FACT SHEET

DISCHARGES ASSOCIATED WITH PRODUCED-WATER TREATMENT FACILITIES

GENERAL PERMIT IN COLORADO
FIRST ISSUE
CDPS PERMIT NUMBER COG-840000

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I. STATUS

This is the first separate general permit for discharge of treated produced-water to surface water. Previously these discharges were covered, under a variety of permits including the Minimum Industrial Discharge (MINDI) general permit (COG-600000) and individual permits.

II. TYPES OF DISCHARGES COVERED

a. Scope of a General Permit

The Water Quality Control Division (Division) may issue a general permit to cover a category of discharges, except those covered by individual permits, within an area which shall correspond to existing geographic or political boundaries. The general permit shall be written to regulate a category of point sources that involve the same or substantially similar types of operations, discharge the same types of wastes, require the same effluent limitations or operating conditions, and require the same or similar monitoring.

b. Scope of This General Permit

This general permit provides coverage for discharges associated with produced water treatment facilities to surface waters of the state. Produced water includes all waters and particulate matter associated with oil and gas producing formations (EPA, 1976). Consistent with the scope of the oil and gas extraction point source category established by EPA in the development of Federal Effluent Limitation Guidelines (ELGs), produced water discharges associated with production of crude petroleum and natural gas, drilling oil and gas wells, and oil and gas field exploration services are included within the scope of the permit. In addition to formation water, produced water may be commingled with injection water, any chemicals added downhole, chemicals added during the oil/water separation processes, or chemicals added during the treatment process.

c. Coverage

The general permit provides coverage for only produced-water discharges to surface waters from the following types of treatment facilities.

Centralized E&P (Exploration and Production) Waste Management Facility – a facility, other than a commercial disposal facility exclusively regulated by the Colorado Department of Public Health and Environment (CDPHE) , that is: (1) used exclusively by one owner or operator, or (2) used by more than one operator under an operating agreement which receives for collection, treatment, temporary storage, and/or disposal or produced water, drilling fluids, completion fluids, and other exempt E&P (exploration and Production) wastes that are generated from two or more production units or areas or from a set of commonly owned or operated leases. This definition includes the surface storage and disposal facilities that are present at Class II disposal well sites. This definition also includes oil-field natural occurring radioactive materials (NORM) related storage, decontamination, treatment, or disposal. (Colorado Oil and Gas Conservation Commission, COGCC, Rules and Regulations, Series 100, Definitions).

Commercial Disposal Facility –an offsite facility located in accord with CDPHE regulations pertaining to solid waste sites and facilities possessing a Certificate of Designation (CD) from the local county.

Produced water includes all waters and particulate matter associated with oil and gas producing formations. Consistent with the scope of the oil and gas extraction point source category established by EPA in the development of Federal Effluent Limitation Guidelines (ELGs), produced water discharges associated with production of crude petroleum and natural gas, drilling oil and gas wells, and oil and gas field exploration services are included within the scope of the permit. In addition to formation water, produced water may be commingled with injection water, any chemicals added downhole, chemicals added during the oil/water separation processes, or chemicals added during the treatment process

The Division considers treated produced water to be produced water that has had advanced treatment involving combinations of the following types of processes:

(1) removal of oil/grease and other organics - physical separation (hydrocyclone, centrifuge, filtration), coalescence, filtration, combined physical and chemical processes, solvent extraction, and adsorption;
(2) removal of salt and other organics from produced water – membrane processes (reverse osmosis, filtration, electrodialysis), ion exchange, capacitive deionization, and thermal distillation; and
(3) addition of chemical amendments to adjust the Sodium Absorption Ratio (SAR) or to increase the ionic strength for passage of the WET test.

This general permit provides coverage only from treatment facilities that accept produced water from conventional oil and gas operations and coal bed methane operations. Discharges from oil shale operations are not eligible for coverage at this time, but their inclusion may be re-considered in the future as more information becomes available.

Dischargers that are not eligible for coverage under this general permit should apply for coverage under an individual permit.

The discharge of produced water to other than surface waters (i.e., groundwater, land surfaces, injection wells, dirt roads) is under the jurisdiction of the COGCC.

d. Federal Regulations

Federal regulations have been considered in the determining the scope of this general permit and in setting effluent limitations. There are Federal Effluent Limitation Guidelines (ELGs) for oil and gas E&P discharges to surface waters, but these do not presently regulate pollutants from coalbed methane (CBM) discharges. EPA did not consider CBM production in developing the 1979 national ELGs because there was no significant CBM production in 1979. EPA identified the CBM sector as a candidate for a detailed study in the *Final 2006 Effluent Guidelines Program Plan* and is currently conducting the study to determine if it would be appropriate to initiate an effluent guidelines rulemaking for the *Oil and Gas Extraction Point Source Category* (40 CFR 435) to control pollutants discharged in CBM produced water. As stated by EPA, the basis for considering CBM a potential new subcategory of the oil and gas extraction category is that the product extracted, coal bed natural gas, is virtually identical to conventional natural gas, which consists largely of methane. Through experience permitting these types of discharges in Colorado, the Division has established a similar nature to the produced water wastes, and found that the treatment of CBM produced water is compatible with the treatment of conventional oil and gas produced water.

Until ELGs are developed for CBM discharges, permit writers can use Best Professional Judgment (BPJ) to identify technology-based limitations on a case-by-case basis. The Division is applying the oil and gas extraction ELG to CBM produced water discharges authorized under this general permit using the BPJ authority provided in the State and Federal Acts and associated regulations. The CBM produced water discharges authorized under this permit will be put to beneficial use for wildlife which are known to be present statewide. Therefore the beneficial use provision of the ELG is implemented in this permit. The effluent limitation for oil and grease will not be implemented in this permit for CBM produced water discharges because BPJ effluent limitations are superceeded by effluent limitation regulations promulgated by the Commission that are applicable to this discharge as described below.

The ELGs for discharges from oil and gas facilities are provided :

40 CFR Part 435 Subpart C: Onshore

There shall be no discharge of wastewater pollutants into navigable waters from any source associated with production, field exploration, drilling, well completion or well treatment (i.e. produced water, drilling muds, drill cuttings and produced sand). Since all discharges to surface waters in Colorado are subject to being used for wildlife or agricultural purposes (Subpart E), Subpart C will not be applied in this General Permit.

40 CFR Part 435 Subpart E: Agricultural and Wildlife Water Use Subcategory - west of the 98th meridian for which the produced water has a use in agriculture or wildlife propagation when discharged into navigable waters.

There shall be no discharge of waste pollutants into navigable waters from any source (other than produced water) associated with production, field exploration, drilling, well completion, or well treatment (i.e. , drilling muds, drill cuttings, and produced sands). Produced water discharges shall not exceed the following daily maximum limitation:

Effluent characteristics: Effluent limitation (mg/l). Oil and Grease: 35.

Thus, in accordance with the ELG, any produced water associated with conventional oil and gas production that is discharged shall meet the 35 mg/l oil and grease limitation. There is no allowable discharge of any wastewaters from drilling, well completion or well treatment.

e. Background

Immediate Needs for General Permit

The Division decided to develop this new general permit, starting in February 2009, based on two pressing needs.

First, the administratively extended Minmum Industrial Discharge (MINDI) general permit contains many certifications for discharges of produced water by oil and gas operations to surface waters and these certifications are included in the Division's backlogged permit count, which is used as a prime, annual performance measure by EPA. The Division is taking steps to reduce the number of certifications under the MINDI general permit to reduce the backlog number and to create new general permits that provide improved regulatory coverage for dischargers that are not adequately addressed with the coverage provided by the MINDI general permit.

Second, there are numerous oil and gas operations in the state and the Division is aware that many operations are considering expansion, new facilities, and treatment improvements that are linked to produced water discharges to surface waters. Typically, the permitting approach would be to require these facilities to apply for individual permits, since new coverage under the MINDI general is not appropriate. With a new general permit providing coverage for many of this type of discharges, certifications can be issued within 30-45 days of application and the permitting process for these facilities would be expedited. The limitations in a general permit (and certification) are expected to be more stringent than those expected to be required in an individual permit for these types of produced water discharges.

Expected Quality of Raw Produced Water

The Division has received discharge permit applications from facilities that propose to treat produced water for surface water discharge and these documents contain representative, physiochemical characterization of the raw produced water that is expected as the influent to these facilities. These characterizations are for proposed facilities in Garfield, Mesa, and Morgan Counties. As the Division receives additonal chemical data on the quality of formation water in different areas of the state (i.e., San Juan Basin), these data will be added to the data base

III. PERMIT CONDITIONS

The narrative and numeric effluent limits of this general permit are based on : (1) the water-quality standards for the receiving water and, thus, will be protective of the designated beneficial uses,(2) numeric limitations and monitoring requirements may occur on a site-specific basis after review of all appropriate facility information ,(3) *The Basic Standards and Methodologies for Surface Water* (Regulation No. 31), (4) Division's policies and guidance documents (see References), and (5) federal regulations (40CFR 435).

A table of limitations and monitoring requirements are provided in this general permit to address the expected types of discharges. For a specific discharge, a site level determination will be made to determine which limitations will apply to

the certification. The basis for each type of limitation is discussed below. Further, each certification under this general permit will state the basis for the limitations that apply to the discharge, based on but not limited to: the nature of the discharge; source water quality; and the characteristics, standards, and designated uses of the receiving stream. Based on the DMR data, the Divison can consider reductions in monitoring frequency based on a policy (WQP# 20). In this general permit, monitoring frequency for compliance with limits will not be considered for reduction during the first term of the permit.

Also, in some certifications, additional limitations can be added based on qualitative reasonable potential decisions due to chemicals present in the produced water (e.g., chemicals added downhole) or chemicals added after the water reaches the well surface (i.e., chemicals used for treatment before discharge). The former additions may be based on qualitative or quantative reasonable potential analyses and the latter additons may be based on the need for additional effluent data to complete quantitative reasonable potential analyses.

The limitations and monitoring requirements are provided in the permit. Certain requirements apply to all dischargers and there are options for additional requirements based on type of produced-water source, nature of receiving water segment, segment-based water quality standards, ambient quality levels, and site-specific considerations.

a. **Limitations Based on Technology**

Federal Effluent Limitation Guidelines

The federal guidelines that apply to produced water generated from conventional oil and gas extraction operations are found under 40 CFR 435 (*Oil and Gas Extraction Point Source Category*). The limitation that applies for oil and grease is 35 mg/l (Table I.B.2 in the permit).

Regulations for Effluent Limitations (Regulation No. 62)

Section 62.4 of the regulations includes effluent limitations that apply to all discharges of wastewater to State waters. These limitations for oil and grease, pH, and Total Suspended Solids (TSS) are potentially applicable to discharges under this general permit. According to Part 62.2(3) of the Regulations for Effluent Limitations –

> "If the Commission has not so promulgated effluent limitation guidelines for any particular industry, but that industry is subject to effluent limitation guidelines promulgated by the United States Environmental Protection Agency pursuant to the Federal Water Pollution Control Act of 1972, the effluent from these industries shall be subject to the applicable EPA guidelines and shall not be subject to the effluent limitations of Regulation 62.4."

Therefore, the oil and grease limit of 10 mg/l does not apply to produced water from conventional oil and gas operations since those discharges are instead subject to the 35mg/l limitation in the ELG. The oil and grease limitation of 10 mg/l is applied to all discharges not subject to the ELG, which includes CBM discharges and discharges of combined produced water from CBM and conventional operations.

The TSS limitation will be applied (Table B.1.1,see permit). The pH limitation is less stringent than the water-quality based limitation (see below) and, thus, is not applied. Other limitations are not applied on the basis that the pollutants are not expected to be present in the discharge (total residual chlorine and BOD_5).

b. **Limitations Based on Salinity Requirements for Colorado River**

All permit actions for discharges to surface waters in the Colorado River Basin must include salinity monitoring. Accordingly, the permit writer will perform an analysis, as set out in the paragraphs that follow, to determine which salinity requirements apply pursuant to the requirements of Section 61.8(2)(l) of the *Colorado Discharge Permit System Regulations* (Regulation No. 61). Multiple discharges covered from a single facility (i.e, one oil/gas field) are subject to the limitation that would apply if there were a single discharge point.

In conformance with the *Colorado Discharge Permit System Regulation* , existing permits for discharges to the

Colorado River basin incorporates Total Dissolved Solids (TDS) as the monitoring parameter for compliance with the salinity requirements. Substitution of Electrical Conductivity (EC) for TDS is not allowed under this general permit.

c. **Limitations Based on Water Quality Standards for Discharges to Surface Waters**

Water quality-based limits are imposed for parameters for which a reasonable potential determination has been made. In establishing limitations under this general permit, certain key assumptions are made:

Mixing Zones

Under this general permit, mixing zone regulations do not apply, since water quality standards are applied at the outfall as the effluent limitations.

TMDL Wasteload Allocations (WLA)

Since the effluent limits are equal to the water-quality standards, then the assumption is that these limits would consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the Division and the discharge will not further impair the quality of the receiving water for the 303(d)-listed parameters. However, if needed the Division can implement a TMDL WLA as a site specific effluent limit.

Use of Chemicals

The discharged produced water contains chemicals that are added as part of the production process (i.e., downhole) as well as chemicals that are added after the water has reached the surface of the well (i.e., treatment). The water quality standards apply to all chemicals contained in the produced water, independent of the source of the chemicals. Therefore, the Division needs review the chemical data provided in the application and then decide whether a chemical is a pollutant of concern, what is the reasonable potential for this chemical, and the necessity for monitoring and/or effluent limitations. If a chemical is not disclosed to the Divison (i.e., in the application or in a request to amend the certification), then the appearance of the chemical in the effluent above the water quality standard would consititue a possible violation.

Further, no permit shall be issued which allows the discharge of any radiological, chemical , or biological warfare agent or
high-level radioactive waste (Regulation 61.8.1.f)

Qualitative Reasonable Potential (RP).

Under this permit, qualitative RP determinations have been made consistent with the Division policy -*Determination of the Requirement to Include Water Quality Standards-Based Limits in CDPS Permits Based on Reasonable Potential*. A qualitative determination of RP may be made where ancillary and/or additional treatment technologies are employed to reduce the concentrations of certain pollutants. However, absent limitations, a facility may no longer continue such pollutant reductions and therefore the discharge would result in RP. For this reason, the Division may make a qualitative determination that absent effluent limitations, there is RP for these pollutants to cause or contribute to exceedances of water quality standards.

d. **Numeric Water Quality Standards**

Many of the limitations provided in the permit are numeric and are based on the water quality standards, either applied on a statewide or a site-specific basis.

pH

This parameter is limited by Water Quality Standards as the water quality standards of 6.5-9.0 s.u. range are more stringent than those specified under the *Regulations for Effluent Limitations* (Regulation No. 62).

Temperature

Statewide limitations are provided for cold and warm waters.

Organic Chemicals

Oil and grease limitations are based on Regulation 62 and the federal ELG. Limitations and/or reporting is required for the BTEX components, the other limitations for organic chemicals are developed on a site-specific basis.

Metals

The limitations for metals are detemrined on a site-specific basis.

Other Pollutant Limitations and/or Monitoring

The permit writer will review every application and determine if any additional pollutants must be limited and/or monitored to protect classified uses. If required, the permit writer will set these additional limitations equal to the appropriate water quality standards.

e. **Narrative Water Quality Standards**

Protection of Irrigated Crops

Section 3.3 of this Water Quality Policy #24 provides an explanation of how the policy can be applied to permitting discharges to surface waters. Specific information on implementation in this general permit is detailed in Note 20 (Appendix A to the permit).

Protection of Livestock Watering

The Division's practice has been to include a TDS limitation of 3,500 mg/l where discharges are to surface waters that could be used for livestock (range cattle) watering. This practice is not implemented in this general permit on the basis that effluent limits included to protect irrigated crops will result in protection of livestock watering. .

Toxicity

Whole Effluent Toxicity (WET) testing will be a part of this permit and the associated policies are cited in the References. Discharges covered under this general permit have been determined to have a potential effect on aquatic life based on the quality of the wastewater and, thus, this limitation is included. The produced-water treatment processes are projected to remove most of the inorganic salts with the result of generating effluent with TDS values less than 500 mg/l (i.e., approaching concentrations in distilled water). This lack of salts may contribute to failure of the WET test, since aquatic organisms require a certain minimal level of salts to survive. To pass the WET test, it may be necessary for dischargers to add salts back into the treated produced water which may be accomplished (typically) by blending in some produced water. One of the permit conditions is to report this blending (Table I.B.1 in permit), so the Division will have a database on this activity for use in future renewal of this general permit. Chronic WET testing is applied on the basis that mixing zone provisions are not included in development of effluent limitations under this general permit. Based on the DMR data, the Division can consider reductions in monitoring frequency based on the Division's WET Guidance

f. **Limitations Based on Existing Quality of Receiving Water (Antidegradation Review)**

As set out in *The Basic Standards and Methodologies of Surface Water*, Section 31.8(3)(c)(ii)(C), an antidegradation analysis is required for all waters not designated as Use Protected, except in cases where the regulated activity will result in only temporary or short term changes in water quality, or if the dilution ratio is greater than 100:1 (receiving stream to discharge). The temporary or short term exemption is not included under this general permit as produced water treatment facilities are not expected to be of a temporary nature. The dilution ratio exemption is not included in this general permit as mixing allowances are not evaluated or granted. Antidegradation based limitations have been calculated to be 15% of the water quality standard for the applicable parameters.

Dischargers may apply for an individual permit for a more site specific consideration of antidegradation based limitations.

IV. APPLICATION

Dischargers can apply for coverage under this general permit once the permit is issued.

Typically, a single certification will be issued for discharges from each fixed facility. There may be instances where mobile treatment facilities are moved to treat stored water (i.e., ponds, tanks) within a single field and the Divison will consider coverage under a single certification providing one set of limitations is applied to all discharges. The Divison recommends that permittees request termination of the certification once the waters are treated, which will reduce continued annual cost of the certification and reduce the Division's paperwork.

Compliance schedules may be included in certifications issued under this general permit for existing discharges(i.e., transfers from individual permits or from other general permits such as the MINDI). The duration and milestones of the compliance schedule will be determined on a site-specific basis in the certification, based on the time needed to construct the treatment needed to meet the new effluent limitations.

V. REFERENCES

Colorado Oil and Gas Conservation Commission http://cogcc.state.co.us/
Rules and Regulations, Series 100 (Definitions). 100 Series Definitions

EPA
Final 2006 Effluent Guidelines Program Plan http://www.epa.gov/EPA-IMPACT/2006/December/Day-21/i21825.htm
Oil and Gas Extraction Point Source Category (40 CFR 435)
http://law.justia.com/us/cfr/title40/40cfr435_main_02.html
1976

Water Quality Control Commission http://www.cdphe.state.co.us/op/wqcc/index.html
Regulation 31- The Basic Standards and Methodologies for Surface Water (amended 1/14/08, effective 5/31/08)
Regulation 61 - Colorado Discharge Permit System Regulations (amended 2/9/09, effective 3/30/09)
Regulation 62 - Regulations for Effluent Limitations (amended 2/11/08, effective 3/30/08)
Regulation 71 - Dillon Reservoir Control Regulation (amended 4/9/07, effective 5/30/07)
Regulation 72 - Cherry Creek Reservoir Control Regulation (amended 11/8/04, effective 12/30/04)
Regulation 73 - Chatfield Reservoir Control Regulation (amended 2/9/09, effective 3/30/09)
Regulation 74 - Bear Creek Watershed Control Regulation (update effective 05/30/05)
Regulation 75 - Cheraw Lake Control Regulation (triennial review 12/8/03)

Water Quality Control Division http://www.cdphe.state.co.us/wq/index.html
WQP #20 Baseline Monitoring Frequency, Sample Type, and Reduced Monitoring Frequency Policy for Industrial and Domestic Wastewater Treatment Facilities.
WQP #24 Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops.

Practical Quantitation Limitation Guidance Document
Reasonable Potential Procedural Guidance *and* Table A: Reasonable Potential Multiplying Factors
Biomonitoring (WET testing) guidance document and Laboratory guidelines for conducting WET testing
Antidegradation Significance Determination for New or Increased Water Quality Impacts, Procedural Guidance and Antidegradation Guidance

VI. PUBLIC NOTICE COMMENTS

The draft general permit was noticed for public comment on April 24, 2009 and the 30-day comment period was extended to June 9, 2009 in response to a request from one of the oil and gas industry associations.

Comments and opinions were received from : Delta Petroleum Corporation, Environmental Resources Management (on behalf of Aspen Creative Enterprises, LLC); BP America Production Company; 212 Resources; Altela, Inc.; Williams Production RMT Company, and Pioneer Natural Resources. Copies of these letters will be provided upon written request. Topical summaries of the comments and opinions are provided for each company followed by the Division's responses.

Based on several comments, changes are made to clarify how site-specific limitations will be detemined using information from Regulations 31 through 38 and other regulations and policies. The information on discharge limitations and monitoring conditions, that was presented in numerous tables in the permit sent to public notice, is consolidated into one table (Table I.B.1). The appendix to the permit now provides information on how site-specific determinations of limitations for certain pollutants of concern (POC) can be developed based on regulations and policies. The notes to this appendix provide details based on information from the regulations and policies. The permit sent to public notice included an appendix that chemically profiled three samples of untreated produced water in comparison with the most restrictive water-quality standards and other limitations for these parameters and, then, used to support decisions on statewide limitations for selected POCs. Based on this limited data set, initial decisions may have been made for numerous statewide limitations that may be too protective on a site-specific basis; thus, treatment above the minimum needed to comply with protection of water-quality in the receiving stream segment would have been required in many certifications. Consequently, the permit is modified to not restrict the opportunity to develop limitations on a site-specific basis and, thus, only require the necessary level of treatment to protect local water-quality. The role of the limited data base for untreated produced water in decision-making for this initial general permit is de-emphasized and the reasonable potential decisions for each certification will be made based on the specific characteristics of the produced water to be discharged to a specific stream segment with associated water quality standards. The Division is updating the approach to developing effluent limits under Water Quality Policy #24 and the current approach is provided in Note 20 of Appendix A.

Delta Petroleum Company

Comment DP-1: Monitoring frequency.
The monitoring frequency for TSS, EC, calcium, magnesium, and sodium and for the instances of flow-based monitoring for volumes greater than 0.05 MGD should be reduced to monthly. Given the consistent performance of produced-water treatent systems, monthly monitoring should be sufficient to confirm compliance with the limitations.

> Response: The Division can consider reductions for monitoring only frequencies, once sufficient monitoring data has been collected. In 2007, the Divison issued a policy on reduction in monitoring frequency (Water Quality Policy #20). No changes are made to the permit.

Comment DP-2: Derivation of hardness-based metal limits
The hardness level for computing metals-based limits should be based on ambient water-quality hardness values rather than the most stringent hardness level (25 mg/l, calcium carbonate) and, thus, hardness-based metals limits would be determined on a site specific basis. Given the stream bed geology in many areas of Colorado, the ambient hardness values are substantially above 25 mg/l. This type of site-specific option is allowed for the SAR limitation.

Response: The permit is clarified to support site-specific determinations as allowed in regulations and policies (see above paragraph on changes to issued permit).

Comment DP-3a: Whole effluent toxicity tests-Necessary increase in total dissolved solids
Other than blending, the permit does not provide guidance on amendment methods which may be use to re-minrealize the effluent to a quality that will pass chronic WET tests. Also, no information is provided on the allowable increase of TDS, EC, chloride, and SAR necessary to pass the WET test. These limits are scalable to allow increases in proportion to the amendment process.

Response: The Division does not provide guidance or review for proposed industrial wastewater treatment processes. There are no regulatory provisions that will support relaxation of water-qualty standards based on the need to pass the WET test. All limits are applied separately. The discharger is responsible for evaluating and selecting the appropriate measures needed to pass the WET test.

Comment DP-3b: Whole effluent toxicity tests- Frequency of whole effluent toxicity tests
The permit should specifically include the text on types of relief from WET quarterly testing once no toxicity is demonstrated.

Response: The Division's guidance allows for reduction in WET testing after one year of results demonstrate no toxicty (see References)

Comment DP-3c: Whole effluent toxicity tests- Acute and chronic requirements
Site-specific conditions should be considered when deciding upon the need for a chronic WET limit, especially conditions related to the effluent-receiving water ratio and intermittent discharges to streams with zero low-flow in all months.

Response: These types of site-specific decisions , which are related to mixing zone considerations, are not available under this general permit, but are available under an individual permit.

Comment DP-4: Water-quality standards below practical quantitation limits (PQLs)
Since several metals limits (Table 1.B.4 and 1.B.5) are below the PQLs, the limits should be re-evaluated based on the PQLs.

Response: The Division must apply the water-quality standard, even if the PQL exceeds the concentration stated in the standard. The Division's "*Practical Quantative Limitation Document*"(see References) should be consulted for selection of analytical methods when the PQL is greater than the effluent limitation. In these cases when the concentartion is below the PQL, the entry on the DMR should be "BDL".

Environmental Resources Management (on behalf of Aspen Creative Enterprises, LLC)

Comment ERM-1: Define "produced water"
The term produced water is often used to refer exclusively to formation water, which creates some ambiguity in the applicability of the permit. Clearly, the permit indicates that the produced water terminology refers to formation water and the variety of other waters that may be generated duirng oil and gas exploration. A suggested definition is "produced water not only includes formation water, but formation water with additives, hydraulic fracture flowback, imported water, recycled water, drilling fluids, completion fluids, drill cuttings, and other fluids generated during oil and gas exploration and production activities".

Response: The definition provided is the Fact Sheet under "Scope of This General Permit" but excludes drill cuttings which can be considered solid waste.

Comment ERM-2: Clarify how certification can apply to several discharges within a local watershed.
Mobile treatment facilities may be used at various locations within an operator's field and consequently may have several discharge points. Can this be covered under a single certification, rather than having numerous separate certifications for basically the same treatment for water produced within a large geographic area but which are under a common plan of development. This "field permit" approach is used by the Division for stormwater permitting.

Response: The Division can provide coverage under a single certification for discharges at different locations within one field, provided all discharges are subject to the same set of effluent limitations.

Comment ERM-3: permit support
The proposed permit demonstrates the Divison's appreciation for the complexities of the oil and gas industry and we the Divison's efforts to streamline the permitting process.

Response: No response provided since this is an opinion.

BP America Production Company

Comment BP-1: General permit and individual permit approach
The permit should be clarified to indicate that the general permit is not setting limitations that will be automatically applied in individual permits, which are developed on a site-specific basis.

Response: The Division agrees and has added clarification in the permit. However, the approach to developing effluent limitations under this general permit may apply to individual permits where the discharge is to a zero low-flow stream segment (i.e., no available asimilative capacity, no allowable mixing zone).

Comment BP-2: Review process for additional chemicals
After the permit application is submitted to the Division, there may arise a situation where other chemicals may be used in the E&P and/or treatment activities. The permit should clarify how this situation is handled and possible consequences to changes in limitations.

Response: An amended permit application is to be submitted to the Division, with changes to the list of used chemicals and associated MSDS information. Based on a qualitative reasonable potential determination, the Division may decide to include limitations and/or monitoring for a chemical identified on this list.

Comment BP-3: San Juan Basin formation waters were not included.
The quality of the formation waters in the San Juan Basin was not included in the background data utilized to conduct the assessment in Appendix A.

Response: As discussed in the above paragraph about changes in the issued permit, the use of the limited data set is limited and key determinations will be made on a site-specific basis, including the chemical profile of the produced water to be discharged to specific stream segment.

Comment BP-4: SAR limit
If the receiving water SAR is less than 2, then is there an option to justify a SAR limit greater than 2 for the effluent?

Response: This situation could exist where the SAR of the discharged water exceeds the SAR of the receiving water, but would have to be supported by site-specific stream data and produced water data.

Comment BP-5:Basis for imposing the sodium limit
Why does the permit provide for a sodium limit when the instream SAR is elevated, even if the SAR limit is met at the discharge ?

Response: The permit does include a sodium limit; however, sodium must be measured along with calcium and mangnesium in order to calculate the SAR value for the effluent. The text has been revised to clarify that the key limit is EC with an associated check on the companion SAR level and sodium limit added in selected situations.

Comment BP-6:Individual Permit and General Permit Limits
Refer to Comment BP-1

Response: See response to Comment BP-1.

Comment BP-7: Degree of effluent blending will need to address many factors.
The degree of effluent stream blending (treated and untreated slip-stream) will need to address mulitple factors including economics, adding sufficient calcium and/or magnesium to keep the effluent SAR within permit limits, keeping the effluent sodium low enough so as not to raise the stream SAR, allowing enough TDS to pass the WET test, and keeping the effluent TDS and conductivity low enough to meet their effluent limits.

Response:No response provided since this is an opinion.

Comment BP-8:Role of reasonable potential
If additional monitoring data are provided for reasonable potential (RP) analyses and no reasonable potential is evident, then the constituent should not be a requirement in the permit.

Response: The Division agrees that effluent limits should only be included when there is a finding of reasonable potential. The Division, in developing this general permit, relied on limited qualitative RP analysis using information available in the earlier appendix. The general permit provides the opportunity to make qualitative reasonable potential determinations on a site-specific basis using the quality of the produced water and the ambient quality of the receiving stream segment.

Comment BP-9: Role of adjusting monitoring schedules based on results
The monitoring requirements do not include provisions for requesting reduction in monitoring frequency, if key conditions are met.

Response: Consistent with the Division's policy *WQP-20 Baseline Monitoring Frequency, Sample Type, and Reduced Monitoring Frequency Policy for Industrial and Domestic Wastewater Treatment Facilities*, new facilities will not be eligible for consideration of reduced monitoring frequencies for one permit term, with the exception of WET, As noted in WET policies (see References), requests can be made for relief. The Division will consider allowances for reduction of monitoring frequencies upon renewal of this general permit.

Comment BP-10: Analytical costs.
Based on Table 3, annual analytical costs are $60,000 for complying with the monitoring requirements.

Response: No response provided since this is an opinion.

212 Resources

Comment 212-1a: Limitations based on existing water quality (antidegradation)
The text in Section III.d sets antidegradation levels at 15% of applicable parameters, which appears to be an arbitrary selection of excessively stringent levels that do not relate to other agency limits. If treatment is provided to meet human health (drinking water) standards and/or existing, typical water quality in receiving waters, then that treated effluent should be sufficient environmental protection.

Response: The comment is correct that the antidegradation based limit does not relate to other agency limits. The Division's antidegradation review and guidance materials are available (see References).

The Division must implement the AD provisions contained in Regulation 31 in discharge permits. The 15% approach does not account for ambient levels of the pollutants in the receiving stream, and is a more conservative approach that was applied in this general permit. A more detailed analysis of ambient water quality and the level of assimilative capacity available at a site can be conducted as part of the individual permit process, as described in the Division policy (see References) .

Comment 212-1b: Lowest measureable limit

The Division appears to use the premise of using the lowest limit found anywhere, which does not necessarily relate to human health protection but rather a standard set by the ability to measure. The use of reasonable health standards will allow reasonable and economically viable development.

> Response: As stated in the above paragraph on changes to the permit before issuance, clarifications are made to prevent instances where treatment is required above the minimum level needed to protect local water quality.

Comment 212-2: Permit processing and communications
Our experience suggests the need for greater procedural clarification and assurances of review and decision timelines and Division processes. We suggest the Division create an "ombudsman" system of single-point support (across programs) to assist with timely review, coordination and management of paperwork and flow, as well as notice of information needs. We have noted experience where permits have been delayed for months due to process "holds" for information that we were not made aware of nor informed about following our questions. Timely, public notice deadlines have been missed because of delayed internal Division peer review when all standards in the application were met. Each delay cost over a month delay in operations.

> Response: The Division appreciates the importance of obtaining the required discharge permits prior to the start of operation. The Division faces resource shortfalls that can cause delays in permit issuance. This new general permit was developed specifically to provide a mechanism for a streamlined permitting process (i.e., shorter timeframe) for discharges from produced water treatment facilities.

Comment 212-3: Monitoring frequency
While the Division must apply a monitoring frequency to demonstrate the efficacy of the process, monthly monitoring or monitoring of operational parameters is sufficient to confirm treated effluent maintains compliance with water quality limits. Since many treatment systems are computer driven, certain effluent standards are tied to operational performance and measures of operational performance can be used as quality assurance to reduce the need for frequent, costly samplings and analytical work. We suggest: (1) an approach that ties equipment operating performance to effluent quality over time, and (2) more frequent sampling for a short period once start-up is achieved and then requiring fewer samples once "proven".

> Response: The state and federal regulations require monitoring of each parameter as defined in the water quality standard or technology-based limitation and, unless there is no specific method to analyze a pollutant, there are no options to substitute "surrogate" parameters or treatment-process performance measures. See comment BP-9 regarding reductions in monitoring frequency based on past performance.

Comment 212-4: Others Issues
We are aware of a number of issues addressed by oil and gas companies and consultants on issues of water hardness (the standard in the proposed permit does not sustain life), WET test compliance (need for amendments other than using contaminated frac fluids as an amendment), and measurability of certain constituents (laboratory inability).

> Response: As stated in the paragraph on changes to the permit before issuance, site-specific information (i.e., water hardness) will be considered when developing metals limits to protect aquatic life uses. Insufficient information is provided in this comment about WET and detection limits for the development of a full response; however, some of these issues are contained in comments by others.

Altela, Inc

Comment A-1: Clarification on coverage for commercial treatment facilities.
While the permit provides coverage for centralized E&P treatment facilities,clarification is need to explain the coverage available for commercial disposal facilities, which are located offsite.

> Response: The general permit offers coverage for discharge of treated produced water to surface waters, independent of the nature of the treatment facility. Therefore, as stated in the Fact Sheet in Section II.c., both types of facilities mentioned could be covered under this general permit.

Comment A-2: Temperature requirements
The proposed water temperature requirements may pose significant challenges for treatment companies as it may prohibit storage of water in above-ground tanks during the summer months.

> Response: The temperature requirements will apply independent of the source of heat added to the effluent prior to discharge. Treatment companies will have to modify treatment processes and produced water handling to result in effluent temperatures below the limitation for discharge.

Comment A-3: Air-contribution of nitrogen
In a thermal evaporation/distillation process, the nitrogen levels in the ambient air may contribute to the nitrogen levels in the treated effluent. Given the proposed ammonia nitrogen limit of 0.09 mg/l, this may be a problem. A request is made to review this limit and consider a higher value.

> Response: As stated in the paragraph on changes to the permit before issuance, there are some initial decisions on statewide standards that have been reconsidered where a site-specific decision is possible (i.e., ammonia nitrogen).

Comment A-4: Review benzene limit.
The benzene limit of 2 ug/l (and 0.3 ug/l for reviewable waters) is very stringent and not typically seen in discharge permits. A request is made to review this limit and consider a high value.

> Response: This limit is based on protection of drinking water supply intake, if present downstream in the stream segment. As mentioned in the above paragraph on chnages to the permit before issuance, there are specific water quality standards for all stream segments which can be used to assign limits in the certification, and these limits may be less stringent than the most stringent limit on a statewide basis (ie. those listed in the general permit).

Comment A-5: Permit support
We believe the proposed permit is a strong step in facilitating treatment and valuable re-use of produced/frac water and re-use consistent with good environmental stewardship and sustainability.

> Response: No response provided since this is an opinion.

Williams Production RMT Company

Comment WPC-1: Role of site specific decisions in general permit process.
The permits allows for some effluent requirements to be based on site specific information provided in the application. Individualized determinations will consume time and deprive the regulated community of the predictability associated with a general permit. The permit should provide more transparency and predictability in the areas where site-specific determinations can be made.

> Response: The general permit is designed to support straight-forward implementation in certifications, while allowing some site-specific considerations which include: segment specific water quality standards, ambient SAR levels in receiving waters, and presence/absence of pollutants of concern in the produced water.
>
> The Division added additional information, including a new appendix, to the permit to identify the factors the permit writer should consider when making site-specific decisions.

Comment WPC-2: Clarification on approval for added chemicals
Produced water contains chemicals used in the production process and chemicals added as part of the treatment process after the water has reached the surface of the well. Clarification is requested that the prohibition of chemical use, unless approved by the Divison (Section 1.A.5), only applies to chemicals added after the water has reached the surface of the well.

> Response: The primary reason the Division requests disclosure of chemicals that may have come in contact with the water to be discharged is to review the nature of the added chemicals and deciding whether or not the

chemical is a pollutant of concern so that a reasonable potential analysis can be conducted and the Division can determine whether an effluent limitation or monitoring is required. .

As stated in the definition of produced water in the permit, all added chemicals that are present in the discharge flow are subject to disclosure in the application for Division review.

Comment WPC-3a: WET testing – control sample water
Given the unique chemistry of many waters within the Colorado River Basin, the control sample should reflect the chemistry of the receiving stream – if WET testing is to have any scientific validity. This should be stated in the permit.

Response: The option for the selection of dilution water for the WET test is available as stated in the laboratory guidance (see References).

Comment WPC-3b: WET testing- alternate test species
While the WET testing provisions mandate the use of Ceriodaphnia dubia, the permit should allow the substitution of other CDPHE-approved species such as Daphnia magna.

Response: The Division can approve use of Daphnia magna for acute WET testing based on a written request for use of this alternate species per the guidance (see Reference) . However, this option is not available under this general permit, since the WET limit is a chronic limit. The use of an alternate species for the chronic WET test would require approval by EPA.

Comment WPC-4: Monitoring reduction
Monitoring of produced water discharges will require travel to remote and difficult to access locations. For many effleunt parameters, sampling frequency is based on level of discharge flow. The permit should include text that provides the option for a reduction in scope and frequency of testing overtime based on the outcome of testing during the early part of the permit's duration.

Response: Regarding reductions in monitoring frequency see response to Comment BP-9. If local conditions preclude access to discharge locations for sample collection, then the sample is not collected and the information is reported on the DMR, per Division policy. However, the Division expects that for the types of discharges covered under this general permit, the site would be accessible at some time during the monitoring period due to the need to check on the operations of the treatment system.

Comment WPC-5: CBM and conventional oil and gas wells should be treated the same.
The composition of produced water from conventional formations and from CBM formations can be very similar or they can be very different. The permit provides for limits based on the produced water's formation and not on the quality, which does not make sense. Also, the stricter CBM requirements will discourage the development of commercial facilities that could treat all produced water at a given operating area. Further, EPA's technology-based effluent limitations for this sector (40 CFR435.20) clearly address both operations and provide no basis for excluding CBM operations.

Response: The only difference in limitations for these two sources of produced water is oil and grease (see permit, Tables I.B.2 and I.B.3). The 35 mg/l limit is based on federal regulation of oil and gas operations, but excludes CBM operations. Thus, the CBM operations have a limit of 10 mg/l based on state regulations.

Comment WPC-6: Permit Support
Williams applauds the efforts of the Colorado Department of Public Health and Environment (Water Quality Control Division) to develop a general permit for the dischare of produced water. If drafted correctly, a general permit can reduce the regulatory burdens and delays associated with individual permits while simultaneously protecting the environment.

Response: No response provided since this is an opinion.

Pioneer Natural Resources

Comment PNR-1: Need for general permit for CBM operations
Pioneer is surprised to learn and does not agree with the permit's conclusion that there is a pressing demand for permits that would apply to CBM treatment facilities. Based on our experience, we offer the following observations. (1) With one or two exceptions, water treatment technolgies suitable for Colordo's produced waters are untested or have only limited operational histroy which makes the adoption of any treatment system a costly, high risk experiment. (2) 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 may apply. (3) CBM water treatment technologies have not been fesible or applicable to CBM operations in Colorado.
Pioneer requests clarification in the Fact Sheet as to the curent practical need for and applicability of such a general permit to water treatment plants and CBM operations in Colorado.

Response: In the Fact Sheet, the discussion under "Immediate Needs for General Permit" does not mention needs pertaining to CBM operations and is based on information received from other segments of the oil and gas operations in Colorado.

Several CBM operators have made requests to the Division for a general permit option in addition to the individual permit option for authorizing produced water discharges. They want a shorter timeframe for obtaining permit coverage and indicate they have access to available treatment that will produce a compliant effluent for discharge to surface waters. Certainly, CBM operators can decide to seek coverage under an individula permit, instead of this general permit.

Comment PNR-2a: Disadvantages of the general permit – excessive treatment
The general permit's stringent limitations will create situations where costly treatment will be installed to produce an effluent that is in excess of the quality level needed to protect receiving water quality. Consequently, operators will be driven to pursue an individual permit, where treated effluent is not in excess of the quality level needed to protect water quality, or to pursue non-discharge options (i.e., deep-well injection).

Response: No response provided since this is an opinion.

Comment PNR-2b: Contribution toincreased backlog
The Division is undertaking two actions that will increase the future backlog for individual permits. As mentioned above, the new general permit is expected to be viewed as not cost-effective and the more cost-effective individual permit will be the preferred option for discharging to surface waters. The Division is phasing out the Minimal Industrial Discharge (MINDI) general permit which will require oil and gas operations to seek another coverage options, which as discussed, will likley be an individual permit.

Response: No response provided since this is an opinion

Comment PNR-2c: How to encourage CBM operators to use the general permit
If the objective of the general permit is to reduce 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.

Response: These types of site-specific decisions, which are related to mixing zone considerations (i.e., available assimilative capacity for dilution) are not available under this general permit, but are available under an individual permit.

In drafting this general permit the Division balanced the need to implement appropriate water quality standards with the desire to provide flexibility based on different water quality standards applied at different segments throughout the state.

Comment PNR-3: Need for a compliance schedule
In support of Delta Petroluem Company's comments on WET, Pioneer echoes the problems associated with blending to pass the WET test, which may create problems with other chemical limits or antidegradation limits.

The permit should allow for a compliance schedule and the opportunity to adjust the effluent limits based on technological and site-specific circumstances, including situations where water-quality standards will continue to be met instream if the effluent limit was increased.

Response: Concerning the WET related issue, see response to Comment DP-3a which indicates limits are applied separately.

The general permit was revised to provide for compliance schedules when an existing individual permit or certification is transferred to a certification under this general permit. The compliance schedule would only be available for new requirements and/or limits.

The effluent limits are based on water –quality standards that apply to the receiving water segment and are to be met at the point of discharge. If there are site-specific circumstances that support consideration of limits greater than the water-quality standard, then this discharge should apply for coverage under an individual permit. The request for flexibility based on site-specific technological circumstances is not understood based on the comment; however, the flexibility may only be available in an individual permit.

Comment PNR-4: SAR and EC limits
The permit should offer the opportunity to specify these limits based on the actual crops that are currently or recently irrigated just downstream and potentially affected by the discharge point. Specifically, the EC limit of 0.7 uohms would be exceeded by in most instances involving treated CBM waters, as was the case with Pioneer's treatment system on the west slope.

Response: In accord with the policy (WQP-24), the EC limit can be determined on a site specific basis, if the application includes the needed agricultural information to support the decision that beans are not the most sensitive crop downstream.

Comment PNR-5: Antidegradation-based limits
According to the permit, a more stringent antidegradation (AD) limit (i.e., 15% of the water-quality standard) applies to a zero low-flow stream than the AD limit that applies to a stream with flow (i.e., limit based on ambient concentration plus 15%). For discharges to use-protected streams, the general permit should allow limits based on applicable water quality for use-protected streams.

Response: Antidegradation-based limits are not applied to streams with designation of Use Protected, per the antidegradation review policy (see link to policy in response to Comment 212-1a). The AD limit in the general permit may be more stringent than an AD limit included in an individual permit, as the individual permitting process would include an analysis of the receiving water ambient concentration.

Comment PNR-6: Monitoring frequency
Given that many of the CBM discharges are high volume and located in remote areas, the monitoring frequency would likely be weekly based on the flow-based approach. These conditons make sample schedules costly and very difficult to achieve at times, especially during the winter. Pioneer requests consideration and acceptance of alternative or surrogate methods of monitoring water-quality output from a treatment facility that are less labor and laboratory intensive.

Response: Regarding reductions in monitoring frequency, see responses to Comment BP-9.

Comment PNR-7: EPA and ELGs
EPA is reviewing effluent limitation guidelines (ELGs) for CBM operations and including a feasibility assessment of water treatment technologies for CBM operations. This process is not expected to reach a decision on CBM ELGs for many years. Pioneer requests that the Division 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 ELGs for CBM operations.

Response: As stated in the Fact Sheet under "Immediate Needs for General Permit", the primary need for the general permit is to provide an option, with a shorter timeline, to the individual permit for produced water

disposal to surface waters. The Division has and continues to develop permits for CBM discharges, including those that have installed treatment and will implement CBM ELGs when provided in EPA regulations.

Comment PNR-8: Commingling of produced waters
Small residual quantities of chemicals may be present in produced waters due to the need to periodically add chemicals down-hole (i.e.add chemicals to prevent growth of harmful bacteria) and the removal of these residuals would be costly or near-impossible. Also, these chemicals may be removed during the treatment process or continue in the discharge at concentrations that would not impair receiving water quality. Pioneer requests that the Division clarifies the Fact Sheet (page 3) that discharge is allowed during and directly from drilling, well completion, or well treatment operations

Response: This clarification is in the general permit (see response to Comment ERM-1).

Comment PNR-9: Exclusion of some discharge sites
Pioneer used a reservoir to mix treated and untreated CBM water to restore the ionic balance needed to pass the WET test before discharge to a stream. While the Fact Sheet (page 3) states that coverage is not provided for discharges to lakes and reservoirs, Pioneer requests that such discharges be covered under the general permit.

Response: This situation, as described, indicates that the reservoir is not state waters and is part of the treatment process and, unless internal outfalls are present, compliance with all the effluent limits are to be met as the flow leaves the reservoir and before entering the stream. Thus, the situation is not a discharge to a reservoir and would be eligible for coverage under the general permit.

Comment PNR-10: Irrigation water treatment
While the Fact Sheet (page 2) identifies certain treatment processes, it appears that other processes to reduce SAR levels in irrigation waters (i.e., bicarbonate removal, caclium or magnesium amendments) may not be covered. Pioneer requests that the Divison consider including such treatment processes under the general permit.

Response: The listed treatment processes are intended to be examples and exclusion does not imply other treatment processes are excluded. The Division does not review or specify industrial terament processes that may be utilized to produce complaint effluents.

Comment PNR-11: Chemical useage
Pioneer requests that the Division clarify 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.

Response: The statement applies to all chemical additions that can be present in the produced water discharge (see response to Comment WPC-2).

Comment PNR-12: Consequence of general permit to CBM operators
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 requirments proposed in the general permit are far stricter than those currently imposed on many CBM water treatment planst 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 is usually viewed as the water management technology of last resort. Adopting unreasonably stringent requirements only puts the treatment of CBM produced water further out of reach. Furthermore, if the proposed general permit is part of a large initiative on the part of the Divison to encourage the treatment of all CBM produced water, the imposition of inflexible and impractical requirments is likley to push CBM producers further away from treatment as a water management option toward deep-well injection wherever possibe.

Response: No response provided since this is an opinion.

Comment PNR-13: Support of comments by others

Pioneer endorses the comments on the proposed general permit that were submitted by Delta Petroluem Corporation.

Response: No response provided since this is an opinion.

Gary Beers
July 23, 2009

STATE OF COLORADO

Bill Ritter, Jr., Governor
James B. Martin, Executive Director

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Colorado Department of Public Health and Environment

CDPS General Permit COG-840000 - Discharges Associated with Produced-Water Treatment Facilities (Effective 1 September 2009)

Information Flyer No. 1 – Introduction to Key Features of the General Permit (August 2009)

Eligible Discharges

Discharges of treated produced-water to surface waters are eligible for coverage under this general permit. There are two types of facilities generating these discharges.

> Exloration and Production (E&P) Waste Management Facilities are generally within an oil gas field, receive E&P wastes from one or more production units, and are exclusively regulated by the Water Quality Control Division. Authorization is a discharge permit. These facilities are typically fixed, but can be mobile to provide treatment of stored water near well pads.
>
> Commercial Disposal Facilities are generally offsite, receives E&P wastes and other types of wastewaters, and is regulated by the local county with the assistance of the Hazardous Material and Waste Management Division (Solid Waste Unit). Authorization is a Certificicate of Designation (CD). These facilities are typically fixed.

Discharges to unlined ponds, lined ponds, land, or injection wells are not eligible for coverage.

Produced Water

Produced-water discharges generated by production of crude petroleum and natural gas, drilling oil and gas wells, oil and gas field exploration services, and associated treatment processes are included within the scope of this permit. In addition to formation water, produced water may be comingled with injection water, any chemicals added downhole, any chemicals added during the oil/water separation process, and any chemicals added during the treatment process.

Effluent Limitations

Effluent limitations are developed, as a result of a two-step process, on the basis of applying the most stringent requirement from the joint consideration the following federal, interstate, and state regulations.

- Federal effluent limitation guidelines (i.e., conventional oil and gas extraction)
- Interstate watershed control regulations (i...e, Colorado River salinity control)
- Statewide effluent regulations
- State watershed control regulations
- Statewide and segment specific water-quality standards

In this general permit, the state water-quality standards are applied as end-of-pipe limits: that is, there is no consideration of the available assimilative capacity in the receiving waters. For this latter consideration, the discharger must apply for an individual permit.

The table of limitations in the general permit reflects a two-step process.

First, numeric limitations are included based on evaluations and reasonable potential determinations made during the development of the general permit. These are to be included in each certification.

Second, other numeric limitations can be developed by the permit writer based on the information and produced-water characteristics provided in the application and considerations of site-specific standards (i.e., utilizing Appendix A). These additions are explained in the certification. In certain instances, monitoring may be required to acquire sufficient effluent data for further reasonable potential analysis and determinations of need for a numeric limit, or need for further monitoring.

Application for Certification

The *Process Water, Stormwater and Ground Water Individual Industrial Wastewater Application* is to be used to apply for a certification to discharge under this general permit, since a specific application form for this general permit is not available.

Full disclosure of the chemical profile of the untreated and treated produced-water is critical to the preparation of the certification in a timely and cost-effective manner. The chemical data characterizing the effluent should include at least the parameters listed in Appendix A of the general permit. If insufficient data are submitted, the permit writer will request additional testing before additional work on the certification. When there is full disclosure, the limitations and monitoring requirements can be narrowed to the minimum necessary to assure protection of water quality in the receiving segment. When there less disclosure, it may be possible to prepare a certification: however, a substantial monitoring requirement will be included in the certification to acquire additional information on the quality of the effluent. A substantial investment in chemical analyses of the effluent data provided in the application should result in lesser monitoring requirements in the certification with a lower cost.

Upon the receipt of a complete application, the preparation of the certification should require 1-3 months, depending upon chemical complexity of the effluent, nature of the treatment facility, and permit writer's workload.

Also, the annual fee for certifications under this general permit is based on flow (Category 07, Subcatgeories 17-19) as follows:

From	0	up to	49,999 gallons/day	$2,150
From	50,000	up to	99,999 gallons/day	$3,280
More than			100,000 gallons/day	$9,880

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Colorado Department of Public Health and Environment

CDPS General Permit COG-840000 - Discharges Associated with Produced-Water Treatment Facilities (Effective 1 September 2009)

Information Flyer No. 2 – Development of Limitations for Discharge to a Ditch (September 2009)

The Question

There will be local situations where the availability of discharged treated produced-water is an opportunity to provide additional irrigation water, by means of a ditch, to agricultural uses.

> Does the discharge of produced water to a ditch require a permit from the Water Quality Control Division (Division)?

The following answer describes which releases of water to ditches require a discharge permit and outlines the Division's approach to developing effluent limitations for certifications issued under general permit COG-840000.

Which Sources of Water to a Ditch Require a Discharge Permit

Ditches contain waters from one or more of the following sources: surface water diversion, stormwater, irrigation return flow, groundwater from a well, and/or wastewater from non-agricultural activities. Which sources are subject to permitting as a discharge by the Division are identified (Table 1).

Table 1. Sources Subject to Discharge Permitting by the Division

Source	Subject to Permitting by Division	Rationale
surface water diversion	No	state waters
stormwater	No	state waters
irrigation return flow	No	not a point source per Regulations 61.2.75 and 61.3.vii
groundwater from well	No	exercise of water right, exempt per Regulation 61.3.1.a
wastewater from non-agricultural activities (i.e. produced water)	Yes	point source subject to permitting per Section 25-8-503(6) of Colorado Water Quality Act*.

* Confirmation that discharges from non-agricultural sources are subject to permitting by the Division is provided in an August 26, 1974 opinion by the Colorado Attorney General.

If the produced water is piped to an agricultural use, then a Division permit is not needed for the release of the produced water for irrigation. However, in this situation, if the produced water leaves the field and enters adjacent surface waters of the state, then the runoff is not exempt as irrigation return flow and the irrigation runoff containing produced water to state waters is subject to permitting by the Division.

Division's Permitting of Discharges to Ditches

Regulation No. 61 provides additional information for developing limitations for discharges to ditches, since Regulation 31.13 states that water in ditches shall not be classified and, thus, will not be assigned beneficial uses and water-quality standards. However, the additional information, provided in Regulation 61.8(10), states:

(a) A permit for a point source discharge to a ditch or other man-made conveyance structure shall include such provisions as are necessary to:
   (i) protect agricultural, domestic, industrial, and municipal beneficial uses made of the waters, which use or uses were decreed and in existence prior to the inception of the discharge.
   (ii) assure compliance with any applicable water-quality standards for waters of the state that may be affected by the discharge.
(b) Issuance of a permit for a point-source discharge to a ditch or other man-made conveyance structure does not relieve the applicant from responsibility to acquire any property rights necessary to conduct its discharge into and through such structure and does not itself create any such property rights. Such statement shall be included in each applicable permit.
(c) Only that portion of the discharge (flow rates, quality and quantity) in existence prior to a subsequent decreed and existing use (flow rate, quality, quantity), and any changes having only a de minimis effect upon any such use, shall be exempt from requirements necessary for the protection of that subsequent decreed and existing use.

Based on the above information, the Division's approach to developing effluent limitations for discharges of produced water to ditches is profiled in Table 2 (next page).

If the ditch returns flow to waters of the state that are classified for beneficial uses, then the water-quality standards that apply to the downstream water segment, per Regulation 61.8(10)(a)(ii), will apply to the ditch and will be addressed in the permit. In this case, the permit limitations would be developed as if the discharge is directly to the downstream state waters, which is the approach described in the general permit.

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Table 2. Framework for Development of Effluent Limitations and Requirements

Federal Regulations	Comment
a federal effluent limitation guideline (ELG) for oil and grease exists (40 CFR 435) for the discharge of produced water	this ELG does not apply since the discharge is to a ditch and the ditch does include a means to return flow directly to waters of the United States (as defined in 40 CFR Part 435).
Colorado Regulations	**Comment**
Effluent Limitations, Regulation No. 62	apply oil and grease, pH, BOD, total suspended solids
Water Quality Standards for Agriculture Uses, Regulation 31.16	apply parameters listed in Table 3 (below)
Water Quality Policy #24, Implementation of narrative standards for protection of water used for crop irrigation.	apply sodium adsorption ratio (SAR) and related parameters to protect "salt" sensitive crops irrigated with ditch water
Whole Effluent Toxicity (WET) testing	no requirement since the state waters in the ditch are unclassified (i.e., not classified for aquatic life use).
Antidegradation Review	Not required per Regulation 31.18, since the receiving water is in a ditch and is not classified.
Watershed Protection Control Regulations (ie., Regulation No. 39 and Nos. 71-75	Since ditch waters are not considered part of a watershed's drainage, salinity and other control regulations do not apply.
Other Discharge Limitations	based on requirements provided by the users of the ditch waters for special crops and/or for ditch maintenance
Other Chemical Limitations	additional chemical limitations based on chemicals in the discharge (see general permit)

Table 3. Basic Agricultural Water Quality Standards from Regulation 31.16.

Parameter	Limit	Limit Applied as
Dissolved Oxygen, mg/l	3.0	Minimum
Cyanide (free),mg/l	0.2	7-day average
Boron, mg/l	0.75	30-day average
Nitrite, mg/l (as nitrogen)	10	7-day average
Nitrate, mg/l (as nitrogen)	100	7-day average
Arsennic, μg/l (total recoverable)	100	30-day average
Antimony, μg/l (total recoverable)	5.6	30-day average
Beryllium, μg/l (total recoverable)	100	30-day average
Cadmium, μg/l (total recoverable)	10	30-day average
Trivalent or Hexavalent Chromium, μg/l, (total recoverable)	100	30-day average
Copper, μg/l, (total recoverable)	200	30-day average
Lead, μg/l, (total recoverable)	100	30-day average
Manganese, μg/l, (total recoverable)	200	30-day average
Nickel, μg/l, (total recoverable)	200	30-day average
Selenium,μg/l, (total recoverable)	20	30-day average
Zinc,μg/l, (total recoverable)	2,000	30-day average

Appendix A. Inventory of Statewide Limits and Site-Dependent Limits, Based on Receiving Water Features , for Surface Waters.

This overview (July 9, 2009) is based on current versions of regulations and practices of implementing narrative standards for protection of livestock watering, crop irrigation of crops, and aquatic biota. While key information is provided in the table and associated notes for each entry, more detailed information is available in the regulations and policies and will be utilized by the permit writer when monitoring requirements and limits are selected. The notes are provided on the pages after the table and indicate the method to calculating the limits that are based on receiving water chemistry and other parameters.

PARAMETER			REGULATORY BASIS FOR LIMITS (ug/l unless noted otherwise)									
			Beneficial Uses and Water Quality Standards (Regulation No. 31)									Other Regulations or Policies
			All Waters	Aquatic Life					Agriculture	Domestic Water Supply	Recreation	
				All Classes		Class 1		Class 2				
				Acute	Chronic	Cold	Warm					
Radionuclides (Picocuries/l, pCi/l)												
Americium 241			0.15									
Cesium 134			80									
Plutonium 239 and 240			0.15									
Radium 226 and 228			5									
Strontium 90			8									
Thorium 230 and 232			60									
Tritium			20,000									
Regulation No. 62 (mg/l except pH)												
Total Suspended Solids (TSS)												30
Total Residual Chlorine (TRC)												0.5
Total Residual Chlorine (TRC)	1-Day					0.019	0.019	--				
	30-day					0.011	0.011	0.011				
Oil and Grease	Reg. No. 62											10
	40 CFR 435.E ELG											35
BOD-5 day												30
CBOD-5 day												25
pH, su						6.5 – 9.0	6.5 – 9.0	6.5 – 9.0		5.0-9.0	6.5 – 9.0	6.0 – 9.0
Physical Parameters												
Dissolved Oxygen, mg/l	No spawning					6.0	6.0	5.0			3.0	
	Spawning					7.0	7.0	--				
Temperature, degrees Centigrade						Note 1	Note 1	Note 1				
Total Dissolved Solids (TDS), mg/l	Reg. No. 61	Concentration										500
		Load, Ton/Day										1 .0
	Livestock Watering, BPJ								3,5000			
Biological Parameters (#/100 ml)												
E. coli										630		
E. coli	Class E and U										126	
	Class P										205	
	Class N										630	
Inorganic Chemicals -Nonmetals (mg/l)												
Total Ammonia (as nitrogen)						Note 2	Note 2	Note 2				
Cyanide - Free						0.005	0.005	0.005	0.2	0.2		
Fluoride										2.0		
Nitrate (as nitrogen)									100	10		
Nitrite (as nitrogen)						Note 3	Note 3	Note 3	10	1.0		
Sulfide (as hydrogen sulfide), undissociated						0.002	0.002	0.002		0.05		

Boron								0.75			
Chloride									250		
Sulfate									250		
Asbestos, fibers/liter									7,000,000		
Phosphorus (as phosphate)	Reg. No. 71 Dillon										Note 4
	Reg. No 72 Cherry Creek										Note 5
	Reg. No 73 Chatfield										Note 6
	Reg. No. 74 Bear Creek										Note 7
	Reg. No. 75 Cheraw										Note 8
Inorganic Chemicals – Metals (ug/l)											
Aluminum , Total Recoverable			750	87							
Antimony									6.0 (30-day)		
Arsenic			340	150					0.02 (30-Day)		
Barium	1-Day								1,000		
	30-Day								490		
Beryllium								100 (30-Day)	4.0 (30-Day)		
Cadmium			Note 9	Note 9				10 (30-Day)	5.0 (1-Day)		
Chromium	III (+3)		Note 10	Note 10				100 (30-Day)	50 (1-Day)		
	VI (+6)		16	11				100 (30-Day)	50 (1-Day)		
Copper			Note 11	Note 11				200	1,000 (30-Day)		
Iron	Total Recoverable		--	1000							
	Dissolved								300 (30-Day)		
Lead			Note 12	Note 12				100 (30-Day)	50 (1-Day)		
Manganese			Note 13	Note 13				200 (30-Day)	50 (1-Day)		
Mercury, Total			1.4	Note 14					2.0 (1-Day)		
Nickel			Note 15	Note 15				200 (30-Day)	100 (30-Day)		
Selenium			16.4	4.6				20 (30-Day)	50 (30-Day)		
Silver			Note 16	Note 16					100 (1-Day)		
Thallium			--	15					0.5 (30-Day)		
Uranium			Note 17	Note 17					30		
Zinc			Note 18	Note 18				2000 (30-Day)	5,000 (30-Day)		
Organic Chemicals (CAS Number)											
Acenaphthene (83-32-9)			1,700	520					420		
Acetochlor (34256-82-1)			---	---					140		
Acrolein (107-02-8)			68	21					3.5		
Acrylamide (79-06-1)			--	--					0.0078		
Acrylonitrile (107-13-1)			7,500	2,600					0.065		
Alachlor (15972-60-8)			---	---					2		
Aldicarb (116-06-3)			---	---					7		
Aldicarb Sulfone (1646-88-4)			---	---					7		
Aldicarb Sulfoxide (1646-87-3)			---	---					7		
Aldrin (309-00-2)			1.5	---					0.0021		
Aniline(62-53-3)			---	---					6.1		
Anthracene (120-12-7)			---	---					2,100		
Aramite (140-57-8)			---	---					1.4		
Atrazine (1912-24-9)			---	---					3		
Azobenzene (103-33-3)			---	---					0.32		
Benzene (71-43-2)			5,300	---					2.2		
Benzidine (92-87-5)			2,500	---					0.00015		
Benzo(a)anthracene (PAH) (56-55-3)			---	---					0.0048		
Benzo(a)pyrene (PAH) (50-32-8)			--	--					0.0048		
Benzo(b)fluoranthene (PAH) (205-99-2)			---	---					0.0048		
Benzo(g,h,i)perylene (PAH) (191-24-2)			---	---					---		
Benzo(k)fluoranthene (PAH) (207-08-9)			---	---					0.0048		

Benzotrichloride (98-07-7)			---	---					0.0027		
Benzyl chloride (100-44-7)			---	---					0.21		
Bis(chloromethyl)ether (BCME) (542-88-1)			---	---					0.00016		
Bromate (15541-45-4)			---	---					0.050		
Bromodichloromethane (HM) (75-27-4)			11,000	---					---		
Bromoform (HM) (75-25-2)			---	---					---		
Butyl benzyl phthalate (85-68-7)			---	---					1,400		
Carbofuran (1563-66-2)			---	---					35		
Carbon tetrachloride (56-23-5)			35,200	---					0.27		
Chlordane (57-74-9)			1.2	0.0043					0.10		
Chlorethyl ether (BIS-2) (111-44-4)			---	---					0.032		
Chlorobenzene (108-90-7)			---	---					100		
Chlorodibromomethane (HM) (124-48-1)			---	---					---		
Chloroform (HM) (67-66-3)			28,900	12,40					---		
Chloroisipropyl ether (BIS-2) (108-60-1)			---	---					280		
4-Chloro-3-methylphenol (59-57-8)			30	---					210		
Chloronapthalene (91-57-7)			2,300	620					560		
Chlorophenol or (2-Chlorophenol) (95-57-8)			4,380	2,000					35		
Chlorpyrifos (2921-88-2)			0.083	0.041					21		
Chrysene (PAH) (218-01-9)			---	---					0.0048		
DDD (72-54-8)			0.6	---					0.15		
DDE (72-55-9)			1,050	---					0.1		
DDT (50-92-3)			0.55	0.001					0.1		
Dalapon (75-99-0)			---	---					200		
Demeton (8065-48-3)			---	0.1					---		
Diazinon (333-41-5)			0.17	0.17					---		
Dibenzo(a,h)anthracene (PAH) (53-70-3)			---	---					0.0048		
1,2 Dibromo-3-Chloropropane (DBCP)			---	---					0.2		
Dicamba (1918-00-9)			---	---					210		
Dichloroacetic acid (79-43-6)			---	---					0.7		
Dichlorobenzene 1,2 (95-50-1)			---	---					600		
Dichlorobenzene 1,3 (541-73-1)			---	---					94		
Dichlorobenzene 1,4 (106-46-7)			---	---					75		
Dichlorobenzidine (91-94-1)			---	---					0.078		
Dichloroethane 1,2 (107-06-2)			118,000	20,000					0.38		
Dichloroethylene 1,1 (75-35-4)			---	---					7		
Dichloroethylene 1,2 cis (156-59-2)			---	---					2		
Dichloroethylene 1,2 trans (156-60-50			---	---					100		
Dichlorophenol 2,4 (120-83-2)			2,020	365					21		
Dichlorophenoxyacetic acid (2,4-D) (94-75-7)			---	---					70		
Dichloropropane 1,2 (78-87-5)			23,000	5,700					0.52		
Dichloropropylene 1,3 (542-75-6)			6,060	244					0.35		
Dichlorvos (62-73-7)			---	---					0.12		
Dieldrin (60-57-1)			0.24	0.056					0.002		
Diethyl phthalate (84-66-2)			---	---					5,6000		
Diisopropylmethylphosphonate (DIMP) (1445-75-6)			---	---					8		
Dimethylphenol 2,4 (105-67-9)			2,120	---					140		
Dimethyl phthalate (131-11-3)			---	---					70,000		
Di-n-butyl phthalate (84-74-2)			---	---					700		
Dinitrophenol 2,4 (51-28-5)			---	---					14		
Dinitro-o-cresol 4,6 (534-52-1)			---	---					0.27		
Dinitrotoluene 2,4 (121-14-2)			---	---					0.11		
Dinitrotoluene 2,6 (606-20-2)			330	230					---		
Dinoseb (88-85-7)			---	---					7		
Dioxane 1,4 (123-91-1)	Through 03/21/10		---	---					6.1		
	Effective 03/22/10		---	---					3.2		

Dioxin (2,3,7,8 TCDD) (1746-01-6)		0.01	0.00001					2.2 x 10-7		
Diphenylhydrazine 1,2 (122-66-7)		270	---					0.044		
Di(2-ethylhexyl)adipate (103-23-1)		---	---					400		
Diquat (85-00-7)		---	---					15		
Endosulfan (115-29-7)		0.11	0.056					42		
Endosulfan, alpha (959-98-8)		0.11	0.056					42		
Endosulfan, beta (33213-65-9)		0.11	0.056					42		
Endosulfan, sulfate (1031-07-8)		0.11	0.056					42		
Endothall (145-73-3)		---	---					100		
Endrin (72-20-8)		0.086	0.036					2		
Endrin aldehyde (7421-83-4)		---	---					2.1		
Epichlorohydrin (106-89-8)		---	---					3.5		
Ethylbenzene (100-41-4)		32,000	---					700		
Ethylene dibromide (106-93-4)		---	---					0.2		
Ethylhexyl phthalate (BIS-2)(DEHP)(117-81-7)		---	---					2.5		
Fluoranthene (PAH) (206-44-0)		3,980	---					280		
Fluorene (PAH) (86-73-7)		---	---					280		
Folpet (133-07-3)		---	---					10		
Furmecyclox (60568-05-0)		---	---					1.2		
Glyphosate (1071-83-6)		---	---					700		
Guthion (86-50-0)		---	0.01					---		
Heptachlor (76-44-8)		0.52	0.0038					0.008		
Heptachlor epoxide (1024-57-3)		0.52	0.0038					0.004		
Hexachlorobenzene (118-74-1)		---	---					0.022		
Hexachlorobutadiene (87-68-3)		90	9.3					0.45		
Hexachlorocyclohexane, alpha (319-84-6)		---	---					0.45		
Hexachlorocyclohexane, beta (319-85-7)		---	---					0.019		
Hexachlorocyclohexane, gama (58-89-9)		0.95	0.08					0.2		
Hexachlorocyclohexane, technical (608-73-1)		100	---					---		
Hexachlorocyclopentadiene (HCCPD) (77-47-4)		7	5					42		
Hexachlorodibenzo-p-dioxin (19408-74-3)		---	---					5.60E-06		
Hexachloroethane (62-72-1)		980	540					0.7		
Hydrazine (302-01-2)		---	---					0.012		
Indeno(1,2,3-cd)pyrene (PAH) (193-39-5)		---	---					0.0048		
Isophorone (78-59-1)		---	---					140		
Malathion (121-75-5)		---	0.1					140		
Methoxychlor (72-43-5)		---	0.03					35		
Methyl Bromide (HM) (74-83-9)		---	---					---		
Methylene chloride (HM) (74-87-3)		---	---					---		
4,4- Methylene bis (N,N’-dimethly)aniline (101-61-1)		---	---					0.76		
Methylene chloride (75-09-2)		---	---					4.7		
Metribuzin (21087-64-9)		---	---					180		
Mirex (2385-85-5)		---	0.001					1.4		
Naphthalene (PAH) (91-20-3)		2,300	620					140		
Nitrobenzene (98-95-3)		27,000	---					3.5		
Nitrophenol 4 (100-07-2)		---	---					56		
Nitrosodibutylamine N (924-16-3)		---	---					0.0065		
Nitrosodiethylamine N (55-18-5)		---	---					0.00023		
Nitrosodimethylamine N (62-75-9)		---	---					0.00069		
N-Nitrosodiethanolamine (1116-54-7)		---	---					0.013		
Nitrosodiphenylamine N (86-30-6)		---	---					7.1		
N-Nitroso-n-methylethylamine (10595-95-6)		---	---					0.0016		
Nitrosopyrrolidine N (930-55-2)		---	---					0.017		
N-Nitrosodi-n-propylamine (62-64-7)		---	---					0.005		
Nonylphenol (84852-15-3 and 25154-52-3) Eff 07/01/10		28	6.6					---		
Oxamyl (vydate) (23135-22-0)		---	---					175		

PCBs (1136-36-3)		2.0	0.014					0.0175		
Parathion (56-38-2)		0.065	0.013					---		
Pentachlorobenzene (608-93-5)		---	---					5.6		
Pentachlorophenol (87-86-5)		19	15					0.29		
Phenol (108-95-2)		10,200	2,560					2,100		
Picloram (1918-02-1)		---	---					490		
Prometon (1610-18-0)		---	---					100		
Propylene oxide (75-56-9)		---	---					0.15		
Pyrene (PAH) (129-00-0)		---	---					210		
Quinoline (91-22-5)		---	---					0.012		
Simazine (122-34-9)		---	---					4		
Styrene (100-42-5)		---	---					100		
Tetrachlorobenzene 1,2,4,5 (95-94-3)		---	---					2.1		
Tetrachloroethane 1,1,2,2 (79-34-5)		---	2,400					0.18		
Tetrachloroethylene (PCE) (127-18-4)		5,280	840					5		
Toluene (108-88-3)		17,500	---					560		
Toxaphene (8001-35-2)		0.73	0.0002					0.032		
Tributyltin (TBT)(56573-85-4)		0.46	0.072					---		
Trichlorobenzene 1,2,4 (120-82-1)		250	50					70		
Trichloroethane 1,1,1 (1,1,1-TCA) (71-55-6)		---	---					200		
Trichloroethane 1,1,2 (1,1,2-TCA) (79-00-5)		9,400	---					2.8		
Trichloroethylene (TCE) (79-01-6)		45,000	21,900					5		
Trichlorophenol 2,4,5 (95-95-4)		---	---					700		
Trichlorophenol 2,4,6 (88-06-2)		---	970					3.2		
Trichlorophenoxypropionic acid (2,4,5-tp) (93-72-1)		---	---					50		
Trihalomethanes, total (sum of sveveral compounds)		---	---					80		
Vinyl chloride (75-01-4)		---	---					0.023		
Xylenes (total) (1330-20-7)		---	---					1,400		
Toxicity										
Whole Effluent Toxicity (WET)		Note 19	Note 19							
WQP #24 (Protection of Irrigated Crops)										
Electrical Conductivity (EC)										Note 20
Sodium Absorption Ratio (SAR)										Note 20
Sodium										Note 20
Calcium										Note 20
Magnesium										Note 20

APPENDIX A. NOTES

INVENTORY OF STATEWIDE LIMITS AND SITE-DEPENDENT LIMITS, BASED ON RECEIVING WATER FEATURES, FOR SURFACE WATERS.

NOTES REFERENCED IN TABLE IN APPENDIX A

Note 1 Temperature (degrees Centigrade)

Class 1		Class 2
Cold Water Biota	Warm Water Biota	
Rivers & Streams: June-Sept = 17.0 (ch), 21.2 (ac) **Rivers & Streams:** Oct –May = 9.0 (ch), 13.0 (ac) **NS[a] Rivers & Streams:** Apr-Oct =18.2 (ch), 23.8 (ac) **NS[a] Rivers & Streams:** Nov-Mar =9.0 (ch), 13.0 (ac) **Lakes & Res:** Apr-Dec = 17.0 (ch), 21.2 (ac) **Lakes & Res:** Jan-Mar = 9.0 (ch), 13.0 (ac) **Large Lakes & Res [d]:** Apr-Dec = 18.2(ch), 23.8 (ac) **Large Lakes & Res [d]:** Jan-Mar = 9.0(ch), 13.0 (ac)	**Rivers & Streams:** Mar-Nov = 28.7 (ch), 31.3 (ac) cs, Jd, od [a] =24.2(ch), 29.0 (ac) rs [b] = 27.7 (ch), 31.3 (ac) other ss [c] = 27.5(ch), 28.6(ac) **Rivers & Streams:** Dec-Feb = 14.3 (ch), 15.2 (ac) cs, Jd, od [a] = 12.1(ch), 14.5(ac) rs [b] = 13.9 (ch), 15.2 (ac) other ss [c] = 13.7 (ch), 14.3 (ac) **Lakes & Res:** Apr-Dec = 26.5 (ch), 29.3 (ac) **Lakes & Res:** Jan-Mar = 13.3 (ch), 14.6 (ac)	Same as Class 1

Note 2 Ammonia

Class 1		Class 2
Cold Water Biota	Warm Water Biota	
chronic = elsp or elsa [(1)] acute = sp [(1)] (N) See Reg No. 31 for footnote	chronic = Apr 1-Aug 31=elsp[(1)] Sept 1-Mar 29=elsa[(1)] acute = sa[(1)] (N)	Class 2 Cold/Warm have the same standards as Class 1 Cold/Warm (N)

Note 3 Nitrite

Established on a case-by-case basis using:

Salmonids and other sensitive fish species present:
Acute= 0.10 (0.59 * [Cl-]+3.90) mg/l NO2-N
Chronic= 0.10 (0.29 * [Cl-]+0.53) mg/l NO2-N
(upper limit for Cl- =40 mg/l)
Salmonids and other sensitive fish species absent:
Acute= 0.20 (2.00 * [Cl-]+0.73) mg/l NO2-N
Chronic=0.10 (2.00 *[Cl-]+0.73) mg/l NO2-N
[Cl-] = Chloride ion concentration
(upper limit for Cl- =22 mg/l)

Note 4. Regulation No. 71 : Dillon Reservoir Control Regulation

New dischargers must have a total phosphorus allocation before starting to discharge into waters of this watershed.

A case-by-case determination is necessary for new industrial dischargers having a temporary discharge and/or a discharge with insignificant phosphorus load to the Dillon Reservoir watershed.

Note 5. Regulation No. 72 : Cherry Creek Reservoir Control Regulation

New dischargers must have a total phosphorus allocation before starting to discharge into waters of this watershed.

A case-by-case determination is necessary for new industrial dischargers having a temporary discharge and/or a discharge with insignificant phosphorus load to the Cherry Creek Reservoir watershed.

Note 6. Regulation No.73: Chatfield Reservoir Control Regulation

New dischargers must have a total phosphorus allocation before starting to discharge into waters of this watershed.

A case-by-case determination is necessary for new industrial dischargers having a temporary discharge and/or a discharge with insignificant phosphorus load to the Chatfield Reservoir watershed.

Note 7. Regulation No. 74: Bear Creek Watershed Control Regulation

New dischargers must have a total phosphorus allocation before starting to discharge into waters of this watershed.

A case-by-case determination is necessary for new industrial dischargers having a temporary discharge and/or a discharge with insignificant phosphorus load to the Bear Creek watershed.

Note 8. Regulation No. 75: Cheraw Lake Control Regulation

The purpose of this regulation is to protect the agricultural uses of water in Horse Creek (Otero and Bent Counties) from the highly saline discharges from tributary Cheraw Lake, while also avoiding an unacceptable adverse impact on other downstream water uses, particularly domestic water supplies.

This regulation would control the levels of TDS in discharges to Cheraw Lake.

Note 9. Cadmium

Aquatic Life	
Acute	Chronic
$(1.136672-[\ln(hardness) \times (0.041838)])\times e^{0.9151[\ln(hardness)]-3.1485}$ $(Trout)=(1.136672-[\ln(hardness)\times (0.041838)])\times e^{0.9151[\ln(hardness)]-3.6236}$	$(1.101672-[\ln(hardness) \times (0.041838)]) \times e^{0.7998[\ln(hardness)]-4.4451}$

Note 10. Chromium III (+3)

Aquatic Life	
Acute	Chronic
$e^{(0.819[\ln(hardness)]+2.5736)}$	$e^{(0.819[\ln(hardness)]+0.5340)}$

Note 11. Copper

Aquatic Life	
Acute	Chronic
$e^{(0.9422[\ln(hardness)]-1.7408)}$	$e^{(0.8545[\ln(hardness)]-1.7428)}$

Note 12. Lead

Aquatic Life	
Acute	Chronic
$(1.46203-[(\ln(hardness)*(0.145712)]])*e^{(1.273[\ln(hardness)]-1.46)}$	$(1.46203-[(\ln(hardness)*(0.145712)]])*e^{(1.273[\ln(hardness)]-4.705)}$

Note 13. Manganese

Aquatic Life	
Acute	Chronic
$e^{(0.3331[\ln(hardness)]+6.4676)}$	$e^{(0.3331[\ln(hardness)]+5.8743)}$

Note 14. Mercury

Aquatic Life	
Acute	Chronic
1.4	0.77 FRV(fish)[6] = 0.01 (Total)

Note 15. Nickel

Aquatic Life	
Acute	Chronic
$e^{(0.846[\ln(hardness)]+2.253)}$	$e^{(0.846[\ln(hardness)]+0.0554)}$

Note 16. Silver

Aquatic Life	
Acute	Chronic
$\frac{1}{2}e^{(1.72[\ln(hardness)]-6.52)}$	$e^{(1.72[\ln(hardness)]-9.06)}$ (Trout) = $e^{(1.72[\ln(hardness)]-10.51)}$

Note 17. Uranium

Aquatic Life	
Acute	Chronic
$e^{(1.1021[\ln(hardness)]+2.7088)}$	$e^{(1.1021[\ln(hardness)]+2.2382)}$

Note 18. Zinc

Aquatic Life	
Acute	Chronic
$0.978\ e^{(0.8525[\ln(hardness)]+1.0617)}$	$0.986\ e^{(0.8525[\ln(hardness)]+0.9109)}$

Note 19. Whole Effluent Toxicity (WET)

TEST AT APPLICATION

At the time of permit application for a new or renewal permit, selected permittees will be required to submit the results of an acute WET test, except for facilities subject to item 4.ii which will be required to conduct a chronic test. The test shall be conducted on 100% effluent and be for both Ceriodaphnia dubia and fathead minnows. Where routine testing has been performed, additional testing at the time of renewal application will to be required. Permittees subject to testing are:

1. All POTWs with design influent flows equal to or greater than one million gallons per day;

2. All POTWs with approved pretreatment programs or POTWs that are required to develop a pretreatment program;
3. All industrial facilities identified as an EPA major;
4. Other POTWs or industrial facilities, based on the following considerations:
i) The variability of the pollutants or pollutant parameters in the effluent (based on chemical-specific information, the type of treatment facility, and types of industrial/pollutant contributions);
ii) The ratio of stream low flow to effluent design flow (a chronic rather than an acute test is required if dilution is less than 10:1, respectively, and the receiving stream has a Class 1 Aquatic Life use or Class 2 Aquatic Life use with all of the appropriate aquatic life numeric standards);
iii) TMDLS and other receiving stream characteristics, including possible or known water quality impairment;
iv) TMDLS and other receiving stream characteristics, including possible or known other pertinent considerations, such as facility history and compliance record.

REASONABLE POTENTIAL

The permit rationale shall contain a discussion of the reasons for including, or not including WET limits or monitoring based on reasonable potential for the effluent to be toxic to aquatic life. The justification for the determination to include or exclude should be based upon factors such as:

a. WET data for the discharge;
b. Existence of a pretreatment program;
c. Chemical characteristics of the discharge;
d. Activity creating the discharge;
e. Receiving water use classification;
Colorado Water Quality Control Division Biomonitoring Guidance Document
f. Compliance history;
g. Number of industrial or commercial taps.

TEST FREQUENCY

WET testing shall normally be on a quarterly basis, although the Division retains authority to vary the frequency as warranted by site specific circumstances. Examples of an alternate frequency may be for a new facility where monthly testing for the first six months is desired, or a facility which has conducted testing and a reduced frequency of once a year is deemed appropriate.

EFFLUENT LIMITS

Acute, Chronic Lethality and Chronic Toxicity WET limits will be written into permits as daily maximum limits. 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.

The chronic low flow will be determined as follows:

1. If the discharge meets any of the criteria for exemption under section 31.10(2) of the Basic Standards and Methodologies for Surface Waters (Basic Standards), then the chronic low flow is equal to the 30E3 low flow of the receiving stream.

2. If the discharge does not meet any of the criteria for exemption under section 31.10(2) of the Basic Standards, then the chronic low flow shall be determined by multiplying the 30E3 flow by the area of the regulatory mixing zone, as that term is defined at section 31.10(1)(c) of the Basic Standards, and dividing that product by the area of the physical mixing zone, as that term is defined at section 31.10(1)(a) of the Basic Standards.

Acute WET Limits - The limit shall be expressed as the LC5O which represents an estimate of the effluent concentration which is lethal to 50% of the test organisms in the time period prescribed by the test. If no instantaneous mixing is provided, the acute WET limit shall be no LC5O at effluent concentration less than or equal to 100% effluent.

Chronic Lethality WET Limits - Effluent discharged shall not result in both; 1) a statistically significant difference in lethality (at the 95% confidence level) between the control and any effluent concentration less than or equal to the instream waste concentration (IWC) and 2) an IC25 less than or equal to the IWC. The IWC shall be determined by dividing the effluent flow limit by the sum of the chronic low flow, as determined above, and the design flow or effluent flow limit, as appropriate. The IC25 refers to the "inhibition concentration" and represents an estimate of the effluent concentration at which 25% of the test organisms demonstrate inhibition as reflected by lethality. The IWC is the relationship between the permit flow limit and the chronic low flow of the receiving stream, expressed as Chronic Toxicity WET Limits - Chronic toxicity refers to WET related to lethality, growth or reproduction. A reopener clause will be placed in permits which contain chronic monitoring or chronic lethality limits. The reopener clause will allow the Division to place chronic toxicity limits in a permit where chronic toxicity is identified. The chronic toxicity limit will be the same as that for chronic lethality, with the expansion to include growth and reproduction.

Note 20. Water Quality Policy # 24: Implementing Narrative Standards in Discharge Permits for the Portection of Irrigated Crops

Section 3.3 of this policy provides an explanation of how the policy can be applied to permitting discharges to surface waters with an overview provided in an accompanying table (Table 3). Table A.1 repeats the information in the above Table 3 with modifications for use in this general permit and setting limits.

Table A.1 WQP#24 Application Options Under General Permit.

Site-Specific Conditions				**Part A. Application of the Policy**	**Can Use Under General Permit**
Agricultural Beneficial Use Assigned to Receiving Water Body and Actual Use Is:		Non-agricultural		**NO**	**YES**
		Agricultural -Livestock		**NO**	
		Agricultural-Irrigated Crops	Diversion present	**YES (see Part B)**	
			No diversion present	**NO**	
Site-Specific Conditions				**Part B. Application of EC and SAR**	**Can Use Under General Permit**
Discharge to a natural drainage	Chronic low-flow greater than Zero	Ratio of low-flow to discharge flow is 100:1 or greater		**No** Due to high immediate dilution, the EC and SAR based effluent limits are not needed.	**YES**
		Ambient levels (85th percentile) of EC and/or SAR values upstream of the discharge point are greater than the applicable criteria for the selected, most EC sensitive local crop		**No** EC and/or SAR effluent limits are set equal to the 85th percentile values	**YES** (for limits, see Note 2)
		Division policy allows for consideration of a mixing zone		**Yes** Effluent limits are based on meeting EC and SAR criteria at downstream edge of mixing zone.	**NO** (only under individual permit)
	Chronic low-flow Equal to Zero	Discharge (undiluted) does reach diversion point		**Yes** Effluent limits are set equal to EC and SAR criteria (i.e., end-of-pipe limits)	**YES** (for limits, see Note 1)
		Discharge does not reach diversion point		**No** Since discharge is not diverted for crop irrigation, the EC and SAR based effluent limits are not needed	**YES**

Discharge to a man-made ditch	Ditch **does not** return diverted flow to classified surface waters of the state	**No** Since all ditches are characterized by zero low flow, there may be circumstances when the management of diverted flow in the ditch supports a discharge with alternate SAR/EC criteria. This will be a site-specific decision, must be supported by an agreement between the ditch owners and the discharger, and is to be consistent with permitting practices.	**YES**
	Ditch **does** return diverted flow to classified surface waters of the state	Yes Effluent limits are based on meeting EC and SAR criteria at downstream edge of mixing zone in classified waters of the state. Also, EC and SAR based limits will reflect understandings between ditch owners and discharger.	**YES** (for limits, see Note 2)

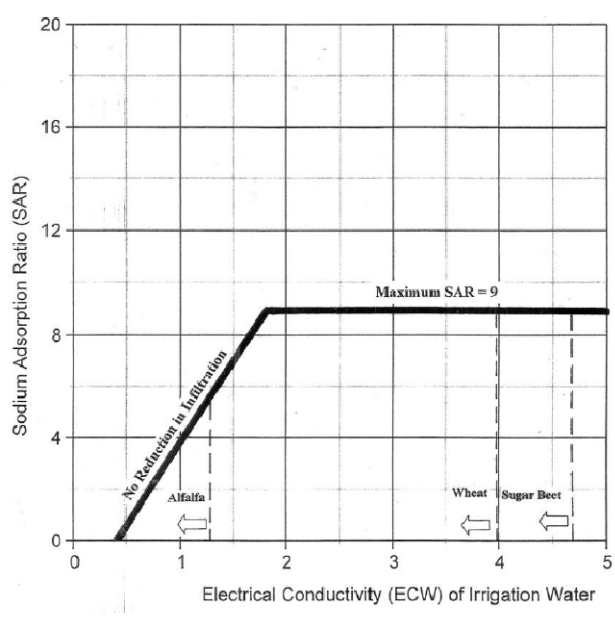
EC and SAR Limitations

Background

In this general permit, the statewide standard for EC is 0.7 dS/m based on beans, as the most sensitive irrigated crop in Colorado (see WQP #24). Based on the Hanson chart (see Figure A.1) and the corresponding equation (Equation A.1) for determining SAR based on the EC value (0.7 dS/m), there will be "no reduction in infiltration" if the concurrent SAR value is 2.5.

Equation A.1 $SAR = (7.10 \times EC) - 2.48$

Figure A.1 SAR/EC Chart from WQP #24



Notes: SAR is defined as

$$SAR = \frac{Na^{+}}{\sqrt{\frac{Ca^{++} + Mg^{++}}{2}}}$$

where concentrations are in milliequivalents

$$meq/l = \frac{Concentration\ in\ mg/l}{Equivalent\ weight\ in\ mg/meq}$$

and the equivalent weights are

Na+ = 23.0 mg/meq (atomic weight of 23, charge of 1)
Ca++ = 20.0 mg/meq (atomic weight of 40.078, charge of 2)
Mg++ = 12.15 mg/meq (atomic weight of 24.3, charge of 2)

Limitations

The maximum limitation for EC is 0.7 dS/m and the associated SAR limitation is 2.5. However, for EC values less than 0.7 dS/m, the SAR limitation needs to be re-calculated using Equation A.1, since the SAR value decreases as the EC of the water decreases (Figure A.1). This re-calculation of the lower SAR limit is necessary to prevent any reduction in infiltration.

The limits table in the certification will include the following requirements, including monitoring of the chemical needed to calculate SAR.

Effluent Parameter	Discharge Limitations			Monitoring Conditions		Basis for Limitation
	30-Day Average	7-Day Average	Daily Maximum	Monitoring Frequency	Sample Type	
Electrical Conductivity, dS/m	0.70	NA	NA	Weekly	Grab	Narrative Stds Policy
Sodium Adsorption Ratio (SAR)	Pass or Fail*	NA	NA	Weekly	Calculated	Narrative Stds Policy
Sodium Adsorption Ratio (SAR)	Report	NA	NA	Weekly	Calculated	Narrative Stds Policy
Sodium, mg/l	Report	NA	Report	Weekly	Grab	Narrative Stds Policy
Calcium, mg/l	Report	NA	Report	Weekly	Grab	Narrative Stds Policy
Magnesium, mg/l	Report	NA	Report	Weekly	Grab	Narrative Stds Policy

* "Pass" If the EC is 0.70 and the SAR is 2.5.
If the EC is less than 0.70 and the SAR is less than the result of Equation A.1 where EC represents specific conductance of the outfall in dS/m.

"Fail" If the EC is 0.70 and the SAR is greater than 2.5.
If the EC is less than 0.70 and the SAR is greater than the result of Equation A.1 where EC represents specific conductance of the outfall in dS/m