Dave Freudenthal, Governor

Department of Environmental Quality

To protect, conserve and enhance the quality of Wyoming's environment for the benefit of current and future generations.

John Corra, Direc

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Terri A. Lorenzon, Director
Environmental Quality Council

Mr. Stephen Tuber
Assistant Regional Administrator
Office of Partnerships and Regulatory Assistance
U.S. EPA, Region 8
999 18th Street - Suite 300
Denver, CO 80202-2466

RE: Factors Considered for Developing BPJ Limits for Coal Bed Natural Gas

Dear Mr. Tuber:

This document has been prepared in response to EPA's September 16, 2004 letter to WDEQ in response to the March 5, 2001 *Petition for Corrective Action or Withdrawal of the State of Wyoming's Authority to Administer the Clean Water Act's National Pollutant Discharge Elimination System Program* filed by the Wyoming Outdoor Council and the Powder River Basin Resource Council. More specifically, this document addresses Allegation I.A.2 ***"The WDEQ does not apply the Best Professional Judgment factors, a violation of the CWA"*** and the request by EPA for WDEQ to explain how it considered the factors for developing BPJ limits (40 CFR 125.3), deciding to rely on the oil and gas effluent limitations guideline (40 CFR 435) as guidance for developing BPJ limitations for coal bed methane (CBNG).

Please feel free to contact Todd Parfitt of my staff at 307-777-6709 or tparfi@state.wy.us with any questions regarding this matter.

Sincerely,

John Corra
Director
Department of Environmental Quality

JVC/jd/5-0488
Attachment
cc: John Wagner, WQD Administrator
Todd Parfitt, WYPDES Program Manager
Vicci Colgan, Senior Assistant Attorney General

WILLIAMS EXHIBIT 1

Wyoming Pollutant Discharge Elimination System (WYPDES) Program
Basis for Technology-Based Effluent Limits
in
Coal Bed Methane (Natural Gas) WYPDES Permits

This document provides the basis for the technology-based effluent limits that have been incorporated into WYPDES permits for the coal bed natural gas (CBNG) industry. These limits are based upon review and consideration of: current knowledge and factual information about CBNG production; the national effluent limitations guidelines (ELGs) for the Coal Mining Point Source Category (40 CFR 434); ELGs for the Oil and Gas Extraction Point Source Category (40 CFR 435); U.S. EPA NPDES Permit Writers' Manual, December 1996; and the 1976 Development Document for the Oil and Gas Extraction Point Source Category.

The Wyoming Department of Environmental Quality (WDEQ), Water Quality Division, Wyoming Pollution Discharge Elimination System (WYPDES) program was granted authority to implement the NPDES program under the Federal Water Pollution Control Act in 1974. The federal Clean Water Act, Wyoming Environmental Quality Act and Wyoming Water Quality Rules and Regulations Chapter 2 require operators who discharge pollutants to a water of the United States, or a surface water of the state under state statute, to obtain a WYPDES permit for the discharge.

The primary industrial activity with surface water discharge in the State of Wyoming is the oil and gas industry. In the early 1970s, conventional oil production was the predominate oil and gas activity within the state. Natural gas development has also been occurring within the state since the 1970's, but in a more limited capacity. CBNG development in Wyoming began in the late 1980's and by the end of 1997, there were 578 active WYPDES permits for oil and natural gas production facilities, 47 of these permits were for CBNG facilities.

During the late 1990s, technological advances provided the oil and gas industry with the ability to extract methane from coal bearing formations in a more economic, efficient and prolific manner. As a result, CBNG development spread rapidly throughout the Greater Powder River Basin. Initial development occurred in the Belle Fourche River Basin and eventually moved into the Cheyenne, Tongue and Powder River Basins. The number of active CBNG permits began to rapidly increase in 1999 and 2000. As of March 3, 2005 there were 1268 active oil and natural gas permits, 823 of these permits were for CBNG facilities.

When establishing effluent limits in WYPDES permits, water quality-based and technology-based effluent limits are always evaluated, taking into consideration all appropriate federal and state regulations. Determination of water quality-based limits is based upon Chapter 1 of the Wyoming Water Quality Rules and Regulations. Technology-based limits can be based upon ELGs or, in the absence of ELGs, best professional judgment (40 CFR 125.3). Technology-based effluent limits for the oil and gas industry in Wyoming are based upon Wyoming Water Quality Rules and Regulations Chapter 2 Appendix H which are consistent with the federal ELGs for the Oil and Gas Extraction Point Source Category (40 CFR Part

435) except that the WDEQ rules provide more stringent controls than the federal rules and the WDEQ rules specifically addresses CBNG produced water.

EPA has taken the position that no ELGs apply to CBNG. However, EPA has recognized that NPDES permit writers can develop BPJ limits by using one of two different methods. A permit writer can either transfer numerical limitations from an existing source such as a similar NPDES permit or an existing ELG, or derive new numerical limitations. WDEQ has used the first method to develop CBNG BPJ limits.

A summary of WDEQ's rationale for developing BPJ limits (40 CFR 125.3) for CBNG relying on the oil and gas effluent limitations guideline (40 CFR 435) as guidance are as follows:

1. Comparison of CBNG Discharges to 40 CFR 434 Coal Mining Point Source Category and 40 CFR 435 Oil and Gas Extraction Point Source Category

A. Comparison of CBNG Discharges to 40 CFR 434

The WYPDES Program evaluated ELGs for the Coal Mining Point Source Category (40 CFR, Part 434). The ELG for the Coal Mining Industry applies to discharges from any coal mine at which the extraction of coal is taking place or is planned to be undertaken and to coal preparation plants and associated areas. The primary Standard Industrial Classification Categories evaluated by the Development Document are:

1111 Anthracite Mining

1112 Anthracite Mining Services

1211 Bituminous Coal and Lignite Mining, and

1213 Bituminous Coal and Lignite Mining Services

The effluent limitations for the coal mining industry include: pH, Total Suspended Solids, Total Iron and Total Manganese. CBNG discharges typically have a pH of 7.5-8.0 standard units; Total Iron is typically a constituent of concern, Total Suspended Solids are typically not a concern and Total Manganese is not a constituent of concern.

The activities conducted by the coal mining industry were compared to those of the CBNG industry. The activities typically conducted by the mining industry were clearly dissimilar. Specifically, the coal mining industry does not rely on drilling activities, commercial extraction of methane gas or the discharge of similar volumes of produced water for their operations.

Based on the review, the WDEQ concluded that there was valuable insight to be gained from evaluating water quality data from coal mine operations, however, because the industrial activities were so dissimilar, using 40 CFR 434 as guidance for developing BPJ limitations for (CBNG) was deemed inappropriate.

B. Comparison of CBNG Discharges to 40 CFR 435

CBNG development is a subset of the oil and gas industry as is conventional oil and conventional natural gas development. CBNG operations are reviewed in the context of oil and gas development as a whole. Comparisons are made to conventional oil and gas technology based on regulations, which have been in place for nearly 30 years.

To determine the appropriateness of relying on 40 CFR 435 as per 40 CFR 125.3, the WYPDES Program conducted an evaluation of 40 CFR 435 and the 1976 Development Document for the Oil and Gas Extraction Point Source Category. According to the development document, the study covered pollutants arising from the production of crude petroleum and natural gas, drilling oil and gas wells, and oil and gas field exploration services. The document makes no explicit exclusion of varying types of oil and gas operations.

CBNG is exceptionally pure compared to conventional natural gas, in that it contains very small proportions of heavier hydrocarbons and other gases. Natural gas is termed "dry" when it is almost pure methane, lacking other commonly associated hydrocarbons, which is the case with CBNG. When other hydrocarbons are present the natural gas is referred to as "wet". The concept of "dry" natural gas is recognized in the 1976 Development Document for the Oil and Gas Extraction Point Source Category, which states "...Gas wells may produce dry gas but usually also produce varying quantities of light hydrocarbon liquids (known as gas liquids or condensate) and salt water."

Segments of the industry covered by the Oil and Gas Extraction Point Source Category are based on the following Standard Industrial Classification (SIC) Codes:

1311 Crude Petroleum and Natural Gas

1381 Drilling Oil and Gas Wells

1382 Oil and Gas Field Exploration Services

1389 Oil and Gas Field Services, not classified elsewhere

These SIC codes were compared to the 1987 Standard Industrial Classification Manual which defines SIC codes for various industrial activities. The Major Group for the Oil and Gas Extraction Category (Major Group 13) includes establishments engaged in:

(1) producing crude petroleum and natural gas;
(2) extracting oil from oil sands and oil shale;
(3) producing natural gasoline and cycle condensate; and
(4) producing gas hydrocarbon liquids from coal at the mine site.

Types of activities included in this major category include exploration, drilling, oil and gas well operation and maintenance, the operation of natural gasoline and cycle plants, and the gasification, liquefaction and pyrolysis of coal at the mine site.

Based on the review of Part 435, the Development Document and the 1987 Standard Industrial Classification Manual, the WDEQ concludes that CBNG activities are similar in nature to those activities outlined in 40 CFR 435. CBNG is clearly within the Major Group 13 and more specifically within the SIC code 1311, which is clearly an industry that was evaluated and included in the Development Document.

EPA established BPT ELGs for the Onshore subcategory (Subpart B) and Agricultural and Wildlife Water Use subcategory (Subpart E) for the Oil and Gas Extraction Point Source Category, on April 13, 1979. EPA imposed a zero discharge requirement for all pollutants in the Onshore subcategory (40 CFR 435.32):

"...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)."

For the Agricultural and Wildlife Water Use subcategory, EPA imposed a zero discharge requirement for all pollutants with the exception of some produced waters (40 CFR 435, Subpart E). To qualify this exemption:

(1) The produced water must be generated from facilities that are engaged in production, drilling, well completion, and well treatment in the oil and gas extraction industry and be located in the continental United States and west of the 98th meridian (40 CFR 435.50).
(2) The produced water must be used in agriculture or wildlife propagation when discharged into navigable waters (40 CFR 435.50).
(3) The produced water discharges must not exceed an oil and grease daily maximum limitation of 35 mg/l (40 CFR 435.52(b)).

EPA defined the term "use in agricultural or wildlife propagation" by stating "the produced water is of good enough quality to be used for wildlife or livestock water or other agricultural uses, and the produced water is actually put to such use during periods of discharge." (40 CFR 435.51(c)). The provisions of 40 CFR 435 make no mention of water quantity necessary to support stock and/or wildlife use.

In 1979, WDEQ promulgated Water Quality Rules and Regulations Chapter 7, "Surface Discharge of Water Associated with the Production of Oil and Gas," which was the WDEQ equivalent to the federal ELG 40 CFR 435 except that the Chapter 7 rules provided more stringent controls than the federal rules. In the early development stages of CBNG the WDEQ applied the requirements of Chapter 7 as the technology based effluent limitations. In November 2004, WDEQ promulgated revised Chapter 2 rules, which incorporated and updated the provisions of Chapter 7 as Appendix H and explicitly identified CBNG as an industrial activity covered under the oil and gas technology based limitations.

For oil and gas discharges, including CBNG, permits issued from 1974 through 2000 by Wyoming, it was assumed that in the arid west region, the produced water would be used for agricultural or wildlife propagation as long as water quality standards and effluent limitations were met. Historically, documentation related to this requirement was not contained or

required in the permit applications or permit files for WYPDES permits. It is WDEQ's belief and understanding that federal permits issued on Indian Lands have been processed in a similar manner. However, in 2000, at the request of Region 8 EPA, the WYPDES Program modified the CBNG permit application to require the applicant to provide a demonstration of compliance with Subpart E.

In September 2001, the EPA provided written comments related to several CBNG permits that the WYPDES Program was proposing to issue. The comments primarily focused on the statements of basis (SOBs) for CBNG permits which invoked WWQRR Chapter 7 and 40 CFR 435. The EPA suggested that the SOBs should describe the beneficial use for the discharged water and that the quality support such a use. The nature of EPA's comments clearly suggested to WDEQ that EPA concurred with the approach of relying on the oil and gas effluent limitations guideline (40 CFR 435 and WWQRR Chapter 7) as guidance for developing BPJ limitations for CBNG.

While not initially stated in the SOBs for the proposed permits, the permit files contained application information regarding the identification of the use(s) for the discharged water and the potential water quality of the proposed discharge. In December 2001, the WYPDES Program began including statements in the SOBs of each CBNG permit to specifically address how the produced water would be used.

Although the ELG associated with the Oil and Gas Point Source Category predates the development of CBNG extraction technology, based on the comparison outlined above, it is the professional judgment of WDEQ that discharges related to CBNG facilities are similar enough to other types of natural gas extraction that the technology-based effluent limits contained in WWQRR Chapter 7 (now WWQRR Chapter 2, Appendix H) and 40 CFR 435 are appropriately applied. EPA acknowledged acceptance of Wyoming's reliance on the technical and economic assumptions of the federal effluent guidelines for the oil and gas extraction point source category (40 CFR 435) to establish technology based effluent limitations for CBNG in its February 26, 2003 letter to WDEQ.

2. Comparison of Water Management Options

The oil and gas industry has historically been forced to manage produced water and other production related wastes based on the constraints of water quality based effluent limitations, technology based effluent limitations and other state regulatory requirements, such as compliance with the Colorado River Salinity Control Forum policies. Because of these constraints the oil and gas industry has historically disposed of produced water by injection, disposal pits and ponds, land application, discharge to surface waters of the state that are not waters of the United States, and discharge to surface waters of the state that are waters of the United States.

Injection:

Injection has been used by the oil and gas industry primarily in the Green River and Snake River Drainage Basins due to high total dissolved solids concentrations in the produced water and the Colorado River Salinity Control Forum policies that are enforced through the

WYPDES program under WWQRR Chapter 6. Similarly, injection has been successfully utilized for CBNG produced water disposal, but on a limited scale, largely due to technological constraints.

Disposal Pits and Ponds:

One method of produced water management historically used by the oil and gas industry has been the use of disposal pits and ponds, typically for evaporation and concentration of brine waste. Similarly, CBNG produced water has been disposed of in pits and ponds. However, because the quality of CBNG produced water is of much higher quality (i.e. meets all Class 4 and most Class 3 water quality criteria at the point of discharge), evaporation plays a small role in the actual management of the produced water. The pits and ponds associated with CBNG produced water are categorized as surface waters of the state and are designed to infiltrate into and recharge shallow aquifers versus evaporation ponds, which are constructed with a liner.

Discharge to Surface Waters of the State that are Not Waters of the United States

As mentioned earlier, water quality-based and technology-based effluent limits are always evaluated for all oil and gas discharges. Waters of the state that are not waters of the United States, such as off-channel pits and ponds, are not subject to federal oversight or federal rules including BPJ or ELGs. However, because the WDEQ promulgated rules consistent with the federal rules for all surface waters of the state, WWQRR Chapter 2 is applied to these discharges.

Discharge to Surface Waters of the State that are Waters of the United States

Historical oil and gas produced water discharges to surface waters of the state that are waters of the United States have been and continue to be subject to the provisions of WWQRR Chapter 7 (now Chapter 2, Appendix H) and 40 CFR 435, as well as, WWQRR Chapter 1. Similarly, CBNG discharges are subject to the same regulations, including the management of drilling muds and other liquids associated with the drilling of wells. In all cases these drilling muds and other associated liquids are not permitted to be discharged to surface waters of the state.

Land Application

Land application has historically been an option for the oil and gas industry to manage disposal of produced water provided they meet the criteria of WWQRR Chapter 3 and obtain a permit from the WDEQ. Similarly, land application is an option for CBNG produced water and has been utilized by several companies for production of a variety of crops and vegetation.

3. Comparison of Water Quality Data

Since the beginning of large scale CBNG development in Wyoming, the DEQ has evaluated the range of possible ground water quality from coal seams based on the following data sources:

A. Land Quality Division records.
B. Water Quality Division records.
C. State Engineers Office records.
D. Oil and Gas Conservation Commission records.
E. USGS records.
F. Wyoming Geological Survey records.
G. Industry records.
H. Other miscellaneous sources.

Based on these reviews the DEQ has identified constituents of concern associated with the groundwater being produced and discharged from CBNG operations across the state. These constituents have been continually monitored. Findings from the evaluation of the data have revealed that iron, SAR and Ec are the primary constituents/parameters of concern. Other parameters such as barium, arsenic and whole effluent toxicity have been identified as concerns in isolated areas.

The 1976 Development Document for the Oil and Gas Extraction Point Source Category identified the significant or potentially significant wastewater constituents as oil and grease, fecal coliform, oxygen demanding parameters, heavy metals, total dissolved solids, and toxic materials. It is the WDEQ's opinion that the fecal coliform and oxygen demanding parameters referenced in the Development Document relate to the off-shore drilling operations where disposal of sewage wastewater would be involved in the process. Because the on-shore category does not include the discharge of sewage wastewater they are excluded from the comparison evaluation. The remaining constituents of concern in the Development Document are the same as the constituents of concern identified for CBNG discharges.

Additionally, the Development Document states that "...the wastes associated with this category result from the discharge of produced water, drilling muds, drill cutting, well treatment and produced sands for all subcategories..." Similar to conventional oil and gas operations, CBNG operations produce drilling muds, drill cuttings and other associated liquids. Appendix H(b)(ix) of Chapter 2 prohibits discharges associated with drilling and well completion (i.e., drilling muds and cuttings) to be discharged to the surface, consistent with 40 CFR 435.

Over the years, the WYPDES Program has collected and reviewed thousands of water quality data from hundreds of facilities. Based upon this data, there have been relatively few instances where additional constituents have required numerical effluent limits to be incorporated into CBNG permits. Concentrations of dissolved iron typically have high concentrations regardless of the location of the discharge point within the Greater Powder River Basin. However, because iron oxidizes rapidly, concentrations are easily and commonly managed through aeration. Metals, such as total barium, total aluminum, total

49senic, dissolved copper, dissolved lead, dissolved zinc and chlorides, on occasion have been identified as having a potential to exceed water quality standards. However, elevated concentrations of these metals are not consistently seen in the produced water.

In certain areas of CBNG development the discharge water has exhibited high sodium adsorption ratio (SAR) values, primarily due to the relative absence of calcium and magnesium. Discharges of CBNG produced water have been managed to ensure protection of Wyoming's narrative standard, Chapter 1, Section 20 "Agricultural Use" and to ensure protection of down stream surface water quality standards of adjacent states (Montana and South Dakota). CBNG surface discharges have been managed primarily through the use of containment ponds in the headwaters. However, other management techniques, such as reverse osmosis and ion exchange, for treatment of the produced water for SAR and specific conductance, are beginning to emerge as potential options on a small scale. As the technology and economics of these alternative management techniques evolve, they will likely become more widely used.

Summary

After consideration of information described above, the WYPDES Program concluded and maintains that it is appropriate to rely on WWQRR Chapter 2 Appendix H (formerly WWQRR Chapter 7) and the ELGs for the Oil and Gas Extraction Point Source Category (40 CFR Part 435) for establishing technology based effluent limits and equally appropriate for developing BPJ limits (40 CFR 125.3) for CBNG.

Finally, the state is aware that EPA is currently developing a guidance document for developing technology-based limits for CBNG operations and an economic analysis of the Powder River Basin. This document is draft and not available for quoting or citing at this time. However, if and when this document is finalized, the WDEQ will review and consider the merits of the guidance document.

If EPA determines that it is necessary to develop a federal ELG for CBNG and proceeds to develop a CBNG ELG the WDEQ would defer to the federal ELG.

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