

0052761

SUBMIT IN TRIPLICATE

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
APPLICATION FOR PERMIT TO SURFACE DISCHARGE PRODUCED
WATER FROM COAL BED METHANE NEW DISCHARGES, RENEWALS, OR
MAJOR MODIFICATIONS**

Revised 12-19-03

FOR AGENCY USE ONLY

Application Number

WY00 **RECEIVED**

Date Received

DEC 27 2003

(mo/day/yr)

WATER CONTROL DIVISION
WY000000

PLEASE PRINT OR TYPE

1. Check the box corresponding to the type of application being applied for

- New CBM permit
- CBM permit renewal Permit Number
- CBM permit major modification Permit Number

2. Select a permit option:

- Option1A - complete containment to an off-channel man made unit(s) (Class 4C), no discharge allowed to surface waters of the state outside the containment unit.
- Option1B - complete containment to a natural closed basin or playa lake (class 3A), no discharge allowed to surface waters of the state outside the basin or playa.
- Option2 - surface discharge to class 2 or 3 receiving stream of the Belle Fourche River or Cheyenne River drainage (class 2ABWW).
- Option2 - surface discharge to class 2 or 3 receiving stream of the Powder River or Little Powder Rivers (class 2ABWW).
- Option2 - surface discharge to class 2 or 3 receiving streams of the Tongue, Clear Creek, or Crazy Woman Creek (class 2AB) - this option requires the permittee to demonstrate that quality of the effluent at the discharge point is equal to or better than the ambient quality of the perennial class 2 receiving water.

3. Name, mailing address, e-mail address, location and telephone number of the individual or company which owns the facility producing the discharge.

Name: **Yates Petroleum Corporation**
 Address: **105 South 4th Street**
 City/State/Zip: **Artesia, NM 88210**
 Telephone: **(505) 748-1471**
 E-Mail:

4. Name(s) and mailing address(es) of owner(s) of the surface rights on whose land the discharge occurs (in cases where the land is owned by the state or federal government but surface rights are leased to a private individual, give lessee's name and address). **Please see attached Land Owner Table.**

5. Name of the facility producing the discharge (this is the facility name that will appear on the NPDES permit. It is not necessary to name every well contributing to this facility's discharge in this section).

Nemesis POD - Dry Creek.



CBM Associates, Inc.

920 E. Sheridan St. • Laramie, WY 82070 • Office: (307) 742-4991 • Fax: (307) 745-1582

December 17, 2004

Mr. Jason Thomas
Environmental Analyst, Water Quality Division
Wyoming Department of Environmental Quality
122 W 25th Street, Herschler Bld. 4W
Cheyenne, WY 82002

**Re: Beneficial Uses of Coal Bed Methane Produced Water
Yates Petroleum Corporation
Nemesis POD – Dry Creek: New NPDES Permit.**

Mr. Thomas:

This letter serves to present my professional opinion of the benefits to livestock and wildlife from Yates Petroleum Corporation discharges of Coal Bed Methane (CBM) produced water from the Nemesis POD – Dry Creek facility within northeastern (NE) Wyoming (see Table 1 in permit application). These remarks present a general overview of incremental-to-significant benefits of CBM discharges to wildlife and livestock and are not an exhaustive review of these potential relationships. In addition, while it is well established that most CBM produced waters are suitable for direct consumption by livestock and wildlife (USGS Water Resources Investigations Report 02-4045), the following remarks assume that the CBM discharged water for this permit will be of sufficient quality for direct consumption (as demonstrated in the permit application).

My credentials as an environmental scientist include a Master of Science in Zoology and Physiology from the University of Wyoming and a Bachelor of Science Degree in Biology from Villanova University. During my graduate study, I worked in wildlife management in NE Wyoming for approximately three years studying pronghorn antelope utilization of ranges reclaimed from strip mining. Currently, I am pursuing additional graduate study in the Department of Geology at the University of Wyoming with emphasis on geochemistry, groundwater hydrology and environmental engineering. I have spent many hours in the field observing the apparent relationships between available surface water resources and landscape responses. Based on these observations as well as numerous conversations with State and Federal wildlife managers and with landowners, it is my opinion that, in most cases, livestock and wildlife populations will benefit incrementally if not substantially from the discharge of produced CBM water to ephemeral and intermittent flow drainages within the Powder River Basin. Based on the Wyoming in-stream water quality standards to be attained, the risk calculations to aquatic biota associated with the federal criteria used to set these standards, and the concentrations of constituents present in CBM produced waters for the permit under consideration, I believe

consumption of CBM produced water stored in reservoirs or available as surface stream flow should not result in adverse affects to terrestrial or avian wildlife, or to livestock. The discharge of CBM produced water to surface ponds and drainages also should create additional habitat for waterfowl, shorebirds, passerines, and their associated predators by creation of additional open water habitat and by the stimulation of growth in riparian and wetland vegetation which should develop along the improved surface moisture gradient. The following discussion provides a brief overview of some of the animals inhabiting the basin that should benefit from CBM discharges created by this permit.

Livestock

The background for the beneficial utilization of CBM discharges by livestock in NE Wyoming follows from the scientific literature on range management. Natural range conditions in this region include the production of large amounts of high protein native grasses in upland areas that commonly are far removed from sources of surface water historically developed for livestock consumption. The distance between water and high quality upland forage is a limiting factor for livestock production (Holechek et al., 2001). Research by the U.S. Department of Agriculture has demonstrated that distance to water is a profound limiting factor for production of cattle per unit area of adequate forage (*inter alia*, Hart et al., 1993). Studies have shown that distances to water for cattle that exceed 0.5 to approximately 2 miles may considerably reduce the use of rangeland in the large pastures that typify much of this region. Gerrish and Davis (1997) found that, in Wyoming, up to 77% of cattle grazing occurred within 1200 feet of a water source, while only 12% of the pasture farther than 2400 feet was utilized. The relationships between excessive distances to water, reduced use of available forage (uniformity of forage utilization), and subsequent reduction in cattle production per unit area of available forage are well established. Essentially, for an accepted stocking rate, the greater the distance to water, the less the grazing pressure on available forage and the lower the cattle production per unit acreage of available pasture (Hart et al., 1993).

The heavy use of forage by cattle near sparsely available surface water may damage soils in upland areas due to the concentration of cattle trails and subsequent increased soil erosion in areas with moderate to high slope. These relationships have been widely observed by the U.S. Geological Survey in their studies of water resources and hydrology in NE Wyoming (Mr. Hugh Lowham, USGS-retired, Lander, WY, personal communication, July, 2004).

Of further note is that the relative warmth of CBM produced waters (~56+ degrees Fahrenheit) during winter may have a positive benefit on livestock and wildlife. Researchers at North Dakota State University have found that optimal livestock water temperature is between 40 to 60° F, (Lardy and Stoltenow, 1999). Local ranchers have observed that cattle generally have better weight gain or maintain weight better during winter when consuming relatively warm water. This may result from a lower expenditure of energy to internally heat the near-freezing stream, livestock tank water, or snow normally available as a wintertime water supply. Reduced energy loss may be particularly advantageous to calf-bearing heifers during the winter portion of gestation. The same warmer-water availability also can be inferred to benefit female ungulates during winter gestation.

The adequate spatial distribution of water resources is obviously a high priority to livestock production in NE Wyoming and is especially important during drought periods as

currently being experienced. According to the State Climatologist (Dr. Jan Curtis, Department of Civil Engineering, University of Wyoming, personal communication July, 2004), Wyoming is in its fifth year of a severe drought with no apparent end to the current cycle. In the face of continuing drought conditions, the increase in available water resources to livestock in NE Wyoming afforded by CBM production should profoundly benefit livestock production and hence the economic viability of local ranches.

The basic need for new surface water resources in NE Wyoming has been documented to the Wyoming Department of Environmental Quality / Water Quality Division (WDEQ/WQD) by many ranchers who have submitted statements accompanying National Pollution Discharge Elimination System (NPDES) Permit applications. In these statements, the ranchers propose to use CBM produced waters to benefit their livestock operations. Additional testimony of local ranchers that document the economic enhancement of their ranch operations derived from use of CBM produced water has been presented to WDEQ/WQD at public hearings in Gillette.

Livestock Observations Summary

The discharge of CBM produced water to surface containment facilities should provide the following benefits:

- Reduce the distance to water and increase the effective available forage for livestock which in turn should increase livestock production per unit acreage of available pasture;
- Reduce the localized heavy use of forage by cattle near sparsely available surface water;
- Decrease potential soil erosion by reducing the concentration of cattle trails in areas with moderate to high slope; and
- Economically benefit local ranchers especially during the ongoing drought.

Wildlife

Big Game – One of the basic principles of wildlife biology is that water availability and its spatial distribution in a semi-arid landscape can significantly influence population maintenance and reproductive success. Mr. Olin Oedekoven [Wildlife Specialist, Wyoming Game & Fish Department (WGFD)] has stated “water is the most limiting factor for wildlife distributions in NE Wyoming” (personal communication July, 2004). Thus, wildlife should benefit at least incrementally by the presence of new surface waters afforded by CBM production.

Elk, deer, pronghorn and moose occur within the CBM development area in NE Wyoming. However, deer and pronghorn antelope should primarily benefit from CBM water because their spatial distribution covers the entire area of the project considered herein. As previously noted, regardless of whether the CBM produced water is discharged to a stock pond, tire tank or directly to stream drainages, the associated increase in water availability should benefit the productivity and survival of these species given the semi-arid landscape of this region. Also as previously noted, the increased availability of relatively warm ground water discharged in winter may enhance female ungulates survival rates during winter gestation.

Of particular concern at present is the reproductive and overwintering success of big game species in NE Wyoming during the current drought. The discharge of CBM produced water

to spatially-distributed surface containments during the present drought cycle should benefit resident populations of large game animals. Mr. Olin Oedekoven [Wildlife Specialist, Wyoming Game & Fish Department] has noted that CBM discharges apparently have allowed ungulate populations to thrive during the present drought conditions based on his anecdotal observations of their reproductive success and possible expansion of home ranges, (personal communication July, 2004).

While field observations by State and Federal wildlife managers indicate that antelope and deer are using CBM water resources, it is unknown to what quantitative extent the consumption of CBM water aids their survival or use of available habitat. Given that antelope and deer may be wide ranging, it can be inferred that the presence of new water resources where water was scarce during previous summers should aid in use of available forage. The discharge of produced water from the CBM outfalls proposed herein should provide additional water for wildlife throughout the year as follows.

Antelope

This permit application includes outfalls located within Antelope Herd Unit 353; Hunt Area 16. In 2003, the WGFD estimated approximately 3,845 antelope within this area (WGFD JCR for Sheridan Region, 2003).

Mule Deer

This permit application includes outfalls located within Mule Deer Herd Unit 319; Hunt Area 26. In 2003, the WGFD estimated approximately 51,401 mule deer within this area (WGFD JCR for Sheridan Region, 2003).

White Tailed Deer

This permit application includes outfalls located within White Tailed Deer Herd Unit #303; Hunt Area 26. In 2003, the WGFD estimated approximately 13,970 white tailed deer within the management area (WGFD JCR for Sheridan Region, 2003).

Birds

Gallinaceous birds - Sage grouse, sharp-tailed grouse, Hungarian partridge, Merriam turkeys and ring-necked pheasants are resident in NE Wyoming. At least some of their populations should benefit from the additional availability of surface water and associated increased habitat as a result of CBM discharges. Additionally, these species all consume succulent herbaceous vegetation (forbs) and associated insects during the summer and early fall whose production should be stimulated by CBM discharges. Any increase in available insects is especially important to young-of-year (YOY) which rely considerably on insects for protein intake during early growth. CBM discharges to ephemeral or intermittent drainages should prolong the growing season for preferred forbs and associated insects and thereby provide gallinaceous bird populations with increased food supply and cover.

Sage Grouse - According to Wyoming Game and Fish, (Olin Oedekoven; 2001 Sage Grouse Job Completion Report; Sheridan Region; Wyoming Project No. W-27-R), there are no recorded sage grouse leks within the townships and ranges of the project area.

Waterfowl - Various waterfowl species; including mallards, gadwall, widgeon, blue-winged teal, green-winged teal, cinnamon teal, and Canada geese inhabit NE Wyoming. All of these species

have the potential to benefit from CBM discharges if the discharged water creates additional seasonal or yearlong habitat. Such benefits to waterfowl have been consistently observed by State and Federal Wildlife managers and by local ranchers. Produced water from this permit will be discharged to and/or contained in stock ponds or reservoirs and should create additional summer breeding and possibly overwintering habitat for waterfowl within the project area.

Of local interest is that the continuous discharge of relatively warm groundwater from CBM wells has acted to keep many larger ponds at least partially open throughout the winter. Some Canada geese and ducks now appear to overwinter in Campbell County in part because of CBM discharges appear to contribute to maintaining open water .

Waterfowl especially appear to have benefited from development of the larger CBM reservoirs. As these reservoirs attain several years of age, they develop substantial wetland fringes and associated food resources. Good examples of such benefits to waterfowl resulting from CBM water discharges are found in the area south of Gillette along Bonepile Creek and upper Caballo Creek. Importantly, one can infer from the feeding ecology of dabbling ducks and geese that a greater abundance of high protein food resources, afforded by more numerous aquatic insects in expanded or new impoundments, should significantly benefit the local production of YOY ducks associated with these ponds.

Shorebirds – Shorebirds that occur in the project area include: Sandhill cranes, killdeer, American avocets, willet, great-blue herons, sandpipers, and common snipe. At least some of these species should benefit from CBM discharges through creation of additional shoreline and shallow water habitats in new or expanded impoundments. Benefits to shorebirds should be derived from an increase availability of food resources including aquatic plants and macro-invertebrates. Increased potential for nesting success also should follow increases in wetland habitat that result from CBM discharges.

Passerines – Numerous songbird species also should benefit from expanded wetland and riparian habitats afforded by CBM discharges. These benefits should derive from expanded cover and food resources in similar fashion to that discussed above.

Expansion of riparian zones

Riparian vegetation develops along stream channels as a direct response to available moisture. It follows that riparian zones should benefit by the expanded moisture gradients established in stream channels by CBM discharges. Increased riparian vegetation in some stream channels should benefit passerine birds, game birds, and their predators in part because of the potential for increased vegetative cover and associated food resources such as insect biomass.

The net effects of increased cover and food supply for YOY passerine and game birds have not been quantified. However, it is reasonable to assume that any expansion of riparian zones also would benefit such bird populations as follows from first principle relationships that the more riparian habitat available, the greater the number of birds that would use such habitat.

Wildlife Observation Summary

The typical chemical quality of the CBM discharge water does not appear to have adverse direct impacts on wildlife species within the Powder River Basin. The discharge of CBM produced water to new, spatially-distributed surface water containment facilities in areas historically devoid of water for most of the year should benefit many local and migratory wildlife species. These benefits should include:

- Presence of new surface waters in a semi-arid landscape where water is currently the limiting factor for maintenance and production of many wildlife populations and much of their habitat;
- Discharge of CBM produced water during the present severe drought cycle should significantly help big game populations;
- Availability of warmer-water supplies in winter may enhance the survival rate of female ungulates during winter gestation;
- Enhanced waterfowl production should accrue from the development of new open water, expanded wetland fringes, and associated food resources in surface water impoundments;
- Enhancement of local amphibian populations; and
- Increased development of riparian zones should benefit passerine birds, game birds, and in turn their predators due to expanded or improved vegetative cover and associated food resources.

The probable attainment of these potential benefits in many areas of NE Wyoming follows from basic wildlife management relationships regarding availability of water as a primary limiting resource to wildlife survival and reproductive success and from numerous anecdotal field observations of State and Federal wildlife managers and local ranchers. Overall, the weight of evidence regarding the accrual of positive benefits of CBM produced waters to WY wildlife is substantial.

In the proposed permit, water from CBM wells will discharge from 40 outfalls into 41 reservoirs and 13 stock tanks available to livestock and wildlife. The suitability of the discharge water for direct consumption by wildlife is demonstrated in the water quality report(s) attached to the permit application.

If you have any questions or would like clarification of any information contained herein, please feel free to contact me at 307-742-4991 or via e-mail at ktaboga@cbmainc.com.

Sincerely,



Karl Taboga, Staff Biologist

References Cited:

Gerrish, J. and M. Davis. 1997. Water Requirements & Availability. In Sustainable Beef Management, pp. 87 -92. NCAT-ATTRA workshop handbook.

Hart, R.H., J. Bissio, M.J. Samuel, and J.W. Waggoner, Jr. 1993. Grazing systems, pasture size, and cattle grazing behavior, distribution and gains. *J. Range Manage.* 46: 81-87.

Holechek, J.L., R.D. Piper and C.H. Herbel. 2001. *Range Management*. 4th Ed. Prentice-Hall.

Lardy and Stoltenow, 1999. *Livestock and Water*. AS-954. North Dakota State University Extension Service Bulletin.

Oedekoven, O. 2001. Sage Grouse Job Completion Report; Sheridan Region; Wyoming Project No. W-27-R). Wyoming Game and Fish Report.

Savory, A. and S.D. Parsons. 1980. The Savory grazing method. *Rangelands* 2: 234-237.

U.S. Geological Survey, 2002. Water quality and environmental isotopic analyses of ground-water samples collected from the Wasatch and Fort Union formations in areas of coalbed methane development – implications to recharge and ground-water flow, Eastern Powder River Basin, Wyoming. Water- Resources Investigations Report 02-4045. 88 pp.