

**COMMENTS ON
PROPOSED GENERAL PERMIT IN COLORADO
CDPS PERMIT NUMBER COG-840000
DISCHARGES ASSOCIATED WITH PRODUCED-WATER TREATMENT FACILITIES**

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The Water Quality Control Division of the Colorado Department of Public Health and Environment (CDPHE) has proposed a general permit for discharges from treatment facilities that process produced water from oil and gas operations, including coalbed methane (CBM) operations. With this letter, Pioneer Natural Resources USA Inc. (Pioneer) is submitting comments on the proposed general permit, specifically as it pertains to the treatment of produced water from coalbed methane operations. Pioneer operates a major CBM project in the Raton Basin of Colorado. It also has a pilot CBM project in northwest Colorado at which it has pilot-tested two different produced water treatment plants.

Pioneer endorses the comments on the proposed general permit that were submitted by Delta Petroleum Corporation. In addition, Pioneer offers the following comments that would make the general permit option more attractive to producers and encourage the use of water treatment technologies for discharge of produced water.

Need for the permit. According to the CDPHE, the proposed permit was developed to address the “pressing need” (Fact Sheet p. 3) to address the backlog of permit applications for the discharge of produced water. Pioneer has several permit renewals pending with CDPHE. However, the proposed general permit only applies to treated surface water discharged from a centralized facility or a commercial disposal facility. As one of the two largest CBM producers in Colorado, Pioneer is surprised to learn that there is a pressing demand for permits that would apply to CBM treatment facilities. In our experience, treatment of CBM water is still in its infancy. With one or two exceptions water treatment technologies suitable for Colorado’s CBM produced waters are untested or have only limited operational history which makes the adoption of any treatment system a costly, high risk experiment. Pioneer no longer operates its CBM water treatment plant (an ion exchange plant) in northwest Colorado and knows of only one or two possible CBM treatment plants to which this general permit might apply. To date, CBM water treatment technologies have not been feasible or applicable to CBM operations in Colorado. Pioneer requests clarification in the Fact Sheet as to the current, practical need for and applicability of such a general permit to water treatment plants and CBM operations in Colorado.

Disadvantages of the general permit as proposed. There are a number of disadvantages with the requirements of the proposed general permit that need to be addressed in order for the general permit to be useful and to encourage oil and gas producers to pursue costly treatment, which has a high risk of not meeting all the permit general requirements. One major disadvantage of the general permit is that all effluent limitations set in this permit are based upon the most stringent

water quality standards, the regulations for effluent limitations, and/or the federal effluent limitation guidelines. More reasonable and practical effluent limits may be obtained with an individual permit because an individual permit can include determinations of the assimilative capacity of the receiving stream based on the dilution that results from mixing with receiving waters that already have ambient concentrations lower than the target stream standard. Thus, the general permit pushes more costly treatment in excess of that required to protect stream quality which will have the effect of encouraging a producer to pursue an individual permit or consider non-discharge options (such as deep injection) rather than to adopt more costly levels of treatment in excess of that required to protect environmental quality. If the objective of the general permit is to reduce permit backlog and encourage the use of water treatment technologies, adopting more reasonable discharge limits and monitoring requirements, particularly for discharges into typically dry, isolated drainages and ephemeral streams would be one step encouraging producers to use the general permit.

Another reason stated for issuing this general permit is the agency's decision not to renew the general minimal discharge permit (MINDI), and the desire to process these MINDI permits under the new general permit. However, the stringent limits and requirements under the new general permit may force many of the MINDI dischargers to pursue individual permits and add to the permit backlog.

Compliance Schedule. The general permit should allow for a compliance schedule and opportunity to adjust effluent limits based on technological and site-specific circumstances. The comments submitted by Delta Petroleum Corporation point out the difficulty of meeting WET requirements using water treatment technologies designed to remove dissolved ions. Mixing of treated water with untreated is often necessary to meet WET requirements. This mixing comes with the risk that one or more of the limits may not be met, particularly when the specified anti-degradation provision results in a limit that is 15% of the water quality standard. Pioneer requests that the general permit include a compliance schedule so that operators have the opportunity to adjust the treatment process in an effort to meet the permit limits. This compliance schedule should also include the option of modifying an effluent limit specified in the general permit when it can be demonstrated that water quality standards for a stream segment are being attained.

SAR and EC limits. The proposed general permit contains numerous tables of limitations and monitoring requirements to address different discharge situations. One advantage of the general permit is the ability to plan based on the specified limits, particularly for EC and SAR. Under many specific circumstances, however this permit may not be functional for oil and gas operators. For example, conductivity is identified as a surrogate for salt loading in Table I.B.1 (Part I, p. 5). However, Pioneer's hydrologic consultant has noted that the relationship between total dissolved solids (TDS) and conductivity (EC) varies depending on the type of water. Based on actual testing of discharges into the Colorado River drainage from an ion exchange facility treating CBM produced water, facility output could meet the salinity loading restriction (500 mg/L total dissolved solids) but its electrical conductivity (0.934) would exceed the proposed general permit limit (0.7). Given that this was one of the few field-tested treatment facilities for CBM water in Colorado, Pioneer believes that CDPHE should consider such pilot tests and consider whether the general permit would even be reasonable and applicable for such a facility. The proposed EC limit of 0.7 is based on the most salt-sensitive crops. The general permit should offer the

opportunity to specify this limit based on the actual crops that are currently or recently irrigated just downstream and potentially affected by the discharge point.

Anti-degradation-based limits. In reviewing the proposed general permit, Pioneer's hydrologic consultant observed that the proposed limits in Table I.B.5 (Part I, p. 7) are anti-degradation limitations set at just 15% of the applicable water quality standards. Anti-degradation limits are required for Reviewable Stream Segments. However, it appears that CDPHE has also adopted this "15% of the applicable water quality standard" methodology for Use-protected Stream Segments as well. Thus, for a stream with a low flow of zero, the CDPHE has adopted the most stringent limit -- 15% of the applicable water quality standard. However, if the low flow for the receiving stream is greater than zero, then the anti-degradation limit is based on that ambient concentration plus 15% of the assimilative capacity of the stream. In short, under CDPHE's anti-degradation requirements in the general permit, a stream with zero low flow, and presumably less value for aquatic life, will receive more restrictive discharge limits than a perennial, flowing stream supporting a fishery. For discharge to use-protected stream segments, the general permit should allow limits based on applicable water quality standards for use-protected streams.

Monitoring frequency. The CDPHE (Part I, p. 4) proposes a monitoring frequency based on flow. This presents two problems. First, the CBM water treatment plants that Pioneer has field-tested are designed to operate in excess of the highest flow (greater than 100,000 gallons per day). For example, the ion exchange unit Pioneer used in northwest Colorado was designed to operate at a flow rate of approximately 22-25,000 barrels per day (more than 900,000 gallons per day). Under the general permit, such a facility would require weekly testing. Oil and gas treatment facilities are often located in remote areas. Travel times to shipping points, laboratory holding times and the availability of next day shipping services makes such a sampling schedule costly and very difficult to achieve at some times of the year. Pioneer requests that CDPHE consider and accept alternative or surrogate methods of monitoring water quality output from a treatment facility that are less labor and laboratory intensive.

EPA and ELGs. As part of its review of effluent limitation guidelines (ELGs) for CBM operations, the U.S. Environmental Protection Agency (EPA) is in the process of assessing the feasibility of water treatment technologies for CBM operations. Completion of this study is a year or more away; a decision on CBM ELGs years beyond that. Pioneer requests that CDPHE clarify why this general permit is needed at this time for CBM water treatment plants and how it is intended to interface with the EPA process for developing CBM effluent limitation guidelines.

Commingling of produced waters. The Fact Sheet (p. 3) of the general permit states: "There is no allowable discharge of any wastewaters from drilling, well completion or well treatment." However, small, residual quantities of products from these operations may be present in a produced water stream entering a treatment plant. For example, a CBM well could be periodically treated to prevent the growth of harmful bacteria in the well bore. Removal of the product prior to treatment could be impossible; removal may not be needed for any water quality reason; or the product itself might be removed during water treatment. Pioneer requests that CDPHE clarify that this statement applies to surface discharge during and directly from drilling, well completion or well treatment operations.

Exclusion of some discharge sites. The following statement is found on page three of the Fact Sheet (p. 3) states: "Discharges to lakes and reservoirs are excluded from coverage under

this permit...” However, a treatment plant may discharge to a reservoir so that treated water can be mixed with some untreated produced water in order to restore the ion balance needed for the discharged water to pass a bio-toxicity test – the fish, *Daphnia magna*, etc. whole effluent toxicity (WET) test. This was the situation at Pioneer’s pilot water treatment plant in northwest Colorado. For this reason, Pioneer requests that discharges to a reservoir be permitted under the general permit.

Irrigation Water Treatment. On page two of the Fact Sheet CDPHE states that the proposed general permit applies only to facilities utilizing advanced treatment of produced water involving processes such as: (1) removal of oil/grease and other organics using physical separation (hydrocyclone, centrifuge, filtration), filtration, and other processes; and 2) removal of salt and other organics from produced water using membrane processes (such as reverse osmosis), filtration, ion exchange, and thermal distillation. However, it appears that the permit would not apply to treatment processes developed to reduce SAR levels in irrigation water, such as bicarbonate removal or calcium-magnesium amendments. Pioneer requests that CDPHE give consideration to including such processes under the general permit.

Chemical usage. On Page 6 of the Fact Sheet, CDPHE states that chemical usage in the treatment process is only allowed when the Division has approved it and stated that in the certification. Most of the treatment processes referred to in the Fact Sheet (p. 2) require chemical usage either in the treatment process, the pre-treatment process, post-treatment to adjust SAR or meet WET requirements, or during treatment plant maintenance (e.g. cleaning membranes). Does CDPHE intend to regulate the details of plant maintenance and treatment processes? It also is not clear whether the chemical usage approval applies to any chemicals added downhole, during the oil/water separation process, or added at other points in the oil-gas production process. Pioneer requests that CDPHE clarify that the statement “chemical usage is only allowed when the Division has approved its use” applies to the post-treatment addition of chemicals prior to surface discharge, and not to downhole or treatment plant operations and maintenance.

Conclusion. Pioneer supports the concept of a general permit as it could simplify the permitting process. However, in practice the proposed general permit imposes such strict water quality standards that it may have little practical application to existing or proposed CBM projects. The requirements proposed in the general permit are far stricter than those currently imposed on the many CBM water treatment plants that have been operating in the Powder River Basin of Wyoming for several years.

The cost to treat CBM produced water is directly related to the target water quality standards. Treatment of CBM water is already such an expensive, high-risk proposition that it is usually viewed as the water management technology of last resort. Adopting unreasonably stringent requirements on its output, only puts the treatment of CBM produced water treatment further out of reach. Furthermore, if the proposed general permit is part of a larger initiative on the part of the State of Colorado to encourage the treatment of all CBM produced water, the imposition of inflexible and impractical requirements is likely to push CBM producers further away from treatment as a water management option toward deep injection wherever possible.