FACT SHEET AND EXECUTIVE DIRECTOR’S FINAL DECISION

For proposed Texas Commission on Environmental Quality (TCEQ) state-only General Permit No. WQG280000 to discharge wastes associated with oil and gas extraction activities into the Gulf of Mexico (between 3.0 and 10.357 statute miles from the Texas coastline).

Issuing Office: Texas Commission on Environmental Quality

P.O. Box 13087

Austin, TX 78711-3087

Prepared By: Chris Linendoll, E.I.T.

Wastewater Permitting Section

Water Quality Division

Date: December 2023

Permit Action: New General Permit to provide state-only authorization to discharge into the Gulf of Mexico (between 3.0 and 10.357 statute miles from the Texas coastline) which is separate to authorization to discharge into the Gulf of Mexico required under U.S. Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) General Permit No. GMG290000 or an individual NPDES permit.

Table of Contents

[I. Summary 2](#_Toc116993917)

[II. Executive Director’s Recommendation 3](#_Toc116993918)

[III. Permit Applicability 3](#_Toc116993919)

[IV. Permit Effluent Limitations and Monitoring Requirements 5](#_Toc116993920)

[V. Changes from Existing EPA NPDES General Permit No. GMG290000 and Individual RRC Discharge Authorizations 14](#_Toc116993921)

[VI. Addresses 14](#_Toc116993922)

[VII. Legal Basis 15](#_Toc116993923)

[VIII. Regulatory Background 16](#_Toc116993924)

[IX. Permit Coverage 16](#_Toc116993925)

[X. Technology-Based Requirements 18](#_Toc116993926)

[XI. Water Quality-Based Requirements 30](#_Toc116993927)

[XIII. Monitoring and Reporting 52](#_Toc116993929)

[XIV. Procedures for Final Decision 54](#_Toc116993930)

[XV. Administrative Record 55](#_Toc116993931)

[Appendix A: Water Quality-Based Effluent Limitations Calculations – Well Treatment, Completion, and Workover Fluids 59](#_Toc116993932)

[Appendix B: Water Quality-Based Effluent Limitations Calculations – Produced Wastewater Discharges 66](#_Toc116993940)

[Appendix C: Water Quality-Based Effluent Limitations Calculations – Produced Wastewater Discharges (Barium and Manganese) 73](#_Toc116993948)

[Appendix D: Saltwater pH screening - Produced Wastewater Discharges 74](#_Toc116993954)

[Appendix E: Water Thermal Evaluation Sheet 75](#_Toc116993955)

# I. Summary

The Texas Commission on Environmental Quality (TCEQ or Commission) is proposing to issue a new state-only discharge general permit under state-only authority [and not under the Texas Pollutant Discharge Elimination System (TPDES) program] authorizing discharges associated with oil and gas extraction activities into the Gulf of Mexico located between 3.0 and 10.357 statute miles 1 from the Texas coastline, and the application of cooling water intake structure (CWIS) requirements. This state-only discharge general permit will replace the need for oil and gas extraction activities located in the Outer Continental Shelf (OCS), i.e., facilities located greater than three miles from the Texas coastline, to obtain individual discharge permits from the Railroad Commission of Texas (RRC). This state-only discharge general permit is proposing to authorize discharges from OCS oil and gas extraction activities. OCS Facilities under TCEQ jurisdiction are oil and gas extraction operations located in the Gulf of Mexico, located between 3.0 and 10.357 statute miles from the Texas coastline. TCEQ does not have the authority to issue TPDES permits greater than three statute miles from the Texas coastline and separate NPDES authorization is required to be obtained from OCS Facilities to discharge into the Gulf of Mexico beyond three statute miles from the Texas coastline from EPA. OCS Facilities located in the Gulf of Mexico greater than 10.357 statute miles from the Texas coastline are only required to obtain authorization to discharge from EPA under the NPDES program, as the State of Texas does not have authority to regulate these discharges. The state-only discharge general permit proposes to authorize discharges of various waste streams described below from OCS Facilities. The state-only discharge general permit also proposes to establish specific prohibitions for the discharge of various waste streams from OCS Facilities proposed for authorization under the state-only discharge general permit; and proposes to establish CWIS operational requirements required under Section 316b of the Clean Water Act (CWA). See discussion in subsequent sections of this fact sheet related to TCEQ applying CWA and NPDES requirements to this state-only discharge general permit.

The purpose of the development of this new state-only discharge general permit is the implementation of House Bill 2771, 86th Legislative Session which transfers permitting authority for discharges of certain waste streams (including discharges from oil and gas extraction activities located in the OCS in Texas) from crude oil and natural gas facilities into water in the state from the RRC to TCEQ. All discharges associated with oil and gas extraction activities adjacent to water in the state (i.e., land application) and other activities not associated with discharge into the Gulf of Mexico remains under the jurisdiction of the RRC. This state-only discharge general permit is for state-only authorization and not subject to EPA oversight under the conditions established for the TPDES program.

1 10.357 statute miles = 9 nautical miles x (1.15078 statute miles / nautical mile).

# II. Executive Director’s Recommendation

The Executive Director has made a preliminary decision that this state-only discharge general permit, if issued, meets all statutory and regulatory requirements. It is proposed that the state-only discharge general permit will expire five years from the effective date.

# III. Permit Applicability

This state-only discharge general permit authorizes the discharge of various waste streams described below from OCS Facilities. The state-only discharge general permit also establishes specific prohibitions for the discharge of various waste streams from OCS Facilities proposed for authorization under the state-only discharge general permit; and establishes CWIS operational requirements required under Section 316b of the CWA.

1. The state-only discharge general permit specifies which facilities may be authorized under this state-only discharge general permit, those that must be authorized by an individual TCEQ state-only discharge permit, and those that are not authorized to discharge under TCEQ regulatory authority.
2. The following discharges are not eligible for state-only discharge general permit coverage:
   1. discharges associated with OCS Facilities adjacent to water in the state (e.g., land application) that are regulated by the RRC, which includes onshore transport of waste streams generated from OCS Facilities disposed of by land application;
   2. new sources or new discharges [as defined in 40 CFR § 122.2, 40 CFR § 435.11(w), and 40 CFR § 435.41(x)] of the constituent(s) of concern to impaired areas of the Gulf of Mexico are not authorized by this state-only discharge general permit unless otherwise allowable under 30 TAC Chapter 305, *Consolidated Permits*, and applicable state law. Impaired areas of the Gulf of Mexico are those that do not meet applicable water quality standard(s) and are listed as category 4 or 5 in the current version of the Texas Integrated Report of Surface Water Quality on the CWA, § 303(d) list. Constituents of concern are those for which areas of the Gulf of Mexico are listed as impaired. As a note, the Water Quality Assessment Section interoffice memorandum regarding the dissolved oxygen modeling assessment for discharges of produced wastewater to the Outer Continental Shelf identified the Gulf of Mexico being impaired for mercury. Available data to TCEQ indicates non-detect values for mercury for existing territorial seas produced wastewater discharges (including discharges to the Outer Continental Shelf). Several samples submitted historically to RRC do not meet current TCEQ minimum analytical levels (MALs) thus a monitoring and reporting requirement for total mercury is proposed in the state-only discharge general permit for discharges of produced wastewater;
   3. discharges of the constituent(s) of concern to impaired areas of the Gulf of Mexico for which there is a total maximum daily load (TMDL) implementation plan are not eligible for this state-only discharge general permit unless they are consistent with the approved TMDL and the implementation plan. The Executive Director may amend this state-only discharge general permit for discharges to the Gulf of Mexico. For discharges not eligible for coverage under this state-only discharge general permit, the discharger must apply for and receive an individual TCEQ state-only discharge permit prior to discharging;
   4. discharges that would adversely affect a listed endangered or threatened species or its critical habitat are not authorized by this state-only discharge general permit. Federal requirements related to endangered species which are being applied to this state-only discharge general permit, and site-specific controls may be required to ensure the protection of endangered or threatened species is achieved;
   5. discharges from oil and gas extraction facilities other than those defined in 40 CFR Part 435, Subpart A (Offshore Subcategory) located between 3.0 and 10.357 statute miles from the Texas coastline and which discharge into the Gulf of Mexico. Furthermore, this state-only discharge general permit does not authorize wastes generated from oil and gas extraction facilities as described above from being transported and discharged to water in the state located within 3.0 statute miles of the Texas coastline or at any onshore location. Discharges beyond 10.357 statute miles from the Texas coastline do not require authorization from the State of Texas and are regulated solely by EPA;
   6. discharge of hydrostatic test water. OCS Facilities seeking to discharge hydrostatic test water into the Gulf of Mexico have the option of obtaining coverage under TPDES General Permit No. TXG670000 or obtaining an individual TCEQ state-only discharge permit. Such hydrostatic test water discharges from OCS Facilities authorized under TPDES General Permit No. TXG670000 are under state-only authority and not under the TPDES program and EPA oversight;
   7. activities associated with OCS Facilities which are not associated with discharges into the Gulf of Mexico as described above are regulated by the RRC. Such activities include, but are not limited to drilling new wells, plugging and abandoning existing wells, blowout prevention control, spill prevention, surface coatings and preparation, and other activities not associated with discharges into the Gulf of Mexico;
   8. discharges into Areas of Biological Concern, including marine sanctuaries and live bottom areas;
   9. discharges of radiological substances or materials in excess of the amount regulated by 30 TAC Chapter 336 as required by 30 TAC § 307.4(c);
   10. discharge of waste streams generated at a location where that waste stream is prohibited from discharge to waters in the U.S. from a location where that waste stream is authorized for discharge to waters in the U.S., as established in 40 CFR Part 435, Subpart G (one example of what is not authorized is produced wastewater generated at a Coastal Facility, where produced wastewater is prohibited from discharge being transported and discharged from an OCS Facility where such discharge is authorized);
   11. discharges from operations defined as Centralized Waste Treatment (CWT) facilities as established in 40 CFR Part 437; and
   12. discharge of halogenated phenolic compounds as part of any waste stream authorized for discharge.
3. Facilities that dispose of various waste streams described below from OCS Facilities by any of the following practices are not required to obtain coverage under this state-only discharge general permit nor an individual TCEQ discharge permit:
4. recycling of these waste streams with no resulting discharge into the Gulf of Mexico, including reuse of waste streams in industrial processes, hydraulic fracturing, etc.;
5. pumping and hauling or otherwise transporting of these waste streams to an authorized disposal facility;
6. discharge of these waste streams to a publicly owned treatment works (POTW), provided POTW’s are authorized to receive such waste streams;
7. underground injection of these waste streams in accordance with 30 TAC Chapter 331, *Underground Injection Control*; or if alternatively regulated for underground injection by RRC;
8. discharge of these waste streams to above ground storage tanks with no resulting discharge into the Gulf of Mexico.

# IV. Permit Effluent Limitations and Monitoring Requirements

* + 1. Discharges into the Gulf of Mexico from OCS Facilities are authorized in the draft state-only discharge general permit and subject to the following effluent limitations and monitoring requirements (and stock limitations and monitoring requirements): Effluent limitations are established at the point of discharge into the Gulf of Mexico. Stock limitations are established to materials utilized in drilling operations.

1. Produced Wastewater and Hydrate Control Fluids

| * 1. Parameter | * 1. Daily Maximum Limitations | * 1. Daily Average Limitations | * 1. Sample Type | * 1. Monitoring Frequency |
| --- | --- | --- | --- | --- |
| * 1. Flow | * 1. Report, MGD | * 1. 0.252 MGD | * 1. Estimate | * 1. Once/day |
| * 1. Free Oil **1** | * 1. No discharge | * 1. N/A | * 1. Observation | * 1. Once/day |
| * 1. Oil & Grease | * 1. 42 mg/L | * 1. 29 mg/L | * 1. Grab | * 1. Once/month |
| * 1. Carbonaceous Biochemical Oxygen Demand (5-day) | * 1. N/A | * 1. 1144 mg/L | * 1. Grab | * 1. Once/month |
| * 1. Ammonia (as N) | * 1. N/A | * 1. 112 mg/L | * 1. Grab | * 1. Once/month |
| * 1. Temperature | * 1. 145 ºF | * 1. N/A | * 1. In-Situ | * 1. Once/quarter |
| * 1. Total Dissolved Solids | * 1. Report mg/L | * 1. N/A | * 1. Grab | * 1. Once/quarter |
| * 1. Total Barium | * 1. 2258 mg/L | * 1. 1068 mg/L | * 1. Grab | * 1. Once/month |
| * 1. Benzene | * 1. Report mg/L | * 1. N/A | * 1. Grab | * 1. Once/month |
| * 1. Total Copper | * 1. 0.194 mg/L | * 1. 0.092 mg/L | * 1. Grab | * 1. Once/month |
| * 1. Total Manganese | * 1. 18.1 mg/L | * 1. 8.54 mg/L | * 1. Grab | * 1. Once/month |
| * 1. Total Mercury | * 1. Report, mg/L | * 1. N/A | * 1. Grab | * 1. Once/month |
| * 1. Total Nickel | * 1. Report, mg/L | * 1. N/A | * 1. Grab | * 1. Once/month |
| * 1. Total Zinc | * 1. 5.40 mg/L | * 1. 2.55 mg/L | * 1. Grab | * 1. Once/month |
| * 1. pH | * 1. 6.0-9.0 standard units | * 1. N/A | * 1. Grab | * 1. Once/week |
| * 1. Sublethal Whole Effluent Toxicity (WET) limit (Parameter 51712) *Menidia beryllina* (Chronic NOEC 2) | * 1. 2.1% | * 1. 2.1% | * 1. Grab | * 1. Once/quarter |
| * 1. Sublethal Whole Effluent Toxicity (WET) limit (Parameter 51713) *Americamysis bahia*   2. (Chronic NOEC **2**) | * 1. 2.1% | * 1. 2.1% | * 1. Grab | * 1. Once/quarter |
| * 1. Lethal Whole Effluent Toxicity (WET) limit (Parameter 51712)   2. *Menidia beryllina*   3. (24-hour acute LC50 **3**) | * 1. > 100% | * 1. > 100% | * 1. Grab | * 1. Once/six months |
| * 1. Lethal Whole Effluent Toxicity (WET) limit (Parameter 51713) *Americamysis bahia* (24-hour acute LC50 **3**) | * 1. > 100% | * 1. > 100% | * 1. Grab | * 1. Once/six months |

**1**As determined by the presence of a film or sheen upon or discoloration of the surface of the receiving water (visual sheen).

**2**The NOEC is defined as the greatest effluent dilution at which no significant sublethality is demonstrated. Significant sublethality is defined as a statistically significantly difference between a specified effluent dilution and the control for a sublethal endpoint. The daily maximum limitation established above is a 7-day minimum limitation.

**3** The LC50 (Lethal Concentration 50) is defined as the effluent dilution at which 50% of the organisms survive.

1. Well Treatment, Completion, and Workover Fluids

| * 1. Parameter | * 1. Daily Maximum Limitations | * 1. Daily Average Limitations | * 1. Sample Type | * 1. Monitoring Frequency |
| --- | --- | --- | --- | --- |
| * 1. Flow | * 1. Report, MGD | * 1. Report, MGD | * 1. Estimate | * 1. Once/day |
| * 1. Free Oil **1** | * 1. No discharge | * 1. N/A | * 1. EPA Approved Method 1 | * 1. Once/day |
| * 1. Oil & Grease | * 1. 42 mg/L | * 1. 29 mg/L | * 1. Grab | * 1. Once/month |
| * 1. pH | * 1. 6.0-9.0 standard units | * 1. N/A | * 1. Grab | * 1. Once/week |
| * 1. Lethal Whole Effluent Toxicity (WET) limit (Parameter 51712)   2. *Menidia beryllina*   3. (24-hour acute LC50 **2**) | * 1. > 100% | * 1. > 100% | * 1. Grab 3 | * 1. Once/six months |
| * 1. Lethal Whole Effluent Toxicity (WET) limit (Parameter 51713)   2. *Americamysis bahia*   3. (24-hour acute LC50 **2**) | * 1. > 100% | * 1. > 100% | * 1. Grab 3 | * 1. Once/six months |

**1**As determined by the static sheen test utilizing EPA Method 1617 established in 40 CFR Part 435, Subpart A, Appendix 1 and in “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 2.

**2** The LC50 (Lethal Concentration 50) is defined as the effluent dilution at which 50% of the organisms survive.

3 Should the planned or actual discharge occur for a duration of 24 hours or greater, the sample type shall be a 24-hour composite.

1. Deck Drainage

| Parameter | Daily Maximum  Limitations | Daily Average  Limitations | Sample Type | Monitoring Frequency |
| --- | --- | --- | --- | --- |
| Free Oil **1** | No discharge | N/A | Observation | Once/day |

**1**As determined by the presence of a film or sheen upon or discoloration of the surface of the receiving water (visual sheen).

1. Domestic Waste

| * 1. Parameter | * 1. Daily Maximum Limitations | * 1. Daily Average Limitations | * 1. Sample Type | * 1. Monitoring Frequency |
| --- | --- | --- | --- | --- |
| * 1. Flow | * 1. Report, MGD | * 1. Report, MGD | * 1. Instantaneous | * 1. Five/week |
| * 1. Floating Solids, and Foam | * 1. No discharge | * 1. N/A | * 1. Observation | * 1. Once/day |
| * 1. Biochemical Oxygen Demand (5-day) | * 1. 65 mg/L | * 1. 20 mg/L | * 1. Grab | * 1. Once/week |
| * 1. Total Suspended Solids | * 1. 65 mg/L | * 1. 20 mg/L | * 1. Grab | * 1. Once/week |
| * 1. Dissolved Oxygen | * 1. 2.0 mg/L (minimum) | * 1. N/A | * 1. Grab | * 1. Once/week |
| * 1. Enterococci | * 1. 130 cfu or MPN/100 mL | * 1. 35 cfu or MPN/100 mL | * 1. Grab | * 1. Once/quarter |
| * 1. Fecal Coliform | * 1. 43 cfu or MPN/100 mL | * 1. 14 cfu or MPN/100 mL | * 1. Grab | * 1. Once/quarter |
| * 1. Total Residual Chlorine | * 1. 1.0 mg/L (minimum) and 4.0 mg/L (maximum) | * 1. N/A | * 1. Grab | * 1. Five/week |
| * 1. pH | * 1. 6.0 – 9.0 standard units | * 1. N/A | * 1. Grab | * 1. Once/day |

1. Sanitary Waste (M10 and M9IM)

| * 1. Parameter | * 1. Daily Maximum Limitations | * 1. Daily Average Limitations | * 1. Sample Type | * 1. Monitoring Frequency |
| --- | --- | --- | --- | --- |
| * 1. Flow | * 1. Report, MGD | * 1. Report, MGD | * 1. Instantaneous | * 1. Five/week |
| * 1. Floating Solids | * 1. No discharge | * 1. N/A | * 1. Observation | * 1. Once/day |
| * 1. Biochemical Oxygen Demand (5-day) | * 1. 65 mg/L | * 1. 20 mg/L | * 1. Grab | * 1. Once/week |
| * 1. Total Suspended Solids | * 1. 65 mg/L | * 1. 20 mg/L | * 1. Grab | * 1. Once/week |
| * 1. Dissolved Oxygen | * 1. 2.0 mg/L (minimum) | * 1. N/A | * 1. Grab | * 1. Once/week |
| * 1. Enterococci | * 1. 130 cfu or MPN/100 mL | * 1. 35 cfu or MPN/100 mL | * 1. Grab | * 1. Once/quarter |
| * 1. Fecal Coliform | * 1. 43 cfu or MPN/100 mL | * 1. 14 cfu or MPN/100 mL | * 1. Grab | * 1. Once/quarter |
| * 1. Total Residual Chlorine | * 1. 1.0 mg/L (minimum) and 4.0 mg/L (maximum) | * 1. N/A | * 1. Grab | * 1. Five/week |
| * 1. pH | * 1. 6.0 – 9.0 standard units | * 1. N/A | * 1. Grab | * 1. Once/day |

1. Uncontaminated Miscellaneous Discharges

| Parameter | Daily Maximum Limitations | Daily Average Limitations | Sample Type | Monitoring Frequency |
| --- | --- | --- | --- | --- |
| Free Oil **1** | No discharge | N/A | Observation | Once/day |

**1**As determined by the presence of a film or sheen upon or discoloration of the surface of the receiving water (visual sheen).

1. Contaminated Miscellaneous Discharges

| * 1. Parameter | * 1. Daily Maximum Limitations | * 1. Daily Average Limitations | * 1. Sample Type | * 1. Monitoring Frequency |
| --- | --- | --- | --- | --- |
| * 1. Flow | * 1. Report, MGD | * 1. N/A | * 1. Estimate | * 1. Once/month |
| * 1. Free Oil **1** | * 1. No discharge | * 1. N/A | * 1. Observation | * 1. Once/day |
| * 1. pH | * 1. 6.0-9.0 standard units | * 1. N/A | * 1. Grab | * 1. Once/week |
| * 1. Lethal Whole Effluent Toxicity (WET) limit (Parameter 51712)   2. *Menidia beryllina*   3. (24-hour acute LC50 **2**) | * 1. > 100% | * 1. > 100% | * 1. Grab | * 1. Once/six months |
| * 1. Lethal Whole Effluent Toxicity (WET) limit (Parameter 51713)   2. *Americamysis bahia*   3. (24-hour acute LC50 **2**) | * 1. > 100% | * 1. > 100% | * 1. Grab | * 1. Once/six months |

**1**As determined by the presence of a film or sheen upon or discoloration of the surface of the receiving water (visual sheen).

**2**The LC50 (Lethal Concentration 50) is defined as the effluent dilution at which 50% of the organisms survive.

1. Water-Based Drilling Fluids and Associated Drill Cuttings (including formation test fluids and dewatering effluent)
2. Effluent Limitations:

| * 1. Parameter | * 1. Daily Maximum Limitations | * 1. Daily Average Limitations | * 1. Sample Type | * 1. Monitoring Frequency |
| --- | --- | --- | --- | --- |
| * 1. Flow **1** | * 1. 1.008 MGD | * 1. N/A | * 1. Estimate | * 1. Once/day |
| * 1. Free Oil **2** | * 1. No discharge | * 1. N/A | * 1. EPA Approved Method 2 | * 1. Once/week |
| * 1. SPP Toxicity **3** | * 1. 3% | * 1. N/A | * 1. EPA Approved Method 3 | * 1. Once/month |
| * 1. Diesel Oil **4** | * 1. No discharge | * 1. N/A | * 1. Certification | * 1. Once/month |

**1**Limitation does not apply prior to installation of the marine riser. The Executive Director reserves the ability to establish more restrictive flow limitations based on proximity to areas of biological concern and will notify individual discharges of such more restrictive conditions or in the alternative require an individual state-only discharge permit.

**2**As determined by the static sheen test utilizing EPA Method 1617 established in 40 CFR Part 435, Subpart A, Appendix 1 and in “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 2.

**3** As determined by the Minimum 96-hour LC50 of the SPP Toxicity Test by volume. Bioassay test procedure – “Suspended Particulate Phase (SPP) Toxicity Test”, EPA Method 1619 established in Appendix 2 of 40 CFR Part 435, Subpart A and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 3.

**4**Drilling fluids to which any diesel oil has been added as a lubricant may not be discharged. Monthly effluent reports shall provide certification indicating compliance with this provision.

1. Stock Limitations:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| * 1. Parameter | * 1. Daily Maximum Limitations | * 1. Daily Average Limitations | * 1. Sample Type | * 1. Monitoring Frequency |
| * 1. Mercury **1** | * 1. 1 mg/kg | * 1. N/A | * 1. EPA Approved Method2 | * 1. Once/well4 |
| * 1. Cadmium **1** | * 1. 3 mg/kg | * 1. N/A | * 1. EPA Approved Method3 | * 1. Once/well4 |

**1**Dry weight maximum in the stock barite.

**2**Sampling shall be conducted using EPA Method 245.5, Method 7471 A, or more recently EPA approved methods.

**3**Sampling shall be conducted using EPA Method 200.7, Method 200.8, Method 3050 B followed by 6010B or 6020, or more recently EPA approved methods.

**4**A representative sample of stock barite used once in drilling fluids shall be analyzed and results submitted prior to use in each new well drilled. If more than one well is being drilled at a site, new analyses are not required for subsequent wells, provided that no new supplies of barite have been received since the previous analysis. A new analysis is required when the composition of stock barite is altered from the previous analysis and prior to use. Alternatively, the permittee may provide stock barite analysis provided by the manufacturer/supplier which complies with the sampling methodologies identified above.

1. Drill Cuttings Associated with Non-Aqueous Drilling Fluids
2. Effluent Limitations:

| * 1. Parameter | * 1. Daily Maximum Limitations | * 1. Daily Average Limitations | * 1. Sample Type | * 1. Monitoring Frequency |
| --- | --- | --- | --- | --- |
| * 1. Free Oil **1** | * 1. No discharge | * 1. N/A | * 1. EPA Approved Method 1 | * 1. Once/week |
| * 1. Diesel Oil **2** | * 1. No discharge | * 1. N/A | * 1. Certification | * 1. Once/month |
| * 1. SPP Toxicity **3** | * 1. 3% | * 1. N/A | * 1. EPA Approved Method 3 | * 1. Once/month |
| * 1. Sediment Toxicity **4** | * 1. 1.0 ratio | * 1. N/A | * 1. EPA Approved Method **4** | * 1. Once/month **5** |
| * 1. Formation Oil **6** | * 1. No discharge | * 1. N/A | * 1. EPA Approved Method **6** | * 1. Once/week **7** |
| * 1. Base Fluid Retained on Cuttings **8** | * 1. 6.9 g/100 g | * 1. N/A | * 1. EPA Approved Method **8** | * 1. Once/day **9** |
| * 1. Base Fluid Retained on Cuttings **1**0 | * 1. 9.4 g/100 g | * 1. N/A | * 1. EPA Approved Method **1**0 | * 1. Once/day **9** |

**1**As determined by the static sheen test utilizing EPA Method 1617 established in 40 CFR Part 435, Subpart A, Appendix 1 and in “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 2.

**2**Drilling cuttings associated with drilling fluids to which any diesel oil has been added as a lubricant may not be discharged. Monthly effluent reports shall provide certification indicating compliance with this provision.

**3**Minimum 96-hour LC50 of the SPP Toxicity Test by volume. Bioassay test procedure – “Suspended Particulate Phase (SPP) Toxicity Test”, EPA Method 1619 which is published in Appendix 2 of 40 CFR Part 435, Subpart A and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 3.

**4**Drilling Fluid Sediment Toxicity Ratio = 4-day LC50 of C16 – C18 internal olefin drilling fluid divided by 4-day LC50 of drilling fluid removed from drill cuttings at the solids control equipment as determined by EPA Method 1644: “Method for Conducting a Sediment Toxicity Test with *Leptocheirius plumulolsus* and Non-Aqueous Drilling Fluids or Synthetic-Based Drilling Muds” after sediment preparation procedures specified in EPA Method 1646 which are established in Appendix 3 (EPA Method 1646) and Appendix 8 (EPA Method 1644) of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 4 (EPA Method 1646) and Section 10 (EPA Method 1644).

**5**Sampling shall be conducted on the drilling fluids removed from cuttings at the solids waste control equipment. The once/month monitoring frequency is applicable to drilling fluids which meet the stock limitations for a C16 – C18 internal olefin. For drilling fluids which meet stock limitations for C12 – C14 ester or C8 ester, monitoring shall be performed at least once per well at the end of drilling.

**6**As determined before drilling fluids are shipped offshore by the GC/MS compliance assurance method (EPA Method 1655), and as determined prior to discharge by the RPE method (EPA Method 1670) applied to drilling fluid removed from drill cuttings. If the operator wishes to confirm the results of the RPE method (EPA Method 1670), the operator may use the GC/MS compliance assurance method (EPA Method 1655). Results from the GC/MS compliance assurance method (EPA Method 1655) shall supersede the results of the RPE method (EPA Method 1670). EPA Methods 1655 and 1670 are established in Appendix 5 (EPA Method 1655) and Appendix 6 (EPA Method 1670) of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 6 (EPA Method 1655) and Section 7 (EPA Method 1670).

**7**Once per week monitoring frequency on the drilling fluid applies during drilling operations. Additionally, monitoring is required once prior to drilling operations.

**8**For NAFs that meet the stock limitations (C16 – C18 internal olefin), the maximum weighted mass ratio (NAF base fluid divided by wet drill cuttings) averaged over all NAF well sections. Ratio is grams of non-aqueous base fluid divided by 100 grams of wet drill cuttings. Maximum permissible retention of non-aqueous drilling fluid (NAF) base fluid on wet drill cuttings averaged over drilling intervals using NAFs as determined by EPA Method 1674, which is established in Appendix 7 of 40 CFR Part 435, Subpart A and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 8. This limitation is applicable for NAF base fluids that meet the base fluid sediment toxicity ratio (see footnote 4 above), biodegradation rate ratio (see footnote 8 in stock limitations table below); and the PAH, mercury, and cadmium stock limitations (C16 – C18 internal olefin) identified in the stock limitations table below.

**9**Once per day monitoring frequency applies when generating new drill cuttings. Specific conditions associated with this requirement are established in 40 CFR Part 435, Subpart A, Appendix 7, Addendum A and B.

**10**For NAFs that meet the C12 – C14 ester or C8 ester stock limitations, the maximum weighted mass ratio (NAF base fluid divided by wet drill cuttings) averaged over all NAF well sections. Ratio is grams of non-aqueous base fluid divided by 100 grams of wet drill cuttings. Maximum permissible retention of NAF base fluid on wet drill cuttings average over drilling intervals using NAFs as determined by EPA Method 1674, established in Appendix 7 of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 8. This limitation is applicable for NAF base fluids that meet the ester base fluid sediment toxicity ratio and ester biodegradation rate ratio stock limitations, as follows. Ester base fluid sediment toxicity ratio = 10-day LC50 of C12 – C14 ester or C8 ester divided by 10-day LC50 of stock base fluid as determined by EPA Method 1644: “Method for Conducting a Sediment Toxicity Test with *Leptocheirus plumulosus* and Non-Aqueous Drilling Fluids or Synthetic-Based Drilling Muds” after sediment preparation procedures specified in EPA Method 1646 which are established in Appendix 3 (Method 1646) and Appendix 8 (Method 1644) of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 4 (EPA Method 1646) and Section 10 (EPA Method 1644). Ester Biodegradation Rate Ratio = Cumulative headspace gas production (mL) of C12 – C14 ester or C8 ester divided by Cumulative headspace gas production (mL) of stock base fluid, both at 275 days as determined by EPA Method 1647 which is established in Appendix 4 of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 5. PAH Mass Ratio, Mercury, and Cadmium stock limitations (C16 - C18 internal olefin) are identified in footnotes above.

1. Stock Limitations (C16 – C18 Internal Olefins):

| * 1. Parameter | * 1. Daily Maximum Limitations | * 1. Daily Average Limitations | * 1. Sample Type | * 1. Monitoring Frequency |
| --- | --- | --- | --- | --- |
| * 1. Mercury **1** | * 1. 1 mg/kg | * 1. N/A | * 1. EPA Approved Method **2** | * 1. Once/well **3** |
| * 1. Cadmium **1** | * 1. 3 mg/kg | * 1. N/A | * 1. EPA Approved Method 4 | * 1. Once/well **3** |
| * 1. PAH5 | * 1. 1.0 x 10-5 ratio | * 1. N/A | * 1. EPA Approved Method **5** | * 1. Once/year **6** |
| * 1. Sediment Toxicity7 | * 1. 1.0 ratio | * 1. N/A | * 1. EPA Approved Method **7** | * 1. Once/year **6** |
| * 1. Biodegradation Rate8 | * 1. 1.0 ratio | * 1. N/A | * 1. EPA Approved Method **8** | * 1. Once/year **6** |

**1**Dry weight maximum in the stock barite.

**2**Sampling shall be conducted using EPA Method 245.5, Method 7471 A, or more recently EPA approved methods.

**3**Sampling shall be conducted using EPA Method 200.7, Method 200.8, Method 3050 B followed by 6010B or 6020, or more recently EPA approved methods.

**4**A representative sample of stock barite used once in drilling fluids shall be analyzed and results submitted prior to use in each new well drilled. If more than one well is being drilled at a site, new analyses are not required for subsequent wells, provided that no new supplies of barite have been received since the previous analysis. A new analysis is required when the composition of stock barite is altered from the previous analysis and prior to use. Alternatively, the permittee may provide stock barite analysis provided by the manufacturer/supplier which complies with the sampling methodologies identified above.

**5**PAH Mass Ratio = Mass (grams) of PAH (as phenanthrene) divided by Mass (grams) of stock base fluid as determined by EPA Method 1654, Revision A entitled “PAH Content of Oil by HPLC/UV”, December 1992, which is established in “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 9.

**6**Monitoring frequency is on each base fluid blend.

**7**Base Fluid Sediment Toxicity Ratio = 10-day LC50 of C16 – C18 internal olefin divided by 10-day LC50 of stock base fluid as determined by EPA Method 1644: “Method for Conducting a Sediment Toxicity Test with *Leptocheirus plumulosus* and Non-Aqueous Drilling Fluids or Synthetic-Based Drilling Muds” after preparing the sediment according to the procedure specified in EPA Method 1646, which are established in Appendix 8 (EPA Method 1644) and Appendix 3 (EPA Method 1646) of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 4 (EPA Method 1646) and Section 10 (EPA Method 1644).

**8**Biodegradation Rate Ratio = Cumulative headspace gas production (mL) of C16 - C18 internal olefin divided by Cumulative headspace gas production (mL) of stock base fluid, both at 275 days as determined by EPA Method 1647, which is established in Appendix 4 of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 5.

B. Discharges into the Gulf of Mexico from the following sources from OCS Facilities are prohibited in the draft state-only discharge general permit:

* Non-Aqueous Drilling Fluids (NAFs) including dewatering effluent and formation test fluids associated with NAFs
* Produced Sand

# V. Changes from Existing EPA NPDES General Permit No. GMG290000 and individual RRC discharge authorizations:

This is the first-time issuance of this state-only discharge general permit intended to streamline the permitting process and replace the need for OCS Facilities to obtain individual RRC discharge authorizations. Identifying changes proposed in this state-only discharge general permit from conditions established in existing individual authorizations issued by RRC is not possible (as such conditions are applied to each individual RRC issued authorization). This state-only discharge general permit does not replace EPA’s existing NPDES General Permit No. GMG290000 and OCS facilities are required to obtain separate TCEQ authorization and NPDES authorization. TCEQ has attempted to identify significant changes TCEQ is proposing in this state-only discharge general permit when compared to conditions established in EPA’s existing NPDES General Permit No. GMG290000 effective October 1, 2017. Such changes are discussed in subsequent sections of this fact sheet. Additionally, EPA is in the process of reissuance of NPDES General Permit No. GMG290000 and conditions established in EPA’s draft GMG290000 NPDES general permit are subject to change.

# VI. Addresses

Comments on this draft state-only discharge general permit should be sent to:

Office of the Chief Clerk (MC-105)

TCEQ

P.O. Box 13087

Austin, TX 78711-3087

(512) 239-3300

Questions concerning this draft state-only discharge general permit should be directed to:

Chris Linendoll, E.I.T.

TCEQ, Water Quality Division

Wastewater Permitting Section (MC-148)

P.O. Box 13087

Austin, TX 78711-3087

(254) 761-3025

Supplementary information on this fact sheet is organized as follows:

VII. Legal Basis

VIII. Regulatory Background

IX. Permit Coverage

X. Technology-based Requirements

XI. Water Quality-based Requirements

XII. Cooling Water Intake Structure Requirements

XIII. Monitoring

XIV. Procedures for Final Decision

XV. Administrative Record

# VII. Legal Basis

Texas Water Code (TWC), § 26.121 makes it unlawful to discharge pollutants into water in the state except as authorized by a rule, permit, or order issued by the Commission. TWC § 26.027 authorizes the Commission to issue permits and amendments to permits for the discharge of waste or pollutants into water in the state. TWC, § 26.040 provides the Commission with the authority to amend or adopt, as necessary to implement this section, rules adopted under TWC, § 26.040, and to authorize waste discharges by general permit. TWC § 26.131 transfers permitting authority for discharges into water in the state of certain waste streams (including waste streams proposed for authorization to discharge under this state-only discharge general permit from OCS Facilities) associated with oil and gas extraction activities from the RRC to TCEQ.

Although this is a state-only discharge general permit being proposed for issuance under the TWC and not explicitly subject to conditions under the CWA and associated EPA NPDES program regulations, TCEQ intends to apply CWA and associated NPDES requirements in this state-only discharge general permit. Prior to the State of Texas receiving TPDES permitting authority from EPA in 1998, predecessor agencies to the TCEQ issued state-only discharge permits for the discharge into water in the state and applied CWA and associated EPA NPDES regulations to such state-only discharge permits. TCEQ intends to apply this historical practice in the proposed issuance of this new state-only discharge general permit.

CWA, §§ 301, 304, and 401 (33 United States Code (USC), §§ 1331, 1314, and 1341) include provisions which state that NPDES permits must include effluent limitations requiring authorized discharges to: (1) meet standards reflecting levels of technological capability; (2) comply with EPA-approved state water quality standards; and (3) comply with other state requirements adopted under authority retained by states under CWA, § 510, 33 USC § 1370. CWA Section 316b establishes requirements related to the operation of cooling water intake structures CWISs).

Two types of technology-based effluent limitations are included in the draft state-only discharge general permit. With regard to conventional pollutants, i.e., pH, biochemical oxygen demand (BOD), oil and grease, total suspended solids (TSS), and fecal coliform bacteria, CWA, § 301(b)(1)(E) requires effluent limitations based on “best conventional pollutant control technology” (BCT). With regard to nonconventional and toxic pollutants, CWA, § 301(b)(2)(A), (C), and (D) requires effluent limitations based on “best available technology economically achievable” (BAT), a standard that generally represents the best performing existing technology in an industrial category or subcategory. BAT and BCT effluent limitations may never be less stringent than corresponding effluent limitations based on best practicable control technology (BPT), a standard applicable to similar discharges before March 31, 1989 under CWA, § 301(b)(1)(A). Furthermore, when a category of discharge(s) authorized under a general permit is subject to new source performance standards (NSPS) established in 40 CFR Chapter I, Subchapter N, general permits must be developed to comply with such NSPS conditions.

Frequently, EPA adopts nationally applicable guidelines identifying the BPT, BCT, BAT, and NSPS standards to which specific industrial categories and subcategories are subject. Until such guidelines are published, however, CWA, § 402(a)(1) includes requirements that appropriate BCT and BAT effluent limitations be included in permitting actions based on best professional judgment (BPJ).

# VIII. Regulatory Background

The Commission was given authority to issue general permits in place of authorizations by rule through legislation, House Bill (HB) 1542, passed during the 75th legislative session (1997). Further clarification of this general permit authority was provided in subsequent legislation, HB 1283, passed during the 76th legislative session (1999). Prior to the amendments of TWC § 26.131 via House Bill 2771 in the 86th Legislative Session, discharges of waste streams proposed for authorization to discharge under this draft state-only discharge general permit into water in the state from OCS oil and gas extraction activities were under authority of the RRC. Separate authorization to discharge into waters of the U.S. and operate CWISs was and continues to be required from EPA as the RRC did not have NPDES authority and TCEQ does not have authority to regulate these discharges and operation of CWISs beyond three statute miles from the Texas coastline.

# IX. Permit Coverage

The purpose of this draft state-only discharge general permit is to regulate the discharge of and prohibition of discharge of various waste streams described below, and the operation of CWISs associated with oil and gas extraction activities from OCS Facilities.

To obtain authorization to discharge under the draft state-only discharge general permit, an applicant will need to use the following guidelines.

* + 1. Applicants seeking authorization to discharge under authority of this state-only discharge general permit must submit a completed Notice of Intent (NOI) on a form approved by the Executive Director. Permittees authorized to discharge from OCS Facilities to the Gulf of Mexico via an existing RRC authorization are required to submit a new NOI within 90 days of the effective date of this state-only discharge general permit to continue authorization to discharge to the Gulf of Mexico under the State of Texas authority. Based on information available to TCEQ, RRC only issued discharge permits for the discharge of produced wastewater and did not permit other discharges subject to the requirements in TWC Section 26.121. Thus, OCS oil and gas extraction activities currently holding authorizations issued by EPA under NPDES general permit GMG290000 for discharges other than produced wastewater are also required to submit a new NOI within 90 days of the effective date of this state-only discharge permit to obtain appropriate discharge authority from the State of Texas. The NOI shall, at a minimum, include the legal name and address of the owner and operator, the facility name and address, specific description(s) of its location, type of facility or discharges, and other contents established in the NOI.
    2. Submission of an NOI is an acknowledgment that the conditions of this state-only discharge general permit are applicable to the proposed discharges, and that the applicant agrees to comply with the conditions of this state-only discharge general permit. Provisional authorization to discharge under the terms and conditions of this state-only discharge general permit begins 48 hours after a paper NOI is postmarked for delivery to the TCEQ. If the TCEQ provides for electronic submission of NOIs during the term of this state-only discharge general permit, authorization begins immediately after the TCEQ confirms receipt of the electronic NOI. Following review of the NOI, the Executive Director shall determine that the NOI is complete and confirm authorization by providing a written notification and an authorization number; determine that the NOI is incomplete and request additional information needed to complete the NOI; or deny authorization in writing. Denial of authorization will be made in accordance with 30 TAC § 205.4, *Authorizations and Notices of Intent*.
    3. Authorization under this state-only discharge general permit is not transferable. If either the owner or operator of the regulated entity changes, then both the present owner and operator must submit a Notice of Termination (NOT) and the new owner and operator must submit an NOI. The NOT and NOI must be submitted no later than 10 days before the change.
    4. If the owner or operator becomes aware that he or she failed to submit any relevant facts or submitted incorrect information in an NOI, the correct information must be provided to the Executive Director in a Notice of Change (NOC) within 14 days after discovery. If relevant information provided in the NOI changes (for example, phone number, address, outfall information, or type of facility or discharges, movement of a drilling rig to new location, etc.) an NOC must be submitted within 14 days of the change.

# X. Technology-Based Requirements

The limitations and conditions of the draft state-only discharge general permit have been developed to comply with the technology-based standards of the CWA (see discussion above on applying CWA and NPDES requirements to this state-only discharge general permit). Currently there are established nationally applicable effluent limitation guidelines identifying the BPT, BCT, BAT, and NSPS standards for a subset of discharges proposed for authorization to discharge by this draft state-only discharge general permit. The most restrictive of EPA established BPT, BCT, BAT, and NSPS standards are controlling and thus established as conditions in the draft state-only discharge general permit (e.g., when BPT standards allow discharges and establish an effluent limitation and where BAT standards outright prohibit discharge, the BAT standard is controlling). For waste streams proposed to be authorized for discharge under this draft state-only discharge general permit where EPA’s nationally applicable effluent limitation guidelines have not developed technology-based standards, the technology-based effluent limitations are based on BPJ. The parameters selected for BCT/BAT limits using BPJ are the primary pollutants of concern for a subset of discharges proposed to be authorized in the draft state-only discharge general permit. Where EPA national effluent limitation guidelines are less restrictive than TCEQ established technology-based standards, TCEQ established technology-based standards are proposed in the draft state-only discharge general permit (e.g., minimum secondary based treatment requirements for the discharge of sanitary waste and domestic waste established in 30 TAC Chapter 309). TCEQ has established state-wide standards for hazardous metals established in 30 TAC Chapter 319, Subchapter B. TCEQ considered application of these hazardous metal limitations in the draft state-only discharge general permit for the discharge of produced wastewater (see further discussion below in this section of the fact sheet).

EPA has established technology-based effluent limitation guidelines at 40 CFR Part 435, Subpart A (Offshore Subcategory) applicable to discharges to the territorial seas, including discharges to the OCS. 40 CFR § 435.10 establishes this subpart is applicable to those facilities engaged in field exploration, drilling, well production, and well treatment in the oil and gas industry which are located in waters that are seaward of the inner boundary of the territorial seas (“offshore”) as defined in section 502(g) of the CWA. 40 CFR Part 435, Subpart A includes different conditions applicable to discharges within three miles of shore and those located greater than three miles from shore. EPA technology-based effluent limitations outlined below are applicable to discharges greater than three miles from shore.

BAT effluent limitations are established at 40 CFR § 435.13 for the following:

* Produced Wastewater:
  + Oil & Grease: 29 mg/L daily average and 42 mg/L daily maximum
* Water-Based Drilling Fluids and Associated Drill Cuttings:
  + SPP Toxicity: Minimum 96-hour LC50 of the SPP Toxicity Test shall be 3% by Volume
  + Free oil: No discharge as determined by the static sheen test
  + Diesel Oil: No discharge
  + Mercury: 1 mg/kg dry weight maximum in the stock barite
  + Cadmium: 3 mg/kg dry weight maximum in the stock barite
* Non-Aqueous Drilling Fluids (NAFs):
* No discharge
* Drill Cuttings Associated with Non-Aqueous Drilling Fluids (Stock Limitations C16 – C18 Internal Olefin):
* Mercury: 1 mg/kg dry weight maximum in the stock barite
* Cadmium: 3 mg/kg dry weight maximum in the stock barite
* Polynuclear Aromatic Hydrocarbons (PAHs): PAH mass ratio shall not exceed 1 x 10-5
* Sediment Toxicity: Base Fluid Sediment Toxicity Ratio shall not exceed 1.0
* Biodegradation Rate: Biodegradation Rate Ratio shall not exceed 1.0
* Drill Cuttings Associated with Non-Aqueous Drilling Fluids (Effluent Limitations):
* Diesel Oil: No discharge
* SPP Toxicity: Minimum 96-hour LC50 of the SPP Toxicity Test shall be 3% by volume
* Sediment Toxicity: Drilling fluid sediment toxicity ratio shall not exceed 1.0
* Formation Oil: No discharge
* Base Fluid Retained on Cuttings: For all NAFs that meet stock limitations (C16 - C18 internal olefin) the maximum weighted mass ratio averaged over all NAF well sections shall be 6.9 g NAF base fluid/100 g wet drill cuttings
* Base Fluid Retained on Cuttings: For all NAFs that meet the C12 – C14 ester or C8 ester stock limitations the maximum weighted mass ratio averaged over all NAF well sections shall be 9.4 g NAF base fluid/100 g wet drill cuttings
* Well Treatment, Completion, and Workover Fluids:
* Oil & Grease: 29 mg/L daily average and 42 mg/L daily maximum
* Deck Drainage:
* Free oil: No discharge as established by visual sheen observation
* Produced Sand
* No discharge
* Domestic Waste:
* Foam: No discharge

BCT effluent limitations are established at 40 CFR § 435.14 for the following:

* Produced Wastewater:
* Oil & Grease: 48 mg/L daily average and 72 mg/L daily maximum
* Water-Based Drilling Fluids and Associated Drill Cuttings:
* Free oil: No discharge as determined by the static sheen test
* Non-Aqueous Drilling Fluids:
* No discharge
* Drill Cuttings Associated with Non-Aqueous Drilling Fluids:
* Free oil: No discharge as determined by the static sheen test method
* Well Treatment, Completion, and Workover Fluids:
* Free oil: No discharge as established by the static sheen method
* Deck Drainage:
* Free oil: No discharge as established by visual sheen observation
* Produced Sand
* No discharge
* Sanitary Waste – M10:
* Total Residual Chlorine: Minimum of 1.0 mg/L (and maintained as close as possible to this level)
* Sanitary Waste - M9IM:
* Floating solids: No discharge
* Domestic Waste:
* Floating solids: No discharge
* For all other domestic waste see 33 CFR Part 151

NSPS effluent limitations are established at 40 CFR § 435.15 for the following:

* Produced Wastewater:
* Oil & Grease: 29 mg/L daily average and 42 mg/L daily maximum
* Water-Based Drilling Fluids and Associated Drill Cuttings:
* SPP Toxicity: Minimum 96-hour LC50 of the SPP Toxicity Test shall be 3% by Volume
* Free oil: No discharge as determined by the static sheen test method
* Diesel Oil: No discharge
* Mercury: 1 mg/kg dry weight maximum in the stock barite
* Cadmium: 3 mg/kg dry weight maximum in the stock barite
* Non-Aqueous Drilling Fluids:
* No discharge
* Drill Cuttings Associated with Non-Aqueous Drilling Fluids (Stock Limitations C16 – C18 Internal Olefin):
* Mercury: 1 mg/kg dry weight maximum in the stock barite
* Cadmium: 3 mg/kg dry weight maximum in the stock barite
* Polynuclear Aromatic Hydrocarbons (PAHs): PAH mass ratio shall not exceed 1 x 10-5
* Sediment Toxicity: Base Fluid Sediment Toxicity Ratio shall not exceed 1.0
* Biodegradation Rate: Biodegradation Rate Ratio shall not exceed 1.0
* Drill Cuttings Associated with Non-Aqueous Drilling Fluids (Effluent Limitations):
* Diesel Oil: No discharge
* SPP Toxicity: Minimum 96-hour LC50 of the SPP Toxicity Test shall be 3% by volume
* Sediment Toxicity: Drilling fluid sediment toxicity ratio shall not exceed 1.0
* Formation Oil: No discharge
* Base Fluid Retained on Cuttings: For all NAFs that meet stock limitations (C16 - C18 internal olefin) the maximum weighted mass ratio averaged over all NAF well sections shall be 6.9 g NAF base fluid/100 g wet drill cuttings
* Base Fluid Retained on Cuttings: For all NAFs that meet the C12 – C14 ester or C8 ester stock limitations the maximum weighted mass ratio averaged over all NAF well sections shall be 9.4 g NAF base fluid/100 g wet drill cuttings
* Well Treatment, Completion, and Workover Fluids:
* Oil & Grease: 29 mg/L daily average and 42 mg/L daily maximum
* Deck Drainage:
* Free oil: No discharge as established by visual sheen observation
* Produced Sand:
* No discharge
* Sanitary Waste – M10:
* Total Residual Chlorine: Minimum of 1.0 mg/L (and maintained as close as possible to this level)
* Sanitary Waste - M9IM:
* Floating solids: No discharge
* Domestic Waste:
* Floating solids: No discharge
* Foam: No discharge
* For all other domestic waste see 33 CFR Part 151

TCEQ has established state-wide quality levels for tidal waters at 30 TAC § 319.23 which are provided in the table below. These effluent limitations are end-of-pipe criteria and do not consider instream dilution. EPA failed to consider this state regulation in development of NPDES General Permit No. GMG290000. Data included in **the “Supplemental Information Report to the 2004 Final Environmental Impact Statement,” dated September 2011** in support of EPA’s issuance of NPDES General Permit No. TXG260000 for territorial seas discharges within three miles of the Texas coastline (see Part XI of this fact sheet) for the discharges of produced wastewater; and well treatment, completion, and workover fluids were compared against these levels to determine the need to establish 30 TAC Chapter 319 effluent limitations in the draft state-only discharge general permit. The Offshore Operators Committee (OOC) also provided more recent produced wastewater data which was submitted to RRC in applications for individual authorizations from the time frame between 2016-2020 in an electronic mail (email) communication with TCEQ dated May 4, 2021 (see Part XI of this fact sheet). This data was also compared against hazardous metals levels established in 30 TAC § 319.23.

Typical TCEQ permitting procedures require inclusion of hazardous metals limitations in discharge permits when available effluent data indicates potential exceedances of levels established in 30 TAC § 319.23. Based on this evaluation 30 TAC Chapter 319 effluent limitations initially were considered for inclusion in the draft state-only discharge general permit for the discharge of produced wastewater for total arsenic, total barium, total cadmium, total manganese, total selenium, total silver, and total zinc. 30 TAC Chapter 319 effluent limitations for the discharge of well treatment, completion, and workover fluids are not warranted based on this analysis.

30 TAC § 319.26 states, in part, that the commission may authorize less stringent quality levels than those set forth in 30 TAC § 319.23 only where the applicant demonstrates that there will be no significant adverse impact on water quality and that the less stringent quality levels are necessary based on considerations consistent with provisions of the Texas Water Code.

The OOC in a letter to TCEQ dated June 10, 2021, applied for an exception to the hazardous metals limitations established in 30 TAC § 319.23 as allowed under 30 TAC § 319.26 in the draft state-only discharge general permit for the discharge of produced wastewater. This letter referenced two previous produced wastewater studies on the Gulf of Mexico conducted by OOC related to conditions established in historical EPA NPDES oil and gas general permits to satisfy the no significant adverse impact on the water quality aspect of the rule. A 2015 study entitled “OOC Produced Water and Water Based Mud Characterization Study” assessed the aquatic life chronic toxicity impacts of produced wastewater discharges. A 1997 study entitled “Gulf of Mexico Produced Water Bioaccumulation Study” assessed bioaccumulation of chemicals in marine organisms and impacts on human consumption of marine organisms. In review of these studies, TCEQ identified shortcoming regarding applying the studies to the drafting of this state-only discharge general permit, which include: the sampling and analysis did not include all the metals listed in 30 TAC Chapter 319, the studies used larger mixing zones than allowed under TCEQ procedures, only chronic aquatic life toxicity was assessed (acute toxicity was not addressed), some methods utilized are not approved under 40 CFR Part 136, and sampling for dissolved metals vs. total metals as total metals are typically assessed by TCEQ. Furthermore, barium and manganese do not have established TCEQ water quality standards that would need to be considered in approving this exception request to demonstrate no significant impact on water quality. Based on TCEQ’s review of these two studies and TCEQ’s own water quality impact assessments outlined in Section XI of this fact sheet, TCEQ supports OOC’s 30 TAC Chapter 319 metals exception request related to the no significant adverse impact on water quality aspect of 30 TAC § 319.26.

To satisfy the second condition established in 30 TAC § 319.26 (less stringent quality levels are necessary based on considerations consistent with provisions of the Texas Water Code), OOC in its June 2021 letter provided information related to the likely economic impact of imposing 30 TAC § 319.23 hazardous metals limitations in the draft state-only discharge general permit based on an inability of treatment technology to achieve compliance with these limitations.

OOC indicated that it would be likely existing offshore oil and gas activities would cease production, new developments would not be pursued, significant cost impacts would be realized for capture of produced wastewater and onshore transport for ultimate disposal, and a reduction in state lease revenues and royalties would occur should 30 TAC § 319.23 limitations be imposed. Furthermore, the information provided by OOC discussed the health and safety impacts associated with onshore transport and disposal of produced wastewater.

TCEQ performed an assessment of OOC’s request associated with this second aspect of the rule conditions and identified the regulatory history associated with the conditions established in 30 TAC § 319.26. 9 TexReg 4078, (July 27, 1984) outlines the Texas Water Development Board’s (TWDB) adoption of the existing regulation and amendments to this regulation that existed prior the existing regulation. The Texas Register preamble identifies Section 26.003 of the Texas Water Code, which is the policy statement of this Chapter, as being applicable to applying less stringent levels than those established in 30 TAC § 319.26. Section 26.003 of the Texas Water Code states, in part, “taking into consideration the economic development of the state”. OOC’s exception request related to economic impacts falls in line with this condition established in the Texas Water Code. This Texas Register publication outlines public comment received on the rule amendments and the TWDB’s position on comments received and demonstrations needed to be made by an applicant to justify less stringent hazardous metals levels. The preamble states in part “the applicant will need to show more than difficulty in paying the higher cost of treatment necessary to meet concentrations” for the TWDB to allow less stringent hazardous metals levels. The preamble further goes onto discuss three potential options an applicant could present to the TWDB to demonstrate “more than difficulty in paying higher costs”. The three options presented do not have direct applicability to treatment and discharge for produced wastewater offshore oil and gas discharges, however, the preamble does not restrict an applicant to these three options. Based on TCEQ’s initial evaluation of this exception request associated with economic impacts, granting less stringent hazardous metals levels could not be supported.

The OOC submitted a supplement to its initial 30 TAC Chapter 319 metals exception request in a letter dated November 22, 2021. OOC’s supplemental submission provided more detailed information related to: EPA developed national technology-based standards for offshore produced wastewater discharges, additional and detailed information on economic impacts to the State of Texas and the oil and gas offshore industry if 30 TAC Chapter 319 metals limitations were imposed in the state-only discharge general permit; and provided a study conducted by the American Petroleum Institute (API) of barium fate and transport in the Gulf of Mexico for offshore oil and gas discharges: “Barium in Produced Water: Fate and Effects in Marine Environment.” Based on TCEQ’s review of OOC’s November 22, 2021 letter, TCEQ supports not imposing hazardous metals limitations as established in 30 TAC § 319.23 as allowed under 30 TAC § 319.26.

30 TAC Chapter 319 Hazardous Metals Quality Levels Discharge to Tidal Waters:

| Parameter | Daily Average | Daily Composite | Grab Sample |
| --- | --- | --- | --- |
| Total Arsenic | 0.1 mg/L | 0.2 mg/L | 0.3 mg/L |
| Total Barium | 1.0 mg/L | 2.0 mg/L | 4.0 mg/L |
| Total Cadmium | 0.1mg/L | 0.2 mg/L | 0.3 mg/L |
| Total Chromium | 0.5 mg/L | 1.0 mg/L | 5.0 mg/L |
| Total Copper | 0.5 mg/L | 1.0 mg/L | 2.0 mg/L |
| Total Lead | 0.5 mg/L | 1.0 mg/L | 1.5 mg/L |
| Total Manganese | 1.0 mg/L | 2.0 mg/L | 3.0 mg/L |
| Total Mercury | 0.005 mg/L | 0.005 mg/L | 0.01 mg/L |
| Total Nickel | 1.0 mg/L | 2.0 mg/L | 3.0 mg/L |
| Total Selenium | 0.1 mg/L | 0.2 mg/L | 0.3 mg/L |
| Total Silver | 0.05 mg/L | 0.1 mg/L | 0.2 mg/L |
| Total Zinc | 1.0 mg/L | 2.0 mg/L | 6.0 mg/L |

EPA’s existing NPDES General Permit No. GMG290000 established the following technology-based permit limitations for discharges not regulated by 40 CFR Part 435, Subpart A; or are more restrictive than 40 CFR Part 435, Subpart A:

* Produced Wastewater
* Flow: Monitor
* Free Oil: No discharge as established by visual observation
* Well Treatment, Completion, and Workover Fluids
* Priority Pollutants: Prohibited from discharge other than in trace amounts
* Miscellaneous Discharges
* Free Oil: No discharge as established by visual observation.
* Miscellaneous Discharges of Seawater and Freshwater which have been Chemically Treated
* Treatment Chemicals: Not to exceed maximum concentration specified in EPA product registration labeling, maximum manufacturer’s recommended concentration, or 500 mg/L
* Free oil: No discharge as established by visual observation
* Flow: Monitor

TCEQ practice is to establish technology-based pH effluent limitations in discharge permits that authorize potentially contaminated waste streams. Technology-based pH effluent limitations of 6.0-9.0 standard units for the discharge of produced wastewater/hydrate control fluids; well treatment, completion, and workover fluids; and contaminated miscellaneous discharge are proposed in the draft state-only discharge general permit. Appendix D of this fact sheet includes an assessment of pH limitations of 6.0-9.0 standard units demonstrating these proposed effluent limitations will meet instream pH water quality standards. Discharges of drilling fluids/drill cuttings are unique in their characterization and not subject to this condition.

TCEQ is proposing to revise “miscellaneous discharges” and “miscellaneous discharges of seawater and freshwater which have been chemically treated” as currently defined in EPA’s existing NPDES General Permit No. GMG290000. These waste streams are proposed to be defined as “uncontaminated miscellaneous discharges” and “contaminated miscellaneous discharges”, respectively in the draft state-only discharge general permit. Uncontaminated miscellaneous discharges are proposed to retain technology-based effluent limitations from EPA’s existing NPDES General Permit No. GMG290000 (no discharge of free oil based on visual observation). Contaminated miscellaneous discharges are proposed to contain a no discharge of free oil (visual observation) technology-based effluent limitation and flow monitoring consistent with EPA’s existing NPDES General Permit No. GMG290000, and a pH effluent limitation of 6.0-9.0 standard units based on TCEQ practice to establish pH technology-based effluent limitations in TCEQ discharge permits that authorize discharge of potentially contaminated waste streams. TCEQ is proposing to remove effluent limitations in EPA’s existing NPDES General permit No. GMG290000 for treatment chemicals used in contaminated miscellaneous discharges as the draft state-only discharge general permit adequately controls chemical usage via WET water quality-based effluent limitations.

TCEQ regulations at 30 TAC § 309.1 establish minimum state-wide secondary treatment standards for the discharge to surface waters of domestic wastewater (which includes both sanitary waste and domestic waste proposed for discharge under the draft state-only discharge general permit). These standards are as follows: BOD (5-day) – 20 mg/L daily average and 65 mg/L single grab; TSS – 20 mg/L daily average and 65 mg/L single grab, Dissolved Oxygen - 2.0 mg/L daily minimum, and pH 6.0-9.0 standard units. 30 TAC § 309.3(g) establishes minimum disinfection requirements for the discharge of domestic wastewater for total residual chlorine (0.5 mg/L minimum with a product of 20 based on minutes of contact time and 4.0 mg/L maximum). 30 TAC § 319.19(a) requires flow monitoring for the discharge of domestic wastewater. TCEQ is proposing effluent limitations which are not established in EPA’s existing NPDES General Permit No. GMG290000 for all of the above parameters/conditions. Total residual chlorine effluent limitations are established at a minimum of 1.0 mg/L (based on 20-minute contact time) and 4.0 mg/L daily maximum. All of the above conditions for sanitary waste and domestic waste are proposed to be established for both M10 and M9IM operated facilities.

Technology-based effluent limitations proposed in the draft state-only discharge general permit based on EPA’s existing NPDES General Permit No. GMG290000; 40 CFR Part 435, Subpart A; TCEQ established technology standards; or BPJ are established as follows:

* Produced Wastewater and Hydrate Control Fluids

|  |  |  |
| --- | --- | --- |
| Parameter | Daily Maximum | Daily Average |
| Free Oil **1** | No discharge | N/A |
| Oil & Grease | 42 mg/L | 29 mg/L |
| pH | 6.0-9.0 standard units | N/A |

**1**As determined by the presence of a film or sheen upon or discoloration of the surface of the receiving water (visual sheen).

* Well Treatment, Completion, and Workover Fluids

|  |  |  |
| --- | --- | --- |
| Parameter | Daily Maximum | Daily Average |
| Flow | Report, MGD | Report, MGD |
| Free Oil **1** | No discharge | N/A |
| Oil & Grease | 42 mg/L | 29 mg/L |
| pH | 6.0-9.0 standard units | N/A |

**1**As determined by the static sheen test utilizing EPA Method 1617 established in 40 CFR Part 435, Subpart A, Appendix 1 and in “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 2.

* Deck Drainage

|  |  |  |
| --- | --- | --- |
| Parameter | Daily Maximum | Daily Average |
| Free Oil **1** | No discharge | N/A |

**1**As determined by the presence of a film or sheen upon or discoloration of the surface of the receiving water (visual sheen).

* Domestic Waste

|  |  |  |
| --- | --- | --- |
| Parameter | Daily Maximum | Daily Average |
| Flow | Report, MGD | Report, MGD |
| Floating Solids and Foam | No discharge | N/A |
| Biochemical Oxygen Demand (5-day) | 65 mg/L | 20 mg/L |
| Total Suspended Solids | 65 mg/L | 20 mg/L |
| Dissolved Oxygen | 2.0 mg/L (minimum) | N/A |
| Total Residual Chlorine | 1.0 mg/L (minimum) and 4.0 mg/L (maximum) | N/A |
| pH | 6.0-9.0 standard units | N/A |

* Sanitary Waste (M10 and M9IM)

|  |  |  |
| --- | --- | --- |
| Parameter | Daily Maximum | Daily Average |
| Flow | Report, MGD | Report, MGD |
| Floating Solids | No discharge | N/A |
| Biochemical Oxygen Demand (5-day) | 65 mg/L | 20 mg/L |
| Total Suspended Solids | 65 mg/L | 20 mg/L |
| Dissolved Oxygen | 2.0 mg/L (minimum) | N/A |
| Total Residual Chlorine | 1.0 mg/L (minimum) and 4.0 mg/L (maximum) | N/A |
| pH | 6.0-9.0 standard units | N/A |

* Uncontaminated Miscellaneous Discharges

|  |  |  |
| --- | --- | --- |
| Parameter | Daily Maximum | Daily Average |
| Free Oil **1** | No discharge | N/A |

**1**As determined by the presence of a film or sheen upon or discoloration of the surface of the receiving water (visual sheen).

* Contaminated Miscellaneous Discharges

|  |  |  |
| --- | --- | --- |
| Parameter | Daily Maximum | Daily Average |
| Flow | Report, MGD | N/A |
| Free Oil1 | No discharge | N/A |
| pH | 6.0-9.0 standard units | N/A |

1 As determined by the presence of a film or sheen upon or discoloration of the surface of the receiving water (visual sheen).

* Water-Based Drilling Fluids and Associated Drill Cuttings

Effluent Limitations:

|  |  |  |
| --- | --- | --- |
| Parameter | Daily Maximum | Daily Average |
| Free Oil **1** | No discharge | N/A |
| SPP Toxicity **2** | 3% | N/A |
| Diesel Oil **3** | No discharge | N/A |

**1**As determined by the static sheen test utilizing EPA Method 1617 established in 40 CFR Part 435, Subpart A, Appendix 1 and in “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 2.

**2**As determined by the Minimum 96-hour LC50 of the SPP Toxicity Test by volume. Bioassay test procedure – “Suspended Particulate Phase (SPP) Toxicity Test”, EPA Method 1619 established in Appendix 2 of 40 CFR Part 435, Subpart A and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 3.

**3**Drilling fluids to which any diesel oil has been added as a lubricant may not be discharged. Monthly effluent reports shall provide certification indicating compliance with this provision.

Stock Limitations:

|  |  |  |
| --- | --- | --- |
| Parameter | Daily Maximum | Daily Average |
| Mercury **1** | 1 mg/kg | N/A |
| Cadmium **2** | 3 mg/kg | N/A |

**1**Dry weight maximum in the stock barite. Sampling shall be conducted using EPA Method 245.5, Method 7471 A, or more recently EPA approved methods.

**2**Dry weight maximum in the stock barite. Sampling shall be conducted using EPA Method 200.7, Method 200.8, Method 3050 B followed by 6010B or 6020, or more recently EPA approved methods.

* Drill Cuttings Associated with Non-Aqueous Drilling Fluids

Effluent Limitations:

|  |  |  |
| --- | --- | --- |
| Parameter | Daily Maximum | Daily Average |
| Free Oil **1** | No discharge | N/A |
| Diesel Oil **2** | No discharge | N/A |
| SPP Toxicity **3** | 3% | N/A |
| Sediment Toxicity **4** | 1.0 ratio | N/A |
| Formation Oil **5** | No discharge | N/A |
| Base Fluid Retained on Cuttings **6** | 6.9 g/100 g | N/A |
| Base Fluid Retained on Cuttings **7** | 9.4 g/100 g | N/A |

**1**As determined by the static sheen test utilizing EPA Method 1617 established in 40 CFR Part 435, Subpart A, Appendix 1 and in “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 2.

**2**Drill cuttings associated with drilling fluids to which any diesel oil has been added as a lubricant may not be discharged. Monthly effluent reports shall provide certification indicating compliance with this provision.

**3**Minimum 96-hour LC50 of the SPP Toxicity Test by volume. Bioassay test procedure – “Suspended Particulate Phase (SPP) Toxicity Test”, EPA Method 1619 which is published in Appendix 2 of 40 CFR Part 435, Subpart A and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 3.

**4**Drilling Fluid Sediment Toxicity Ratio = 4-day LC50 of C16 – C18 internal olefin drilling fluid divided by 4-day LC50 of drilling fluid removed from drill cuttings at the solids control equipment as determined by EPA Method 1644: “Method for Conducting a Sediment Toxicity Test with *Leptocheirius plumulolsus* and Non-Aqueous Drilling Fluids or Synthetic-Based Drilling Muds” after sediment preparation procedures specified in EPA Method 1646 which are established in Appendix 3 (EPA Method 1646) and Appendix 8 (EPA Method 1644) of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 4 (EPA Method 1646) and Section 10 (EPA Method 1644).

**5**As determined before drilling fluids are shipped offshore by the GC/MS compliance assurance method (EPA Method 1655), and as determined prior to discharge by the RPE method (EPA Method 1670) applied to drilling fluid removed from drill cuttings. If the operator wishes to confirm the results of the RPE method (EPA Method 1670), the operator may use the GC/MS compliance assurance method (EPA Method 1655). Results from the GC/MS compliance assurance method (EPA Method 1655) shall supersede the results of the RPE method (EPA Method 1670). EPA Methods 1655 and 1670 are established in Appendix 5 (EPA Method 1655) and Appendix 6 (EPA Method 1670) of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 6 (EPA Method 1655) and Section 7 (EPA Method 1670).

**6** For NAFs that meet the stock limitations (C16 – C18 internal olefin), the maximum weighted mass ratio (NAF base fluid divided by wet drill cuttings) averaged over all NAF well sections. Ratio is grams of non-aqueous base fluid divided by 100 grams of wet drill cuttings. Maximum permissible retention of non-aqueous drilling fluid (NAF) base fluid on wet drill cuttings averaged over drilling intervals using NAFs as determined by EPA Method 1674, which is established Appendix 7 of 40 CFR Part 435, Subpart A and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 8. This limitation is applicable for NAF base fluids that meet the base fluid sediment toxicity ratio (see footnote 4 above), biodegradation rate ratio (see footnote 8 in stock limitations table below); and the PAH, mercury, and cadmium stock limitations (C16 – C18 internal olefin) identified in the stock limitations table below.

**7** For NAFs that meet the C12 – C14 ester or C8 ester stock limitations, the maximum weighted mass ratio (NAF base fluid divided by wet drill cuttings) averaged over all NAF well sections. Ratio is grams of non-aqueous base fluid divided by 100 grams of wet drill cuttings. Maximum permissible retention of NAF base fluid on wet drill cuttings average over drilling intervals using NAFs as determined by EPA Method 1674, established in Appendix 7 of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 8. This limitation is applicable for NAF base fluids that meet the ester base fluid sediment toxicity ratio and ester biodegradation rate ratio stock limitations, as follows. Ester base fluid sediment toxicity ratio = 10-day LC50 of C12 – C14 ester or C8 ester divided by 10-day LC50 of stock base fluid as determined by EPA Method 1644: “Method for Conducting a Sediment Toxicity Test with *Leptocheirus plumulosus* and Non-Aqueous Drilling Fluids or Synthetic-Based Drilling Muds” after sediment preparation procedures specified in EPA Method 1646 which are established in Appendix 3 (Method 1646) and Appendix 8 (Method 1644) of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 4 (EPA Method 1646) and Section 10 (EPA Method 1644). Ester Biodegradation Rate Ratio = Cumulative headspace gas production (mL) of C12 – C14 ester or C8 ester divided by Cumulative headspace gas production (mL) of stock base fluid, both at 275 days as determined by EPA Method 1647 which is established in Appendix 4 of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 5. PAH Mass Ratio, Mercury, and Cadmium stock limitations (C16 - C18 internal olefin) are identified in footnotes above.

Stock Limitations (C16 – C18 Internal Olefins):

|  |  |  |
| --- | --- | --- |
| Parameter | Daily Maximum | Daily Average |
| Mercury **1** | 1 mg/kg | N/A |
| Cadmium **2** | 3 mg/kg | N/A |
| PAH **3** | 1.0 x 10-4 ratio | N/A |
| Sediment Toxicity **4** | 1.0 ratio | N/A |
| Biodegradation Rate **5** | 1.0 ratio | N/A |

**1**Dry weight maximum in the stock barite. Sampling shall be conducted using EPA Method 245.5, Method 7471 A, or more recently EPA approved methods.

**2**Dry weight maximum in the stock barite. Sampling shall be conducted using EPA Method 200.7, Method 200.8, Method 3050 B followed by 6010B or 6020, or more recently EPA approved methods.

**3**PAH Mass Ratio = Mass (grams) of PAH (as phenanthrene) divided by Mass (grams) of stock base fluid as determined by EPA Method 1654, Revision A entitled “PAH Content of Oil by HPLC/UV”, December 1992, which is established in “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 9.

**4**Base Fluid Sediment Toxicity Ratio = 10-day LC50 of C16 – C18 internal olefin divided by 10-day LC50 of stock base fluid as determined by EPA Method 1644: “Method for Conducting a Sediment Toxicity Test with *Leptocheirus plumulosus* and Non-Aqueous Drilling Fluids or Synthetic-Based Drilling Muds” after preparing the sediment according to the procedure specified in EPA Method 1646, which are established in Appendix 8 (EPA Method 1644) and Appendix 3 (EPA Method 1646) of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 4 (EPA Method 1646) and Section 10 (EPA Method 1644).

**5**Biodegradation Rate Ratio = Cumulative headspace gas production (mL) of C16 - C18 internal olefin divided by Cumulative headspace gas production (mL) of stock base fluid, both at 275 days as determined by EPA Method 1647, which is established in Appendix 4 of 40 CFR Part 435, Subpart A, and “Analytical Methods for the Oil and Gas Extraction Point Source Category”, EPA-821-R-11-004, December 2011, Section 5.

* Non-Aqueous Drilling Fluids (NAFs) including formation test fluids and dewatering effluent– No Discharge
* Produced Sand – No Discharge

# XI. Water Quality-Based Requirements

TCEQ discharge permits to water in the state contain technology-based effluent limitations reflecting the best controls available. Where these technology-based effluent limitations do not protect water quality or the designated uses, additional water quality-based effluent limitations and/or conditions are included in TCEQ discharge permits to water in the state. State narrative and numerical water quality standards are used in conjunction with EPA criteria and other toxicity data bases to determine the adequacy of technology-based effluent limitations and the need for additional water-quality based controls. Furthermore, the draft state-only discharge general permit has been developed to comply with Ocean Discharge Criteria, established in 40 CFR Part 125, Subpart M.

The *Texas Surface Water Quality Standards* (TSWQS)*,* found at 30 TAC Chapter 307, state that surface waters will not be toxic to man from ingestion of water, consumption of aquatic organisms, or contact with the skin, or to terrestrial or aquatic life. The methodology outlined in the TCEQ guidance document *Procedures to Implement the Texas Surface Water Quality Standards* (*IPs*) RG-194 is designed to ensure compliance with 30 TAC Chapter 307. Specifically, the methodology is designed to ensure that no source will be allowed to discharge any wastes that (1) results in instream aquatic toxicity; (2) causes a violation of an applicable narrative or numerical state water quality standard; (3) results in the endangerment of a drinking water supply; or (4) results in aquatic bioaccumulation that threatens human health.

* 1. **Assessment of Individual Toxics with Established Water Quality Standards:**

The Texas Toxicity Modeling Program (TEXTOX), developed by TCEQ, was used to perform a reasonable potential (RP) screening against available discharge data for this industry (oil and gas extraction) which TCEQ is regulating for the first time. TEXTOX is the method TCEQ uses to calculate water quality-based effluent limitations for toxics in accordance with the TSWQS and the IPs (RG-194). The receiving stream’s physical and chemical characteristics (for the purpose of this state-only discharge general permit is the Gulf of Mexico) are used to calculate what concentrations of pollutants are allowed to be discharged while ensuring that no significant degradation of any water in the state will occur and that existing uses will be maintained and protected. Segment 2501 values found in Appendix D of the IPs (RG-194), pollutant criteria found in the TSWQS, the receiving stream’s (Gulf of Mexico for the purpose of this state-only discharge general permit) mixing ability, and the effluent flow are used to calculate the concentration of each pollutant the receiving stream (Gulf of Mexico for the purpose of this state-only discharge general permit) can tolerate that would still be protective of aquatic life and human health.

Calculations of water quality-based effluent limitations for the protection of aquatic life and human health are presented in Appendix A, B, and C. Aquatic life criteria established in Table 1 and human health criteria established in Table 2 of the TSWQS are incorporated into the calculations. TSS values were obtained from Segment 2501 in Appendix D of the IPs (RG-194).

TCEQ practice for determining RP is to compare available analytical data from discharges against percentages of the calculated daily average water quality-based effluent limitations. Permit limitations are required when available analytical data exceeds 85 percent of the calculated daily average water quality-based effluent limitation. Monitoring and reporting are required when available analytical data exceeds 70 percent of the calculated daily average water quality-based effluent limitation.

The underlying methodology and statistics utilized to calculate individual pollutant water quality-based effluent limitations are outlined in RG-194, section titled “Toxic Pollutants,” pages 130-173.

TEXTOX Menu 5 was used to calculate appropriate daily average and daily maximum water quality-based effluent limitations. TEXTOX Menu 5 was used to calculate appropriate water quality-based effluent limitations for discharges into the Gulf of Mexico (Segment No. 2501) using a zone of initial dilution (ZID) at 50 feet, an aquatic life mixing zone at 200 feet, and a human health mixing zone at 400 feet consistent with conditions established in RG-194.

Standard TCEQ practice is to evaluate discharges into marine water bodies discharging less than 10 million gallons per day (MGD) using a zone of initial dilution (ZID) at 50 feet of 30%, an aquatic life mixing zone at 200 feet of 8%, and a human health mixing zone at 400 feet of 4% based on EPA’s horizontal jet plume model. This approach was utilized to assess the need for water quality-based effluent limitations for the discharge of well treatment, completion, and workover fluids. See further discussion below on assessment of well treatment, completion, and workover fluids discharges.

As discussed above, TCEQ typically utilizes EPA’s horizontal plume model for discharges of less than 10 MGD to calculate standard instream dilution rates to marine water bodies. **In support of issuance of EPA’s existing NPDES General Permit No. TXG260000 for discharges to the territorial seas within three miles of the Texas coastline (effective February 8, 2012), EPA conducted an RP analysis of produced wastewater discharges to the territorial seas which is outlined in EPA’s existing fact sheet for TXG260000 (dated October 4, 2011). The fact sheet indicates EPA utilized data obtained from the RRC [per table 6.1 of the 2004 final Environmental Impact Statement (EIS)] to conduct its RP analysis. This data summarized in EPA’s TXG260000 fact sheet is included in Table 4-2 of the “Supplemental Information Report to the 2004 Final Environmental Impact Statement,” dated September 2011. Data in the 2011 EIS supplement is included in the table below “Produced Wastewater Data.” Section 4.4.2 of the 2011 EIS supplement summarizes this RP analysis. It indicates the highest pollutant concentrations for available Texas discharge data obtained from RRC and worst-case discharge scenarios [(3885 barrels per day (bbl/day)] discharge rate and depth to sea floor of 7.32 meters were utilized based on modeling results from CORMIX versions 4.2 GP and 7.0.**

**EPA’s existing TXG260000 nor GMG290000 does not restrict flow rates or depths to sea floor for allowable produced wastewater discharges. Appendix A, Table 1 in EPA’s existing TXG260000 establishes produced wastewater discharge critical dilutions at flow rates up to 25,000 bbl/day and depths to sea floor between 0 and >16 meters. EPA’s existing NPDES General Permit No. GMG290000 authorizes produced wastewater flows up to and exceeding 75,000 barrels/day. Appendix A, Table 1 of EPA’s existing TXG260000 establishes a maximum critical dilution at the edge of the aquatic life mixing zone of 7.8% (which is consistent with TCEQ’s established critical dilution at the edge of the aquatic life mixing zone of 8%) when utilizing EPA’s horizontal jet plume model. TCEQ initially performed an RP analysis of this EIS data against calculated water quality-based effluent limitations derived from using standard dilution rates from EPA’s horizontal jet plume model. The TCEQ’s RP analysis indicated the need to include numerous water quality-based effluent limitations not established in EPA’s existing TXG260000 or GMG290000.**

**Based on the TCEQ’s initial RP assessment and consistent with historical EPA methodology, TCEQ initiated and completed its own CORMIX modelling assessment for produced wastewater discharges to the Outer Continental Shelf in the Gulf of Mexico. To properly assess individual water quality-based pollutants utilizing dilution modeling, permitted discharge flow is a key component in the analysis (see above discussion on issues with EPA development of existing TXG260000 and GMG290000 related to unrestricted flow rates). TCEQ contacted the OOC to obtain acceptable produced wastewater discharge flow restrictions to be established in the state-only general permit. OOC in coordination with its member companies agreed to a produced wastewater daily average flow restriction for discharges to the Outer Continental Shelf in Texas waters to be included in the state-only general permit at 7000 bbl/day (0.294 MGD when converting 1 bbl = 42 gallons). TCEQ solicited public comment during the formal public comment period based on comments received during an informal comment period sharing the draft general permit with stakeholders to reduce produced wastewater flows to 6000 bbl/day (0.252 MGD). Formal public comment was received and TCEQ supports reducing permitted daily average produced wastewater flows to 6000 bbl/day (0.252 MGD) and further analysis below is based on the reduced permitted daily average flow. Additionally, OOC agreed to restrictions on the depth to sea floor from the discharge point of no less than 4-6 meters, and a maximum discharge pipe diameter of six inches. Furthermore, TCEQ obtained more recent produced wastewater analytical data that was submitted in recent permit applications to RRC for state authorizations to discharge from offshore oil and gas extraction facilities to the Gulf of Mexico. The more recent produced wastewater analytical data is summarized in the table below “Produced Wastewater Data” (analytical data from seven offshore platforms were assessed and the highest value observed is included in the referenced table). Data in parenthesis are included to indicate non-detect values provided in the submitted data that do not meet current TCEQ minimum analytical levels (MALs).**

**The following is a summary of inputs, assumptions, and other factors utilized in TCEQ’s produced wastewater CORMIX assessment:**

* Effluent Characterization and CORMIX Model Version
* CORMIX model Version 11.0GTD (Version 11.0.1.0) was used for all model simulations.
* The pollutant type was specified as a conservative pollutant, meaning the pollutant does not undergo any decay or growth processes.
* The pollutant discharge concentration was set to 100% which is appropriate for the characterization of the discharge.
* A range of effluent densities were considered. Specifically, a maximum effluent density value (1109.4 kg/m3) and a minimum effluent density value (1019.64 kg/m3) were both modeled based on produced water effluent data, as provided by the RRC (temperature and total dissolved solids data provided in the table below), “Produced Wastewater Data”.
* Ambient Geometry
* The input values for average depth and depth at dischargewere presumed to be the same in the Gulf of Mexico. The depths are varied according to the modeled input parameters. The minimum depth modeled was 5 m, and the maximum depth modeled was 16 m.
* The wind speed (Uw) parameter was set to 2 m/s which is representative of a light wind and is the recommended wind speed by the CORMIX User Manual when measured data are not available.
* The ambient velocity (Ua) was set to 0.05 m/s, consistent with the TCEQ’s guidance document, *Mixing Analyses Using CORMIX*.
* A bottom friction (Manning *n*) value of 0.020 was assumed, consistent with TCEQ guidance for CORMIX analyses. A value of 0.020 is representative of a smooth channel bottom with no weeds.
* The water body was considered unbounded.
* In the ambient density data field, a non-freshwater density of 1017.65 kg/m3 was used based on temperature and salinity measurements collected from TCEQ Surface Water Quality Monitoring Stations (SWQM) in the Gulf of Mexico (Segment No. 2501). The ambient density is the average density value based on water column averages of temperature and salinity.
* From the SWQM data available, the median density difference from the top of the water column to the bottom of the water column was analyzed to determine whether stratification should be factored into the analysis. An additional model scenario was run on the most critical case, but it did not significantly change the model predictions.
* Discharge Geometry
* The CORMIX1 Single Port model was utilized in this exercise.
* The nearest bank was set to 1000 m to the left.
* Port diameters of 4 inches and 6 inches were both used throughout the modeling exercise.
* A submerged offshore discharge configuration was used with a submerged port height of 20 cm below the surface.
* A vertical angle (θ) was set to -90°, and a horizontal angle (σ) was set to 0°. This configuration represents a downward pipe pointing towards the channel bottom and in the direction of the ambient flow (i.e., co-flowing). When the vertical angle (θ) is set to ± 90°, the horizontal angle (σ) is automatically set to 0°.
* Mixing Zone Specifications
* No water quality standard was specified in the modeled iterations.
* Model results were assessed at the edges of the regulatory mixing zone boundaries, consistent with the *Procedures to Implement the Texas Surface Water Quality Standards* (TCEQ RG-194). Mixing zone boundaries were assessed at trajectory distances of 60.96 m for the chronic aquatic life mixing zone, 15.24 m for the zone of initial dilution (ZID), and 121.92 m for the human health mixing zone.
* The region of interest was 1000 m.
* **CORMIX Modeling Dilution Results**
* **Effluent Fraction at the edge of ZID (50 feet): 3.0%**
* **Effluent Fraction at the edge of the Aquatic Life Mixing Zone (200 feet): 2.1%**
* **Effluent Fraction at the edge of the Human Health Mixing Zone (400 feet): 1.6%**

**As described above, TCEQ performed an RP analysis for produced wastewater discharges to the Outer Continental Shelf in the Gulf of Mexico seas utilizing TCEQ’s CORMIX modelling results at a daily average flow of 6000 bbl/day (0.252 MGD), depth to sea floor of a minimum of 4-6 meters, and a maximum pipe diameter of six inches. U**pdated/more recent data obtained from OOC (RRC individual permit application data) were screened against calculated water quality-based effluent limitations in Appendix B. Based on this assessment and in relation to dissolved oxygen modeling discussed below, discharges of produced wastewater are restricted to a pipe diameter of no greater than six inches and depth to sea floor of no less than five meters. This resulted in **water quality-based effluent limitations or monitoring/reporting requirements for the following parameters for produced wastewater discharges in the draft state-only general permit:**

* **Total Barium**
* **Benzene**
* **Total Copper**
* **Total Manganese**
* **Total Mercury**
* **Total Nickel**
* **Total Zinc**

**Additionally, a water quality-based produced wastewater flow limitation of 0.252 MGD is proposed in the draft state-only general permit (based on the RP analysis previously discussed), as well as monitoring and reporting requirements for total dissolved solids (TDS) and temperature to obtain additional data and confirm the buoyancy of produced wastewater discharges when mixing with Gulf of Mexico ambient water.**

**Produced Wastewater Data:**

| Pollutant | EIS Data | RRC 2016 – 2020 Data |
| --- | --- | --- |
| Total Aluminum | 0.610 mg/L | 129 mg/L |
| Total Arsenic | 0.090 mg/L | 0.152 mg/L |
| Total Barium | 564 mg/L | 1200 mg/L |
| Benzene | 13.1 mg/L | 37.7 mg/L |
| Total Cadmium | 0.100 mg/L | 0.015 mg/L (< 0.2 mg/L) |
| Hexavalent Chromium | 0.143 mg/L | < 0.1 mg/L |
| Total Copper | 0.260 mg/L | 0.156 mg/L |
| Cyanide | 0.030 mg/L | 0.007 mg/L (< 0.05 mg/L) |
| Total Lead | 0.400 mg/L | 0.019 mg/L (< 0.120 mg/L) |
| Total Mercury | 0.0019 mg/L | 0.0002 mg/L (< 0.006 mg/L) |
| Total Nickel | 0.639 mg/L | < 0.5 mg/L |
| Total Selenium | 0.268 mg/L | 0.292 mg/L |
| Total Silver | 0.020 mg/L | < 0.05 mg/L |
| Total Zinc | 0.218 mg/L | 26.3 mg/L |
| Temperature | ---- | 183 °F |
| pH | ---- | 5.66 S.U. |
| Dissolved Oxygen | ---- | 0.0 mg/L |
| Hardness | ---- | 64,100 mg/L |
| Total Suspended Solids | ---- | 710 mg/L |
| Total Dissolved Solids | ---- | 149,000 mg/L |
| Chlorides | ---- | 90,700 mg/L |
| Sulfates | ---- | 1530 mg/L |
| Sulfides | ---- | 0.680 mg/L (< 1.0 mg/L) |
| Ammonia-Nitrogen | ---- | 68.7 mg/L |
| Calcium | ---- | 25,400 mg/L |
| Magnesium | ---- | 849 mg/L |
| Sodium | ---- | 40,100 mg/L |
| Potassium | ---- | 1250 mg/L |
| Iron | ---- | 71.7 mg/L |
| Total Manganese | ---- | 51.9 mg/L |
| Oil and Grease | ---- | 14.3 mg/L |
| Total Organic Carbon | ---- | 3050 mg/L |
| Phenols | ---- | 20.4 mg/L |
| Naphthalene | ---- | 65.1 mg/L |

**Table 2-4 of the “Supplemental Information Report to the 2004 Final Environmental Impact Statement,” in support of issuance of NPDES General Permit No. TXG260000 dated September 2011 provides data for the discharge of fluids from an acidizing well treatment. Section 2.2.2.6 of that document indicates this data was developed from two offshore wells in California. Although this data may not be representative of discharges of well treatment, completion, and workover fluids from offshore oil and gas extraction activities in Texas, TCEQ performed an RP analysis of this discharge data using both the methodology described above for discharges of less than 10 MGD and EPA’s horizontal jet plume model. RRC historically only permitted discharges of produced wastewater. Thus, more recent data for well treatment, completion, and workover fluids specific to Texas offshore discharges is not available.** Screening this data against calculated water quality -based effluent limitations in Appendix A indicated no pollutant-specific water quality-based effluent limitations are justified in the draft state-only discharge general permit. EPA’s existing NPDES General Permit No. GMG290000 for discharges from OCS facilities includes conditions requiring industry studies on the discharge of these waste streams and the impacts of these discharges to the Gulf of Mexico for acute toxicity. An industry wide study titled “Final Report: Joint Industry Project Study of Well Treatment, Completion, and Workover Effluents”, submitted by Offshore Operators Committee, September 23, 2021 was reviewed by TCEQ which included analysis of specific individual pollutants, organics and metals. Based on the short duration identified in this study (median one hour) and small volume (median 473 barrels), typical procedures for screening individual pollutants for compliance with the Texas Surface Water Quality Standards developed by TCEQ are not applicable to the intermittent and low volume nature of these discharges and TCEQ is proposing water quality controls on these discharges via the establishment of 24-hour acute lethal whole effluent toxicity (WET) limitations (see discussion below on whole effluent toxicity assessment).

**Well Treatment, Completion, Workover Fluids Data**

| Pollutant | EIS Data |
| --- | --- |
| Total Aluminum | 0.0531 mg/L |
| Total Antimony | < 0.0039 mg/L |
| Total Arsenic | < 0.0019 mg/L |
| Total Barium | 0.0126 mg/L |
| Total Beryllium | < 0.0001 mg/L |
| Total Boron | 0.0319 mg/L |
| Total Cadmium | 0.0004 mg/L |
| Total Calcium | 0.0353 mg/L |
| Total Chromium | 0.019 mg/L |
| Total Cobalt | < 0.0019 mg/L |
| Total Copper | 0.003 mg/L |
| Total Iron | 0.572 mg/L |
| Total Lead | < 0.00982 mg/L |
| Total Magnesium | 0.162 mg/L |
| Total Molybdenum | < 0.00096 mg/L |
| Total Nickel | 0.0529 mg/L |
| Total Selenium | < 0.0029 mg/L |
| Total Silver | < 0.0007 mg/L |
| Sodium | 1.64 mg/L |
| Total Thallium | 0.005 mg/L |
| Total Tin | 0.00666 mg/L |
| Total Titanium | 0.00068 mg/L |
| Total Vanadium | 0.0361 mg/L |
| Yttrium | 0.00019 mg/L |
| Total Zinc | 0.0285 mg/L |
| pH | 2.48 S.U. |
| Aniline | 0.434 mg/L |
| Naphthalene | Non-detect |
| o-Toluidine | 1.852 mg/L |
| 2-Methylnaphalene | Non-detect |
| 2,4,5-Trimethylamine | 2.048 mg/L |
| Oil and Grease | 0.619 mg/L |

Waste streams other than produced wastewater and well treatment, completion, and workover fluids were not evaluated for the need of individual toxic water quality-based effluent limitations based on either the waste stream being proposed for discharge is not expected to contain toxic pollutants or there is no available data to assess such discharges. Drilling fluids and associated drill cuttings are properly addressed for toxic impacts via technology-based toxicity requirements discussed in the technology-based effluent limitations section of this fact sheet. As discussed in Section X of this fact sheet, a previous version of EPA’s NPDES General Permit No. GMG290000 required studies of water-based muds to assess potential toxicity of this discharge. The 2015 study entitled “OOC Produced Water and Water Based Mud Characterization Study” assessed the aquatic life chronic toxicity impacts of water-based muds in addition to produced wastewater discharges. EPA concluded that the technology-based effluent limitations (established in 40 CFR Part 435, Subpart A) properly addressed toxicity from such discharges (as toxicity testing and limitations are established in this regulation) and TCEQ concurs with that position. Flow limitations for the discharge of water-based drilling fluids and associated drill cuttings are established in this draft state-only discharge general permit consistent with conditions established in EPA’s existing NPDES General Permit No. GMG290000.

**B. Assessment of Barium and Manganese, which Do Not Have Established Water Quality Standards:**

Based on the OOC 30 TAC Chapter 319 metals exception request dated June 10, 2021, which is discussed above in the technology-based effluent limitations section of this fact sheet, TCEQ performed an assessment of not applying these state-wide established limitations and the potential water quality impacts of not applying these limitations for produced wastewater discharges to the Outer Continental Shelf in the Gulf of Mexico. This assessment was in addition to the previously discussed review of OOC-conducted and API-conducted aquatic toxicity and bioaccumulation studies. All metals with criteria established in 30 TAC Chapter 319 have established marine water quality standards in the TSWQS, with the exception of barium and manganese.

TCEQ’s Water Quality Assessment staff conducted research into EPA nationally developed water quality criteria applicable to marine discharges in the state of Texas as well as other available and applicable marine water quality toxicity data.

The following water quality criteria were determined to be applicable to marine water bodies in the State of Texas for aquatic life toxicity and bioaccumulation of metals in marine organisms:

Barium:

Acute Aquatic Life Criteria: 150 mg/L

Chronic Aquatic Life Criteria: 25 mg/L

Human Health Bioaccumulation Criteria: N/A

Manganese:

Acute Aquatic Life Criteria: N/A

Chronic Aquatic Life Criteria: N/A

Human Health Bioaccumulation Criteria: 0.100 mg/L

Calculations are presented in Appendix C of this fact sheet. Based on this assessment and comparing calculated water quality-based effluent limitations against historically reported analytical data, water quality-based effluent limitations are being proposed in the draft state-only discharge general permit for both total barium and total manganese for the discharge of produced wastewater.

1. **Assessment of Dissolved Oxygen Impacts:**
   1. Produced wastewater from offshore oil and gas platforms may contain very high levels of oxygen-demanding substances. Available information from discharges into marine waters of the western Gulf of Mexico, off the shores of Texas and Louisiana, indicates frequent very high concentrations and extreme variability of direct oxygen-demanding substances such as Biochemical Oxygen Demand (BOD) and ammonia-nitrogen (NH3-N). Typically, these discharges undergo minimal, if any, treatment for constituents of this type. In addition, concentrations of dissolved oxygen (DO) in these produced wastewater discharges are often near 0.0 mg/L, according to available sampling data.
   2. Information related to: discharge flow volumes; 5-day Biochemical Oxygen Demand (BOD5) concentrations and loadings; NH3-N concentrations and loadings; and effluent DO concentrations was obtained from regulated facility representatives, including through the OOC. Information was also obtained from a hypoxic zone study conducted by EPA to study how produced wastewater discharges from offshore oil and gas operations may contribute to impacts on the hypoxic zone in the western Gulf of Mexico (offshore of Louisiana and the easternmost portion of Texas jurisdictional waters). Neither the hypoxic zone study nor existing EPA general permits for discharges of produced wastewater from offshore oil and gas platforms included an explicit analysis of potential localized DO impacts in relation to established state or federal water quality DO criterion standards in the vicinity of individual produced wastewater discharges. The TSWQS designates the portion of the Gulf of Mexico within Texas jurisdictional waters as having an Exceptional Aquatic Life Use with a corresponding DO criterion of 5.0 mg/L.
   3. In order to assess the potential for more-localized and near-field DO impacts and to set corresponding effluent limits for this state-only discharge general permit, if necessary, an analysis methodology was developed to represent individual produced wastewater discharges and consider the highly dispersive environment of the open waters of the Gulf of Mexico. This analysis approach included the use of CORMIX modeling in combination with a Continuously Stirred Tank Reactor (CSTR) model to evaluate potential DO impacts for a range of discharge conditions that would fall within the scope of this state-only discharge general permit authorization.
   4. A CORMIX modeling analysis was initially developed (using CORMIX 11.0GTD (Version 11.0.1.0) modeling software), separate from the DO modeling analysis, to determine appropriate Critical Condition dilution factor (percent effluent) values to use in the evaluation of this draft state-only discharge general permit. These percent effluent values were determined for the Zone of Initial Dilution (ZID), the Chronic Aquatic Life Mixing Zone, and the Human Health Mixing Zone. These dilution factors are used for the evaluation of pollutants and other substances typically characteristic of or otherwise anticipated to potentially be present in discharges based on the category of wastewater being discharged.
   5. The details of the CORMIX modeling analysis are available from the Critical Conditions review of this draft state-only discharge general permit which was discussed previously. Only the percent effluent (dilution) values corresponding to the Chronic Aquatic Life Mixing Zone portion of the Critical Conditions review are applicable to this DO modeling analysis. The TSWQS prescribe that certain water quality standards, including those applicable to a water body’s DO criteria, apply at and beyond the edge of the Chronic Aquatic Life Mixing Zone associated with that discharge, which for open-water marine water bodies is typically at a radius of 200 feet from the point of discharge.
   6. The CORMIX modeling analysis included a variety of discharge scenarios indicated to be within the scope of this draft state-only discharge general permit, with percent effluent predictions varying as these modeled parameter details were adjusted. Percent effluent values were derived for many cases other than the final dilution values determined to be most critical from a Critical Conditions review perspective. These fluctuating model conditions included discharge volume, discharge pipe diameter, and water body average depth (within the modeled portion of the water body). Due to the greater density of these produced wastewater discharges compared to the density of the receiving water body, all CORMIX model cases predicted the effluent plume to be negatively buoyant and that it would consequently sink towards the seafloor bottom. The same modeling scenarios and state-only discharge general permit coverage constraints applicable to the CORMIX analysis also apply to the DO modeling analysis, as the CORMIX modeling results are a critical component of the DO modeling analysis.
   7. Analysis conducted under this draft state-only discharge general permit was established to produced wastewater discharges of up to 7000 barrels/day (bbl/day), equivalent to 0.294 million gallons per day (MGD). Furthermore, the DO modeling results are only considered valid for discharges into waters with an average depth of no less than 5 meters (16.4 feet) in the general vicinity of the discharge. The analysis included here and recommended effluent limitations were not modified for the reduced produced wastewater flow of 6000 barrels/day as public comments received were specific to individual toxics and whole effluent toxicity (WET) limitations established in the publicly noticed general permit. See discussion in the formal response to comments (RTC) document prepared to support issuance of the general permit.
   8. For the analysis of this draft state-only discharge general permit, the CORMIX modeling analysis was set up to predict percent effluent values at the edge of the aquatic life mixing zone under a variety of potential discharge condition combinations -- for average depths between 5 and 6 meters, between 6 and 9 meters, between 9 and 12 meters, between 12 and 14 meters, between 14 and 16 meters, and greater than 16 meters; for discharge pipe diameters of 4 inches and 6 inches; and for discharge flowrates of up to 7000 bbl/day.
   9. For the DO modeling analysis, these CORMIX results were then incorporated into a CSTR modeling approach to assess potential DO impacts beyond the edge of the Chronic Aquatic Life Mixing Zone. The CORMIX-predicted percent effluent values were used to establish predicted levels of oxygen-demanding constituents at the edge of the Chronic Aquatic Life Mixing Zone for further analysis of a similar array of DO modeling cases with various combinations of oxygen-demanding constituent concentrations.
   10. The CSTR modeling runs for this state-only discharge general permit were structured to assess discharge scenarios at 500 bbl/day, 1000 bbl/day, 2000 bbl/day, 3000 bbl/day, 4000 bbl/day, 5000 bbl/day, 6000 bbl/day and 7000 bbl/day (using the highest flows for various flow range groupings) paired with the shallowest of the CORMIX depth range groupings (e.g., for the CORMIX percent effluent predicted value representing a 4-inch diameter discharge pipe for a discharge flowrate range between 6000 bbl/day and 7000 bbl/day at a depth range between 9 meters and 12 meters, the corresponding CSTR model run used that percent effluent with a model discharge flow input of 7000 bbl/day (converted to 0.294 MGD) at a model depth of 9 meters). These highest flow/shallowest depth cases represent higher effluent percentages for each modeled flow/depth/pipe diameter scenario and are thus the most pessimistic from a dissolved oxygen modeling perspective. Deeper scenarios did not equate to more pessimistic DO modeling results as is sometimes the case with an end-of-pipe modeling approach, since the deeper scenarios also equated to lower effluent percentages at the edge of the Chronic Aquatic Life Mixing Zone.
   11. In order to establish ambient water quality values to pair with the effluent quality values, an analysis of data from TCEQ SWQM stations located throughout the Gulf of Mexico was performed. The analysis developed values that would represent an approximation of average conditions that could be used in a general permitting approach. A total of 27 SWQM stations were used, some with surface-only data and some with water-column profile data, and some with a mix of both. The water-column profile samples included a mix of both stratified and unstratified conditions, according to SWQM guidance concerning salinity stratification. Periods of record and data quantities also varied considerably by station.
   12. Using this method, generalized representative ambient water quality values were established for use in the CSTR modeling analysis. These values included a summertime temperature (31.03°C), with July, August, and September found to be the three warmest months; median summertime salinity (31.5 ppt); percent DO saturation (93.67%), using only water-column data and taking salinity stratification into account (using either water-column-average values if not stratified or mixed-surface-layer values if stratified); a baseline ambient DO value of 5.85 mg/L, based on the temperature, salinity, and percent DO saturation values; BOD5 (3.0 mg/L); and NH3-N (0.05 mg/L).
   13. Edge-of-mixing-zone concentrations for BOD5, NH3-N, and DO were calculated using the CORMIX percent effluent values for various input combinations of end-of-pipe BOD5 and NH3-N concentrations, based on available oil and gas offshore facility produced wastewater sampling data, paired with calculated edge-of-mixing zone DO concentration values, using an assumed end-of-pipe effluent DO concentration of 0.0 mg/L and an ambient DO concentration of 5.85 mg/L. These edge-of-mixing-zone concentrations were then used as inputs for the CSTR modeling analysis.
   14. The CSTR models were set up consistent with standard open-water CSTR modeling procedures, using 10-acre model cells (three consecutive 10-acre cells), with average depths set in all cells (different depth scenarios) at depths of 5 meters, 6 meters, 9 meters, 12 meters, 14 meters, and 16 meters. Temperature and salinity in the models were set at 31.03°C and 31.5 ppt, respectively, representing summertime conditions, when DO conditions are typically expected to be most pessimistic, at least in terms of factors that can be represented in this modeling approach.
   15. The CORMIX analysis percent effluent calculations included a presumed small ambient flow (due to currents, tidal action, etc.) of 0.05 meters/second (0.164 feet/second). To be additionally conservative, especially considering the generalized nature of this assessment approach, as well as due to limitations of the CSTR model itself, no additional dilution, dispersion, or ambient flow was included in the CSTR portion of the modeling analysis.
   16. The CSTR models were run at various discharge flows, using mass-balance-calculated BOD5, NH3­-N, and DO concentration values, derived from the CORMIX percent effluent calculations, for flows of up to 7000 bbl/day for the analysis of this draft state-only discharge general permit. The most pessimistic CSTR modeling cases in regard to predicted DO impacts were determined to be the combinations of overall highest discharge flows and overall shallowest discharge conditions, which corresponded to the highest predicted percent effluent values from the CORMIX modeling analysis.
   17. It should be noted that the CSTR model is not able to simulate temperature or salinity impacts of these discharges beyond the edge of the Chronic Aquatic Life Mixing Zone. However, mass-balance calculations using the percent effluent calculations with available discharge temperature and salinity values in combination with ambient (summertime) values indicates that resultant temperatures and salinities at the edge of the Chronic Aquatic Life Mixing Zone are expected to remain within the range of observed ambient data and are not expected to have a significant impact on predicted DO concentrations beyond the edge of the Chronic Aquatic Life Mixing Zone.
   18. Comparison of these CSTR DO modeling results with available effluent quality data indicates that inclusion of effluent limits for BOD5 and NH3-N is warranted in the draft state-only discharge general permit. As different combinations of BOD5 and NH3-N effluent limits would achieve similar modeling results, a menu of possible effluent set combinations was discussed with OOC representatives in development of TPDES General Permit No. TXG310000 which is also being proposed to discharge produced wastewater (within three miles of the coastline in the Gulf of Mexico) before the final effluent limit recommendations for the draft TPDES general permit were determined. Based on an increase in produced wastewater flows assessed to 7000 bbl/day in the state-only discharge general permit compared to produced wastewater flows being established in the TPDES TXG310000 general permit, modeling analysis indicated minimal impacts to effluent limitations would occur when adjusting NH3-N to lower levels, thus NH3-N are being proposed in the draft state-only discharge general permit as being proposed in the draft TPDES general permit, and BOD5 values were decreased to meet instream dissolved oxygen standards.
   19. Based on the results of the modeling analysis, end-of-pipe concentration effluent limits of 1,144 mg/L BOD5 and 112 mg/L NH3-N are predicted to be adequate for discharge flows of up to 7000 bbl/day to ensure that dissolved oxygen levels beyond the edge of the Chronic Aquatic Life Mixing Zone will be maintained above the criterion established by the Standards Implementation Team for the Gulf of Mexico (Segment No. 2501) (5.0 mg/L). Other effluent set combinations may also be adequate and can be evaluated in future permitting actions.
   20. Secondary treatment levels for BOD (5-day) and minimum dissolved oxygen effluent limitations discussed in the technology-based section of this fact sheet should ensure protection for instream dissolved oxygen criteria for discharges of domestic waste and sanitary waste authorized under the draft state-only discharge general permit assumed at volumes less than 0.1 MGD. Likewise, additional waste streams authorized under the draft state-only discharge general permit (other than produced wastewater) are not expected to contain elevated levels of oxygen demanding substances, or are only discharged intermittently, thus further analysis of these discharges is not justified.

**D. Assessment of Thermal/Temperature Impacts:**

* 1. Based on new/updated analytical data obtained from the OOC (individual permit application data submitted to RRC) for produced wastewater discharges to the territorial seas that indicated significantly elevated temperature levels (see “Produced Wastewater Data” table above indicating values up to 183 °F), TCEQ performed an assessment on acceptable temperature levels for produced wastewater discharges to the OCS Facilities in the Gulf of Mexico. No temperature assessment was performed by EPA in development of the existing NPDES TXG260000 or GMG290000 general permits.
  2. In order to determine an acceptable produced wastewater temperature at which the TSWQS will not be exceeded at the maximum discharge volume for produced wastewater to the Outer Continental Shelf in the Gulf of Mexico assessed during development of this draft state-only discharge general permit (7000 bbl/day), simple, conservative heat-balance calculations were run. Note, a revised analysis was not conducted for the reduced permitted discharge volume of 6000 bbl/day. The results indicate that an effluent temperature limit of 145 oF is required to ensure TSWQS for temperature are met at the edge of the chronic aquatic life mixing zone. These calculations are based on draft Thermal Evaluation Procedures, which have undergone two revisions based on stakeholder input received from five public meetings as well as initial comments from EPA. Though these procedures are still draft and have not been officially incorporated in the Texas Procedures to Implement the TSWQS (RG-194), in a letter dated April 1, 2020, the EPA agreed to allow their use in development of standard operating procedures (SOPs) to establish permitting controls and conditions for thermal discharges. As stated previously, issuance of this state-only discharge general permit is not under the TPDES program and EPA oversight, however procedures used to develop TPDES permit conditions are being implemented in assessment of issuance of this state-only discharge general permit.
  3. The screening approach in the draft Thermal Procedures uses a risk-based approach. Screening procedures progress from simple, conservative analyses to more complex, site-specific approaches as necessary. In this case, the simple, conservative analysis was used. There are two thermal criteria applicable to this draft state-only discharge general permit - thermal maximum and maximum temperature differential (rise over ambient). The thermal maximum criterion for Segment 2501 is 95 degrees Fahrenheit (F). The maximum differential applicable to Segment 2501 is 4 degrees F September through May, and 1.5 degrees F for June, July, and August. The screening calculations are as follows:
  4. Screening for compliance with Maximum Temperature Criterion:
  5. Equation 1 below compares the maximum temperature at the edge of the chronic aquatic life mixing zone (right side of equation) with the maximum temperature criterion (TC) for Segment 2501 (left side of equation). A permit limit is not usually required when Equation 1 is satisfied (that is, TC> right side of equation).
  6. Equation 1: TC ≥ (EF)(TE) + (1 - EF)(TA)
  7. Where: TC = segment maximum temperature criterion (°F)
  8. EF = effluent fraction at the edge of the aquatic life mixing zone
  9. TE = maximum effluent temperature (°F)
  10. TA = ambient temperature (°F)
  11. The following items explain the variables used in Equation 1:
  12. TC The maximum temperature criterion for the segment is found in Appendix A of the TSWQS.
  13. EF Effluent fraction at the edge of the aquatic life mixing zone as described in the “Mixing Zones and ZIDs for Aquatic Life Protection” in the Procedures to Implement the Texas Surface Water Quality Standards (2010).
  14. TE The effluent temperature is (1) the daily maximum permitted temperature (when evaluating existing limits), (2) the maximum of self-reported temperature data for the months of June, July, and August for the preceding two years of available data (when evaluating the need for a temperature limit when the permit only includes monitoring and reporting requirements), or (3) the expected maximum effluent temperature provided in the permit application.
  15. TA The ambient temperature is initially set at 86.9 °F (30.5 °C), which is the same critical summer temperature used in dissolved oxygen modeling. A site-specific value may be used in lieu of the default temperature by calculating the 90th percentile using ambient temperature data for the months of June, July, and August from the Surface Water Quality Monitoring Information System (SWQMIS) database or other available data.
  16. Screening for compliance with rise over ambient temperature criterion:
  17. Equation 2 below compares the temperature at the edge of the aquatic life mixing zone (right side of equation) with the sum of the ambient temperature (TA) and the rise over ambient temperature criterion (ΔTC) (left side of equation). A permit limit is usually not required when Equation 2 is satisfied (that is, TA + ΔTC > right side of equation).
  18. Equation 2: (TA+ΔTC)≥(EF)(TE)+(1-EF)(TA)
  19. Where: TA = ambient temperature (°F)
  20. ΔTC = rise over ambient temperature criterion (°F)
  21. EF = effluent fraction at the edge of the aquatic life mixing zone
  22. TE = maximum effluent temperature (°F)
  23. The following items explain the variables used in Equation 2:
  24. TA The ambient temperature is initially set at 86.9 °F (30.5 °C), which is the same critical summer temperature used in dissolved oxygen modeling. A site-specific value may be used in lieu of the default temperature by calculating the 90th percentile using ambient temperature data for the months of June, July, and August from the SWQMIS database or other available data.
  25. ΔTC The rise over ambient temperature criteria are found in 30 TAC § 307.4(f). These criteria are water body specific. In this case:
  26. Tidal rivers, bays, and gulf water:
  27. Summer (June, July, and August): 1.5°F
  28. Fall, winter, and spring (September – May): 4°F
  29. EF Effluent fraction at the edge of the aquatic life mixing zone as described in the “Mixing Zones and ZIDs for Aquatic Life Protection” in the Procedures to Implement the Texas Surface Water Quality Standards (2010).
  30. TE The effluent temperature is (1) the daily maximum permitted temperature (when evaluating existing limits), (2) the maximum of self-reported temperature data for the months of June, July, and August for the preceding two years of available data (when evaluating the need for a temperature limit when the permit only includes monitoring and reporting requirements), or (3) the expected maximum effluent temperature provided in the permit application.
  31. Temperature analysis conducted under this draft state-only discharge general permit was performed at discharges of up to 7000 barrels/day (bbl/day), equivalent to 0.294 million gallons per day (MGD).
  32. In order to establish ambient water quality values for use in these two thermal evaluation equations, an analysis of data from TCEQ SWQM stations located throughout the Gulf of Mexico was performed to develop values that would represent an approximation of average conditions that could be used in a general permitting approach. A total of 27 SWQM stations were used: some stations had surface-only data, some stations had water-column profile data, and some stations had a mix of both surface data and water-column profile data. The water-column profile samples included a mix of both stratified and unstratified conditions, according to SWQM guidance concerning salinity stratification. Periods of record and quantities of data also varied considerably by station. The data from the SWQM stations was used to obtain the 90th percentile temperature for June, July, and August in accordance with draft Thermal Evaluation Procedures. As a safeguard, additional data for the 90th and 10th percentiles of the lowest winter temperatures were used in the thermal evaluation calculations.
  33. Effluent temperature data from existing facilities that are currently permitted by EPA and/or RRC showed one outlier temperature of 183°F, with the remaining temperatures less than 150°F. The facility reporting the one data point of 183°F was contacted regarding this temperature value. They indicated that this did not appear to be typical and subsequent data obtained from this facility showed temperatures to be less than 150°F.
  34. A range of temperatures was used in the draft Thermal Procedure equations to determine whether the effluent discharged from produced wastewater facilities would violate TSWQS thermal criteria for discharge flows of up to 7000 bbl/day. The most conservative equation in this case was equation 2, rise over ambient. Based on the results of the draft Thermal Evaluation Procedure equations, it was determined that effluent temperatures up to 145 oF would meet TSWQS temperature criteria for the Gulf of Mexico in Segment 2501 at the edge of the chronic aquatic life mixing zone. To ensure compliance with Segment No. 2501 temperature criteria, an end-of-pipe effluent temperature limit of 145 oF is being proposed for this draft state-only discharge general permit. This temperature effluent limitation is not established in EPA’s existing GMG290000 NPDES general permit. Calculations are provided in Appendix E.
  35. Discharges of waste streams proposed to be authorized in this state-only discharge general permit (with the exception of produced wastewater) are not expected to contain elevated temperature levels, thus no effluent limitations and/or monitoring requirements are proposed in the draft state-only discharge general permit for these discharges.

### E. Assessment of Bacteria:

The TSWQS establish bacteria criteria for water in the state. Specifically, 30 TAC § 307.4(j) establishes criteria for pathogens, 30 TAC § 307.7(b)(1) establishes criteria for contact recreation, and 30 TAC § 307.7(b)(3)(B) establishes bacteria criteria for the protection of oyster waters. The discharges of sanitary waste and domestic waste proposed in the draft state-only discharge general permit have the potential to contain human pathogens and *Enterococci* and Fecal Coliform water quality-based effluent limitations are proposed to control these discharges. 30 TAC § 309.3(h) requires that bacteria effluent limitations be established in discharge permits to water in the state for the discharge of domestic wastewater (sanitary waste and domestic waste proposed in the draft state-only discharge general permit). 30 TAC § 319.9(b) establishes bacteria monitoring frequencies based on permitted flow (for the purpose of this draft state-only discharge general permit, flows are presumed to be less than 0.1 MGD). The TCEQ is proposing to add bacteria water quality-based effluent limitations not contained in existing EPA NPDES General Permit No. GMG290000 for the discharge of domestic waste and sanitary waste. Other waste streams proposed for authorization to discharge under the state-only discharge general permit are not expected to contain bacteria and thus no conditions associated with bacteria requirements are proposed.

**F. Assessment of Dissolved Solids:**

30 TAC § 307.4(g)(1) establishes that concentrations of dissolved minerals such as total dissolved solids (TDS) must be maintained such that uses of receiving waters are not impaired. TCEQ has not established numeric TDS standards in the TSWQS for the Gulf of Mexico. Nor has EPA established such controls in GMG290000 for discharges to the Gulf of Mexico. The TSWQS establishes narrative criteria for dissolved solids and proper restrictions of impacts of discharges to the Gulf of Mexico are established in the draft state-only discharge general permit. TDS effluent limitations are not proposed in the draft state-only discharge general permit. Monitoring and reporting requirements for TDS for the discharge of produced wastewater are proposed in the draft state-only discharge general permit as discussed in the Individual Toxics Assessment (CORMIX analysis) section of this fact sheet.

**G. Whole Effluent Toxicity (WET) Assessment:**

The TSWQS in 30 TAC § 307.6(e) establishes requirements for total toxicity [e.g., whole effluent toxicity (WET)]. This section of the TSWQS establishes WET conditions for both acute and chronic WET. The IPs(RG-194) establish conditions when WET is appropriate or applicable to certain discharges. 30 TAC § 307.6(e)(2)(A) establishes that facilities whose discharges have a significant potential for exerting toxicity in receiving waters as described in the IP’s (RG-194) are required to conduct WET biomonitoring at appropriate dilutions. 30 TAC § 307.6(e)(2)(B) also requires that discharges shall not be acutely toxic to aquatic life, as determined by requiring greater than 50% survival in 100% effluent using a 24-hour acute toxicity test. WET biomonitoring requirements are typically required for continuously flowing discharges or discharges with the potential to exert toxicity in the receiving water body, according to the IP’s(RG-194).

Based on information available to TCEQ, conditions contained in EPA’s existing NPDES General Permit No. GMG290000, TCEQ has determined that there may be pollutants present in a subset of discharges proposed in the draft state-only discharge general permit that may have the potential to cause toxic conditions in the Gulf of Mexico and are required to be controlled via WET conditions.

Produced wastewater; well treatment, completion, and workover fluids; hydrate control fluids; and contaminated miscellaneous discharges authorized for discharge under this draft state-only discharge general permit may be continuously flowing and/or have the potential to exert toxicity in the Gulf of Mexico. Discharges other than those identified above proposed to be authorized for discharge under this draft state-only discharge general permit either are not typically continuously flowing discharges or do not have the potential to exert toxicity in the Gulf of Mexico, and the effluent limitations for pollutants of concern in the draft state-only discharge general permit will preclude toxicity in the Gulf of Mexico. EPA’s effluent limitation guidelines in 40 CFR Part 435, Subpart A specifically include toxicity testing and associated toxicity limitations for the discharge of drilling fluids and associated drill cuttings specific to this unique type of discharge(s) and thus further toxicity assessment is not warranted.

WET limitations proposed in the draft state-only discharge general permit differ from those established in EPA’s existing NPDES General Permit No. GMG290000, as follows:

* Produced wastewater and hydrate control fluids discharges include 7-day chronic sublethal WET limitations as established in EPA’s existing GMG290000. One single 7-day chronic critical dilution (with its associated dilution series) is established in the draft state-only discharge general permit based on a daily average discharge rate of 6000 bbl/day, where EPA’s existing GMG290000 authorized continually varying WET limitations based on the most recent reported flow in monthly DMRs, including produced wastewater flows beyond the 6000 bbl/day flow restriction. 24-hour acute 100% WET limitations are proposed that are not established in EPA’s existing GMG290000 and are consistent with TCEQ practice for permitting discharges of this type of nature. Compliance schedules for existing discharges are established for these WET limitations.
* WET limitations for the discharge of contaminated miscellaneous discharges are proposed in the draft state-only discharge general permit for 24-hour acute tests (100% effluent), as opposed to 48-hour acute tests established in EPA’s existing NPDES General Permit GMG290000 (where 48-hour acute tests include varying dilutions based on varying discharge rate and pipe diameter). This revision is consistent with RG-194 and TCEQ practice where 48-hour acute WET testing is normally reserved for discharges with extremely low dilution percentages that would typically require 7-day chronic WET conditions. Compliance schedules for existing discharges are established for these WET limitations.
* Well treatment, completion, and workover fluids discharges are proposed to require 24-hour acute WET limitations to replace conditions established in EPA’s existing NPDES General Permit No. GMG290000 that prohibit discharges of priority pollutants other than in trace amounts to improve enforceability of the state-only discharge general permit. EPA’s existing NPDES General Permit No. GMG290000 for discharges from OCS facilities includes conditions requiring industry studies on the discharge of these waste streams and the impacts of these discharges to the Gulf of Mexico for acute toxicity. An industry wide study titled “Final Report: Joint Industry Project Study of Well Treatment, Completion, and Workover Effluents”, submitted by Offshore Operators Committee, September 23, 2021 was reviewed by TCEQ and supports the addition of the 24-hour acute WET limitation. The study indicated discharges of these waste streams are short in duration (median duration of one hour) and small in volume (median 473 barrels). EPA’s draft GMG290000 is proposing 48-hour acute WET limitations at varying dilutions specific to each platform which TCEQ does not support in this general permit and specific conditions established for 24-hour acute WET conditions established in the Texas Surface Water Quality Standards. Compliance schedules for existing discharges are established for these WET limitations.
* Compliance schedules justification for WET limitations is provided in the response to comments (RTC) prepared for this general permit as a result of publishing the draft general permit to solicit public comments and public comments received following publication.

WET testing (biomonitoring) is the most direct measure of potential toxicity, which incorporates the effects of synergism of effluent components and receiving stream water quality characteristics. Biomonitoring and WET limitations of a subset of discharges proposed for authorization are, therefore, required as conditions of this draft state-only discharge general permit to control potential toxicity.

**H. Proposed Water Quality-Based Effluent Limitations:**

Water quality-based effluent limitations and monitoring/reporting requirements proposed in the draft state-only discharge general permit based on the TSWQS are established as follows: Note the daily maximum flow limitation for water-based drilling fluids/cuttings is proposed based on conditions established in EPA’s existing NPDES General Permit No. GMG290000, restricted at 1000 bbl/hr and is not based specifically on the TSWQS.

* Produced Wastewater and Hydrate Control Fluids

| Parameter | Daily Maximum | Daily Average |
| --- | --- | --- |
| Flow (MGD) | N/A | 0.252 MGD |
| Carbonaceous Biochemical Oxygen Demand (5-day) | N/A | 1144 mg/L |
| Ammonia (as N) | N/A | 112 mg/L |
| Temperature | 145 °F | N/A |
| Total Dissolved Solids | Report mg/L | N/A |
| Total Barium | 2258 mg/L | 1068 mg/L |
| Benzene | Report mg/L | N/A |
| Total Copper | 0.194 mg/L | 0.092 mg/L |
| Total Manganese | 18.1 mg/L | 8.54 mg/L |
| Total Mercury | Report, mg/L | N/A |
| Total Nickel | Report, mg/L | N/A |
| Total Zinc | 5.40 mg/L | 2.55 mg/L |
| Sublethal Whole Effluent Toxicity (WET) limit (Parameter 51712) *Menidia beryllina* (Chronic NOEC **1**) | 2.1% | 2.1% |
| Sublethal Whole Effluent Toxicity (WET) limit (Parameter 51713) *Americamysis bahia* (Chronic NOEC **1**) | 2.1% | 2.1% |
| Lethal Whole Effluent Toxicity (WET) limit (Parameter 51712) *Menidia beryllina* (24-hour acute LC50 **2**) | > 100% | > 100% |
| Lethal Whole Effluent Toxicity (WET) limit (Parameter 51713) *Americamysis bahia* (24-hour acute LC50 **2**) | > 100% | > 100% |

**1**The NOEC is defined as the greatest effluent dilution at which no significant sublethality is demonstrated. Significant sublethality is defined as a statistically significantly difference between a specified effluent dilution and the control for a sublethal endpoint. The daily maximum limitation established above is a 7-day minimum limitation.

**2** The LC50 (Lethal Concentration 50) is defined as the effluent dilution at which 50% of the organisms survive.

7-day chronic toxicity tests are required to be performed in accordance with protocols described in *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms,* Third Edition (EPA-821-R-02-014). The stipulated test species are appropriate to measure the toxicity of the effluent consistent with the requirements of the state water quality standards. The biomonitoring frequency has been established to reflect the likelihood of ambient toxicity and to provide data representative of the toxic potential of the waste stream discharge. The draft state-only discharge general permit requires five (5) dilutions in addition to the control (0% effluent) to be used in the toxicity tests. These additional effluent concentrations are 0.8%, 1.3%, 1.5%, 2.1%, and 2.7%. The low-flow effluent concentration (critical dilution) is defined as 2.1% effluent. The dilution series outlined above was calculated using a 0.75 factor applied to the critical dilution. The critical dilution is the estimated effluent dilution at the edge of the aquatic life mixing zone. If none of the first four consecutive quarterly tests demonstrates significant lethal or sublethal effects, the permittee may submit this information in writing and, upon approval and submittal of an NOC, reduce the testing frequency to once per six months for the invertebrate test species and once per year for the vertebrate test species. If one or more of the first four consecutive quarterly tests demonstrates significant sublethal effects, the permittee is required by the draft state-only discharge general permit to continue quarterly testing for that species until four consecutive quarterly tests demonstrate no significant sublethal effects. At that time, the permittee may apply for the appropriate testing frequency reduction for that species. If one or more of the first four consecutive quarterly tests demonstrates significant lethal effects, the permittee is required by the draft state-only discharge general permit to continue quarterly testing for that species until the state-only discharge general permit is reissued.

24-hour acute toxicity tests shall be performed in accordance with protocols described in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, Fifth Edition (EPA-821-R-02-012) or the latest revision.

* Well Treatment, Completion, and Workover Fluids

| Parameter | Daily Maximum | Daily Average |
| --- | --- | --- |
| Lethal Whole Effluent Toxicity (WET) limit (Parameter 51712) *Menidia beryllina* (24-hour acute LC50 **1**) | > 100% | > 100% |
| Lethal Whole Effluent Toxicity (WET) limit (Parameter 51713) *Americamysis bahia* (24-hour acute LC50 **1**) | > 100% | > 100% |

1 The LC50 (Lethal Concentration 50) is defined as the effluent dilution at which 50% of the organisms survive.

24-hour acute toxicity tests shall be performed in accordance with protocols described in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, Fifth Edition (EPA-821-R-02-012) or the latest revision.

* Contaminated Miscellaneous Discharges

| Parameter | Daily Maximum | Daily Average |
| --- | --- | --- |
| Lethal Whole Effluent Toxicity (WET) limit (Parameter 51712) *Menidia beryllina* (LC50 1) | > 100% | > 100% |
| Lethal Whole Effluent Toxicity (WET) limit (Parameter 51713) *Americamysis bahia* (Acute LC50 1) | > 100% | > 100% |

1 The LC50 (Lethal Concentration 50) is defined as the effluent dilution at which 50% of the organisms survive.

24-hour acute toxicity tests shall be performed in accordance with protocols described in *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, Fifth Edition (EPA-821-R-02-012) or the latest revision.

* Domestic Waste

| Parameter | Daily Maximum | Daily Average |
| --- | --- | --- |
| Enterococci | 130 cfu or MPN/100 mL | 35 cfu or MPN/100 mL |
| Fecal Coliform | 43 cfu or MPN/100 mL | 14 cfu or MPN/100 mL |

* Sanitary Waste (M10 and M91M)

| Parameter | Daily Maximum | Daily Average |
| --- | --- | --- |
| Enterococci | 130 cfu or MPN/100 mL | 35 cfu or MPN/100 mL |
| Fecal Coliform | 43 cfu or MPN/100 mL | 14 cfu or MPN/100 mL |

* Water-Based Drilling Fluids/Cuttings

| Parameter | Daily Maximum | Daily Average |
| --- | --- | --- |
| Flow (MGD) | 1.008 MGD | N/A |

**I. Anti-degradation review:**

Part II, Section B.3 of the draft state-only discharge general permit states that the Executive Director may require an application for an individual TCEQ discharge permit to authorize a discharge from any activity that will not maintain existing uses of the Gulf of Mexico. Part II, Section B.5 of the draft state-only discharge general permit disallows new sources or new dischargers of constituents of concern to impaired waters (CWA Section 303(d) listed water bodies) unless otherwise allowable under 30 TAC Chapter 305. Part II, Section B.6 of the draft state-only discharge general permit states that the Executive Director may require an applicant to apply for an individual TCEQ discharge permit based on conditions of an approved TMDL and TMDL implementation plan. Part II, Section B.7 of the draft state-only discharge general permit prohibits discharges that would adversely affect a listed endangered or threatened species or its critical habitat. Part II, Section B.11 of the draft state-only discharge general permit prohibits the discharge into areas of biological concern, including marine sanctuaries. Part II, Section B.12 of the draft state-only discharge general permit prohibits the discharge of radioactive materials or substances in excess of the amount regulated by 30 TAC Chapter 336.

In accordance with 30 TAC §307.5, effective as state rule February 7, 2018, and TCEQ’s *IPs* (RG-194), an antidegradation review of this draft state-only discharge general permit was performed in order to ensure that no significant degradation of the Gulf of Mexico will occur and that existing uses will be maintained and protected. It has been preliminarily determined that if the draft state-only discharge general permit requirements are properly implemented, no significant degradation is expected, and existing uses will be maintained and protected.

**XII. Cooling Water Intake Structure Requirements**

As discussed in previous sections of this fact sheet, this state-only discharge permit is not under the TPDES program and EPA oversight. Again, TCEQ intention is to apply all applicable federal requirements under the CWA and NPDES program to operations authorized under this state-only discharge general permit, including requirements related to cooling water intake structures (CWISs).

Section § 316(b) of the CWA requires that the location, design, construction, and capacity of CWISs reflect the Best Technology Available (BTA) for minimizing Impingement Mortality and Entrainment. EPA promulgated 316(b) Phase III regulations at 40 CFR Part 125, Subpart N, which require new offshore oil and gas facilities (including OCS Facilities) to take measures to reduce entrainment and impingement of aquatic life.

316(b) Phase III regulations apply to new facilities which intake 2 million gallons per day of water and use at least 25 percent for cooling. Phase III regulations also apply on a BPJ basis to new and existing facilities which use a CWIS but do not meet these minimum threshold requirements. The facilities which are affected by these requirements include: 1) new facilities which are regulated by the Offshore Subcategory of the Oil and Gas Extraction Point Source Category Effluent Limitation Guidelines in 40 CFR Part 435 and commenced construction after July 17, 2006; and 2) existing facilities which are regulated by the Offshore Subcategory of the Oil and Gas Extraction Point Source Category Effluent Limitation Guidelines in 40 CFR Part 435 and commenced construction on or prior to July 17, 2006. EPA regulations for CWISs for New Offshore Oil and Gas Extraction Facilities under Section 316(b) are established in 40 CFR Part 125, Subpart N, Effluent Guidelines and Standards. In general, EPA’s regulations require operators to submit information demonstrating that 316(b) Phase III facilities will be designed so that the water intake velocity is less than 0.5 feet per second and other measures such as screens are employed to reduce entrainment when feasible. Every new or existing offshore oil and gas facility which meets the criteria above must comply with the CWIS requirements even when more than one facility (new and/or existing) are working at the same site.

The 316(b) Phase III regulations also require baseline and periodic biological monitoring. Baseline monitoring is required to characterize the biological community which could be impacted by the intake of cooling water. Periodic monitoring is intended to measure the number of organisms and types of species entrained in the system. As proposed, the draft state-only discharge general permit will require certain 316(b) Phase III facilities to conduct this biological monitoring. Such a study will need to include sufficient detail to demonstrate the intake structure designs are sufficient to minimize impacts due to entrainment and impingement and that no additional measures are warranted.

TCEQ is proposing to expand CWIS requirements in this draft state-only discharge general permit, as compared to the equivalent EPA’s existing GMG290000 NPDES general permit. EPA’s existing NPDES General Permit No. GMG290000 only applied requirements to new CWIS’s. EPA regulations at 40 CFR § 125.130(c), 40 CFR § 125.90(b), and 40 CFR § 125.91(d) apply to existing and below threshold offshore oil and gas CWIS’s. TCEQ is proposing to subject these operations to requirements established in EPA regulations.

# XIII. Monitoring and Reporting

Monitoring is required by 40 CFR § 122.44(i) for each pollutant limited in a permit to ensure compliance with the permit limitations. The draft state-only discharge general permit has the following criteria established for monitoring.

A. Samples shall be collected, measurements shall be taken, and visual observations shall be made at times and in a manner so as to be representative of the monitored and/or observed discharge. Specific and unique sampling requirements for effluent and stock limitations associated with the discharge of water-based drilling fluids and associated drill cuttings, and drill cuttings associated with non-aqueous drilling fluids are established in the draft state-only discharge general permit.

B. All samples shall be collected according to the latest edition of "Standard Methods for the Examination of Water and Wastewater" (prepared and published jointly by the American Public Health Associa­tion, the American Water Works Association, and the Water Environment Federation), or the EPA’s, "Methods for Chemical Analysis of Water and Wastes" (1979), or the EPA’s, "Biological Field and Laboratory Methods for Measuring the Quality of Surface Waters and Effluents" (1973). The effluent limitations for the observation of free oil, floating solids, and foam are not subject to this condition. Specific and unique sampling requirements for effluent and stock limitations associated with the discharge of water-based drilling fluids and associated drill cuttings, and drill cuttings associated with non-aqueous drilling fluids are established in the draft state-only discharge general permit.

C. Sample containers, holding times, and preservation methods shall either follow the requirements specified in 40 CFR Part 136 or the latest edition of “Standard Methods for the Examination of Water and Wastewater.” The effluent limitations for the observation of free oil, floating solids, and foam are not subject to this condition. Specific and unique sampling requirements for effluent and stock limitations associated with the discharge of water-based drilling fluids and associated drill cuttings, and drill cuttings associated with non-aqueous drilling fluids are established in the draft state-only discharge general permit.

D. The permittee shall ensure that properly trained and authorized personnel monitor, sample, and as applicable, observe the discharge. Specific and unique sampling requirements for effluent and stock limitations associated with the discharge of water-based drilling fluids and associated drill cuttings, and drill cuttings associated with non-aqueous drilling fluids are established in the draft state-only discharge general permit.

E. The sampling point and observation point (as applicable) must be downstream of any treatment unit or treatment technique that is used to improve or otherwise alter the quality of the discharge. Specific and unique sampling requirements for effluent and stock limitations associated with the discharge of water-based drilling fluids and associated drill cuttings, and drill cuttings associated with non-aqueous drilling fluids are established in the draft state-only discharge general permit.

F. Analytical results for determining compliance with effluent and stock limitations shall be submitted to the TCEQ Enforcement Division (MC-224) on an approved form established by the Executive Director. Effluent and stock sampling shall be conducted in accordance with the monitoring frequencies specified in this draft state-only discharge general permit. The Monthly Effluent Report (MER) for any given month shall be due by the 20th day of the following month. The MER for annual testing shall be due by March 31st of the following year. All MERs shall be signed in accordance with the requirements in Part IV.8 of this draft state-only discharge general permit. If non-compliance with a discharge occurs, the permittee shall provide notification according to Part III.B.6 of this state-only general permit.

G. All laboratory tests submitted to demonstrate compliance with this draft state-only discharge general permit must meet the requirements of 30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification. The effluent limitations for the observation of free oil, floating solids, and foam are not subject to this condition. Specific and unique sampling requirements for effluent and stock limitations associated with the discharge of water-based drilling fluids and associated drill cuttings, and drill cuttings associated with non-aqueous drilling fluids are established in the draft state-only discharge general permit which may not be subject to these requirements.

H. Records of monitoring and observation activities shall include:

* 1. date, time, and place of sample, measurement, or observation;
  2. identity of individual who collected the sample, made the measurement, or made the observation;
  3. date and time of laboratory analysis (the effluent limitations for the observation of free oil, floating solids, and foam are not subject to this condition);
  4. identity of the individual and laboratory who performed the analysis (the effluent limitations for the observation of free oil, floating solids, and foam are not subject to this condition);
  5. the technique or method of analysis (the effluent limitations for the observation of free oil, floating solids, and foam are not subject to this condition);
  6. the results of the analysis, measurement, or observation; and
  7. quality assurance/quality control records (the effluent limitations for the observation of free oil, floating solids, and foam are not subject to this condition).

I. If the permittee monitors any pollutant in a discharge or stock material more frequently than required by the draft state-only discharge general permit using approved analytical methods as specified in Part IV.7 of the draft state-only discharge general permit, all results of such monitoring shall be included in the calculation and recording of the values on the MER. Increased frequency of sampling shall be indicated on the MER.

J. Any effluent or stock violation which deviates from the permitted effluent or stock limitation by more than 40% shall be reported by the permittee in writing to the appropriate Regional Office and the Enforcement Division (MC-224) within five working days of becoming aware of the noncompliance.

# XIV. Procedures for Final Decision

According to 30 TAC Chapter 205, *General Permits for Waste Discharges*, when the draft state-only discharge general permit is proposed, notice shall be published, at a minimum, in at least one newspaper of statewide or regional circulation and in the *Texas Register*. The Commission may also publish notice in additional newspapers of statewide or regional circulation. Mailed notice shall also be provided to the following:

* the county judge of the county or counties in which the discharges under the draft state-only discharge general permit could be located;
* if applicable, state and federal agencies for which notice is required in 40 CFR § 124.10(c);
* persons on a relevant mailing list kept under 30 TAC § 39.407, relating to Mailing Lists; and
* any other person the Executive Director or Chief Clerk may elect to include.

After notice of the draft state-only discharge general permit is published in the *Texas Register* and the newspaper(s), the public will have 30 days to provide public comment on the draft state-only discharge general permit.

Any person, agency, or association may make a request for a public meeting on the draft state-only discharge general permit to the Executive Director of the TCEQ before the end of the public comment period. A public meeting will be granted when the Executive Director or Commission determines, on the basis of requests, that a significant degree of public interest in the draft state-only discharge general permit exists. A public meeting is intended for the taking of public comment and is not a contested case proceeding under the Texas Administrative Procedure Act.

If the Executive Director calls a public meeting, the Commission will give notice of the date, time, and place of the meeting, as required by Commission rule. The Executive Director shall prepare a response to all significant public comments on the draft state-only discharge general permit raised during the public comment period. The Executive Director shall make the response available to the public. The draft state-only discharge general permit will then be filed with the Commission to consider final authorization of the draft state-only discharge general permit. The Executive Director’s response to public comment shall be made available to the public and filed with the Chief Clerk at least ten days before the Commission acts on the draft state-only discharge general permit.

# XV. Administrative Record

The following section is a list of the fact sheet citations to applicable statutory or regulatory provisions and appropriate supporting references.

A. NPDES General Permits

NPDES General Permit No. TXG260000 for Discharges from the Offshore Subcategory of the Oil and Gas Extraction Point Source Category to the Territorial Seas effective February 8, 2012.

NPDES General Permit No. GMG290000 for New and Existing Sources and New Discharges in the Offshore Subcategory of the Oil and Gas Extraction Point Source Category for the Western Portion of the Outer Continental Shelf of the Gulf of Mexico effective October 1, 2017.

B. 40 CFR Citations

1. FR Parts 122, 124, 125, 136, and 435

C. TCEQ Rules

1. TAC Chapters 39, 205, 281, 305, 307, 309, 319, 331, 335, and 336

D. Letters/Memoranda/Records of Communication

Letter dated April 1, 2020 from C. Maguire (EPA) to L. Stepney (TCEQ) with attached “Draft Evaluating Thermal Discharges dated July 27, 2017.”

Electronic mail (email) from M. Lutz (J. Conner Consulting, Inc.) to Chris Linendoll (TCEQ) with attached Excel spreadsheet dated May 4, 2021 related to produced wastewater data submitted to RRC for offshore produced wastewater discharges.

Letter dated June 10, 2021 from Greg Southworth, Associate Director, Offshore Operators Committee to Earl Lott, Director, Office of Water, TCEQ.

Letter dated June 17, 2021 from Earl Lott, Director, Office of Water, TCEQ to Greg Southworth, Associate Director, Offshore Operators Committee.

Notice to Oil and Gas Operators, prepared by Texas Railroad Commission of Texas, Oil and Gas Division, dated August 2021.

Letter dated November 22, 2021 from Greg Southworth, Associate Director, Offshore Operators Committee to Earl Lott, Director, Office of Water, TCEQ.

TCEQ Interoffice Memorandum dated September 27, 2022 from J. Michalk (Water Quality Assessment Section) to Industrial Permits Team related to critical conditions assessment and CORMIX modeling at produced water (wastewater) flows at 7000 barrels/day for development of the WQG280000 oil and gas general permit.

TCEQ Interoffice Memorandum dated September 27, 2022 from J. Michalk (Water Quality Assessment Section) to Industrial Permits Team related to dissolved oxygen impact assessment for development of the WQG280000 oil and gas general permit.

TCEQ Interoffice Memorandum dated October 3, 2022 from M. Pfeil (Water Quality Assessment Section) to Industrial Permits Team related to barium/manganese marine water quality criteria for development of the WQG280000 oil and gas general permit.

TCEQ Interoffice Memorandum dated October 6, 2022 from P. Schaefer (Water Quality Assessment Section) to Industrial Permits Team related to temperature/thermal impact assessment for development of the WQG28000 oil and gas general permit.

WQG280000 Antidegradation Review, Interoffice Memorandum from the Standards Implementation Team to Wastewater Permitting Section dated November 29, 2022.

Letter dated June 8, 2023 from M. Lutz, J. Connor Consulting to Office of the Chief Clerk, TCEQ.

Letter dated June 11, 2023 from S. Hamm, W&T Offshore, Inc. to Office of the Chief Clerk, TCEQ.

TCEQ Interoffice Memorandum dated August 3, 2023 from J. Michalk (Water Quality Assessment Section) to Industrial Permits Team related to critical conditions assessment and CORMIX modeling at produced water (wastewater) flows at 6000 barrels/day for development of the WQG280000 oil and gas general permit.

E. Miscellaneous

EPA, National Recommended Water Quality Criteria: 2002, EPA-822-R-02-047, November 2002.

EPA, Quality Criteria for Water 1986 (EPA 440/5-86-001)

TCEQ, *Implementation Procedures of the Texas Surface Water Quality Standards*, (RG-194), January 2010.

“Supplemental Information Report to the 2004 Final Impact Statement, New Source NPDES General Permit for Discharges from the Offshore Subcategory of the Oil and Gas Extraction Point Source Category to the Territorial Seas of Texas (Permit No. TXG260000”, September 2011.

Fact Sheet and Supplemental Information for the Proposed NPDES General Permit for Discharges from the Offshore Subcategory of the Oil and Gas Extraction Point Source Category to the Territorial Seas of Texas (Permit Number TXG260000), October 4, 2011.

Fact Sheet and Supplemental Information for the Final Reissuance of the NPDES General Permit for New and Existing Sources in the Offshore Subcategory of the Oil and Gas Extraction Point Source Category for the Western Portion of the Outer Continental Shelf of the Gulf of Mexico (GMG290000), September 18, 2017.

“Characteristics of Produced Water Discharged to the Gulf of Mexico Hypoxic Zone”, prepared by Environmental Assessment Division Argonne National Laboratory, ANL/EAD/05-3, August 2005.

“OOC Produced Water and Water Based Mud Characterization Study” – Final Report, prepared by Tetra Tech, September 2015.

“Gulf of Mexico Produced Water Bioaccumulation Study”, prepared by Continental Shelf Associates, Inc., April 1997.

Texas Register Publication, 9 TexReg 405, published January 20, 1984, amendments to 31 TAC Section 329.46.

“Barium in Produced Water: Fate and Effects in the Marine Environment”, American Petroleum Institute, September 1995, Publication Number 4633.

CORMIX Model Version 11.0 GTD (Version 11.0.1.0).

CORMIX User Manual (published December 2007 and updated February 2017 by Robert L. Doneker and Gerhard H. Jirka).

TCEQ’s Guidance Manual for Mixing Analyses Using CORMIX (revised on October 2, 2018 by Mark Rudolph, P.E.).

SWQM data for the Gulf of Mexico: TCEQ Surface Water Quality Monitoring Stations (SWQM) in the Gulf of Mexico (Segment No. 2501).

“Analytic Methods for the Oil and Gas Extraction Point Source Category”, U.S. Environmental Protection Agency, Engineering and Analysis Division, EPA-821-R-11-004, December 2011.

“Final Report: Joint Industry Project Study of Well Treatment, Completion, and Workover Effluents”, submitted by Offshore Operators Committee, September 23, 2021.

# Appendix A: Water Quality-Based Effluent Limitations Calculations – Well Treatment, Completion, and Workover Fluids

TEXTOX MENU #5 - BAY OR WIDE TIDAL RIVER

The water quality-based effluent limitations developed below are calculated using:

Table 1, 2014 Texas Surface Water Quality Standards (30 TAC 307) for Saltwater Aquatic Life

Table 2, 2018 Texas Surface Water Quality Standards for Human Health

"Procedures to Implement the Texas Surface Water Quality Standards," TCEQ, June 2010

PERMIT INFORMATION

|  |  |
| --- | --- |
| Permittee Name: | State-Only Outer Continental Shelf Oil and Gas General Permit |
| TCEQ Permit No: | WQG280000 |
| Outfall No: | N/A (Well Treatment/Completion/Workover Fluids |
| Prepared by: | Water Quality Division |
| Date: | 9/22/2020 |

DISCHARGE INFORMATION

|  |  |
| --- | --- |
| Receiving Waterbody: | Gulf of Mexico |
| Segment No: | 2501 |
| TSS (mg/L): | 12 |
| Effluent Flow for Aquatic Life (MGD) | <10 |
| % Effluent for Chronic Aquatic Life (Mixing Zone): | 8 |
| % Effluent for Acute Aquatic Life (ZID): | 30 |
| Oyster Waters? | **Yes** |
| Effluent Flow for Human Health (MGD): | <10 |
| % Effluent for Human Health: | 4 |

CALCULATE DISSOLVED FRACTION (AND ENTER WATER EFFECT RATIO IF APPLICABLE):

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***Estuarine Metal*** | ***Intercept***  ***(b)*** | ***Slope***  ***(m)*** | ***Partition Coefficient (Kp)*** | ***Dissolved Fraction (Cd/Ct)*** | ***Source*** | ***Water Effect Ratio (WER)*** | ***Source*** |
| Aluminum | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Arsenic | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Cadmium | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Chromium (total) | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Chromium (trivalent) | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Chromium (hexavalent) | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Copper | 4.85 | -0.72 | 11830.13 | 0.876 |  | 1.00 | Assumed |
| Lead | 6.06 | -0.85 | 138897.98 | 0.375 |  | 1.00 | Assumed |
| Mercury | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Nickel | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Selenium | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Silver | 5.86 | -0.74 | 115187.64 | 0.420 |  | 1.00 | Assumed |
| Zinc | 5.36 | -0.52 | 62925.37 | 0.570 |  | 1.00 | Assumed |

CALCULATED DAILY AVERAGE AND DAILY MAXIMUM EFFLUENT LIMITATIONS FOR AQUATIC LIFE PROTECTION:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Parameter*** | ***SW Acute***  ***Criterion***  ***(µg/L)*** | ***SW Chronic***  ***Criterion***  ***(µg/L)*** | ***WLAa***  ***(µg/L)*** | ***WLAc***  ***(µg/L)*** | ***LTAa***  ***(µg/L)*** | ***LTAc***  ***(µg/L)*** | ***Daily Avg.***  ***(µg/L)*** | ***Daily Max.***  ***(µg/L)*** |
| Acrolein | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Aldrin | 1.3 | N/A | 4.33 | N/A | 1.39 | N/A | 2.03 | 4.31 |
| Aluminum | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Arsenic | 149 | 78 | 497 | 975 | 159 | 595 | 233 | 494 |
| Cadmium | 40.0 | 8.75 | 133 | 109 | 42.7 | 66.7 | 62.7 | 132 |
| Carbaryl | 613 | N/A | 2043 | N/A | 654 | N/A | 961 | 2033 |
| Chlordane | 0.09 | 0.004 | 0.300 | 0.0500 | 0.0960 | 0.0305 | 0.0448 | 0.0948 |
| Chlorpyrifos | 0.011 | 0.006 | 0.0367 | 0.0750 | 0.0117 | 0.0458 | 0.0172 | 0.0364 |
| Chromium (trivalent) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Chromium (hexavalent) | 1090 | 49.6 | 3633 | 620 | 1163 | 378 | 555 | 1176 |
| Copper | 13.5 | 3.6 | 51.4 | 51.4 | 16.4 | 31.3 | 24.1 | 51.1 |
| Copper (oyster waters) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 51.1 |
| Cyanide (free) | 5.6 | 5.6 | 18.7 | 70.0 | 5.97 | 42.7 | 8.78 | 18.5 |
| 4,4'-DDT | 0.13 | 0.001 | 0.433 | 0.0125 | 0.139 | 0.00763 | 0.0112 | 0.0237 |
| Demeton | N/A | 0.1 | N/A | 1.25 | N/A | 0.763 | 1.12 | 2.37 |
| Diazinon | 0.819 | 0.819 | 2.73 | 10.2 | 0.874 | 6.24 | 1.28 | 2.71 |
| Dicofol [Kelthane] | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Dieldrin | 0.71 | 0.002 | 2.37 | 0.0250 | 0.757 | 0.0153 | 0.0224 | 0.0474 |
| Diuron | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Endosulfan I (*alpha*) | 0.034 | 0.009 | 0.113 | 0.113 | 0.0363 | 0.0686 | 0.0533 | 0.112 |
| Endosulfan II (*beta*) | 0.034 | 0.009 | 0.113 | 0.113 | 0.0363 | 0.0686 | 0.0533 | 0.112 |
| Endosulfan sulfate | 0.034 | 0.009 | 0.113 | 0.113 | 0.0363 | 0.0686 | 0.0533 | 0.112 |
| Endrin | 0.037 | 0.002 | 0.123 | 0.0250 | 0.0395 | 0.0153 | 0.0224 | 0.0474 |
| Guthion [Azinphos Methyl] | N/A | 0.01 | N/A | 0.125 | N/A | 0.0763 | 0.112 | 0.237 |
| Heptachlor | 0.053 | 0.004 | 0.177 | 0.0500 | 0.0565 | 0.0305 | 0.0448 | 0.0948 |
| Hexachlorocyclohexane (*gamma*) [Lindane] | 0.16 | N/A | 0.533 | N/A | 0.171 | N/A | 0.250 | 0.530 |
| Lead | 133 | 5.3 | 1182 | 177 | 378 | 108 | 158 | 335 |
| Malathion | N/A | 0.01 | N/A | 0.125 | N/A | 0.0763 | 0.112 | 0.237 |
| Mercury | 2.1 | 1.1 | 7.00 | 13.8 | 2.24 | 8.39 | 3.29 | 6.96 |
| Methoxychlor | N/A | 0.03 | N/A | 0.375 | N/A | 0.229 | 0.336 | 0.711 |
| Mirex | N/A | 0.001 | N/A | 0.0125 | N/A | 0.00763 | 0.0112 | 0.0237 |
| Nickel | 118 | 13.1 | 393 | 164 | 126 | 99.9 | 146 | 310 |
| Nonylphenol | 7 | 1.7 | 23.3 | 21.3 | 7.47 | 13.0 | 10.9 | 23.2 |
| Parathion (ethyl) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Pentachlorophenol | 15.1 | 9.6 | 50.3 | 120 | 16.1 | 73.2 | 23.6 | 50.0 |
| Phenanthrene | 7.7 | 4.6 | 25.7 | 57.5 | 8.21 | 35.1 | 12.0 | 25.5 |
| Polychlorinated Biphenyls [PCBs] | 10 | 0.03 | 33.3 | 0.375 | 10.7 | 0.229 | 0.336 | 0.711 |
| Selenium | 564 | 136 | 1880 | 1700 | 602 | 1037 | 884 | 1870 |
| Silver | 2 | N/A | 15.9 | N/A | 5.08 | N/A | 7.47 | 15.8 |
| Toxaphene | 0.21 | 0.0002 | 0.700 | 0.00250 | 0.224 | 0.00153 | 0.00224 | 0.00474 |
| Tributyltin [TBT] | 0.24 | 0.0074 | 0.800 | 0.0925 | 0.256 | 0.0564 | 0.0829 | 0.175 |
| 2,4,5 Trichlorophenol | 259 | 12 | 863 | 150 | 276 | 91.5 | 134 | 284 |
| Zinc | 92.7 | 84.2 | 542 | 1847 | 174 | 1127 | 255 | 539 |

CALCULATED DAILY AVERAGE AND DAILY MAXIMUM EFFLUENT LIMITATIONS FOR HUMAN HEALTH PROTECTION:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Parameter*** | ***Fish Only Criterion (µg/L)*** | ***WLAh***  ***(µg/L)*** | ***LTAh***  ***(µg/L)*** | ***Daily Avg. (µg/L)*** | ***Daily Max. (µg/L)*** |
| Acrylonitrile | 115 | 2875 | 2674 | 3930 | 8315 |
| Aldrin | 1.147E-05 | 0.000287 | 0.000267 | 0.000392 | 0.000829 |
| Anthracene | 1317 | 32925 | 30620 | 45011 | 95228 |
| Antimony | 1071 | 26775 | 24901 | 36604 | 77441 |
| Arsenic | N/A | N/A | N/A | N/A | N/A |
| Barium | N/A | N/A | N/A | N/A | N/A |
| Benzene | 581 | 14525 | 13508 | 19857 | 42010 |
| Benzidine | 0.107 | 2.68 | 2.49 | 3.65 | 7.73 |
| Benzo(*a*)anthracene | 0.025 | 0.625 | 0.581 | 0.854 | 1.80 |
| Benzo(*a*)pyrene | 0.0025 | 0.0625 | 0.0581 | 0.0854 | 0.180 |
| Bis(chloromethyl)ether | 0.2745 | 6.86 | 6.38 | 9.38 | 19.8 |
| Bis(2-chloroethyl)ether | 42.83 | 1071 | 996 | 1463 | 3096 |
| Bis(2-ethylhexyl) phthalate [Di(2-ethylhexyl) phthalate] | 7.55 | 189 | 176 | 258 | 545 |
| Bromodichloromethane [Dichlorobromomethane] | 275 | 6875 | 6394 | 9398 | 19884 |
| Bromoform [Tribromomethane] | 1060 | 26500 | 24645 | 36228 | 76645 |
| Cadmium | N/A | N/A | N/A | N/A | N/A |
| Carbon Tetrachloride | 46 | 1150 | 1070 | 1572 | 3326 |
| Chlordane | 0.0025 | 0.0625 | 0.0581 | 0.0854 | 0.180 |
| Chlorobenzene | 2737 | 68425 | 63635 | 93543 | 197905 |
| Chlorodibromomethane [Dibromochloromethane] | 183 | 4575 | 4255 | 6254 | 13232 |
| Chloroform [Trichloromethane] | 7697 | 192425 | 178955 | 263064 | 556550 |
| Chromium (hexavalent) | 502 | 12550 | 11672 | 17157 | 36298 |
| Chrysene | 2.52 | 63.0 | 58.6 | 86.1 | 182 |
| Cresols [Methylphenols] | 9301 | 232525 | 216248 | 317884 | 672532 |
| Cyanide (free) | N/A | N/A | N/A | N/A | N/A |
| 4,4'-DDD | 0.002 | 0.0500 | 0.0465 | 0.0683 | 0.144 |
| 4,4'-DDE | 0.00013 | 0.00325 | 0.00302 | 0.00444 | 0.00939 |
| 4,4'-DDT | 0.0004 | 0.0100 | 0.00930 | 0.0136 | 0.0289 |
| 2,4'-D | N/A | N/A | N/A | N/A | N/A |
| Danitol [Fenpropathrin] | 473 | 11825 | 10997 | 16165 | 34201 |
| 1,2-Dibromoethane [Ethylene Dibromide] | 4.24 | 106 | 98.6 | 144 | 306 |
| *m*-Dichlorobenzene [1,3-Dichlorobenzene] | 595 | 14875 | 13834 | 20335 | 43022 |
| *o*-Dichlorobenzene [1,2-Dichlorobenzene] | 3299 | 82475 | 76702 | 112751 | 238542 |
| *p*-Dichlorobenzene [1,4-Dichlorobenzene] | N/A | N/A | N/A | N/A | N/A |
| 3,3'-Dichlorobenzidine | 2.24 | 56.0 | 52.1 | 76.5 | 161 |
| 1,2-Dichloroethane | 364 | 9100 | 8463 | 12440 | 26319 |
| 1,1-Dichloroethylene [1,1-Dichloroethene] | 55114 | 1377850 | 1281401 | 1883658 | 3985155 |
| Dichloromethane [Methylene Chloride] | 13333 | 333325 | 309992 | 455688 | 964075 |
| 1,2-Dichloropropane | 259 | 6475 | 6022 | 8851 | 18727 |
| 1,3-Dichloropropene [1,3-Dichloropropylene] | 119 | 2975 | 2767 | 4067 | 8604 |
| Dicofol [Kelthane] | 0.30 | 7.50 | 6.98 | 10.2 | 21.6 |
| Dieldrin | 2.0E-05 | 0.000500 | 0.000465 | 0.000683 | 0.00144 |
| 2,4-Dimethylphenol | 8436 | 210900 | 196137 | 288321 | 609986 |
| Di-*n*-Butyl Phthalate | 92.4 | 2310 | 2148 | 3158 | 6681 |
| Dioxins/Furans [TCDD Equivalents] | 7.97E-08 | 0.0000020 | 0.0000019 | 0.0000027 | 0.0000058 |
| Endrin | 0.02 | 0.500 | 0.465 | 0.683 | 1.44 |
| Epichlorohydrin | 2013 | 50325 | 46802 | 68799 | 145554 |
| Ethylbenzene | 1867 | 46675 | 43408 | 63809 | 134998 |
| Ethylene Glycol | 1.68E+07 | 420000000 | 390600000 | 574182000 | 1214766000 |
| Fluoride | N/A | N/A | N/A | N/A | N/A |
| Heptachlor | 0.0001 | 0.00250 | 0.00233 | 0.00341 | 0.00723 |
| Heptachlor Epoxide | 0.00029 | 0.00725 | 0.00674 | 0.00991 | 0.0209 |
| Hexachlorobenzene | 0.00068 | 0.0170 | 0.0158 | 0.0232 | 0.0491 |
| Hexachlorobutadiene | 0.22 | 5.50 | 5.12 | 7.51 | 15.9 |
| Hexachlorocyclohexane (*alpha*) | 0.0084 | 0.210 | 0.195 | 0.287 | 0.607 |
| Hexachlorocyclohexane (*beta*) | 0.26 | 6.50 | 6.05 | 8.88 | 18.7 |
| Hexachlorocyclohexane (*gamma*) [Lindane] | 0.341 | 8.53 | 7.93 | 11.6 | 24.6 |
| Hexachlorocyclopentadiene | 11.6 | 290 | 270 | 396 | 838 |
| Hexachloroethane | 2.33 | 58.3 | 54.2 | 79.6 | 168 |
| Hexachlorophene | 2.90 | 72.5 | 67.4 | 99.1 | 209 |
| 4,4'-Isopropylidenediphenol [Bisphenol A] | 15982 | 399550 | 371582 | 546224 | 1155618 |
| Lead | 3.83 | 255 | 237 | 349 | 738 |
| Mercury | 0.0250 | 0.625 | 0.581 | 0.854 | 1.80 |
| Methoxychlor | 3.0 | 75.0 | 69.8 | 102 | 216 |
| Methyl Ethyl Ketone | 9.92E+05 | 24800000 | 23064000 | 33904080 | 71729040 |
| Methyl *tert*-butyl ether [MTBE] | 10482 | 262050 | 243707 | 358248 | 757927 |
| Nickel | 1140 | 28500 | 26505 | 38962 | 82430 |
| Nitrate-Nitrogen (as Total Nitrogen) | N/A | N/A | N/A | N/A | N/A |
| Nitrobenzene | 1873 | 46825 | 43547 | 64014 | 135431 |
| N-Nitrosodiethylamine | 2.1 | 52.5 | 48.8 | 71.7 | 151 |
| N-Nitroso-di-*n*-Butylamine | 4.2 | 105 | 97.7 | 143 | 303 |
| Pentachlorobenzene | 0.355 | 8.88 | 8.25 | 12.1 | 25.6 |
| Pentachlorophenol | 0.29 | 7.25 | 6.74 | 9.91 | 20.9 |
| Polychlorinated Biphenyls [PCBs] | 6.4E-04 | 0.0160 | 0.0149 | 0.0218 | 0.0462 |
| Pyridine | 947 | 23675 | 22018 | 32366 | 68475 |
| Selenium | N/A | N/A | N/A | N/A | N/A |
| 1,2,4,5-Tetrachlorobenzene | 0.24 | 6.00 | 5.58 | 8.20 | 17.3 |
| 1,1,2,2-Tetrachloroethane | 26.35 | 659 | 613 | 900 | 1905 |
| Tetrachloroethylene [Tetrachloroethylene] | 280 | 7000 | 6510 | 9569 | 20246 |
| Thallium | 0.23 | 5.75 | 5.35 | 7.86 | 16.6 |
| Toluene | N/A | N/A | N/A | N/A | N/A |
| Toxaphene | 0.011 | 0.275 | 0.256 | 0.375 | 0.795 |
| 2,4,5-TP [Silvex] | 369 | 9225 | 8579 | 12611 | 26681 |
| 1,1,1-Trichloroethane | 784354 | 19608850 | 18236231 | 26807258 | 56714676 |
| 1,1,2-Trichloroethane | 166 | 4150 | 3860 | 5673 | 12003 |
| Trichloroethylene [Trichloroethene] | 71.9 | 1798 | 1672 | 2457 | 5198 |
| 2,4,5-Trichlorophenol | 1867 | 46675 | 43408 | 63809 | 134998 |
| TTHM [Sum of Total Trihalomethanes] | N/A | N/A | N/A | N/A | N/A |
| Vinyl Chloride | 16.5 | 413 | 384 | 563 | 1193 |

CALCULATED 70% AND 85% OF DAILY AVERAGE EFFLUENT LIMITATIONS FOR AQUATIC LIFE PROTECTION:

|  |  |  |
| --- | --- | --- |
| ***Parameter*** | ***70% of***  ***Daily Avg.***  ***(µg/L)*** | ***85% of***  ***Daily Avg.***  ***(µg/L)*** |
| Acrolein | N/A | N/A |
| Aldrin | 1.42 | 1.73 |
| Aluminum | N/A | N/A |
| Arsenic | 163 | 198 |
| Cadmium | 43.9 | 53.3 |
| Carbaryl | 672 | 817 |
| Chlordane | 0.0313 | 0.0381 |
| Chlorpyrifos | 0.0120 | 0.0146 |
| Chromium (trivalent) | N/A | N/A |
| Chromium (hexavalent) | 389 | 472 |
| Copper | 16.9 | 20.5 |
| Copper (oyster waters) | N/A | N/A |
| Cyanide (free) | 6.14 | 7.46 |
| 4,4'-DDT | 0.00784 | 0.00952 |
| Demeton | 0.784 | 0.952 |
| Diazinon | 0.898 | 1.09 |
| Dicofol [Kelthane] | N/A | N/A |
| Dieldrin | 0.0156 | 0.0190 |
| Diuron | N/A | N/A |
| Endosulfan I (*alpha*) | 0.0373 | 0.0453 |
| Endosulfan II (*beta*) | 0.0373 | 0.0453 |
| Endosulfan sulfate | 0.0373 | 0.0453 |
| Endrin | 0.0156 | 0.0190 |
| Guthion [Azinphos Methyl] | 0.0784 | 0.0952 |
| Heptachlor | 0.0313 | 0.0381 |
| Hexachlorocyclohexane (*gamma*) [Lindane] | 0.175 | 0.213 |
| Lead | 110 | 134 |
| Malathion | 0.0784 | 0.0952 |
| Mercury | 2.30 | 2.79 |
| Methoxychlor | 0.235 | 0.285 |
| Mirex | 0.00784 | 0.00952 |
| Nickel | 102 | 124 |
| Nonylphenol | 7.68 | 9.32 |
| Parathion (ethyl) | N/A | N/A |
| Pentachlorophenol | 16.5 | 20.1 |
| Phenanthrene | 8.45 | 10.2 |
| Polychlorinated Biphenyls [PCBs] | 0.235 | 0.285 |
| Selenium | 619 | 751 |
| Silver | 5.22 | 6.35 |
| Toxaphene | 0.00156 | 0.00190 |
| Tributyltin [TBT] | 0.0580 | 0.0705 |
| 2,4,5 Trichlorophenol | 94.1 | 114 |
| Zinc | 178 | 216 |

CALCULATED 70% AND 85% OF DAILY AVERAGE EFFLUENT LIMITATIONS FOR HUMAN HEALTH PROTECTION:

|  |  |  |
| --- | --- | --- |
| ***Parameter*** | ***70% of***  ***Daily Avg.***  ***(µg/L)*** | ***85% of***  ***Daily Avg.***  ***(µg/L)*** |
| Acrylonitrile | 2751 | 3340 |
| Aldrin | 0.000274 | 0.000333 |
| Anthracene | 31508 | 38260 |
| Antimony | 25622 | 31113 |
| Arsenic | N/A | N/A |
| Barium | N/A | N/A |
| Benzene | 13899 | 16878 |
| Benzidine | 2.55 | 3.10 |
| Benzo(*a*)anthracene | 0.598 | 0.726 |
| Benzo(*a*)pyrene | 0.0598 | 0.0726 |
| Bis(chloromethyl)ether | 6.56 | 7.97 |
| Bis(2-chloroethyl)ether | 1024 | 1244 |
| Bis(2-ethylhexyl) phthalate [Di(2-ethylhexyl) phthalate] | 180 | 219 |
| Bromodichloromethane [Dichlorobromomethane] | 6579 | 7988 |
| Bromoform [Tribromomethane] | 25359 | 30793 |
| Cadmium | N/A | N/A |
| Carbon Tetrachloride | 1100 | 1336 |
| Chlordane | 0.0598 | 0.0726 |
| Chlorobenzene | 65480 | 79512 |
| Chlorodibromomethane [Dibromochloromethane] | 4378 | 5316 |
| Chloroform [Trichloromethane] | 184144 | 223604 |
| Chromium (hexavalent) | 12009 | 14583 |
| Chrysene | 60.2 | 73.2 |
| Cresols [Methylphenols] | 222519 | 270202 |
| Cyanide (free) | N/A | N/A |
| 4,4'-DDD | 0.0478 | 0.0581 |
| 4,4'-DDE | 0.00311 | 0.00377 |
| 4,4'-DDT | 0.00956 | 0.0116 |
| 2,4'-D | N/A | N/A |
| Danitol [Fenpropathrin] | 11316 | 13741 |
| 1,2-Dibromoethane [Ethylene Dibromide] | 101 | 123 |
| *m*-Dichlorobenzene [1,3-Dichlorobenzene] | 14234 | 17285 |
| *o*-Dichlorobenzene [1,2-Dichlorobenzene] | 78926 | 95838 |
| *p*-Dichlorobenzene [1,4-Dichlorobenzene] | N/A | N/A |
| 3,3'-Dichlorobenzidine | 53.5 | 65.0 |
| 1,2-Dichloroethane | 8708 | 10574 |
| 1,1-Dichloroethylene [1,1-Dichloroethene] | 1318561 | 1601109 |
| Dichloromethane [Methylene Chloride] | 318982 | 387335 |
| 1,2-Dichloropropane | 6196 | 7524 |
| 1,3-Dichloropropene [1,3-Dichloropropylene] | 2846 | 3457 |
| Dicofol [Kelthane] | 7.17 | 8.71 |
| Dieldrin | 0.000478 | 0.000581 |
| 2,4-Dimethylphenol | 201824 | 245073 |
| Di-*n*-Butyl Phthalate | 2210 | 2684 |
| Dioxins/Furans [TCDD Equivalents] | 0.0000019 | 0.0000023 |
| Endrin | 0.478 | 0.581 |
| Epichlorohydrin | 48159 | 58479 |
| Ethylbenzene | 44666 | 54237 |
| Ethylene Glycol | 401927400 | 488054700 |
| Fluoride | N/A | N/A |
| Heptachlor | 0.00239 | 0.00290 |
| Heptachlor Epoxide | 0.00693 | 0.00842 |
| Hexachlorobenzene | 0.0162 | 0.0197 |
| Hexachlorobutadiene | 5.26 | 6.39 |
| Hexachlorocyclohexane (*alpha*) | 0.200 | 0.244 |
| Hexachlorocyclohexane (*beta*) | 6.22 | 7.55 |
| Hexachlorocyclohexane (*gamma*) [Lindane] | 8.15 | 9.90 |
| Hexachlorocyclopentadiene | 277 | 336 |
| Hexachloroethane | 55.7 | 67.6 |
| Hexachlorophene | 69.3 | 84.2 |
| 4,4'-Isopropylidenediphenol [Bisphenol A] | 382357 | 464291 |
| Lead | 244 | 296 |
| Mercury | 0.598 | 0.726 |
| Methoxychlor | 71.7 | 87.1 |
| Methyl Ethyl Ketone | 23732856 | 28818468 |
| Methyl *tert*-butyl ether [MTBE] | 250773 | 304511 |
| Nickel | 27273 | 33117 |
| Nitrate-Nitrogen (as Total Nitrogen) | N/A | N/A |
| Nitrobenzene | 44810 | 54412 |
| N-Nitrosodiethylamine | 50.2 | 61.0 |
| N-Nitroso-di-*n*-Butylamine | 100 | 122 |
| Pentachlorobenzene | 8.49 | 10.3 |
| Pentachlorophenol | 6.93 | 8.42 |
| Polychlorinated Biphenyls [PCBs] | 0.0153 | 0.0185 |
| Pyridine | 22656 | 27511 |
| Selenium | N/A | N/A |
| 1,2,4,5-Tetrachlorobenzene | 5.74 | 6.97 |
| 1,1,2,2-Tetrachloroethane | 630 | 765 |
| Tetrachloroethylene [Tetrachloroethylene] | 6698 | 8134 |
| Thallium | 5.50 | 6.68 |
| Toluene | N/A | N/A |
| Toxaphene | 0.263 | 0.319 |
| 2,4,5-TP [Silvex] | 8828 | 10719 |
| 1,1,1-Trichloroethane | 18765081 | 22786170 |
| 1,1,2-Trichloroethane | 3971 | 4822 |
| Trichloroethylene [Trichloroethene] | 1720 | 2088 |
| 2,4,5-Trichlorophenol | 44666 | 54237 |
| TTHM [Sum of Total Trihalomethanes] | N/A | N/A |
| Vinyl Chloride | 394 | 479 |

# Appendix B: Water Quality-Based Effluent Limitations Calculations – Produced Wastewater Discharges

TEXTOX MENU #5 - BAY OR WIDE TIDAL RIVER

The water quality-based effluent limitations developed below are calculated using:

Table 1, 2014 Texas Surface Water Quality Standards (30 TAC 307) for Saltwater Aquatic Life

Table 2, 2018 Texas Surface Water Quality Standards for Human Health

"Procedures to Implement the Texas Surface Water Quality Standards," TCEQ, June 2010

PERMIT INFORMATION

|  |  |
| --- | --- |
| Permittee Name: | State-Only Outer Continental Shelf Oil & Gas General Permit |
| TCEQ Permit No: | WQG280000 |
| Outfall No: | N/A (Produced Wastewater) |
| Prepared by: | Water Quality Division |
| Date: | August 3, 2023 |

DISCHARGE INFORMATION

|  |  |
| --- | --- |
| Receiving Waterbody: | Gulf of Mexico |
| Segment No: | 2501 |
| TSS (mg/L): | 12 |
| Effluent Flow for Aquatic Life (MGD) | 0.252 |
| % Effluent for Chronic Aquatic Life (Mixing Zone): | 2.1 |
| % Effluent for Acute Aquatic Life (ZID): | 3 |
| Oyster Waters? | **yes** |
| Effluent Flow for Human Health (MGD): | 0.252 |
| % Effluent for Human Health: | 1.6 |

CALCULATE DISSOLVED FRACTION (AND ENTER WATER EFFECT RATIO IF APPLICABLE):

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***Estuarine Metal*** | ***Intercept (b)*** | ***Slope (m)*** | ***Partition Coefficient (Kp)*** | ***Dissolved Fraction (Cd/Ct)*** | ***Source*** | ***Water Effect Ratio (WER)*** | ***Source*** |
| Aluminum | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Arsenic | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Cadmium | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Chromium (total) | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Chromium (trivalent) | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Chromium (hexavalent) | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Copper | 4.85 | -0.72 | 11830.13 | 0.876 |  | 1.00 | Assumed |
| Lead | 6.06 | -0.85 | 138897.98 | 0.375 |  | 1.00 | Assumed |
| Mercury | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Nickel | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Selenium | N/A | N/A | N/A | 1.00 | Assumed | 1.00 | Assumed |
| Silver | 5.86 | -0.74 | 115187.64 | 0.420 |  | 1.00 | Assumed |
| Zinc | 5.36 | -0.52 | 62925.37 | 0.570 |  | 1.00 | Assumed |

CALCULATED DAILY AVERAGE AND DAILY MAXIMUM EFFLUENT LIMITATIONS FOR AQUATIC LIFE PROTECTION:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Parameter*** | ***SW Acute Criterion (µg/L)*** | ***SW Chronic Criterion (µg/L)*** | ***WLAa (µg/L)*** | ***WLAc (µg/L)*** | ***LTAa (µg/L)*** | ***LTAc (µg/L)*** | ***Daily Avg. (µg/L)*** | ***Daily Max. (µg/L)*** |
| Acrolein | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Aldrin | 1.3 | N/A | 43.3 | N/A | 13.9 | N/A | 20.3 | 43.1 |
| Aluminum | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Arsenic | 149 | 78 | 4967 | 3714 | 1589 | 2266 | 2336 | 4942 |
| Cadmium | 40.0 | 8.75 | 1333 | 417 | 427 | 254 | 373 | 790 |
| Carbaryl | 613 | N/A | 20433 | N/A | 6539 | N/A | 9611 | 20335 |
| Chlordane | 0.09 | 0.004 | 3.00 | 0.190 | 0.960 | 0.116 | 0.170 | 0.361 |
| Chlorpyrifos | 0.011 | 0.006 | 0.367 | 0.286 | 0.117 | 0.174 | 0.172 | 0.364 |
| Chromium (trivalent) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Chromium (hexavalent) | 1090 | 49.6 | 36333 | 2362 | 11627 | 1441 | 2117 | 4480 |
| Copper | 13.5 | 3.6 | 514 | 196 | 164 | 119 | 175 | 371 |
| Copper (oyster waters) | 3.6 | N/A | 196 | N/A | 62.6 | N/A | 92.0 | 194 |
| Cyanide (free) | 5.6 | 5.6 | 187 | 267 | 59.7 | 163 | 87.8 | 185 |
| 4,4'-DDT | 0.13 | 0.001 | 4.33 | 0.0476 | 1.39 | 0.0290 | 0.0427 | 0.0903 |
| Demeton | N/A | 0.1 | N/A | 4.76 | N/A | 2.90 | 4.27 | 9.03 |
| Diazinon | 0.819 | 0.819 | 27.3 | 39.0 | 8.74 | 23.8 | 12.8 | 27.1 |
| Dicofol [Kelthane] | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Dieldrin | 0.71 | 0.002 | 23.7 | 0.0952 | 7.57 | 0.0581 | 0.0854 | 0.180 |
| Diuron | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Endosulfan I (*alpha*) | 0.034 | 0.009 | 1.13 | 0.429 | 0.363 | 0.261 | 0.384 | 0.813 |
| Endosulfan II (*beta*) | 0.034 | 0.009 | 1.13 | 0.429 | 0.363 | 0.261 | 0.384 | 0.813 |
| Endosulfan sulfate | 0.034 | 0.009 | 1.13 | 0.429 | 0.363 | 0.261 | 0.384 | 0.813 |
| Endrin | 0.037 | 0.002 | 1.23 | 0.0952 | 0.395 | 0.0581 | 0.0854 | 0.180 |
| Guthion [Azinphos Methyl] | N/A | 0.01 | N/A | 0.476 | N/A | 0.290 | 0.427 | 0.903 |
| Heptachlor | 0.053 | 0.004 | 1.77 | 0.190 | 0.565 | 0.116 | 0.170 | 0.361 |
| Hexachlorocyclohexane (*gamma*) [Lindane] | 0.16 | N/A | 5.33 | N/A | 1.71 | N/A | 2.50 | 5.30 |
| Lead | 133 | 5.3 | 11823 | 673 | 3783 | 411 | 603 | 1276 |
| Malathion | N/A | 0.01 | N/A | 0.476 | N/A | 0.290 | 0.427 | 0.903 |
| Mercury | 2.1 | 1.1 | 70.0 | 52.4 | 22.4 | 32.0 | 32.9 | 69.6 |
| Methoxychlor | N/A | 0.03 | N/A | 1.43 | N/A | 0.871 | 1.28 | 2.71 |
| Mirex | N/A | 0.001 | N/A | 0.0476 | N/A | 0.0290 | 0.0427 | 0.0903 |
| Nickel | 118 | 13.1 | 3933 | 624 | 1259 | 381 | 559 | 1183 |
| Nonylphenol | 7 | 1.7 | 233 | 81.0 | 74.7 | 49.4 | 72.5 | 153 |
| Parathion (ethyl) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Pentachlorophenol | 15.1 | 9.6 | 503 | 457 | 161 | 279 | 236 | 500 |
| Phenanthrene | 7.7 | 4.6 | 257 | 219 | 82.1 | 134 | 120 | 255 |
| Polychlorinated Biphenyls [PCBs] | 10 | 0.03 | 333 | 1.43 | 107 | 0.871 | 1.28 | 2.71 |
| Selenium | 564 | 136 | 18800 | 6476 | 6016 | 3950 | 5807 | 12285 |
| Silver | 2 | N/A | 159 | N/A | 50.8 | N/A | 74.7 | 158 |
| Toxaphene | 0.21 | 0.0002 | 7.00 | 0.00952 | 2.24 | 0.00581 | 0.00854 | 0.0180 |
| Tributyltin [TBT] | 0.24 | 0.0074 | 8.00 | 0.352 | 2.56 | 0.215 | 0.315 | 0.668 |
| 2,4,5 Trichlorophenol | 259 | 12 | 8633 | 571 | 2763 | 349 | 512 | 1084 |
| Zinc | 92.7 | 84.2 | 5423 | 7037 | 1735 | 4293 | 2551 | 5397 |

CALCULATED DAILY AVERAGE AND DAILY MAXIMUM EFFLUENT LIMITATIONS FOR HUMAN HEALTH PROTECTION:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Parameter*** | ***Fish Only Criterion (µg/L)*** | ***WLAh (µg/L)*** | ***LTAh (µg/L)*** | ***Daily Avg. (µg/L)*** | ***Daily Max. (µg/L)*** |
| Acrylonitrile | 115 | 7188 | 6684 | 9826 | 20788 |
| Aldrin | 1.147E-05 | 0.000717 | 0.000667 | 0.000980 | 0.00207 |
| Anthracene | 1317 | 82313 | 76551 | 112529 | 238072 |
| Antimony | 1071 | 66938 | 62252 | 91510 | 193603 |
| Arsenic | N/A | N/A | N/A | N/A | N/A |
| Barium | N/A | N/A | N/A | N/A | N/A |
| Benzene | 581 | 36313 | 33771 | 49642 | 105026 |
| Benzidine | 0.107 | 6.69 | 6.22 | 9.14 | 19.3 |
| Benzo(*a*)anthracene | 0.025 | 1.56 | 1.45 | 2.13 | 4.51 |
| Benzo(*a*)pyrene | 0.0025 | 0.156 | 0.145 | 0.213 | 0.451 |
| Bis(chloromethyl)ether | 0.2745 | 17.2 | 16.0 | 23.4 | 49.6 |
| Bis(2-chloroethyl)ether | 42.83 | 2677 | 2489 | 3659 | 7742 |
| Bis(2-ethylhexyl) phthalate [Di(2-ethylhexyl) phthalate] | 7.55 | 472 | 439 | 645 | 1364 |
| Bromodichloromethane [Dichlorobromomethane] | 275 | 17188 | 15984 | 23497 | 49711 |
| Bromoform [Tribromomethane] | 1060 | 66250 | 61613 | 90570 | 191614 |
| Cadmium | N/A | N/A | N/A | N/A | N/A |
| Carbon Tetrachloride | 46 | 2875 | 2674 | 3930 | 8315 |
| Chlordane | 0.0025 | 0.156 | 0.145 | 0.213 | 0.451 |
| Chlorobenzene | 2737 | 171063 | 159088 | 233859 | 494764 |
| Chlorodibromomethane [Dibromochloromethane] | 183 | 11438 | 10637 | 15636 | 33080 |
| Chloroform [Trichloromethane] | 7697 | 481063 | 447388 | 657660 | 1391377 |
| Chromium (hexavalent) | 502 | 31375 | 29179 | 42892 | 90745 |
| Chrysene | 2.52 | 158 | 146 | 215 | 455 |
| Cresols [Methylphenols] | 9301 | 581313 | 540621 | 794712 | 1681330 |
| Cyanide (free) | N/A | N/A | N/A | N/A | N/A |
| 4,4'-DDD | 0.002 | 0.125 | 0.116 | 0.170 | 0.361 |
| 4,4'-DDE | 0.00013 | 0.00813 | 0.00756 | 0.0111 | 0.0234 |
| 4,4'-DDT | 0.0004 | 0.0250 | 0.0233 | 0.0341 | 0.0723 |
| 2,4'-D | N/A | N/A | N/A | N/A | N/A |
| Danitol [Fenpropathrin] | 473 | 29563 | 27493 | 40414 | 85503 |
| 1,2-Dibromoethane [Ethylene Dibromide] | 4.24 | 265 | 246 | 362 | 766 |
| *m*-Dichlorobenzene [1,3-Dichlorobenzene] | 595 | 37188 | 34584 | 50839 | 107557 |
| *o*-Dichlorobenzene [1,2-Dichlorobenzene] | 3299 | 206188 | 191754 | 281878 | 596356 |
| *p*-Dichlorobenzene [1,4-Dichlorobenzene] | N/A | N/A | N/A | N/A | N/A |
| 3,3'-Dichlorobenzidine | 2.24 | 140 | 130 | 191 | 404 |
| 1,2-Dichloroethane | 364 | 22750 | 21158 | 31101 | 65799 |
| 1,1-Dichloroethylene [1,1-Dichloroethene] | 55114 | 3444625 | 3203501 | 4709146 | 9962888 |
| Dichloromethane [Methylene Chloride] | 13333 | 833313 | 774981 | 1139221 | 2410189 |
| 1,2-Dichloropropane | 259 | 16188 | 15054 | 22129 | 46819 |
| 1,3-Dichloropropene [1,3-Dichloropropylene] | 119 | 7438 | 6917 | 10167 | 21511 |
| Dicofol [Kelthane] | 0.30 | 18.8 | 17.4 | 25.6 | 54.2 |
| Dieldrin | 2.0E-05 | 0.00125 | 0.00116 | 0.00170 | 0.00361 |
| 2,4-Dimethylphenol | 8436 | 527250 | 490343 | 720803 | 1524965 |
| Di-*n*-Butyl Phthalate | 92.4 | 5775 | 5371 | 7895 | 16703 |
| Dioxins/Furans [TCDD Equivalents] | 7.97E-08 | 0.0000050 | 0.0000046 | 0.0000068 | 0.0000144 |
| Endrin | 0.02 | 1.25 | 1.16 | 1.70 | 3.61 |
| Epichlorohydrin | 2013 | 125813 | 117006 | 171998 | 363887 |
| Ethylbenzene | 1867 | 116688 | 108519 | 159523 | 337495 |
| Ethylene Glycol | 1.68E+07 | 1050000000 | 976500000 | 1435455000 | 3036915000 |
| Fluoride | N/A | N/A | N/A | N/A | N/A |
| Heptachlor | 0.0001 | 0.00625 | 0.00581 | 0.00854 | 0.0180 |
| Heptachlor Epoxide | 0.00029 | 0.0181 | 0.0169 | 0.0247 | 0.0524 |
| Hexachlorobenzene | 0.00068 | 0.0425 | 0.0395 | 0.0581 | 0.122 |
| Hexachlorobutadiene | 0.22 | 13.8 | 12.8 | 18.7 | 39.7 |
| Hexachlorocyclohexane (*alpha*) | 0.0084 | 0.525 | 0.488 | 0.717 | 1.51 |
| Hexachlorocyclohexane (*beta*) | 0.26 | 16.3 | 15.1 | 22.2 | 46.9 |
| Hexachlorocyclohexane (*gamma*) [Lindane] | 0.341 | 21.3 | 19.8 | 29.1 | 61.6 |
| Hexachlorocyclopentadiene | 11.6 | 725 | 674 | 991 | 2096 |
| Hexachloroethane | 2.33 | 146 | 135 | 199 | 421 |
| Hexachlorophene | 2.90 | 181 | 169 | 247 | 524 |
| 4,4'-Isopropylidenediphenol [Bisphenol A] | 15982 | 998875 | 928954 | 1365562 | 2889046 |
| Lead | 3.83 | 638 | 594 | 872 | 1846 |
| Mercury | 0.0250 | 1.56 | 1.45 | 2.13 | 4.51 |
| Methoxychlor | 3.0 | 188 | 174 | 256 | 542 |
| Methyl Ethyl Ketone | 9.92E+05 | 62000000 | 57660000 | 84760200 | 179322600 |
| Methyl *tert*-butyl ether [MTBE] | 10482 | 655125 | 609266 | 895621 | 1894818 |
| Nickel | 1140 | 71250 | 66263 | 97405 | 206076 |
| Nitrate-Nitrogen (as Total Nitrogen) | N/A | N/A | N/A | N/A | N/A |
| Nitrobenzene | 1873 | 117063 | 108868 | 160036 | 338579 |
| N-Nitrosodiethylamine | 2.1 | 131 | 122 | 179 | 379 |
| N-Nitroso-di-*n*-Butylamine | 4.2 | 263 | 244 | 358 | 759 |
| Pentachlorobenzene | 0.355 | 22.2 | 20.6 | 30.3 | 64.1 |
| Pentachlorophenol | 0.29 | 18.1 | 16.9 | 24.7 | 52.4 |
| Polychlorinated Biphenyls [PCBs] | 6.4E-04 | 0.0400 | 0.0372 | 0.0546 | 0.115 |
| Pyridine | 947 | 59188 | 55044 | 80915 | 171188 |
| Selenium | N/A | N/A | N/A | N/A | N/A |
| 1,2,4,5-Tetrachlorobenzene | 0.24 | 15.0 | 14.0 | 20.5 | 43.3 |
| 1,1,2,2-Tetrachloroethane | 26.35 | 1647 | 1532 | 2251 | 4763 |
| Tetrachloroethylene [Tetrachloroethylene] | 280 | 17500 | 16275 | 23924 | 50615 |
| Thallium | 0.23 | 14.4 | 13.4 | 19.6 | 41.5 |
| Toluene | N/A | N/A | N/A | N/A | N/A |
| Toxaphene | 0.011 | 0.688 | 0.639 | 0.939 | 1.98 |
| 2,4,5-TP [Silvex] | 369 | 23063 | 21448 | 31528 | 66703 |
| 1,1,1-Trichloroethane | 784354 | 49022125 | 45590576 | 67018147 | 141786692 |
| 1,1,2-Trichloroethane | 166 | 10375 | 9649 | 14183 | 30007 |
| Trichloroethylene [Trichloroethene] | 71.9 | 4494 | 4179 | 6143 | 12997 |
| 2,4,5-Trichlorophenol | 1867 | 116688 | 108519 | 159523 | 337495 |
| TTHM [Sum of Total Trihalomethanes] | N/A | N/A | N/A | N/A | N/A |
| Vinyl Chloride | 16.5 | 1031 | 959 | 1409 | 2982 |

CALCULATED 70% AND 85% OF DAILY AVERAGE EFFLUENT LIMITATIONS FOR AQUATIC LIFE PROTECTION:

|  |  |  |
| --- | --- | --- |
| ***Parameter*** | ***70% of Daily Avg. (µg/L)*** | ***85% of Daily Avg. (µg/L)*** |
| Acrolein | N/A | N/A |
| Aldrin | 14.2 | 17.3 |
| Aluminum | N/A | N/A |
| Arsenic | 1635 | 1985 |
| Cadmium | 261 | 317 |
| Carbaryl | 6728 | 8170 |
| Chlordane | 0.119 | 0.145 |
| Chlorpyrifos | 0.120 | 0.146 |
| Chromium (trivalent) | N/A | N/A |
| Chromium (hexavalent) | 1482 | 1800 |
| Copper | 122 | 149 |
| Copper (oyster waters) | 64.4 | 78.2 |
| Cyanide (free) | 61.4 | 74.6 |
| 4,4'-DDT | 0.0298 | 0.0362 |
| Demeton | 2.98 | 3.62 |
| Diazinon | 8.98 | 10.9 |
| Dicofol [Kelthane] | N/A | N/A |
| Dieldrin | 0.0597 | 0.0725 |
| Diuron | N/A | N/A |
| Endosulfan I (*alpha*) | 0.269 | 0.326 |
| Endosulfan II (*beta*) | 0.269 | 0.326 |
| Endosulfan sulfate | 0.269 | 0.326 |
| Endrin | 0.0597 | 0.0725 |
| Guthion [Azinphos Methyl] | 0.298 | 0.362 |
| Heptachlor | 0.119 | 0.145 |
| Hexachlorocyclohexane (*gamma*) [Lindane] | 1.75 | 2.13 |
| Lead | 422 | 512 |
| Malathion | 0.298 | 0.362 |
| Mercury | 23.0 | 27.9 |
| Methoxychlor | 0.896 | 1.08 |
| Mirex | 0.0298 | 0.0362 |
| Nickel | 391 | 475 |
| Nonylphenol | 50.8 | 61.7 |
| Parathion (ethyl) | N/A | N/A |
| Pentachlorophenol | 165 | 201 |
| Phenanthrene | 84.5 | 102 |
| Polychlorinated Biphenyls [PCBs] | 0.896 | 1.08 |
| Selenium | 4065 | 4936 |
| Silver | 52.2 | 63.5 |
| Toxaphene | 0.00597 | 0.00725 |
| Tributyltin [TBT] | 0.221 | 0.268 |
| 2,4,5 Trichlorophenol | 358 | 435 |
| Zinc | 1785 | 2168 |

CALCULATED 70% AND 85% OF DAILY AVERAGE EFFLUENT LIMITATIONS FOR HUMAN HEALTH PROTECTION:

|  |  |  |
| --- | --- | --- |
| ***Parameter*** | ***70% of Daily Avg. (µg/L)*** | ***85% of***  ***Daily Avg. (µg/L)*** |
| Acrylonitrile | 6878 | 8352 |
| Aldrin | 0.000686 | 0.000833 |
| Anthracene | 78770 | 95650 |
| Antimony | 64057 | 77783 |
| Arsenic | N/A | N/A |
| Barium | N/A | N/A |
| Benzene | 34749 | 42196 |
| Benzidine | 6.39 | 7.77 |
| Benzo(*a*)anthracene | 1.49 | 1.81 |
| Benzo(*a*)pyrene | 0.149 | 0.181 |
| Bis(chloromethyl)ether | 16.4 | 19.9 |
| Bis(2-chloroethyl)ether | 2561 | 3110 |
| Bis(2-ethylhexyl) phthalate [Di(2-ethylhexyl) phthalate] | 451 | 548 |
| Bromodichloromethane [Dichlorobromomethane] | 16447 | 19972 |
| Bromoform [Tribromomethane] | 63399 | 76984 |
| Cadmium | N/A | N/A |
| Carbon Tetrachloride | 2751 | 3340 |
| Chlordane | 0.149 | 0.181 |
| Chlorobenzene | 163701 | 198780 |
| Chlorodibromomethane [Dibromochloromethane] | 10945 | 13290 |
| Chloroform [Trichloromethane] | 460362 | 559011 |
| Chromium (hexavalent) | 30024 | 36458 |
| Chrysene | 150 | 183 |
| Cresols [Methylphenols] | 556298 | 675505 |
| Cyanide (free) | N/A | N/A |
| 4,4'-DDD | 0.119 | 0.145 |
| 4,4'-DDE | 0.00777 | 0.00944 |
| 4,4'-DDT | 0.0239 | 0.0290 |
| 2,4'-D | N/A | N/A |
| Danitol [Fenpropathrin] | 28290 | 34352 |
| 1,2-Dibromoethane [Ethylene Dibromide] | 253 | 307 |
| *m*-Dichlorobenzene [1,3-Dichlorobenzene] | 35587 | 43213 |
| *o*-Dichlorobenzene [1,2-Dichlorobenzene] | 197315 | 239597 |
| *p*-Dichlorobenzene [1,4-Dichlorobenzene] | N/A | N/A |
| 3,3'-Dichlorobenzidine | 133 | 162 |
| 1,2-Dichloroethane | 21771 | 26436 |
| 1,1-Dichloroethylene [1,1-Dichloroethene] | 3296402 | 4002774 |
| Dichloromethane [Methylene Chloride] | 797455 | 968338 |
| 1,2-Dichloropropane | 15490 | 18810 |
| 1,3-Dichloropropene [1,3-Dichloropropylene] | 7117 | 8642 |
| Dicofol [Kelthane] | 17.9 | 21.7 |
| Dieldrin | 0.00119 | 0.00145 |
| 2,4-Dimethylphenol | 504562 | 612682 |
| Di-*n*-Butyl Phthalate | 5526 | 6710 |
| Dioxins/Furans [TCDD Equivalents] | 0.0000048 | 0.0000058 |
| Endrin | 1.19 | 1.45 |
| Epichlorohydrin | 120398 | 146198 |
| Ethylbenzene | 111666 | 135594 |
| Ethylene Glycol | 1004818500 | 1220136750 |
| Fluoride | N/A | N/A |
| Heptachlor | 0.00598 | 0.00726 |
| Heptachlor Epoxide | 0.0173 | 0.0210 |
| Hexachlorobenzene | 0.0406 | 0.0493 |
| Hexachlorobutadiene | 13.1 | 15.9 |
| Hexachlorocyclohexane (*alpha*) | 0.502 | 0.610 |
| Hexachlorocyclohexane (*beta*) | 15.5 | 18.8 |
| Hexachlorocyclohexane (*gamma*) [Lindane] | 20.3 | 24.7 |
| Hexachlorocyclopentadiene | 693 | 842 |
| Hexachloroethane | 139 | 169 |
| Hexachlorophene | 173 | 210 |
| 4,4'-Isopropylidenediphenol [Bisphenol A] | 955893 | 1160727 |
| Lead | 610 | 741 |
| Mercury | 1.49 | 1.81 |
| Methoxychlor | 179 | 217 |
| Methyl Ethyl Ketone | 59332140 | 72046170 |
| Methyl *tert*-butyl ether [MTBE] | 626934 | 761278 |
| Nickel | 68184 | 82794 |
| Nitrate-Nitrogen (as Total Nitrogen) | N/A | N/A |
| Nitrobenzene | 112025 | 136030 |
| N-Nitrosodiethylamine | 125 | 152 |
| N-Nitroso-di-*n*-Butylamine | 251 | 305 |
| Pentachlorobenzene | 21.2 | 25.7 |
| Pentachlorophenol | 17.3 | 21.0 |
| Polychlorinated Biphenyls [PCBs] | 0.0382 | 0.0464 |
| Pyridine | 56640 | 68777 |
| Selenium | N/A | N/A |
| 1,2,4,5-Tetrachlorobenzene | 14.3 | 17.4 |
| 1,1,2,2-Tetrachloroethane | 1576 | 1913 |
| Tetrachloroethylene [Tetrachloroethylene] | 16746 | 20335 |
| Thallium | 13.7 | 16.7 |
| Toluene | N/A | N/A |
| Toxaphene | 0.657 | 0.798 |
| 2,4,5-TP [Silvex] | 22070 | 26799 |
| 1,1,1-Trichloroethane | 46912702 | 56965425 |
| 1,1,2-Trichloroethane | 9928 | 12056 |
| Trichloroethylene [Trichloroethene] | 4300 | 5221 |
| 2,4,5-Trichlorophenol | 111666 | 135594 |
| TTHM [Sum of Total Trihalomethanes] | N/A | N/A |
| Vinyl Chloride | 986 | 1198 |

# Appendix C: Water Quality-Based Effluent Limitations Calculations – Produced Wastewater Discharges (Barium and Manganese)

* 1. TEXTOX MENU #5 - BAY OR WIDE TIDAL RIVER
  2. The water quality-based effluent limitations developed below are calculated using:
  3. Table 1, 2014 Texas Surface Water Quality Standards (30 TAC 307) for Saltwater Aquatic Life
  4. Table 2, 2018 Texas Surface Water Quality Standards for Human Health
  5. "Procedures to Implement the Texas Surface Water Quality Standards," TCEQ, June 2010

PERMIT INFORMATION

|  |  |
| --- | --- |
| Permittee Name: | State-Only Outer Continental Shelf Oil and Gas General Permit |
| TPDES Permit No: | WQG280000 |
| Prepared by: | Water Quality Division |
| Date: | August 3, 2023 |

DISCHARGE INFORMATION

|  |  |
| --- | --- |
| % Effluent for Chronic Aquatic Life (Mixing Zone): | 2.1 |
| % Effluent for Acute Aquatic Life (ZID): | 3 |
| % Effluent for Human Health: | 1.6 |

CALCULATED DAILY AVERAGE AND DAILY MAXIMUM EFFLUENT LIMITATIONS FOR AQUATIC LIFE PROTECTION:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***Parameter*** | ***SW Acute Criterion (µg/L)*** | ***SW Chronic Criterion (µg/L)*** | ***WLAa (µg/L)*** | ***WLAc (µg/L)*** | ***LTAa (µg/L)*** | ***LTAc (µg/L)*** | ***Daily Avg. (µg/L)*** | ***Daily Max. (µg/L)*** |
| Barium | 150,000 | 25,000 | 5,000,000 | 1,190,476 | 1,600,000 | 726,190 | 1,067,500 | 2,258,452 |

CALCULATED DAILY AVERAGE AND DAILY MAXIMUM EFFLUENT LIMITATIONS FOR HUMAN HEALTH PROTECTION:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Parameter*** | ***Fish Only***  ***Criterion***  ***(µg/L)*** | ***WLAh***  ***(µg/L)*** | ***LTAh***  ***(µg/L)*** | ***Daily Avg.***  ***(µg/L)*** | ***Daily Max.***  ***(µg/L)*** |
| Manganese | 100 | 6,250 | 5,813 | 8,544 | 18,077 |

SCREENING VALUES (70% AND 85% OF DAILY AVERAGE EFFLUENT LIMITATIONS):

|  |  |  |
| --- | --- | --- |
| **Aquatic Life**  ***Parameter*** | ***70% of Daily Avg.***  ***(µg/L)*** | ***85% of Daily Avg.***  ***(µg/L)*** |
| Barium | 747,250 | 907,375 |

|  |  |  |
| --- | --- | --- |
| **Human Health**  ***Parameter*** | ***70% of Daily Avg.***  ***(µg/L)*** | ***85% of Daily Avg.***  ***(µg/L)*** |
| Manganese | 5,981 | 7,263 |

**Calculated Limitations:**

Barium:

Daily Average = 1,067,500 µg/L / 1,000 µg/L/ mg = **1,068 mg/L**

Daily Maximum = 2,258,452 / 1,000 µg/L/ mg = **2,259 mg/L**

Manganese:

Daily Average = 8,544 µg/L/ 1,000 µg/L/ mg = **8.54 mg/L**

Daily Maximum = 18,077 µg/L/ 1,000 µg/L/ mg = **18.08 mg/L**

# Appendix D: Saltwater pH screening for – Produced Wastewater from oil and gas facilities

pH screening. Calculation of pH of a mixture in seawater.

# Appendix E: Water Thermal Evaluation Sheet

Equation 1- Compliance with the Maximum Temperature Criterion:

| Equation | Left Side Equation | Right Side Equation |  |
| --- | --- | --- | --- |
| TC ≥ (Ef)(TE) + (1 - Ef)(TA) | ≥ 95 ˚F | 88.17728 ˚F | True |

| Variable | Value |
| --- | --- |
| TC (Segment maximum temperature criterion): | 95˚F **[[1]](#footnote-1)** |
| EF (Effluent fraction at the edge of the mixing zone): | 0.024 **[[2]](#footnote-2)** |
| TE (Maximum effluent temperature): | 145 ˚F |
| TA (Ambient temperature): | 86.78 ˚F **[[3]](#footnote-3)** |
| TA January/Feb.: | 62.6 ˚F [[4]](#footnote-4) |
| TA January: | 45.5 ˚F [[5]](#footnote-5) |

Equation 2: Compliance With Rise Over Ambient:

| Equation |  | Left Side Equation | Right Side Equation |  |
| --- | --- | --- | --- | --- |
| (TA+ΔTC)≥(EF)(TE)+(1-EF)(TA) | Summer | 88.28 ˚F ≥ | 88.17728 ˚F | True |
| (TA+ΔTC)≥(EF)(TE)+(1-EF)(TA) | Winter | 90.78 ˚F ≥ | 88.17728 ˚F | True |

| Variable | Value |
| --- | --- |
| ΔTC June, July, August **[[6]](#footnote-6)** | 1.5 ˚F |
| ΔTC Sept. – May **[[7]](#footnote-7)** | 4 ˚F |

A range of possible effluent temperatures was evaluated. The most stringent equation in this case is rise over ambient and that equation indicates that the temperature criterion will be met at effluent temperatures up to 145 degrees F.

| SOP [[8]](#footnote-8) | Winter (Summer Ambient) | 90.78 ˚F ≥ | 88.17728 ˚F | True |
| --- | --- | --- | --- | --- |
| Non-SOP **[[9]](#footnote-9)** | Winter (90th Percentile) | 66.6 ˚F ≥ | 64.5776 ˚F | True |
| Non-SOP **[[10]](#footnote-10)** | Winter (10th Percentile) | 49.5 ˚F ≥ | 47.888 ˚F | True |

| Month | 90th Percentile Temperature | 90th Percentile Temperature |
| --- | --- | --- |
| June | 29.7 °C | 85.46 °F |
| July | 30.6 °C | 87.08 °F |
| August | 31 °C | 87.8 °F |
| Average June-August | 30.43333333°C | 86.78 °F |

| Month | 10th Percentile Temperature | 10th Percentile Temperature |
| --- | --- | --- |
| January | 7.5 °C | 45.5 °F |

| Month | 90th Percentile Temperature. | 90th Percentile Temperature |
| --- | --- | --- |
| January | 17 °C | 62.6 °F |
| February | 17 °C | 62.6 °F |
| Average | 17 °C | 62.6 °F |

1. From Appendix A TSWQS. [↑](#footnote-ref-1)
2. 2.4% is highest percent effluent at edge of aquatic life mizing zone based on a September 27, 2022 critical conditions memo. [↑](#footnote-ref-2)
3. 90th percentile of gulf temperatures for June July and August. [↑](#footnote-ref-3)
4. 90th percentile winter temperature. [↑](#footnote-ref-4)
5. 10th percentile winter temperature. [↑](#footnote-ref-5)
6. From TSWQS. [↑](#footnote-ref-6)
7. From TSWQS. [↑](#footnote-ref-7)
8. Rise over ambient checked per thermal evaluation SOPs using 90th percentile summer temperature. [↑](#footnote-ref-8)
9. Rise over ambient checked using 90th percentile temperature from January and February. [↑](#footnote-ref-9)
10. Rise over ambient checked using 10th percentile temperature from January (month with coldest average temperatures). [↑](#footnote-ref-10)