Pumpkin Creek Watershed General Permit for Surface Discharges Related to Coal Bed Methane Production WYG280000

Wyoming Department of Environmental Quality
Water Quality Division
WYPDES Program

Fact Sheet

This permit has been modified from the version that appeared in public notice to incorporate items brought to the attention of the WYPDES Program during public notice. These items include the following:

1. Additional irrigation protection for diversions located on South Prong, Pumpkin Creek. These diversions were not identified previously.

2. An additional discharge category (ID), for operators wishing to treat discharges using current, commonly used technologies prior to discharge. The WYPDES program realizes that, in order to achieve the established effluent limits, treatment may be necessary in some instances. However, should the chosen type of treatment indicate the need for effluent limits other than those established to provide adequate environmental protection, operators may be required to apply for an individual permit. Although sulfate has been determined to be a pollutant of non-concern for raw CBM produced water, current commonly-utilized water treatment technologies may cause an increase in sulfate concentration prior to discharge. Therefore, an effluent limit for sulfate (3000 mg/l) is being included in this discharge category.

3. Removal of language prohibiting treatment and discharge under this general permit.

4. Containment requirements for Category II and Category III discharges have been changed from requiring operators to contain all CBM effluent in addition to storm water runoff related to a 100 year, 24 hour precipitation event to requiring containment of all CBM effluent in addition to storm water runoff from a 50 year, 24 hour storm event.

5. To include additional language clarifying which headcuts must be mapped and monitored on a routine basis, and how headcuts are to be identified. Based on input from the Pumpkin Creek stakeholder group, the plan now requires that all headcuts equal to or greater than 2 feet in height from the highest point of the headcut to the bottom of the pool created by the headcut to be identified. All identified headcuts are to be mapped and monitored on an annual basis.

END-OF-PIPE EFFLUENT LIMITS BY CATEGORY

Constituent and Units	Category IA	Category IB	Category IC	Category ID[4]	Category II	Category III
Whole Effluent Toxicity Testing, Chronic[5]	NOEC @100%	NA, unless potential to reach Powder on frequent and/or persistent basis, then NOEC @100%	NA, unless potential to reach Powder on frequent and/or persistent basis, then NOEC @100%	NOEC @100%	NA	NA
Sulfate	NA	NA	NA	3000 mg/l	NA	NA

[1]To be calculated as the sum of all discharges from all Category I outfalls. Individual limits to be established within each discharge authorization.
[2]Monitoring requirements for these constituents established within the containment units due to concerns related to concentration due to evaporation within the containment units.
[3] Limits in parenthesis only applicable upstream of irrigation on North Prong Pumpkin Creek, and South Prong, Pumpkin Creek, which are located more than 10 stream miles from the Pumpkin Creek-Powder River confluence.
[4]Effluent limits for Category ID discharges stated as being "Location-dependent" will be established in the same manner as Category IA-IC discharges.
[5]For whole effluent toxicity testing, NOEC refers to the No Observed Effect Concentration. An NOEC at 100% effluent concentration means that the effluent must pass the WET test at all dilutions, including 100% effluent. See Part I Section 10 of the general permit for additional details relating to WET test endpoints and test procedures.

Hardness-Dependent Metals

Hardness-dependent metals are those metals whose toxicity depends upon the hardness of the water that they are contained within. Toxicity from these metals occurs at lower concentrations as the $CaCO_3$ (calcium carbonate) concentration (hardness) of the water is reduced. Because the National Toxics Criteria *(EPA's Section 304(a) Criteria)*, are based upon the total recoverable amounts of the metals within the water, a conversion factor is necessary to convert the total recoverable values to the dissolved values. The EPA and the State of Wyoming have both determined that effluent limits based upon the dissolved concentrations for these metals, rather than the total recoverable concentrations, are more appropriate, as the portion of the metals contained within the water in the dissolved state is the portion that is bioavailable, and is thus the portion that has the potential to cause toxic effects. As the dissolved portion of these metals is the only portion that has been deemed to have the potential to cause toxic effects within the water, it is therefore more appropriate to directly limit these metals by directly addressing the chemical state (dissolved) that has the potential to cause toxic effects.

The State of Wyoming, when calculating effluent limits for hardness-dependent metals, utilizes conversion factors that are widely accepted by the scientific community and the EPA. Further information on conversion factors used in the calculation of hardness-dependent metals may be found in *Chapter 1 of the Wyoming Water Quality*

Rules and Regulations, Appendix F. This general permit establishes effluent limits for the following hardness-dependent metals: dissolved copper, dissolved lead, dissolved zinc, and dissolved cadmium. While there are other hardness-dependent metals, review of historic data related to CBM discharges reveals that these metals are not present in CBM discharges in concentrations that require the establishment of effluent limitations, especially when the ambient hardness of the Powder River is considered.

Effluent limitations for hardness-dependent metals are calculated as per the equations listed in *Chapter 1 of the Wyoming Water Quality Rules and Regulations, Appendix F.* Although the Powder River has an average ambient hardness of 680 mg/l $CaCO_3$, calculated by averaging the results of 282 hardness measurements taken by the United States Geological Survey between 1946 and 1995 at gauging station 06317000 (Powder River at Arvada), a hardness of 400 mg/l is used in hardness-based metals calculations whenever the ambient hardness is greater than 400 mg/l, as per *Chapter 1 of the Wyoming Water Quality Rules and Regulations, Appendix* . Results are given in Table 4 below:

Table 4:

Powder River Metals Limits				
$CaCO_3$ mg/l		400		
	Acute Value	Chronic Value	Calculated Limit, Including Anti-Degradation (calculated at 20% of Chronic Value)	Established Limit, Considering Practic Quantitation Limits
Constituent, dissolved	**(ug/l)**	**(ug/l)**	**(ug/l)**	**(ug/l)**
CADMIUM	19.1	6.2	1.2	1.2
COPPER	49.6	29.3	5.9	6
LEAD	280.8	10.9	2.2	2.2
ZINC	379.3	382.4	76.5	75
Acute Value = 1-hour average concentration				
Chronic value= 4-day average concentration				

While both acute and chronic values are calculated, the established effluent limit is based upon the most stringent value calculated. This value is most often, as is the case in this instance, the chronic value. The established effluent limits also incorporate the State of Wyoming's antidegradation requirements, and consider the practical quantitation limits of the accepted laboratory methods for these constituents.

Ammonia

In accordance with *Chapter 1 of the Wyoming Water Quality Rules and Regulations, Appendix C*, the ammonia limits being established in this general permit are expressed in milligrams of ammonia nitrogen per liter (mg N/L), and consider the temperature and/or pH of the receiving stream and the discharge, and the species of fish and life stages present.

While the Powder River is not known to support populations of salmonids (trout), it is known to support populations of other fish species. Therefore, the ammonia effluent limits being established in this general permit incorporate limits protective of fish early life stages, but not those necessary for salmonid species. As there was no data available related to the temperature of the discharge, an estimated average temperature of 22°C was utilized in the ammonia calculations. Based upon available flow data, flow within the Powder River varies