[172] HOM, p. 2322, ln. 4-7.

Chemicals Used in Desalination Process

The Port's permit as currently drafted does not contain any explicit requirements or limits for the chemicals the Facility will use as part of its desalination process. This is in many ways related to the absence of information in the Port's application regarding chemicals discussed earlier in this closing argument.[173]

By way of example, Port expert Mr. Wesner expects that chlorine (sodium hypochlorite) will be added during the desalination process, but the permit contains no specific limit for chlorine.[174] Additionally, the Port's application does not identify the specific coagulants and flocculants that will be used by the Facility.[175] Further, some of the chemicals expected to be used are not included in the application materials submitted by the Port, for example, an antiscalant compound is expected to be used, but was not included in the design basis as part of the application.[176] As a result, TCEQ does not currently have information regarding the exact chemicals that will be used, and thus has no way to evaluate whether corresponding permit limits are necessary.[177]

Further, there is testimony in the record that all process waste (presumably with the exception of settled solids that will be disposed of separately) will be discharged as part of the effluent stream.[178] For example, the antiscalant mentioned earlier will not be removed, but will instead be discharged with the effluent.[179] For the Port, Mr. Palachek testified during cross examination that while the Applicant has agreed to dechlorinate water in its permit application,

[173] HOM, p. 104, ln. 3-7, p. 107, ln. 3-8.
[174] HOM, p. 108, ln. 22-24.
[175] HOM, p. 109, ln. 23-35.
[176] HOM p. 173, ln. 10-15.
[177] HOM, p. 190, ln. 25 – p. 191, ln. 8.
[178] HOM, p. 129, ln. 12-16.
[179] HOM, p. 174, ln. 10-17.

this has not been memorialized as a term of the permit.[180] Mr. Palachek also stated that the permit requires the Port to notify TCEQ of any chemicals it will use.[181] For the ED, Ms. Gibson testified that chemicals must be pre-approved by TCEQ, but that this process won't allow for public input unless it resulted in a permit amendment.[182] Finally, Ms. Gibson explained that end-of-pipe testing required by the permit will include analysis of any chemicals used in the process and permit can be re-opened if necessary.[183]

While OPIC appreciates that the chemicals used by the Port must ultimately be approved by TCEQ, concern remains that this review will take place after the permit is issued and likely will not allow for public input or involvement. OPIC finds that the public interest would best be served by requiring the Port to identify the chemicals it will use in its application as discussed earlier and by including reasonable limits for those chemicals in the permit, if ultimately issued.

III. CONCLUSION

For the reasons discussed above, the record supports findings and conclusions that the proposed draft permit does not meet applicable requirements regarding Issues A, C, D, G, H and I. Therefore, OPIC recommends denial of the permit.

Respectfully submitted,

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[180] HOM, p. 831, ln. 7-23.
[181] HOM, p. 867, ln. 15 – p. 868, ln. 1.
[182] HOM, p. 2238, ln. 1-6, 15-24.
[183] HOM, p. 2242, ln. 5-16.

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CERTIFICATE OF SERVICE

I hereby certify that on April 12, 2022, the foregoing document was filed with SOAH, the TCEQ Chief Clerk, and copies were served to all parties on the attached mailing list via e-mail, hand delivery, facsimile transmission, inter-agency mail, or by deposit in the U.S. Mail.

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