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Increased Emphasis on Toxics Control in Oil and Gas Industry NPDES Permits¹

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ABSTRACT

The 1987 amendments to the Clean Water Act emphasized stricter control of toxics in wastewater discharges. Although state and U.S. Environmental Protection Agency permit writers have had the authority to incorporate strict water quality-based controls in permits, they did not widely use this authority in the past. However, general permits proposed in the past year by Region VI for discharges into the territorial seas of Louisiana and by Region X for coastal and offshore discharges in Alaska are much stricter than their predecessors. The Region VI permit requires numerical produced water limits on arsenic, lead, benzene, total phenols, radium, and whole effluent toxicity. The Region X permit requires numerical produced water limits on copper, arsenic, zinc, total aromatic hydrocarbons, total aqueous hydrocarbons, and whole effluent toxicity. The additional requirements increase the cost of complying with the permit, present more opportunities for exceeding one of the permit limits, and serve as a precedent for future permits. The industry should be prepared to accept the additional costs of these requirements or develop data to convince the regulatory agencies that the increased level of monitoring and permit limits is not necessary to protect water quality. Regulatory agencies should be receptive to new data provided by the industry and flexible in setting additional toxics controls.

THE CLEAN WATER ACT

In 1972, Congress passed amendments to the Federal Water Pollution Control Act that established a comprehensive program for water quality protection and water pollution control. This statute was later called the Clean Water Act (CWA). Two key goals of the CWA that are relevant to this paper are found in §101(a):

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"(1) it is the national goal that the discharge of pollutants into navigable waters be eliminated by 1985;" and

"(3) it is the national policy that the discharge of toxic pollutants in toxic amounts be prohibited."

The first of these goals is not practical but is often cited as the basis for "ratcheting down" permit limits. The second goal is important and is the basis for much of the discussion in this paper.

The most important regulatory program established under the CWA is the National Pollutant Discharge Elimination System (NPDES). All point source discharges of pollutants to navigable waters (which include ditches and drainage pipes) must be authorized by an NPDES permit. More details on NPDES permits are provided in the next section.

In 1987, Congress amended the CWA to place a much greater emphasis on toxics. In particular, states were required to adopt specific numeric water quality standards for all toxic pollutants for which the U.S. Environmental Protection Agency (EPA) has published criteria and which could interfere with the designated uses of streams in that state. Most states have now adopted new toxics standards. As new NPDES permits are issued, they must include limits to ensure that discharges will not violate water quality standards.

NPDES PERMITS

Background

Although the NPDES program is a federal program, the EPA has delegated NPDES authority to 40 states. For those states that do not have NPDES authority, the local EPA region issues and enforces NPDES permits. This paper focuses on oil and gas industry permits issued by Region VI for Gulf of Mexico discharges and by Region X for Alaskan discharges.

NPDES permits may be issued for periods up to five years. In practice, a particular permit often remains in effect well beyond five years; if the permitting agency does not reissue the permit, the existing permit normally remains in effect indefinitely.

Most dischargers are covered under individual NPDES permits, but for the oil and gas industry, which has large numbers of facilities in the same geographic area with similar discharges, the EPA has issued general permits. General permits provide a set of operating and monitoring requirements; any facility that meets the eligibility criteria of a general permit can be covered by the general permit. Dischargers are not forced to seek coverage under a general permit, but most eligible dischargers choose to do so.

Calculation of Permit Limits

The most important part of most NPDES permits is the numerical limits for selected pollutants. Permits specify enforceable limits for metals, organics, and other more conventional pollutants, along with a monitoring schedule. The permit writer calculates permit limits by using two separate approaches and then chooses the more stringent of the two for each pollutant.

The first approach calculates technology-based limits. The limit is determined by the availability of cost-effective and dependable treatment technology and is set at a level that can be achieved by proper operation of such technology. For most major industrial categories, including the oil and gas industry, the EPA has published effluent limitations guidelines (ELGs) that establish national minimum technology-based standards.

The EPA's ELGs divide the oil and gas extraction industry into five subcategories: offshore, onshore, coastal, agricultural and wildlife water use, and stripper (40 CFR 435). This paper focuses on just the offshore and coastal ELGs.

Best practicable technology (BPT) limits, a first-tier level of treatment under the CWA, were adopted for each category on April 13, 1979 (44 FR 22075). More recently, the EPA updated the offshore and coastal ELGs. It promulgated final offshore ELGs on March 4, 1993 (58 FR 12454), and proposed coastal ELGs on February 17, 1995 (60 FR 9428). Final coastal ELGs are expected to be promulgated in November 1996. Both of these new ELGs contain best available technology (BAT) and new source performance standards (NSPS) limits. BAT and NSPS are an advanced level of performance applicable to existing and new source dischargers, respectively. During the many years prior to adoption of final BAT and NSPS for the offshore and coastal ELGs, permit writers had to rely on their best professional judgement of what would be appropriate technology-based limits.

The second approach for calculating permit limits is known as the water quality-based approach. Permit writers determine the allowable dilution and calculate the concentration of each pollutant that can be discharged and still meet water quality standards at the edge of a mixing zone. Each state has different water quality standards and mixing zone policies, so a wide range of possible water quality-based limits can be derived.

In several recent EPA general permits, limits for produced water were based on a combination of the technology-based and water quality-based approaches. Oil and grease limits were based on the ELGs, and limits on toxics and whole effluent toxicity were based on state water quality standards and water quality modeling.

INCREASED EMPHASIS ON TOXICS

Given the CWA goals of zero discharge of pollutants and no discharge of toxics in toxic amounts, it is not surprising that NPDES permit limits have become more stringent over the years. The general permits that have been proposed and issued in the past several years have required major changes in oil and gas industry operations. In some cases, reissued permits have required zero discharge of wastewater streams that had previously been discharged. In other cases, proposed new permits would require vastly more monitoring and more stringent limits on toxics. The following sections of this paper discuss several examples of the extent of the changes that have been made to discharge requirements as general permits have been reissued or proposed for reissuance.

Produced Water Discharges to Coastal Waters of Louisiana and Texas

In coastal waters of Louisiana and Texas, operators had discharged produced water for many years. A combination of state and EPA measures are leading toward zero discharge of produced water in coastal waters. The Louisiana Department of Environmental Quality (LADEQ) promulgated regulations in 1991 that required a phase out of coastal produced water discharges by January 1, 1995 (LAC 33:IX, 7.708). Based on some preliminary U.S. Department of Energy (DOE) comments, on December 16, 1994, LADEQ extended the deadline for discontinuing produced water discharges for certain open bay locations to January 1997. Texas regulations do not contain any specific prohibition for produced water discharges to coastal waters.

Region VI issued general permits LAG290000 and TXG290000 for produced water and produced sand discharges to coastal waters of Louisiana and Texas on January 9, 1995 (60 FR 2387). The permits required zero discharge for both produced water and produced sand. They were accompanied by a general administrative compliance order that provided a time extension until January 1, 1997, to meet the zero discharge requirement.

The EPA's proposed ELGs for coastal oil and gas operations also contain a zero discharge requirement for produced water and produced sand discharges to the Gulf of Mexico. Although discussions about extending the compliance date for the general permit and for meeting the new ELGs when they become effective are occurring during the summer of 1996 involving EPA Region VI, Texas, and Louisiana, it appears inevitable that sooner or later, Texas and Louisiana coastal operators will be required to meet zero discharge for produced water. The rationale for zero discharge is a combination of a cost-effective technology being available and in common use (underground injection) and the concern that produced water discharges may cause violations of state water quality standards.

Discharges to Louisiana Territorial Seas

On April 3, 1981, EPA Region VI issued general permit LA0060224 for discharges from oil and gas operations to the territorial seas of Louisiana (46 FR

20284). The territorial seas are the band of waters stretching three miles seaward from the coastline. Discharges to the territorial seas are covered under the offshore ELGs. The permit set limits based on BPT for the offshore subcategory of the ELGs. The permit contained oil and grease limits for produced water and specified no discharge of free oil for drilling fluids, drill cuttings, deck drainage, and well treatment fluids. The permit expired April 3, 1983, and was reissued on September 15, 1983 (48 FR 41494). Although that permit expired June 30, 1984, it was extended administratively to the present.

On July 19, 1996, Region VI proposed a new general permit LAG260000, which will replace LA0060224 when it is issued (61 FR 37746). The proposed new permit is much more stringent, incorporating BAT- and NSPS-level limits along with water quality-based limits on toxics. Table 1 summarizes the existing and proposed effluent limits for the major wastewater streams. Although the limits in the new permit are very restrictive when compared with those of the existing permit, one must remember that the existing limits have remained unchanged for more than 15 years.

Discharges to Outer Continental Shelf in Western Gulf of Mexico

On July 9, 1986, EPA Region VI issued general permit GMG280000 for discharges to the Outer Continental Shelf of the Gulf of Mexico (51 FR 24897). The permit conditions reflected BPT-level performance with some best professional judgement used.

On November 19, 1992, Region VI issued final general permit GMG290000 for discharges to the outer continental shelf in the western Gulf of Mexico (57 FR 54642). This permit, which replaced GMG280000, was subsequently modified on December 3, 1993, to incorporate provisions from the final offshore ELGs (58 FR 63964). The new permit is much more stringent, incorporating BAT- and NSPS-level limits along with water quality-based limits on toxics. Table 2 summarizes the previous and new effluent limits for the major wastewater streams.

Discharges to Cook Inlet, Alaska

On October 3, 1986, EPA Region X issued general permit AKG285000 for discharges to Cook Inlet (51 FR 35460). This permit was far more comprehensive than the comparable permit then in effect in Region VI, particularly for drilling fluids and drill cuttings. The permit contained limits on cadmium and mercury in the barite used to make up drilling fluids and required toxicity testing for drilling fluids.

Region X proposed a new general permit AKG285100 on September 20, 1995, to cover discharges to Cook Inlet (60 FR 48796). Cook Inlet is considered part of the coastal subcategory, and the coastal ELGs have not yet been finalized; some of the limits from the offshore ELGs were incorporated through best professional judgement. Other limits were chosen to meet Alaskan water quality

standards. Table 3 summarizes the existing and proposed effluent limits for the major wastewater streams.

DISCUSSION

The main conclusion that can be drawn from this evidence is that the latest round of permits issued to the oil and gas industry is significantly more stringent than previous permits. In some cases, this strictness is attributable to promulgation of final ELGs for the offshore subcategory. In other cases, it is attributable to an increased emphasis on toxics that was underscored by the 1987 amendments to the CWA. The latest permits include water quality-based limits on individual metals and organics as well as on whole effluent toxicity.

The increased complexity of the newer permits and the extra parameters that need monitoring create more opportunities for noncompliance with permit limits. Thus, dischargers must be increasingly diligent, not only about operating treatment facilities sufficiently to meet permit limits but also about coordinating the logistics of the expanded level of monitoring. The expense of the additional monitoring represents another complicating factor for offshore and coastal operators. Operators in these areas have been able to discharge for many years under relatively limited effluent requirements. Those days are past, and operators must be prepared to accept the additional costs of these requirements or develop data to convince the regulatory agencies that the increased level of monitoring and permit limits is not necessary to protect water quality.

The proposed Gulf of Mexico territorial seas permit offers the potential for reduced monitoring frequency when repeated samples show compliance with the permit limits. This type of flexibility helps to ease the monitoring burden somewhat. When permits are renewed, operators should seek this and other mechanisms for reducing the monitoring burden to a level that offers assurance to regulatory agencies without being unnecessarily costly.

As part of the shift toward greater stakeholder involvement, which should include the industry's concerns, regulatory agencies should be receptive to new data provided by the industry and flexible in setting additional toxics controls. Establishing provisions like the reduced monitoring frequency from the proposed Gulf of Mexico territorial seas permit mentioned above and allowing analytical results that are below a minimum quantification level to be reported as zero are good steps in that direction.

It is tempting to compare the stringency of Region VI and Region X general permits. In terms of limits and conditions, the Region X permits appear to be more stringent. On the other hand, drilling fluids, drill cuttings, and produced water discharges into coastal Gulf of Mexico waters are currently prohibited or will soon be prohibited yet discharges into Cook Inlet, also considered to be coastal waters, are permitted. When developing its general permits, each region needs to consider the location of the permitted facilities, the

nature of the water environment around those facilities, and the relevant state water quality standards and mixing zone policies, as well as the political climate within that region.

The U.S General Accounting Office recently reported on the differences among states in issuing NPDES permits (1). Its report found that in regulating toxic pollutants from municipal wastewater treatment facilities, some states consistently established numerical limits for toxics, while other states consistently imposed monitoring requirements. A few states placed neither permit limits nor monitoring requirements into their permits. Given the evidence from reference (1), it is not surprising that the Region VI and Region X general permits do not look the same.

REFERENCES

1. U.S. General Accounting Office, "Water Pollution, Differences among the States in Issuing Permits Limiting the Discharge of Pollutants," report GAO/RCED-96-42, January 1996.

Table 1

Summary of Limits from Existing General Permit LA0060224 and Proposed General Permit LAG260000 for Discharges to Territorial Seas

Discharge	Parameter	Limitations - LA0060224	Limitations - LAG260000
Drilling Fluids & Drill Cuttings		no discharge of free oil	zero discharge of fluids or cuttings
Produced Water	oil & grease	72 mg/l max.	29 mg/l avg. 42 mg/l max.
	chronic toxicity		depends on dilution
	arsenic, benzene, lead, total phenols		depends on dilution
Produced Sands			zero discharge
Deck Drainage	free oil	no discharge	no discharge
Well Treatment Fluids, Completion Fluids, & Workover Fluids	oil & grease	no discharge of free oil	29 mg/l avg. 42 mg/l max.
Misc. Discharges of Seawater and Freshwater to Which Chemicals Have Been Added	treatment chemicals		most stringent of: EPA label registration, manufacturer's recommended dose, or 500 mg/l
	free oil		no discharge
	acute toxicity		depends on dilution

Table 2

Summary of Limits from Previous General Permit GMG280000 and New General Permit GMG290000 for Discharges to the Outer Continental Shelf

Discharge	Parameter	Limitations - GMG280000	Limitations - GMG290000
Drilling Fluids & Drill Cuttings	free oil	no discharge	no discharge
	acute toxicity		30,000 ppm min.
	mercury & cadmium		limits placed on concentration in barite
Produced Water	oil & grease	48 mg/l avg. 72 mg/l max.	29 mg/l avg. 42 mg/l max.
	chronic toxicity		depends on dilution
	radium 226 & 228		monitor
Produced Sands		no discharge of free oil	zero discharge of produced sands
Deck Drainage	free oil	no discharge	no discharge
Well Treatment Fluids, Completion Fluids, & Workover Fluids	oil & grease	no discharge of free oil	29 mg/l avg. 42 mg/l max.

Table 3

Summary of Limits from Existing General Permit AKG285000 and Proposed General Permit AKG285100 for Discharges to Cook Inlet

Discharge	Parameter	Limitations - AKG285000	Limitations - AKG285100
Drilling Fluids & Drill Cuttings	acute toxicity	preapproval of additives based on toxicity	30,000 ppm min.
	mercury & cadmium	limits placed on concentration in barite	limits placed on concentration in barite
	chemical additives	provide list of additives	provide list of additives
	barium, cadmium, chromium, copper, mercury, zinc, and lead	monitor only	monitor only
Produced Water	oil & grease	48 mg/l avg. 72 mg/l max. (except for one platform with 15 mg/l avg. & 20 mg/l max.)	29 mg/l avg. 42 mg/l max. (except for one platform with 15 mg/l avg. & 20 mg/l max.)
	chronic toxicity		depends on dilution
	copper, arsenic, zinc, total aromatic hydrocarbons, & total aqueous hydrocarbons		depends on dilution
	cadmium, lead, nickel, & silver		monitor only
Produced Sands	free oil	no discharge	not listed in permit
Deck Drainage	free oil	no discharge	no discharge
	chronic toxicity (for production operations)		monitor only
Well Treatment Fluids, Completion Fluids, & Workover Fluids	oil & grease	no discharge of free oil	29 mg/l avg. 42 mg/l max.
	cadmium, copper, lead, nickel, silver, & zinc		monitor only