

STATE OF COLORADO

John W. Hickenlooper, Governor
Christopher E. Urbina, MD, MPH
Executive Director and Chief Medical Officer

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S. Laboratory Services Division
Denver, Colorado 80246-1530 8100 Lowry Blvd.
Phone (303) 692-2000 Denver, Colorado 80230-6928
Located in Glendale, Colorado (303) 692-3090
<http://www.cdphe.state.co.us>



Colorado Department
of Public Health
and Environment

February 27, 2012

Tim Pivonka, Owner
Timka Resources
2116 SE 14th St
Loveland, CO 800537

RE: Certification, Colorado Discharge Permit System – Produced Water Treatment Facilities
Permit Number COG840000 Certification Number: COG840007

Dear Mr. Pivonka;

Enclosed please find a copy of the permit certification, which was issued under the Colorado Water Quality Control Act. **Please read the enclosed permit and certification.** The Division holds the permittee legally liable for all permit requirements. The Water Quality Control Division (the Division) has reviewed the application submitted for the **Barnhart #1 Well** facility and determined that it qualifies for coverage under the CDPS General Permit for **Produced Water Treatment Facilities** (the permit).

As you have been previously notified, this permit and certification requires a substantial amount of additional monitoring requirements and limitations. As these limitations are new, a compliance schedule has been added to the permit, granting time to collect monitoring data for these parameters to determine whether the limitations can be met, and to devise treatment or other activities in order to meet the limitations. During the interim, limitations will be set at report only. If during the course of collecting data for these parameters, and once sufficient data is collected, the permittee may request an amendment to the permit to eliminate parameters which are absent in the effluent discharge, or at levels well below the limitations, in accordance with the Division's Reasonable Potential Guidance document.

Facility Information:

- **Industry Description**

The Barnhart #1 Well is an oil producing well that operates year around. The SIC code for this facility is 1311. Crude oil is stored on site in production tanks.

- **Treatment Facility Description**

Oil and water is separated and sent through a slammer pit and evaporation pit. The average flow from the facility is 55 gallons per minute (0.3 mgd).

- **Chemical Usage**

The permittee indicated that chemicals are not used in the treatment process and therefore no chemical usage is approved under this certification.

Basis of Certification Limitations:

- **Stream Segment Information**

The discharge is to an unnamed stock pond, which is tributary to Rayner Creek, ultimately tributary to Pawnee Creek, within Segment 02b of the Lower South Platte River Sub-basin, South Platte River Basin, found in the Classifications and Numeric

Standards for the South Platte River Segment (Regulation No. 38) (COSPLS02b). Segment 02b is Use Protected, and is classified for the following beneficial uses: Aquatic Life, Class 2 Warm; Recreation Class E; and Agriculture.

- Technology Based Standards

The limitations for oil and grease and total suspended solids are from Regulation 62, which apply to all discharges that would be covered under this General Permit.

- Water Quality Standards

Limitations for metals and inorganics are based on the water quality standards specific to stream segment COSPLS02b. Note that for many of the metals, the standards relate to the hardness of the receiving stream. During the last update to Regulation 38, the hardness value for this segment was determined to 400 mg/l. The calculations for the TVS metal standards are provided below. Note that the hardness value for aluminum is capped at 220 mg/l.

Note that temperature limitations will not be applied as the receiving stream is assumed to be a zero low flow stream in all months. For all other parameters the water quality standards for Segment COSPLS02b will be applied. For organic parameters, only the aquatic life limits in Regulation 31 will be applied.

Parameter	In-Stream Water Quality Standard		TVS Formula: Hardness (mg/l) as CaCO ₃ = 400
Aluminum, Total Recoverable	Acute	10071 µg/l	$e^{(1.3695(\ln(\text{hardness}))+1.8308)}$
	Chronic	220 µg/l	$e^{(1.3695(\ln(\text{hardness}))-0.1158)}$
Cadmium, Dissolved	Acute	9.1 µg/l	$[1.136672-0.041838\ln(\text{hardness})]e^{(0.9151(\ln(\text{hardness}))-3.1485)}$
	Chronic	1.2 µg/l	$[1.101672-0.041838\ln(\text{hardness})]e^{(0.7998(\ln(\text{hardness}))-4.4451)}$
Trivalent Chromium, Dissolved	Acute	1773 µg/l	$e^{(0.819(\ln(\text{hardness}))+2.5736)}$
	Chronic	231 µg/l	$e^{(0.819(\ln(\text{hardness}))+0.5340)}$
Hexavalent Chromium, Dissolved	Acute	16 µg/l	Numeric standards provided, formula not applicable
	Chronic	11 µg/l	Numeric standards provided, formula not applicable
Copper, Dissolved	Acute	50 µg/l	$e^{(0.9422(\ln(\text{hardness}))-1.7408)}$
	Chronic	29 µg/l	$e^{(0.8545(\ln(\text{hardness}))-1.7428)}$
Lead, Dissolved	Acute	281 µg/l	$[1.46203-0.145712\ln(\text{hardness})]e^{(1.273(\ln(\text{hardness}))-1.46)}$
	Chronic	11 µg/l	$[1.46203-0.145712\ln(\text{hardness})]e^{(1.273(\ln(\text{hardness}))-4.705)}$
Manganese, Dissolved	Acute	4738 µg/l	$e^{(0.3331(\ln(\text{hardness}))+6.4676)}$
	Chronic	2618 µg/l	$e^{(0.3331(\ln(\text{hardness}))+5.8743)}$
Nickel, Dissolved	Acute	1513 µg/l	$e^{(0.846(\ln(\text{hardness}))+2.253)}$
	Chronic	168 µg/l	$e^{(0.846(\ln(\text{hardness}))+0.0554)}$
Selenium, Dissolved	Acute	18.4 µg/l	Numeric standards provided, formula not applicable
	Chronic	4.6 µg/l	Numeric standards provided, formula not applicable
Silver, Dissolved	Acute	22 µg/l	$\frac{1}{2} e^{(1.72(\ln(\text{hardness}))-6.52)}$
	Chronic	3.5 µg/l	$e^{(1.72(\ln(\text{hardness}))-9.06)}$
Uranium, Dissolved	Acute	11070 µg/l	$e^{(1.1021(\ln(\text{hardness}))+2.7088)}$
	Chronic	6915 µg/l	$e^{(1.1021(\ln(\text{hardness}))+2.2382)}$
Zinc, Dissolved	Acute	467 µg/l	$0.978 e^{(0.8525(\ln(\text{hardness}))+1.0617)}$
	Chronic	405 µg/l	$0.986 e^{(0.8525(\ln(\text{hardness}))+0.9109)}$

- **Antidegradation**

Because the receiving water is use protected, an antidegradation is not applicable to this discharge.

- **Narrative Standards**

Section 31.11(1)(a)(iv) of The Basic Standards and Methodologies for Surface Waters (Regulation No. 31) includes the narrative standard that State surface waters shall be free of substances that are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life.

Agricultural Protection

The interpretation of these conditions (i.e., “no harm to plants” and “no harm to the beneficial uses”) and how they were to be applied in permits were contemplated by the Division as part of an Agricultural Work Group, and culminated in the most recent policy entitled Implementing Narrative Standards in Discharge Permits for the Protection of Irrigated Crops (hereafter the Narrative Standards policy)

Based on available information, the water in Pawnee Creek is used for irrigation water. The evaluation of the suitability (i.e., quality) of irrigation water is complex and involves the detailed understanding of the interactions of plant tolerances, soil types, and agricultural management practices. Irrigation water has two properties – salinity and sodicity – that can have concurrent impacts on the irrigated crop beneficial use. The Division has thus determined that two parameters, specifically electrical conductivity (EC) and sodium absorption ratio (SAR), are the best parameters to regulate in discharge permits to control levels of salts to minimize both the loss of irrigated crop yield and the sodium hazard.

In order to establish “standards” and limits for EC and SAR, the Division must: (1) determine the most sensitive crop usually grown in the area downstream from the discharge and determine the corresponding EC of irrigation water (ECw) threshold value for no reduction in yield below 100%; and (2) determine the SAR based on the ECw value, with consideration of existing water quality, to prevent the exceedance of the SAR.

Electrical Conductivity: The electrical conductivity (EC) is also known as specific conductance, conductance, conductivity, or specific conductivity. Crops have varying sensitivity to electrical conductivity. Studies have established the maximum conductivity in the water in the root zone that will result in no reduction of crop yield. This value is referred to as the EC saturation extract or ECe. However, the ECe is not the same as the EC of the irrigation water (ECw). The ECw is the maximum conductivity in the irrigation water that will result in no reduction in crop yield.

The ECw that is used in the development of permit limits is determined based on the most sensitive of the ECw’s for the crops grown in the area. Based on information from the Colorado Decision Support Systems (CDSS) website, there are active intakes on Pawnee Creek that are used to irrigate corn fields. The allowable EC for corn-grain, as listed in the Ag Policy, is 1.1 dS/m. Therefore the limitation for EC will be added to the permit at this value.

SAR – SAR means Sodium Adsorption Ratio, which is a representation of the relative proportion of sodium cations to calcium and magnesium cations (also known as the “sodium hazard”). The equation for SAR follows:

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

The values for sodium (Na+), calcium (Ca++) and magnesium (Mg++) in this equation are expressed in units of milliequivalents per liter (meq/l). Generally, data for sodium, calcium and magnesium are reported in terms of mg/l, which must then be converted to calculate the SAR. The conversions are:

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

Where the equivalent weights are determined based on the atomic weight of the element divided by the ion’s charge:

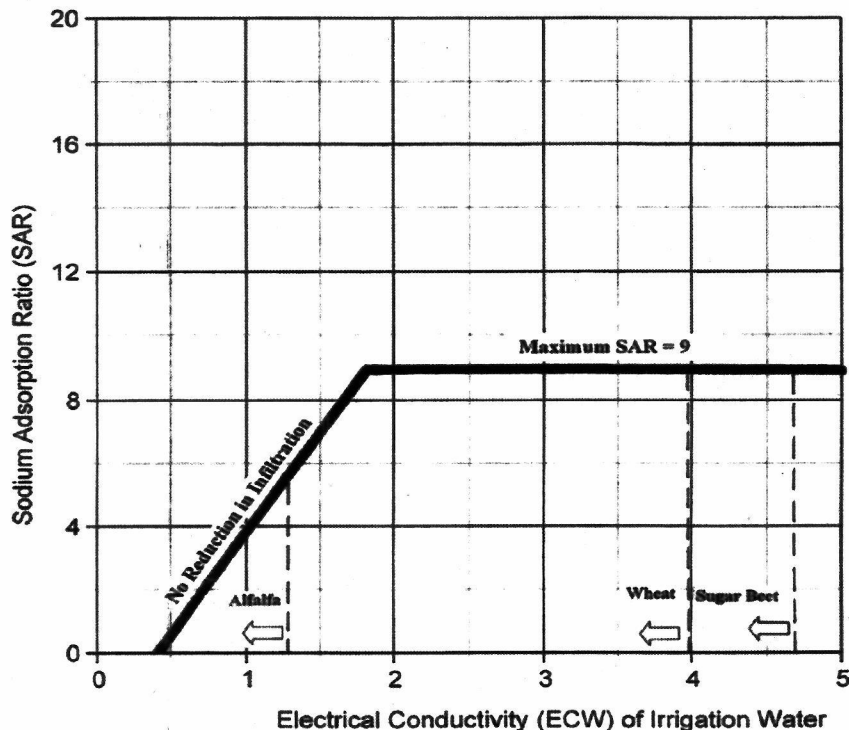
$$Na^{+} = 23.0 \text{ mg/meq (atomic weight of 23, charge of 1)}$$

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)

The SAR standard is established using the SAR/EC equation, shown graphically in the figure below, which is reproduced herein from the Narrative Standards Policy. Specifically, the WQBEL calculated for ECw was used to establish a SAR standard of 8.17. Since the allowable SAR value is tied to the actual EC of the effluent, the EC/SAR equation ($SAR = (7.1 * EC) - 2.48$) will be the SAR limit in the permit, however the allowable SAR of the effluent will be capped at the value above or at 9, whichever is less. Due to the effect of bicarbonate on the available calcium and magnesium, limitations will be expressed as adjusted SAR, which accounts for bicarbonate. This is explained in more detail in the fact sheet and permit documents.

Relative Rate of Water Infiltration as Affected by ECw and SAR with Modification to Show Upper Limit for SAR = 9



Whole Effluent Toxicity

For WET testing, although the proposed treatment would remove almost all pollutants from the wastewater, this in fact may be toxic to aquatic life as the discharge water will be too clean to support aquatic life due to ionic imbalances. The permittee will likely need to adjust the RO system to allow for some pass through of salts to maintain a suitable ionic balance, or may have to blend some of the RO brine back into the effluent or add some salts back into the discharge water prior to release. This will need to be done in order to have a chemically balanced discharge that will pass a WET test, but also maintain compliance with other permit limitations. Because of the zero low flow condition of the receiving stream, and a more permanent discharge scenario, chronic WET testing will be required.

General Information:

- **Permit Action Fees** : The Annual Fee for this certification is \$3280 [Category 12 Subcategory 3 Manufacturing and Other Industry per CRS 25-8-502] and is invoiced every July. Do Not Pay This Now. The initial invoice will be prorated and sent to the legal contact shortly.
- **Changes to the Certification** – Any changes that need to be made to the certification page – changes in outfalls, monitoring requirements, etc., must be submitted using the “Permit and Certification Modification form” available on our website: coloradowaterpermits.com, and signed by the legal contact.
- **Discharge Monitoring Report (DMR)** forms will be mailed out within the next month. Reports must be submitted **monthly** as long as the certification is in effect. The permittee shall provide the Division with any additional monitoring data on the permitted discharge collected for entities other than the Division. This will be supplied to the Division within 48 hours of the receipt of the data by the permittee. If forms have not been received, please contact the Division at 303-692-3517.

- **Sampling Requirements** Sampling shall occur at a point after treatment, or after the implementation of any Best Management Practices (BMPs). If BMPs or treatment are not implemented, sampling shall occur where the discharge leaves control of the permittee, and prior to entering the receiving stream or prior to discharge to land. Samples must be representative of what is entering the receiving stream.
- **Termination requirements** This certification to discharge is effective long term, even though construction and dewatering discharge are only expected for approximately three months. For termination of permit coverage, the permittee must initiate this by sending the "CDPS Permits and Authorization Termination Form." This form is also available on our web site and must be signed by the legal contact.
- **Groundwater Contamination** If groundwater contamination is encountered, then the permittee is to contact the Division, the permit writer, cease all discharges, and if appropriate, contact the owner of the collection system receiving the discharge. If the dewatering can be treated to meet surface water or groundwater numeric limitations, the certification will be amended to include sampling and monitoring for additional parameters representative of the groundwater contamination. **The discharge of contaminated groundwater, above surface water or groundwater standards, is not authorized under this permit.**
- **Certification Records Information** The following information is what the Division records show for this certification.

For any changes to Contacts – Legal, Local, Billing, or DMR – a "Notice of Change of Contacts form" must be submitted to the Division. This form is also available on our web site and must be signed by the legal contact.

Facility: Barnhart #1 Well
Industrial Activities : Crude oil production

LoganCounty
SIC Code 1311

Legal Contact *Receives all legal documentation, pertaining to the permit certification. [including invoice; is contacted for any questions relating to the facility; and receives DMRs.]*

Tim Pivonka, Owner
Timka Resources
2116 SE 14th St
Loveland, CO 800537

Phone number: 970-667-9861
Email:

Facility Contact *Contacted for general inquiries regarding the facility
Same as Legal Contact*

Billing Contact
Same as Legal Contact

DMR Contact
Same as Legal Contact

If you have any other questions please contact me at 303-692-3392.

Sincerely



Andrew Neuhart
Assessment Based Permits Unit Manager
WATER QUALITY CONTROL DIVISION

Enclosures: Certification page; General Permit
xc: Regional Council of Government
Logan County, Local County Health Department
D.E., Technical Services Unit, WQCD