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May 21, 2009

Mr. Gary Beers
Colorado Department of Public Health and Environment
Water Quality Division-P-B2
4300 Cherry Creek Drive South
Denver, CO 80246-1530

RE: Comments in Response to Colorado Discharge Permit System General Permit for Discharges Associated with Produced Water Treatment Facilities (COG-840000)

Dear Mr. Beers:

Delta Petroleum Corporation (Delta) respectfully submits the following comments in response to the Colorado Discharge Permit System (CDPS) statewide General Permit COG-840000 posted in the Colorado Department of Public Health and Environment (CDPHE) April 2009 public notice. Delta considers responsible management of produced water a valuable step forward for the oil and gas industry. Produced water management can be costly. However, when treated properly and discharged into surface water, the water can be viewed as a resource and not a waste product. Delta has invested 14 months examining and evaluating water quality, treatment processes and recycling of this valuable resource. From this experience, the following comments are submitted for review and incorporation into COG-840000.

1. Monitoring Frequency

   Weekly monitoring is required for certain parameters listed in Table 1.B.1. For other parameters in Tables 1.B.4, 1.B.5, 1.B.8, and 1.B.9, the monitoring frequency is increased as the volume of discharge is increased. Delta suggests that the weekly monitoring for total suspended solids, electrical conductivity (EC), calcium, magnesium, and sodium be reduced to monthly monitoring and that all flow based monitoring parameters be reduced to a monthly frequency. By nature of the treatment of produced water, the water quality is improved and the process should produce consistent treated water. Understanding that CDPHE must apply a monitoring frequency to demonstrate the efficacy of the process, monthly monitoring is sufficient to confirm treated effluent water maintains compliance with Colorado's water quality limits.

2. Derivation of Hardness-based Metal Limits

According to the Fact Sheet (page 6) that accompanies COG-840000, the most stringent hardness standard, of 25 mg/L as $CaCO_3$, from Colorado's Water Quality Regulation 31 was applied when calculating limits for hardness based metals. The 25 mg/L as $CaCO_3$ is unrealistic considering regional stream bed geology in the West. The fact sheet (page 7) states "*In instances where the application for a certification under this general permit includes sufficient upstream data to characterize a greater SAR value as the ambient level, then the permit writer has the option to use the ambient SAR value as the limit.*" Delta suggests the general permit should include allowance to adjust the hardness to the ambient concentration of the receiving water as is allowed for Sodium Adsorption Ratio (SAR).

3. Whole Effluent Toxicity Tests

a. Necessary Increase in Total Dissolved Solids

In most produced water treatment processes, inorganics are removed to concentrations below the Colorado standards. But as the Fact Sheet (page 8) correctly identifies, treated produced water that has the inorganic ions removed is chemically similar to de-ionized water. Aquatic life cannot survive in de-ionized water. As a result blending with untreated water or addition of mineral amendment is required to rebalance the treated produced water to be considered an enhancement and not a detriment to aquatic ecosystems. Produced water treated to de-ionized water quality will not pass EPA required whole effluent toxicity (WET) tests therefore CDPHE's concession to allow increased total dissolved solids (TDS), EC, chloride and/or SAR is imperative. Delta conducted WET tests over the past year verifying this exact issue. A Toxicity Identification Evaluation conducted by TRAC Labs (Pensacola, Florida) with treated produced/flowback composite water determined that 100% mortality (*P. promelas*) occurred in un-amended treated effluent, 5% mortality after 7 days in treated produced water amended to a hardness of 88 mg/L as $CaCO_3$, and no mortality after 7 days in treated produced water amended to 140 mg/L as $CaCO_3$.

The Fact Sheet indicates that when the removal of the inorganic ions contributes to WET test failure then "*the dissolved solids levels may be elevated to support passage of the WET test.*" The general permit allows for blending of untreated influent with treated effluent to rebalance the final discharge water. Blending with untreated produced water is a reasonable alternative for certain produced waters like coalbed methane produced water but untreated conventional oil and gas produced waters may have concentrations of TDS, oil and grease, and toxic organic compounds that if blended may cause toxicity failures. Other than blending, the general permit does not provide clear guidance to address alternate

amendment methods which may be used to re-mineralize the effluent to a quality that will pass chronic WET tests. The general permit, also, does not provide clear guidance as to the allowable increase of TDS, EC, chloride and SAR necessary to pass a WET test. Delta suggests the TDS, EC, chloride and SAR limits would need to be scalable to allow an increase in proportion to the amendment process.

b. Frequency of Whole Effluent Toxicity Tests

Per Colorado's Water Quality Control Division Biomonitoring (WET) Guidance Document (updated Sept 2007) and Regulation 61.8(2)(b)(i), relief from quarterly WET testing can be requested once no toxicity is demonstrated. Delta suggests the following statement copied from the Guidance be added to the general permit. "*After one year of WET testing during which no toxicity has been demonstrated, the permittee may request relief relative to future monitoring. The Division may at that time maintain the level of monitoring, reduce the frequency, allow alternate species or drop monitoring completely.*"

c. Acute vs. Chronic Requirements

Likewise, the above referenced WET Guidance indicates that acute WET testing should be considered rather than chronic WET testing when appropriate. Chronic WET testing is expensive and not always necessary to provide protection to the aquatic environment of the receiving waters. The Guidance reads "*Chronic WET testing requirements will be appropriate where the ratio of the "chronic low flow" to the effluent design flow or flow limit is less than 10:1 and the receiving stream is classified for a Class 1 Aquatic Life use or Class 2 Aquatic Life use with all of the appropriate aquatic life numeric standards. An exception may be made where the receiving stream has a low flow of 0 in all months, and when the discharge is intermittent. This exception is being made as a zero low flow stream will not normally contain water, and the discharge does not flow continuously, therefore, chronic conditions are not likely to occur. The exception shall be granted on a site-specific basis.*" Delta suggests the WET test requirements defined in each permittee's certification be appropriate to the effluent-receiving water ratio and should follow the Division's WET Guidance.

4. Water Quality Standards Below Practical Quantitation Limits

The permitted limits in Table 1.B.4 (total arsenic, potentially dissolved copper, and total mercury) and in Table 1.B.5 (total recoverable aluminum, total arsenic, potentially dissolved copper, total mercury, radium 226, and radium 228) are below the practical quantitation limits (PQL) defined by the Colorado State Laboratory (November 2008). By definition a PQL is considered the lowest concentration that

can be accurately measured. Delta requests that the limit be re-evaluated to represent the PQL since the current limits are not accurately measurable.

Delta requests the CDPHE review the above mentioned comments and modify the general permit requirements or language as appropriate. We appreciate your consideration of these comments. Please do not hesitate to contact me or Laurie Heath (Trihydro Corporation (307) 745-7474; lheath@trihydro.com) with any questions.

Sincerely,
Delta Petroleum Corporation

Brian J. Macke, P.E.
Regulatory Compliance Manager

Cc: Carl Lakey - Delta Petroleum Corporation
Alex Nash - Delta Petroleum Corporation