

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

U.S. Environmental Protection Agency  
Region 6  
1445 Ross Ave.  
Dallas, TX 75202

**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 (TXG260000)**

**AGENCY:** Environmental Protection Agency  
**ACTION:** Notice of Proposed NPDES General Permit Issuance

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**SUMMARY:** The Director of the Water Quality Protection Division, EPA Region 6 today proposes to issue a National Pollutant Discharge Elimination System (NPDES) general permit No. TXG260000 for existing source facilities and New Source facilities in the Offshore Subcategory of the Oil and Gas Extraction Point Source Category (40 CFR Part 435, Subpart A) located in and discharging to lease blocks in the territorial seas offshore of Texas. The discharge of produced water to the Territorial Seas of Texas from Offshore Subcategory facilities located in the Outer Continental Shelf waters is proposed not to be authorized by this permit. The draft permit also proposes to add monitoring requirements for priority pollutants and radium contributed by produced water. The draft permit also proposes for zero discharge of produced water from new production wells.

The permit limitations conform to Oil and Gas Offshore Subcategory Guidelines and contain additional requirements to assure that state water quality standards will be met and that there will be no unreasonable degradation of the marine environment, as required by Section 403(c) of the Clean Water Act. Specifically, the draft permit proposes to retain prohibiting the discharge of drilling fluids, drill cuttings, and produced sand to the territorial seas. Limits for oil and grease and 24-hour (end-of-pipe) acute toxicity and 7-day chronic toxicity are retained from the current permit for produced water discharges. Well treatment, completion, and workover fluids are retained to be limited for oil and grease and the discharge of priority pollutants. A prohibition on the discharge of free oil is also retained for a number of other waste discharges, such as deck drainage associated with oil and gas operations. Limits on free oil, the concentration of treatment chemicals, and acute toxicity are established for chemically treated seawater and freshwater discharges.

Several new requirements are proposed and they include best management practices requirements for surface preparation and coating activities, best management practices for blow out preventer and spill prevention, monitoring of ambient water, and requirements to minimize adverse environmental impacts caused by cooling water intake structures (CWISs) for new facilities. Other changes include deletion of new source exemption language, filing of the Notice of Intent for each facility, and electronic Discharge Monitoring Reports (NetDMR).

**ADDRESS:** Comments should be sent to:

Ms. Diane Smith  
U.S. Environmental Protection Agency, Region 6  
Water Quality Protection Division  
1445 Ross Avenue, Suite 1200 (6WQ-NP)  
Dallas, Texas 75202-2733.

**DATE:** Comments must be received by [ 45 days after publication ].

**FOR FURTHER INFORMATION CONTACT:** Ms. Diane Smith, U.S. Environmental Protection Agency, Region 6, 1445 Ross Avenue, Dallas, Texas 75202-2733. Telephone: (214) 655-2145.

## FACT SHEET AND SUPPLEMENTAL INFORMATION

**I. Legal Basis**

Section 301(a) of the Clean Water Act (CWA or the Act), 33 USC 1311(a), renders it unlawful to discharge pollutants to waters of the United States in the absence of authorizing permits. CWA section 402, 33 USC 1342, authorizes EPA to issue National Pollutant Discharge Elimination System (NPDES) permits allowing discharges on condition they will meet certain requirements, including CWA sections 301, 304, 306, 401 and 403. Those statutory provisions require NPDES permits to include effluent limitations requiring that authorized discharges (1) meet standards reflecting levels of treatment technology, (2) comply with EPA-approved state water quality standards, (3) comply with other state requirements adopted under authority retained by states under CWA section 510, 33 USC 1370 and (4) cause no unreasonable degradation to the territorial seas, waters of the contiguous zone or the oceans.

Three types of technology-based effluent limitations are included in the proposed permit. With regard to conventional pollutants, CWA section 301(b)(1)(E) requires effluent limitations based on "best conventional pollution control technology" (BCT). With regard to nonconventional and toxic pollutants, CWA section 301(b)(2)(A), (C) and (D) require effluent limitations based on "best available pollution control technology economically achievable" (BAT). For New Sources, CWA section 306 requires effluent limitations based on New Source Performance Standards (NSPS). Final effluent guidelines specifying BCT, BAT and NSPS for the Offshore Subcategory of the Oil and Gas Point Source Category (40 CFR 435, Subpart A) were issued January 15, 1993 and were published at 58 FR 12454 on March 4, 1993.

CWA section 301 requires compliance with BCT and BAT no later than March 31, 1989. CWA section 306 requires compliance with NSPS no later than the effective date of such standards. Section 306 also requires that New Sources meeting NSPS before commencing discharge shall not be subject to any more stringent NSPS or BAT requirements during a ten-year period beginning with the date of construction completion or discharge commencement, or the period of depreciation or amortization of the facility, whichever period ends first.

Water quality based limits are included in the proposal as required by Texas Water Quality Standards (Texas Administrative Code, Title 30 Chapter 307), and to the Ocean Discharge Criteria at CWA section 403(c). As required by the Texas Administrative Code, Title 30 Chapter 307.6(e)(2)(b), 24-hour end-of-pipe acute toxicity limits are retained from the permit issued in 2005 (2005 permit) for produced water. 48-hour acute toxicity limits for chemically treated sea water and fresh water discharges are also retained based on Texas Water Quality Standards and Ocean Discharge Criteria.

**II. Regulatory Background**

On April 3, 1981, EPA published final general NPDES permits (46 FR 20284) covering operators of lease blocks in the Offshore Subcategory of the Oil and Gas Extraction Point Source Category located landward of the outer boundary of the territorial seas of the State of Texas (TX0085651) and the territorial seas of the State of Louisiana (LA0060224), except for certain

specified lease blocks containing potential productive or unique biological communities. Those general permits implemented "Best Practicable Control Technology Currently Available" (BPT) guidelines for the Offshore Subcategory (40 CFR 435). The permits contained daily maximum limits for oil and grease in produced water discharges of 72 mg/l, No Discharge of Free Oil for drilling fluids, drill cuttings, deck drainage and well treatment fluids, and 1 mg/l residual chlorine for sanitary waste. Those general permits expired April 3, 1983 and were reissued on September 15, 1983 (48 FR 41494) with an expiration date of June 30, 1984. The permits were issued for a short period of time because National Effluent Limitations Guidelines for Best Available Technology Economically Achievable were expected to be promulgated by 1983 and again by 1984. The Offshore Subcategory Guidelines were in fact issued on March 4, 1993 (see 58 FR 12504). Coverage under the permits was administratively continued for lease blocks covered by the permits prior to the permit expiration date. The general permit for the territorial seas of Louisiana was reissued by EPA on November 7, 1997 (see 62 FR 50687). The reissued permit was numbered LAG260000. The Louisiana Department of Environmental Quality (LDEQ) reissued the general permit LAG260000 on October 13, 2009.

On November 4, 2005, EPA issued a new Texas Territorial Seas NPDES general permit (TXG260000) which replaced the BPT general permit TX0085651, which was issued in 1983. That permit implemented the BCT, BAT and NSPS guidelines for the Offshore Subcategory (40 CFR Part 435, Subpart A). In addition, the permit included limits and requirements necessary to assure that the permitted discharges would comply with State Water Quality Standards and Federal Ocean Discharge Criteria. Those limits include whole effluent toxicity testing for discharges of produced water, chemically treated sea water, and chemically treated fresh water. The permit expired on November 4, 2010 and coverage under the permit is administratively continued for lease blocks covered by the permit prior to the permit expiration date.

### **III. Facility Coverage**

The proposed general permit covers existing source facilities, New Source facilities, and new dischargers in the Offshore Subcategory of the Oil and Gas Extraction Point source Category located in and discharging to lease blocks in the Territorial Seas of Texas. The Offshore Subcategory Guidelines (40 CFR 435, Subpart A) are applicable to facilities engaged in production, field exploration, drilling, well production, and well treatment in the oil and gas extraction industry which are located seaward of the inner boundary of the territorial seas. The territorial seas are defined in CWA section 502 (8) as "the belt of the seas measured from the line of ordinary low water along that portion of the coast which is in direct contact with the open sea and the line marking the seaward limit of inland waters, and extending seaward a distance of three miles". The 2005 permit authorized discharges of produced water to the Territorial Seas of Texas from wells located in the Outer Continental Shelf (OCS), but EPA determines to restrict discharges of produced water from wells located in the OCS water. EPA does not expect many facilities will be affected by this change because discharges of produced water to the Territorial Seas of Texas must comply with more stringent limitations (e.g., 24-hr toxicity limit at end-of-pipe) than discharges to the OCS. This permit renewal does not authorize discharges of produced water from wellheads located in the territorial seas to the OCS.

#### IV. Types of Discharges Covered

This draft permit renewal proposes to retain most discharges authorized by the 2005 issued permit. The discharges addressed by this proposal are described below.

**A. Drilling fluids** - the circulating fluid (mud) used in the rotary drilling of wells to clean and condition the hole and to counterbalance formation pressure. Drilling fluids may include water-based, oil-based, enhanced mineral oil-based, synthetic-based drilling fluids. Discharges of drilling fluids are prohibited by this permit.

**B. Drill cuttings** - the particles generated by drilling into subsurface geologic formations and carried to the surface with the drilling fluid. Discharges of drilling cuttings are prohibited by this permit.

**C. Produced water** - the water (brine) brought up from the hydrocarbon-bearing strata during the extraction of oil and gas, and can include formation water, injection water, and any chemicals added downhole or during the oil/water separation process.

**D. Produced sand** - slurried particles used in hydraulic fracturing, the accumulated formation sands and scale particles generated during production. Produced sand also includes desander discharge from the produced water waste stream, and blowdown of the water phase from the produced water treating system. There shall be no discharge of produced sand.

**E. Well treatment, completion fluids and workover fluids** - well treatment fluids are any fluids used to restore or improve productivity by chemically or physically altering hydrocarbon-bearing strata after a well has been drilled; well completion fluids are salt solutions, weighted brines, polymers, and various additives used to prevent damage to the well bore during operations which prepare the drilled well for hydrocarbon production; and workover fluids are salt solutions, weighted brines, polymers, or other specialty additives used in a producing well to allow for maintenance, repair or abandonment procedures. Packer fluids, low solids fluids between the packer, production string and well casing, are considered to be workover fluids and must meet only the effluent requirements imposed on workover fluids.

**F. Deck drainage** - any waste resulting from deck washings, spillage, rainwater, and runoff from gutters and drains including drip pans and work areas within facilities subject to this permit.

**G. Sanitary waste** - human body waste discharged from toilets and urinals located with facilities subject to this permit.

**H. Domestic waste** - material discharged from galleys, sinks, showers, safety showers, eye wash stations, hand washing stations, fish cleaning stations, and laundries.

**I. Hydrate Control Fluids** - Water vapor mixed with natural gas may cause corrosion or develop hydrate formation in pipeline resulting in flow blockage. Hydrate control fluids may be used to dehydrate natural gas in deep water operations.

**J. Miscellaneous discharges –**

**blowout preventer control fluid** - fluid used to actuate the hydraulic equipment on the blow-out preventer or subsea production wellhead assembly.

**boiler blowdown** - discharges from boilers necessary to minimize solids build-up in the boilers, including vents from boilers and other heating systems.

**diatomaceous earth filter media** - filter media used to filter seawater or other authorized completion fluids and subsequently washed from the filter.

**excess cement slurry** - the excess mixed cement, including additives and wastes from equipment washdown, after a cementing operation. Discharges of unused cement slurry or mixed cement for equipment testing are not authorized.

**mud, cuttings and cement at the sea floor** - discharges that occur at the seafloor prior to installation of the marine riser and during marine riser disconnect, well abandonment and plugging operations.

**source water and sand** - water from non-hydrocarbon bearing formations for the purpose of pressure maintenance or secondary recovery including the entrained solids.

**uncontaminated or treated ballast/bilge water** - means seawater added or removed to maintain proper draft (ballast water) or water from a variety of sources that accumulates in the lowest part of the vessel/facility (bilge water) without contact with or addition of chemicals, oil, or other wastes, or such water being treated for removal of contaminants prior to discharge.

**uncontaminated freshwater** - freshwater which is discharged without the addition or contact of chemicals, oil, or other waste; included are (1) discharges of excess freshwater that allow the continuous operation of fire control and utility lift pumps, (2) excess freshwater from pressure maintenance and secondary recovery projects, (3) water used during training and testing of personnel in fire protection, and (4) water used to pressure test new piping.

**uncontaminated seawater** - seawater which is returned to the sea without the addition or contact of chemicals, oil, or other waste; included are (1) discharges of excess seawater which permit the continuous operation of fire control and utility lift pumps, (2) excess seawater from pressure maintenance and secondary recovery projects, (3) water released during the training and testing of personnel in fire protection, (4) seawater used to pressure test piping and (5) once through non-contact cooling water.

**K. Chemically Treated Seawater and Freshwater** - seawater or freshwater to which corrosion inhibitors, scale inhibitors, biocides, and/or other chemicals have been added and include the following discharges:

1. Excess seawater which allows the continuous operation of fire control and utility lift pumps;
2. Excess seawater from pressure maintenance and secondary recovery projects;

3. Water released during training and testing of personnel in fire protection;
4. Seawater used to pressure test piping and pipelines;
5. Ballast water or bilge water;
6. Non-contact cooling water; and,
7. Desalinization unit discharge.

## V. Technology-Based and Water Quality-Based Permit Conditions

Conditions in the proposed permit are based on the Effluent Limitations Guidelines, Best Professional Judgment (BPJ), Texas Water Quality Standards, and requirements of section 403(c) of the Clean Water Act.

Texas Water Quality Standards: EPA is required under 40 CFR Part 122.44(d) to include conditions as necessary to achieve State water quality standards as established under CWA section 303. The Texas Water Quality Standards (Texas Administrative Code, Title 30 Chapter 307) contain narrative and specific numerical criteria for listed water bodies according to their designated uses.

1. Narrative Standards: The State has established narrative criteria which, in part, state that "surface waters will not be toxic to men or terrestrial or aquatic life." The Texas Commission on Environmental Quality's implementation document, "Procedures for Implement the Texas Surface Water Quality Standards" (Texas IP) (January, 2003), requires that water in the State is not acutely toxic and shall only be chronically toxic within the mixing zone. In addition, TAC Title 30, Chapter 307.6(e)(2)(B) requires that effluents are not acutely toxic to sensitive organisms as measured by a 24-hour acute toxicity test on 100% effluent.

2. Numeric criteria: Numeric Criteria are listed in TAC Title 30, Chapter 307.6(c). The procedures for implementing the State Numeric Criteria are described in the Texas IP.

3. Mixing Zones: Water Quality Standards require that: acute aquatic life criteria are met at the edge of the zone of initial dilution, chronic aquatic life criteria are met at the edge of the mixing zone, and human health criteria are met at the edge of the human health mixing zone. Mixing zones are defined under the state's implementation plan as a maximum radius that extends over the receiving water in all directions. For the territorial seas the mixing zones are defined as follows: the zone of initial dilution has a radius of 50 feet (15.24 meters), the chronic aquatic life mixing zone has a radius of 200 feet (61 meters); and the human health mixing zone has a radius of 400 feet (122 meters).

The Railroad Commission of Texas stated in the State certification letter of January 12, 2004, that the previously proposed permit (which was issued in 2005) complied with state water quality laws. EPA proposes to retain water quality-based limits in the 2005 permit for this permit renewal.

Ocean Discharge Criteria (403 of the Clean Water Act): Sections 402 and 403 of the Clean Water Act require that NPDES permits for discharges to the territorial seas, the contiguous zone, and the ocean be issued in compliance with EPA's regulations for preventing unreasonable degradation of the receiving waters. In the event that an assessment determines that unreasonable

degradation may occur even with proposed technology and water quality-based permit conditions in place, Section 403(c) authorizes the Agency to impose more stringent permit conditions and/or monitoring.

### A. Drilling Fluids and Drill Cuttings

For facilities located within 3 nautical miles from shore (from the inner boundary of the territorial seas), the Offshore Subcategory guidelines for NSPS (40 CFR 435.15) and BAT (40 CFR 435.13) respectively require no discharge of drilling fluids and drill cuttings. The proposed permit requirement of no discharge of drilling fluids and drill cuttings is based on these Offshore NSPS and BAT guidelines.

### B. Produced Water

**Technology-based Limitations:** The Offshore Subcategory guidelines for NSPS (40 CFR 435.15) and BAT (40 CFR 435.13) require Oil and Grease limits of 29 mg/l, monthly average, and 42 mg/l, daily maximum.

**Water Quality Analysis and Limitations:** Produced water discharges were analyzed to determine compliance with EPA approved 2010 numeric State Water Quality Standards. The analysis was accomplished using the discharge rate and effluent data obtained from the Railroad Commission of Texas (per Table 6.1, 2004 final EIS). The TEXTOX program, developed by the Texas Commission on Environmental Quality, was used to perform the reasonable potential screening. The critical dilutions used to calculate the reasonable potential are based on CORMIX 7.0 modeling results. The Texas IP requires comparison of the effluent concentration with 70% and 85% of the calculated monthly average water quality based limits at the mixing zones. A limit is required to be included in a permit when effluent data are shown to exceed 85% of the calculated limit. In cases where the effluent is shown to exceed 70% of the calculated limit, monitoring is required to be included in permits. EPA conducted a comparison of the previous produced water data obtained from the Railroad Commission with the values calculated to be 70% of the monthly average limits based on the most recent State Water Quality Standards, and results are shown in Table 1 below.

**Table 1: Numeric Water Quality Based Limits Analysis**

<u>Parameter</u>	<u>Effluent Conc. (µg/l)</u>	<u>70% Aquatic Life Limit (µg/l)</u>	<u>70% Human Health Limit (µg/l)</u>
Aluminum	610	N/A	N/A
Arsenic	90	5031	N/A
Barium	564,000	N/A	N/A
Benzene	13,100	N/A	93570
Cadmium	100	842	N/A
Chromium	143	4178	91564
Copper	260	342	N/A
Cyanide	30	189	N/A
Lead	400	1147	1794
Mercury	1.90	71	4.56

Nickel	639	1104	208000
Selenium	268	11457	N/A
Silver	20	153	N/A
Zinc	218	5075	N/A

Based on this analysis (conducted on August 2, 2011 by using TEXTOX MENU #5), the produced water discharges proposed to be authorized by the general permit do not appear to have the potential to exceed state water quality standards. Therefore, no limits or monitoring are proposed to be required based on the numeric water quality standards.

**Toxicity Testing Requirements:** Requirements are based on State Water Quality Standards and CWA Section 403(c). Water quality standards based limits are proposed for 24-hour acute (end-of-pipe) toxicity and 7-day chronic toxicity based on the dilution at the edge of the mixing zone for chronic aquatic life.

Produced water discharges contain pollutants in quantities which may have the potential to cause toxic conditions in the receiving water in violation of section 101(a)(3) of the Clean Water Act. Whole effluent toxicity testing is the most direct measure of potential toxicity in the receiving water resulting from synergistic effects of effluent components and receiving water characteristics. It is the national policy of EPA to use toxicity testing to evaluate the toxic effects of a discharge upon the receiving waters (49 FR 9016, 3/9/84). Also, the goal of Third Round and Post Third Round NPDES permits is that no chronic toxicity is allowed outside the mixing zone. The State has established narrative criteria which, in part, state that "surface waters will not be toxic to men or terrestrial or aquatic life." The Texas IP requires no chronic toxicity at the edge of the mixing zone. In accordance with EPA's policy, Texas's narrative criteria, and the implementation document, the draft permit includes whole effluent toxicity limits and monitoring for produced water discharges. The mixing zone defined by Texas for chronic aquatic life (61 meters) was used to calculate critical dilutions for the toxicity limits.

**Modeling of Produced Water Discharges:** When EPA finalized the expired permit in 2005, dispersion modeling, CORMIX v.4.2 GT was used to determine the dilution of produced water discharges at the edge of the various mixing zones. The model results were used to establish the proposed whole effluent toxicity limits. The following input parameters were used for this analysis:

Density Gradient =  $0.2291 \text{ kg/m}^3/\text{m}$   
Ambient seawater density =  $1017 \text{ kg/m}^3$   
Produced water density =  $1070 \text{ kg/m}^3$   
Current velocity = 4 cm/sec  
Wind velocity = 4 m/sec  
Pipe diameter = 0.1524 meters = 6 inches

Because the size of pipe does not cause much changes of critical dilution and the 6 inch diameter is common for discharge pipe, the critical dilution values listed in the 2005 issued permit could be simplified based on the 6 inch diameter pipe as shown on Table 2 below. The depths used on the dilution tables are based on representative water depths in which platforms are located in the territorial seas off Texas.

**Table 2: Critical Dilution for Produced Water Toxicity Limitations**

Discharge Rate (bbl/day-m <sup>3</sup> /s)	Water Depth (meters)*						
	0-4	4-6	6-9	9-12	12-14	14-16	> 16
500 - 0.00092	0.33	0.2	0.15	0.15	0.15	0.15	0.15
1000 - 0.0018	0.7	0.4	0.22	0.22	0.22	0.22	0.22
2000 - 0.0037	1.3	0.8	0.54	0.31	0.31	0.31	0.31
3000 - 0.0055	1.9	1.1	0.73	0.38	0.38	0.38	0.38
4000 - 0.0074	2.4	1.3	0.91	0.6	0.44	0.44	0.44
5000 - 0.0092	2.8	1.6	1.1	0.8	0.49	0.49	0.49
6000 - 0.011	3.2	1.8	1.2	0.9	0.54	0.54	0.54
7000 - 0.0129	3.6	2	1.3	1	0.58	0.58	0.58
8000 - 0.0147	3.9	2.2	1.5	1.1	0.71	0.62	0.6
9000 - 0.0166	4.3	2.4	1.6	1.2	0.83	0.65	0.63
10,000 - 0.0184	4.6	2.6	1.7	1.3	0.93	0.68	0.66
15,000 - 0.0276	5.9	3.3	2.2	1.4	1.3	1	0.78
20,000 - 0.0368	7.1	3.9	2.6	1.7	1.6	1.3	0.88
25,000 - 0.046	7.8	4.2	2.9	1.9	1.8	1.6	0.96

\* Distance between the discharge pipe and the seafloor.

EPA used CORMIX v.7.0 to reevaluate the critical dilutions and found that results from version 4.2 are more conservative than results from version 7.0. A comparison is provided in the Addendum to this Fact Sheet. Therefore, this permit renewal retains the same dilution factors from the 2005 issued permit.

**Diffuser Option.** This permit renewal retains the diffuser option contained in the 2005 issued permit for the territorial seas of Texas to allow adding diffusers to produced water discharges in order to obtain more dilution to meet the numeric water quality based limits or the chronic toxicity limits for produced water. Permittees needing to obtain additional dilution will be allowed to design and construct multi-port diffusers modeled using CORMIX2. CORMIX2 is the multi-port discharge component of CORMIX. The same limitations described above for single port discharges apply to multi-port discharges designed using CORMIX2. Operators wishing to obtain additional dilution will model the diffuser discharge using CORMIX2. They will then use the dilutions calculated at 200 feet (61 meters) as the water quality based limit for toxicity.

Using this approach, permittees will have the option to design their discharge configuration to attain increased dilution. Permittees making use of this option will be required to construct the outfall to correspond with that which was modeled and to use the modeled dilutions as the permit limit for produced water toxicity. They will also be required to certify that the diffuser was designed and constructed according to the CORMIX2 results using the input parameters required

by the permit. The ambient hydrological conditions required as model input are included in the permit so that modeling results obtained by different permittees will be consistent.

**Vertically Separated Multiple Port Discharges.** The use of multiple discharge ports which are vertically separated is an additional option proposed to be available for operators' use to obtain increased produced water dilution. Under that option, operators needing increased dilution to meet the produced water toxicity limit may divide the discharge among vertically separated ports to achieve greater dilution. As proposed, the permit includes a table with the required minimum port spacing. Operators will use the discharge rate from a single port to determine the new critical dilution to be met for the toxicity limit and will design and construct the discharge accordingly.

Permittees using this option will design and construct vertically aligned discharge ports with enough separation to prevent the effluent plumes from colliding. The minimum port separation retained from the 2005 permit, based on the CORMIX v.4.2 GT, is shown below in Table 3 and is included in the permit. The critical dilution permittees will need to meet for the toxicity limit will be based on the discharge rate from a single port.

**Table 3: Minimum Vertical Port Separation Distance to Avoid Interference**

Discharge Rate Per Port (bbl/day)	Minimum Port Spacing (m)	Calculated Plume Thickness (m)	Minimum Distance Between Plumes (m)
0 - 500	3.2	1.6	1.6
501 - 1000	4	2	2
1001 - 2000	5	2.5	2.5
2001 - 3000	5.8	2.9	2.9
3001 - 4000	6.4	3.2	3.2
4001 - 5000	6.8	3.4	3.4

If discharges with multiple ports do not meet the minimum vertical port separation distance, the total flow must be used to calculate the critical dilution.

The 2005 issued permit stipulated that the testing procedures used for produced water toxicity testing are the Mysidopsis bahia (Mysid shrimp) chronic static renewal 7-day survival and growth test and the Menidia beryllina (Inland Silverside minnow) chronic static renewal 7-day larval survival and growth test. The toxicity tests will be required to be performed in accordance with the protocols of "*Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*, Third Edition, October 2002, EPA-821-R-02-014 or the most recent update thereof. Permittees will be required to prepare the full report in accordance with that protocol but will only be required to report the No Observable Effect Concentration (NOEC) and the critical dilution to EPA in the electronic Discharge Monitoring Report submitted for that reporting period. The NOEC is defined as the greatest effluent dilution which does not result in lethality that is statistically different from the control (0% effluent) at the 95% confidence level. Both the monthly average and the minimum toxicity (7-day NOEC)

values shall not be less than the effluent dilution as calculated at the edge of the mixing zone. The 2005 permit allowed adding seawater to the produced water to comply with the toxicity limitations.

**Monitoring Frequencies:** Grab sampling for oil and grease analysis is once per month. Monitoring for produced water toxicity is proposed to be required once per six months. This is consistent with the frequency normally required by NPDES permits in Region 6 in cases where there is a fairly low potential for the effluent to exhibit toxic effects at the critical dilution.

### **C. Produced Sand**

The Offshore Subcategory guidelines for NSPS, BAT and BCT all require No Discharge of produced sand. This is the basis for the requirement of No Discharge of produced sand in the proposed permit.

### **D. Well Treatment, Completion and Workover Fluids**

**Technology-based Limitations:** The Offshore Subcategory guidelines for NSPS and BAT require Oil and Grease limits of 29 mg/l, monthly average, and 42 mg/l, daily maximum, for well treatment, completion and workover fluids. These guidelines are, therefore, the basis for the permit's oil and grease limits for these discharges.

**Water Quality-based Limitations:** Ocean Discharge Criteria (CWA section 403(c)). Discharged well treatment, completion, and workover fluids are proposed to be limited to no free oil as measured using the static sheen test method and no priority pollutants except in trace amounts as established in the 2005 issued permit. If materials added downhole as well treatment, completion, and workover fluids do not contain priority pollutants, then the discharge is assumed not to contain priority pollutants, except in trace amounts. The no free oil limit will help to prevent the discharge of toxic pollutants contained in oil, which may contaminate these fluids and cause unreasonable degradation of the marine environment. The limit of no priority pollutants except in trace amounts will help prevent the discharge of fluids which contain toxic pollutants with the potential to cause unreasonable degradation to the marine environment. Both of these limits are retained from the expired Texas Territorial Seas general permit, issued September 6, 2005 (see 70 FR 53008). The proposed no free oil limit is also consistent with BCT issued in the Offshore Subcategory guidelines (40 CFR 435.14).

**Monitoring Frequencies:** Sampling for static sheen test is daily when a discharge occurs. Grab sampling for oil and grease analysis is once per month.

### **E. Deck Drainage**

**Technology-based Limitations:** The Offshore Subcategory NSPS, BAT and BCT guidelines all require No Discharge of Free Oil as determined by the presence of a film or sheen upon, or a discoloration of, the surface of the receiving water (visual sheen). This is the basis for the permit's requirement of No Free Oil as monitored using the visual sheen test.

**Monitoring Frequency:** Observation for visual sheen daily when the facility is manned.

## F. Sanitary Waste

**Technology-based Limitations:** For sanitary waste, the Offshore Subcategory NSPS and BCT guidelines require residual chlorine to be maintained as close to 1 mg/l as possible for offshore facilities continuously manned by ten or more persons. Also, the NSPS and BCT guidelines require No Discharge of floating solids for offshore facilities continuously manned by nine or fewer persons or intermittently manned by any number of persons. This is the basis of the permit's requirements for this discharge.

**Monitoring Frequencies:** Observation for floating solids is daily and sampling for residual chlorine is once per month.

## G. Domestic Waste

**Technology-based Limitations:** For domestic waste, the Offshore Subcategory NSPS, BAT and BCT guidelines require no floating solids or foam and require compliance with the requirements of 33 CFR 151. This is the basis for the permit's requirements for this waste.

**Monitoring Frequency:** Observation for floating solids is made daily.

## H. Miscellaneous Discharges

**Technology-based Limitations:** The permit requirements of No Free Oil as monitored by the Visual Sheen Test and no floating solids or foam are based on BCT using BPJ. These miscellaneous discharges are not addressed in the Offshore Subcategory guidelines, but have the same limits as the Western Gulf of Mexico OCS general permit GMG290000 (72 FR 31573, June 7, 2007) and the expired Texas Territorial Seas general permit (70 FR 53008, September 6, 2005).

**Monitoring Frequency:** Observation for visual sheen and floating solids is once per week.

## I. Chemically Treated Seawater and Freshwater

These miscellaneous discharges are not addressed in the Offshore Subcategory guidelines, but have the same limits in the OCS general permit GMG290000 (72 FR 31573) and the expired Texas Territorial Seas general permit. The discharge of individual types of biocides, scale inhibitors and corrosion inhibitors is not proposed to be limited. Due to the large number of chemical additives used, it would be very difficult to develop technology based limits for each individual additive. Also, if the permit were to limit specific chemicals it could potentially halt the development and use of new and potentially more beneficial treatment chemicals which would not be specifically listed in the permit and for which discharge would not be authorized. Thus, generic limits for all parameters used are included in the proposed permit.

**Technology-based Limitations:** Best Available Technology Economically Achievable (BAT) limits established by BPJ are proposed to be retained from the 2005 permit for these discharges. Many of the chemicals normally added to seawater or freshwater, especially biocides, have

manufacturers' recommended maximum concentrations or EPA product registration labeling. The 2005 issued permit has established restriction from using any of the chemical additives or biocides in concentrations greater than 500 mg/l. The 2005 issued permit limits discharges to the most stringent of the following three conditions:

- 1) the maximum concentrations and any other conditions specified in the EPA product registration labeling if the chemical additive is an EPA registered product,
- 2) the maximum manufacturer's recommended concentration when one exists, or
- 3) 500 mg/l.

In addition to BAT based limits, BCT based limits of No Free Oil are retained from the 2005 permit for the chemically treated seawater and freshwater discharges. Free Oil has been chosen as a surrogate parameter for conventional pollutants in these discharges.

**Water Quality-based Limitations:** As stated previously for produced water discharges, NPDES permits are required to contain any limitations or conditions necessary to ensure compliance with State water quality standards and Ocean Discharge Criteria. The same water quality based limitations established in the 2005 issued permit are retained in the proposed permit to ensure compliance with both water quality standards and Ocean Discharge Criteria. The No Free Oil condition is retained from the 2005 permit.

**Toxicity Limitations:** Toxicity limitations and monitoring are retained from the 2005 permit to ensure compliance with Ocean Discharge Criteria and with State water quality standards. Toxicity limits will ensure compliance with the narrative water quality standard which states that "toxic substances shall not be present in quantities that alone or in combination will be toxic to plant or animal life." In addition to the narrative standard, the toxicity limits are surrogate limits for the numerical water quality standards.

Critical dilutions at which the toxicity limits must be met were calculated using CORMIX v.4.2 GT with the same input parameters for ambient water conditions as were used to calculate produced water critical dilutions. Model input for effluent density was lower than the density input used for produced water modeling since the discharges are expected to have a lower density. The effluent density used for seawater was 1017 kg/m<sup>3</sup> which is the same as the ambient receiving water, as opposed to produced water which was modeled using a density of 1070 kg/m<sup>3</sup>.

As retained from the 2005 issued permit, the permit requires a 48-hour acute toxicity test to be conducted to monitor toxicity. A table has been included in the permit from which permittees will obtain their critical dilution based on their discharge rate and pipe diameter.

**Table 4: Critical Dilutions (Percent Effluent) for Toxicity Limitations for Seawater to Which Treatment Chemicals Have Been Added**

Depth Difference (Meters)	Discharge Rate (bbl/day)	Pipe Diameter		
		>0" to 2"	>2" to 4"	>4"
All	0 to 1,000	3.1	10.5	26.7
	>1,000 to 10,000	2.1	8.0	16.5
	> 10,000	2.1	7.0	13.3

**Table 5: Critical Dilutions (Percent Effluent) for Toxicity Limitations for Freshwater to Which Treatment Chemicals Have Been Added**

Depth Difference (Meters)	Discharge Rate (bbl/day)	Pipe Diameter		
		>0" to 2"	>2" to 4"	>4"
All	0 to 1,000	5.1	29.0	32.5
	>1,000 to 10,000	2.8	15.4	37.4
	>10,000	2.5	12.0	27.8

**Monitoring Frequencies:** The frequency of free oil monitoring is required to be once per week, when discharging. Monitoring for toxicity is proposed to be required at a frequency of once per six months when discharging. Intermittent discharges are proposed to be required to be monitored once per discharge but no more frequently than once per six months, unless they are not compliant with the limit.

#### J. For All Discharges

For all permitted discharges, the permit includes the following prohibitions: The discharge of halogenated phenols is prohibited based on CWA section 403(c). Based on the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978, commonly referred to as MARPOL, the discharge of rubbish, trash and other refuse is prohibited. Discharges are prohibited in areas of biological concern based on CWA section 403(c), and discharges of surfactants, dispersants and detergents are required to be minimized based on CWA section 403(c). These requirements are contained in the Western Gulf of Mexico Outer Continental Shelf general permit GMG290000 (72 FR 31573) and the previous Texas Territorial Seas general permit (70 FR 53008, September 6, 2005).

#### VI. Monitoring at Unmanned Platforms

Source water, source sand, uncontaminated ballast water, uncontaminated bilge water, uncontaminated freshwater, and uncontaminated seawater are often discharged under automatic

controls at platforms which are not continuously manned. Monitoring requirements are waived for these discharges when platforms are unmanned. The permittee may note "Unmanned" on reports if the facility is unmanned during the whole reporting period.

## **VII. Significant Changes from 2005 Issued Permit**

### **A. New Source Exemption**

The current permit has given new sources a ten year exemption from new, more stringent, technology based requirements in permit. This permit renewal removes the ten year new source exemption from new and more stringent technology-based requirements for the following reasons:

(1) The effluent limitations and monitoring requirements for new sources are the same as for existing sources and new dischargers, the definition of a New Source currently does not have a material effect under the 2005 permit.

(2) Even if new and more stringent technology-based requirements are promulgated in the future, new NSPS guidelines are not likely applicable to facilities covered by an existing NPDES permit because the current guidelines definition for New Source may exclude such facilities.

(3) The permit must be reopened for modification or renewed to incorporate any new effluent guidelines to make new guidelines enforceable. This permit does not propose to incorporate future new guidelines into the permit automatically without reopening the permit. And

(4) EPA Region 6 will reconsider the exemption for new sources if compliance schedules to comply with more stringent guidelines for NSPS are not provided in the new effluent guidelines.

### **B. Produced Water Discharge**

#### **Toxicity Testing**

The 2005 permit requires the increase of testing frequency for facilities failing the toxicity test and allows the decrease of testing frequency for facilities passing tests for twelve consecutive months. This permit renewal proposes that a facility must pass both 7-day chronic limit and 24-hour acute limit for discharging produced water. For facilities have been discharging produced water continuously, both chronic and acute toxicity tests must be conducted within 30 days from the effective date of the final permit. For intermittent discharges, toxicity tests must be conducted and passed prior to any discharge. EPA considers it inappropriate to allow a discharge that violates the permit when "no discharge" can be achieved. Information available to EPA has demonstrated that facilities in the territorial seas have conveyed produced waters to onshore for beneficial reuses or disposals.

## Produced Water and Ambient Water Characterization Study

The First Circuit Court of Appeals, State of Louisiana, recently remanded the LAG260000 general permit for oil and gas extraction, development, and production facilities in the Territorial Seas of Louisiana in a court decision dated June 10, 2011, because the court found that the LDEQ did not provide for direct testing or bio-monitoring requirements to verify that the discharge of produced water to the territorial seas of Louisiana causes no significant environmental impact. The naturally occurring radium in the produced water was also a main concern. While this state court decision does not directly impact today's proposed permit, it did highlight a potential concern that the EPA feels appropriate to address.

In order to assess the potential future impact caused by the produced water, this draft permit renewal proposes to include monitoring for produced water and ambient water, so EPA may further evaluate the effects of this authorization of discharges based on new data. This permit proposes to require each facility, only if that facility discharges produced water, to collect a set of representative samples which include one produced water sample, one ambient water sample outside the 200 feet mixing zone, and one ambient water sample each at about 50 feet and 200 feet from the point of discharge. The down current ambient water samples shall be taken at the same depth to the depth of the discharge or at locations where representative samples reflecting water quality in the mixing zones could be collected. The distances of 50 feet and 200 feet are based on the allowable distances for Texas mixing zones for the zone of initial dilution and the chronic aquatic life mixing zone, respectively. Pollutants to be analyzed include those commonly found in the produced water, but not limited to pH, total dissolved solids, aluminum, arsenic, barium, benzene, cadmium, chromium, copper, cyanide, lead, mercury, nickel, radium, selenium, silver, and zinc. This permit renewal also proposes that the operator conduct a 7-day chronic toxicity test for the ambient water sample collected at 200 feet down current from the point of discharge. EPA may evaluate sampling analytical results and ambient water toxicity test results against produced water toxicity test results for future permit development. Samples shall be taken once per calendar year (starting in Year 2012) during normal discharge of produced water. If a facility does not discharge produced water for the whole calendar year, no sampling for produced water and ambient water is required for that calendar year. In order to evaluate the environmental impact by the naturally occurring radium in the produced water, monitoring of radium-226 and radium-228 in sediment is also proposed.

## No Discharge of Produced Water

The 2005 permit allows new sources to discharge produced water to the territorial seas. However, information provided by industries indicates that most, if not all, of the operators have transported produced water over pipelines onshore for disposal or beneficial reuse. Also, operators of facilities covered by the 2005 permit have not submitted DMRs for years so it would be reasonable for EPA to believe that those facilities have not discharged waste streams for years. Produced waters may not have been discharged to the Texas territorial seas because produced waters from formations in the area could have difficulty passing the 24-hour acute toxicity testing and transportation pipelines infrastructures are available to convey produced water to onshore for beneficial reuse or disposal. EPA proposes not to authorize discharges of produced water from new production wells. EPA is soliciting comments whether produced waters from certain formations in the Texas territorial seas are less toxic and may pass the 24-

hour acute toxicity testing. Furthermore, EPA is soliciting comments on whether “no discharge” of produced water is practically achievable for every existing facility, so EPA may consider “no discharge” of produced water to the Texas territorial seas for all facilities. Any existing facility which is discharging produced water and is planning to continue such a discharge should provide the name of the owner/operator, permit or tracking number, type and location of the facility, and the daily average discharge rate of the produced water in the comment. The discharge of produced water may cause more environmental concern than other authorized discharges due to its natural properties and volume of the discharge. To eliminate the discharge would substantially reduce waste streams into the territorial seas of Texas and minimize adverse environmental impact to the territorial seas of Texas. The Coastal Subcategory Effluent Limitations Guidelines (40 CFR 435.43), which covers a zone immediately landward of the territorial seas, prohibits the discharge of produced waters.

#### C. Chemically Treated Miscellaneous Discharges

This permit renewal proposes that the facility must conduct the toxicity test and demonstrate passing the toxicity limit prior to the discharge of chemically treated waters. The 2005 permit required the monitoring frequency for toxicity testing be increased if the discharge was found to be toxic at the critical dilution. If it was not shown to be toxic, the frequency could be reduced after one year of testing. EPA considers it inappropriate to allow the discharge of a pollutant which indicates a violation of the permit when “no discharge” can be achieved.

#### D. Phase Out Pre-dilution Provision for Toxicity Testing

The 2005 permit allows seawater to be added to produced water discharge (pre-dilution) in order to meet the 7-day toxicity limit and also allows seawater to be added to chemical treated miscellaneous discharge to comply with the 48-hour toxicity limit. EPA proposes to phase out the pre-dilution provision during the 5-year term of the proposed permit because many facilities do not discharge produced water and facilities may use diffuser or multiple port options to meet the toxicity limit for produced water. Facilities should be able to comply with toxicity limits for chemically treated miscellaneous discharges without using the pre-dilution practice. A facility may manage the quantity and type of chemicals and/or the discharge rate to comply with the toxicity limit. This proposal does not prohibit facilities from combining wastes prior to discharging as long as each waste stream complies with its specific technology-based effluent limitations and the combined final discharge complies with water quality-based limitations (e.g., toxicity limits).

#### E. Hydrate Control Fluids

This permit renewal proposes to add effluent limitations to hydrate control fluids although either hydrate control fluids may not be required in the territorial seas operations or facilities will recycle most of hydrate control fluids. Hydrate control fluids shall be discharged with produced water. In case where hydrate control fluids must be discharged separately from produced water discharge, it must comply with oil and grease, 7-day toxicity, and 24-hour acute toxicity effluent limitations established for produced water.

#### F. Discharge of Wastes from Surface Preparation of Coating

Regulations at 33 CFR 151 and the current permit prohibit the discharge of garbage. Under the regulations, garbage is defined to include maintenance waste. This prohibition has led to confusion regarding the level of effort required to capture maintenance waste associated with sandblasting and other types of surface preparation and painting, or coating, of the prepared surface. When performing operations such as sand blasting, operators typically utilize tarps or other means to capture as much waste material as practicable. It is, however, not possible to capture all waste materials when conducting these operations without creating a safety risk for personnel. To resolve this issue, new language included in the proposed permit requires operators to capture as much waste as practicable. The discharge of that collected waste is prohibited. The discharge of fugitive material, such as windblown sand or paint spray, is not included in that discharge prohibition if operators take all steps practicable to capture waste material. EPA included the same requirements in the 2007 reissued OSC general permit (GMG290000). Since this change only clarifies the requirement that operators capture as much waste as practicable and does not authorize the discharge of any new waste stream, the scope of the permit is not expanded as a result of this clarification.

#### G. Cooling Water Intake Structures

Section §316(b) of the Clean Water Act requires that the location, design, construction and capacity of cooling water intake structures (CWIS) reflect the best technology available (BTA) for minimizing adverse environmental impact. EPA promulgated 316(b) Phase III regulations which require that new offshore oil and gas facilities take measures to reduce entrainment and impingement of aquatic life. The 316(b) Phase III regulation applies to new facilities which intake 2 million gallons per day of water and use at least 25 percent for cooling. The facilities which are affected by these new requirements are new facilities for which construction is commenced after July 17, 2006. In general, the regulations require operators to submit information demonstrating that new 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 reduced entrainment when feasible. These new requirements are proposed to be included in the reissued permit. Every new facility which meets the criteria above must comply with the CWIS requirements even when more than one new facility 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 organisms and types of species entrained in the system. As proposed, the permit will require new 316(b) Phase III facilities to conduct this biological monitoring. Such a study will need to include sufficient detail such that EPA can determine that intake structure designs are sufficient to minimize impacts due to entrainment and impingement and that no additional measures are warranted.

#### H. Safety Best Management Practices

This general permit does not authorize uncontrollable discharges caused by failures of equipment, blowout, damage of facility, or any form of unexpected discharge. Specific best

management practices (BMPs) for blow out preventers (BOPs) and spill prevention are proposed in this permit renewal.

#### I. Notification and Reporting

This permit proposes to include more information (i.e., platform identifier, platform coordinates, depth of water, expected drill dates, and etc.) to be submitted with the Notification of Intent (NOI). This permit renewal proposes to require a NOI for each facility for authorization of discharges. A facility includes platform, rig, ship, or any structure from where exploration, development, or production operations are performed. The owner and the operator of the facility are treated as co-permittees under the proposed permit. The permittees shall file NOIs for facilities under the expired NOI coverage within 60 days from the effective date of this permit. Facilities that fail to file a new NOI within the 60-day period are not authorized to discharge from the structure under the permit number TXG260000 until a 30-day waiting period is observed after a NOI is filed. New facilities must file an NOI no less than 30 days prior to any authorized discharge. The proposed permit renewal also requires operators who have submitted a NOI to be authorized to discharge by this permit to re-submit a new NOI to be authorized to discharge by a subsequent permit.

This permit also proposes to increase reporting frequency for DMRs from once per year to once per quarter. Because EPA intends to move away from paper DMRs reporting at a future point, the draft permit proposes to require electronic reports. Monitoring results shall be submitted electronically in place of the paper DMR Form. To submit electronically, access the NetDMR website at [www.epa.gov/netdmr](http://www.epa.gov/netdmr) and email the [R6NetDMR@epa.gov](mailto:R6NetDMR@epa.gov) in-box for further instructions.

#### IX. References

Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, (2000) EPA-821-R-02-012, 5<sup>th</sup> ed. U.S. Environmental Protection Agency.

Oil and Gas Extraction Point Source Category Effluent Limitations Guidelines and New Source Performance Standards. (1993). EPA, 40 CFR Part 435, March 4, (58 FR 12454).

Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. (2002b). EPA-821-R-02-014, 3<sup>rd</sup> ed. U.S. Environmental Protection Agency.

Texas Water Quality Standards (Texas Administrative Code, Title 30 Chapter 307).

Procedures for Implement the Texas Surface Water Quality Standards, (January, 2003).

State certification letter of January 12, 2004, Railroad Commission of Texas.

## ADDENDUM TO FACT SHEET

**Produced Water Critical Dilution Percent Effluent Values**

The critical dilution percent effluent table has been remodeled and the outputs analyzed to determine if CORMIX 7.0 as applied is more conservative with respect to the concentrations derived from modeling similar parameters used in the previous general permit (TXG260000). For this permitting action, CORMIX 7.0 is employed to determine the critical dilutions used at the edge of the regulatory mixing zones. The common parameters for all model runs are arranged by the appropriate input parameter pages and are described herein.

*1. Effluent Characterization*

- a. The pollutant is assumed to function as a conserved pollutant which means that the pollutant does not undergo any decay or growth processes.
- b. The pollutant discharge concentration is set to 100% which is appropriate for the characterization of the discharge.
- c. Effluent density is the averaged value ( $1070 \text{ kg/m}^3$ ) based on previously obtained data for produced water used in the preceding issuance of the TXG260000 permit.

*2. Ambient Geometry*

- a. The input values for *average depth* and *depth at discharge* are presumed to be the same in the Gulf of Mexico. This assumption is representative for the vast majority of the seafloor in the Gulf. The depths are varied according to the modeled input parameters.
- b. Wind Speed ( $U_w$ ) parameter is set to 4 m/s which is representative of a light to moderate wind at the design conditions.
- c. The ambient velocity ( $U_a$ ) is set to 0.04 m/s which is conservative with respect to the dispersion of the pollutant and representative of the territorial seas.
- d. The water body is considered to be unbounded which is appropriate in an ocean setting.
- e. Bottom friction (Manning  $n$ ) is considered to be low based upon the character of the sea floor in the Texas Territorial Seas. A representative value for a smooth bottom and no weeds was used which is represented by a value of 0.020.
- f. In the ambient density data field, a non-fresh water density of  $1017 \text{ kg/m}^3$  is an appropriate salt water density at the surface. A linear density gradient of  $0.182 \text{ kg/m}^3/\text{m}$  is used which represents the 75<sup>th</sup> percentile according to the response to comments document accompanying the previous issuance. A 20 centimeter headspace was allowed above the discharge point which was not included in the density gradient.

*3. Discharge Geometry*

- a. The CORMIX1 Single Port model is utilized in this exercise.
- b. The nearest bank is set to 1000 m to the left which is a representative distance appropriate to the Texas Territorial Seas.
- c. Port diameter is set to the representative diameter of 6 inches which is used throughout in the modeling exercise.
- d. A submerged offshore discharge configuration is used with a submerged port height of 20 cm below the surface.

- e. The appropriate vertical angle ( $\theta$ ) and horizontal angle ( $\sigma$ ) for a topside downward oriented pipe are  $-90^\circ$  and  $0^\circ$  respectively.
4. *Mixing Zone Specifications*
- a. No water quality standard is specified in the modeled iterations.
  - b. A downstream mixing zone distance of 61 m for chronic aquatic life was utilized as found in the *Procedures to Implement the Texas Surface Water Quality Standards* (TCEQ RG-194).
  - c. The region of interest is 2000 m.

The critical dilution effluent percentages with respect to the 2005 permit issuance are shown in Table 1-A. The parameters for Table 1-A can be found in the previous factsheet and response to comments documents. The exercise conducted for the current issuance compared the results from the CORMIX 7.0 runs to the previous effluent percentages.

Table 1-A. Critical Dilutions from the 2005 Permit

Discharge Rate (bbl/day-m <sup>3</sup> /s)	Water Depth (meters)*						
	0-4	4-6	6-9	9-12	12-14	14-16	> 16
<b>0 – 500</b>	0.33	0.2	0.15	0.15	0.15	0.15	0.15
<b>500 – 1000</b>	0.7	0.4	0.22	0.22	0.22	0.22	0.22
<b>1000 – 2000</b>	1.3	0.8	0.54	0.31	0.31	0.31	0.31
<b>2000 – 3000</b>	1.9	1.1	0.73	0.38	0.38	0.38	0.38
<b>3000 – 4000</b>	2.4	1.3	0.91	0.6	0.44	0.44	0.44
<b>4000 – 5000</b>	2.8	1.6	1.1	0.8	0.49	0.49	0.49
<b>5000 – 6000</b>	3.2	1.8	1.2	0.9	0.54	0.54	0.54
<b>6000 – 7000</b>	3.6	2	1.3	1	0.58	0.58	0.58
<b>7000 – 8000</b>	3.9	2.2	1.5	1.1	0.71	0.62	0.6
<b>8000 – 9000</b>	4.3	2.4	1.6	1.2	0.83	0.65	0.63
<b>9000 – 10,000</b>	4.6	2.6	1.7	1.3	0.93	0.68	0.66
<b>10,000 – 15,000</b>	5.9	3.3	2.2	1.4	1.3	1	0.78
<b>15,000 – 20,000</b>	7.1	3.9	2.6	1.7	1.6	1.3	0.88
<b>20,000 – 25,000</b>	7.8	4.2	2.9	1.9	1.8	1.6	0.96

Table 1-B. Critical Dilutions using CORMIX 7.0

Discharge Rate (bbl/day-m <sup>3</sup> /s)	Water Depth (meters)*						
	0-4	4-6	6-9	9-12	12-14	14-16	> 16
<b>0 – 500</b>	0.244	0.159	0.131	0.131	0.129	0.132	0.132
<b>500 – 1000</b>	0.508	0.307	0.191	0.192	0.188	0.192	0.192
<b>1000 – 2000</b>	0.995	0.606	0.371	0.274	0.269	0.275	0.275
<b>2000 – 3000</b>	1.397	0.863	0.570	0.336	0.329	0.337	0.337
<b>3000 – 4000</b>	1.79	1.097	0.727	0.386	0.378	0.388	0.387
<b>4000 – 5000</b>	2.061	1.282	0.866	0.559	0.420	0.430	0.432
<b>5000 – 6000</b>	2.730	1.454	0.875	0.682	0.458	0.469	0.469
<b>6000 – 7000</b>	2.650	1.599	0.981	0.790	0.490	0.504	0.504
<b>7000 – 8000</b>	2.852	1.775	1.071	0.886	0.655	0.533	0.576
<b>8000 – 9000</b>	3.803	1.923	1.149	0.973	0.751	0.564	0.563
<b>9000 – 10,000</b>	3.455	2.094	1.245	1.052	0.838	0.590	0.592
<b>10,000 – 15,000</b>	4.327	2.657	1.616	1.396	1.173	0.940	0.703
<b>15,000 – 20,000</b>	5.047	3.208	1.884	1.348	1.412	1.209	0.948
<b>20,000 – 25,000</b>	5.615	3.464	2.199	1.514	1.628	1.417	1.182

After the modeled percentages were obtained using CORMIX 7.0 with respect to the appropriate inputs, the new outputs in the form of critical dilution percentage values were compared to the 2005 permit's values. In almost all cases, the new value was below the previous value. Therefore, the previous value is retained.

In summary, Tables 1-A is retained as the appropriate critical dilution percentages and should be utilized in all instances associated with the general permit number TXG260000.