FINAL WORKPLAN

FOR

WATERSHED-BASED WYPDES PERMITTING

for the

POWDER RIVER BASIN, WYOMING

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY

WATER QUALITY DIVISION

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I. NEED STATEMENT

Introduction

The Wyoming Department of Environmental Quality, Water Quality Division (WDEQ/WQD) is the primary governmental agency in Wyoming with responsibility for controlling and preventing water pollution. The Wyoming Pollutant Discharge Elimination System (WYPDES) Program within the WQD has responsibility for issuing, monitoring, and enforcement of permits to control point source discharges of pollutants into surface waters of the State. Primacy for the WYPDES program was obtained from the U. S. Environmental Protection Agency (EPA) in 1974.

Through the WYPDES Program, the WDEQ regulates discharges of pollutants resulting from the dewatering of coal-bearing formations for the purpose of methane gas production. The WYPDES Program has issued individual and general WYPDES permits for coal bed methane (CBM) product water discharges, and a variety of other industrial and municipal point sources, into the Powder River Basin (PRB) in northeastern Wyoming (Fig. 1). Regulated industrial point sources in the PRB include coal mining, oil, and gas production units. Based on figures provided in the U. S. Bureau of Land Management's (BLM) Final Environmental Impact Statement (FEIS) for the Powder River Basin Oil and Gas Project, an estimated 50,000 to 80,000 CBM wells were projected to be drilled on BLM lands in the Powder River Basin by the year 2010. During 2002, approximately 30 new N(WY)PDES permits per month were issued by the WDEQ for discharges of CBM product water. In 2003, the number of new N(WY)PDES permits issued per month declined to approximately 20 new permits per month. The decline in new permit applications was attributed to uncertainty in permitting requirements on Federally (BLM) administered lands and additional monitoring requirements (WET) included in N(WY)PDES permits associated with the Big George coal seam. However, in the first and second quarters of 2004, the number of new WYPDES permits in public notice increased slightly over 2003 levels, and WDEQ expects an even greater increase in permit applications due to high natural gas prices.

Reason for Project

This project is necessary to address concerns identified by EPA and WDEQ relative to the volume and density of existing N(WY)PDES CBM permitted discharges in the PRB and the anticipated large-scale development (both spatial and temporal) of CBM resources in the Powder, Little Powder, Tongue, Belle Fourche, and Cheyenne River Basins in northeastern Wyoming. The potential impacts to water quality in an area the size of the PRB, approximately 9,000 square miles in Wyoming, from industrial point source discharges is significant and the WDEQ/WQD, with stakeholder involvement, has identified a need to strengthen the WYPDES permitting process for the PRB. WDEQ/WQD proposes to implement a watershed-based WYPDES permitting approach for the PRB within Wyoming. The primary goals of

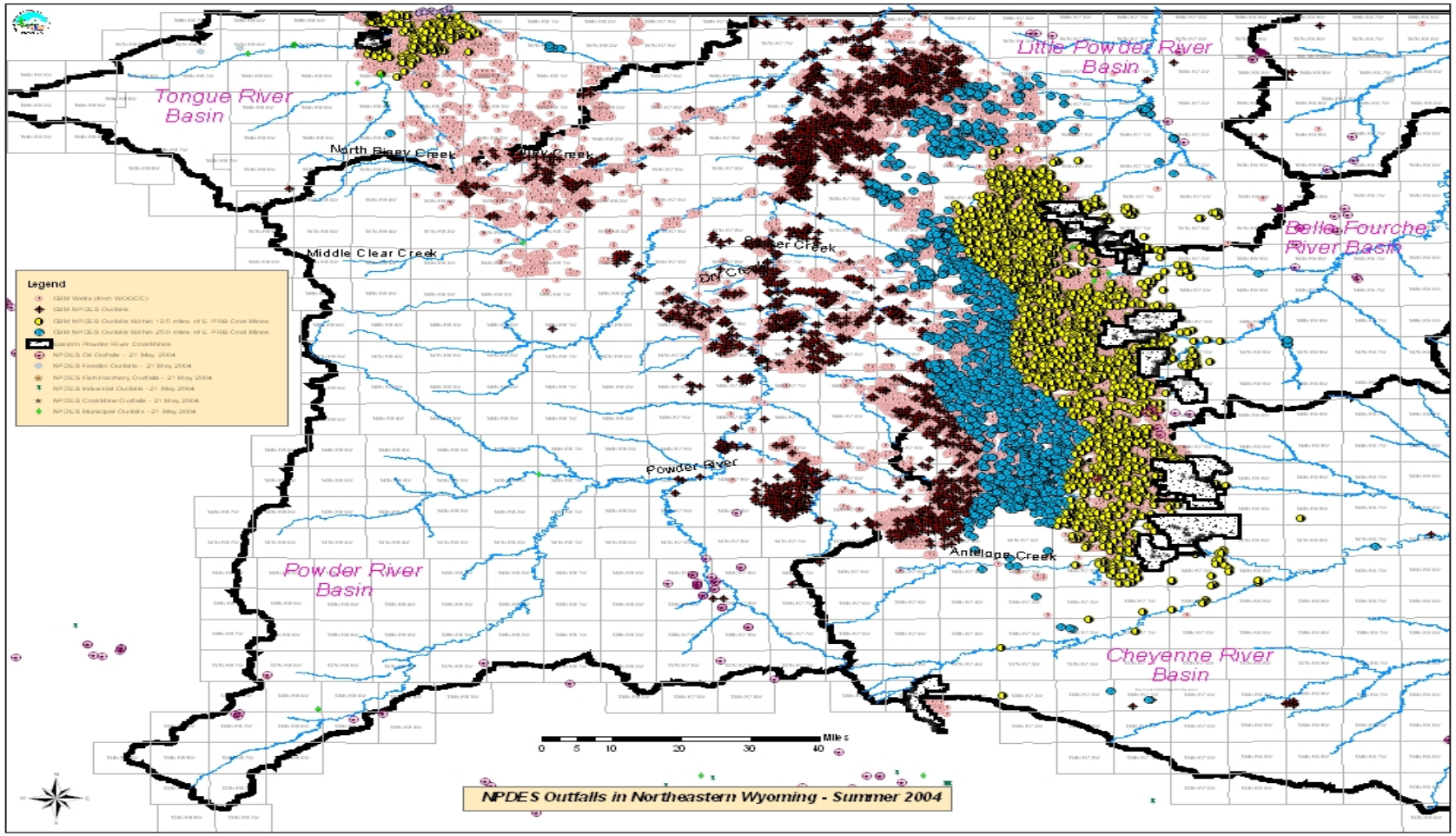

Figure 1. WYPDES Outfalls in NE Wyoming's Powder River Basin.

implementing a watershed-based WYPDES permitting strategy are the consideration of cumulative impacts to water quality over an entire watershed and developing an efficient permitting process. A secondary goal is to develop a template for watershed-based WYPDES permitting that can be transferred to other watersheds in Wyoming and potentially to other states with similar permitting issues and watersheds. Ultimately, implementation of a watershed-based permitting approach for northeast Wyoming should improve and simplify the WYPDES permit application process and strengthen the WYPDES regulatory mechanism to enhance compliance with established water quality standards.

II. GOALS

The overall goal of implementing a watershed-based WYPDES permitting strategy is the consideration of cumulative impacts of permitted discharge activities to water quality in an entire watershed. Specific goals of this proposal are:

1. Provide baseline water quality assessment for the entire PRB to establish end goals such as flow, concentrations, and loads for the project area;

2. Identify water quality parameters with the greatest sensitivity (parameters first to exhibit a detectable response to effluent discharges) to allow for efficient assessment of inputs (e.g. proposed discharge volume and constituent concentrations);

3. Compile and interpret data on the identified sensitive water quality parameters;

4. Develop protocols to format data for use in the Arc Hydro GIS platform;

5. Quantify existing and reasonably foreseeable potential future industrial development in the PRB of Wyoming;

6. Utilizing Goals 1-5, develop a WYPDES watershed-based permitting framework for the Powder River Basin including: 1) Identify the potential assimilative capacity for the PRB; 2) Develop a conceptual outline for the allocation of available capacity; 3) Develop an appropriate permitting approach or mechanism (i.e. general vs. individual permits, synchronize permitting, and assimilative capacity) for point source discharges into the PRB.

Additional goals and objectives, including measurable environmental results, are summarized below.

Likely Improvement in Results from Project Implementation:

The implementation of a watershed-based WYPDES permitting approach for northeast

Wyoming would improve and simplify the WYPDES permit process and strengthen the WDEQ/WQD regulatory mechanism to enhance compliance with established water quality standards. The watershed-based permitting approach would improve WDEQ/WQD administrative efficiency (reduction in time needed to review permit applications) and potentially reduce permit applicant's costs (potentially fewer permit applications, improve consistency of permits in the same drainage [i.e. HUC 10]).

The watershed-based approach differs from the current permitting method by looking at a cumulative assessment of the potential impacts to water quality in an entire basin. The watershed-based approach builds on lessens learned from the large number of WYPDES permit applications received by WDEQ/WQD when the CBM play started in the late 1990s. The quantifiable improvements from implementing a watershed-based permitting approach would be improved water quality for the PRB. The measurable improvements in administrative efficiency would be quicker turn-around time from receipt of permit application to submission for public notice and a reduction in operational costs since fewer personnel hours would be required per permit application. The quantifiable reductions in costs for the permit applicant would be fewer required permits per watershed resulting in a reduction in expenses for permit application development. Also, stakeholder involvement in the development of the watershed-based permits may result in fewer objections during the public notice period and a reduction in staff time needed to respond to comments.

Measuring Improvement and Accountability:

The watershed-base permitting approach is designed to achieve and demonstrate results in the near-term (3 Years) and then transfer the project methodology to implement a watershed-based WYPDES permitting process for other watersheds within Wyoming. The project will involve stakeholder identification and public meetings to allow a collaborative atmosphere to drive the project. To successfully design and implement a watershed-based approach for WYPDES permitting, all affected stakeholders must be given the opportunity to be involved from the inception of the watershed-based process. To achieve this goal, WDEQ/WQD will identify, contact, and encourage participation of all of the stakeholders in the respective HUC 10 basins within the PRB.

WDEQ has identified, and established, a network of monitoring sites in the PRB to assess ambient water quality conditions, to detect deviations from historic metrics of central tendency (means, medians, modes at historic monitoring sites on the mainstems in the PRB), and to assess impacts from CBM development. WDEQ has contracted with the U.S. Geological Survey (USGS) to perform the monitoring activities. The data is available to the public via the USGS website and annual reports. Previous surface water quality monitoring efforts (PAW, USGS, WQD/WYPDES, DMRs, etc) will be included to ascertain a more robust analysis of existing conditions. In addition, WYPDES IMR and DMR data will be used to assess point source discharges into the individual watersheds. Finally, WDEQ/WQD WYPDES Inspection data will

be used to assess the efficacy of the self-reporting IMR and DMR data and will be used to supplement ambient surface water monitoring data. The existing ambient water quality conditions in the PRB, as determined by the aforementioned monitoring network, will be compared with future water quality conditions after the watershed-based WYPDES permitting approach is implemented to estimate impacts.

The relatively aggressive three-year timeline demonstrates a commitment of staff and support from WDEQ/WQD to implement a watershed-based permitting process. The expected long-term results obtained from a watershed-based permitting approach are improved water quality, increased compliance from the permitted industry, improved administrative efficiency and reduction in WYPDES program costs, a transferable watershed model, and a better informed public through an upfront and transparent public participation process.

Transferring Innovation:

WDEQ/WQD proposes to document the outcome of the watershed-based permitting approach in reports, presentations, and a transferable computer model. The potential for widespread application of a watershed-based WYPDES permitting process is great for Wyoming, other states in Region 8, and other states with a need for a cumulative assessment tool of NPDES discharges into large watersheds. The pursuit of a watershed-based approach to WYPDES permitting demonstrates WDEQ/WQD's culture of forward thinking and innovative problem-solving on environmental matters. WDEQ/WQD is committed to sharing and transferring the lessons learned from the watershed-based permitting process to other states and interested parties. WDEQ/WQD currently networks with counterparts in adjacent state agencies on a variety of water quality issues. Those relationships will continue in the future and will allow WDEQ/WQD opportunities to improve upon and transfer the watershed-based WYPDES permitting concepts to interested agencies, industries, and special interest groups in adjacent states.

III. DESCRIPTION OF THE PROJECT

Background Information

The current priority environmental issue for the WDEQ/WQD is CBM development in the PRB. An estimated additional 30,000 - 50,000 CBM wells are projected to be drilled in the PRB by the year 2010. EPA has been promoting the concept of a watershed-based NPDES permitting strategy for nearly a decade; however, the implementation of such a permitting strategy has been slow throughout the United States. WDEQ/WQD recognizes the potential short-term benefits of implementing a watershed-based permitting process for CBM development and the potential long-term benefits of a watershed-based permitting approach for achieving significant water quality improvements at the watershed or basin scale.

A watershed-based WYPDES permitting approach for the PRB would assess cumulative impacts from identified contributors (stressors) and provide measurable enhancements over the existing permitting process. The watershed-based permitting project is designed to achieve and demonstrate results in the near-term (3 years) and then transfer the project methodology to other watersheds and other States.

WQD has established a schedule for developing watershed-based permits in the PRB (Fig 2) and is proceeding in the Pumpkin, Fourmile, and Willow Creek drainages.

The components of a conceptual watershed-based WYPDES permitting process include:

- involvement of stakeholders
- watershed characterization (e.g., land use, ownership, topography, channel capacity, climate, vegetation, hydrology)
- assimilation of data into Arc Hydro GIS platform
- description of potential water quality impairments and water quality standards
- pollutant source assessment and estimate of existing pollutant loads
- water quality goals (water quality targets)
- allocation of capacity
- monitoring strategy

Stakeholder Involvement

WDEQ/WQD initial efforts to implement a watershed-based approach to WYPDES permitting will be the identification of stakeholders, by watershed. Stakeholder involvement is critical to the success of a watershed-based WYPDES permitting strategy. The process of stakeholder involvement will include:

- Identification of stakeholders (landowners, irrigators, industry, lease holders, environmental groups, governmental agencies [city, county, state, federal], and non-governmental organizations)
- Notification of the watershed-based permitting approach to stakeholders
- Identification of Stakeholder Representatives
- Invitation to stakeholders for involvement in the process
- Public meetings/Scoping meetings with professional facilitators to ensure productive meetings

WDEQ/WQD staff will take the lead on stakeholder identification and involvement and will be responsible for scheduling public meetings. The public meetings will be the forum to discuss goals, data needs, applicable water quality standards and impairments, watershed and water quality modeling efforts, and identify concerns and outstanding issues.

Watershed Characterization

WDEQ/WQD will contract with an outside source to assist with the task of characterizing the various watersheds in the PRB. Data needs to complete the watershed characterization include:

- Land use
- Ownership
- Lease Holders
- Irrigation Practices
- Topography
- Watershed hydrography
- Hydrology
- Channel capacity
- Climatic history
- Vegetation cover
- Existing WYPDES permitted point source discharges
- Existing WOGCC permitted wells (CBM, oil, conventional gas)
- Assessment of non-point source contributions to the watershed

Data compiled to complete the watershed characterization will be checked for accuracy and completeness by WYPDES staff. Data acquired from sources with existing quality assurance/quality control (QA/QC) programs (i.e. the USGS surface water monitoring program, WQD WYPDES Inspections) will be reviewed by the contractor and WQD staff and formatted for incorporation into a GIS platform. Data from secondary sources (i.e. self-reporting WYPDES IMRs and DMRs) will be reviewed by the contractor and WQD staff for discrepancies and obvious inconsistencies. Data collection and evaluation will follow WDEQ/WQD Standard Operating Procedures (SOPs) for the WYPDES Program.

WQD estimates the level of effort (LOE) to complete this task will vary depending on the spatial extent of the individual watersheds. Based on past experience (data needs for Pumpkin, Fourmile, and Willow Creeks), approximately 100 hours of contract time, per watershed, will be required to characterize the individual watersheds. In addition, approximately 50 hours of WQD staff time, per watershed, will be required to complete this task. WQD anticipates the LOE for characterizing watersheds will decline somewhat as experience is gained in identifying, gathering, and compiling data from the various federal, state, and county agencies.

Assimilation of Data into the Arc Hydro GIS platform

The assimilation of existing data into an Arc Hydro data platform will be conducted by WQD staff and through a contract with an outside source. The effort will be supervised and coordinated by the WQD project manager.

EPA developed a GIS based water quality management tool, BASINS, to integrate temporal and geospatial hydrology data and water-quality models. The Arc Hydro data model can extend the robustness of the BASINS model using ArcGIS technology. Arc Hydro can incorporate or process remotely sensed terrain data (LIDAR) with radar rainfall or storm precipitation data (NEXRAD) to produce a time sequence of flood inundation maps. By merging CBM outfall data with terrain and precipitation data using Arc Hydro, a cumulative assessment of water quality impacts from point-source discharges into an entire watershed can be conducted. Modifications to the precipitation or discharge data can lead to predictive capabilities of the Arc Hydro model to assess impacts from future additional point source discharges (i.e. CBM effluent discharges) or gradual reductions in point source discharges (decrease in flow per outfall as CBM wells play out).

Currently, WDEQ/WQD is evaluating two (2) models to assist with loading calculations on the Powder River. One, a regression model utilizing USGS surface water quality monitoring data on the Powder River (gaging stations in Wyoming, and at the Moorhead, MT station) has been developed and tested. The model has difficulties predicting correlations between flow and electrical conductivity (EC) at low flows (below 125 cfs). The regression model is constantly undergoing refinement as new monitoring data becomes available and an effort is underway to refine the sensitivity of the model at low flows.

WDEQ/WQD is also using a simple mix mass balance spreadsheet model. The spreadsheet model also uses surface water quality monitoring data from USGS gaging stations on the Powder River in Wyoming and at the gaging station at Moorhead, MT. The spreadsheet model is updated as new monitoring data becomes available. The mass loadings of sodium (Na) and SAR constituents in the Powder River have been compared from the two models. In some situations and for some seasons, the regression model appears to be more conservative while the spreadsheet model appears more conservative in other situations or seasons.

Description of Water Quality Impairments and Water Quality Standards

WQD staff will conduct a review of the Wyoming State 303(d) list and the WDEQ Water Quality Rules and Regulations, Chapter 1, Wyoming Surface Water Quality Standards to determine the impairment status of the watersheds in the PRB. The existing water quality standards and designation of uses will be incorporated into the Arc Hydro GIS platform.

Pollutant Source Assessment and Estimate of Existing Pollutant Loads

An assessment of the existing pollutant loads and the sources of the loads will be conducted for the watersheds in the PRB. An assessment of existing conditions will be closely tied to the characteristics of the watershed and the description of existing water quality impairments and water quality standards. WQD staff will supervise this effort, which will be contracted with an

outside source.

Water Quality Goals (Water Quality Targets)

An assessment of the water quality goals or targets required to protect existing or designated uses in the watersheds of the PRB will be conducted by WQD staff.

Allocation of Capacity

With stakeholder involvement, the allocation of assimilative capacity for water quality constituents will be performed for the watersheds in the PRB based on the aforementioned pollutant source assessment. WQD staff will make the final determinations for allocation of assimilative capacity. The nature of the CBM play in the PRB may allow for a re-allocation of assimilative capacity amongst or between tributaries to the Powder River. For example, a potential re-allocation of capacity, relative to CBM development, may allow for an overall reduction in CBM constituent loading to the Powder River through a trading, or re-allocation, program at the sub-watershed or tributary level (e.g. higher quality CBM effluent discharged at a higher rate into LX Bar Creek to compensate for lower quality CBM effluent discharged at a lower rate into Pumpkin Creek).

Monitoring Strategy

WQD, through the WYPDES watershed-based permit and monitoring requirements, and an ambient monitoring program, will develop a comprehensive monitoring strategy to ensure compliance with issued WYPDES permits and to determine the effectiveness of the watershed-based approach. WQD currently funds (contracting through the USGS) monthly collection and analysis of surface water samples at 44 locations throughout the PRB (Fig. 2). The locations are on the mainstem and major tributaries of the Powder River (28 stations), Tongue River (5 stations), Belle Fourche River (6 stations), and the Cheyenne River (5 stations). The USGS has established QA/QC protocols for surface water sample collection and analyses (see Reference Section). The WQD has EPA reviewed SOPs for Sample Collection and Analysis that govern the collection, transport, handling time, and analyses of water samples collected as part of the WYPDES Compliance program. WQD WYPDES Inspectors collect water samples from outfalls associated with WYPDES permits. Samples collected by WQD Inspectors are submitted to the WQD WYPDES Water Quality Lab. The WQD Lab follows EPA reviewed SOPs for QA/QC of samples submitted. Secondary data (WYPDES IMRs and DMRs) from WYPDES Permit requirements (monthly, quarterly, semi-annual, or annual reporting) are collected from WYPDES Permittees. The Permittees are required to collect and submit water samples to document compliance with WYPDES permit conditions. Permittees submit water samples to the Lab of their choice, provided the Lab can perform the required analyses following appropriate EPA protocols (40 CFR Part 136). WQD assesses the various analytical labs used by WYPDES Permittees through the EPA's Annual DMR QA Program and EPA Audits. The Annual DMR

QA Program designates permits, permittee, and/or the analytical Lab that Permittees use to analyze water quality samples for the WYPDES Program. An audit of the Lab includes the analysis of test samples that contain known concentrations of a given constituent. The sample results for the DMR QA Program are evaluated by the WQD and corrective actions implemented, if necessary. The DMR QA process assists the WQD in determining the accuracy and consistency of Labs that analyze water quality samples for compliance with the WYPDES program.

Refer to Table 1 for a list of parameters analyzed in the USGS monitoring Schedules 1757 and 1943. The existing monitoring strategy will assist WQD staff with making determinations of program progress and accomplishing program goals. The data is available on-line at the USGS website: http://wy.water.usgs.gov/

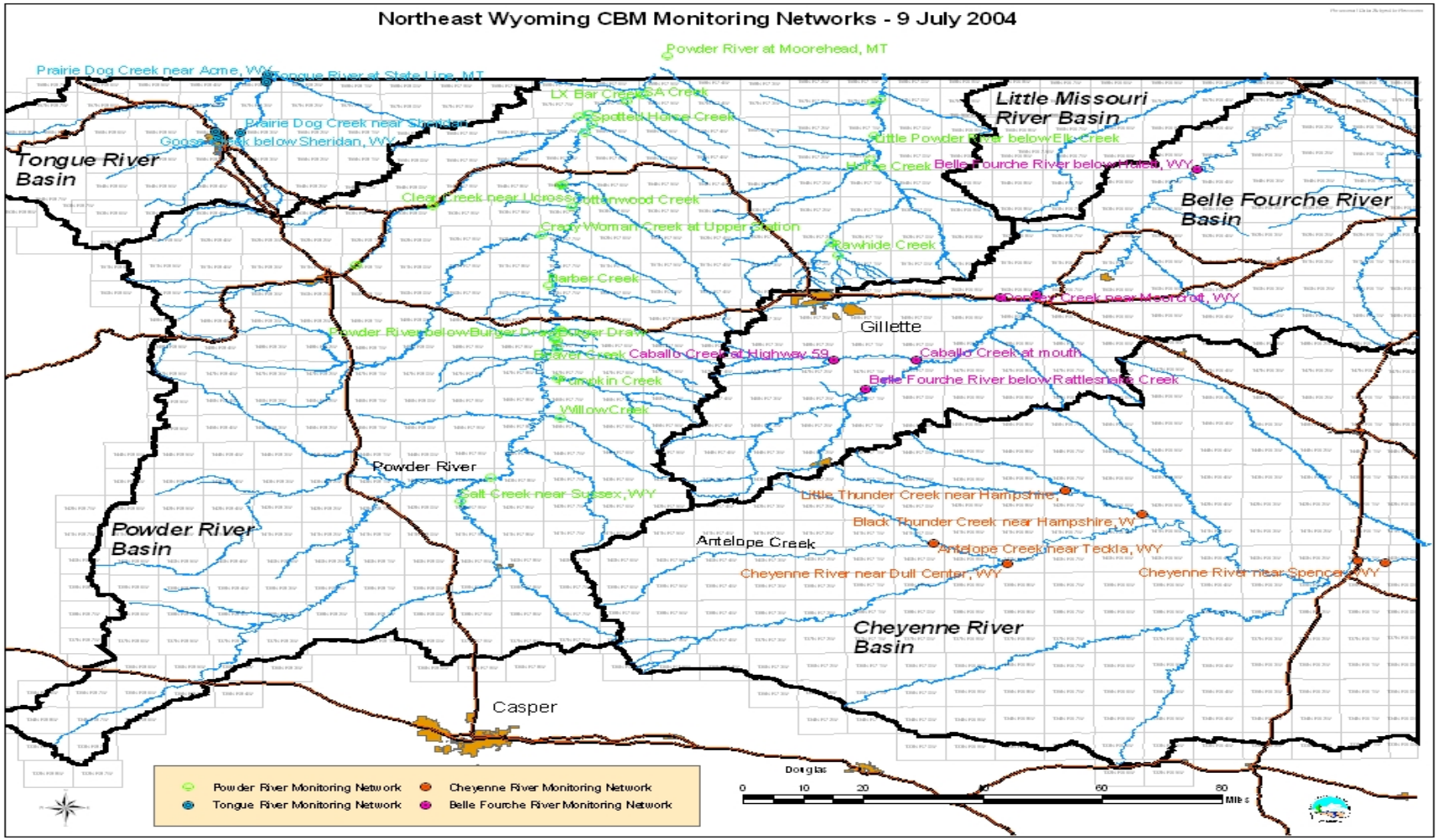

Figure 3. Surface Water Quality Monitoring Networks in NE Wyoming.

Table 1. List of parameters sampled by USGS for WDEQ CBM monitoring network. Mainstem and major tributary stations (i.e. Clear Creek) follow the Schedule 1757, while minor tributary stations (Cottonwood Creek) follow the Schedule 1943.

Parameter	USGS Schedule	
	1757	1943
Station number	X	X
Date	X	X
Sample start time	X	X
Discharge, instantaneous, cubic feet per second	X	X
Barometric pressure, millimeters of mercury	X	X
Dissolved oxygen, water, unfiltered, milligrams per liter	X	X
Dissolved oxygen, water, unfiltered, percent of saturation	X	X
pH, water, unfiltered, field, standard units	X	X
Specific conductance, water, unfiltered, microsiemens / cm at 25 degrees C	X	X
Temperature, air, degrees Celsius	X	X
Temperature, water, degrees Celsius	X	X
Hardness, water, unfiltered, milligrams per liter as calcium carbonate	X	X
Calcium, water, filtered, milligrams per liter	X	X
Magnesium, water, filtered, milligrams per liter	X	X
Potassium, water, filtered, milligrams per liter	X	
Sodium adsorption ratio, water, number	X	X
Sodium, water, filtered, milligrams per liter	X	X
Alkalinity, water, filtered, fixed endpoint (pH 4.5) titration, laboratory, mg/liter as CaCO3	X	
Chloride, water, filtered, milligrams per liter	X	
Fluoride, water, filtered, milligrams per liter	X	
Silica, water, filtered, milligrams per liter	X	
Sulfate, water, filtered, milligrams per liter	X	
Residue, water, filtered, sum of constituents, milligrams per liter	X	
Residue on evaporation, dried at 180 degrees Celsius, water, filtered, mg/per liter	X	X
Aluminum, water, unfiltered, recoverable, micrograms per liter	X	
Arsenic, water, filtered, micrograms per liter	X	
Barium, water, unfiltered, recoverable, micrograms per liter	X	
Beryllium, water, unfiltered, recoverable, micrograms per liter	X	
Iron, water, filtered, micrograms per liter	X	
Manganese, water, filtered, micrograms per liter	X	
Selenium, water, unfiltered, micrograms per liter	X	

IV. OUTPUTS/PROGRESS REPORTS/MILESTONES

The desired output is a transferable watershed-based permitting process (either a general WYPDES permit for individual watersheds, or a Water Management Plan for the respective watershed with individual WYPDES permits issued to the various dischargers). A secondary output is a transferable watershed-based permitting model with the flexibility to account for unique watershed characteristics in other areas of Wyoming, such as the Cheyenne or Green River Basins. Additionally, the watershed-based permitting model would be transferable to other states in the Region (e.g. Montana and South Dakota).

Progress reports will be provided by the Wyoming DEQ to the U.S. EPA Region 8 office in Denver on a quarterly schedule. The progress reports will summarize the status of ongoing or completed tasks for the reporting period (Quarter) related to project components funded through this grant. A final report will be submitted to U.S. EPA upon completion of the project.

Milestones for this project, after Notification from EPA of Grant Reward and approval for grant disbursement, will follow a Phased or incremental schedule. Due to the scope, both spatial and temporal, of developing watershed-based permitting for as many as 25-30 watersheds in the PRB, WDEQ will initiated the watershed-based process in the Pumpkin, Fourmile, and Willow Creek watersheds. Lessons-learned from the initial watersheds will assist with refining the schedule and LOE estimates for subsequent watersheds. As the watershed-based process for the initial watersheds nears completion, the watershed-based process will kick-off for the next series (or set) of watersheds (i.e. as the process nears completion in Pumpkin, Fourmile, and Willow, the process will commence in the next set of watersheds, Clear and Fence Creeks, for example). Consequently, the following schedule and LOE is for a “typical set of watersheds,” and should be multiplied by 15 to get an estimate for the total costs for the watersheds planned for involvement in the watershed-based permitting process in the PRB of Wyoming. The nine (9) month schedule, for an individual watershed, will overlap with watersheds nearing completion and with watersheds initiating the process. WDEQ envisions no more than three (3) sets of watershed-based processes occurring simultaneously (one set in the early stages of development, one set mid-way through the process, and one set nearing completion).

Month 1 and 2 - WDEQ/WQD will release Requests for Proposals (RFPs) for contractual assistance. Contractors will be hired to assist with: 1) identifying and gathering existing data (landowners, mineral leaseholders, surface leaseholders, CBM operators, irrigators, etc.) for the individual watersheds; 2) conducting field surveys to characterize channel geomorphology and identify areas of concern (irrigation diversions, spreader dikes, points of constriction, culverts and other crossing, etc.) in the individual watersheds; 3) serve as Facilitator (facilitate Committee Meetings, compile meeting notes, prepare announcements, etc.) for each series of watersheds; 4) compiling data into Arc Hydro platform. WDEQ/WQD staff will commence identifying and describing water quality conditions, standards, and water quality goals.

Task 1 – Existing Data Gathering: WDEQ will release RFP. WDEQ LOE = 40 hours (develop, review, and finalize RFP)

Task 2 – Channel Capacity Estimates: WDEQ will release RFP. WDEQ LOE = 40 hours (develop, review, and finalize RFP)

Task 3 – Facilitator: WDEQ will release RFP. WDEQ LOE = 40 hours (develop, review, and finalize RFP)

Task 4 – WDEQ staff will describe water quality objectives (existing water quality standards, existing permit limits). WDEQ LOE = 120 hours (40 hours per watershed, assume 3 watersheds).

Task 5 – WDEQ will publish notices for upcoming Watershed-based permitting meetings. WDEQ LOE = 6 hours (2 hours per watershed, assume 3 watersheds).

Task 6 – Arc Hydro Platform: WDEQ will release RFP. WDEQ LOE = 40 hours (develop, review, and finalize RFP)

Task 7 – WDEQ will begin identifying stakeholders. WDEQ LOE = 120 hours (40 hours per watershed, assume 3 watersheds).

Month 3 – WDEQ/WQD staff will identify, notify, and conduct public meetings (3) for stakeholders, and continue work from Months 1 & 2. In addition, bid reviews will be conducted, interviews held, and contracts awarded. WDEQ/WQD staff complete assessment of water quality conditions and standards, and set water quality goals.

Task 1 – Existing Data Gathering: WDEQ will award contract and conduct kick-off meeting. WDEQ LOE = 8 hours, Contractor LOE = 8 hours.

Task 2 – Channel Capacity Estimates: WDEQ will award contract and conduct kick-off meeting. WDEQ contacts landowners to attempt to gain access for contractor. WDEQ and Contractor conduct three (3) day site visit. WDEQ LOE = 68 hours (8 hours for kick-off meeting and 60 hours for access issues and site visit), Contractor LOE = 122 hours (8 hours for kick-off meeting and 114 hrs for site visits[38 hours per watershed]).

Task 3 – Facilitator: WDEQ will award contract. Contractor will begin assembling material for committee meetings. WDEQ LOE = 40 hours, Contractor LOE = 120 hours (40 hours per watershed).

Task 4 – WDEQ staff will complete task (set water quality goals). WDEQ LOE = 60

hours (20 hours per watershed).

Task 5 – WDEQ and Facilitator will assemble Stakeholder Committee and conduct public meetings (3) for the Watershed-based permitting process. WDEQ explains process and seeks input from Stakeholder Committee on concerns and constraints of CBM development in the watershed. Also seeking input from Committee on existing data (fill in landowner data gaps, fill in data gaps on existing reservoirs and impoundments, etc.). WDEQ LOE = 200 hours (40 hours per person, 5 WDEQ staff, 3 watersheds), Contractor LOE = 120 hours (60 hours per person, 2 contractors, 3 watersheds, preparation and meeting time).

Task 6 – Arc Hydro Platform: WDEQ will award contract and conduct kick-off meeting. WDEQ LOE = 16 hours, Contractor LOE = 16 hours.

Month 4 and 5 – WDEQ/WQD staff manage contractors for Tasks 1, 2, 3, and 6. Contractors submit QA/QC protocols for completing tasks. WDEQ and Facilitator conduct Stakeholder Meeting to gather input on process, data needs, existing data, and concerns. WDEQ/WQD assumes DEQ Director will attend the initial watershed Stakeholder Committee Meeting, but not the remaining Stakeholder Meetings for this set of watersheds.

Task 1 – Existing Data Gathering: WDEQ staff manage contractor. Contractor gathers existing data. WDEQ LOE = 40 hours, Contractor LOE = 240 hours (80 hours per watershed).

Task 2 – Channel Capacity Estimates: WDEQ staff manage contractor and conduct field QA/QC. Contractor conducts channel surveys (Rosgen Level II & III). WDEQ LOE = 80 hours, Contractor LOE = 480 hours (160 hours per watershed).

Task 3 – Facilitator: WDEQ and Facilitator will assemble Stakeholder Committee and conduct public meetings (3) for the Watershed-based permitting process. WDEQ LOE = 160 hours (40 hours per person, 4 WDEQ staff, 3 watersheds), Contractor LOE = 120 hours (60 hours per person, 2 contractors, 3 watersheds, preparation and meeting time).

Task 4 – Arc Hydro Platform: WDEQ staff manage contractor. Contractor begins design of data layer templates and merging a geochemical model (Visual MINTEQ) with Arc Hydro. WDEQ LOE = 40 hours, Contractor LOE = 240 hours (80 hours per watershed).

(Note: WDEQ/WQD will kick-off next set of watersheds, essentially starting Months 1 and 2 for the next set of watersheds while progressing on the initial set of watersheds).

Month 6 and 7 - WDEQ/WQD staff and contractual staff assimilate input data into Arc Hydro and conduct modeling scenarios. Conduct another Stakeholder Committee meeting to update members and public. Conduct assessment of water quality impairments. WDEQ/WQD begins drafting either watershed permit or water management plan.

Task 1 – Facilitator: WDEQ and Facilitator will assemble Stakeholder Committee and conduct public meetings (3) for the Watershed-based permitting process. WDEQ LOE = 160 hours (40 hours per person, 4 WDEQ staff, 3 watersheds), Contractor LOE = 120 hours (60 hours per person, 2 contractors, 3 watersheds, preparation and meeting time).

Task 2 – Arc Hydro Platform: WDEQ staff manage contractor. Contractor assimilates data into Arc Hydro. Contractor, with WDEQ staff, conducts modeling scenarios and refines the model. WDEQ LOE = 80 hours, Contractor LOE = 360 hours (120 hours per watershed).

Task 3 – WDEQ drafts either watershed permit or a water management plan and submits draft to Committee for review and comments. WDEQ LOE = 120 hours (40 hours per watershed).

Month 8 and 9 - WDEQ/WQD assess pollutant sources and loads based on compilation of existing data and water quality conditions. Results from the model will be used to assess allocation of assimilative capacity among the PRB watersheds. WDEQ/WQD staff will assess assimilative capacity with reference to water quality goals. WDEQ/WQD will finalize either a watershed general permit or a watershed water management plan.

Task 1 – Facilitator: WDEQ and Facilitator will assemble Stakeholder Committee and conduct public meetings (3) for the Watershed-based permitting process. WDEQ LOE = 160 hours (40 hours per person, 4 WDEQ staff, 3 watersheds), Contractor LOE = 120 hours (60 hours per person, 2 contractors, 3 watersheds, preparation and meeting time).

Task 2 – Arc Hydro Platform: WDEQ staff manage contractor. Contractor, with WDEQ staff, complete modeling scenarios. WDEQ LOE = 40 hours, Contractor LOE = 84 hours (28 hours per watershed).

Task 3 – WDEQ finalizes either a general watershed permit or a watershed water management plan and submits in Public Notice for comments. WDEQ LOE = 72 hours (24 hours per watershed).

Month 10 – WDEQ/WQD issues a general permit or a watershed water management plan for the

initial set of watersheds, and kicks-off the third set of watersheds. In short, WDEQ will essentially start Months 1 and 2 for the third set of watersheds while finishing the first set of watersheds, and progressing (Months 3 and 4) on the second set of watersheds.

The nine (9) month schedule is for a given set of watersheds (typically three watersheds per set). WDEQ/WQD anticipates improvement in the watershed-based permitting process as sets of watersheds are completed. Several tasks, such as existing data gathering, water quality objectives (different classes of streams in the various watersheds), channel surveys, and facilitation, may need the same LOE, relatively, for each set of watersheds. For the Arc Hydro tasks, WDEQ/WQD anticipates, once the data platform is developed and the geochemical model linked to Arc Hydro, a significant reduction in LOE will occur with each successive set of watersheds.

For subsequent sets of watersheds, the schedule for two (2) tasks, data gathering and channel surveys, will move up by a month. Specifically, for this proposal, in Month 4, a Contractor gathers existing data, and another Contractor conducts channel surveys, while in subsequent sets of watersheds the tasks will be completed in Month 3.

While not specifically listed as a line-item in the above schedule, WDEQ/WQD will prepare and submit Quarterly Reports to EPA Region 8 (Denver). The Final Task, end of Year Three of the Project, will be preparation of a Final Report for submission to EPA Region 8 (Denver).

BUDGET:

WDEQ/WQD is requesting funding from U.S. EPA through the State Innovation Grant Program, of $198,000, to implement a watershed-based NPDES permitting approach for the Powder River Basin in Wyoming. The majority of the requested funding will be used to contract outside sources to conduct watershed characterization, computer modeling and programming tasks. WDEQ/WQD estimates costs for tasks such as compiling data and characterizing watersheds at $100.00 per hour for the outside sources ($100.00 per hour * 850 hours = $85,000). In addition, WDEQ/WQD estimates costs for tasks such as computer programming and computer modeling at $150.00 per hour ($150.00 per hour * 700 hours = $105,000). WDEQ/WQD estimates internal costs for staff committed to this project of $70,000 ($40.00 per hour * 1750 hours = $70,000). WDEQ/WQD is evaluating avenues for additional funding to assist with the costs of Tasks associated with Facilitation (600 hours).

BUDGET SUMMARY

State: Wyoming
Agency: Department of Environmental Quality
Project Title: Watershed-based NPDES Permitting for the Powder River Basin, Wyoming

	Total Project Costs	Proposed State Leverage Funds	EPA Funding Requested
Staff Salaries and Benefits (Including Indirect)	$ 70,000.00	$ 70,000.00	
Travel	$ 8,000.00		$ 8,000.00
Supplies	$ 2,500.00	$ 2,500.00	
Contracts	$ 190,000.00		$ 190,000.00
Total:	$ 270,500.00	$ 72,500.00	$ 198,000.00

References Cited

Book 9. Section A. National Field Manual for the Collection of Water-Quality Data

9-A1. *National Field Manual for the Collection of Water-Quality Data: Preparations for Water Sampling,* by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS-TWRI Book 9, chap. AI. 1998. 47p.

9-A2. *National Field Manual for the Collection of Water-Quality Data: Selection of Equipment for Water Sampling,* edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS-TWRI Book 9, chap. A2. 1998. 97p.

9-A3. *National Field Manual for the Collection of Water-Quality Data: Cleaning of Equipment Water Sampling,* edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R.T. Iwatsubo: USGS-TWRI Book 9, chap. A3. 1998. 75p.

9-A4. *National Field Manual for the Collection of Water-Quality Data: Collection of Water Samples,* edited by F .D. Wilde, D.B. Radtke, Jacob Gibs, and R. T. Iwatsubo: USGS-TWRI Book 9, chap. A4. 1999. 156p.

9-A5. *National Field Manual for the Collection of Water-Quality Data: Processing of Water Samples,* edited by F.D. Wilde, D.B. Radtke, Jacob Gibs, and R. T . Iwatsubo: USGS-TWRI Book 9, chap. A5. 1999. 149p.

9-A6. *National Field Manual /or the Collection 0/ Water-Quality Data: Field Measurements,* edited by F .D. Wilde and D.B. Radtke: USGS- TWRI Book 9, chap. A6. 1998. Variously paginated.

9-A9. *National Field Manual for the collection of Water-Quality Data: Safety in Field Activities,* by S. L. Lane and R.O. Fay: USGS- TWRI Book 9, chap. A9. 1998. 60p.

Anticipated WDEQ Staff for the Watershed-based WYPDES Permitting Project:

Director

WQD Administrator

NPDES Program Manager

Program Supervisor

WQD/WYPDES Water Quality Lab

Project IT - Computer Programmer

Project Manager

Program Principal

Environmental Senior Analyst

Environmental Analyst

Environmental Specialists

WATERSHED-BASED NPDES PERMITTING FOR THE POWDER RIVER BASIN IN WYOMING
STATE INNOVATION GRANTS – LOGIC MODEL

Inputs:
•WDEQ Staff
•Contracted Outside Sources
•Stakeholder Issues and Concerns

Activities:
•Identify and Engage Stakeholders
•Baseline Watershed Characterization
•Compile and Review Existing WQ Data
•Identify and Compare WQ Models for Potential Use in Watershed-based Permitting
•Use Arc Hydro GIS Platform for Fine Scale Spatial Analyses
•Allocate Available Assimilative Capacity
•Develop General WYPDES Permit for Watersheds
•Identify Strategies to Streamline Permitting Process
•Existing WQ Monitoring Networks
•WYPDES Inspection Data

Wyoming & Stakeholders:
•Estimate Future CBM Development
•Develop Innovative Technical and Permitting Approaches
•Enhance WYPDES Database to Quantify Permit Contributions (Loads) by Watershed

Outputs:
•Surface Water Monitoring Results
•WYPDES Inspection Results
•WYPDES DMR Results
•Transferable Arc Hydro Watershed Model
•Allocation of Load in each Watershed and/or Sub-watershed

Customers Reached:
•Point Source Dischargers
•Non Point Source Dischargers
•Other Stakeholder Groups

Short-term Outcomes:
•Engage Stakeholders in Collaborative Process
•Establish Surface WQ Monitoring Networks in NE Wyoming
•More Accurate Characterization of Watersheds with Potential Future CBM Development
•Development of General Watershed Permit
•Consolidate, where feasible, Point Sources (Outfalls)

Intermediate Outcomes:
•Improved Quality of WYPDES Permit Applications
•Fewer WYPDES Applications per Watershed
•Improve Compliance Rates
•Implement Consolidated WQ Monitoring Strategy to Achieve Goals

Environmental and/or Economic Outcomes:
•Prevent Watersheds from becoming Impaired and Listed
•Meet Designated Uses in All PRB Watersheds
•Decrease handling time by WQD of WYPDES Permit Applications
•Design More Effective WYPDES Permits Based on Holistic Watershed Approach
•Appropriate Allocation of Load
•Measured Improvement in Cost Effectiveness of Permitting on a Watershed Basis, including Decrease in Time to Permit
•Protect and Maintain WQ Standards of Wyoming and Neighboring States

WATERSHED-BASED NPDES PERMITTING FOR THE POWDER RIVER BASIN IN WYOMING
STATE INNOVATION GRANTS – PERFORMANCE MEASURES

Inputs:
•WDEQ Staff
•Contracted Outside Sources
•Stakeholder Issues and Concerns

Activities:
•Identify and Engage Stakeholders
•Baseline Watershed Characterization
•Compile and Review Existing WQ Data
•Identify and Compare WQ Models for Potential Use in Watershed-based Permitting
•Use Arc Hydro GIS Platform for Fine Scale Spatial Analyses
•Allocate Available Assimilative Capacity
•Develop General WYPDES Permit for Watersheds
•Identify Strategies to Streamline Permitting Process
•Existing WQ Monitoring Networks
•WYPDES Inspection Data

Wyoming & Stakeholders:
•Estimate Future Development
•Develop Innovative Technical and Permitting Approaches
•Enhance WYPDES Database to Quantify Permit Contributions (Loads) by Watershed

Outputs:
•Surface Water Monitoring Results
•WYPDES Inspection Results
•WYPDES DMR Results
•Transferable Arc Hydro Watershed Model
•Allocation of Load in Each Watershed and/or Sub-watershed

Customers Reached:
•Point Source Dischargers
•Non Point Source Dischargers
•Other Stakeholder Groups

Short-term Outcomes:
•Engage Stakeholders in Collaborative Process
•Establish Surface WQ Monitoring Networks in NE Wyoming
•More Accurate Characterization of Watersheds with Potential Future CBM Development
•Development of General Watershed Permit
•Consolidate, where feasible, Point Sources (Outfalls)

Intermediate Outcomes:
•Improved Quality of NPDES Permit Applications
•Fewer WYPDES Applications per Watershed
•Increase Compliance Rates
•Implement Consolidated WQ Monitoring Strategy to Achieve Goals

Environmental and/or Economic Outcomes:
•Prevent Watersheds from becoming Impaired and Listed
•Meet Designated Uses in All PRB Watersheds
•Decrease handling time by WQD of WYPDES Permit Applications
•Design More Effective WYPDES Permits Based on Holistic Watershed Approach
•Appropriate Allocation of Load
•Protect and Maintain WQ Standards of Wyoming and Neighboring States

EPA NPDES Permitting for Environmental Results Strategy - Goals and Approaches:
Permit Prioritization:
•Identify CBM Permits With High Environmental Significance
Permit Streamlining:
•General Watershed Permit
•Synchronized Permitting by Watershed
•Develop eDMR
Program Integrity:
•Design, Fund, & Implement WQ Monitoring Networks
•Program Self-Assessments
•Public & Stakeholder Involvement During Watershed-based Permit Development