Wyoming Department of Environmental Quality
Water Quality Division
WYPDES Program

Statement of Basis

RENEWAL

APPLICANT NAME:	Yates Petroleum Corporation
MAILING ADDRESS:	105 South 4th Street Artesia, NM 88210-2118
FACILITY LOCATION:	Morphius MPWHC, which is located in the SWSW of Section 7, the SENW, NWSE, SWSE, SENE, and NESE of Section 18, Township 53 North, Range 75 West; the SWSE of Section 1, the SWNE of Section 12, Township 53 North, Range 76 West; the NENE, and SENE of Section 34, Township 54 North, Range 76 West, all in Campbell County. The produced water will be discharged directly to on-channel reservoirs (class 3B), to various unnamed ephemeral tributaries (class 3B), South Windmill Draw (class 3B), and/or Black Bill Draw (class 3B), to Middle Prong Wild Horse Creek (class 3B), to Wild Horse Creek (class 3B) which is tributary to the Powder River (class 2ABWW). The permit requires that the produced water being discharged from this facility originate in one or more of the following formations: the Anderson, Canyon, and/or Wall coal seams.
NUMBER:	WY0054747

This permit has been renewed in accordance with current WYPDES permitting requirements. All permit effluent limits and monitoring requirements have been updated in accordance with current WDEQ regulations and policy. Specific changes to the permit include the following:

1. *The effluent limit for total recoverable arsenic is updated from 7 µg/l to 8.4 µg/l in accordance with current WDEQ regulations.*
2. *Irrigation monitoring points, IMP3-IMP4, are added to this facility (See Table 1).*
3. *The required routine monitoring frequencies for chloride, alkalinity and bicarbonate are updated to annual.*

General Description

This facility is a typical coal bed methane production facility in which groundwater is pumped from a coal bearing formation resulting in the release of methane from the coal bed. The permit authorizes the discharge to the surface of groundwater produced in this way provided the effluent quality is in compliance with effluent limits that are established by this permit. In developing effluent limits, all federal and state regulations and standards have been considered and the most stringent requirements

incorporated into the permit. The EPA Effluent Guidelines and Standards for Oil and Gas Extraction Point Source Category (Part 435, Subpart E) predate the development of coal bed methane extraction technology; however the technology is similar enough to conventional gas extraction that, in the professional judgment of the WDEQ, this effluent limit guideline is appropriately applied to coal bed methane gas production. This permit does not cover activities associated with discharges of drilling fluids, acids, stimulation waters or other fluids derived from the drilling or completion of the wells.

Facility Description

The permittee has chosen option 2 of the coal bed methane permitting options for outfalls 001-011. Under this permitting option, the produced water is immediately discharged to a class 2 or 3 receiving stream which is eventually tributary to a class 2AB perennial water of the state. The permit establishes effluent limits for the end of pipe, which are protective of all the designated uses defined in Chapter 1 of Wyoming Water Quality Rules and Regulations. This may include drinking water, game and non-game fish, fish consumption, aquatic life other than fish, recreation, agriculture, wildlife, industry and scenic value. Based on a review of this permit application and previous applications in this area, it has been determined that active irrigation uses of surface water occur downstream from the facility on Wild Horse Creek.

The permittee is required to contain all effluent from the outfalls in the on-channel reservoirs at this facility, unless prior written authorization is granted by the WYPDES program for a reservoir release, in association with use of assimilative capacity credits for the Powder River Basin. In the event that such an authorization for release is granted for this facility, the authorization letter will specify the release volume, duration and individual reservoir(s) covered. In the absence of such written authorization for release, the following containment requirements will apply at the reservoirs: The permittee will be required to contain all produced water within the reservoirs during "dry" operating conditions, and discharge of effluent from the reservoirs, except during periods of time in which natural precipitation causes the reservoirs to overtop and spill, is prohibited. Intentional or draw-down type releases from the reservoirs will constitute a violation of this permit. Discharge from the reservoirs is limited by the permit to natural overtopping and shall not extend beyond a 48 hour period following commencement of natural overtopping. It is the responsibility of the permittee to adequately demonstrate the circumstances in which reservoir discharges occurred, if requested to do so by the WYPDES Program.

Effluent Limits and Permit Requirements

Permit effluent limits are based on federal and state regulations and are effective as of the date of issuance. Permit limits are applicable to all permitted outfalls unless otherwise indicated. The permit requires that the pH must remain within 6.5 and 9.0 standard units. The pH limit is based on water quality standards established in Chapter 2 of the *Wyoming Water Quality Rules and Regulations,* in order to protect for livestock and wildlife consumption. The permit also establishes a total recoverable barium limit of 1800 µg/l and a total recoverable arsenic limit of 8.4 µg/l. These limits are based on Water Quality Criteria as established in the *Wyoming Water Quality Rules and Regulations, Chapter 1,* for Human Health values. In addition, the permit establishes a chloride limit of 150 mg/l, which is based on Water Quality Criteria as established in the *Wyoming Water Quality Rules and Regulations,* Chapter 1, for chronic aquatic life protection values. The limits established in this permit for metals and chlorides reflect the application of the antidegradation provisions required under the *Wyoming Water Quality Rules and Regulations,* Chapter 1. In addition, the permit establishes a dissolved iron limit of 1000 µg/l. The dissolved iron effluent limit is based upon chronic aquatic life protection for class 3B waters, and does not consider the antidegradation provisions under Chapter 1 *of the Wyoming Water Quality Rules and Regulations*, as dissolved iron has been determined to be a non-persistent pollutant, and all the outfalls being authorized for discharge in this permit are located more than one stream mile from confluence with

the nearest class 2 water, in this case, the Powder River. This approach reflects current WYPDES permitting practice in regards to establishing dissolved iron effluent limits in CBM surface discharge permits. Based upon the results of the initial monitoring, this permit may be reopened and more stringent limits and/or monitoring and reporting required.

All limits described in this section are intended to protect for the above listed designated uses, on both the immediate receiving water and the perennial mainstem, and apply at the end of pipe.

Irrigation Use Protection

Irrigation Use Protection: In order to monitor and regulate coal bed methane discharge for compliance with Chapter 1, Section 20 of the Wyoming Water Quality Rules and Regulations (protection of agricultural water supply), an effluent limit for specific conductance (EC) is included in this permit. The Wyoming DEQ has determined that a specific conductance effluent limit of 3,260 micromhos/cm is appropriate for protection of agricultural use within the Middle Prong Wild Horse Creek drainage. This effluent limit for EC was derived using information obtained in the application for permit WY0054585 (*Section 20 Compliance Analysis for Discharges by Williams Cedar Draw Project to the Middle Prong Wild Horse Creek drainage;* KC Harvey, LLC, February 2006). The estimated background instream salinity within the Middle Prong Wild Horse Creek drainage was derived by WDEQ, using data from the above referenced report on the average root zone salinity within the irrigated hay and pasture meadows along Middle Prong Wild Horse Creek. As indicated in the above referenced report, the average root zone salinity within the irrigated areas of the Middle Prong Wild Horse Creek drainage was measured at 11,012 micromhos/cm (+/- 95% confidence interval of 1,853 micromhos/cm). The historic background salinity of the applied irrigation water in this drainage is assumed to be equal to the average root zone salinity of the irrigated soils (11,012 micromhos/cm), divided by 1.5. This yields an estimated background salinity of 7,340 micromhos/cm in the historically-applied irrigation water. As described further in Part I of the permit below, an irrigation monitoring point (IMP) is established below the outfall(s) to serve as a data collection point. WDEQ will evaluate the instream data collected at the IMP(s) in order to determine whether effluent from this facility is resulting in an instream EC higher than the calculated historical average (7,340 micromhos/cm).

With regard to developing an end-of-pipe EC effluent limit for the discharges within this drainage, WDEQ recognized two primary goals: 1) Set the EC effluent limit at a level that will not exceed the estimated background salinity of the historically-applied irrigation water (7,340 micromhos/cm); and 2) Set the EC effluent limit at a level which will not adversely degrade the existing effluent discharge quality within the Middle Prong Wild Horse Creek drainage. As part of its review, WDEQ analyzed all available CBM discharge data for the Middle Prong Wild Horse Creek drainage. Of the 266 EC data points taken from discharges within the Middle Prong Wild Horse Creek drainage, the average EC in the effluent was 2,024 micromhos/cm, with a range of 865 micromhos/cm to 2,810 micromhos/cm, and a standard deviation of 452 micromhos/cm. Taking the maximum discharge EC value (2,810 micromhos/cm), and adding one standard deviation of the data set (452 micromhos/cm) results in a final rounded effluent limit of 3,260 micromhos/cm. This effluent limit for EC meets both of the above stated water quality goals.

The above described effluent limit for specific conductance is established at each outfall authorized under this permit, and is effective year-round.

Monitoring and Reporting Requirements

The permit requires daily monitoring on various unnamed, ephemeral tributaries to Middle Prong Wild Horse Creek below the outfalls in order to determine whether effluent discharged from the outfalls reaches the established irrigation monitoring points (IMP1-IMP4 listed in Table 1 of the permit below). Daily monitoring is necessary because the permit establishes different sampling and analysis requirements

based on whether the effluent reaches the irrigation monitoring point. Once effluent flow at the irrigation monitoring point has been documented within a sampling month, then weekly monitoring of flow at the IMP is required for the remainder of that calendar month. At the beginning of each calendar month, the monitoring frequency will revert to daily until such time as effluent flow occurs at the irrigation monitoring point and a sample is collected to represent effluent quality for irrigation monitoring point constituents. Results are to be reported twice-yearly and if no effluent from this facility reaches the irrigation monitoring point during an entire sampling month, then "no discharge" is to be reported for the IMP that month. The IMP is not a compliance point. It is intended only as a location to gather downstream water quality data.

Data collected at location IMP1-IMP4 will be evaluated by WDEQ on an ongoing basis in order to determine if effluent from this facility conforms to the EC target concentration established above as being representative of the estimated background salinity of historically-applied irrigation water (7,340 micromhos/cm), as well as to determine if effluent from this facility conforms with the following chemical relationship at the IMP locations:

$$SAR < 7.10 \times EC - 2.48$$

(where "SAR" represents sodium adsorption ratio, and "EC" represents specific conductance of the IMP sample in dS/m).

In the event that effluent from this facility is contributing to flow at station IMP1-IMP4, and the IMP water quality sample does not conform to either the 7,340 micromhos/cm target value or the above relationship during four or more sampling months in any calendar year, then WDEQ will re-open the permit to adjust the outfall effluent limits for SAR accordingly.

The permit also requires sampling at a designated tributary water quality monitoring station located on the receiving stream – Wild Horse Creek, and at mainstem water quality monitoring station locations on the Powder River upstream and downstream of the Wild Horse Creek - Powder River confluence. Water quality monitoring stations on the Powder River will be located in the main channel of the Powder River outside of the mixing zone of Wild Horse Creek and the Powder River. Effluent samples at the designated water quality monitoring stations must be collected on a monthly basis and are to be reported semiannually. Samples taken in compliance with the monitoring requirements specified above shall be taken at the following locations: designated water quality monitoring stations identified as TRIB1, UPR, and DPR in Table 1, Part I.B. 13 of the permit below. Established water quality monitoring stations on the mainstem are to be located outside the mixing zone with the tributary and the mainstem. Monthly water quality samples are to be collected at all three water quality monitoring stations when effluent from this CBM facility reaches the TRIB1 station on Wild Horse Creek. If flow occurs at the TRIB1 station during a given monthly monitoring period, but this CBM facility did not contribute to that flow, the permittee will report "did not contribute" in the discharge monitoring reports for that monthly monitoring period. Under such circumstances, sampling is not required at the three water quality monitoring stations, and it will be the responsibility of the permittee to demonstrate that the effluent from this facility did not contribute to the flow occurring at the TRIB1 station. If no flow at all occurs at the TRIB1 station for an entire monthly monitoring period, then "no flow" is to be reported and samples need not be collected at the three water quality monitoring stations for that monthly monitoring period.

At the designated water quality monitoring stations, monitoring will be required for calcium, magnesium, sodium, sodium adsorption ratio and specific conductance. Information gathered from the water quality monitoring stations may result in modification of the permit to protect existing uses on the tributary and mainstem.

Results are to be reported twice-yearly and if no discharge occurs at the outfall then "no discharge" is to be reported. The permit also requires that an initial monitoring of the effluent be conducted within the first 60 days of discharge and the results submitted to WDEQ and the U.S. Environmental Protection Agency within 120 days of the commencement of discharge.

General Permit Requirements

There shall be no discharge of floating solids or visible foam in other than trace amounts, nor shall the discharge cause formation of visible deposits of iron, hydrocarbons or any other constituent on the bottom or shoreline of the receiving water. In addition, erosion control measures will be implemented to prevent significant damage to or erosion of the receiving water channel at the point of discharge. Discharge water is to be released at a rate which does not cause significant erosion to the channel or receiving lands.

The discharge of wastewater and the effluent limits that are established in this permit have been reviewed to ensure that the levels of water quality necessary to protect the designated uses of the receiving waters are maintained and protected. An antidegradation review has been conducted and verifies that the permit conditions, including the effluent limitations established, provide a level of protection to the receiving water consistent with the antidegradation provisions of Wyoming surface water quality standards.

Self monitoring of effluent quality and quantity is required on a regular basis with reporting of results semiannually. The permit is scheduled to expire on December 31, 2012. This expiration date was determined through review of the watershed permitting schedule which the WDEQ is implementing in order to synchronize the permitting and expiration of facilities within the same watershed. This holistic approach will provide for more efficient permitting of point-source discharges.

Carrie Ferguson—Renewal
Water Quality Division
Wyoming Department of Environmental Quality
Drafted: July 9, 2008

AUTHORIZATION TO DISCHARGE UNDER THE

WYOMING POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Water Pollution Control Act, (hereinafter referred to as "the Act"), and the Wyoming Environmental Quality Act,

Yates Petroleum Corporation,

is authorized to discharge from the wastewater treatment facilities serving the

Morphius MPWHC,

located in the

SWSW of Section 7, the SENW, NWSE, SWSE, SENE, and NESE of Section 18, Township 53 North, Range 75 West; the SWSE of Section 1, the SWNE of Section 12, Township 53 North, Range 76 West; the NENE, and SENE of Section 34, Township 54 North, Range 76 West, all in Campbell County,

to receiving waters named

on-channel reservoirs (class 3B), to various unnamed ephemeral tributaries (class 3B), South Windmill Draw (class 3B), and/or Black Bill Draw (class 3B), to Middle Prong Wild Horse Creek (class 3B), to Wild Horse Creek (class 3B) which is tributary to the Powder River (class 2ABWW),

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II and III hereof.

This permit shall become effective on the date of signature by the Director of the Department of Environmental Quality.

This permit and the authorization to discharge shall expire at midnight, December 31, 2012.

_____ _____

John F. Wagner
Administrator - Water Quality Division

Date

_____ _____

John V. Corra
Director – Department of Environmental Quality

Date