

A Summary of EPA's Produced Water Permitting Requirements and Potential Developments

The Clean Water Act established the National pollutant Discharge Elimination System (NPDES) permitting program. Under that program, all discharges of pollutants to surface waters of the United States are prohibited unless they are authorized by NPDES permits.

EPA is required to include two types of limits in NPDES permits. Those limits are based on treatment technology and water quality. The regulations require that technology based limits are included in permits which ensure that discharges are treated using the best available treatment technology economically achievable (BAT). After BAT based limits are established, additional limits and conditions are included in permits when needed to protect water quality.

Technology Based Limitations

EPA has issued national Effluent Guidelines for the oil and gas extraction industry which establish technology based limits for produced water (see 40 CFR Part 435). Those Effluent Guidelines are divided into subcategories to account for wellhead location and economic factors associated with the operation. Those subcategories are: Offshore, Coastal, Onshore, Agricultural and Wildlife Use, and Striper. The Offshore Subcategory covers wells located in the open ocean. Coastal Subcategory wells are those located in bays and estuaries. Wells which are located on land fall under one of three subcategories, onshore, striper, or agriculture and wildlife.

Effluent Guidelines for the Onshore and Coastal Subcategories established re-injection as BAT for produced water in most cases. Discharge of produced water from Coastal and Onshore Subcategory wells is prohibited except in Cook Inlet, Alaska. Due to a lack of disposal capability and the adverse conditions in Cook Inlet, Offshore Subcategory produced water limits apply to facilities in that location.

The Striper Subcategory covers wells which are located onshore and produce less than 10 barrels per day when operating at a maximum feasible production rate. No technology based limits were established under the Striper Subcategory Effluent Guidelines. EPA Region 6 established technology based limits for Striper Subcategory Wells located in Texas east of the 98th meridian. Oil and grease is limited in those produced water discharges to a monthly average of 25 mg/l and a maximum of 35 mg/l. Additional water quality based limits described later also apply to those discharges.

Agricultural and Wildlife Use Subcategory wells are those located onshore west of the 98th meridian. In order to be covered under that subcategory, the produced water must be of good enough quality to be used for wildlife or livestock watering or irrigation and must actually be put to those uses. The technology based oil and grease limit established by the Effluent Guidelines for produced water is a maximum of 35 mg/l. EPA does not presently have any permits authorizing discharges from Agricultural or Wildlife Use Subcategory wells; however, the Effluent Guideline requirement that the water is of good enough quality to be used for watering or irrigation would most likely be addressed through water quality based limits.

The Offshore Subcategory Effluent Guidelines limit oil and grease in produced water discharges to an average of 29 mg/l and a maximum of 42 mg/l. Those limits are based on dissolved gas floatation technology. The oil and grease limits have been difficult to achieve in some cases where dissolved oil is present in the produced water. Operators have resolved that issue by adjusting the pH of produced water prior to treatment. The same oil and grease limits apply to produced water discharges in Cook Inlet.

The Effluent Guidelines also address transfer of produced water between subcategories (see 40 CFR Part 435, Subpart G). The more stringent of the technology based limits for either the location of the well head or the location of disposal apply. An example would be produced water originating from an offshore well which is transported to shore for disposal. In that case, the discharge prohibition of the Onshore Subcategory Effluent Guidelines would apply. Likewise, if Onshore or Coastal Subcategory produced water were transferred offshore, the discharge prohibition applying to the location of the wellhead would apply.

Water Quality Based Limitations

When discharges are made to State waters, permits must contain limits necessary to ensure that State Water Quality Standards are met. State waters include all inland waters and extend to the outer boundary of the territorial seas, three miles offshore. EPA has issued two general permits for facilities located in the territorial seas of Louisiana and Texas. The Texas permit includes whole effluent toxicity limits to comply with the Texas standards for acute and chronic toxicity. The Louisiana permit also includes several limits based on State Water Quality Standards for lead, phenols, thallium, and benzene. If permits are issued which authorize discharges from the Stripper or Agriculture and Wildlife Use Subcategories, State Water Quality Standards will need to be addressed. Those standards will typically be applied based on in-stream dilution at the edge of a mixing zone or a zone of initial dilution.

Discharges to the oceans are required to contain conditions which ensure compliance with Federal ocean Discharge Criteria (Clean Water Act section 403(c) and 40 CFR Part 125). EPA has traditionally relied on whole effluent toxicity limits to ensure compliance with Ocean Discharge Criteria.

Current Permitting Actions

Texas Coastal General Permit

The Coastal Oil and Gas general permit for Texas expired on December 15, 2006. A reissued permit was proposed and a public notice was published in the Federal Register on December 28, 2006. The only change proposed for the permit is the addition of monitoring for total dissolved solids when produced water discharges are authorized. The expired permit authorized discharges of non-saline produced water from several formations. The permit limited total dissolved solids in those produced water discharges to 3,000 mg/l but did not require monitoring to ensure compliance with that water quality based limit. Regulations require that NPDES permits require monitoring at a minimum frequency of once per year for any limited

parameter. Monitoring for total dissolved solids is proposed to be required at a frequency of once per year. The comment period for the permit closes February 27, 2007. The permit should be finalized during the summer of 2007.

Western Gulf of Mexico Outer Continental Shelf (OCS) General Permit

The OCS general permit authorizes discharges from over 12,000 leases located greater than three miles offshore of Texas and Louisiana. Based on BAT, produced water discharges are limited to an average and maximum oil and grease concentration of 29 mg/l and 42 mg/l, respectively. Whole effluent toxicity limits are also included in the permit based on Ocean Discharge Criteria. The limits were derived based on the calculated dilution at the edge of a 100 meter mixing zone. A study on the effects of produced water discharges to the hypoxic zone in the northern Gulf of Mexico was completed under the existing permit. The study found that there probably is a potential impact; however, it is minor and within the margin of error of the data and the hypoxia models. The OCS general permit expires November 7, 2007. A reissued permit was proposed on December 21, 2006 with a comment period which expires on February 19, 2007. Whole effluent toxicity testing requirements for produced water discharges are proposed to be changed to include compliance with sub-lethal effects. A two year compliance schedule is included to accommodate changes that operators may need to make. No other changes to produced water limitations are proposed.

Other EPA Oil and Gas Permitting Actions

EPA Region 10 proposed a general permit for Cook Inlet in Alaska during April, 2006 and is expected to be finalized by May, 2007. That proposed general permit contains State Water Quality Standards based limits for metals, hydrocarbons, and whole effluent toxicity. The permit authorizes produced water discharges from six discharging facilities and four facilities which may discharge on an intermittent basis. The permit does not authorize produced water discharges from new facilities. Several new companies have expressed an interest in exploring in Cook Inlet in the near future; however, they are not expected to need to discharge produced water during the term of the new permit. The State of Alaska develops different mixing zones for each discharge, so authorization of new produced water discharges in the coastal portion of Cook Inlet is difficult under an existing general permit.

A new Louisiana Territorial Seas general permit is being drafted by the Louisiana Department of Environmental Quality to replace the current permit which expired in 2003. That permit should be proposed during the spring of 2007 and is not expected to contain significant changes from the current permit.

There are no other ongoing EPA permitting actions for oil and gas produced water discharges. EPA Headquarters is, however, exploring the need for a new Effluent Guideline subcategory to address discharges from coal bed methane extraction.