

Appendix D — Mitigation Monitoring and Reporting Plan

This Appendix outlines the planning process for the Mitigation Monitoring and Reporting Plan (MMRP) for the Powder River Basin Oil and Gas Project Area. This document describes the basic components of the plan and steps involved in its implementation.

The PRB Oil and Gas Project FEIS contains a detailed description of the nature of exploration and development of coal bed methane in the Powder River Basin. It is speculative to predict how future development will proceed. There is uncertainty about the specifics of future development. Because of this uncertainty, a number of assumptions were necessary to predict the impacts associated with future development. Those assumptions may or may not be correct. Therefore, mitigation measures may need to be modified as development evolves.

Purpose and Need

The effects of the proposed action on the environment as identified in this analysis are based on a series of assumptions. Because the development may not occur exactly as portrayed in this document, it will be important to monitor effects as development progresses over time. It will also be important to assess the effectiveness of the mitigation measures adopted. For instance, will adopted mitigation and best management practices be adequate to prevent water quality degradation in the Tongue, Powder and Little Powder Rivers? Will operating within decibel level thresholds be sufficient to protect grouse breeding integrity? These questions are particularly relevant given our current ability to predict cumulative perturbations on the ecosystem. Predictions regarding the severity of the impacts are complicated further by the fact that some of the development may occur on private and state lands where protective measures (such as seasonal restrictions to protect big game and raptor nests, no surface occupancy stipulations) are not typically applied. Will perturbations on private lands increase density on Federal lands resulting in deteriorating quality of habitat?

The uncertainties as to where and at what level development will proceed as well as uncertainties associated with the assumptions that were used to predict impacts suggest that the one-time determination of impacts that is included in the EIS may not occur as projected. A MMRP would help to continually assess the effects of the project and the adequacy of the mitigation. Such a plan/process would provide a mechanism for continuously modifying management practices in order to allow development while continuing to protect the environment. CEQ regulations provide for appropriate application of continual monitoring and assessment. Section 102(2)(B) of NEPA calls for “*methods ... which will insure that presently unquantified environmental amenities and values may be given appropriate consideration,*” CEQ regulations (40 CFR 1505.2(c); 1505.3(c) and

(d) state “a monitoring and enforcement program would be adopted and summarized, where applicable, for any mitigation” and that agencies “may provide for monitoring to assure that their decisions are carried out and should do so in important cases.” The lead agency must “upon request, inform cooperating or commenting agencies on progress in carrying out mitigation measures which they have proposed, and which were adopted in the decision.” And, “upon request, make available to the public the results of relevant monitoring.”

Goals and Objectives

The goals and objectives of the MMRP are to develop resource-monitoring plans for specified resources to:

- Determine the effects of development on these resources;
- Determine the effectiveness of the mitigation measures contained in the Record of Decision (ROD);
- Modify the mitigation measures as deemed appropriate to achieve the stated goal/objective;
- Assure that non-oil-and-gas related BLM decisions (such as grazing, recreation, etc.) regarding, are coordinated with oil and gas-related development;
- Provide a rapid response to unnecessary/undue environmental change;
- Validate predictive models used in the EIS and revise the models/projections as necessary based on field observations and monitoring;
- Accurately monitor and predict cumulative impacts through BLM maintenance of a Geographic Information System (GIS) on Federal and non-Federal lands and how they are affecting resources;
- Provide guidance for monitoring (surveys) upon which the need to initiate Section 7 consultation with the USFWS will be determined.

Resource Monitoring Plans and Objectives

Monitoring Plans will be prepared for the following resources and activities. Determination of the on-the-ground monitoring will be made by the BLM and cooperating agencies that carry out the monitoring programs.

Wildlife Resource

Sage grouse/sharp-tailed grouse

1. Clearance surveys for sage grouse breeding activity would be documented in a database. Document changes, if any, in breeding distribution, associated with oil and gas development.
2. Loss of sagebrush shrublands and their reclamation success would be documented in a database. Weed infestation would also be documented so appropriate treatment can occur.

Raptors

1. Monitor and document raptor nesting activity and locations within the PRB.
2. Document changes, if any, in nesting locations, active nest sites, and effects from oil and gas development.

Threatened, Endangered, or Sensitive Species

1. A written summary will be provided to the USFWS' Wyoming Field Office semi-annually. The semi-annual report will include field survey reports for endangered, threatened, proposed and candidate species for all actions covered under the *Environmental Impact Statement (EIS) for the Powder River Basin Oil and Gas Project* and ROD. The semi-annual reports will include all actions completed up to 30 days prior to the reporting dates. The first report will be due 6 months after the signing of the ROD and on the anniversary date of the signing of the ROD. Reporting will continue for the life of the project.

Bald Eagle

1. A database would be maintained tracking bald eagle deaths or injuries encountered in the field related to this action.
2. Suitable nesting and winter roosting habitats inventoried would be identified and mapped.
3. All take of bald eagle habitat associated with implementation of the action would be documented.
4. A carcass monitoring program would be implemented.

Black-footed Ferret

1. Suitable black-footed ferret habitat would be identified and mapped.
2. All take of prairie dog habitat associated with implementation of the action would be documented.

Mountain Plover

1. All take of mountain plover habitat associated with implementation of the action would be documented.
2. A carcass monitoring program would be implemented.
3. The success of reclamation of areas of previously suitable mountain plover habitat would be monitored. Reclamation would be considered complete when ground cover with seeded species is similar to pre-disturbance percentages. Weed infestation would also be documented so appropriate treatment can occur.

Ute ladies'-tresses orchid

1. Suitable orchid habitat would be identified and mapped.
2. The success of reclamation of areas of previously suitable orchid habitat would be monitored. Reclamation would be considered complete when ground cover with seeded species is similar to pre-disturbance percentages.

Weed infestation would also be documented so appropriate treatment can occur.

Aquatics

1. Water quality in ponds developed for fisheries would be sampled on an annual basis for selenium, TDS, and sodium bicarbonate, at a minimum.
2. Stream channel monitoring for erosion, degradation, and riparian health would be conducted on an annual basis and after major storm events to determine the storm event's effects (non-CBM related effects). Surveys would include no less than one stream reach above all CBM discharges and several stream reaches below CBM discharges. Where monitoring occurs, a station would be placed above all CBM outfalls and one below all CBM outfalls, at least on main stems.
3. Sub-watersheds that will receive CBM produced waters and would be monitored for macroinvertebrates and fish populations include: Upper Tongue River, Upper Powder River, Salt Creek, Crazy Woman Creek, Clear Creek, Middle Powder River, Little Powder River, Antelope Creek, Upper Cheyenne River, and Upper Belle Fourche River. Sampling sites would be established at existing flow and water quality monitoring stations where possible. Monitoring of salinity by electric conductance in discharged water would be performed to assess the potential for adverse effects. Sampling would occur on an annual basis during low flow periods, and all data collected would be entered into a central database. At least two sampling locations per stream or river would be established in these watersheds.

Water

Groundwater

1. The effects of infiltrated waters on the water quality of existing shallow groundwater aquifers are not well documented at this time. Potential impacts will be highly variable depending on local geologic and hydrologic conditions. It may be necessary to conduct investigations at representative sites around the basin to quantify these impacts, and provide site-specific guidance on the placement and design of CBM related impoundments. Shallow groundwater wells would be installed and monitored where necessary.
2. A battery of 35 groundwater monitoring well locations would be installed throughout the project area.

Surface Water

BLM, in cooperation with the WDEQ, WSEO, USGS and others fund an extensive network of surface water monitoring sites in the project area. Approximately 47 stations are currently operated to continuously record stream flow on major rivers and streams in the area. Over half of these sites include periodic water quality analysis as well. This analysis typically includes major cations and ions (calcium, magnesium, sodium, bicarbonate, chloride, and sulfate), selected nutrients (nitrate and phosphorus), and trace metals (arsenic, barium, iron, manganese,

and selenium). The PAW also contracts water quality sampling at 26 sites on tributary streams in the region. Continued monitoring by BLM in conjunction with federal, state, and local agencies at existing sites on tributaries and mainstems in the Project Area would be incorporated into the monitoring plans described below.

All parties involved are currently developing a comprehensive, basin wide surface water-monitoring plan that will integrate the efforts of all cooperators into a single monitoring effort. All data from this monitoring network will be compiled at a single depository and will be available to all interested parties.

Discharges of CBM

Proposed CBM produced water discharges would initially be characterized in accordance with the requirements of WDEQ's NPDES general permit application. Once surface discharge is authorized, under a WDEQ-issued NPDES permit, initial monitoring of the discharge from each outfall would include Total Petroleum Hydrocarbons (TPH), pH, Specific Conductance (EC), Total Dissolved Solids (TDS), sulfate, chloride, Radium 226, Total Iron (Fe), Total Manganese (Mn), Total Barium (Ba), and Flow Volume. Following initial monitoring, routine monitoring at specified intervals would include flow (monthly), TPH, pH, EC (every 6 months), and Radium 226, Fe, Mn, Ba, Chloride (annually). During monthly flow monitoring, a visual inspection of erosion control measures would take place, to assure that no significant damage or erosion of the receiving water channel at the point of discharge has occurred. This monitoring describes the minimum requirements of WDEQ's general permit for CBM produced water discharges; additional or more stringent monitoring requirements may be imposed at the discretion of the WDEQ.

Bicarbonate is one constituent of interest that may require additional monitoring because of its potential toxicity to aquatic life. Discharges of CBM produced water are typically higher in sodium bicarbonate, which could have adverse effects on local populations of fish in selected drainages of the Project Area. The need for routine monitoring for bicarbonate would be evaluated during the NPDES permit process, based on the initial characterization of the CBM produced water discharge and aquatic resources specific to the drainage receiving the discharge.

If surface discharge of CBM produced water is proposed in receiving drainages where there are existing irrigation activities taking place, WDEQ permitting procedures may require operators to include an irrigation use protection plan with the NPDES permit application that specifies necessary measures to prevent violating the narrative standards for the protection of irrigated agriculture in the drainage. If the water quality of the proposed discharge is not of equal or better quality than the ambient quality of the main stem, operators would be required to demonstrate that a poorer water quality with respect to EC and SAR values would not result in a measureable reduction in crop yield and soil quality and permeability. In addition to initial characterization of the CBM produced water proposed for surface discharge (i.e. irrigation use), baseline soils monitoring that may be required to make this determination would include soil type, texture, and permeability, as well as analyses for SAR, EC, sodium (Na), calcium (Ca), magnesium (Mg), and exchangeable sodium percentage (ESP). Subsequent monitoring to gauge changes in water and soil quality would include the list of analytes

listed above, and would need to occur at monthly intervals during the irrigation season to facilitate adjustments before measurable decreases in crop productivity result.

Natural Springs

Before CBM development occurs, existing springs within ½ mile of the proposed development would be inventoried. Initial flow rates would be measured, and a water quality sample to be analyzed for the same list of constituents required by WDEQ's NPDES general permit application would be obtained. The springs would be re-sampled every spring and fall to monitor any changes in the quantity or quality as a result of CBM development. These subsequent samples would be analyzed for the same list of constituents required by the monitoring specified in the WDEQ-issued NPDES permit.

Impoundments

CBM produced water discharges to off-channel containment impoundments would be subject to the requirements of WDEQ's NPDES general permit for these structures. Routine monitoring at specified intervals at the end-of-pipe discharge to the impoundment would include flow and TPH (monthly), pH, EC, chloride, and Total Selenium (Se) (every 6 months), and Radium 226 (annually). During monthly monitoring, a visual inspection of the impoundment would take place, to assure that no significant seeps or springs has occurred. In addition to the discharge to the impoundment, monitoring for Total Se, EC, chloride, and sulfate in the water contained in the impoundment would be required every 6 months, to evaluate the effects of evaporation on the water quality in the impoundment. This monitoring describes the minimum requirements of WDEQ's general permit for CBM produced water discharges to off-channel containment impoundments; additional or more stringent monitoring requirements may be imposed at the discretion of the WDEQ.

Land Application Disposal Areas

Routine monitoring of the water quality and soils at LAD areas would need to occur to assure that adverse effects are not occurring, or if so, can be mitigated. Monitoring of the CBM produced water proposed for LAD would include analysis for SAR, EC, major cations (Ca, Mg, Na), pH, and bicarbonate on a monthly basis, and monthly soils monitoring including the above constituents in addition to ESP and cation exchange capacity (CEC). Soil samples would be taken from each soil profile, and, while the number of samples would be determined based on site-specific topography, climate, and soil conditions, approximately one sample for every 5 acres of LAD area would be included.

Wetlands/Riparian

1. Any disturbed wetlands and/or riparian areas would be documented and tracked in a database.
2. The success of reclamation of disturbed areas would be monitored. Reclamation would be considered complete when ground cover with seeded species is similar to pre-disturbance percentages. Weed infestation would also be documented so appropriate treatment can occur.

3. Similar to #3. in aquatics, monitoring of salinity, by electric conductance in discharged water, would be performed to assess the potential for adverse effects to riparian vegetation. For each POD where salinity of discharged water is likely to reach a stream or wetland, one or more monitoring stations would be installed to assess effects to vegetation.

Reclamation/Best Management Practices

Surface Disturbance Revegetation

1. Annually monitor disturbed site reclamation/revegetation success and invasive species occurrences.

Soils

1. Compile data related to LAD operation and mitigation to determine best management practices under various soil/water parameters.
2. BLM has installed 31 soil gas probes in 12 clusters. The probes are mainly in the Gillette area and the Thunder Basin National Grassland east of Wright. Probes have been installed in areas that may be potential conduits for methane to migrate to the surface, near the coal burn line where highly permeable clinker may allow gas to migrate, near drill holes or old wells to check for improper sealing, and near inactive mine faces and old mine fires.

The scope of the program will probably remain at a low level unless an incident occurs that would warrant an expanded network. Gillette has also installed over 30 probes within the city limits and measures them on a quarterly basis.

Air Quality

1. An annual monitoring report would be completed of actual on-the-ground calculated potential NO_x emissions (i.e., the level of NO_x emission from permitted, actually constructed/installed facilities based upon the permitted level of emissions per well location, compressor facility, etc.) for a sample size of the project area.
2. Continue to cooperate in the implementation of existing visibility and atmospheric deposition impact monitoring programs.

WDEQ detects changes in air quality through monitoring and maintains an extensive network of air quality monitors throughout the state. Particulate is most commonly measured as particles finer than 10 microns or PM₁₀. The eastern side of the Powder River Basin has one of the most extensive networks of monitors for PM₁₀ in the nation due to the density of coal mines. In addition to the network associated with the mines, there are also monitors in Sheridan and Gillette, Wyoming. To better monitor particulate related to coal bed methane, Wyoming is currently installing monitors in Arvada and Wright, Wyoming.

WDEQ uses monitoring located throughout the state to anticipate issues related to air quality. These monitoring stations are located to measure ambient air and not located to measure impacts from a specific source. Monitors located to measure impacts from a specific source may also be used for trends. This data is used to pro-actively arrest or reverse trends towards air quality problems. When WDEQ became aware that particulate readings were increasing due to increased coal bed methane activity and exacerbated by prolonged drought, the DEQ approached the counties, coal mines and coal bed methane industry. A “coalition of the counties”, coal companies and coal bed methane operators have made significant efforts towards minimizing dust from roads. Measures taken have ranged from the implementation of speed limits to paving of heavily traveled roads.

Monitoring is also used to measure compliance. Where monitoring shows a violation of any standard, the WDEQ can take a range of enforcement actions to remedy the situation. Where a standard is exceeded specific to an operation, the enforcement action is specific to the facility. For many facilities, neither the cause nor the solution are simple. The agency normally uses a negotiated settlement in those instances.

There are also monitors for nitrogen oxides (NO_x) in spread along the east side of the Basin. WDEQ has also sited two visibility monitoring stations in the Basin. One of these sites is 32 mi north of Gillette and includes a Nephelometer, a Transmissometer, an Aerosol Monitor (IMPROVE Protocol), instruments to measure meteorological parameters (temp., RH, wind speed, wind direction), a digital camera, instruments to measure Ozone and instruments to measure Oxides of Nitrogen (NO, NO₂, NO_x).

The other visibility monitoring station is located 14 miles west of Buffalo and includes a Nephelometer, a Transmissometer, an Aerosol Monitor (IMPROVE Protocol), instruments to measure meteorological parameters (temp., RH, wind speed, wind direction), and a digital camera.

Noise

Where compressors are built a distance of one-quarter mile from sensitive receptors, monitoring devices would be installed so that noise levels would not exceed 50 decibels above background noise.

Transportation

Access roads and sales pipelines

1. Monitor construction to ensure design and use standards are met and maintained.
2. GIS will be updated at least semi-annually based on companies' submittals of as built geo-referenced POD maps.

Mitigation, Monitoring and Reporting Planning Process Implementation

The BLM Buffalo Field Manager will implement the MMRP by establishing the *Powder River Basin Working Group* (PRBWG). The PRBWG will function as a resource working group consisting of BLM, cooperating agencies and other agencies who have expertise in the area. The structure of the PRBWG will be as follows:

The PRBWG may include representatives from the following federal and state agencies:

- Bureau of Land Management [Buffalo and Platte Field Offices and personnel with special expertise from other BLM offices]
- U.S. Fish and Wildlife Service
- U.S. Army Corps of Engineers
- USDA Forest Service
- State of Wyoming agencies [Wyoming Game and Fish Department, Wyoming Department of Transportation, Wyoming Department of Environmental Quality - Air and Water Quality Divisions, State Historic Preservation Office, State Engineers Office, Wyoming Oil and Gas Conservation Commission, etc.]
- U.S. Environmental Protection Agency
- Johnson, Sheridan, Campbell and Converse County government as outlined in the state cooperating agency agreement.

An MMRP will be initiated after the approval of the PRBO&G ROD. The primary function of the PRBWG will be to:

- Review the development and implementation of monitoring plans for the PRB oil and gas development;
- Meet at a minimum once a year or more often as needed;
- Keep written record of meetings and disseminate to members and interested public;
- Conduct field inspections as needed to review the implementation of construction and rehabilitation operations; Review status quo and any new information since last meeting (e.g., monitoring results of impact mitigation effectiveness);
- Synthesize monitoring plan activities/expectations for the coming year, based upon operator input and new information;
- Review recommendations from the Task Groups and submit a recommendation to BLM (e.g., management practices and monitoring needs for upcoming field season);
- Oversee implementation of monitoring.

The PRBWG may establish Task Groups. The individual Task Groups would be initiated as needed.

The BLM would implement and coordinate the MMRP Process. BLM would have the sole authority for decisions relative to this process. The leadership for the coordination will be located in the BLM Buffalo Field Office. Meetings of the PRBWG and TG's would be held at a minimum, annually. Minutes of the meetings would be made available to the public upon request.

Function of PRBWG at First Meeting:

Explain Purpose and Need for MMRP process;

- Explain organizational structure and functional responsibilities of PRBWG and TGs;
- Establish and select PRBWG representatives;
- Review draft Memorandum of Understanding;
- Establish and select TG members;
- Set date, time, and place for next PRBWG meeting.

Function of PRBWG at Subsequent Meetings:

- Review minutes from previous meeting;
- Reports presented from the TG's on monitoring results;
- Review recommendations from TG's;
- Develop any changes to mitigation measure recommendations if necessary;
- Submit recommendations and monitoring results to BLM;
- BLM specify any new directives, set date, time, and place for next PRBWG meeting.

Task Group Functions.

Separate resource or activity Task Groups (TG's) would be established if necessary to complete the following:

- Recommend implementation of specified resource/activity monitoring plans;
- Keep written record of meetings and disseminate to PRBWG members and interested public;
- Implementation protocol including proposed fund sources;
- Annual monitoring report needs and meeting frequency;
- Resource concerns (e.g., based upon current conditions, drilling plans, etc.)
- Preparation of the monitoring plan and for evaluation of monitoring results, review, evaluate and summarize past/present data pertaining to the resource;
- Annual survey/inventory, monitoring, etc. that needs to be completed;
- Evaluation of mitigation measure(s) effectiveness;
- Results of monitoring and evaluation of the effect of project development on the resource;
- Implement monitoring plan as approved by BLM.
- Review and evaluate monitoring data collected;

- Present and submit monitoring results annually to PRBWG;
- Review and evaluate current monitoring plan;
- Modify monitoring plan and implement as approved by BLM;
- Recommend modifications to the development and monitoring plan to the PRBWG and BLM;
- If necessary, recommend modification to mitigation as needed.

The TG leadership for the coordination among the group and for the development, implementation, and reporting results of the monitoring plans will be as determined by group members. Meetings of the TG's will be held as often as deemed necessary but at least annually. TG meetings will be held during work hours. The agenda will be developed by the TG leader to address the necessary items as defined under the TG Functions above.

MMRP Funding

The PRBWG will work with the O&G industry to implement the monitoring programs specified. Agencies and cooperators will work with industry in corporate funding of monitoring to the extent that budget allocations permit.