

FACT SHEET AND SUPPLEMENTAL INFORMATION  
FOR THE PROPOSED 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)

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## 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 U.S.C. section 1342, authorizes the Environmental Protection Agency (EPA) to issue National Pollutant Discharge Elimination System (NPDES) permits allowing discharges on the condition they will meet certain requirements, including CWA sections 301, 304, 306, 401 and 403. Those statutory provisions require NPDES permits include effluent limitations for authorized discharges that: (1) meet standards reflecting levels of technological capability; (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 U.S.C. section 1370; and, (4) cause no unreasonable degradation to the territorial seas, waters of the contiguous zone, or the oceans.

CWA section 301 requires compliance with "best conventional pollution control technology" (BCT) and "best available pollution control technology economically achievable" (BAT) no later than March 31, 1989. CWA section 306 requires compliance with New Source Performance Standards (NSPS) no later than the effective date of such standards. Accordingly, three types of technology-based effluent limitations are included in the proposed permit. With regard to conventional pollutants, i.e., pH, BOD, oil and grease, TSS, and fecal coliform, CWA section 301(b)(1)(E) requires effluent limitations based on BCT. With regard to nonconventional and toxic pollutants, CWA sections 301(b)(2)(A), (C), and (D) require effluent limitations based on 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. Those guidelines were modified on January 22, 2001 (see 66 FR 6850, January 22, 2001), to issue technology based treatment standards for discharges associated with the industry's use of synthetic based drilling fluids.

### **II. Ocean Discharge Criteria Evaluation.**

When issuing permits for discharges into waters of the territorial sea, contiguous zone, or oceans, CWA section 403 requires EPA to consider guidelines for determining potential degradation of the marine environment. These Ocean Discharge Criteria (40 CFR 125, Subpart M) are intended to "prevent unreasonable degradation of the marine environment and to authorize imposition of effluent limitations, including a prohibition of discharge, if necessary, to ensure this goal" (see 45 FR 65942, October 3, 1980). EPA Region 6 has previously determined that discharges in compliance with the Western Gulf of Mexico Outer Continental Shelf general permit (GMG290000) will not cause unreasonable degradation of the marine environment (see 57 FR 54642, November 19, 1992, 64 FR 19156, April 19, 1999, 66 FR 65209, December 18, 2001, 69 FR 60150, October 7, 2004, and 72 FR 31575, June 7, 2007).

This proposed permit is no less stringent than previous permits. In addition, this permit proposes to add characterization study requirements for produced water and drilling fluids so EPA will have more area-specific data for future evaluations. Discharges proposed to be authorized by this reissued general permit will not cause unreasonable degradation of the marine environment.

### **III. Regulatory Background**

On April 3, 1981 (see 46 FR 20284), EPA published three final general NPDES permits authorizing discharges from facilities in the Offshore Subcategory of the Oil and Gas Extraction Point Source Category located offshore of Louisiana and Texas. Two of those permits, TX0085651 and LA0060224, authorized discharges from facilities located in the territorial seas off Louisiana and Texas. The third permit, TX0085642, authorized discharges from facilities located seaward of the outer boundary of the territorial seas off Louisiana and Texas, an area commonly known as the Outer Continental Shelf. The Outer Continental Shelf General Permit did not include several facilities located near the Flower Garden Banks, an area with sensitive biological features approximately 120 miles southeast of Galveston, Texas. Twelve facilities in the vicinity of the Flower Garden Banks were authorized to discharge under individual permits. The 1981 general permits implemented "Best Practicable Control Technology Currently Available" (BPT), as established by effluent guidelines for the Offshore Subcategory (see 40 CFR 435). Those permits contained a daily maximum oil and grease limit of 72 mg/l for produced water discharges, a prohibition of the discharge of oil based drilling fluids, a limit of no free oil for drilling fluids, drill cuttings, deck drainage and well treatment fluids, and 1 mg/l residual chlorine for sanitary waste water.

The 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 promulgation of National Effluent Limitations Guidelines for Best Available Technology Economically Achievable were expected by 1983 and again by 1984. The limitations contained in the permits were unchanged in the 1984 reissuance; however, some changes were made for facilities located near the Flower Garden Banks. Lease blocks of: North Padre Island 962 and Garden Banks 113 through 132, previously excluded from the permit, were authorized to discharge. High Island South block A392 was excluded from the permit due to its potential effects on the Flower Garden Banks ecosystem. The Louisiana Territorial Seas General Permit was reissued on November 7, 1997 (62 FR 59687), and renumbered as LAG260000. The Louisiana Department of Environmental Quality is now the permitting agency to reissue the general permit LAG260000. The Texas Territorial Seas General Permit was reissued on September 6, 2005, as permit number TXG260000.

On July 9, 1986 (51 FR 24897), EPA reissued the Outer Continental Shelf General Permit. In that action EPA Region 6 issued a joint permit with Region 4 authorizing discharges from facilities located in the Outer Continental Shelf throughout the Gulf of Mexico. That permit, numbered GMG280000, prohibited discharge of oil based drilling fluids, oil contaminated drilling fluids, drilling fluids containing diesel oil, and drill cuttings generated using oil based drilling fluids. New limits were included in the permit for suspended particulate phase toxicity in drilling fluids, the drilling fluid discharge rate near areas of biological concern,

and for free oil in drilling fluids and drill cuttings. The general permit expired on July 1, 1991.

On November 19, 1992, EPA Region 6 reissued the NPDES general permit for the Western Gulf of Mexico Outer Continental Shelf (57 FR 54642), GMG290000, covering operators of lease blocks in the Offshore Subcategory of the Oil and gas Extraction Point Source Category located seaward of the outer boundary of the territorial seas of Texas and Louisiana. As a part of that reissuance, new limits for produced water toxicity were added, as well as new limits for cadmium and mercury in stock barite, and a prohibition on the discharge of drilling fluids to which mineral oil has been added. That general permit was modified on December 3, 1993, to implement Offshore subcategory effluent limitations guidelines promulgated March 4, 1993 (58 FR 12504), and to include more accurate calculations of produced water critical dilutions. A general permit covering New Sources in that same area of coverage was issued and combined with the Western Gulf of Mexico Outer Continental Shelf general permit on August 9, 1996 (61 FR 41609). The permit expired on November 19, 1997, and was reissued in two parts on November 2, 1998 (63 FR 58722), and April 19, 1999 (64 FR 19156).

In the 1998 reissuance, EPA Region 6 authorized new discharges of seawater and freshwater to which treatment chemicals, such as biocides and corrosion inhibitors, have been added. The maximum discharge rate limit for produced water was removed and the critical dilutions required to be met for the produced water toxicity limit were updated based on the new discharge rates and more current models. To account for advances in drilling fluid technology, the permit was modified on December 18, 2001 (66 FR 65209), to authorize discharges associated with the use of synthetic based drilling fluids. Additional monitoring requirements were also included at that time to address hydrostatic testing of existing piping and pipelines and those discharges were authorized. That permit expired on November 3, 2003, and was reissued on October 7, 2004 (69 FR 60150). With that reissuance, EPA made the following changes to the permit. Produced water monitoring requirements were included for facilities located in the hypoxic zone. The discharge prohibitions at National Marine Sanctuaries were clarified in an attempt to better reflect National Oceanic and Atmospheric Administration regulations. See 15 C.F.R. Part 922. The variability factor for use in determining compliance with the permit's limits for sediment toxicity and biodegradation was removed. An allowance was included for blending of compliant synthetic base fluids in drilling fluids. The requirement to submit fourteen day advanced notification of intent to be covered by the permit is removed. The final discharge monitoring report may be submitted along with the notice of termination. The permit was issued for a three year term rather than the typical five year term so that the results from the produced water hypoxia study could be addressed in a timely manner if additional permit conditions were found to be warranted. In the 2007 permit reissuance (72 FR 31575), requirements to comply with new cooling water intake structure regulations were included. Sub-lethal effects were required to be measured for whole effluent toxicity testing. New testing methods were allowed for monitoring cadmium and mercury in stock barite.

#### **IV. Facility Coverage**

A facility means a platform, rig, ship, and any surface/sub-surface fixed or mobile

structure from where exploration, development, or production operations are performed. Under new determination the permit coverage area consists of lease areas that are located in and discharging to Federal waters in the Gulf of Mexico specifically located in the Central to Western portions of the Gulf of Mexico (GMG290000). The lease areas under Region 6 that begin in the Central portion include: Chandeleur, Chandeleur East, Breton Sound, Main Pass, Main Pass South and East, Viosca Knoll (but only those blocks under Main Pass South and East; the Viosca Knoll blocks between Main Pass and Mobile are under EPA Region 4 jurisdiction), South Pass, South Pass South and East, West Delta, West Delta South, Mississippi Canyon, Atwater Valley, Lund, and Lund South. These named lease areas and all lease areas westward are part of Region 6. The 2007 issued permit authorizes discharges to the OCS from facilities located in the Louisiana or Texas territorial seas that are covered by the general permits LAG260000 and TXG260000, respectively. No change is proposed.

## V. Types of Discharges Covered

The discharges proposed to be authorized by the reissued permit are listed below. The definitions of the waste streams are the same as those given in the Offshore Subcategory guidelines (40 CFR 435, Subpart A) except for miscellaneous discharges which were not covered by those guidelines. Most of the authorized waste streams are retained from the current 2007 issued permit.

**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. Classes of drilling fluids are:

(a) “Water-Based Drilling Fluid” means the continuous phase and suspending medium for solids is a water-miscible fluid, regardless of the presence of oil.

(b) “Non-Aqueous Drilling Fluid” means the continuous phase and suspending medium for solids is a water-immiscible fluid, such as oleaginous materials (*e.g.*, mineral oil, enhanced mineral oil, paraffinic oil, C<sub>16</sub>-C<sub>18</sub> internal olefins, and C<sub>8</sub>-C<sub>16</sub> fatty acid/2-ethylhexyl esters).

(i) “Oil-Based” means the continuous phase of the drilling fluid consists of diesel oil, mineral oil, or some other oil, but contains no synthetic material or enhanced mineral oil.

(ii) “Enhanced Mineral Oil-Based” means the continuous phase of the drilling fluid is enhanced mineral oil.

(iii) “Synthetic-Based” means the continuous phase of the drilling fluid is a synthetic material or a combination of synthetic materials.

The Offshore Operators Committee (OOC) requested inclusion of small amounts of drilling fluids that are adhered to marine risers, diverter systems testing, and blow-out preventers (BOPs) in the category of de minimis discharges. This permit proposes to authorize the discharge of such de minimis drilling fluids and such discharges are subject to discharge limitations established for drill cuttings using non-aqueous based drilling fluids. This permit

action retains the 2007 permit condition about the quantity of de minimis discharge which said “Such de minimis discharges are not likely to be measurable and are not considered in the base fluids retained on cuttings limit.”

**B. Drill cuttings** - the particles generated by drilling into subsurface geologic formations including cured cement carried out from the wellbore with the drilling fluid. Examples of drill cuttings include small pieces of rock varying in size and texture from fine silt to gravel. Drill cuttings are generally generated from solids control equipment and settle out and accumulate in quiescent areas in the solids control equipment or other equipment processing drilling fluid (*i.e.*, accumulated solids).

(a) “Wet Drill Cuttings” means the unaltered drill cuttings and adhering drilling fluid and formation oil carried out from the wellbore with the drilling fluid.

(b) “Dry Drill Cuttings” means the residue remaining in the retort vessel after completing the retort procedure specified in Appendix 7 of 40 CFR 435, Subpart A.

**C. 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. British Petroleum (BP) requests EPA to authorize discharge of pesticides/biocides which are added to drain pipes to prevent clog. EPA believes that operators may use steam or other physical means, instead of chemicals, to maintain drain pipes free of clog. Also, an operator may have difficulty collecting drainage samples for toxicity test if EPA authorizes such discharges. Therefore, EPA does not consider authorizing such discharges in this permit reissuance.

**D. Produced water** - the water 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.

The OOC requested clarification on whether the produced water salt slurry generated from the salt centrifuge unit in the monoethylene glycol (MEG) reclamation process is considered produced water or not. Because the salt slurry is part of the produced water, it could be considered produced water if it is free of solids. This permit action proposes that salt slurry which is free of solids may be mixed with produced water for discharge. If salt slurry is discharged separately from produced water, such a discharge must comply with effluent limitations and monitoring requirements established for produced water.

The OOC also requested modification of the sampling procedure for toxicity testing for multiple discharge points if the discharge points have different flow and pipe diameters or if the multiple ports do not meet the minimum vertical separation distance requirement. This permit proposes that for discharges with multiple ports that meet the minimum separation distance, if the discharge points have different flows and/or pipe diameters, the permittee may perform the test on the discharge with the highest calculated critical dilution. For discharges with multiple ports that do not meet the vertical separation distance requirements of Table 1-G or that have noncircular ports, the permittee shall calculate port size for tables 1-A through 1-F using an

equivalent diameter representative of all openings, and use total flow to determine the critical dilution. Equivalent diameter shall be calculated using:

$$\text{Equivalent Diameter} = \text{square root } (A_{\text{total}} * 4/\pi),$$

where  $A_{\text{total}}$  is the total area of all discharge openings in question. This change does not relax the current permit condition.

**E. 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 produced water waste stream and blowdown of water phase from the produced water treatment system.

**F. 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. The OOC requested EPA to clarify if propping agents are authorized for discharge. In the 2007 issued permit, propping agents were included in the definition of well treatment fluids. This permit action further clarifies that propping agents returned with well treatment fluids or produced water meet the definition of produced sands.

**G. Sanitary waste** - human body waste discharged from toilets and urinals.

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

**I. Miscellaneous discharges** -  
**desalinization unit discharge** - wastewater associated with the process of creating freshwater from seawater.

**blowout preventer control fluid** - fluid used to actuate the hydraulic equipment on the blow-out preventer. This permit action clarifies that this discharge includes fluid from the subsea wireline "grease-head."

**untaminated or treated ballast/bilge water** - 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 being treated for removal of contaminants prior to discharge. These definitions are modified from the current definitions to distinguish ballast water and bilge water and to add the treated ballast water and bilge water to the definition.

**untaminated freshwater** - freshwater which is discharged without the addition or contact of treatment, chemicals, oil, or other wastes; included are: (1) discharges of excess freshwater that

permit 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.

**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.

**uncontaminated seawater** - seawater which is returned to the sea without the addition or contact of treatment chemicals, oil, or other wastes. 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; (5) once through noncontact cooling water which has not been treated with biocides, and (6) seawater not treated by chemicals used during Dual Gradient Drilling. Waste streams (5) and (6) are newly added to the list per OOC's request. EPA thinks it is appropriate to categorize streams (5) and (6) as uncontaminated seawater.

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

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

**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 pumped to wells, including additives and wastes from equipment washdown, after a cementing operation. Mixed cement for equipment testing purposes does not meet the definition of excess cement slurry.

**Subsea production discharges** - include: subsea wellhead preservation fluids, subsea production control fluid, umbilical steel tube storage fluid, leak tracer fluid, and riser tensioner fluids.

**Bulk Transfer Operations Powder** – de minimis amounts of bulk product (e.g., barite, cement, etc.) that may be released during transfers from supply boats to a drilling rig.

This permit action proposes to modify the definitions of uncontaminated ballast/bilge water, uncontaminated freshwater, uncontaminated seawater, and excess cement slurry as indicated above, and add a definition for bulk transfer operations powder. This permit action adds the definition for bilge water which was not included in the current permit and also adds no contact of chemicals, oil, and pollutants to the definitions of uncontaminated freshwater or seawater. The OOC has requested the addition of bulk transfer operations powder to the permit. During the bulk transfer of solid products (e.g., barite, cement) from a boat to a rig, vents are opened on the rig tanks to allow for pressurized air to escape from the receiving container/tank. Trace amounts of the product being transferred may escape from the vents as dust. Vent dusts may not be avoidable, so EPA proposes to include the discharge of escaped bulk transfer operations powder in the proposed permit action but limit authorization to those falling into water directly. Therefore, the operator needs to exercise Best Management Practices (BMP) to collect escaped powder which falls on the rig and shall not dispose collected powder into the water. The OOC has also requested EPA to add cement slurry used to test proper operation of cement handling equipment to the definition of excess cement slurry. It is reasonable to allow excess mixed cement and equipment washdown after a subsea cementing job be discharged to

sea floor. EPA clarifies that it has not been EPA's intent to authorize overboard discharges of mixed cement used for equipment testing purposes prior to an actual cementing operation under the current permit. Therefore, cement used for equipment testing purposes is not authorized for discharge by this permit reissuance.

**J. Chemically Treated Seawater and Freshwater** - seawater or freshwater to which corrosion inhibitors, scale inhibitors, and/or biocides have been added. The existing permitted discharges in the current permit include:

1. Excess seawater which permits 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 of personnel in fire protection,
4. Seawater used to pressure test piping and pipelines,
5. Ballast water, and
6. Once through non-contact cooling water.

Because additional types of chemically treated waters have been generated due to new technology and practices, the OOC requests that the permit includes two more types of discharges: seawater used during Dual Gradient Drilling (DGD); and seawater/freshwater used as piping and equipment preservation fluid. The DGD is a practice of maintaining two effective fluid gradients in the wellbore annulus while drilling. The denser gradient is below the sea floor and the less dense gradient is above the sea floor. There are two discharges associated with DGD: one is seawater used to provide hydraulic power to Mud Lift Pump; and another is seawater used to provide static head in riser during DGD. Depending on the system design, corrosion inhibitors and biocides may need to be used to prevent corrosion and properly operate and maintain the DGD system.

For a sub-sea discharge of chemically treated seawater or freshwater used for piping and equipment preservation, where to collect discharge samples is not practical, EPA proposes to authorize those discharges by permitting the operator to conduct the required toxicity tests prior to the use of the product. EPA also proposes to modify the current toxicity testing requirements by requiring re-tests if the discharge volume increases more than 20% from the previous test.

The OOC also requested that EPA define that hypochlorite, bromide, and chlorine generated from electric current do not make waters subject to Chemically Treated Seawater and Freshwater conditions. In the 2007 issued permit, toxicity tests were not required for miscellaneous discharges which are treated with hypochlorite and chlorine generated by using an electric current. EPA is not proposing changes from the 2007 permit requirements. If new information provided during the public comment period can demonstrate that bromide, which is more persistent, is not toxic to aquatic life, EPA may exclude bromide from toxicity test. Both hypochlorite and chlorine are still required to be in compliance with the current technology-based quantity limits.

## **VI. Proposed Permit Conditions**

Conditions are based on: (A) NSPS for New Source facilities; (B) BCT to control conventional pollutants; (C) BAT to control toxic and nonconventional pollutants; and (D) Ocean Discharge Criteria (CWA section 403(c)). Discussions of the rationale for the specific effluent limitations for each regulated waste stream appear below.

## **A. Drilling Fluids**

The limitations in the current permit are based on a combination of National Effluent Limitations Guidelines and Ocean Discharge Criteria. The current permit's limitations are proposed to be included in the reissued permit.

### **1. NSPS, BAT, and BCT**

Offshore subcategory guidelines for NSPS (40 CFR 435.15) and BAT (40 CFR 435.13) for drilling fluids discharges from facilities located farther than 3 nautical miles from shore (from the inner boundary of the territorial seas), require no discharge of free oil, no discharge of diesel oil, and a minimum toxicity limit of 3% by volume. In addition, the effluent limitations guidelines prohibit the discharge of non-aqueous based drilling fluids except those adhering to drill cuttings and some small volume discharges. Free oil, for drilling fluids discharges, is measured using the static sheen test method. Toxicity is measured with a 96 hour LC50 on the suspended particulate phase using the *Mysidopsis bahia* species. Based on the guidelines, cadmium and mercury in stock barite used in drilling fluids are limited to 3 mg/kg dry weight and 1 mg/kg dry weight, respectively.

In addition to those effluent limitations guidelines based limits, the reissued permit is proposed to retain the prohibitions of the discharge of oil-based drilling fluids, inverse emulsion drilling fluids, oil contaminated drilling fluids, and drilling fluids to which mineral oil has been added. These prohibitions were included in the permit to ensure compliance with the no discharge of free oil BAT and NSPS limitations. In the current permit, EPA has allowed the discharge of non-aqueous based fluids with water-based drilling fluids if a non-aqueous based fluid was added in water-based drilling fluids as a carrier agent or lubricity additive.

### **2. Requirements Based on Ocean Discharge Criteria (CWA section 403(c))**

The current permit contains discharge rate limitations for drilling fluids which ensure discharged drilling fluids are sufficiently dispersed to prevent unreasonable degradation of the marine environment. Those limitations are proposed to remain in the reissued permit.

## **B. Drill Cuttings**

### **1. All Drill Cuttings**

The main source of pollutants in discharged drill cuttings is generally from the drilling fluids which were used in the well. Therefore, based on BAT, BCT, and NSPS, drill cuttings which are authorized to discharge by the general permit must all meet the same limitations and prohibitions as drilling fluids. The discharge of drill cuttings generated using drilling fluids which are oil contaminated or contain diesel oil or mineral oil is prohibited. Cadmium and

mercury, as measured in barite used in the drilling fluid, is limited to 3 mg/kg and 1 mg/kg, respectively. Also, the toxicity of the suspended particulate phase of the drilling fluids is limited to 30,000 ppm. Drill cuttings discharges are limited to no free oil, as measured using the static sheen test. These limitations are included in the current permit and are not changed in the reissued permit.

## 2. Drill Cuttings Generated Using Non-Aqueous Based Drilling Fluids

The current permit authorizes the discharge of drill cuttings generated by use of non-aqueous based drilling fluids. The limitations included in the permit were based on the Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards for the Oil and Gas Extraction Point Source Category, which was published in the Federal Register on January 22, 2001 (see 66 FR 6850). The new limits were included in the permit for both the stock base fluids and those drilling fluids which adhere to discharged drill cuttings. Limitations on the stock base fluid include polynuclear aromatic hydrocarbons (PAH), sediment toxicity (10-day), and biodegradation rate. Prior to its use, the drilling fluid is also limited for formation oil contamination, measured using Gas Chromatography/Mass Spectrometry (GC/MS). Drilling fluids which adhere to discharged drill cuttings are limited for sediment toxicity (4-day), formation oil contamination as measured by either a reverse phase extraction test or GC/MS, and base fluids which are retained on discharged drill cuttings. No changes to those limits are proposed.

## C. Produced Water

### 1. NSPS and BAT

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. Those limitations are contained in the current permit and are included in the proposed permit.

### 2. Ocean Discharge Criteria (CWA Section 403(c))

The 7-day toxicity limit and no free oil limit are contained in the current permit based on Ocean Discharge Criteria (CWA section 403(c)). No changes to those requirements are proposed as a part of this reissuance. New critical dilutions have been developed by using the new CORMIX version 7.0. The dispersion modeling used to develop the toxicity limits was examined and detailed descriptions are included in the attached Addendum to this fact sheet.

## D. Produced Sand

### 1. NSPS, BAT and BCT

The current permit prohibits the discharge of produced sand based on NSPS, BAT, and BCT, established by the Offshore Subcategory Effluent Limitations Guidelines. That prohibition is proposed to be maintained.

## E. Well Treatment, Completion and Workover Fluids

### 1. NSPS, BAT, and BCT

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. A limit of no free oil was also established by the guidelines based on BCT. Those limits are contained in the current permit and are not proposed to be changed.

### 2. 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. If materials added downhole as well treatment, completion, and workover fluids do not contain priority pollutants then the discharge is assumed to contain no priority pollutants, except in trace amounts. The no free oil limit will help 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 containing toxic pollutants which have the potential to cause unreasonable degradation of the marine environment. Both of these limits are included in the current permit based on Ocean Discharge Criteria under CWA section 403(c).

## **F. Deck Drainage**

### 1. NSPS, BAT and BCT

The current permit's limits are based on the Offshore Subcategory NSPS, BAT and BCT guidelines which 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). No changes to those limits are proposed.

## **G. Sanitary Waste**

### 1. NSPS and BCT

For sanitary waste, the Offshore Subcategory NSPS and BCT guidelines require residual chlorine to be a minimum of 1 mg/l and 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. The current and proposed permits contain limits for sanitary wastewater which are based on those guidelines.

A facility operator which properly operates and maintains a marine sanitation device (MSD) that complies with pollution control standards and regulations under section 312 of the Act is deemed in compliance with permit prohibitions and limitations for sanitary waste.

## **H. Domestic Waste**

### 1. NSPS, BAT and BCT

The current and proposed permits' limits for domestic waste are based on the Offshore Subcategory NSPS, BAT and BCT established by the Effluent Limitations Guidelines. The guidelines require no floating solids or foam and require compliance with the requirements of 33

CFR Part 151-Vessels Carrying Oil, Noxious Liquid Substances, Garbage, Municipal or Commercial Waste, and Ballast Water.

## **I. Miscellaneous Discharges**

### **1. Best Professional Judgment**

The current permit's requirements of No Free Oil as monitored by the Visual Sheen Test and no floating solids or foam are based on BCT using Best Professional Judgment (BPJ) and are proposed to be continued in the reissued permit. These miscellaneous discharges are not addressed in the Offshore Subcategory guidelines. In addition, the miscellaneous discharges of chemically treated sea water and fresh water are limited for the concentration of treatment chemicals used based on BAT using BPJ and for whole effluent toxicity based on 403(c).

### **2. Ocean Discharge Criteria (CWA Section 403(c))**

Fluids which are used as Sub Sea Wellhead Preservation Fluids, Sub Sea Production Control Fluids, Umbilical Steel Tube Storage Fluids, Leak Tracer Fluids, and Riser Tensioning Fluids shall have a 7-day No Observable Effect Concentration (NOEC) of no less than 50 mg/l. This permit action proposes to restrict the use of products which can not meet the 50 mg/l NOEC limitation by not authorizing discharges if the product fails the toxicity test. Because sub sea fluids are inherently stable, according to the OOC comments, it would be reasonable to conduct toxicity tests prior to the application of the product. Therefore, no discharge of a sub sea fluid is authorized if that product fails the 50 mg/l NOEC limit. Also, discharges of sub sea fluid at a concentration above the product-specific NOEC are prohibited.

The OOC requested that EPA allow a re-test and using the average of the results if the same batch of product passed the previous annual test but fails the new annual test. If the test is an invalid test, the operator does not need to report it. But, if the test is a valid test, EPA does not consider that averaging results of the failed test and the re-test can properly demonstrate the toxicity of the discharge. No change is proposed.

Operators have noted that a 50 mg/l of powder dye solution is much more concentrated than a 50 mg/l of liquid dye solution. For dry powder dye, EPA proposes that the maximum concentration that can be used for leak testing is the 7-day NOEC for that specific powder dye.

Chemically treated miscellaneous discharges are required to comply with a 48-hour toxicity testing limitation prior to discharging.

## **J. All Discharges**

For all permitted discharges, the current permit requires no discharge of halogenated phenols based on CWA section 403(c), no discharge of rubbish, trash and other refuse based on the International Convention for the Prevention of Ships (MARPOL), no discharge in areas of biological concern based on CWA section 403(c) and the minimization of discharge of surfactants, dispersants and detergents based on CWA section 403(c). These requirements are not proposed to be changed.

## VII. Significant Changes from the Current Permit

In addition to some proposed changes discussed above, this permit action is proposing the following significant changes:

### A. Deletion of New Source Exemption Language

The final guidelines for the Offshore Subcategory (40 CFR 435, Subpart A and 58 FR 12454) define "New Source" for purposes of the guidelines as any development or production platform, the construction of which is begun after the effective date of the Offshore Subcategory NSPS guidelines (March 4, 1993). The Offshore guidelines define "development facility" as any fixed or mobile structure that is engaged in the drilling of productive wells. "Production facility" is defined as any fixed or mobile structure that is either engaged in well completion or used for active recovery of hydrocarbons from producing formations. "Exploratory facility" is defined as any fixed or mobile structure that is engaged in the drilling of wells to determine the nature of potential hydrocarbon containing reservoirs. Exploratory facilities were excluded from the definition of new sources and are instead considered new dischargers.

The current permit has given new sources a ten year exemption from new, more stringent, technology based requirements in permit. This permit action proposes to remove the ten-year exemption provision 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 ten-year exemption provision for New Sources has expired and does not have a material effect under the current permit.

(2) If new and more stringent technology-based requirements are promulgated for New Sources in the future, EPA Region 6 will consider either exemption or a compliance schedule for existing new sources to comply with the more stringent new effluent guidelines.

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

### B. Addition of Effluent Limitations of Hydrate Control Fluids

Water vapor mixed with natural gas may cause corrosion or develop hydrate formation in a pipeline resulting in flow blockage. Glycol and/or other chemicals may be used to dehydrate natural gas in deepwater operations. Hydrate control fluids are regulated as a miscellaneous discharge in the 2007 issued permit. Because hydrate control fluids are toxic to aquatic life, EPA proposes to add toxicity test requirements to the discharge. While hydrate control fluids are discharged with produced water, the toxicity limitation established for produced water will assess the overall impact caused by hydrate control fluids. When a hydrate control fluid is discharged with other miscellaneous discharges, EPA proposes that a toxicity test designed for chemical treated miscellaneous discharges be conducted. In case a discharge of hydrate control

fluids is not monitored by the toxicity test either for produced water or for miscellaneous discharges, the operator must conduct a 7-day chronic toxicity test for that specific hydrate control fluid. A pre-test prior to the application can be used as long as the final concentration in the discharge does not to exceed the NOEC at the applicable critical dilution at the edge of 100 meters from the point of discharge. The toxicity test result is good for one year. Because hydrate control fluids have different physical properties (e.g., density), EPA proposes that the operator develop a product-specific critical dilution by utilization of the CORMIX modeling program. Samples taken for toxicity test must be representative.

#### C. Authorization of Discharge Due To Subsea Safety Diverter Valve Testing

Regulations in 30 CFR 250.433 state that:

When you install the diverter system, you must actuate the diverter sealing element, diverter valves, and diverter-control systems and control stations. You must also flow-test the vent lines.

(a) For drilling operations with a surface wellhead configuration, you must actuate the diverter system at least once every 24-hour period after the initial test. After you have nipped up on conductor casing, you must pressure-test the diverter-sealing element and diverter valves to a minimum of 200 psi. While the diverter is installed, you must conduct subsequent pressure tests within 7 days after the previous test.

(b) For floating drilling operations with a subsea BOP stack, you must actuate the diverter system within 7 days after the previous actuation.

(c) You must alternate actuations and tests between control stations.

This permit action to authorize the discharge of limited amount of drilling fluids with cuttings due to the testing of subsea safety valves if such discharges are unavoidable and to contain such discharges may compromise personal safety. The operator must demonstrate that drilling fluids and drill cuttings to be discharged would comply with limitations established for drilling fluids and drill cuttings. Oil-based drilling fluids or oil-contaminated (including diesel oil) drilling fluids are prohibited for discharge. If synthetic-based drilling fluids are used, only a minimal discharge after displacement of drilling fluid is allowed.

#### D. Spill Prevention 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. Being part of Proper Operation and Maintenance, a provision of Spill Prevention Best Management Practices is proposed.

#### E. New Notification and Reporting Requirements

This permit proposes to define “operator” for the purpose of this permit and only in the context of discharges associated with oil and gas exploration, development, and production activities regulated by this permit. An “operator” means any party that meets either of the following three criteria:

1. The party possesses the lease for the block where the exploration, development, or production activity will take place and has operational control over exploration, development, or production activities, including the ability to hire or fire contactors who conduct the actual work that results in discharges regulated by the permit; or
2. The party has day-to-day operational control of those activities at an exploration, development, or production project which are necessary to ensure compliance with permit; or
3. The party has operational control over a vessel or other mobile facility with cooling water intake structures subject to CWA 316(b).

This definition is provided to inform permittees of EPA Region 6's interpretation of how the regulatory definitions of "owner or operator" and "facility or activity" are applied to discharges of associated with oil and gas exploration, development, and production activities regulated by this permit.

EPA is also proposing requirements for electronic filing of notices of intent (eNOIs). An operator must file an eNOI for discharges to be covered by this permit. An eNOI is required for each lease block and that eNOI shall include all discharges controlled by the operator within the block. Operators who operate under the 2007 permit must file their eNOI within 90 days from the effective date of this permit for continuous coverage. EPA may deny an NOI within 45 days after the filing. EPA proposes to require the following information in the eNOI:

- a) the legal names and contact information of the lessee or designated operator registered with BOEM;
- b) the legal name and contact information of the operator who files the eNOI;
- c) the permit number previously assigned to the operator;
- d) the lease block (including state tract) code and number assigned by the state or Department of Interior;
- e) the name and/or identification and location including geographic coordinates (latitude and longitude) of each facility operated by the operator;
- f) the types of discharges, estimated volumes, and associated sources (facilities or wells) under the control of the operator;
- g) expected/actual drill commence date and well locations;
- h) the range of depth of water within the operation area;
- i) facilities for which construction was commenced after July 17, 2006: design intake capacity (million gallons per day) of each cooling water intake structure (CWIS), the maximum designed intake through-screen velocity (feet per second) of each CWIS, and the percentage (%) of total intake water used for cooling purpose; and
- j) any information included in the eNOI.

Because EPA intends to move away from paper DMR reporting, the draft permit

proposes to require electronic reports. Monitoring results shall be submitted electronically in place of the paper DMR Form unless additional paper DMRs are required by EPA on a case-by-case basis. EPA has started providing NetDMR training and operators shall start contacting EPA for training. 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. This permit action proposes to increase reporting frequency for DMRs from once per year to once per quarter. The increase of reporting frequency is necessary to provide timely discharge compliance status to both EPA and the public. The time to prepare the quarterly report will be manageable when the NetDMR is online. In case the NetDMR is not in place on time, operators may submit a paper DMR annually instead of quarterly.

#### F. Produced Water and Water-based Drilling Fluid Characterization Study

The produced water and drilling fluids data used for screening against federal water quality criteria and state water quality standards in the Ocean Discharge Criteria Evaluation were more than 25 years old and may not be representative for produced water generated and drilling fluids used in the permitting area. This permit action proposes to require a characterization study and operators may conduct either an individual study or a joint study. To conduct an individual study, the lessee or designated operator shall take at least one produced water sample and one drilling fluid sample from each block where the operator has control of either discharge. For lessees and designated operators who want to conduct a joint study, joint-operators must collect at least ten (10) produced water samples and ten drilling fluid samples from each State or BOEM designated lease area (i.e., Green Canyon, Mississippi Canyon, and etc.) and samples shall be taken from different blocks. Drilling fluid samples must be representative if non-aqueous based fluid is added in water-based drilling fluids as a carrier agent or lubricity additive. Samples shall be analyzed for, but not limited to, the following metals in the total form: aluminum, arsenic, barium, benzene, cadmium, chromium, copper, cyanide, lead, mercury, nickel, selenium, silver, and zinc; and radium-226 and radium-228. Operators (or joint-operators) must submit an electronic report including sampling areas/blocks, sampling dates, analytical results of each sample, the lowest value, the highest value, and the average value of each pollutant of concern. The operator may submit an electronic spread sheet to fulfill the reporting requirement for the study. The study report must be submitted no later than three (3) years from the effective date of the permit.

#### G. Monitoring Requirements for Cooling Water Intake Structure

The current permit requires that the new facility operators conduct weekly visual inspection or remote device monitoring to ensure intake structures and impingement/entrainment control technologies operate as designed. It has been brought to EPA's attention that it may pose a safety risk to conduct visual inspection or to conduct inspection by remote device, such as remotely operated vehicles (ROV), during the normal operation of the intake structure. For a dynamically positioned non-fix facility, it requires the use of thrusters for dynamic positioning of the vessel during drilling operation. Because intake structures are located close to the thrusters, an ROV may damage the thrusters if the thrusters are in use. However, inspections may be performed between drilling periods when drifting off course or disconnection is not a safety or well control issue. Visual or remote device inspection may be also limited for sea chest or at

deep water operation. This permit action proposes to add an alternative which allows continuous monitoring of intake structure efficiency by a measuring device. The draft permit requires the operator maintain every individual screen at 85% or above efficiency (less than 15% screen blockage) as an alternative to comply with the visual or remote device inspection. The facility must also comply with other requirements, such as a 0.5 ft/s intake screen velocity.

## **IX. Other Issues**

The OOC provided EPA with a list of suggested revisions and clarifications to the current permit on July 15, 2011. Those suggestions which are related to previously authorized discharges and result in changes to the current permit have been discussed above. This section discusses issues not being addressed above.

Mixed Chemicals or Products. The OOC requested authorization to discharge unused drilling fluids, well completion fluids, treatment fluids, or workover fluids, and excess cement slurry prepared for cement unit commission. The current permit does not specifically authorize such discharges and EPA determines such discharges are not within the scope of the current permit. Although the discharge quantities of those wastes may not be significant for an individual rig, the total and cumulative excess amounts of wastes from all active facilities will likely increase impacts on both water quality and aquatic life.

Pipeline Brine. Pipeline brines are salt solutions and weighted brines used during pipeline commissioning for hydro testing or flow line preservation. Brine can be left in the pipe without adding biocide or corrosion inhibitor and may also inhibit hydrate formation. The OOC requested addition of pipeline brine to the list of miscellaneous discharges. EPA proposes to authorize discharges of pipeline brine. Because the nature of brines is similar to well treatment fluid brines, EPA proposes the same effluent limitations for well completion, workover, and treatment fluids.

EPA proposed a methods update rule to approve several new or revised analytical methods (test procedures) in wastewater regulations. The full title of the rule "Guidelines Establishing Test Procedures for the Analysis of Pollutants under the Clean Water Act; Analysis and Sampling Procedures" was published on Federal Register, Vol. 75, No. 184, September 23, 2010. If EPA promulgates changes or incorporates new testing protocol or methods in the Effluent Limitations Guideline at 40 CFR Part 435 before the issuance of this permit, those new methods and associated revised definitions will be incorporated into the final permit. If the final rule change becomes effective after issuance of this permit, those new protocol or methods supersede the applicable requirements in this permit.

## **X. References**

1. Letter of July 15, 2011, from Offshore Operators Committee to Isaac Chen regarding permit revisions/clarifications and past determinations for GMG290000 renewal 2012.
2. Letter of December 15, 2011, from Offshore Operators Committee to Isaac Chen.



ADDENDUM TO THE FACT SHEET AND SUPPLEMENTAL INFORMATION FOR THE  
PROPOSED 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)

## Produced Water Critical Dilution Percent Effluent Values

The critical dilution percent effluent tables have been revised to reflect a more representative concentration derived from modeling the same parameters used in the previous general permit (GMG290000). For this permitting action, CORMIX 7.0.0.0 is employed to determine the critical dilutions used at the edge of the 100 meter regulatory mixing zone. The common parameters for all model runs are arranged by the appropriate input parameter pages.

### 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 used for the preceding issuance of the GMG290000 permit.

### 2. *Ambient Geometry*

- a. The average depth and the 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 wind at the design conditions.
- c. The ambient velocity ( $U_a$ ) is set to 0.1 m/s which is conservative with respect to the dispersion of the pollutant and current speeds in the Gulf of Mexico.
- 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 bottom of the OCS. 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 is appropriate given the maximum density (bottom density- RHOAB) used in the modeling is  $1020.822 \text{ kg/m}^3$ .

### 3. *Discharge Geometry*

- a. The CORMIX1 Single Port model is utilized in this exercise.
- b. The nearest bank is set to 3000 m to the left which is the minimum distance which is appropriate to the OCS.
- c. Port diameter is varied with the representative diameters used in the modeling exercise.
- d. A submerged offshore discharge configuration is used with a submerged port height of 20 cm below the surface. The 20 cm above the port is not included in the density gradient portion of the calculation.
- 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 is set to 100 m.
- c. The region of interest is 3000 m.

The tables representing the appropriate critical dilution effluent percentages are as follows:

<b>Table 1-A: Critical Dilution (Percent Effluent) for Discharges with a Depth Difference Between the Discharge Pipe and the Sea Floor of Greater than 0 Meters to 4 Meters</b>						
<b>Discharge Rate</b>	<b>Pipe Diameter (inches)</b>					
<b>(bbl/day)</b>	<b>&gt;0" to 5"</b>	<b>&gt;5" to 7"</b>	<b>&gt;7" to 9"</b>	<b>&gt;9" to 11"</b>	<b>&gt;11" to 15"</b>	<b>&gt;15"</b>
0 to 500	0.07	0.20	0.16	0.13	0.10	0.08
501 to 1000	0.16	0.39	0.32	0.26	0.20	0.16
1001 to 2000	0.35	0.35	0.63	0.56	0.40	0.31
2001 to 3000	0.55	0.54	0.94	0.79	0.60	0.47
3001 to 4000	0.89	0.85	0.85	0.85	0.85	0.85
4001 to 5000	1.14	1.09	1.08	1.08	1.08	1.08
5001 to 6000	1.40	1.35	1.30	1.31	1.31	1.31
6001 to 7000	1.66	1.59	1.51	1.53	1.53	1.54
7001 to 8000	1.90	1.83	1.75	1.74	1.73	1.73
8001 to 9000	2.13	2.07	2.00	1.94	1.93	1.94
9001 to 10,000	2.38	2.30	2.21	2.13	2.13	2.14
10,001 to 15,000	3.15	3.39	3.28	3.18	3.04	3.04
15,001 to 20,000	4.34	4.39	4.25	4.15	3.83	3.92
20,001 to 25,000	5.14	5.43	5.20	5.17	4.77	4.46
25,001 to 35,000	6.36	7.18	7.18	6.86	6.56	5.96
35,001 to 50,000	7.29	8.91	9.44	9.20	8.62	8.03
50,001 to 75,000	8.33	10.52	11.72	12.22	11.34	10.90

<b>Table 1-B: Critical Dilution (Percent Effluent) for Discharges with a Depth Difference Between the Discharge Pipe and the Sea Floor of Greater than 4 Meters to 6 Meters</b>						
<b>Discharge Rate</b>	<b>Pipe Diameter (inches)</b>					
<b>(bbl/day)</b>	<b>&gt;0" to 5"</b>	<b>&gt;5" to 7"</b>	<b>&gt;7" to 9"</b>	<b>&gt;9" to 11"</b>	<b>&gt;11" to 15"</b>	<b>&gt;15"</b>
0 to 500	0.07	0.14	0.11	0.09	0.07	0.05
501 to 1000	0.10	0.27	0.22	0.18	0.14	0.11
1001 to 2000	0.18	0.18	0.44	0.37	0.28	0.22
2001 to 3000	0.29	0.29	0.66	0.55	0.42	0.33
3001 to 4000	0.40	0.39	0.39	0.74	0.56	0.43
4001 to 5000	0.51	0.50	0.49	0.92	0.70	0.54
5001 to 6000	0.75	0.73	0.70	0.71	0.70	0.70
6001 to 7000	0.90	0.87	0.83	0.82	0.83	0.83
7001 to 8000	1.05	1.01	0.97	0.96	0.96	0.96
8001 to 9000	1.18	1.15	1.10	1.08	1.08	1.08

9001 to 10,000	1.32	1.28	1.24	1.19	1.20	1.20
10,001 to 15,000	1.93	1.92	1.87	1.81	1.78	1.75
15,001 to 20,000	2.46	2.52	2.42	2.34	2.24	2.25
20,001 to 25,000	2.97	3.02	2.94	2.95	2.76	2.73
25,001 to 35,000	3.75	4.00	4.01	3.95	3.82	3.54
35,001 to 50,000	4.54	5.31	5.43	5.37	5.14	4.84
50,001 to 75,000	5.49	6.64	7.14	7.34	6.90	6.73

**Table 1-C: Critical Dilution (Percent Effluent) for Discharges with a Depth Difference Between the Discharge Pipe and the Sea Floor of Greater than 6 Meters to 9 Meters**

Discharge Rate (bbl/day)	Pipe Diameter (inches)					
	>0" to 5"	>5" to 7"	>7" to 9"	>9" to 11"	>11" to 15"	>15"
0 to 500	0.08	0.10	0.08	0.06	0.05	0.04
501 to 1000	0.11	0.19	0.15	0.13	0.10	0.08
1001 to 2000	0.14	0.14	0.31	0.26	0.20	0.15
2001 to 3000	0.17	0.17	0.46	0.39	0.29	0.23
3001 to 4000	0.20	0.20	0.20	0.51	0.39	0.30
4001 to 5000	0.24	0.24	0.23	0.64	0.49	0.38
5001 to 6000	0.30	0.29	0.29	0.29	0.59	0.46
6001 to 7000	0.36	0.35	0.34	0.34	0.69	0.53
7001 to 8000	0.48	0.47	0.45	0.45	0.45	0.45
8001 to 9000	0.56	0.54	0.52	0.51	0.52	0.52
9001 to 10,000	0.63	0.62	0.60	0.58	0.58	0.58
10,001 to 15,000	0.99	0.98	0.95	0.92	0.90	0.91
15,001 to 20,000	1.29	1.34	1.30	1.26	1.19	1.20
20,001 to 25,000	1.58	1.61	1.58	1.57	1.50	1.49
25,001 to 35,000	2.11	2.15	2.15	2.09	2.07	1.95
35,001 to 50,000	2.69	2.88	2.91	2.91	2.85	2.71
50,001 to 75,000	3.37	3.90	4.12	4.15	4.01	3.94

**Table 1-D: Critical Dilution (Percent Effluent) for Discharges with a Depth Difference Between the Discharge Pipe and the Sea Floor of Greater than 9 Meters to 12 Meters**

Discharge Rate (bbl/day)	Pipe Diameter (inches)					
	>0" to 5"	>5" to 7"	>7" to 9"	>9" to 11"	>11" to 15"	>15"
0 to 500	0.08	0.07	0.06	0.05	0.04	0.03
501 to 1000	0.11	0.15	0.12	0.10	0.08	0.06
1001 to 2000	0.14	0.14	0.24	0.20	0.15	0.12
2001 to 3000	0.17	0.17	0.36	0.30	0.23	0.18
3001 to 4000	0.19	0.19	0.19	0.40	0.31	0.24

4001 to 5000	0.21	0.21	0.21	0.50	0.38	0.30
5001 to 6000	0.23	0.23	0.23	0.23	0.46	0.36
6001 to 7000	0.24	0.24	0.24	0.24	0.53	0.41
7001 to 8000	0.19	0.19	0.19	0.19	0.61	0.47
8001 to 9000	0.20	0.20	0.20	0.20	0.69	0.53
9001 to 10,000	0.30	0.23	0.23	0.23	0.76	0.59
10,001 to 15,000	0.74	0.74	0.72	0.70	0.69	0.69
15,001 to 20,000	0.76	0.77	0.75	0.75	0.72	0.72
20,001 to 25,000	0.97	0.98	0.96	0.94	0.91	0.90
25,001 to 35,000	1.34	1.34	1.34	1.32	1.29	1.24
35,001 to 50,000	1.79	1.81	1.86	1.82	1.80	1.73
50,001 to 75,000	2.37	2.58	2.64	2.61	2.61	2.55

**Table 1-E: Critical Dilution (Percent Effluent) for Lower Volume Discharges with a Depth Difference Between the Discharge Pipe and the Sea Floor of Greater than 12 Meters**

Discharge Rate (bbl/day)	Pipe Diameter (inches)					
	>0" to 5"	>5" to 7"	>7" to 9"	>9" to 11"	>11" to 15"	>15"
0 to 500	0.08	0.07	0.05	0.04	0.03	0.03
501 to 1000	0.11	0.13	0.10	0.09	0.07	0.05
1001 to 2000	0.15	0.15	0.21	0.18	0.13	0.10
2001 to 3000	0.17	0.17	0.31	0.26	0.20	0.16
3001 to 4000	0.19	0.19	0.19	0.35	0.27	0.21
4001 to 5000	0.21	0.21	0.21	0.44	0.33	0.26
5001 to 6000	0.23	0.23	0.23	0.23	0.40	0.31
6001 to 7000	0.24	0.24	0.24	0.24	0.47	0.36
7001 to 8000	0.19	0.19	0.19	0.19	0.53	0.41

**Table 1-F: Critical Dilution (Percent Effluent) for Higher Volume Discharges with a Depth Difference Between the Discharge Pipe and the Sea Floor of Greater than 12 Meters**

Depth Difference Greater than 12 Meters to 14 Meters						
Discharge Rate (bbl/day)	Pipe Diameter (inches)					
	>0" to 5"	>5" to 7"	>7" to 9"	>9" to 11"	>11" to 15"	>15"
8001 to 9000	0.20	0.20	0.20	0.20	0.60	0.47
9001 to 10,000	0.21	0.21	0.21	0.21	0.67	0.52
10,001 to 15,000	0.39	0.39	0.39	0.39	0.39	0.39
15,001 to 20,000	0.73	0.74	0.71	0.71	0.68	0.68
20,001 to 25,000	0.94	0.95	0.93	0.92	0.89	0.88
25,001 to 35,000	1.06	1.04	1.21	1.02	0.99	0.96
35,001 to 50,000	1.47	1.48	1.42	1.45	1.43	1.38

50,001 to 75,000	1.90	2.06	2.04	2.06	2.02	1.98
<b>Depth Difference Greater than 14 Meters to 16 Meters</b>						
<b>Discharge Rate</b>	<b>Pipe Diameter (inches)</b>					
<b>(bbl/day)</b>	<b>&gt;0" to 5"</b>	<b>&gt;5" to 7"</b>	<b>&gt;7" to 9"</b>	<b>&gt;9" to 11"</b>	<b>&gt;11" to 15"</b>	<b>&gt;15"</b>
8001 to 9000	0.20	0.20	0.20	0.20	0.53	0.41
9001 to 10,000	0.21	0.21	0.21	0.21	0.59	0.46
10,001 to 15,000	0.39	0.39	0.39	0.39	0.39	0.39
15,001 to 20,000	0.43	0.44	0.44	0.44	0.44	0.44
20,001 to 25,000	0.68	0.69	0.67	0.67	0.64	0.48
25,001 to 35,000	1.05	1.03	1.02	1.01	0.99	0.95
35,001 to 50,000	1.48	1.48	1.45	1.44	1.42	1.39
50,001 to 75,000	1.62	1.69	1.70	1.69	1.68	1.63
<b>Depth Difference Greater than 16 Meters to 19 Meters</b>						
<b>Discharge Rate</b>	<b>Pipe Diameter (inches)</b>					
<b>(bbl/day)</b>	<b>&gt;0" to 5"</b>	<b>&gt;5" to 7"</b>	<b>&gt;7" to 9"</b>	<b>&gt;9" to 11"</b>	<b>&gt;11" to 15"</b>	<b>&gt;15"</b>
8001 to 9000	0.20	0.20	0.20	0.21	0.46	0.36
9001 to 10,000	0.21	0.21	0.21	0.21	0.51	0.40
10,001 to 15,000	0.39	0.39	0.39	0.40	0.40	0.40
15,001 to 20,000	0.44	0.44	0.44	0.45	0.45	0.45
20,001 to 25,000	0.48	0.48	0.48	0.49	0.49	0.49
25,001 to 35,000	0.55	0.55	0.55	0.57	0.57	0.57
35,001 to 50,000	1.07	1.06	1.04	1.02	1.00	0.96
50,001 to 75,000	1.58	1.61	1.60	1.59	1.54	1.53
<b>Depth Difference Greater than 19 Meters</b>						
<b>Discharge Rate</b>	<b>Pipe Diameter (inches)</b>					
<b>(bbl/day)</b>	<b>&gt;0" to 5"</b>	<b>&gt;5" to 7"</b>	<b>&gt;7" to 9"</b>	<b>&gt;9" to 11"</b>	<b>&gt;11" to 15"</b>	<b>&gt;15"</b>
8001 to 9000	0.20	0.20	0.20	0.20	0.42	0.33
9001 to 10,000	0.21	0.21	0.21	0.21	0.47	0.36
10,001 to 15,000	0.39	0.39	0.39	0.39	0.39	0.39
15,001 to 20,000	0.44	0.44	0.44	0.44	0.44	0.44
20,001 to 25,000	0.48	0.48	0.48	0.48	0.48	0.48
25,001 to 35,000	0.55	0.55	0.55	0.55	0.56	0.56
35,001 to 50,000	0.64	0.64	0.64	0.65	0.65	0.65
50,001 to 75,000	1.32	1.33	1.32	1.30	1.26	1.25

CORMIX 7.0.0.0 is the latest version of the CORMIX model available to the Agency at the time of revised effluent table development and represents the most robust version of the model used in the effort to describe the critical dilutions. Several significant updates are included in the latest

version when compared to the previous model versions used (CORMIX 3.2/4.0) in the critical dilution percent effluent tables. A list of features, updates, and bug fixes can be found at [http://www.mixzon.com/quality\\_assurance.php](http://www.mixzon.com/quality_assurance.php). In particular, the handling of negatively buoyant plumes and density gradients has been addressed.

In summary, Tables 1-A through 1-F hereby supersede all previous iterations of the critical dilution percent effluent tables and should be utilized in all instances associated with the general permit number GMG290000.